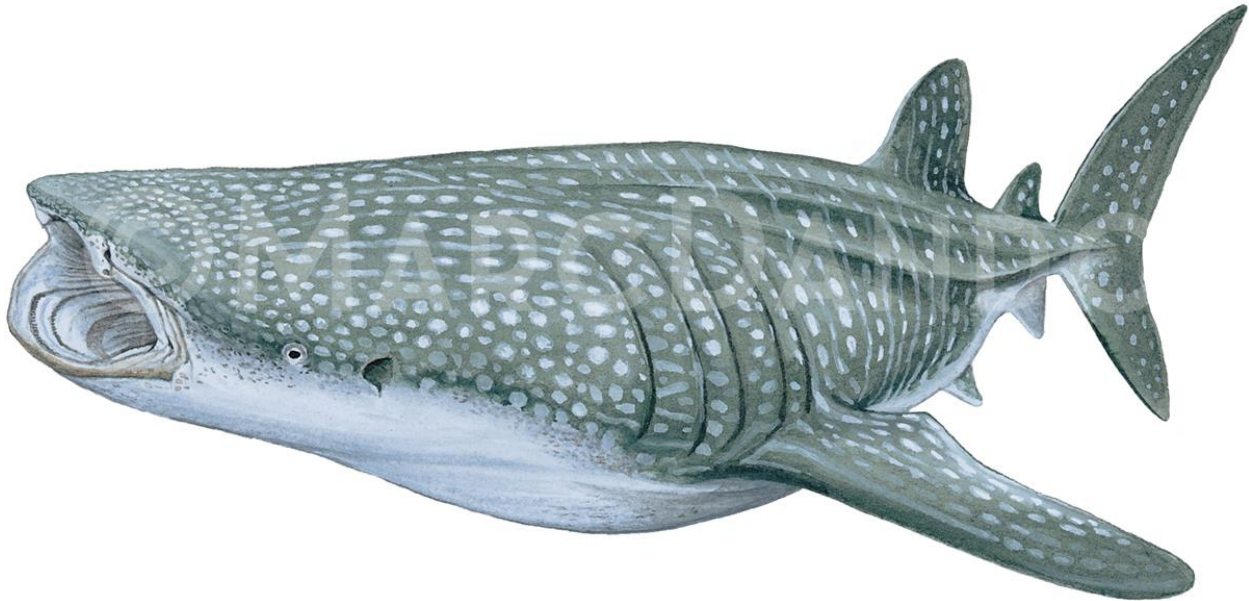


Memorandum of Understanding on the Conservation of Migratory Sharks

Whale Shark Fact Sheet



Class:	Chondrichthyes	Whale shark
Order:	Orectolobiformes	Requin-baleine
Family:	Rhincodontidae	Tiburón ballena
Species:	<i>Rhincodon typus</i>	

Illustration: © Marc Dando

1. BIOLOGY

The Whale shark (*Rhincodon typus*) is the world's largest living fish (<20m), found globally in tropical and warm temperate waters (Chen 2002; Rowat & Brooks 2012). Coastal feeding aggregations are known from these filter feeders, where they exploit seasonal productivity of pelagic invertebrates, fish spawning events, and small schooling fishes. Although encounters are rarely associated with surface temperatures below 21°C, whale sharks are capable of withstanding temperatures as low as 4.2°C during dives to up to 1,900 m (Colman 1997; Duffy 2002; Afonso et al. 2014; Tyminski et al. 2015). Their reproductive ecology is poorly understood but associated with slow growth and late maturity and therefore a limited reproductive capacity.

2. DISTRIBUTION

Whale sharks are distributed *circum-tropically* from approximately 30°N to 35°S with seasonal variations (Rowat & Brooks 2012; Sequeira et al. 2014). Several aggregation sites are distributed over all three ocean basins, with major subpopulations in the Atlantic Ocean and Indo-Pacific

(Sequeira et al. 2013). Nonetheless, evidence of the connectivity of the Atlantic and Indo-Pacific subpopulations remains contradictory but are considered as functionally separated by the latest IUCN species assessment (Sequeira et al. 2013; Vignaud et al. 2014; Pierce & Norman 2016).



Figure 1: Distribution of *Rhincodon typus*, courtesy of IUCN.

3. CRITICAL SITES

Critical sites of whale sharks are comprised of aggregation sites, typically dominated by specific age classes (juvenile males in coastal feeding aggregations, and adult sharks at seamounts and volcanic islands) and migration corridors. Thus, they are critical for the species and urgently need to be protected from targeted and incidental fisheries. Known sites, which are important feeding, pupping or mating grounds comprise inter alia.

4. POPULATION STATUS AND TRENDS

Two global-scale genetic studies on whale sharks have estimated genetic effective population size. Castro et al. (2007) used mitochondrial DNA to estimate current genetic effective population size to be 119,000 – 238,000 sharks. Schmidt et al. (2009) estimated genetic effective population size to be approximately 103,000. An estimated 75% whale sharks inhabit the Indo-Pacific, while 25% occur in the Atlantic. Overall, the global population experienced an estimated decline of 50% over the last three generations (75 years). (Pierce & Norman 2016). In addition to the decline in abundance, a decline in mean total length was also reported from a number of locations. The current IUCN Red List status for the global populations for whale sharks is Endangered (Pierce & Norman 2016)¹.

Estimated Decline	Region	Time Period	Reference
ATLANTIC			
≥30%	Whole Atlantic	Last 75 years	Pierce & Norman 2016
~70%	Western Africa	1980 - 2010	Sequeira et al. 2014
INDO-PACIFIC			
50 to 63%	Whole Indo-Pacific	Last 75 years	Pierce & Norman 2016
~66%	Western Indian Ocean & Central	1991- 2007	Sequeira et al. 2013
50%	Western Central Pacific	2003 - 2012	Harley et al. 2013

¹ See the IUCN website for further details on the population assessment: <http://www.iucnredlist.org/details/19488/0>.

Estimated Decline	Region	Time Period	Reference
> 79%	Tofo, Inhambane, Mozambique	2005 - 2016	Rohner et al. 2013; S Pierce unpubl. data.
~92%	Andaman Sea, Thailand	1992 - 2001	Theberge & Dearden 2006
40% (controversial)	Ningaloo Reef, Western Australia	1995 - 2004	Bradshaw et al. 2008
~60%	Pamilacan, Philippines	1993 - 1997	Alava et al. 2002
~60%	Guiwanon, Philippines	1993 - 1997	Alava et al. 2002
~80%	Hongchun Harbour, Taiwan, China	1980s - 1995	Chen & Phipps 2002
~50%	Taiwan	1997 - 2002	Chen & Phipps 2002

5. THREATS

- **Fisheries:** Whale sharks, incidentally captured in tuna purse seine or gillnet fisheries, are believed to have a predominant impact on a populations level than targeted fisheries (Pierce & Norman 2016). Although the current large-scale fisheries in southern China, where whale sharks are routinely captured and retained when sighted, are of major concern (Li et al. 2012).
- **International trade:** Recent surveys indicated that whale shark fins are demanding high prices, which could lead to increased targeted fisheries and trade (Li et al. 2012).
- **Ship strikes:** Whale sharks are exposed to the threat of vessel strikes due to their frequent feeding behaviour close to the surface. Propeller injuries are commonly recorded during monitoring programs (Rowat et al. 2007; Speed et al. 2008; Fox et al. 2013). However, the total scope of this issue remains largely unexplored.
- **Climate change:** Climate change might have adverse effects on prey availability, ocean acidification and currents. The dimension of these effects and how whale sharks will manage to cope with them remains uncertain.
- **Pollution:** Environmental pollution events occurring in whale shark hotspots, such as the Deepwater Horizon oil spill in the Gulf of Mexico could have population level impacts (McKinney et al. 2012). As filter feeding organisms, they are likely to be affected by high concentrations of microplastic pollution (Fossi et al. 2017).
- **Tourism:** Tourism activities may increase the risk of vessel strikes, local disturbance from interference, crowding or provisioning.

6. KEY KNOWLEDGE GAPS

The existing knowledge about basic facts concerning their life history traits, reproductive ecology or population size of the world's largest fish is still very limited, although significant progress has been made compared to other species of sharks. Great uncertainty can be found when looking at connectivity between populations and trends. Apart from biological knowledge gaps, the impact of threats, like harvest & trade level trends, frequency of vessel strikes, or impact of climate change & pollution need more science and fisheries-based attention.

7. KEY MANAGEMENT AND CONSERVATION GAPS

- A number of Range States that are Signatories to the Sharks MOU and/or Parties to CMS do not provide legal protection for whale sharks or establish sufficient enforcement.
- Regional/multilateral cooperation is lacking.
- Some RFBs have not agreed on any measures for whale shark protection (International Commission for the Conservation of Atlantic Tunas).
- Existing laws & measures for whale shark protection lack enforcement.
- Support for scientific research and monitoring is sparse.
- No mitigation for gillnets fisheries has been put in place by IOTC.

8. RECOMMENDATIONS FOR CONSERVATION AND MANAGEMENT ACTION

A multifaceted approach is required to address the management and conservation gaps for whale sharks. Sharks MOU Signatories and other Range States are encouraged:

a) Incorporate conservation measures for whale sharks into national legislation of all Parties/Signatories (in line with CMS Appendix II & the Objective of the Sharks MOU)

- Evaluate & revise the current implementation/compliance with CITES Appendix II obligations and RFBs/RFMO measures;
- Make effective enforcement a high priority;
- Adopt the Port State Measures Agreement and Implement port-state controls;
- Conduct market surveys and patrols;
- Patrol in protected areas;
- Prosecute exporters.

b) Improve the understanding of whale sharks through strategic research, monitoring and information exchange

- Investigate whale shark aggregation sites, seasonality, population connectivity & migrations to support development of spatial fisheries management;
- Assess the impacts of bycatch, climate change & pollution on whale sharks;
- Develop capacity in research, data collection & monitoring;
- Address data gaps in biological knowledge (life history parameters, reproductive ecology) of whale sharks;
- Conduct long-term monitoring of whale shark populations;
- Share research results and expertise with other stakeholders/Range States/Sharks MOU Secretariat.

c) Improve multilateral cooperation among regions & RFBs

- Communicate your actions to the public and other Range States;
- Increase awareness about the CMS Sharks MOU in the South-east Asian region by highlighting the benefits whale shark conservation brings to countries and communities;
- Engage neighboring countries, including non-Signatory Range States to protect whale sharks and encourage their integration in conservation approaches (e.g. via joint workshops);
- Cooperate with RFBs and RSCs on:
 - Developing and supporting proposals for minimum on board observer coverage on commercial shipping lines & fishing vessels to gain information on vessel strikes, bycatch & fisheries interactions;
 - Collating information on bycatch & fisheries interaction to assess the level of impact;
 - Developing potential bycatch mitigation strategies;
 - Supporting the ban of setting of purse-seine nets around whale sharks by ICCAT.

d) Minimize interactions between fisheries and whale sharks

- Collect information on the scale of bycatch and fisheries interaction to assess the level of impact on whale sharks & any potential mitigation strategies;
- Introduce spatio-temporal gear restrictions around whale shark aggregation sites;
- Adopt & promote safe release and handling guidelines;
- Promote data reporting, safe release & prohibition requirements;

- Encourage IOTC to devise mitigation strategies for gillnet fisheries;
- Encourage ICCAT to develop a recommendation on the use of FADs, which would include recommendations for the entanglement of whale sharks.

e) Improve/implement national fisheries reporting

- Support proposals for Establish a reporting scheme for whale sharks;
- Standardize species-specific bycatch reporting scheme (national fisheries & RFMOs);
- Disseminate identification materials;
- Train observers (customs officers, scientists and NGOs).

f) Support development of alternate livelihoods for communities reliant on Whale shark fisheries

- Develop & implement unified guidelines for sustainable whale shark tourism (support Philippines with Concerted Actions proposal);
- Promote non-consumptive usage, sustainable fisheries & aquaculture;
- Assist with raising capital for expenses of implementation.

g) Raise awareness about the threats to whale sharks and reduce the demand for fins

- Inform the public about the need of shark conservation via educational, social media and local outreach campaigns;
- Develop science-based campaigns for demand reduction;
- Highlight the threats posed to whale sharks & health risk of the consumer (heavy metals).

9. LEGAL INSTRUMENTS

Instrument	Description
Cartagena Convention Convention for the Protection and Development of the Marine Environment of the Wider Caribbean Region	Annex III: Parties may regulate the use of these species of flora and fauna in order to ensure and maintain their populations at the highest possible levels.
CCSBT Commission for the Conservation of Southern Bluefin Tuna	CCSBT encourages both Members and Cooperating Non-Members to comply with a variety of binding and non-binding measures in order to protect species ecologically related to Southern bluefin tuna, including sharks.
CITES Convention on International Trade in Endangered Species of Wild Fauna and Flora	Appendix II: Species not necessarily threatened with extinction, but in which trade must be controlled in order to avoid utilization incompatible with their survival.
CMS Convention on the Conservation of Migratory Species of Wild Animals	Appendix I: Migratory species threatened with extinction; CMS Parties strive towards strictly protecting these species, conserving or restoring the places where they live, mitigating obstacles to migration and controlling other factors that might endanger them.
	Appendix II: Migratory species that have an unfavourable conservation status and need or would significantly benefit from international cooperation; CMS Parties shall endeavour to conclude global or regional agreements to benefit these species.
FAO	IPOA Sharks: International Plan of Action for Conservation and Management

Instrument	Description
Food and Agriculture Organization	of Sharks
IATTC Inter-American Tropical Tuna Commission	Res. C-16-01: Amendment of resolution C-15-03 on the collection and analysis of data on fish-aggregating devices Res. C-16-04: Amendment to resolution C-05-03 on the conservation of sharks caught in association with fisheries in the eastern Pacific Ocean Res. C-16-05: Resolution on the management of shark species
IOTC Indian Ocean Tuna Commission	Res. 13/05: On the conservation of Whale Sharks (<i>Rhincodon typus</i>) Res. 13/06: On a scientific and management framework on the conservation of sharks species caught in association with IOTC managed fisheries Res. 15/09: On a fish aggregating devices (FADs) working group Res. 17/05: On the conservation of sharks caught in association with fisheries managed by IOTC Res. 17/07: On the prohibition to use large-scale driftnets in the IOTC Area Res 17/08: Procedures on a FADs Management Plan including limitation on number of FADs, more detailed specifications of catch reporting from FAD sets, & development of improved designs to reduce incidence of entanglement of non-target species
Sharks MOU Memorandum of Understanding on the Conservation of Migratory Sharks	Annex 1: Signatories should endeavour to achieve and maintain a favourable conservation status for these species based on the best available scientific information and taking into account their socio-economic value.
UNCLOS United Nations Convention on the Law of the Sea	Annex I: States whose nationals fish in the region for the highly migratory species listed shall cooperate directly or through appropriate international organizations to ensure the conservation and optimum utilization of such species throughout the region, both within and beyond the exclusive economic zone.
WCPFC Western & Central Pacific Fisheries Commission	CMM 2008-04: Conservation and management measures to prohibit the use of large sale driftnets on the high seas in the Convention Area CMM 2009-02: Conservation and management measures on the application of high seas FAD closure and catch retention CMM 2010-07: Conservation and management measures for sharks CMM 2012-04: Conservation and management measure for protection of Whale Sharks from purse seine fishing operations CMM 2014-05: Conservation and management measures for sharks

10. KNOWN CRITICAL SITES

Critical sites for whale shark may include known areas of aggregation in various locations around the world (Pierce and Norman 2016). These sites function as feeding areas or areas where mating takes place. A compilation of these sites and their purpose (i.e. feeding, mating, etc.) is ongoing and being complemented by current research efforts.

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