




WWF is working in partnership with Trygg Mat Tracking to tackle unsustainable fishing practices.

A large, conical fishing net, teeming with fish, is suspended by ropes and hoisted by a yellow crane on the deck of a ship. The net is the central focus, with the ship's structure and the sky visible in the background.

UNREGULATED FISHING ON THE HIGH SEAS OF THE INDIAN OCEAN

THE IMPACTS ON, RISKS TO, AND CHALLENGES FOR
SUSTAINABLE FISHING AND OCEAN HEALTH

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WWF's mission is to stop the degradation of the planet's natural environment and to build a future in which humans live in harmony with nature, by conserving the world's biological diversity, ensuring that the use of renewable natural resources is sustainable and promoting the reduction of pollution and wasteful consumption.

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ACRONYMS

ABNJ	Areas Beyond National Jurisdiction
AIS	Automatic identification system
AoC	Area of Competence
BBNJ	Biodiversity in Areas Beyond National Jurisdiction
CCAMLR	Commission for the Conservation of Antarctic Marine Living Resources
CCSBT	Commission for the Conservation of Southern Bluefin Tuna
CDS	Catch Documentation Scheme
CMM	Conservation and Management Measure
DWF	Distant water fleet
EEZ	Exclusive economic zone
ERS	Ecologically related species
FAO	Food and Agriculture Organization of the United Nations
GFCM	General Fisheries Commission for the Mediterranean
GFW	Global Fishing Watch
IATTC	Inter-American Tropical Tuna Commission
ICCAT	International Commission for the Conservation of Atlantic Tunas
IOTC	Indian Ocean Tuna Commission
IPOA-IUU	International Plan of Action to Prevent, Deter, and Eliminate IUU Fishing
IUU	Illegal, unreported and unregulated
MCS	Monitoring, control and surveillance
NPFC	North Pacific Fisheries Commission
NWIO	Northwest Indian Ocean
PA	Protected area
RAV	Record of authorised vessels
RFB	Regional Fisheries Bodies
RFMO	Regional Fisheries Management Organisation
SBT	Southern bluefin tuna
SEAFO	South East Atlantic Fisheries Organisation
SIO	Southern Indian Ocean
SIOFA	Southern Indian Ocean Fisheries Agreement
SPRFMO	South Pacific Regional Fisheries Management Organisation
SWIOFC	Southwest Indian Ocean Fisheries Commission
TAC	Total allowable catch
TMT	Trygg Mat Tracking
UNCLCS	United Nations Commission on the Limits of the Continental Shelf
UNCLOS	United Nations Convention on the Law of the Sea
UNFSA	United Nations Fish Stock Agreement
VME	Vulnerable marine ecosystem
VMS	Vessel monitoring system
WCPFC	Western and Central Pacific Fisheries Commission
WWF	World Wild Fund for Nature

EXECUTIVE SUMMARY



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Indian Ocean fisheries are some of the most important, accounting for 14.55%¹ of the global marine capture harvest. Trends show that catches have been increasing steadily since the 1980s, with small pelagics, large pelagics (tuna and billfish) and shrimp driving the bulk of this growth.² However, the United Nations Food and Agriculture Organization's (FAO) most recent assessment indicates that 30% of the Indian Ocean's assessed stocks are not fished within biologically sustainable levels.³

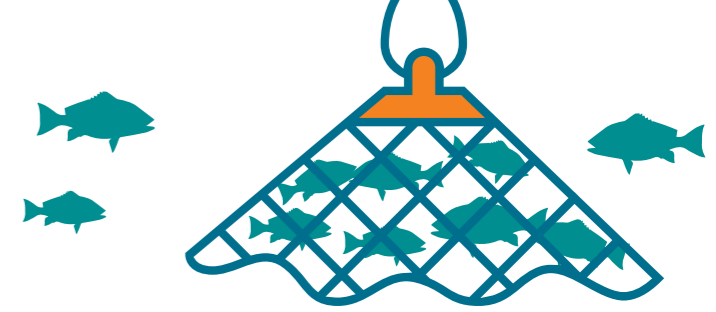
Illegal, unreported and unregulated (IUU) fishing has dire consequences on the economies of States and on the marine ecosystems of this region, undermining regulated and sustainable fisheries management efforts. As demand for fish products continues to increase worldwide,⁴ seafood importing nations face significant challenges to ensure IUU products are not entering their markets. In addition, these illicit activities put key stakeholders along the seafood value chain at risk, including vulnerable coastal communities in less developed countries that principally rely on the ocean for their livelihoods, as well as large- and small-scale fishers that abide by the rules but lose out to endemic and rampant fraud.

Further, warming ocean temperatures are modifying suitable habitats for marine species across the globe, changing their ranges and their productivity, causing them to move further across jurisdictional boundaries, and compounding risks for population collapses if not appropriately and urgently mitigated.⁵ The impacts of the climate crisis exacerbate an already dire problem: unsustainable fishing. These activities augment pressures on fish stocks and incentivise IUU fishing. A 2015 study of selected species representing about half of the total Indian Ocean catch asserted that 16% to 34% of catches were either illegal or unreported.⁶

While international attention focuses heavily on illegal and unreported fishing in the Indian Ocean, the unregulated aspect of IUU fishing is often overlooked. This requires further scrutiny as its impacts to both marine ecosystems and economies is under-estimated. This report presents the first study to use automatic identification system (AIS) data to examine the risks of unregulated fishing to ocean health. It also addresses the challenges faced by decision makers and regional management bodies to tackle unregulated fishing on the high seas of the Indian Ocean within the context of a failure to date to sustainably manage this global commons.

This study has revealed two salient features that contribute to unregulated fishing on the high seas of the Indian Ocean within the current institutional landscape of fisheries management: **the gaps in spatial areas of competence and the gaps between the groups of species covered by regional fisheries management organisations (RFMOs).**

Spatial regulatory coverage for species covered by tuna-specific RFMOs is comprehensive across the Indian Ocean. However, for non-tuna RFMOs, there are significant gaps



30% OF THE INDIAN OCEAN'S ASSESSED STOCKS ARE FISHED OUTSIDE OF BIOLOGICALLY SUSTAINABLE LEVELS

in spatial coverage. There is clear evidence of fishing taking place in the unregulated areas that result, including the targeting of new species and development of new fisheries. In some areas of the high seas, there are no international arrangements other than those for tuna fisheries covered by the Indian Ocean Tuna Commission (IOTC). Therefore, other than for tuna and tuna-like species, other fisheries remain at risk of unregulated fishing if flag States fail to adopt national conservation and management measures. In the context of the squid fishery alone (see Case Study 1), the expansion of vessels to unregulated fisheries expanded by 830% in 5 years — from 30 vessels in 2015 to 279 at the end of 2019. Unregulated fishing is not reported and not bound by any regional monitoring and surveillance system, making it difficult for coastal State authorities to identify vessels operating in or near their waters. The consequences of being unable to sustainably manage fisheries and catch methods can have dire consequences for wider marine ecosystems.

In addition to the issue of unregulated fishing taking place on the high seas and in areas outside of RFMO coverage in the Indian Ocean, the issue of wide gaps in species management with RFMO mandates puts the viability of global marine food webs at risk. For all RFMOs, the weaknesses and gaps in species coverage leave a large number of species without any conservation and management measures (CMMs) and outside of the management scope of regional bodies. These include species with current commercial value, as well as those which could become commercially important in the future as ocean temperatures increase and species distribution patterns shift. This results in a lack of regulation on destructive activities such as bycatch and, in some cases, blind spots on impacts to endangered species. Further,

1. FAO (2020), *State of World Fisheries and Aquacultures*, Rome.

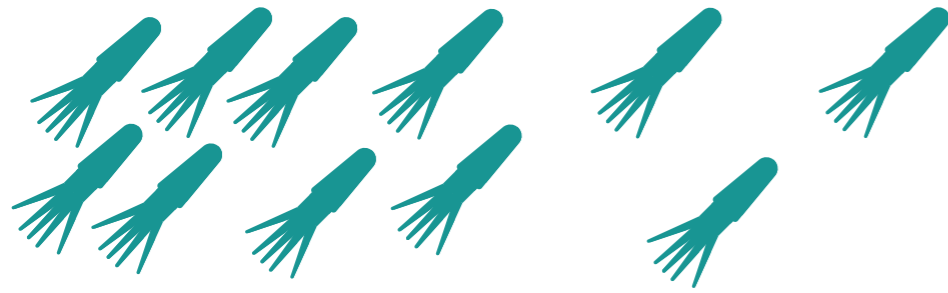
2. Ibid.

3. Ibid.

4. Ibid.

5. The Intergovernmental Panel on Climate Change (IPCC) (2019), *Special Report on the Ocean and Cryosphere in a Changing Climate*.

6. USA Office of the Director of National Intelligence (2012), *The Fisheries-Food Security Nexus in the Indian Ocean and South China Sea: Impacts on Selected States and US Security Interests Out to 2020 and 2040*, Retrieved September 2, 2015.



UNREGULATED SQUID FISHERIES EXPANDED BY 830% IN 5 YEARS

some contracting Parties of RFMOs have failed to transpose international fisheries laws into national policies, which leaves flag States without enforcement rules to regulate their fisheries. This situation is not only contrary to what has been cooperatively agreed by the contracting Parties, but provides a legal void in which unsustainable fishing practices continue without regulation.

Within the contexts of expanding global demand for fish resources and increasingly globalised markets,⁷ this study unveils unregulated fisheries expanding at a rapid pace in the high seas of the Indian Ocean, as regulations for transitioning toward documented and thus sustainably managed fisheries take too long to be adopted and enforced. The result is a high risk that seafood caught in the absence of sustainable fisheries management or conservation measures is being sold in key global market States, including the European Union.

Fisheries that transition to regulated and sustainable practices can restore the health of the ocean, making its ecosystems more resilient and its fish stocks more productive. This is critical for the Indian Ocean region as it can allow an increase in wild-caught seafood, provided that fisheries are sustainably managed.⁸

UN SUSTAINABLE DEVELOPMENT GOAL 14.4:

By 2020, effectively regulate harvesting and end overfishing, illegal, unreported and unregulated (IUU) fishing, and destructive fishing practices; implement science-based management plans to, in the shortest time feasible, restore fish stocks to levels that can, at minimum, produce maximum sustainable yield as determined by their biological characteristics.

In response to the global increase in demand for seafood from an ocean facing unprecedented changes from damaging human activities, including climate change, concerted action from all stakeholders is needed:

- Adopt joint conservation and management measures across RFMOs to address unregulated fishing activities; this must include coverage for species that are not targeted by fisheries to minimise instances of bycatch, giving wider ocean ecosystems and their interconnected nature due consideration.
- Adopt a precautionary and ecosystem-based management approach to fisheries management when there is insufficient data on a targeted species and the health of its wider ecosystem.
- Collect data of fisheries activities through electronic monitoring and/or observer coverage to conduct scientifically-robust stock assessments and surveillance on activities that impact unregulated species.
- Ensure that adequate biological indicators and environmental impact assessments of all fisheries are undertaken prior to the development of any significant fisheries activities.
- Expand the area of competence of RFMOs; alternatively, empower RFMOs to manage unregulated species.
- Improve seafood traceability to ensure important market States such as the EU, Japan, the USA and China are not driving unregulated fisheries.

7. Ibid.

8. Costello, C., Cao, L., Gelcich, S. et al. (2020), The future of food from the sea, *Nature*.

UNREGULATED: A MEANS TO OVERFISHING IN THE INDIAN OCEAN?



© Gilles Hosch

It is estimated that 34.2% of the world's fisheries are overfished, while 59.6% are fished at their maximum capacity.⁹ IUU fishing is a leading cause of overfishing in our ocean and impacts multiple stakeholders, including those fishers that abide by the rules.¹⁰ This undermines the replenishment of marine fish populations and thus support to resilient ecosystems, as thriving marine biodiversity is key to mitigating the impacts of climate change. Thus, IUU fishing is one of the greatest threats to fisheries sustainability worldwide.

Over two billion people live along the coasts of the Indian Ocean and are experiencing rapid economic and population growth. The Indian Ocean is home to rich fisheries, accounting for 14.55%¹¹ of the global marine capture harvest, providing an important source of food and livelihood security for millions of people in coastal communities across the region. If overfishing and IUU fishing are not addressed, the resulting loss of fish biomass will translate into a shortage of fatty acids and essential micronutrients for millions of people in the region, with a disproportionate risk of malnutrition in low- and middle-income countries.¹² As demand for commercially important species such as tuna and tuna-like species (including swordfish) has skyrocketed, so has the fishing effort to capture them. This increasing competition for fish stocks threatens the economic stability of some coastal communities, as risks of conflict over diminishing resources arise.¹³

A 2015 study of selected species representing about half of the total Indian Ocean catch asserted that 16% to 34% of that catch was either illegal or unreported.¹⁴ Yet, while international attention has focused on illegal and unreported fishing in the Indian Ocean, the unregulated aspect of IUU fishing is too often overlooked. The FAO defines unregulated fishing as fishing that takes place “*in the area of application of a relevant regional fisheries management organization that are conducted by vessels without nationality, or by those flying the flag of a State not party to that organization, or by a fishing entity, in a manner that is not consistent with or contravenes the conservation and management measures of that organization; or in areas or for fish stocks in relation to which there are no applicable conservation or management measures and where such fishing activities are conducted in a manner inconsistent with State responsibilities for the conservation of living marine resources under international law*”.¹⁵ It is within this framework that this study focuses on the high seas of the Indian Ocean.

High seas are defined as the ocean areas that lie beyond national jurisdictions, such as exclusive economic zones (EEZs). Globally, the high seas cover almost half of the planet's surface, posing particular management challenges for the international community to sustainably exploit and conserve their marine resources. The Biodiversity Beyond National Jurisdictions (BBNJ) negotiations present a critical moment to address some of those challenges, as the future Agreement could be used to strengthen impact assessments for fishing activities taking place on the high seas, as well as existing monitoring, control and surveillance (MCS)

frameworks to protect our ocean's interconnected marine ecosystems. In particular, the Agreement would serve to address cases where flag States, primarily responsible for the management and conservation of living resources on the high seas exploited by vessels flying their flag, fail to adequately control such vessel activities and their impact on marine ecosystems. Some flag States fail to propose multilateral management measures for new and developing fisheries on the high seas, or to enact unilateral management measures that apply to their fleets in such fisheries.

The high seas of the Indian Ocean are not fully covered by regional regulatory frameworks for any species other than tuna and tuna-like species. For species coverage where regulatory frameworks are in place, the current de facto situation leaves several commercially and ecologically important species and species groups unregulated. This is because RFMO mandates are insufficiently clear, absent (or specifically excluded) from RFMO mandates or due to current RFMO CMMs not yet covering them. This undermines the efforts being made towards ecosystem-based fisheries management, threatens the marine food web and, as a consequence, puts commercially managed and high-value species at risk.

When set against the background of the unprecedented challenges the global community has faced in 2020 due to the COVID-19 pandemic, coupled with the ongoing threats of climate change which have already caused species migration patterns to shift beyond their historical geographical limits¹⁶, the urgent need for decisive action from policy makers and effective regulation from RFMOs to prevent unregulated fishing is clear. New fisheries are emerging and expanding at a rapid pace in the Indian Ocean, without measures to sustainably manage and effectively protect the implicated resources. This puts all fish stocks and wider ocean ecosystems at risk. It is important to acknowledge the key roles that fisheries play in ensuring food security and economic recovery. Thriving marine biodiversity is key to ensuring food security, building sustainable economies and mitigating climate change impacts. Ensuring that our high seas are adequately regulated, managed and protected must be a priority.

9. FAO (2020), *State of World Fisheries and Aquacultures*, Rome.

10. Ibid.

11. Ibid.

12. Vianna, G.M.S., Zeller, D. & Pauly, D (2020), Fisheries and Policy Implications for Human Nutrition, *Curr Envir Health Rpt.*

13. WWF(2020), *Seafood sustainability, stability and security; Newssecuritybeat (2020), Fisheries Management: A Possible Venue for Navigating Fisheries Conflicts in the Indian Ocean*

14. USA Office of the Director of National Intelligence (2012), *The Fisheries-Food Security Nexus in the Indian Ocean and South China Sea: Impacts on Selected States and US Security Interests Out to 2020 and 2040*, Retrieved September 2, 2015.

15. FAO (2001), *International Plan of Action to prevent, deter and eliminate illegal, unreported and unregulated fishing*, Rome.

16. Monnier, L., Gascuel, D., Alava, J.J., Barragán, M.J., Gaibor, N., Hollander, F.A., Kanstinger, P., Niedermueller, S., Ramirez, J., & Cheung, W.W.L. 2020. *Small-scale fisheries in a warming ocean: exploring adaptation to climate change*. Scientific report. WWF Germany.

METHODOLOGY TO IDENTIFY AND ASSESS UNREGULATED FISHING IN THE INDIAN OCEAN

The analysis presented in this report was conducted using open source data on the fishing fleets and fishing vessel movements in the Indian Ocean and covered three main themes:

1. A review of legal frameworks and RFMO mandates to identify geographical and species coverage and gaps, including comparison of management measures between the different bodies;
2. Fishing vessel movements were analysed by Global Fishing Watch (GFW) and Trygg Mat Tracking (TMT) using publicly broadcasted AIS data to analyse vessel information and vessel activity patterns, including fishing operations, port visits, encounters at sea and loitering events.

THE USE OF AIS TO ASSESS UNREGULATED FISHING IN THE INDIAN OCEAN

The automatic identification system transmits a ship's position so that other ships are aware of its location, in order to avoid collision. The International Maritime Organization (IMO) started to mandate the use of AIS on vessels larger than 300 gross tonnes that travel internationally under the 2002 SOLAS Agreement. The use of AIS in the Indian Ocean is not typically mandated for vessels under 300 gross tonnes, but there are exceptions to this for vessels flagged to Bahrain and to EU countries, with AIS mandated on vessels down to 12 metres in length in the latter case.

The key factors that affect the completeness and accuracy of footprints derived from AIS are its use and reception. AIS use is a measure of the number of vessels that have an AIS device installed and that broadcast. AIS reception is a measure of how likely it is for a vessel's AIS message to be received correctly by the existing network of satellites and terrestrial antennas placed along the world's coastlines. In regions of the world with high maritime traffic, AIS signals can interfere with each other, which reduces reliable satellite reception.

It is estimated that the Indian Ocean has a relatively low AIS use by fishing vessels compared to other

3. TMT also compiled vessel and company data to identify fishing fleets operating in the Indian Ocean that are linked by target species, gear type, ownership or flag State.

This report does not aim to gauge the quality or completeness of existing fishery management frameworks applied to given species, groups or families of species, or geographical areas against a given standard. Instead, it assesses where regulatory gaps – both geographical and in species coverage – exist, examines if and how these gaps are being exploited or where there is a risk of this occurring through case studies, and identifies steps that are required to end unregulated fishing on the high seas in the Indian Ocean.

regions, which can be explained by a low uptake of AIS in domestic fisheries and a historic piracy risk in the northwest Indian Ocean. A recent study by GFW and the FAO¹⁷ found that in the Western Indian Ocean, with the exceptions of Bahrain, Seychelles and distant water longliner fleets, less than 50% of vessels over 24 metres use AIS. This includes artisanal and semi-industrial fleets from coastal countries, industrial trawlers and purse seine vessels. Fishing activity in the eastern Indian Ocean is similarly poorly represented in AIS data, including on the high seas, as many of the vessels operating in the area do not use AIS.

Despite the lack of AIS use throughout the ocean basin, analysis of AIS data still provides important insights into the character of fisheries in the Indian Ocean, enabling the identification of potentially emerging and unregulated fishing activity. It also suggests that the case studies provided in this report underrepresent the true scale of unregulated fishing in the Indian Ocean. Evidence of this can be seen in recent reports of illegal activity by Iranian vessels in the waters off Somalia and Yemen where an increase in the use of AIS systems by the vessels allowed the scale of the problem to be quantified for the first time.¹⁸

17. Taconet, M., Kroodsmas, D., & Fernandes, J.A. (2019), *Global Atlas of AIS-based fishing activity – Challenges and opportunities*, Rome, FAO. (also available at www.fao.org/3/ca7012en/ca7012en.pdf).

18. TMT, GFW (2020), *Fisheries Intelligence Report*, GFW-TMT-NWIO-02-2020, available at www.tmt-tracking.org/post/illegal-fishing-hotspot-identified-in-northwest-indian-ocean.

REGULATORY FRAMEWORKS GOVERNING FISHERIES ON THE HIGH SEAS OF THE INDIAN OCEAN



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The United Nations Convention on the Law of the Sea (UNCLOS), the UN Fish Stocks Agreement (UNFSA) and the FAO Compliance Agreement provide the overarching sources of international law that govern the high seas, the fisheries pursued thereupon, and the multilateral institutional framework created to regulate and to administer these fisheries. While UNCLOS recognises the right of all States for their nationals to fish on the high seas, this right is subject to a number of significant qualifications, including obligations to conserve living marine resources of the high seas and to cooperate with other States. The FAO's International Plan of Action to Prevent, Deter, and Eliminate IUU Fishing (IPOA-IUU) therefore calls upon all States to “give full effect to relevant norms of international law” to combat IUU fishing and to become party to these agreements. Flag States are required to monitor their vessels activities, granting authorisations to fish on the high seas only once vessels have ensured they do not undermine CMMs.

Regulatory frameworks directly governing the fisheries of the high seas in the Indian Ocean typically fall into two distinct categories. The first category of frameworks relates to the CMMs adopted by RFMOs with competence in the area or with competence over given species distributed in the area. These CMMs are binding for RFMO Parties, who are the coastal States bordering the Indian Ocean and/or flag States fishing in the Indian Ocean. The second set of regulatory frameworks of relevance is domestic (or national) in character and consists of the laws and regulations of States that apply to fishing operations in waters under their jurisdiction. These may apply to fisheries-related operations taking place in their ports or to vessels flying their flags and that are operating in the Indian Ocean on the high seas. Despite these standards and responsibilities being enshrined in relevant international instruments, IUU fishing on the high seas constitutes, first and foremost, the failure of flag States to adhere to them and thus to hold themselves accountable for the sustainable management of shared marine resources.



THE RIGHT OF ALL STATES TO FISH ON THE HIGH SEAS IS SUBJECT TO SIGNIFICANT QUALIFICATIONS, INCLUDING OBLIGATIONS TO CONSERVE LIVING MARINE RESOURCES

EXISTING MANAGEMENT MEASURES IN THE INDIAN OCEAN



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REGIONAL FISHERIES MANAGEMENT ORGANISATIONS

Three RFMOs hold a mandate to manage and to conserve fishery resources occurring on the high seas of the Indian Ocean. Two of these, the IOTC and the Commission for the Conservation of Southern Bluefin Tuna (CCSBT), cover tuna and tuna-like species, while the Southern Indian Ocean Fisheries Agreement (SIOFA) covers fishery resources other than highly migratory species. These are the RFMOs that are critical for the management of fishery resources in Areas Beyond National Jurisdiction (ABNJ) of the Indian Ocean.

The Indian Ocean Tuna Commission

IOTC is one of five tuna-RFMOs, globally.¹⁹ The Agreement establishing the IOTC entered into force in 1996. IOTC is mandated to manage and conserve tuna and tuna-like resources in the Indian Ocean and adjacent seas. Its Area of Competence (AoC) covers both FAO statistical areas 51 and 57 completely, and a minor portion of FAO statistical area 47 below the southern tip of South Africa. IOTC's AoC includes the EEZs of bordering Indian Ocean coastal States. At the time of writing, IOTC had 31 contracting Parties and 2 cooperating non-Parties.

Species-specific management measures cover the four major commercial tuna species, billfishes and several shark species. CMMs have been adopted for bycatch species such as turtles and seabirds, as well as for particular shark species. Since the end of 2016, a rebuilding plan for the currently overfished yellowfin tuna is in place and fishing limits for total allowable catches (TACs) have recently been introduced for several key species (i.e. skipjack, bigeye tuna). However, these are not being fully implemented due to the lack of compliance of contracting Parties and to fishing efforts being maintained at too high a level.²⁰

The Commission for the Conservation of Southern Bluefin Tuna

CCSBT, another of the five tuna-RFMOs, also has competence in the Indian Ocean. The Convention establishing CCSBT entered into force in 1994. The CCSBT is mandated to manage a single species of tuna throughout its area of distribution: the southern bluefin tuna (SBT). It has no defined AoC, putting the CCSBT in the remarkable position of being endowed with a species of competence instead. CCSBT has eight contracting Parties.

The management measures of CCSBT are wide-ranging, but largely limited to the management of its single species of competence. Management measures include overall annual TACs for the species and quotas for its Parties, gear restrictions, as well as a limited number of recent (2019) measures on ecologically related species (ERS) to adopt

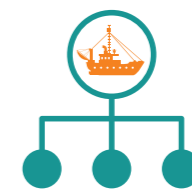
conservation and mitigation measures applicable within the AoCs of other tuna-RFMOs. CCSBT continues to rebuild the SBT stock, which came close to collapse in 2008.

The Southern Indian Ocean Fisheries Agreement

The Agreement establishing SIOFA – one of the most recent RFMOs to come into existence – only entered into force in 2012, with the first CMMs adopted in 2016. SIOFA's area of competence covers fractions of FAO statistical Areas 51 and 57. Area 51 excludes the northern sub-areas 1, 2, and 3, and the portion north of the equator of sub-area 4. Area 57 excludes all of sub-areas 1, 2, 5.1 and 6, as well as large parts of sub-areas 3 (the portion north of 20°S) and 4 (the portion east of 120°E). SIOFA's AoC also explicitly excludes areas under national jurisdiction.

SIOFA's mandate is to ensure the long-term conservation and sustainable use of fishery resources including fish, molluscs, crustaceans and other sedentary species within the area, and excludes highly migratory species²¹ (part of which are covered by IOTC and CCSBT) and sedentary species subject to the fishery jurisdiction of coastal States.²² SIOFA has 11 Parties²³ and 1 cooperating non-member.

SIOFA's management measures cover bottom-contact fishing in general, including the identification and designation of four interim vulnerable marine ecosystem (VME) protected areas (PAs), and provide more detailed measures for toothfish in particular, including TACs. Overall, the SIOFA regulatory framework is rudimentary and management rules for specific fisheries remain limited at this time.



**IOTC, CCSBT AND SIOFA ARE THE 3 RFMOs
CRITICAL FOR MANAGING FISHERY RESOURCES
IN AREAS BEYOND NATIONAL JURISDICTION OF
THE INDIAN OCEAN**

19. The five tuna-RFMOs are: CCSBT, IATTC, ICCAT, IOTC and WCPFC. (n.b. the RFMO classification used in this study as per Ásmundsson, S. (2016) under <https://www.cbd.int/doc/meetings/mar/soiom-2016-01/other/soiom-2016-01-fao-19-en.pdf>.)

20. WWF position for the 24th session of the IOTC (2020).

21. Listed in Annex I of UNCLOS.

22. Sedentary species are defined in Article 77(4) of UNCLOS and may occur in the SIOFA AoC if an extended seabed (or outer continental shelf) has been granted to a coastal State.

23. Of which one is Chinese Taipei, officially referred to as a "participating fishing entity".

GEOGRAPHIC GAPS IN FISHERIES REGULATION ON THE HIGH SEAS OF THE INDIAN OCEAN

- Gaps in geographical coverage for non-tuna and tuna-related species
- Exclusive economic zones (EEZs)

REGIONAL FISHERIES MANAGEMENT ORGANISATIONS (BINDING MEASURES)

● Indian Ocean Tuna Commission - IOTC Creation 1996

Contracting parties	Cooperating non-members
Australia Bangladesh China Comoros Eritrea European Union France India Indonesia Iran Japan Kenya Madagascar Malaysia Maldives Mauritius Mozambique Oman Pakistan Philippines Republic of Korea Seychelles Sierra Leone Somalia Sri Lanka South Africa Sudan Tanzania Thailand United Kingdom Yemen	Liberia Senegal
	Covered species
	Yellowfin tuna Skipjack Bigeye tuna Albacore tuna Southern Bluefin tuna Longtail tuna Kawakawa Frigate tuna Bullet tuna Narrow-barred Spanish mackerel Indo-Pacific king mackerel Blue Marlin Black Marlin Striped Marlin Indo-Pacific Sailfish Swordfish

● The Commission for the Conservation of Southern Bluefin Tuna - CCSBT Creation 1994

CCSBT sets no geographic limits of competence; it extends across all national waters and high seas where southern bluefin tuna are found.

Contracting parties	Cooperating non-Contracting Party:
Australia European Union The Fishing Entity of Taiwan Indonesia	Japan Republic of Korea New Zealand South Africa Philippines
	Covered species
	Southern Bluefin tuna

● South Indian Ocean Fisheries Agreement- SIOFA Creation 2012

Contracting parties	Participating fishing entity
Australia China Cook Islands European Union France on behalf of its Indian Ocean Territories Japan Republic of Korea Mauritius Seychelles Chinese Taipei Comoros	Chinese Taipei
	Cooperating non-Contracting Party
	Comoros
	Covered species
	Pelagic armourhead Patagonian toothfish Oreos Orange roughy Dogfish Bluenose Warehou Alfonsino

ENVIRONMENTAL TREATY WITH A MANDATE TO MANAGE FISHERIES (BINDING MEASURES)

● Convention for the Conservation of Antarctic Marine Living Resources - CCAMLR Creation 1982

Contracting parties	Covered species
Argentina Australia Belgium Brazil Chile China European Union France Germany India Italy Japan Namibia	New Zealand Norway Poland Republic of Korea Russian Federation South Africa Spain Sweden Ukraine United Kingdom United States of America Uruguay
	All the populations of fin fish, molluscs, crustaceans and all other species of living organisms, including birds, found south of the Antarctic Convergence.



OTHER REGIONAL FISHERIES BODIES

In addition to the RFMOs covering the Indian Ocean, there are four relevant Regional Fisheries Bodies (RFBs) which provide voluntary guidelines and minimum standards to sustainably manage fisheries. These are the Southwest Indian Ocean Fisheries Commission (SWIOFC)²⁴, the Regional Commission for Fisheries (RECOFI)²⁵, the Asia-Pacific Fisheries Commission (APFIC)²⁶ and the Southeast Asian Fisheries Development Center (SEAFDEC).²⁷ These have been established in the southwestern, northwestern and eastern Indian Ocean quadrants, and set out to promote the sustainable management of fishery resources within – primarily – the EEZs of coastal States bordering the Indian Ocean. These bodies do not have regulatory powers, but they may influence how some of the fisheries resources in the Indian Ocean are or should be managed.²⁸ This can create grounds for fostering political will and a basis for voluntary implementation of management measures.

ADJACENT OCEANS AND OTHER RELEVANT ORGANISATIONS MANAGING FISHERIES RESOURCES

The Indian Ocean borders the Atlantic Ocean to the west, the western and central Pacific Ocean to the east, and the Southern Ocean to the south. Several relevant and important regional organisations are mandated to manage those areas and their resources, as a number of resources straddle multiple ocean basins, which is important for understanding wildlife corridors and fully protecting marine biodiversity. This is notably the case for bottom and deep water fishery resources between SIOFA, the South East Atlantic Fisheries Organisation (SEAFO), the South Pacific Regional Fisheries Management Organisation (SPRFMO) and the Convention on the Conservation of

Antarctic Marine Living Resources (CCAMLR). Overlaps in the competence for distinct species – and potentially individual stocks of such species – apply to deep water species such as alfoncino, orange roughy or toothfish.

Likewise, tuna resources are managed by multiple regulatory bodies, namely: IOTC, the International Commission for the Conservation of Atlantic Tuna (ICCAT) and the Western and Central Pacific Fisheries Commission (WCPFC). While only IOTC and CCSBT have separate mandates between tuna species, separation of stocks is verified between all tuna-RFMOs. The areas of operation of some authorised fleets overlap, also implying a distinct set of challenges at the level of regulatory competence and coherence, and the monitoring of and control over fleet activities.

Finally, other specialised RFMO and RFMO-type organisations with species of competence and global distribution (as opposed to an area of competence) exist and have certain responsibilities relating to marine species in the Indian Ocean. Examples include the International Whaling Commission (IWC), which is charged with the management of whaling globally in all waters where such activities may occur and with regard to all catchers flying the flag of a Member of the Commission. In 2018, its updated set of rules established zero catch limits for ten species of whale across the entire Indian Ocean. Similarly, the Agreement on the Conservation of Albatrosses and Petrels, signed in 2004, aims to achieve and maintain a favourable conservation status for the 31 species of these sea birds, by conserving and restoring habitats, eliminating or controlling non-native species detrimental to their survival, and to research, educate, raise awareness and disseminate information to aid their conservation. The modified Agreement (2018) contains an Action Plan in its Annex 2, listing several CMMs that are binding on its Parties.²⁹ However, most measures directly relating to fisheries operations merely request Parties to implement mitigation measures adopted by RFMOs to which they are Parties.



WHILE SOME REGIONAL FISHERIES BODIES DO NOT HAVE REGULATORY POWERS, THEY CAN INFLUENCE HOW SOME FISHERIES RESOURCES ARE MANAGED

24. SWIOFC: <http://www.fao.org/fishery/rfb/swiofc/en>.

25. RECOFI: <http://www.fao.org/fishery/rfb/recofi/en>.

26. APFIC: <http://www.fao.org/asiapacific/apfic/en/>.

27. SEAFDEC: <http://www.fao.org/fishery/rfb/seafdec/en>.

28. The term 'straddling' does not appear in UNCLOS and is mentioned but not defined in UNFSA. It is generally understood to characterize the stocks referred to in Article 63(2) of UNCLOS, i.e., stocks which occur both within an EEZ and in a high seas area beyond and adjacent to it.

29. See the Agreement on the Conservation of Albatrosses and Petrels Amended by the Sixth Session of the Meeting of the Parties Skukuza, South Africa, 7 – 11 May 2018.

ADVISORY REGIONAL FISHERIES BODY (NON-BINDING MEASURES)

Southwest Indian Ocean Fisheries Commission- SWIOFC Creation 2004

Contracting parties	Covered species
Comoros France Kenya Madagascar Maldives Mauritius Mozambique	All living marine resources

Regional Commission for Fisheries - RECOFI Creation 2001

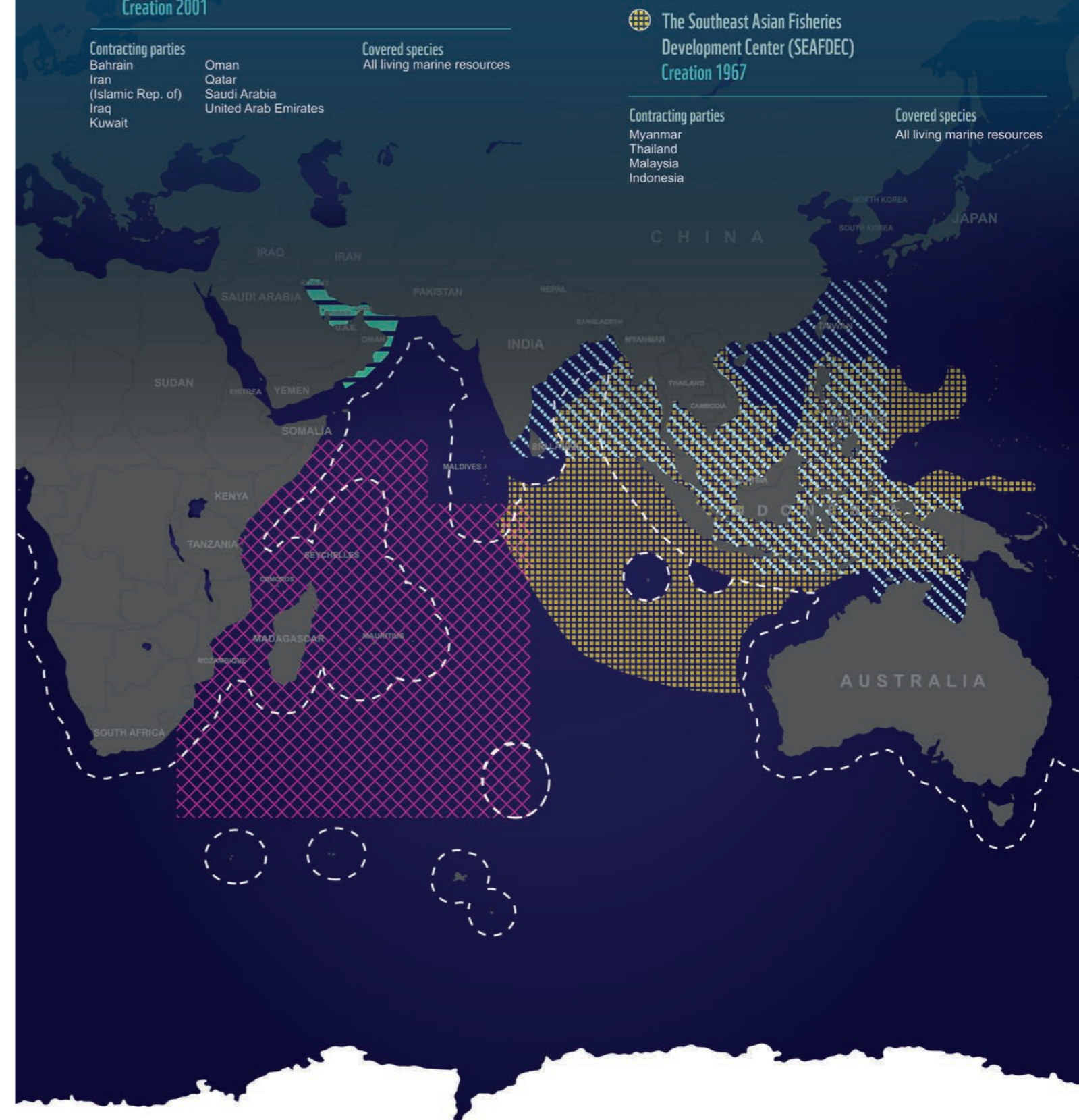
Contracting parties	Covered species
Bahrain Iran (Islamic Rep. of) Iraq Kuwait	All living marine resources

The Asia-Pacific Fishery Commission-APFIC Creation 1948

Contracting parties	Covered species
Australia Bangladesh Cambodia China France India Indonesia Japan Malaysia Myanmar	Marine fresh and brackish water species, including coastal, and high seas stocks.

The Southeast Asian Fisheries Development Center (SEAFDEC) Creation 1967

Contracting parties	Covered species
Myanmar Thailand Malaysia Indonesia	All living marine resources



THE GEOGRAPHIC GAPS IN FISHERIES REGULATION



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In terms of area coverage, the geographic distributions of tuna and tuna-like species cover the Indian Ocean in its entirety, including both the high seas and EEZs. Since CCSBT has a single species of competence, southern bluefin tuna are managed by that Commission throughout their full range of distribution wherever they occur, including the Indian Ocean. On the other hand, IOTC covers the entire Indian Ocean – inclusive of all FAO statistical sub-areas of Areas 51 and 57 and EEZs of Indian Ocean Coastal States. IOTC borders ICCAT to the west and WCPFC to the east, and no Indian Ocean high seas areas lay beyond its remit.

The regulatory frameworks of CCSBT and IOTC cover both the Indian Ocean high seas and its EEZs, despite their divergent area-based and species-based mandates, implying that stocks and species are managed in a manner that takes into account their highly migratory nature. This provides a strong framework for coastal member States to adopt and apply the respective regimes to fisheries occurring within waters under their national jurisdiction, and for flag States to apply the same regimes to vessels flying their flags when operating in such fisheries.

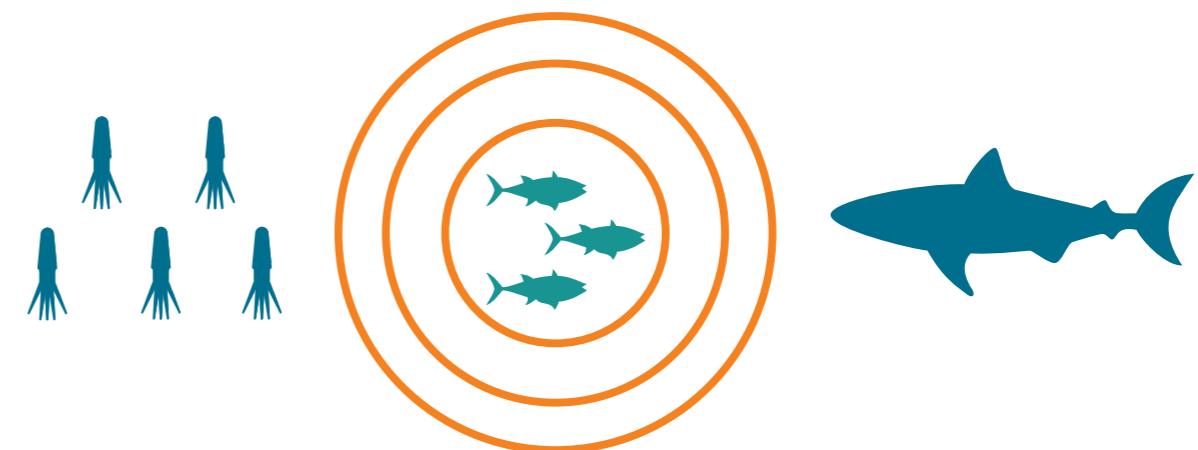
With regards to SIOFA and the exclusion of EEZs from its mandate, the opposite situation arises. Under SIOFA, any and all rules applying to the regulatory area do not automatically apply within its Members' EEZs, and coastal State regulations must be separately and formally developed and adopted in order to complement SIOFA's rules or, as a minimum, to not undermine them for straddling stocks.³⁰ While this situation does not cause prejudice to regulatory sway in matters limited to the high seas (e.g. the designation of VME-related PAs), it does create weaknesses and additional sovereign efforts in the management of fisheries where species tend to straddle EEZ/ABNJ boundaries.

Further, there is a very different regulatory situation with regards to the geographic coverage of the non-tuna-like and non-highly-migratory species covered by SIOFA. While SIOFA also borders SEAFO to the west, SPRFMO to the east and CCAMLR to the south, and thus provides geographic continuity of mandates, there are significant areas in the northwest, northeast and southeast quadrants of the Indian Ocean basin that are not covered by SIOFA nor any other RFMO-type organisation with geographically-based rule making powers.

Notwithstanding the existence and the works of the RFBs covered above, this gives rise to a situation where capture fisheries of the high seas in the northwest Indian Ocean (NWIO), wedged between the EEZs of Yemen, Oman, Pakistan, India and the Maldives, are not covered by any arrangement other than the tuna fisheries covered by IOTC. Therefore, other than for tuna and tuna-like species, this area remains wide open to unregulated fishing.

APFIC and SEAFDEC cover Indian Ocean capture fisheries on the eastern side of the Indian Ocean. Their combined influence regarding high seas capture fisheries in and south of the Bay of Bengal is not a strategic priority for these organisations, nor do any of their decisions or recommendations provide binding or guiding substance in this domain. The situation discussed above in the northwest quadrant of the Indian Ocean's high sea is mirrored in the eastern Indian Ocean, but covers an unregulated oceanic area that is several times larger.

30. See UNFSA, Article 7 on the obligation of regulatory compatibility, which applies in this situation.



ONLY TUNA AND TUNA-LIKE SPECIES HAVE LEGALLY-BINDING MEASURES FOR THEIR MANAGEMENT AND PROTECTION ACROSS THE ENTIRE INDIAN OCEAN

RISKS OF OVEREXPLOITATION AND HABITAT LOSS

Having identified that significant geographical gaps exist in the regulation of fisheries on the high seas of the Indian Ocean, it is important to understand whether these gaps are currently being exploited, and if there is a risk of overexploitation or unsustainable practices to VMEs as these may have indirect impacts on the health of other fish populations. The following section presents the results of an extensive analysis of fishing activity in the unregulated geographical regions including, where possible, identification of target species.

THE RAPID EXPANSION OF UNREGULATED SQUID FISHERIES

Squid are targeted by fisheries operations for direct human consumption and increasingly as a component of fishmeal for aquaculture. As there is neither an RFMO with a regional mandate nor an international body with CMMs, squid fisheries on the Indian Ocean high seas remain unregulated. Significant squid fisheries are being developed in regions of the Indian Ocean, falling into the geographical gaps of regulatory coverage. In this context, the flag State would have the responsibility to sustainably manage the targeted fishery, but this is rarely the case, as shown in the Case Study 1.



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CASE STUDY 1 - RAPID GROWTH OF SQUID FISHERIES IN THE INDIAN OCEAN

Research conducted in 2017 charted the expansion of a previously little-known squid fishery taking place on the high seas of the NWIO.³¹ This squid fishery is adjacent to the EEZs of Oman and Yemen, with vessels fishing across an area of nearly 700,000km². The fishery appears to have started in earnest in 2015 and has significantly expanded year on year.

As the fishing grounds fall outside of the SIOFA convention area, they are not covered by any RFMO with a potential mandate to manage squid fisheries. As a result, this fishery is not regulated by a supra-national body and the only means of subjecting this fishery to a management regime is via the regulatory powers of the flag State – applicable to the vessels and fleets flying its flag.

How much squid fishing is happening in the area?

A variety of methods were used to narrow AIS data covering the period of 2015-2019 down to just the vessels participating in the squid fishery: first, a long-list of AIS signals that were not known to be associated with non-relevant vessels (e.g. known cargo vessels) was produced; this list was then matched against Trygg Mat Tracking's FACT vessel database to identify vessels contained in public and subscription vessel databases; non-relevant vessels were then removed from the list, based on analysis of the matched identity details as well as identity details transmitted over AIS; finally, AIS tracks

for the remaining vessels were analysed visually to confirm that all AIS signals included in the study showed operating patterns consistent with squid fishing in the area of interest.

30 distinct MMSIs (AIS vessel identification numbers) were detected in the fishery in 2015; by 2019, this rose to 279 distinct MMSIs. However, the exact number and identities of vessels operating in the fishery remains unknown. There are very low levels of AIS transmission by some vessels, and many only transmitted AIS signals during transit from China to the NWIO and then ceased transmissions shortly after arriving on the fishing grounds. The challenges in monitoring this fleet are also exacerbated by the practice of one vessel transmitting more than one MMSI, in some cases simultaneously.

While it is not possible to confirm that the vessels are targeting squid from AIS analysis alone, analysis of the identifiers transmitted indicate that the vessels involved are primarily squid jiggers or purse seiners (where a positive identity match can be made), while analysis of satellite imagery confirms the use of high intensity lights on the fishing ground, consistent with squid fishing.

31. FISHIAFRICA (2017), Squid capture in the Northwest Indian Ocean: unregulated fishing on the high seas.

Figure 1: Number of distinct vessel identities detected over AIS on the northwest Indian Ocean squid fishing grounds, 2015-2019

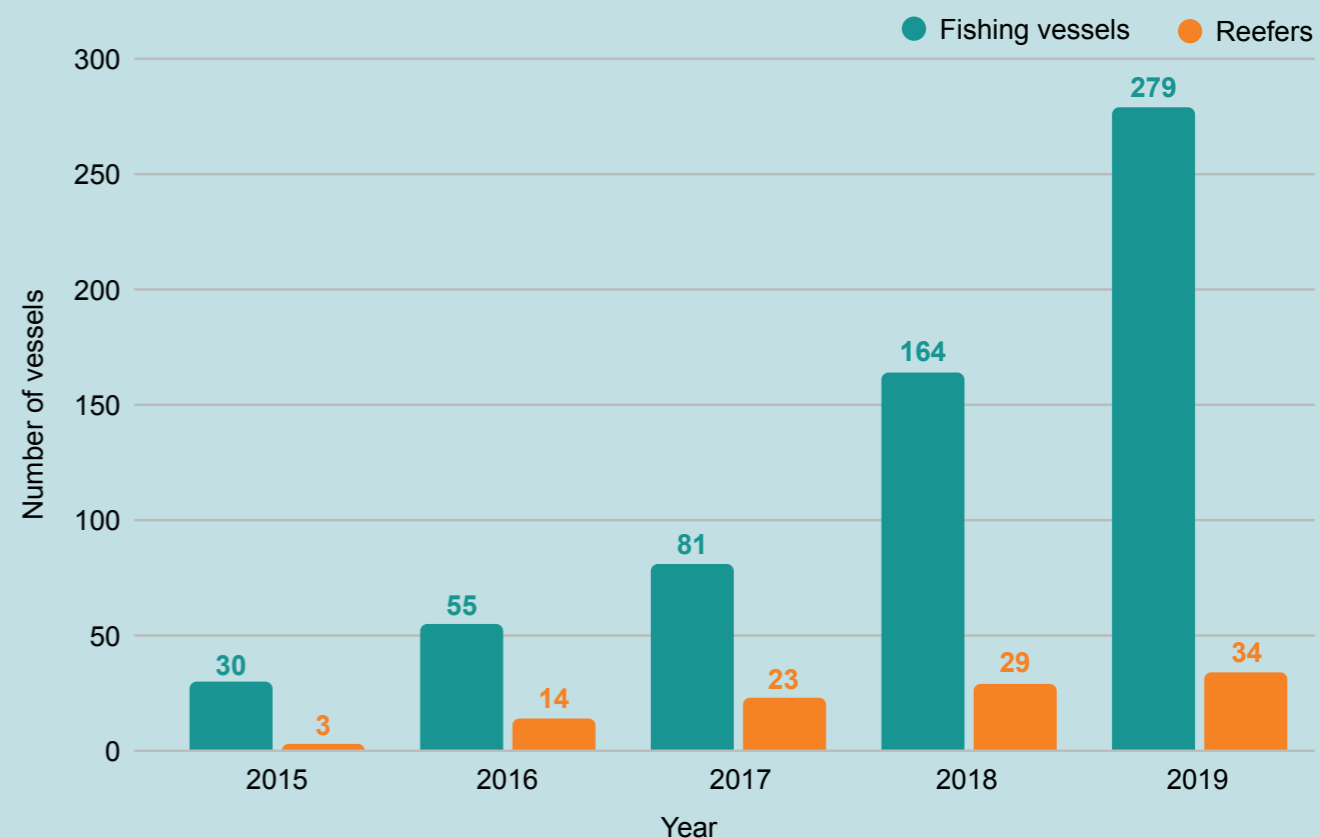
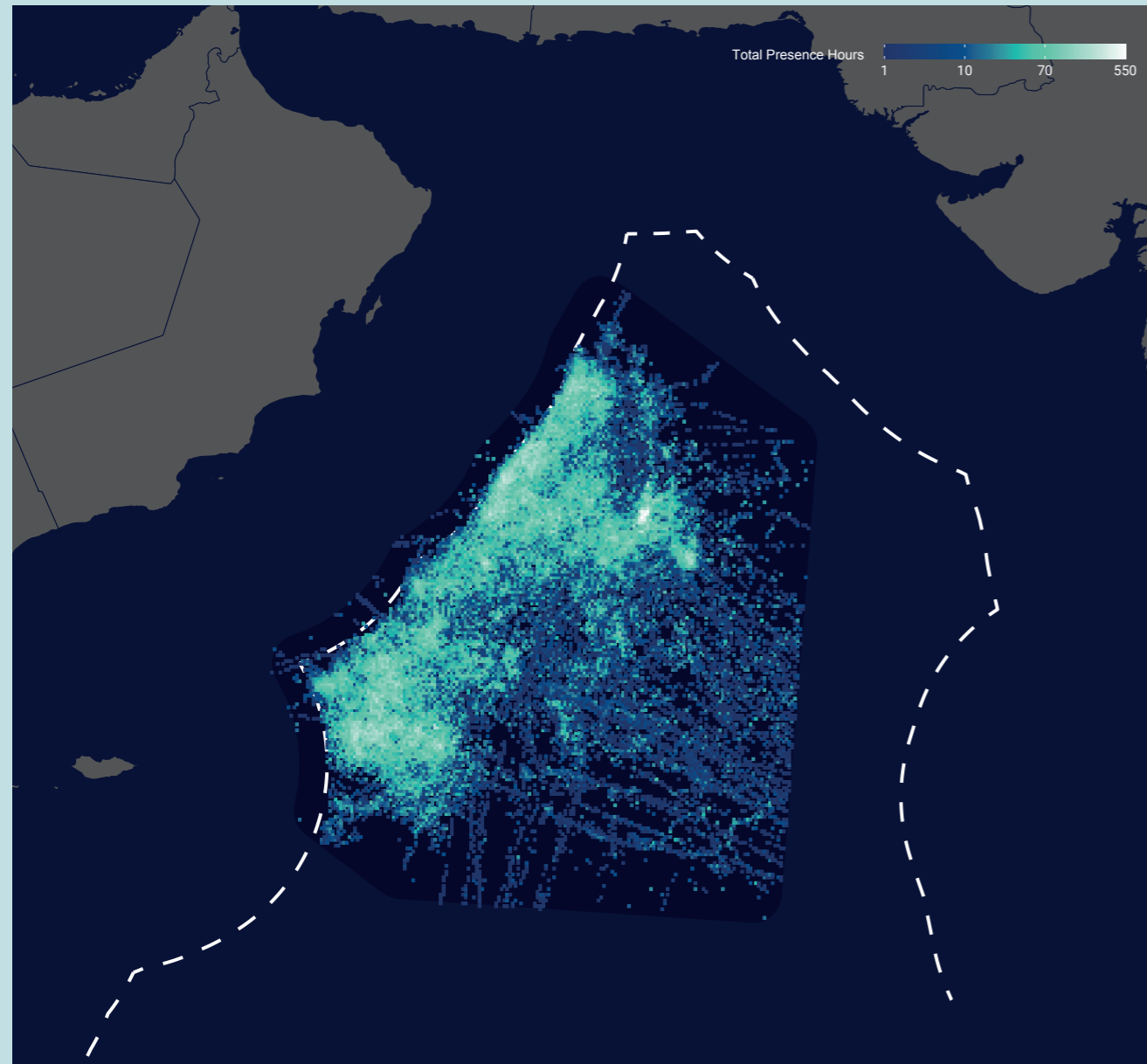


Figure 2: AIS vessel presence of presumed squid fishing vessels in the unregulated area of interest, 2017-2019



The total combined hours spent in the area of interest by the identified vessels also increased year on year, in proportion with the increase in vessel numbers. Interestingly, the total number of fishing hours detected by Global Fishing Watch's neural net increased much more slowly. This reflects the fact that many of the vessels involved in the fishery appear to transmit relatively frequently over AIS while in transit to and from the fishing ground, but transmit very infrequently within the fishing ground itself. This makes it possible to assert that these vessels were present in the fishery and also challenging to clearly identify the dominant fishing activity for the time they spend in the area.

Monitoring fish carrier vessel activity in this region supports the fishing hour analysis and indicates a year on year increase in transshipment activity. Using AIS data, GFW identified possible transshipment activity from where fishing vessels encounter fish carriers at sea and also where fish carriers show movement patterns indicative of a transshipment when the donor vessel is not visible on AIS. Between 2017 and 2019, the number of these events increased by over 300% with 251, 654 and 767 events in 2017, 2018 and 2019, respectively. This degree of increase in fish carrier activity supports the finding of a significant increase in resource extraction over the three year period.

Analysis of vessel presence in the area of interest indicates that the fishery is seasonal. However, as the total number of vessels in the fishery increased, their presence on the fishing grounds also spread over a more protracted period of the year. It is unclear whether this reflects changes in the seasonality of the fishery related to climate or other factors, or whether vessels are simply extending the time they spend in the fishery as it develops. In 2015 and 2016, fishing activity was concentrated in the northern hemisphere winter, with vessels present from October to April. In subsequent years, the season has extended to start in September and finish in May, while the peak continues to occur from November to January.

Who is participating in the fishery?

To date, all vessels detected in this fishery have been identified as confirmed or likely Chinese-flagged fishing vessels, based on the analysis of transmitted vessel identifiers and vessel movements. Approximately 45% of the identified vessels have, at some point, been authorised to fish in an RFMO that manages squid fisheries – the majority to the North Pacific Fisheries Commission (NPFC) and a lesser proportion to SPRFMO.

More than 50 refrigerated cargo (reefer) vessels were identified which appear to have also operated in the fishery. Of these, nearly 40% were flagged to China, approximately one third were flagged to Panama, with the remainder flagged to eight other flag States.

Figure 3: Trend in number of MMSIs present in the fishery (right-hand axis), total presence hours and total fishing hours (left-hand axis) by year, 2015 – 2019

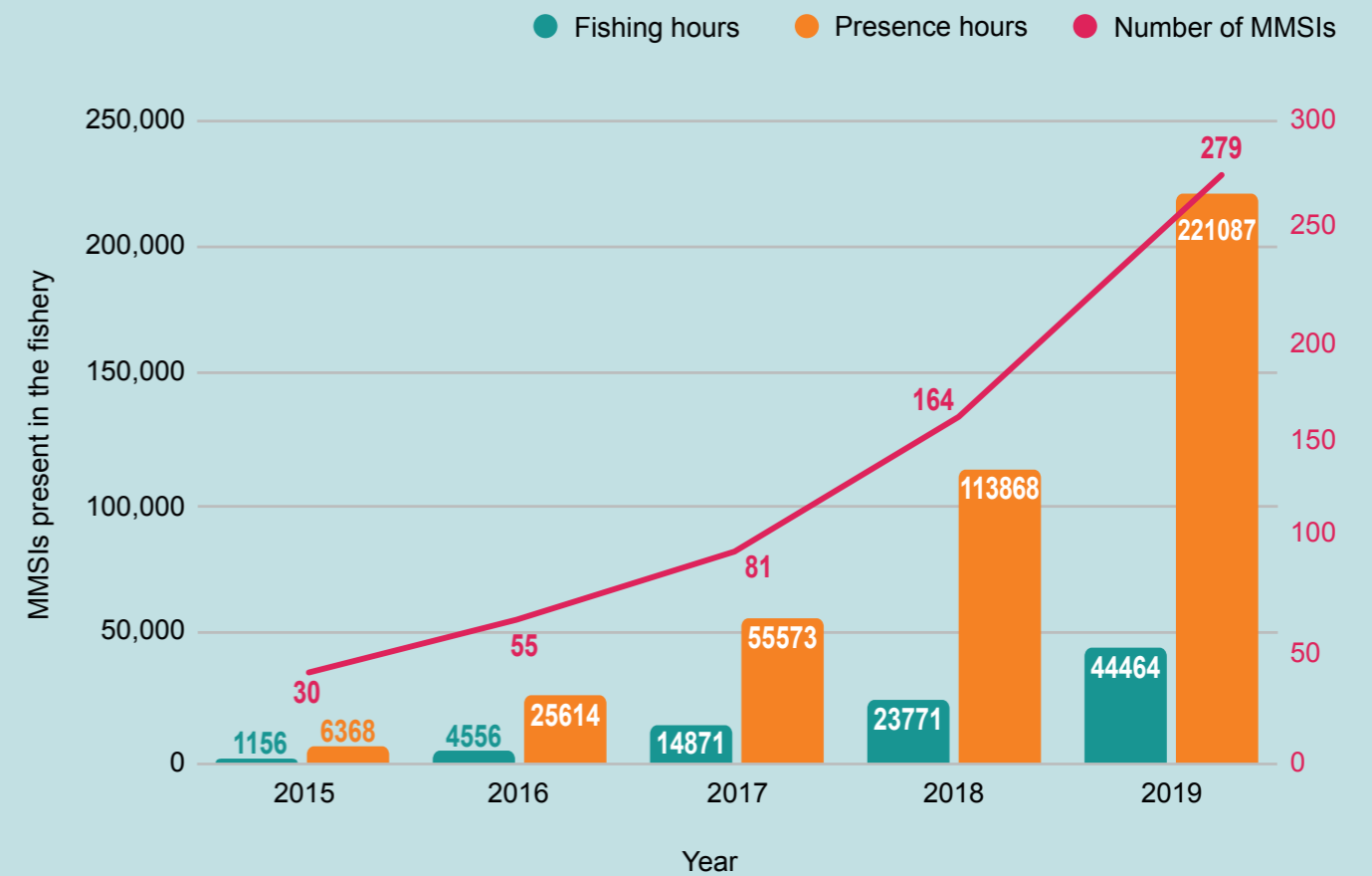
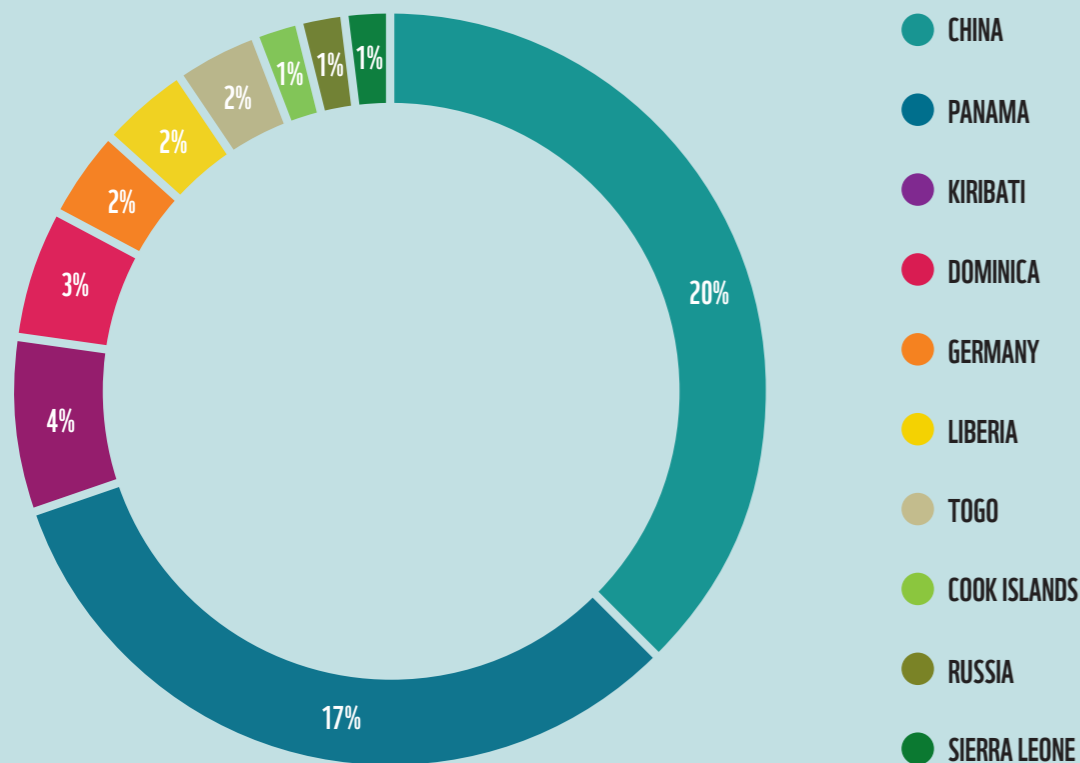


Figure 4: Flag States of reefer vessels showing potential operations in the northwest Indian Ocean squid fishing grounds



How does the fishery operate?

Analysis of AIS data indicates that catch is transhipped at sea to reefer vessels, with some presumably also transhipped in Chinese ports after vessels return home. Approximately 60% of detected anchorage visits by the fishing vessels took place in China. The only other ports with significant numbers of anchorage visits were Singapore – with many vessels making an anchorage visit during their journey to or from the fishing grounds – and Busan, South Korea, which appears to be used as a port by the portion of the fleet that also operates in the North Pacific but was not visited directly after fishing trips to the NWIO.

Analysis of port calls made by the 53 reefer vessels identified as potentially operating in the fishery can provide some insights into the port and market destinations of the catch, and thus the responsible market States. Similar to the fishing vessels, approximately half of the more than 850 detected anchorage visits were to China, with the majority of the remainder to Singapore and Busan.

Many of the fishing vessels and reefers operate in other known squid or related fisheries outside of the NWIO squid season. Analysis of the global movements of known squid vessels operating in the NWIO indicates connectivity with the squid/saury fishery in the northwest Pacific (high seas off Japan), as well as the squid fisheries in the southwest Atlantic and eastern

central Pacific Oceans. It is interesting to note that the original 2017 study found that vessels fishing in the NWIO primarily also fished in the northwest Pacific, reflecting the increasing global nature of Chinese fishing operations targeting squid. It is worth noting that two other relevant regions have relatively recently come under the management remit of an RFMO (the NPFC and SPRFMO), while the Southwest Atlantic squid fishery continues unregulated other than through flag State measures.

What is the true identity of vessels?

Fishing vessels are notorious for keeping their identities opaque and their ability to change identifiers such as name and call sign. To address this challenge, there has been an international effort to increase the number vessels carrying an IMO number as a unique vessel identifier that stays with the vessel through its operational lifetime,³² but uptake is slow. Matching of transmitted details (name, call sign, MMSI and IMO number) against TMT data indicates that 218 of the 342 fishing vessels that have been present in the fishery between 2017 and 2019 have been allocated an IMO number. However, almost no vessels were consistently transmitting their correct IMO number over AIS – in fact, no vessels were consistently transmitting a correct IMO number between 2015 and 2017, and just 1-2 % of vessels did so in 2018 and 2019. While it is not uncommon for vessels in many fleets to not transmit an IMO number, the proportion of vessels transmitting

a valid Chinese call sign was also low, never rising above 50% of active MMSIs in a year. In addition, not all of the vessels active in the fishery were consistently transmitting a recognisable vessel name – with between 13% (2019) and 37% (2015) of MMSIs not consistently transmitting a clear name in each given year, instead transmitting a numeric value or alphanumeric combination such as “HHHH”.

It is also noticeable that between 23% and 48% of MMSIs in any given year were transmitting identity details that could not be matched to any known vessel from an RFMO or other vessel information source. This is not surprising, given that a significant proportion of global squid fishing does not yet fall under the remit of RFMO management or any international body. This further illustrates the challenge of monitoring a nascent high seas fishery, such as that of squid in the Indian Ocean.

Table 1: Percentage of MMSIs that are linked to a vessel with an IMO number or RFMO authorisation history, versus ‘unknown’ vessels, by year; and quality of identifier data routinely transmitted over AIS (% of MMSIs active in a given year).

	2015	2016	2017	2018	2019
Number of MMSIs	30	55	81	164	279
Vessel characteristics					
Has an IMO number	77%	53%	52%	61%	67%
Has been RFMO authorised	50%	44%	41%	47%	46%
Unknown	23%	47%	48%	37%	32%
AIS transmissions					
Valid Chinese MMSI	87%	76%	84%	85%	89%
Valid Chinese callsign	27%	18%	11%	22%	42%
Identifiable vessel name	63%	65%	74%	81%	87%
Correct IMO	0%	0%	0%	1%	2%

32. Global Record of Fishing Vessels, Refrigerated Transport Vessels and Supply Vessels, available at: <http://www.fao.org/global-record/background/about/en/>



CHINA'S PRESENCE IN THE INDIAN OCEAN

The dominance of China in this squid fishery highlights the key role that flag States must play in closing such unregulated gaps. In addition, Flag States of reefer carrier vessels should also monitor and regulate their activities of catch transport and transshipment at sea.

There are some positive signs that China intends to address the issue of its unregulated squid fishing activities. A 2020 Chinese Government Notice³³ noted that “Squid is the main fishing and utilization target of China’s [distant water fleet (DWF)]” and that “in order to strengthen the scientific conservation of squid resources on the high seas, and promote the long-term sustainable utilization of squid resources and the sustainable development of China’s DWF” several relevant issues have been identified, including the need to:

- Fully understand the importance of conserving squid resources on the high seas
- Implement CMMs for squid resources on the high seas, including:
 - Strengthen the management of squid fishing operations on the high seas taking into account transshipment operations
 - Strengthen the dynamic monitoring and evaluation of squid resources on the high seas
 - Encourage the development of environmentally friendly operations

- Effectively strengthen the application of scientific research on squid resources, including:
 - Actively carry out investigations and assessments of squid resources
 - Strengthen the development and application of the Index of China’s Distant Water Squid Fishery
 - Strengthen the research on the management system of the whole industry chain of squid
- Actively carry out cooperative international squid conservation management, e.g. with RFMOs and other relevant institutions

On 15 April 2020, the Chinese Ministry of Agriculture tabled recommendations to other RFMO contracting Parties on measures to protect squid fisheries, including implementing closed seasons. The proposed measures would see China’s DWF halt squid fishing in the southwest Atlantic Ocean from July to September and in the east Pacific Ocean from September to November. Notably this does not include closures in the Indian Ocean. Importantly, the proposed closed season for the eastern Pacific has some overlap with the fishing season in the NWIO, which raises the possibility that these measures, if implemented, could lead to a transfer of even more fishing effort into this region.

There are strong indications however that there is a continued intention to expand high seas squid fisheries. In addition to the squid fishery operating in the NWIO, it appears that a new unregulated squid fishery further east is in the nascent stages of development and expansion.

33. Ministry of Agriculture and Rural Affairs (MOARA) (2020), Notice on Strengthening the Conservation of Squid Resources on the High Seas and Promoting the Sustainable Development of Distant Water Fisheries (DWF).



BETWEEN 2017 AND 2019, THE NUMBER OF TRANSSHIPMENTS IN SQUID FISHERIES IN THE NORTHWEST INDIAN OCEAN INCREASED BY OVER 300%

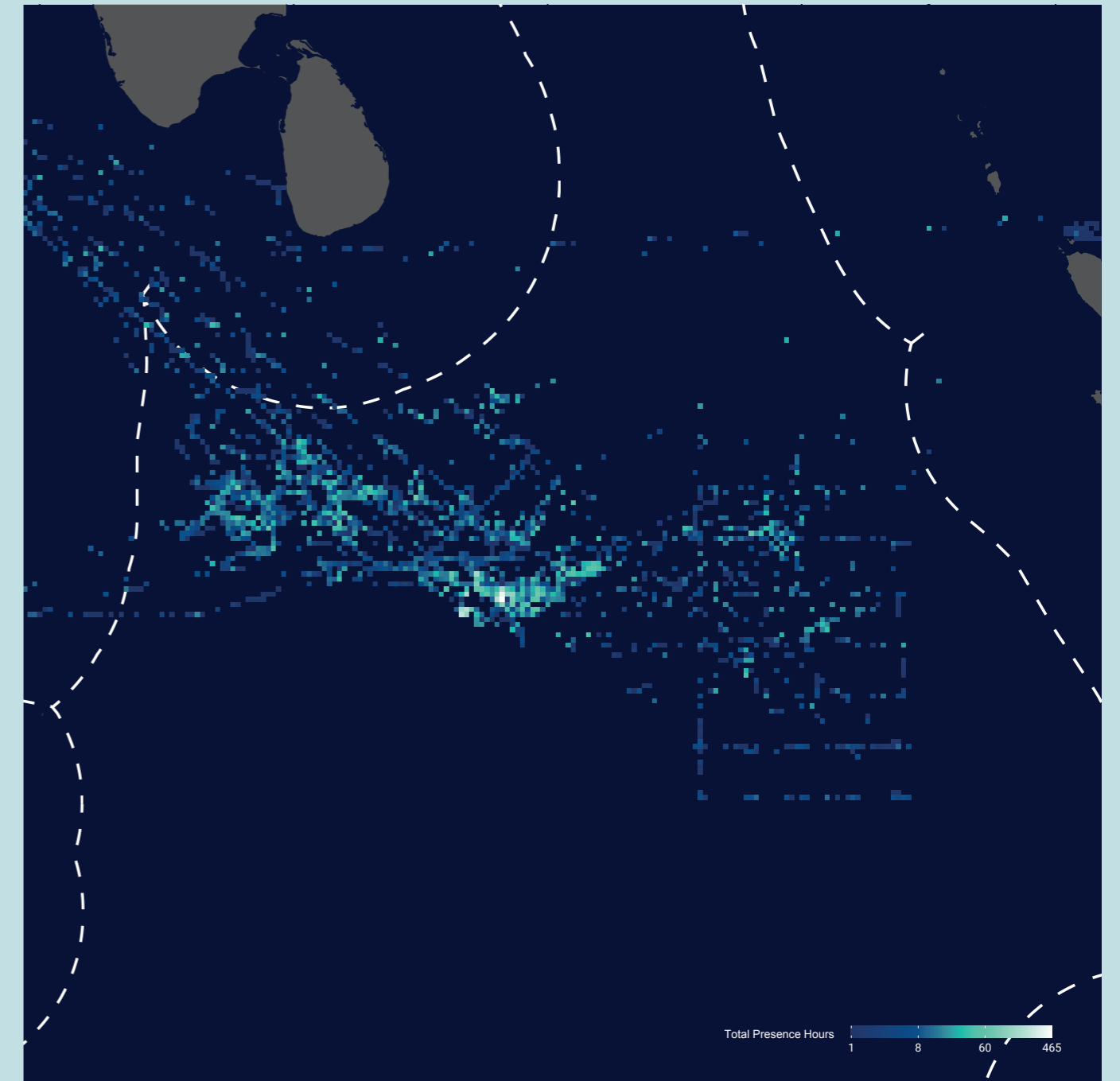
CASE STUDY 2 – A NEW FISHERY DEVELOPING IN UNREGULATED WATERS?

Analysis of the AIS tracks of the squid fleet operating in the NWIO led to the observation that a small subset of these vessels was also fishing on the high seas of the eastern Indian Ocean. As in the NWIO, the area targeted is unregulated, falling outside of the SIOFA Convention Area and is thus not under the remit of any RFMO with the mandate to manage squid or other non-tuna resources.

Of the 341 identified vessels that were detected fishing in the NWIO from 2015 to 2019, 24 also fished in the eastern Indian Ocean between 2017 and 2019 (Figure 5). The area targeted

varied across years: in 2017 activity was concentrated in the northern part of the Ninety East Ridge (to the south of the Andaman Islands), while in 2018 and 2019 activity was concentrated further west in waters to the south and southeast of Sri Lanka. Fishing activity in both areas took place from June to August each year (outside of the NWIO fishing season) with some vessels fishing there while in transit between the NWIO and China, while others spent time fishing there between two fishing seasons in the NWIO (without returning to China).

Figure 5: Heat map showing presence in the eastern Indian Ocean fishing grounds of the 24 identified fishing vessels, 2017-2019



Tracks also show that two vessels from the NWIO fished on the Ninety East Ridge in September and October 2019. This was outside the seasonal pattern displayed by the other vessels and in a year when all ten of the other vessels that fished in the eastern Indian Ocean were operating south of Sri Lanka rather than on the ridge. Interestingly, the tracks for these two vessels show that they fished in a very systematic pattern, such as would be expected by vessels undertaking a fisheries survey, which could indicate that they were engaged in a survey or exploratory fishery.

Based on their association with the NWIO squid fishery, it is considered that some of these vessels may be targeting squid. However, there is in fact very little information to indicate what species the vessels could be targeting and thus what the health of the stock may be, or what vulnerabilities are faced by species or ecosystem due to fishing effort. While Soviet trawlers did conduct deep-sea trawl surveys on the Ninety East Ridge in the 1970s, this appears to have taken place in an area further south³⁴ and the vessels' area of operations in the NWIO are not

consistent with deep-sea trawling. It is interesting to note that approximately half of the 25 vessels fishing in the area of interest are listed as purse seiners by the RFMOs where they are authorised (NPFC and SPRFMO); the other half do not have an identified gear type. Given the very small number of vessels that have been detected fishing in this area, this may not be significant, but it could indicate that they are targeting a species other than squid, such as small pelagic fish.

It should also be noted that the region is a well-known and significant feeding ground for various species of whales, targeting both small pelagic fish and squid.³⁵ There is a clear risk that the vessels are targeting the same stocks, with a potential impact on these species and the overall ecosystem.

34. FAO (2003), *Summary and review of soviet and Ukrainian scientific and commercial fishing operations on the deepwater ridges of the southern Indian ocean*, FAO Fisheries Circular No. 991.

35. Arkhipkin A. & Al. (2015), *World squid fisheries, Reviews in Fisheries Science & Aquaculture*, Volume 23.



In both of the fisheries case studies, the Chinese fleet, operating in the absence of regulatory measures applied by the flag State, can be considered to be engaged in unregulated fishing “in areas or for fish stocks in relation to which there are no applicable conservation or management measures and where such fishing activities are conducted in a manner inconsistent with State responsibilities for the conservation of living marine resources under international law”. China has ratified the United Nations Fish Stock Agreement (UNFSA) and, as a flag State, has the duty to adopt and implement management measures, especially in light of the fact that the fishery is expanding at a rapid pace.

Market States can also act to make sure products entering their markets are sustainably managed. This is particularly relevant for the European Union as, in 2017, imports into the EU from non-EU countries reached a 10-year peak of EUR 25.3 billion, mainly due to increased imports of frozen cuttlefish and squid originating principally from India and China.³⁶

Species such as squid function as both predator and prey, and play an important role in the trophic web of pelagic ecosystems such as the tuna food chain.³⁷ Tuna fisheries are directly impacted if the trophic web is disrupted by the overfishing that is likely to result from continued and expanding unregulated squid fishing in the Indian Ocean. Due to the importance of squid to food webs in these pelagic ecosystems, including for commercially valuable species like tuna as well as blue carbon sinks like whales, the management of squid must be incorporated into ecosystem-based fisheries management models for tuna and tuna-like species to maintain both sustainable fisheries and resilient ecosystems.

RECOMMENDATIONS:

- Squid should not remain without management measures, as this threatens the equilibrium of the entire marine ecosystem. SIOFA and IOTC contracting Parties must urgently create a joint working group to overcome the challenge of unregulated fishing and adopt joint CMMs, taking into account an ecosystem-based fisheries management approach. Squid could be taken under the SIOFA mandate if the spatial area cover is expanded, through a specific IOTC measure addressing the management of ecosystem-related species or through the creation of an international body to regulate squid fisheries across the world.
- Concrete measures to manage the global distant water squid operations must be developed that include the Indian Ocean and should cover closed seasons, robust stock assessment, monitoring, control and surveillance measures, as well as political support for the development of multilateral regulatory frameworks covering squid species and the geographical areas where they are being targeted. As the primary and possibly only flag State involved in the unregulated fishing of squid on the high seas of the Indian Ocean, China has a crucial role to play, while the flag States involved in the transport and trade of squid should monitor their activities to ensure marine resources are sustainably caught.
- Important market States such as the EU, Japan and the USA should ensure they are not driving unregulated squid fisheries by adopting robust importation requirements which support a transparent seafood supply chain; tools to support this include electronic monitoring of vessel activities and catch documentation schemes.
- To address vessel identity and monitoring concerns, IMO numbers and AIS should be made mandatory for all fishing vessels. These should not be in isolation from each other, whereby a fishing vessel's IMO number should be required to be broadcast through its AIS.



SQUID PLAY AN IMPORTANT ROLE IN THE TUNA FOOD CHAIN AND TUNA FISHERIES ARE LIKELY TO BE DIRECTLY IMPACTED BY AN EXPANSION OF UNREGULATED SQUID FISHING

36. European Market Observatory for Fisheries and Aquaculture Products (2018), *The EU Fish Market* www.eumofa.eu/documents/20178/132648/EN_The+EU+fish+market+2018.pdf.

37. ICCAT (2018), *A preliminary assessment of the ecological role and importance of squid in the pelagic trophic web of the northwest Atlantic ocean including the Sargasso sea*.

THE EMERGING PICTURE OF GAPS IN SPECIES MANAGEMENT MEASURES



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RFMO mandates, regardless of AoC and spatial coverage issues, contain critical gaps with regard to the species they cover and frameworks in place for sustainable management of life in our ocean.

Table 2 regroups all of the individual species and groups of species that are either directly covered by RFMOs or which, while not covered by an RFMO, may be (or should

be) of particular interest. Where measures exist, they are not always complied with by contracting Parties or strong enough to provide full protection as species migrate across RFMO geographic AoCs, as explored in Case Study 3. Joint work between RFMOs to address these shortcomings is needed to not undermine conservation work taking place in other regions of our ocean and to bring effective protection to species put at risk from unsustainable fishing.

Table 2: Species, families and other groups of fish and marine mammals included or excluded from current RFMO mandates in the Indian Ocean, and currently applied management frameworks

Species or groups of species are subject to four distinct types of management regimes:

None:	The species or the group is not covered by any management framework currently in place and may be directly excluded from given RFMO mandates.
Framework generic:	The species or group of species does fall under the mandate of an RFMO and generic management rules are in place (e.g. the fishing vessel must be listed on a record of authorised vessels (RAV) kept by the RFMO and/or must report catch data).
Protection-type rules:	The species or group of species is the direct object of one or more dedicated rules, that set out to confer more protection. This is generally the case for bycatch species, where certain operational standards must be respected (e.g. ban on shark finning).
Stock management-type rules:	The species is the object of dedicated stock management rules (e.g. TACs and quota regime, full ban on landing), ensuring the fishery evolves within a largely controlled and sustainable framework; or the species is the object of a total catch and landing ban, regardless of whether it is the object of a targeted fishery or not.

	Scientific name	English vernacular name	Management measures in place			Notes
			Framework generic	Protection-type rules	Stock mgt-type rules	
Covered by mandates of IOTC and CCSBT	<i>Thunnus albacares</i>	Yellowfin tuna	✔	✔	✔	IOTC CMM 19/01 & 18/01
	<i>Katsuwonus pelamis</i>	Skipjack	✔	✔	✔	IOTC CMM 16/02
	<i>Thunnus obesus</i>	Bigeye tuna	✔	✔	✔	IOTC CMM 05/02
	<i>Thunnus alalunga</i>	Albacore tuna	✔	✔	✘	IOTC CMM 13/09
	<i>Thunnus maccoyii</i>	Southern bluefin tuna	✔	✔	✔	CCSBT resolutions
	<i>Thunnus tonggol</i>	Longtail tuna	✔	✘	✘	IOTC generic framework – including MCS and reporting obligations
	<i>Euthynnus affinis</i>	Kawakawa	✔	✘	✘	
	<i>Auxis thazard</i>	Frigate tuna	✔	✘	✘	
	<i>Auxis rochei</i>	Bullet tuna	✔	✘	✘	
	<i>Scomberomorus commerson</i>	Narrow-barred Spanish mackerel	✔	✘	✘	
	<i>Scomberomorus guttatus</i>	Indo-Pacific king mackerel	✔	✘	✘	
	<i>Makaira mazara / nigricans</i>	Indo-Pacific blue marlin	✔	✔	✔	IOTC CMM 18/05
	<i>Makaira indica</i>	Black marlin	✔	✔	✔	
	<i>Tetrapturus audax</i>	Striped marlin	✔	✔	✔	
	<i>Istiophorus platypterus</i>	Indo-Pacific sailfish	✔	✔	✔	
<i>Xiphias gladius</i>	Swordfish	✔	✔	✔	IOTC CMM 15/10	
Excluded from SIOFA, and not covered explicitly in IOTC, and CCSBT mandates	Family Bramidae	Pomfrets	✘	✘	✘	
	<i>Tetrapturus angustirostris</i>	Shortbill spearfish	✘	✘	✘	
	<i>Scomberesox saurus scombroides</i>	King gar	✘	✘	✘	
	<i>Coryphaena hippurus</i>	Common dolphinfish	✘	✘	✘	
	<i>Coryphaena equiselis</i>	Pompano dolphinfish	✘	✘	✘	
	<i>Hexanchus griseus</i>	Bluntnose sixgill shark	✔	✔	✘	IOTC CMM 17/05 (generic ban on shark finning)
	<i>Cetorhinus maximus</i>	Basking shark	✔	✔	✘	
	Family Alopiidae	Thresher sharks	✔	✔	✔	IOTC CMM 12/09 (discard obligation)
	<i>Rhincodon typus</i>	Whale shark	✔	✔	✘	IOTC CMM 13/05 (prohib. of PS setting, live release & reporting)
	Family Carcharhinidae	Requiem sharks	✔	✔	✘	IOTC CMM 17/05 (generic ban on shark finning)
	Family Sphyrnidae	Hammerhead sharks	✔	✔	✘	IOTC CMM 17/05 (generic ban on shark finning)
	Family Isurida	Mackerel sharks	✔	✔	✘	
Family Delphinidae	Dolphins	✔	✘	✘	IOTC CMM 13/04 (prohibition of PS setting [only], live release & reporting of interactions)	
Currently managed by SIOFA	Functional shark group	Deep-sea sharks	✔	✔	✘	CMM 2019/12 (ban on targeted deep-sea shark fishing); <i>H. griseus</i> (a deep-water shark) is excluded
	<i>Hoplostethus atlanticus</i>	Orange roughy	✔	✘	✘	CMM 2019/15
	<i>Beryx splendens</i>	Alfonsino	✔	✘	✘	
	<i>Dissostichus eliginoides</i>	Patagonian toothfish	✔	✔	✔	CMM 2019/15 (TACs by species and by area)
	<i>Dissostichus Mawsoni</i>	Antarctic toothfish	✔	✔	✔	CMM 2019/15
Other IOTC measures	Family Mobulidae	Mobulid rays	✔	✔	✘	IOTC CMM 19/03 (prohibition of setting, release & reporting)
	Super-order Selachimorpha	Sharks	✔	✔	✘	IOTC CMM 17/05 (generic ban on shark finning)
	<i>Prionace glauca</i>	Blue shark	✔	✔	✘	IOTC CMM 18/02 (data collection only)
	<i>Carcharhinus longimanus</i>	Oceanic whitetip shark	✔	✔	✔	IOTC CMM 13/06 (discard obligation; objection from India)
Other non-regulated functional groups	Clupeiformes	Small pelagics (Sardines, anchovies, hilsa, menhaden, etc.)	✘	✘	✘	
	Decapodiformes	Cephalopod molluscs (Squid)	✘	✘	✘	
	Crustacea	Crustaceans, including deep water shrimp etc.	✘	✘	✘	
	Chelonidae	Turtles	✔	✘	✘	IOTC CMM 12/05 (bycatch mitigation & handling, reporting)

GAPS IN THE REGULATION OF SPECIES ON THE HIGH SEAS OF THE INDIAN OCEAN: RISKS TO THE FOOD CHAIN AND RESILIENT ECOSYSTEMS

Where and how species are covered by conservation and management measures, as well as by fishery regulatory frameworks paint a complex scene in the Indian Ocean. The IOTC, the Commission for the CCSBT and the SIOFA are the three most prominent regional fisheries management organisations in the Indian Ocean with binding measures on their Parties. The following shows which binding measures these groups have to manage and protect some species and species groups in the Indian Ocean.*

*This graphic does not measure the ambition or efficiency of these conservation and management measures.

Indian Ocean Tuna Commission (IOTC)
Southern Indian Ocean Fisheries Agreement (SIOFA)
Conservation of Southern Bluefin Tuna (CCSBT)

Other regional fisheries management organisations mentioned:
Western Central Pacific Fisheries Commission (WCPFC)
International Commission for the Conservation of Atlantic Tunas (ICCAT)
Commission for the Conservation of Antarctic Marine Living Resources (CCAMLR)

SEABIRDS



IOTC has a measure to reduce incidental bycatch of seabirds in longline fisheries, with three provisions to minimise occurrences: setting nets at night with minimum deck lighting, using bird-scaring lines, and weighting lines.

CCSBT has a specific rule for species that are ecologically related to its fisheries, including seabirds, which mandates that vessels usetori lines in all southern bluefin tuna fisheries. However, this rule only applies when fishing outside of areas covered by IOTC, WCPFC and ICCAT; in practice, this rule only applies to a limited number of operations.

SIOFA's measures note the best-practice guidance from the Agreement on the Conservation of Albatrosses and Petrels which includes measures to reduce elements which attract seabirds to nets and cables.

TURTLES



IOTC has provisions solely for reporting bycatch of sea turtles, but this data does not distinguish between different species.

CCSBT aligns with the Ecologically Related Species measures of other tuna RFMOs, including the IOTC provisions described above.

As SIOFA measures apply to deep-sea fisheries, they do not cover sea turtles.

CETACEANS (DOLPHINS, WHALES AND PORPOISES)

IOTC has protection measures to reduce accidental catches of cetaceans, with purse seiners prohibited from setting nets; however high levels of bycatch continue. Despite provisions for data reporting to support conservation efforts, ambiguous and contradictory language leaves Parties exempt from reporting.

CCSBT has agreed to IOTC's measures to mitigate bycatch.

SIOFA currently has no measures in place, but the scientific committee has recommended adopting a mandatory protocol for documenting interactions between fishing vessels and marine mammals in a manner compatible with CCAMLR.

TUNA & BILLFISH

16 tuna and tuna-like species are under direct and targeted IOTC management measures. The species subject to direct management measures are skipjack, yellowfin, bigeye and albacore tunas, other scombrids, and five species of billfish. This leaves around 40% of species without any direct biological management targets, falling instead under generic management rules only.

CCSBT has a comprehensive management framework in place for southern bluefin tuna, including total allowable catches and stock recovery targets.

As SIOFA measures apply to deep-sea fisheries, they do not cover tuna or billfish.

SHARKS AND RAYS

IOTC does not have a formal mandate to directly manage any shark or ray species, despite being caught by vessels fishing for tuna or as bycatch. However, some measures have been put in place, such as prohibition of setting nets on sharks, reduction of entanglement, prohibition to retain accidental catches on board and provisions for live releases, as well as enhanced data reporting rules.

CCSBT applies ecologically related species rules in line with three other tuna RFMOs: the IOTC provisions described above, as well as those of WCPFC and ICCAT.

As SIOFA measures apply to deep-sea fisheries, they do not cover sharks and rays.

DEEP-SEA FISH

As IOTC and CCSBT measures apply to tuna and tuna-related species, they do not cover deep-sea fish.

While SIOFA's measures intend to protect vulnerable deep-sea ecosystems, few stock-specific management rules are in place, reflecting the recent creation of the Commission. One measure covers orange roughy, two species of toothfish and alfonsino, but only the toothfish are subject to detailed measures. As their populations are largely distributed in the Southern Ocean, toothfish are principally managed by CCAMLR, which causes management coordination challenges.

DEEP-SEA SHARKS

As IOTC and CCSBT measures apply to tuna and tuna-related species, they do not cover deep-sea sharks.

SIOFA has a generic shark protection measure in place under CMM 2019-12, prohibiting Parties from directly targeting 20 species of deep-sea sharks.

MOLLUSCS, CRUSTACEANS AND OTHER SEDENTARY SPECIES

As IOTC and CCSBT measures apply to tuna and tuna-related species, they do not cover molluscs, crustaceans or other sedentary species.

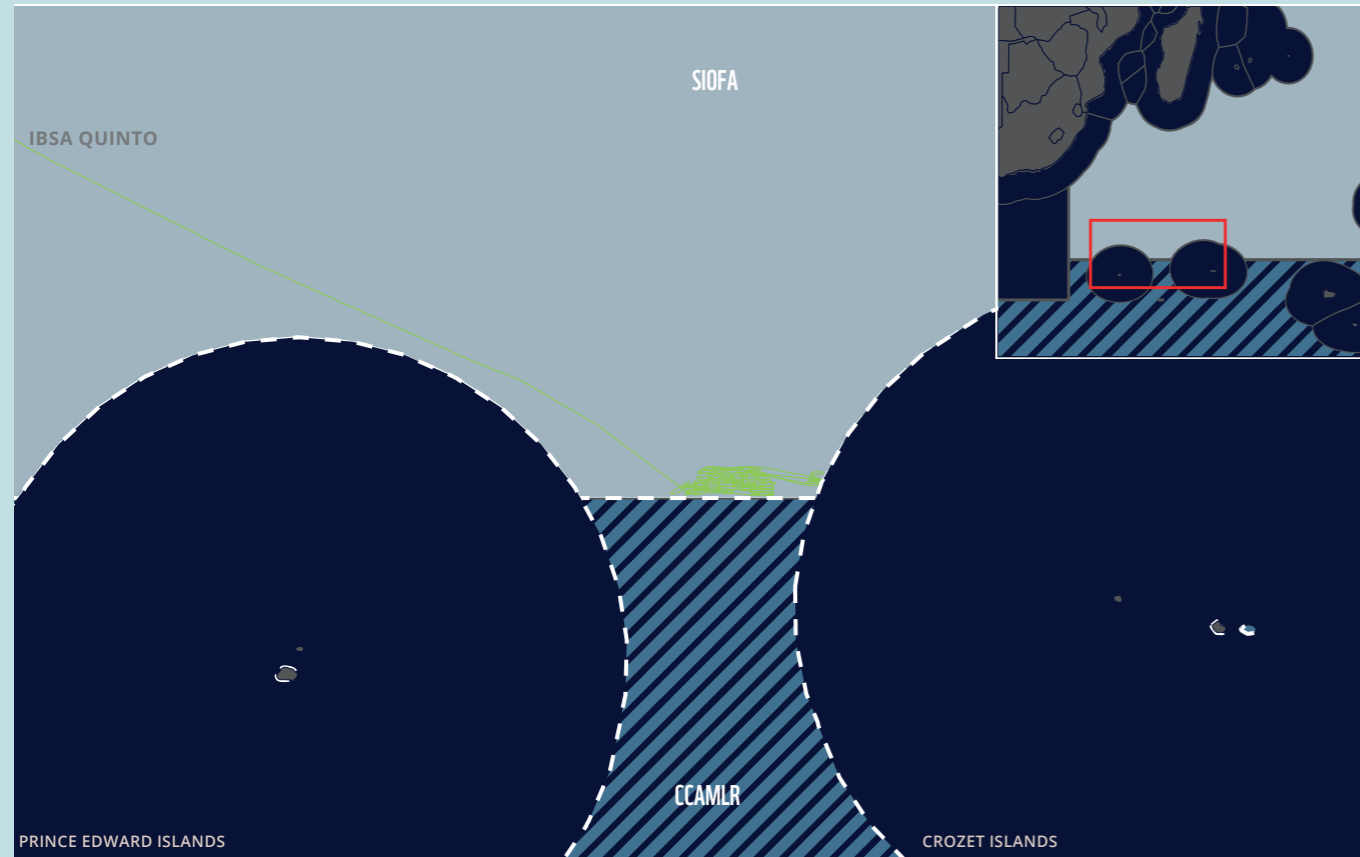
SIOFA's mandate lacks clarity about what species groups it covers, leaving actions without clear parameters.

CASE STUDY 3 – THE NEED FOR JOINT WORK BETWEEN RFMOs TO HARMONISE CMMs

The recent development of a fishery for toothfish on Williams Ridge and the Del Cano Rise in the southern Indian Ocean revealed an existing gap in management measures for stocks in this area. While no toothfish were reported to be caught in 2016,³⁸ between 2017 and 2019, around 800 tons of toothfish were harvested.

The fishing operations were primarily carried out by two vessels flagged to Spain, a SIOFA contracting party. The vessel Tronio was not consistently received on AIS in the area for the years in question, while more positions were received from the Ibsa Quinto, however with an intermittent frequency of signals.

Figure 6: The green pathway in green shows the track of the Ibsa Quinto between 12 April and 19 May 2018. The orange colour reflects the SIOFA area being fished in, while blue to the south depicts the CCAMLR area.



The AIS track of the Ibsa Quinto shows that its fishing activities in the SIOFA zone were consistently carried out as close as one nautical mile to the CCAMLR area. While operating in the SIOFA area, the operators could reportedly target toothfish without catch limits, while vessels operating in the waters immediately adjacent were subject to existing CCAMLR toothfish conservation measures. The toothfish caught in the SIOFA area are the same stock as those in CCAMLR.³⁹ These fishing activities were publicised and protested by several players, including other fishing industry actors operating in CCAMLR areas adjacent to Williams Ridge and Del Cano Rise. As a response, CMMs for toothfish catches in these areas were introduced in 2019 by SIOFA.⁴⁰

This is an important example of the crucial need for cooperation and harmonisation of CMMs between RFMOs in the Indian Ocean where stocks straddle regulated areas which overlap with interconnected ecosystems, especially as climate change forces species to migrate beyond their historical geographical limits. New fisheries are emerging and RFMOs must be prepared to prevent unregulated fishing in adjacent regulated areas, as these activities put all stocks at risk.

38. CCAMLR (2019), *Next steps in cooperation between CCAMLR and the Southern Indian Ocean Fisheries Agreement (SIOFA)*, CCAMLR-38/BG/45.

39. Ibid.

40. SIOFA, *CMM 2019/15 Conservation and Management Measure for the Management of Demersal Stocks in the Agreement Area (Management of Demersal Stocks)*.

Tuna

Tuna are among the world's most popular seafood and thus among the most commercially valuable. Tuna is a key resource of the Indian Ocean, accounting for 20% of the global commercial tuna catch (i.e. one million tons) and 16% of the global tuna industry's revenue (i.e. USD 6.5 billion based on the total wholesale price of canned tuna).⁴¹ Fishing effort is not the only pressure on global tuna stocks, as climate change-related impacts are expected to affect tuna biology, ecology, survival and reproductive success.⁴² The effects of fishing and climate variability on tuna stocks are complex and pose significant challenges for sustainable fisheries management and the economic development of countries in the Indian Ocean.

In this context, it is crucial to minimise pressure on tuna stocks and to ensure that all stocks, including those in the Indian Ocean, are carefully managed and regulated. The 16 species of tuna and tuna-like species under the competence of IOTC and CCSBT fall under framework generic measures which do not provide full protection for the sustainable exploitation of species, with many legal loopholes which allow overfishing to continue. About half of IOTC's species of competence are the object of advanced stock management-type measures but some important species remain covered only under framework generic measures.

41. IDDRI (2017), *Indian Ocean tuna fisheries: between development opportunities and sustainability issues*.

42. Dell'Apa A., Carney K., Davenport T., Vernon Carle M. (2018), *Potential medium-term impacts of climate change on tuna and billfish in the Gulf of Mexico: A qualitative framework for management and conservation*, Marine Environmental Research.



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In contrast to the Atlantic and Pacific Oceans, where several species are made up of more than a single stock, the Indian Ocean contains a single stock of every species.⁴³ For example, the southern bluefin tuna, while made up of a single stock, is the only species straddling the AoCs of tuna-RFMOs across the Southern Hemisphere. It is managed by the CCSBT which has competence to regulate the species across its range of distribution. As none of the four species managed by IOTC consists of more than a single stock, nor are any stocks straddling IOTC's AoC, the overall management situation is simpler.

In contrast, the tuna fishing zones of both CCSBT and IOTC in the Indian Ocean overlap. Vessels fishing for albacore and/or southern bluefin tuna in the southern latitudes are active in the same waters to a great extent, with many of these vessels listed on both IOTC and CCSBT RAVs. Of

the 423 fishing vessels listed on CCSBT's RAV (excluding carrier vessels), at least 289 of the same vessels are also listed on IOTC's RAV.⁴⁴ Therefore, at least 68% of all fishing vessels actively targeting southern bluefin tuna in the southern Indian Ocean are also authorised to directly target IOTC species, although this figure is expected to be significantly higher as the CCSBT RAV includes vessels not operating in the Indian Ocean. The distributional ranges of IOTC-relevant tuna species and southern bluefin tuna overlap to a varying degree both in feeding and spawning waters.⁴⁵ The question, therefore arises, of how much of the fishing practiced by vessels only authorised by IOTC is in fact harvesting CCSBT species without a formal authorisation to do so; a question of further relevance when considering that CCSBT country membership is much more limited than that of IOTC.

Another issue is weak or non-existent domestication of IOTC measures by contracting Parties, which leaves some tuna fisheries on the high seas of the Indian Ocean unregulated or poorly regulated in practice. International fisheries law is regulated through two main approaches at the national level: there is either a blanket clause which states that international law applies to flagged vessels; or the law is transcribed and domesticated into national law. The latter is generally the accepted process in the majority of countries, as the former frequently creates constitutional law complexities. Therefore, if a country fails to transpose international law into national law, operators of vessels of that flag State fishing on the high seas have no binding national law applying to their operations. As a result, these fishing activities remain unregulated, regardless of the member status of the flag State with the RFMO – a situation arising in the Indian Ocean, as demonstrated in Case Study 4.

RECOMMENDATIONS:

- All RFMO contracting Parties, particularly those of IOTC, must take urgent steps to domesticate and implement relevant CMMs regulating fishing on the high seas in the Indian Ocean, and to maintain a process to ensure that new measures are rapidly domesticated and implemented. This monitoring can be improved by enhancing transparency in the compliance mechanisms.⁵⁰
- IOTC and other tuna-RFMOs must increase cooperation to develop a traceability system (e.g. electronic catch documentation schemes) for all commercial tuna species, and ensure alignment with other RFMO frameworks to eliminate loopholes and prevent additional burden on private and public sector stakeholders in exporting and importing States.

50. WWF position for the 24th session of the IOTC (2020); EU IUU Coalition (2020), *Achieving transparency and combating IUU fishing in RFMOs*.

THE ROLE OF CATCH DOCUMENTATION SCHEMES

Once tuna products⁴⁶ enter international trade, their ocean of origin and the RFMO under whose authority any given product was managed and harvested loses its importance. A lack of information for consumers enables fish products to be eaten without knowledge about whether the species is overfished. Import control schemes, which can take the form of catch documentation schemes (CDS), gather information on the point of origin, the volume and the species caught throughout the supply chain. This is vital for authorities and consumers alike to understand the origins of imported seafood, and provides data that is vital to improve fisheries management and ensure transparency along the value chain.

A recent assessment has shown that in order to be effective, a CDS must cover all traded harvests of a given species worldwide, regardless of the ocean and/or RFMO of origin.⁴⁷ This implies that a CDS seeking

to deny market access to illegally, unreported or unregulated harvested products of a given species – this being the ultimate objective of any CDS – can only function if all RFMOs with competence for managing individual stocks of a given species implement and operate the scheme between them in an harmonised manner, applying it to all of the trade of all of the products derived from such species, worldwide.⁴⁸

IOTC shares its four major commercial tuna species (skipjack tuna, bigeye tuna, yellowfin tuna and albacore tuna) with the Inter-American Tropical Tuna Commission (IATTC), ICCAT and WCPFC. The report of the first IOTC CDS working group meeting became available in February 2020, and it is positive that the 2019 proposal for a CDS that is electronic, harmonised and operated between tuna-RFMOs is being carried forward as one of two options to be pursued in the future.⁴⁹

43. The more complex situations arise, where the 5 species ICCAT manages fall into 9 individual stocks, or where IATTC and WCPFC have shared management competence for three stocks of two different species (PBT & ALB), requiring complex institutional arrangements for the management of these species throughout their natural range of distribution.

44. RAVs queried on 13th February, 2020. 69 vessels produced name mismatches against the same registration number, and 63 vessels produced registration number mismatches against the same vessel name between IOTC and CCSBT records. Vessels where both name and registration number produce a mismatch between RAVs were not counted, but are likely a given, considering the large number of single mismatches existing between pairs (132 out of 578 records; or 23%).

45. Both tunas are temperate water species, as opposed to the tropical tunas (SKJ, BET and YFT).

46. The term "product" covers tuna in all of its forms, once landed and/or processed, ranging from whole "round" specimens following landing, to canned tuna.

47. EU IUU Coalition (2020), A comparative study of key data elements in import control schemes aimed at tackling illegal, unreported and unregulated fishing in the top three seafood markets: the European Union, the United States and Japan; Hosch, G. (2016), Trade Measures to Combat IUU Fishing: Comparative Analysis of Unilateral and Multilateral Approaches. International Centre for Trade and Sustainable Development, Geneva, Switzerland; Hosch, G. (2016), Design Options for the Development of Tuna Catch Documentation Schemes, FAO Fisheries & Aquaculture Technical Paper no. 596. Rome, FAO.

48. Note that the two currently existing tuna CDS under both ICCAT and CCSBT cover two species of tuna (BFT and SBT) for which both RFMOs, individually, have exclusive and global competence. These are the only two commercially important tuna species for which this situation applies and their schemes are currently under revision.

49. IOTC (2020), Report and documentation of the 3rd meeting of the catch documentation scheme (CDS) working group (WG), Nairobi, Kenya 10-11 February 2020.



CASE STUDY 4 - LARGE-SCALE DRIFTNET FISHERIES

Since 1991, United Nations General Assembly (UNGA) Resolution 46/215 has called for a global moratorium on large-scale high seas driftnet fishing. The IOTC prohibits the use of large-scale driftnets on the high seas in the IOTC area through Resolution 12/12.

However, in Pakistan, gillnet fishing is still practiced to target tuna species. While Pakistan is a member of IOTC, measures have not been domesticated and there is no national program nor national legislation in place to regulate the use of large scale driftnets or to reduce bycatch in gillnet fisheries.⁵¹ While under the federal fisheries Exclusive Fishing Zone (Regulation of Fishing) Act 1975 there is a provision for making legislation to restrict use of any gear or to ban catches of any species, no legislation of this type has been enacted for tuna gillnet fisheries.⁵² As a result, there is no restriction on construction of boats for any general or targeted fisheries using this gear type, no limits on the overall length of the nets, nor any limits on the mesh size of the gillnets. Any fishing by these vessels for tuna species remains, therefore, unregulated.

While the majority of Pakistani vessels using large-scale driftnets operate within their EEZ, analysis of vessel positional data via AIS in the northwest Indian Ocean, together with investigations on the ground, suggest that some vessels do operate on the high seas and, therefore, that unregulated gillnet fishing for tuna is occurring in the high seas zone of the Indian Ocean as well. These activities remain condoned by the flag State despite being illegal from an IOTC CMM perspective.⁵³

Beyond the issue of the resulting unregulated fishing for tuna, these fishers also catch significant quantities of sharks and rays: mainly shortfin mako shark, thresher sharks, silky shark, hammerhead shark, pelagic stingray and mobulid rays.⁵⁴ These fishing activities have detrimental effects on these species of concern and on the broader marine environment, and are in contravention of IOTC Resolution 12/12 and UNGA Resolution 46/2.

Of further concern is the total lack of regulation to restrict incidental or deliberate catching of dolphins, porpoises, whales or any marine birds⁵⁵.

51. Coastal fisheries in Pakistan are governed and managed by provincial governments of two maritime provinces, i.e. Sindh and Balochistan. For this purpose, both Provincial governments have enacted legislation, namely Sindh Fisheries Ordinance, 1980 and Baluchistan Fisheries Ordinance, 1970 and rules made thereunder. Some Amendments have also been made in these ordinances and rules. These legislations lay down procedures for operation of the fishing boats, licensing regimes and various punitive actions for violations of their provisions. They also fail to make provision for any rules relating to tuna fisheries, bycatch or incidental catches in fishing operations. Under provincial wildlife legislations, i.e. Sindh Wildlife Protection Ordinance, 1972 and Baluchistan Wildlife Protection Ordinance, 1974, catching of marine turtles of the genera Dermochelys, Chelonia, Caretta and Eretmochelys, i.e. all leatherback, green or hawksbill, loggerhead and tortoise-shell turtles is banned.

52. WWF-Pakistan has decided to initiate a programme to modify local gillnet boats to use handline, longline and possibly pole and line for catching tuna instead of gillnetting.

53. Taconet, M., Kroodsma, D., & Fernandes, J.A. (2019), *Global Atlas of AIS-based fishing activity - Challenges and opportunities*, Rome, FAO.

54. WWF-Pakistan (2019), Annual report.

55. Moazzam M., Nawaz R. (2014), By-catch of tuna gillnet fisheries of Pakistan: A serious threat to non-target, endangered and threatened species, *Journal of the Marine Biological Association of India* Vol. 56, No.1.



Sharks

Sharks play important roles in marine ecosystems. Their removal through targeted fishing efforts and as bycatch has significant implications for broader ocean ecosystem health. Globally, numerous shark species have undergone significant population declines. As of August 2020, 105 shark species are endangered or critically endangered according to the IUCN Red List, up from 68 in 2014.⁵⁶ Due to their biological characteristics, many sharks are particularly vulnerable to overfishing, as they typically mature slowly, have low reproductive rates and slow population growth. Pelagic sharks are caught throughout all ocean basins, either as target species or as secondary catch in longline, purse-seine and gillnet fisheries when species such as tuna, swordfish and billfish are being targeted. The full scale of declines due to overfishing – primarily by tuna long-liners – has become evident.⁵⁷ Due to their wide-ranging distribution, migratory nature and occurrence in international waters beyond national jurisdiction, many shark species could fall under the remit of RFMOs. In the Indian Ocean, current shark fisheries fall under two different management regimes: as bycatch in tuna fisheries in IOTC and as part of demersal deep-sea fisheries under SIOFA. This leaves many species out of the scope of any regulatory framework to monitor and protect their populations.

Data collection is a challenge, particularly when sharks are internationally traded. Without regulations for data collection and conservation measures, most shark species remain unregulated or insufficiently regulated. In 2017, only 62% of global reported shark catches were recorded by taxonomic grouping, which is not specific enough to determine impacts at species level.⁵⁸ An increasing number of species are now listed on CITES Appendix II, which identifies those species for which trade must be controlled to prevent overexploitation that threatens their survival. This provides an opportunity to improve fisheries sustainability and to adopt or reinforce regulations for their protection

through better data collection and management measures, as well as the legality of catches and international trade in commercially valuable shark species.

Insufficient protection from IOTC

Sharks are an ecologically related species (ERS) to tuna fisheries, however, IOTC has no direct mandate to manage sharks, nor to manage ERS. This undermines the will and responsibility of IOTC Parties to study and to cooperate in maintaining shark populations at levels that permit their long term conservation and sustainable use for food and other purposes.⁵⁹ Nevertheless, ERS do fall under the wider IOTC mandate by virtue of the general applicability of the 1995 UNFSA to conserve and manage highly migratory species.⁶⁰ IOTC's CMMs only cover accidental catches of non-targeted species, in several cases adopting non-retention measures, leaving sharks with few legal provisions for protection or conservation should they become the primary or secondary target species. Bycatch of sharks is thus covered to a certain extent under distinct

56. IUCN red list: <https://www.iucnredlist.org/>.

57. IOTC (2019), Scientific Committee report.

58. Okes, N. and Sant, G. (2019), An overview of major shark traders, catchers and species, TRAFFIC, Cambridge, UK.

59. An amendment of the Annex B of the IOTC Agreement is recommended to solve this impasse

60. UNSFA, Article 5 "(e): In order to conserve and manage straddling fish stocks and highly migratory fish stocks, coastal States and States fishing on the high seas shall, in giving effect to their duty to cooperate in accordance with the Convention: [...] (e) adopt, where necessary, conservation and management measures for species belonging to the same ecosystem or associated with or dependent upon the target stocks, with a view to maintaining or restoring populations of such species above levels at which their reproduction may become seriously threatened"

types of management regimes for fisheries that target tuna (Table 2), with the most specific measure being the ban on all shark finning (CMM 17/05). The oceanic whitetip shark (*Carcharhinus longimanus*) and three species of thresher sharks of the family *Alopiidae* are subject to prohibitions on retention and discard obligations, making them fully protected from duly licensed and registered vessels targeting tuna and, as such, are considered to be covered by a more advanced form of stock management-type rule. However, many species still remain poorly regulated or unregulated without broader impact assessment on the ecosystem (see Table 2).

A Working Party on Ecosystems and Bycatch (WPEB) first met in 2005 and has been advising IOTC on actions to take in this domain since that time. However, compliance with data collection and scientific information remains weak. In 2019, the Scientific Committee gave management advice for a subset of shark species⁶¹ but stock status data was only available for the blue shark⁶² – an exceptional case which may be explained by their consumption in the EU and the associated high standard of importation requirements, which oblige all catch data to be reported. This reflects a vicious cycle where, if countries fail to collect and submit data on sharks, accurate population assessments cannot be made.

Many shark species are now seriously threatened and political will to protect them remains lacking. For instance, India objected to CMM 13/06 on a scientific and management framework on the conservation of shark species caught as bycatch in tuna fisheries, which established that oceanic whitetip sharks (*Carcharhinus longimanus*) may not be retained on board. This measure was expected to lead to a better data reporting system as well as the use of more selective gear to limit instances of bycatch. While RFMOs make decisions on regulating a given issue in a particular manner, it is the responsibility of the contracting Parties to translate these measures into national regulatory frameworks and to subsequently enforce them. The fact that sharks have been regulated and prohibited from being landed under IOTC rules since 2012 has not prevented some contracting Parties from simply refraining from enforcing the agreed ruleset by opting out from these decisions, leaving some shark fisheries without any regulations.

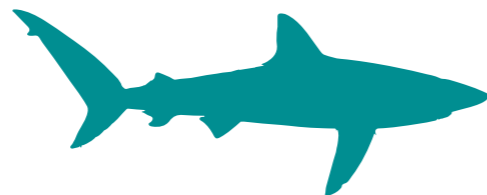
The limited scope for protecting deep-sea sharks in SIOFA

SIOFA excludes a number of species from its AoC which are also not covered by other RFMOs, with pelagic and migratory sharks being one of the most ecologically important and sensitive groups. SIOFA also does not yet provide management measures for a host of species and groups which fall directly under its mandate. In contrast to the AoC of IOTC and CCSBT for species management, SIOFA's AoC only covers a fraction of the Indian Ocean basin. This implies that when a given shark (or other) species that is currently or may in future become managed by SIOFA roams beyond the SIOFA AoC, it can be exploited in a lawful and unregulated manner in the large geographical areas of the Indian Ocean's high sea that is not covered by SIOFA.

Given the seafloor topography of the Indian Ocean, with seamounts not far below the sea level and often considered as biodiversity hotspots, the issue of a limited species and area of competence might affect deep-sea species and their fisheries in the future. This may impair future efforts to effectively conserve and manage other deep-sea sharks which can be simultaneously epipelagic, mesopelagic and bathypelagic, as many sharks traverse wide oceanic ranges in daily cycles. This is the case, for instance, for pelagic species such as blue sharks, as well as for deep-sea sharks that are epi- and mesopelagic.

Even when disregarding the fact that SIOFA's area of competence in the NWIO and eastern Indian Ocean is incomplete, oceanic sharks are explicitly excluded from SIOFA's mandate as highly migratory species under Annex I to UNCLOS, leaving IOTC – an RFMO where they are neither explicitly included nor excluded – as the only de facto option under which pelagic sharks can be conserved and managed in the future. Few fishery resource-specific SIOFA management rules are currently in place, reflecting the recent creation of the Commission. Despite a generic shark protection measure in place under CMM 2019-12 which prohibits Parties from directly targeting 20 species of deep-sea sharks, its generic nature leaves this regulation unable to ensure the management and protection of these species.

Inadequate and insufficient conservation and management regimes for sharks fall alongside weak data collection systems, when they do exist at all. An effective regional framework for the management of shark fishing which follows the guidance provided by the FAO International Plan of Action for Conservation and Management of Sharks is necessary to ensure effective protection and sustainable exploitation of these species. It is critical that RFMO contracting Parties develop and implement a comprehensive, effective and integrated regional framework to end unregulated shark fishing in the Indian Ocean. Until this is achieved, shark fisheries management will remain in a partially regulatory vacuum. As a species which replenishes more slowly, continued unsustainable fishing will leave shark populations in such severe decline that it may be very difficult for them to recover.



IN 2020, 105 SHARK SPECIES WERE LISTED AS ENDANGERED OR CRITICALLY ENDANGERED, UP FROM 68 IN 2014.

RECOMMENDATIONS:

- Amend the IOTC Agreement to provide more coverage to ecologically related species, with direct coverage for sharks as a target species, affording them similar management measures as tuna. Sharks must be recognised as valuable economic, ecosystemic and nutritional resources, and be accorded due CMMs.
- Require more robust recording and reporting of catch and trade data, recognising the need for more “real time” monitoring of such trade. This will ensure that dramatic changes in how particular species are targeted do not occur in the absence of suitable management measures and that they adhere to management arrangements.
- Encourage further research into potential spatial and temporal management to prevent a lack of regulation for bycatch in biodiversity hotspots and to shift coordination between RFMOs from a single species management approach towards a multi-species approach when adopting new CMMs.
- Evaluate the implementation and effectiveness of bycatch CMMs to develop and exchange best practices across tuna-RFMOs; this can be achieved by creating and reinforcing bycatch working groups, such as the existing Kobe Joint tuna-RFMO process which works to harmonise the protection of non-targeted migratory species.
- Improve communication and cooperation between CITES, RMFOs and other relevant bodies active in the Indian Ocean to provide guidance and advice for the CITES-listed species caught within the jurisdiction of each RFMO which can help to reinforce protection rules

61. Blue shark (*Prionace glauca*), Oceanic whitetip shark (*Carcharhinus longimanus*), Scalloped hammerhead shark (*Sphyrna lewini*), Shortfin mako shark (*Isurus oxyrinchus*), Silky shark (*Carcharhinus falciformis*), Bigeye thresher shark (*Alopias superciliosus*), Pelagic thresher shark (*Alopias pelagicus*)

62. IOTC (2019), Scientific Committee report.

63. ICCAT (2019), CMM 19/01, Recommendation by ICCAT On Fishes Considered to be Tuna and Tuna-Like Species or Oceanic, Pelagic, and Highly Migratory Elasmobranchs.

64. ICCAT (2019), ICCAT agreed a new management plan for tropical tunas and to amend the International Convention for the Conservation of Atlantic Tunas, providing a mandate to manage oceanic sharks and rays, Press release.

65. These catch limits for Blue sharks adopted by ICCAT in 2019 represent a world first in establishing international catch limits for sharks.

RFMOs OVERCOMING LEGAL AND POLITICAL BARRIERS TO PROTECT SHARKS

Overall, the management framework for sharks on the high seas in the Indian Ocean is notably incomplete. It is unclear whether IOTC can move forward and start to manage shark species in the same manner in which it manages tuna and tuna-like species, as a target species, in the absence of a clear mandate to do so.

In the Atlantic Ocean, ICCAT addressed the same constraint in 2019, resulting in the recent adoption of CMM 19/01 – Recommendation by ICCAT On Fishes Considered to be Tuna and Tuna-Like Species or Oceanic, Pelagic, and Highly Migratory Elasmobranchs⁶³. This went hand in hand with an amendment of the Convention establishing ICCAT, thus providing the RFMO with a mandate to directly manage oceanic sharks and rays.⁶⁴ Two CMMs were then adopted, setting catch limits for Blue sharks in both the north and south Atlantic.⁶⁵

ICCAT has managed to bring sharks within its mandate in order to directly manage and conserve them. This new legal framework makes contracting Parties more responsible for the management and protection of sharks, thereby mending the holes in the net that lead to unregulated fishing.



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OTHER UNREGULATED FISHERIES AND THEIR DEVELOPMENT ON THE HIGH SEAS



Many other marine species also currently lack regulation in the Indian Ocean and are in need of greater attention and precautionary management rules before any uncontrolled development of their exploitation as resources.

It is important to underline the stark lack of conservation and management measures of small cetaceans in the Indian Ocean, many of which are caught in association with tuna fisheries and thus embody a similar picture as the one on sharks. This situation is highlighted in Case Study 5.



Clupeiformes is the order of ray-finned fish that includes the herring family (Clupeidae) and the anchovy family (Engraulidae). The group, commonly known as small pelagics, includes many of the most important forage and food fish, such as shads, sardines, hilsa and menhadens. Most species eat plankton, which they filter from the water with their gill rakers. These species naturally fall under SIOFA's mandate but are currently not the object of any management efforts.



No single species of crustacean, whether free-swimming or bottom associated, is the object of any current management measures. Locations like the Saya de Malha bank hold potential for such species to occur and to be (or become) the object of targeted fisheries outside of EEZs on the high seas of the Indian Ocean.



Two species of dolphinfish (coryphaenidae) and the family Bramidae (pomfrets), the King Gar and the Shortbill Spearfish are directly excluded from SIOFA's mandate and not included under any other Indian Ocean RFMO mandate. This implies that any present or future development in fisheries for these particular species on the high seas would occur within a setting where no management mandate exists. Dolphinfish are frequently caught as bycatch in tuna purse seine fisheries.

ECOSYSTEM-BASED FISHERIES MANAGEMENT IN VULNERABLE MARINE ECOSYSTEMS

Transition from unregulated to regulated fisheries cannot only occur on paper – to achieve this, flag States must have the means to enforce CMMs. The recent protection of VMEs on the high sea of the Indian Ocean is a valuable example of a successful transition to a regulated fishery.

The VME concept emerged from discussions at UNGA and gained momentum after UNGA Resolution 61/105 in 2007. VMEs constitute areas that may be vulnerable to impacts from fishing activities.⁶⁶ Acknowledging their importance, SIOFA has initiated several measures to protect the habitats

in known VMEs, as well as for the identification, mapping and protection of unknown VMEs. For the latter, these measures include move-on rules, where vessels are required to shift their fishing location if indicators of a VME are present; the indicators generally include a given percentage of certain species being present in the catches.

In 2018, SIOFA designated five VMEs as PAs or no-take zones for deep water bottom fishing. Case Study 6 examines these PAs for recent activity, finding indications of targeted fishing efforts and that significant AIS gaps for several SIOFA-authorized vessels severely limit the potential for any external monitoring of compliance. Furthermore, while the responsibility of flag States to monitor and report on fishing activity related to SIOFA VMEs is relatively clear, the actual execution of monitoring and control duties by some flag States appear to vary and the extent to which these are actually performed is not always clear. The reality is that while the PAs do currently possess a regulatory framework, implementation and data verification overwhelmingly sits with flag States at present and independent third-party oversight is very limited. Regulations should not only be theoretical, but comply with CMMs by contracting Parties. Case Study 6 highlights the risks of transitioning to regulated fisheries if an ecosystem-based management approach is not taken. When fisheries management occurs in silos, gaps remain in how to efficiently manage fisheries and protect associated VMEs.

Since 2006, several additional areas have been identified within the SIOFA territory as being potentially vulnerable and are under further scientific assessment. In light of their potential classification as VMEs, contracting Parties should adopt a precautionary approach to all activities in these areas which give due consideration to ecosystem connectivity and biodiversity corridors across neighbouring RFMOs.

RECOMMENDATIONS:

- Require an active Automatic Identification System on all SIOFA, CCSBT and IOTC authorised vessels.
- Vulnerable marine ecosystems and broader biodiversity hotspots should be protected and managed using a fisheries ecosystem-based approach which goes beyond the management of a single species.
- SIOFA, IOTC and CCSBT contracting Parties should work together to define and connect biodiversity hotspots and protected areas, while bearing in mind that tuna fishery biodiversity hotspots are seasonal, vary in location, are often linked to front systems and that tuna migrate between EEZ boundaries. In support of developing area-based management tools, including marine spatial planning, States must adopt protection measures on migratory corridors and connectivity for species utilising the high seas.

⁶⁶ FAO, Vulnerable ecosystem database, available here: <http://www.fao.org/in-action/vulnerable-marine-ecosystems/en/>

CASE STUDY 5 - WHALES, PORPOISES AND DOLPHINS

In the Indian Ocean, whales have full protection under the International Whaling Commission in the form of a global catch moratorium since 1972. The IWC has global competence for the management of commercial whaling, but does not have any role in protecting whales from fishing bycatch, for example. While it does not have competence for the capture of porpoises and dolphins, it does cover Killer whales (*Orcinus orca*) which belong to the family of dolphins (*Delphinidae*). Whales gain further protection under IOTC CMM 13/05, prohibiting the setting of purse seine nets on cetaceans in all their forms (whales, porpoises and dolphins). Under IOTC, vessel interactions with these species must also be reported.

Dolphin bycatch, specifically, is a very serious issue in the Indian Ocean. While the intentional setting of purse seines on cetaceans is banned (see above), large amounts of bycatch continue to occur in gillnet fisheries across the Indian Ocean. A recent review by Anderson et al. (2020) notes that: "the Indian Ocean tuna gillnet fishery has been effectively unmanaged; it may be the largest unresolved contemporary cetacean conservation and management issue."⁶⁷ A comparative study of ecosystem-based management approaches in tuna fisheries by Juan-Jordá et al. (2018), which also covered the issue of marine mammal bycatch, concluded that IOTC was the worst performing of the tropical tuna RMFOs in this domain.⁶⁸

67. Anderson, C.R., Herrera, M., Ilangakoon, A.D., Koya, K.M., Moazzam, M., Mustika, P.L., Sutaria, D.N. (2020), Cetacean bycatch in Indian Ocean tuna gillnet fisheries, *Endangered Species Research*, Vol. 41: 39–53. <https://doi.org/10.3354/esr01008>

68. Juan-Jordá, M.J., Murua, H., Arrizabalaga, H., Dulvy, N.K., Restrepo, V. (2018), Report card on ecosystem-based fisheries management in tuna regional fisheries management organizations, *Fish and Fisheries*, Vol. 19: 321–339. <https://doi.org/10.1111/faf.12256>



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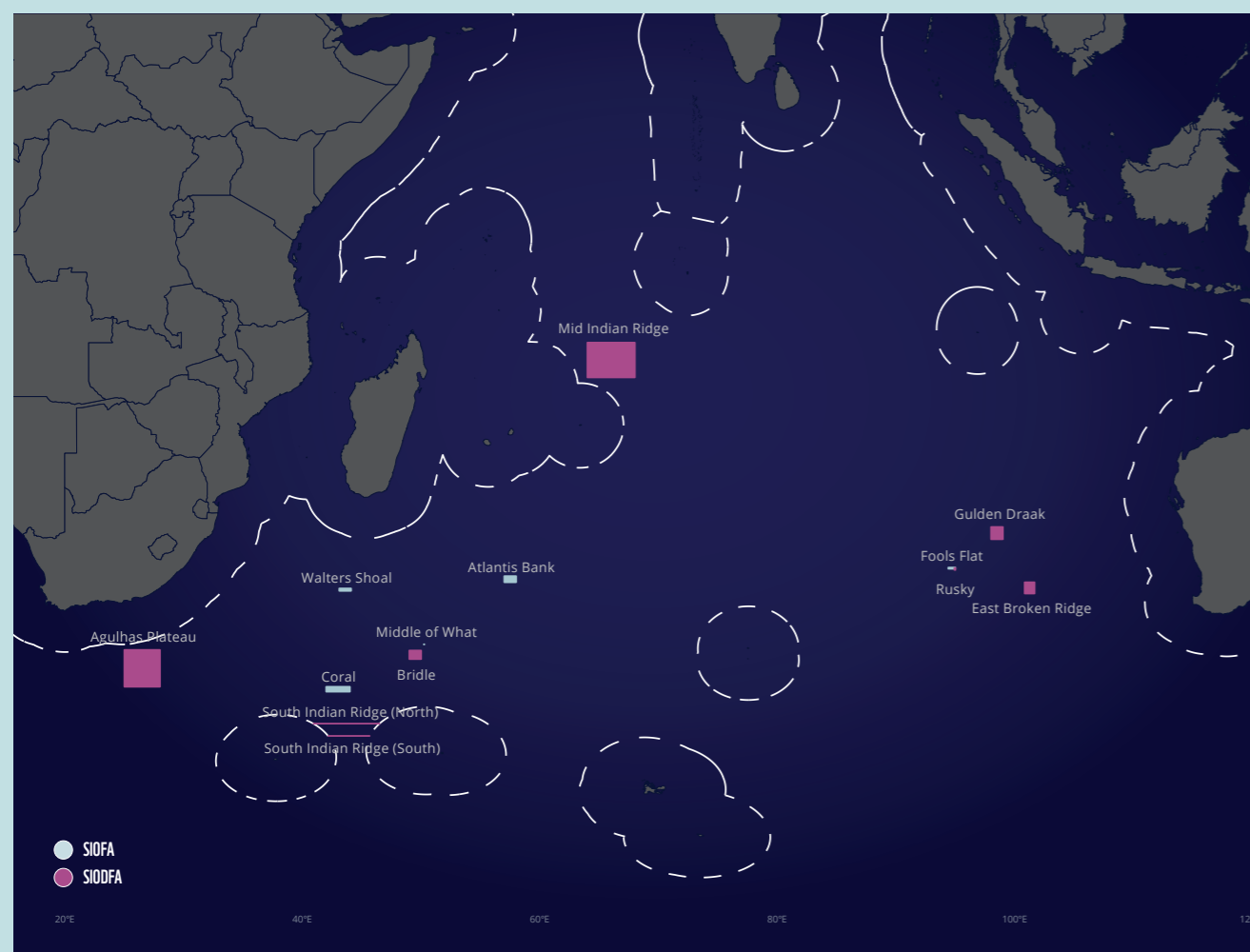
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CASE STUDY 6 – VMEs IN SIOFA: THE GAPS AND RISKS THAT REMAIN FROM TRANSITIONING TO REGULATED FISHERIES

In 2018, SIOFA designated five Vulnerable Marine Ecosystems (VMEs) as Protected Areas (PAs) or no-take zones for bottom-contact fishing. The areas are all in the southern portion of the Indian Ocean (SIO) and are Walters Shoal, Atlantis Bank, Coral Point, Fools Flat and Middle of What.

Figure 7: Location of the five VME PAs designated under SIOFA's mandate and the VMEs identified by the Southern Indian Ocean Deepsea Fishers Association (SIODFA)*

* *SIODFA is an industry association from some fishing operators in the SIO, which has voluntarily banned their members from operating with bottom trawls and dredges in the remaining VMEs not yet protected under SIOFA – suggesting that they should be considered for designation as PAs under SIOFA's mandate.*

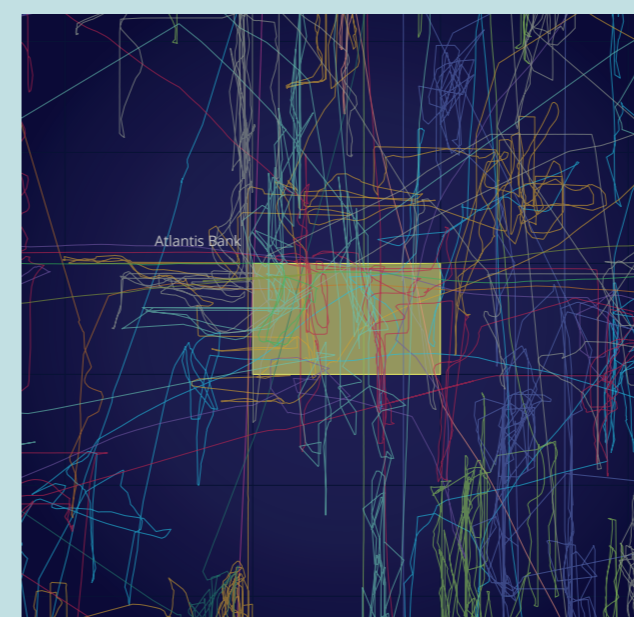


Measuring the benefits of PAs and detecting any potential non-compliant fishing activities may theoretically be done through analysis of the annual reporting to SIOFA by the Parties, which includes catch, effort and spatial distribution data. To a large extent, these data are based on reports from the vessels themselves, which creates a need for third-party verification of this reporting.

One source that can be used for this purpose is VMS data, which allows authorities to track vessel movements and detect whether fishing activity is taking place. While there is currently no SIOFA VMS, the organisation mandates national VMS as one of the key sources of verification for vessels operating in the SIOFA area.

AIS data that is available for the years 2015-2019 indicates that the VMEs saw high levels of vessel traffic, with approximately 20% of vessels present in these areas being fishing vessels. These were primarily in transit between ports or fishing grounds, but some were also identified as engaging in probable fishing operations. While most of this fishing activity is accounted for by IOTC-authorized tuna vessels operating with drifting longlines and with the majority of entries into the PAs occurring as part of gear sets

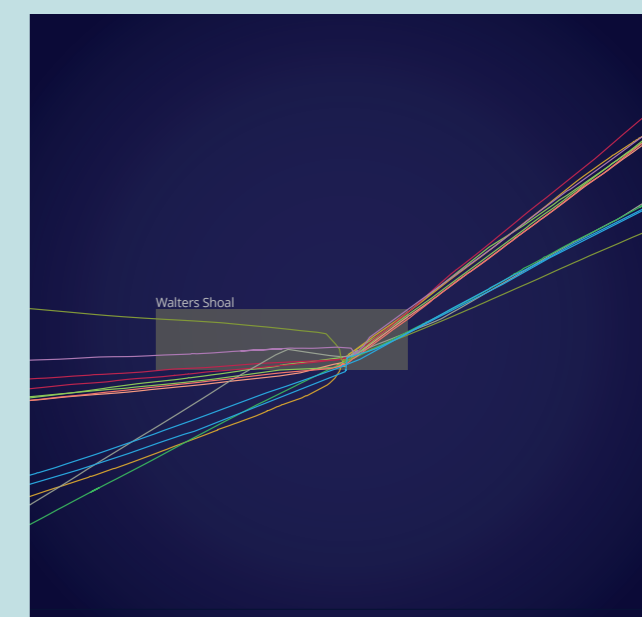
Figure 8: Tracks of drifting longline fishing vessels operating in and around Atlantis Bank in 2019.



Other, more targeted activities also exist in the PAs. AIS analysis identified likely fishing activity taking place over short periods of time (measured in hours or days) by several Chinese fishing vessels while in transit to and from Atlantic squid fishing grounds and their home ports in China. This pattern was seen consistently across several years. The suspected fishing activity took place entirely within a small section of the Walters Shoal PA south of Madagascar and was usually less than two days in duration. The short time periods suggest that this is opportunistic fishing, undertaken either for vessel supplies or, potentially, to target high value species for which there is greater demand from the international seafood market. In any case, this activity represents a potential risk to compliance with the protected area regulations.

and hauls in adjacent areas, some fishing activity appears to be targeted within the PAs themselves. As the VMEs are located in the middle of the tuna fishing grounds in the SIO, this is to be expected and is not illegal (tuna longliners are not conducting deep sea fishing). However, species and habitats are intrinsically connected, and a holistic impact assessment must be undertaken to take biodiversity corridors and connectivity of the ecosystem into consideration.

Figure 9: Tracks of squid vessels in transit to and from fishing grounds off Argentina seen stopping in Walters Shoal in 2019. This activity was seen in previous years as well.



Of 68 vessels authorised to SIOFA in 2019, around 20% are believed to have operated primarily in the SIO, including in areas adjacent to the VMEs. While around 50% of these authorised vessels are detected consistently on AIS, the other 50% are detected only intermittently, with some vessels systematically going 'dark' while at sea, turning AIS on only when entering port or infrequently within fishing grounds. While these vessels should have their VMS switched on at all times, currently, only the flag State is in a position to ensure this. This suggests that SIOFA should mandate the use of AIS on all authorised vessels when operating in ABNJ to increase opportunities for monitoring of this fishery, particularly with regard to compliance with provisionally designated PA regulations.



WAY FORWARD: CLOSING THE UNREGULATED GAPS

Significant geographical areas and many species present on the high seas of the Indian Ocean are insufficiently regulated or not covered by any regulatory frameworks. This puts the entire oceanic food web at risk. As demand for fish resources increases, new fisheries are developing extremely rapidly without due consideration for their impact on the target species or broader ecosystems. Fisheries management issues cannot be dealt with in silos; an ecosystem-based management approach is required to adopt management and protection measures across geographical boundaries. Evaluations which encompass the connectivity of marine ecosystems are necessary to mitigate the risks of instability which could befall the Indian Ocean region if unregulated fishing continues. Flag, market and port States are all responsible to address the regulatory weaknesses which threaten our ocean's resilience.



Important gaps in the coverage of species in the Indian Ocean must urgently be closed to protect the region's interconnected ecosystems.

Disparities between the mandates of IOTC and SIOFA arise where species are not included in the former and are explicitly excluded from the latter.

While oceanic sharks are covered to a limited degree by IOTC management measures, these are extremely limiting from a biological management point of view, offering little more than basic protection under very specific circumstances relating to the management of other species as bycatch. Ultimately, such measures may do little to ensure the sustainable management and protection of any species.

Given SIOFA's limited area of competence and the clear exclusion of these species from its mandate, **IOTC must expand its mandate to cover oceanic sharks directly**, as ICCAT did in 2019 for some shark species. This will allow an increased responsibility to manage and protect sharks, not only as a tuna-related species, but as a species in itself which is critical to both oceanic ecosystems and socio-economic development.

With regards to other species which currently have no protective measures at the level of any international body, it is critical to accelerate the development and implementation of conservation and management measures at SIOFA, and to determine the species for which stock assessment work and management framework development needs to be undertaken. Adopting ecosystem-based fisheries management measures is key to protect biodiversity and for building an ocean that is both resilient to the effects of climate change and able to support robust economies.



As a crucial part of any RFMO's statutory area of competence (AoC), the currently limited geographical coverage of RFMOs must be addressed without delay if these organisations are to fulfil their mandate to successfully manage marine living resources in the Indian Ocean.

Where the geographical coverage of an RFMO appears to be unduly limited, management of key resources is not possible beyond RFMO boundaries for either their natural range of distribution nor for their harvest, undermining the management of stocks which straddle these boundaries.

All efforts must be undertaken to either expand areas of competence for these RFMOs or to empower RFMOs to manage a species beyond their AoC in a manner that emulates the CCSBT model.

These gaps are either being exploited or are at risk of being exploited by fishing operations, as few or no limits on catches or the type of gear being used exist, and little to no effort is currently being applied to record catches or implement science-based management. Cumulatively, this has a tremendous impact on all marine ecosystems, with direct consequences for the regulated, high-value fisheries within and beyond the Indian Ocean. In addition, weak or non-existent transposition of IOTC measures by contracting Parties into national laws means that, in practice, some tuna fisheries on the high seas of the Indian Ocean are still unregulated or poorly regulated. As tuna is a key resource for the region, these irresponsible practices undermine the sustainability fisheries and thus the nutritional and economic security of current and future generations.

While many of the marine species lacking regulation are currently not of commercial significance, this does not mean that they should not be afforded management measures. Targeted fishing efforts can expand rapidly and fishing dynamics are subject to constant change, particularly in the face of a growing global human population and the impacts of climate change which are already bringing changes to our seas. A concrete ecosystem-based and precautionary approach to sustainable fisheries management is urgently needed.



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RECOMMENDATIONS TO END UNREGULATED FISHING ON THE HIGH SEAS OF THE INDIAN OCEAN

1

All RFMO Parties with an interest in Indian Ocean fishery activities must harmonise management measures to break down the compartmentalisation of fleets operating under different RFMO regimes. Compartmentalisation results in different rules for different operators under different RFMO frameworks, as well as discrepancies for fleets operating under different frameworks simultaneously. This creates additional burdens for vessel operators to comply with multiple measures, and can create outright incompatibilities between monitoring and data collection systems. Addressing these shortcomings removes incentives for vessel operators to engage in unregulated fishing practices.

2

All RFMO Parties must commence discussions to expand their mandate to cover the joint management of species that are not targeted by fisheries to minimise instances of bycatch, giving wider ocean ecosystems and their interconnected nature due consideration. For instance, species such as squid are ecologically tied to the sustainable management of both tuna fisheries and other marine mammals as a source of prey. An ecosystemic view to fisheries management is critical to ensuring the longevity of the industry and oceanic health for generations to come.

3

States, either alone or collectively as members of relevant global, regional or sub-regional bodies, should establish a standing regional cooperation arrangement for the Indian Ocean. This arrangement should involve all relevant States and bodies and, among other matters, be tasked with identifying and studying poorly regulated fisheries, and proposing solutions that States and stakeholders can implement. **These solutions should include the implementation of ecosystem-based approaches to fisheries management within a broader integrated oceans management framework**, with a view to identifying connectivity corridors for migratory species within which effective protection measures can be taken to secure conservation outcomes. Relevant bodies would include regional fisheries bodies, including those with regulatory responsibilities such as IOTC, SIOFA, CCSBT and CCAMLR, as well as UNEP-supported Regional Seas Organisations and global bodies with relevant mandates such as the Convention on Biological Diversity, CITES, the Convention on Migratory Species, IWC, FAO and IMO.

4

RFMO Parties must urgently adopt harmonised and real time traceability tools, including electronic catch documentation schemes, that verify the legality and the sustainability of the seafood value chain from point of catch to point of sale. Universal adoption and implementation of traceability tools will enhance data collection, contributing to more robust fisheries management and provide a gateway for new and expanding fisheries to enter the global fisheries market while safeguarding marine resources for generations to come. Important market States such as the EU, Japan, the USA and China must ensure a transparent supply chain to remove outlets for IUU products to enter the international seafood market.

As unregulated fishing in the Indian Ocean targets species throughout the marine food web, the vitality of the species that form our regulated fisheries are put at risk. Due to the inextricable links across our ocean's food web, all of these species represent essential sources of revenue and support the livelihoods of millions of people across the Indian Ocean region. Port and Market States have a responsibility to ensure that their consumers, importers, transshippers, buyers, and other services suppliers are aware of the detrimental effects of doing business with vessels identified as engaged in unregulated fishing. Policy makers must embrace bold and ambitious approaches to fisheries management, adopting an ecosystem-based approach within a better coordinated institutional and regulatory environment across regional bodies.

Unregulated fishing must be identified, addressed and eliminated. Business as usual, including the development of new and major fisheries in a regulatory vacuum, cannot continue without incurring major ecosystem disruptions that may be felt across all marine ecosystems with dire impacts to economies and societies tied to our ocean. Robust measures must be taken in upcoming RFMO meetings to urgently address unregulated fishing and increase the resilience of oceanic species and ecosystems. This will create the capacity for our ocean to recover from decades of unsustainable activities and the ability to adapt to new conditions brought on by climate change.



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