



**MEMORANDUM OF UNDERSTANDING
ON THE CONSERVATION OF
MIGRATORY SHARKS**

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2nd Meeting of the Advisory Committee (AC2)
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Agenda Item 6

**EFFECTIVENESS OF MARINE PROTECTED AREAS FOR THE CONSERVATION OF
MIGRATORY SHARKS AND RAYS**

SPATIAL MANAGEMENT; SPATIAL DATA AND DATA GAPS, CLARIFICATION OF TERMS

(Prepared by the Chair of the Advisory Committee)

Background

1. As stated in the Conservation Plan of the Memorandum of Understanding on the Conservation of Migratory Sharks (Sharks MOU) under Activities 9.1 (Objective C), Signatories are requested to “designate and manage conservation areas, sanctuaries or temporary exclusion zones along migration corridors and in areas of critical habitat, including those on the high seas in cooperation with relevant RFMOs and RSCs where appropriate, or take other measures to remove threats to such areas”.
2. The mandate of the Advisory Committee (AC) is to “serve and assist the Signatories in the implementation of the Memorandum of Understanding including the Conservation Plan”, by providing expert advice and making recommendations on potential initiatives to the Secretariat and the Signatories. In addition, the Conservation Working Group may also complement the AC with expertise in areas where it is needed, such as fisheries, population ecology and habitat use.
3. In order to enable the AC to provide recommendations to MOS3 on the implementation of Activity 9.1, the Chair of the AC has provided an overview of the existing MPAs and sanctuaries specifically designed for sharks and rays.

Spatial Management Approaches

4. Spatial management approaches often have limited benefits for highly mobile and migratory species (Ketchum et al., 2014; Espinoza et al., 2015b; Heupel et al., 2015). As reported by Espinoza et al. (2015a), even in systems with semi-isolated coral reefs, smaller species with strong site attachment are likely to gain more protection from MPAs than larger, wider-ranging predators. This is also likely to vary during ontogeny and with increasing reef isolation. According to Espinoza et al. (2015a), spatial protection alone is unlikely to be an effective strategy for wide-

ranging and migratory species. The high individual variability in residency and large-scale connectivity of some shark species creates additional challenges for their management across multiple jurisdictions. Other alternative measures (e.g., limited allocation of fishing licenses, total allowable catch, size or bag limits, restricted take or protection of high risk species, gear modifications, bycatch reduction devices, or better reporting mechanisms) are needed to improve the protection and sustainability of populations (Heupel et al., 2015) in conjunction with Marine Protected Areas (MPAs).

Interestingly, some studies argued that MPAs in isolated and remote islands (e.g. Cocos, Malpelo and Galapagos) appear to have important conservation value for migratory species such as Scalloped Hammerhead *Sphyrna lewini* and Galapagos Shark *Carcharhinus galapagensis* (Bessudo et al., 2011; Salinas de León et al., 2016). However, as demonstrated by recent studies, the benefits from isolated-remote MPAs will depend on the level of enforcement and the implementation of more sustainable fishing practices (Arias et al., 2014; White et al., 2015; Arias & Pressey, 2016; López-Garro et al., 2016).

MPAs for Sharks

5. Nations have established MPAs, which restrict some fishing activities in defined areas, in order to aid fisheries management and conservation. MPAs for sharks range from small-targeted coastal MPAs up to vast MPAs that cover both coastal and pelagic areas. The “super” MPAs, termed shark sanctuaries, are a collection of conservation measures in the form of a moratorium on both commercial shark fishing and the export of shark products in their Exclusive Economic Zone (Davidson, 2012; Pew Environmental Group, 2013; Dulvy, 2013). Since 2015, 29 per cent of total ocean area protected was designated exclusively for shark conservation (Davidson and Dulvy, 2017; www.mpatlas.org).

6. Shark sanctuaries have been criticized because they are limited to States with certain socioeconomic features (e.g., higher dependence on dive tourism and/or ecotourism), may have insufficient enforcement, may lead to overexploitation and degradation of other resources and habitats not included in the shark sanctuary regulations, and a diversion of resources from other fisheries management and conservation measures. In response to these criticisms, it has been argued that this type of moratorium can in fact be more easily enforced than other conservation tactics through trade export monitoring, and effectively preventing overexploitation. There is considerable debate on this subject (e.g. Davidson, 2012; Chapman et al., 2013).

7. The establishment of very large MPAs and shark sanctuaries has far outpaced research on their ecological effectiveness. Reviews and commentaries have highlighted both the potential benefits of large MPAs (Koldewey et al., 2010; Lubchenco and Grorud-Colvert, 2015) and scepticism of their utility (Dulvy, 2013; Hilborn, 2015). Ward-Paige (2017) reviewed the current ‘Shark Sanctuaries’, summarizing commonalities and differences (**Annex**). Catch data were used to evaluate the impact current shark sanctuaries could have on shark catch, foreign fleets, trade and abundance. Although shark sanctuaries may have the intended effect of reducing shark mortality, there is a need to address bycatch within shark sanctuary regulations, and to collect baseline data that can be used to monitor sanctuary effectiveness.

Effectiveness of MPAs for shark conservation

8. Some studies have found that smaller-scale MPAs have benefited certain inshore shark species. For example, Espinoza et al. (2014) found that the relative abundance of sharks was significantly higher in non-fished sites of the Great Barrier Reef Marine Park, highlighting the conservation value and benefits of the potentially no-fished areas as tools of MPAs. Caribbean Reef Sharks *Carcharhinus perezii* which exhibit high site fidelity at Glover's Reef Marine Reserve, Belize (Bond et al., 2012), had a stable population within this area for more than a decade, which suggests that marine reserves can be an effective conservation tool for reef-associated shark species (Bond et al., 2017). Boncuk Bay (Turkey, Mediterranean) may be an important nursery area (and critical habitat) for Sandbar Sharks *Carcharhinus plumbeus*. For this reason, a Shark Protection Area (SPA) was established in the bay where the Sandbar Shark population was routinely monitored by underwater visual observations (Filiz & Gulsahin 2015).

9. Current studies suggest that MPAs are likely to be site- and species-specific, with species that are more reef-oriented or philopatric to certain areas benefiting most from areas prohibited to fishing, even for some species that are highly migratory. The spatial patterns of residency and site fidelity of Tiger Sharks *Galeocerdo cuvier* within the Galapagos Marine Reserve suggest that the presence of a predictable source of prey and suitable habitats could reduce the spatial extent of this large shark which is highly migratory in other parts of its range (Acuña-Marrero et al., 2017).

10. On a broader scale, Davidson and Dulvy (2017) examined how much area is needed to expand the current MPA network to avert the extinction of those species listed in the IUCN Red List as threatened (Critically Endangered, Endangered, and Vulnerable). The authors found that expanding the MPA network by 3 per cent in 70 nations would cover half of the geographic range of 99 of the most imperiled endemic sharks and rays.

Recommendations to MOS3 on criteria for effective MPAs

11. In order to implement activity 9.2 efficiently, Signatories would require clear guidance from the AC on the requirements to make MPAs effective tools for the conservation of migratory sharks and rays. Suggestions should be made in relation to the species concerned, as well as the size, geography, location, status, governance and monitoring/control of MPAs. It might be useful to identify good practice examples, where MPAs have proven to protect migratory sharks and rays efficiently and to identify the key features for success and to translate those to the conditions in other countries and regions. Another important aspect would be to examine which migratory species would benefit most from the establishment of MPAs.

12. The Guidelines for applying the IUCN Protected Area Management Categories to MPAs, which are provided as [CMS/Sharks/AC2/Inf.2](#), are aimed at ensuring that the IUCN categories for the management of Protected Areas can be effectively applied to all types of MPAs, as well as to any marine components of adjoining terrestrial protected areas, provided a site meets the IUCN definition of a protected area. The AC might consider taking these guidelines into account for the development of criteria to make MPAs and their management efficient for the conservation and management of sharks and rays.

13. The recommendations of the AC will be submitted to the 3rd Meeting of the Signatories (MOS3) in 2018.

Action requested:

The Advisory Committee is requested to:

- a) provide recommendations to MOS3 with regard to action 9.1 in the Conservation Plan “Designation and Management of MPAs”.

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Annex: A summary of current shark sanctuaries, from Ward-Paige (2017).

Table 1

Key features of present Shark Sanctuaries. Included are states that have amendments to national fisheries acts that prohibit targeted commercial shark fishing at a minimum, and have language aiming to make it unlawful to possess, sell or trade sharks or their parts. EEZ - Exclusive Economic Zone covers a band from shore up to 200 nm, where each has rights to explore and exploit, conserve and manage resources.

Country	EEZ area (km ²)	Shelf area (km ²)	Human Population	Urbanization (%)	Ocean Density (per km ²)	GDP (PPP; million)	GDP (per capita PPP)	Exports (million)	Dive tourism (number of dive shops)	Exports (commodities)	Industries
Bahamas	628,026	117,344	324,597	83	0.517	\$9166	\$25,200	\$976	15	Crawfish	Tourism, maritime industries, transshipment
British Virgin Islands (UK)	80,111	3093	33,454	46	0.418	\$500	\$42,300	\$25	7	Fresh fish	Tourism
Caribbean Netherlands	24,866	437									
Cook Islands	1,960,027	1213	9838	75	0.005	\$244	\$12,300	\$3	4	Fish, pearls and pearl shells	Tourism, fishing
French Polynesia	4,771,088	27,653	282,703	56	0.059	\$7150	\$26,100	\$230	7	Cultured pearls, mother-of-pearl, shark meat	Tourism, pearls
Honduras	218,804	61,050	8,746,673	55	39.975	\$41,060	\$4900	\$7759	25	Shrimp, lobster	NA
Maldives	916,011	31,488	393,253	46	0.429	\$5191	\$14,900	\$301	26	Fish	Tourism, fish processing, shipping, coral and sand mining
Marshall Islands	1,992,022	20,891	72,191	73	0.036	\$175	\$3200	\$54	6	Fish	Tuna processing, tourism, seashells, pearls
Micronesia (Federated States of)	2,992,415	26,076	105,216	22	0.035	\$306	\$3000	\$88	4	Fish	Tourism, specialized aquaculture, craft items (shell)
New Caledonia (France)	1,422,596	52,754	271,615	70	0.191	\$11,100	\$38,800	\$1565	6	Fish	NA
Palau	604,253	3467	21,265	87	0.035	\$272	\$15,100	\$19	9	Shellfish, tuna	tourism, craft items (shell, pearls)

EEZ and shelf area from Sea Around Us project – from Pauly and Zeller [24].

Human population, Urbanization, GDP, Exports, Industries – from Central Intelligence Agency Worldfact Book (CIA [25]).

Dive tourism – derived from Google Searches for “Dive Shop”, “Scuba”, “Diving” in each country or region.

Ocean density – calculated as human population per EEZ area.

Table 2
Summary of amendments defining 'shark sanctuaries'.

Descriptor	Bahamas	British Virgin Islands	Caribbean Netherlands	Cook Islands	French Polynesia	Honduras	Maldives	Marshall Islands	Micronesia	New Caledonia	Palau
Year	2011	2014	2015	2012	2012	2011	2010	2011	2015	2013	2009
Document title	S.I. No.64 of 2011	Virgin Islands Fisheries (Protected Species) Order, 2014	Declaration*	Marine Resources (Shark Conservation) Regulations 2012	Order no. 396 CM (2006); no. 1784 CM (2012)	Agreement No. 002-2010	(1) NO: FA_D2/29/2009/212; (2) NO:30-D2/29/2010/32; (3) NO: (IUL)138/1/2011/42	Bill No: 100ND1	No. 18-134, C.D.1, C.D.2; C.B. 19-86	No. 2013-1007/GNC	Senate Bill No. 8-105
Reason provided?	No	No	Yes	No	No	Yes	Yes	Yes	Yes	No	Yes
Local reason?	NA	NA	Yes	No	NA	No	Yes	Yes	No	NA	No
EEZ?	Yes	Yes	Yes	Yes	Not stated	Yes	Yes	Yes	Yes	Yes	Yes
Sharks defined?	No	Yes	Yes	Yes	Yes	No	Yes	No	Yes	Yes	No
Rays included?	NA	Yes	Yes	Yes	No	NA	Yes	NA	Yes	Yes	NA
Fines?	Yes	Yes	No	Yes	No	No	No	Yes	Yes	No	Yes
Other penalties?	No	No	No	Yes	No	Yes	Yes	Yes	No	No	Yes
Research permit exemptions?	Yes	Yes	Yes	No	No	No	No	Yes	Yes	Yes	No
Fishing exemptions?	No	Yes	No	No	No	No	No	Yes	No*	No	Yes
If exemptions, species exceptions?	NA	Yes	NA	NA	NA	NA	NA	Yes	NA	NA	No
Fishing ban on sharks?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Finning specified?	No	Yes	Yes	Yes	No	No	Yes	Yes	Yes	Yes	Yes
Possession ban?	Yes	Yes	Yes	Yes	No	No	No	Yes	No	Yes	Yes
Trade ban?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	No	Yes	Yes
Sale ban?	Yes	Yes	Yes	Yes	Yes	Yes	Yes*	Yes	Yes	Yes	Yes
Transshipment specified?	No	No	Yes	Yes	No	No	No	Yes	Yes	Yes	Yes
Provisioning (chumming) ban?	No	Yes	No*	Yes	Yes	No	No	No	No	Yes	Yes
Bycatch release clarity?	Yes	Yes	Yes	Yes	Yes	No	No	Yes	Yes	Yes	Yes
Gear restriction?	No	No	Yes	Yes	No	No	No	Yes	Yes	No*	No
Status/monitoring reports required?	No	No	Yes	No	No	No	No	No*	No	No	Yes

*Maldives – presumed 'sale' ban as it is "illegal to catch, keep in captivity, trade or harm any of the animals listed".

*Marshall Islands – there is mention of 'monitoring and surveillance of the vessels and fleets', but not in monitoring of sharks or their population status.

*New Caledonia – there is mention of "net cutters to be used to free accidentally caught animals" – not reduce catch.

*Federated States of Micronesia – no exceptions for subsistence or other shark fishing, but the law says "It shall be unlawful to purchase, offer for sale or sell sharks or shark parts, including shark fins which have been removed on board a vessel, transhipped or landed in contravention of this section", where this section refers to a "fishing vessel originated from FSM", not necessarily by those originating from elsewhere (imports). Note: Fishing vessel is defined as "any vessel, boat, ship, canoe, or other craft, which is used for, equipped to be used for or of a type that is normally used for fishing..."

*Caribbean Netherlands – Not the entire EEZ of the Netherlands, but the entire EEZ of Bonaire, Saba and Sint Eustatius. "Declaration for the establishment of a Marine Mammal and Shark Sanctuary in the Caribbean Netherlands".