



Second Meeting of the Signatories to the
Memorandum of Understanding on the Conservation of Migratory Sharks
15th – 19th February 2016, San José, Costa Rica

NATIONAL REPORT

Shark conservation, management and research in Australia: a focus on species listed by CMS

Australia is committed to the international protection and conservation of migratory species and to the national protection of such species whilst they are located in, or pass through, areas within Australia's jurisdiction. This includes the protection of many of the shark and ray species that are currently listed, or proposed for listing, on Annex 1 of the Memorandum of Understanding on the Conservation of Migratory Sharks (Sharks MoU) such as:

- white shark (*Carcharodon carcharias*)
- basking shark (*Cetorhinus maximus*)
- whale shark (*Rhincodon typus*)
- porbeagle (*Lamna nasus*)
- shortfin mako (*Isurus oxyrinchus*) and longfin mako (*Isurus paucus*)
- reef manta ray (*Manta alfredi*) and great manta ray (*Manta birostris*)
- pygmy devilray (*Mobula eregoodootenkee*), Japanese devilray (*Mobula japanica*) and bentfin devilray (*Mobula thurstoni*)
- narrow sawfish (*Anoxypristes cuspidata*), largetooth sawfish (*Pristis pristis*), dwarf sawfish (*Pristis clavata*) and green sawfish (*Pristis zijsron*)
- silky shark (*Carcharhinus falciformis*)

Domestically, the species listed above are protected under national environmental law as the species have been listed as "Migratory" under the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act). By listing a species as "Migratory", it becomes a matter of national environmental significance and an offence to kill, injure, take, trade, keep or move the species in Commonwealth waters.

Management Actions

The Australian Government affords sharks protection through a suite of complementary measures.

The Second National Plan of Action for the Conservation and Management of Sharks 2012 (Shark-plan 2) is Australia's overarching policy for guiding and coordinating engagement in shark conservation and management. The second iteration of this plan was released in July 2012 following a review of Shark-plan 1, reaffirming Australia's commitment to shark

conservation. Shark-plan 2 identifies how Australia will manage and conserve sharks, and ensure that Australia meets international conservation and management obligations.

Shark-plan 2 identifies research and management actions across Australia for the long-term sustainability of sharks, including actions to help minimise the impacts of fishing on sharks. Shark-plan 2 was developed with state, Northern Territory and Australian Government agencies in consultation with key non-government stakeholders. A Shark Representative Group oversees and reports on the implementation of the operational strategy for Shark-Plan 2. A copy of Shark-plan 2 can be accessed at:

<http://www.agriculture.gov.au/fisheries/environment/sharks>

The Australian Government Department of the Environment works closely with Commonwealth and state fisheries management agencies to ensure that fishing activities do not have an unsustainable impact on sharks. All Commonwealth-managed fisheries and those state fisheries which export product or operate in Commonwealth waters are required to be assessed under the EPBC Act.

Shark finning is not permitted in Commonwealth-managed fisheries. Similar measures are in place to encourage full retention in state and territory managed fisheries. The Australian Government advocates at Regional Fisheries Management Organisations for sustainable management practices for shark fishing, including banning the use of wire traces and the implementation of anti-finning measures such as landing sharks with their fins naturally attached.

In addition to being listed as "Migratory" under the EPBC Act, the white shark, whale shark, largetooth sawfish, dwarf sawfish and green sawfish are also listed as "Threatened" species. Species that are listed as "Threatened" under the EPBC Act may have recovery plans developed in order to guide research and conservation actions aimed at recovery.

For instance, the white shark has a recovery plan which was reviewed and updated in 2013 . It can be accessed at:

<http://www.environment.gov.au/resource/recovery-plan-white-shark-carcharodon-carcharias>

A recovery plan for the three sawfish species (*Pristis pristis*, *Pristis zijsron*, *Pristis clavata*) was released in 2015. It can be accessed at:

<http://www.environment.gov.au/biodiversity/threatened/publications/recovery/sawfish-river-sharks-multiplespecies-recovery-plan>

A review of the whale shark recovery plan was finalised in 2014. The plan has now ceased to be in force due to sunsetting provisions but a Conservation Advice was published for the species in October 2015 that outlines conservation actions. The Conservation Advice can be accessed at: <http://www.environment.gov.au/cgi-bin/sprat/public/sprat.pl>.

Marine bioregional plans have been developed for four of Australia's marine regions - Southwest, North-west, North and Temperate East. Marine bioregional plans will help improve the way decisions are made under the EPBC Act, particularly in relation to the protection of marine biodiversity and the sustainable use of our oceans and their resources by our marine-based industries. Marine bioregional plans aim to ensure that the marine environment remains healthy and resilient. The plans will be used by government and industry to improve the way the marine environment is managed and protected.

Very little is known about Australia's oceans compared to our terrestrial environment. Marine bioregional plans improve our understanding of Australia's oceans by presenting a consolidated picture of the biophysical characteristics and diversity of marine life, including sharks. They describe the marine environment and conservation values of each marine region, set out broad biodiversity objectives, identify regional priorities and outline strategies and actions to address these priorities.

Copies of Australia's marine bioregional plans can be accessed at:
<http://www.environment.gov.au/coasts/marineplans/index.html>

Research

Hammerhead sharks

The Australian Government is currently assessing the eligibility of three hammerhead shark species, the scalloped hammerhead (*Sphyrna lewini*), great hammerhead (*S. mokarran*) and smooth hammerhead (*S. zygaena*) for listing as threatened species under the EPBC Act. In 2015, the National Environmental Science Program initiated the project – “*Defining the connectivity of Australia's hammerhead sharks*”. Hammerhead sharks are known to swim large distances, including across the open ocean. Sharks from Australia may therefore mix with sharks from Indonesia, Papua New Guinea and islands of the Pacific. Understanding these connections is central to providing information on the status of hammerhead shark populations to support Australian and international conservation and management initiatives. The project will use tagging and genetic sampling to see how hammerhead sharks are connected. The project findings will be combined with biological, ecological and fisheries data to assess the stock structure and population status of hammerhead sharks in Australian waters. This project has commenced and is expected to be funded through to 2018.

Following the listing of several shark species, including the scalloped, smooth and great hammerhead, on Appendix II of the Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES), the Australian Government completed a non-detriment finding for the harvest of these species by Australian commercial fisheries. The non-detriment finding was informed in part by two independent assessments; an assessment of Australian fishery management and historic harvest levels, and; a population distribution and stock assessment. The non-detriment finding found that an Australian catch at average historic levels for the three hammerhead species is unlikely to be detrimental to the species. Management arrangements have been implemented in Australian managed fisheries to meet the majority of requirements of the non-detriment finding. In accordance with CITES requirements, the Australian Government is collecting and analysing national harvest, import and export data for scalloped, smooth and great hammerhead sharks to inform future non detriment findings.

The non-detriment finding report and the two independent assessment reports, are published at:
<http://www.environment.gov.au/biodiversity/wildlife-trade/publications/non-detriment-finding-five-shark-species>

White shark

The 2013 Recovery Plan for White Shark includes a range of research actions, including actions which will assist in understanding the population status and trends of this species to determine whether it is recovering. Australian waters include an eastern and western population of the species divided by Bass Strait. Research projects on the east and west coasts of Australia support the implementation of the recovery plan.

The National Environmental Science Program's Marine Biodiversity Hub is currently undertaking a project titled – “*Towards a national population assessment for white sharks*”. The project aims to combine novel genetic and electronic tagging techniques to develop an estimate of the abundance of white sharks in eastern Australian waters, so that population trends can be effectively monitored into the future. This project was extended in 2014 to include gathering information on the western population, with the intention of developing a population estimate of the west coast population, leading to a national estimate. This project is due to be completed in 2017. These tools will provide a framework for similarly assessing the population status of other shark species of conservation concern, such as sawfish species.

There have been a number of research papers released recently regarding white sharks, which also contribute to our understanding of white shark population status in Australian waters:

Bradford R and Robbins R (2013). A rapid assessment technique to assist management of the white shark (*Carcharodon carcharias*) cage dive industry, South Australia. *Open Fish Science Journal*, vol. 6: 13 – 18.

Bruce BD (2015). White Shark population and abundance trends. pp. 44–45. In Bax NJ and Hedge P (eds.) (2015). *Marine Biodiversity Hub, National Environmental Research Program, Final report 2011–2015*. Report to Department of the Environment, Canberra, Australia.

Pethybridge HR, Parrish CC, Bruce BD, Young JW, and Nichols PD (2014). Lipid, Fatty Acid and Energy Density Profiles of White Sharks: Insights into the Feeding Ecology and Ecophysiology of a Complex Top Predator. *PLoS ONE*, vol. 9(5): e97877.

Robbins R, Bruce B and Fox A (2014). First reports of proliferative lesions in the great white shark, *Carcharodon carcharias* L., and bronze whaler shark, *Carcharhinus brachyurus* Günther. *Journal of Fish Diseases*, vol. 37(11): 997 – 1000.

Whale shark

The Australian Government has funded a range of projects aimed at the conservation of whale sharks.

In 2013, the Western Australian Department of Parks and Wildlife developed a Whale Shark Management Plan for the Ningaloo Coast World Heritage Area. This management plan aims to combat increasing pressures on the species, and provide a blueprint for future research and monitoring requirements. The management plan is available at:

<http://www.dpaw.wa.gov.au/management/marine/marine-wildlife/65-whale-sharks>

The Australian Institute of Marine Science also undertakes extensive research on whale sharks and holds data that contributes to the understanding of abundance, movement patterns and reproductive biology of whale sharks in Australian waters.

Pelagic sharks (shortfin mako, longfin mako and porbeagle)

The Australasian Mako Shark Workshop was held in Hobart, Tasmania in 2012.

The workshop was well attended by state and federal government agencies; CSIRO; shark scientists; recreational fishing organisations and non-government organisations. A key output from the workshop was a 2014 report entitled “*Shark futures: A synthesis of available data on mako and porbeagle sharks in Australasian waters: Current status and future directions*”. Key summary points made in the report were:

- “Despite recent improvements in the biological knowledge of mako sharks, some basic demographic parameters critical for interpreting their vulnerability to fishing and thus the status of their populations, remain poorly known or current information is ambiguous”
- “neither nominal nor refined catch rate estimates show any significant trends over the time period of available data (1998–2011) that would indicate significant changes in stock status (for mako sharks)”
- “Although available data do not indicate any evidence for significant declines in mako shark abundance, it is not possible to quantitatively assess their current status in Australasian waters”, and
- “Mako and porbeagle sharks have a demonstrated vulnerability to the impacts of fishing in other regions and experiences in both the Mediterranean and Atlantic support that careful attention toward monitoring their populations elsewhere is required, including in Australasian waters.”

As discussed under “Hammerhead sharks”, following the CITES listing of several shark species, including porbeagle, on Appendix II, the Australian Government non-detriment finding found that average historic harvest levels for porbeagle are unlikely to be detrimental to the species. In accordance with CITES requirements, the Australian Government is collecting and analysing national harvest, import and export data for porbeagle and oceanic whitetip sharks to inform future non detriment findings.

There have been a number of research papers released recently regarding mako and porbeagle sharks, which also contribute to our understanding of the species in Australian waters:

Bruce B (2014). *A synthesis of available data on mako and porbeagle sharks in Australasian waters. Current status and future directions*. FRDC Project No. 2011/045, Final Report, CSIRO Marine and Atmospheric Research, Hobart, Tasmania.

Corrigan S, Kacev D and Werry J (2015). A case of genetic polyandry in the shortfin mako *Isurus oxyrinchus*. *Journal of Fish Biology*, vol. 87(3): 794 – 798.

Koopman M and Knuckey I (2014). *Advice on CITES Appendix II Shark Listings*. Report to Department of Sustainability, Environment, Water, Populations and Communities. Fishwell Consulting. 144 pp.

Rogers PJ, Huveneers C, Page B, Goldsworthy SD, Coyne M, Lowther AD, Mitchell JG and Seuront L (2015). Living on the continental shelf edge: habitat use of juvenile shortfin makos *Isurus oxyrinchus* in the Great Australian Bight, southern Australia. *Fisheries Oceanography*, vol. 24(3): 205 – 218.

Simpfendorfer C (2014). *Information for the development of Non Detriment Findings for CITES listed sharks*. July 2014, Report to Department of the Environment. James Cook University.

Sawfish

A recovery plan for the three sawfish species (*Pristis pristis*, *Pristis zijsron*, *Pristis clavata*) was released in 2015.

The National Environmental Science Program is undertaking the project – *Northern Australian hotspots for the recovery of threatened euryhaline species*, the focus of which is three sawfish species which occur in Australian waters, dwarf sawfish, largetooth sawfish and green sawfish, and two river shark species (*Glyptis* spp.). The aim of this project is to develop a novel and modern assessment and monitoring strategy for these species to assess population status, distribution and current management effectiveness. This project is due to be completed in 2017. Key findings so far for sawfish include:

- strong population structuring of largetooth sawfish across northern Australia, however the very low CPUE of individuals aged above one year suggests that few juveniles survive above this age and limited capacity for recolonisation of depleted local populations
- only limited numbers of dwarf sawfish have been caught during the project, however, records from mid-reaches of rivers demonstrate the use of this habitat as nursery for juveniles

There have been a number of research publications released recently regarding sawfish, which also contribute to our understanding of the species in Australian waters:

Chen X, Kyne PM, Pillans RD and Feutry P (2015). Complete mitochondrial genome of the Endangered Narrow Sawfish *Anoxypristes cuspidata* (Rajiformes: Pristidae). *Mitochondrial DNA*, 1 – 2.

Kyne PM and Pillans RD (2014). *Protocols for surveying and tagging sawfishes and River Sharks*. CSIRO Brisbane and CDU Darwin.

Faria VV, McDavitt MT, Charvet P, Wiley TR, Simpendorfer CA and Naylor GJP (2013). Species delineation and global population structure of Critically Endangered sawfishes (Pristidae). *Zoological Journal of the Linnean Society*, vol. 167: 136 – 164.

Feutry P, Kyne PM, Pillans RD, Chen X, Marthick JR, Morgan DL and Grewe PM (2015). Whole mitogenome sequencing refines population structure of the Critically Endangered sawfish *Pristis pristis*. *Marine Ecology Progress Series*, vol. 533: 237 – 244.

Feutry P, Kyne PM, Grewe PM, Chen X and Liu M (2013). Whole mitogenome of the Endangered dwarf sawfish *Pristis clavata* (Rajiformes: Pristidae). *Mitochondrial DNA*, vol. 26(2): 329 – 330.

Phillips N (2012). *Conservation genetics of Pristis sawfishes in Australian waters*. PhD Thesis. Murdoch University. 247 pp.