A checklist and status overview of the sharks and rays of Solomon Islands

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The Pacific holds a rich diversity of sharks and rays and these animals have important social, cultural and economic values. In large-scale commercial tuna fisheries, shark catch and by-catch are important issues in managing bycatch and as by-product. For some coastal small-scale fishing communities, sharks may be taken for meat and fins, and this income may be crucial to livelihoods (e.g. Vieira et al. 2017). However, sharks are also important as living tourist attractions in many Pacific countries, and shark tourism can have real and significant economic and community benefits (Brunnschweiler 2010; Vianna et al. 2012). For other communities, sharks and rays have important cultural and spiritual values that go beyond income.

In spite of these different values, scientific understanding of the Pacific's sharks and rays is still very limited. Most research has been done on the species taken in larger quantities in commercial fisheries, but there are many other important and significant species and discoveries. Some of the most commonly encountered species have recently been found to be species complexes – a group of species that may look alike but have completely different biology (Last et al. 2016). In other cases, species are being 'rediscovered' by scientists who have taken the time to engage local people who know their waters the best and know where these 'hidden' species occur (White et al. 2015). These examples highlight the need to better understand the diversity of sharks and rays in the Pacific, especially as these diversity catalogues are essential to reporting on the Convention on Biological Diversity (CBD), or for developing an FAO National Plan of Action for sharks and rays.

Shark Search Indo-Pacific (SSIP) is a new programme focused on filling this need. Launched in 2017, SSIP is slowly assembling a checklist of sharks and rays for every country in the Pacific. Each checklist is paired with a *Status Overview* which is a synthesis of the diversity, values, threats, and management aspects relating to sharks and rays in that country. SSIP is aiming to complete lists and overviews for all the PICTS by 2022 (see SPC Fisheries Newsletter Issue 151). SSIP has now published its first checklist, the Sharks and rays of the Solomon Islands.

Building a checklists and synthesis for the Solomon Islands

Each SSIP checklist is a desktop study that synthesizes the available information on sharks and rays for each country. To build the data for the Solomon Islands checklist, Sarah Hylton and the SSIP team dug into reference guides, scientific databases such as museum databases, fisheries databases and knowledge repositories (such as SPC and SPREP online data), as well as scientific journal articles. Given that much knowledge in the Pacific is contained in grey literature (reports and documents that aren't published as scientific papers), Sarah also used Google Scholar and Google to find information. Perhaps most importantly, each checklist and *Status Overview* is built with the help of *In-Country Partners*, people in or with experience within each country that help provide useful data, but also check the checklists and *Status Overview* to ensure they are accurate. For the Solomon Islands checklist, this included eleven different in-country partners including government officers, scientists, and also tourism operators who provided photographs and resort checklists to add to the data. SSIP also includes citizen science where fishers and SCUBA divers are invited to send photos of the sharks and rays and these photos provide important visual verification of different species, especially those species that aren't captured in fisheries. Data also came from some usual sources, like footage from National Geographic of the Kavachi underwater volcano that showed several species such as the sixgill stingray (*Hexatrygon bickelii*) and the southern

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The Shark Search Indo-Pacific programme aims to build a checklist and status overview for every country and territory in the Pacific by 2022.

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Kuhl's devil ray *Mobula kuhlii* photographed by Andrew Short from Maravagi Bay, Mangalonga Island. Andrew was diving aboard the live-aboard vessel Bilikiki in September 2017 and kindly sent SSIP several photos of these species.

sleeper shark (*Somniosus antarcticus*). Furthermore a historical photo provided by local contacts provided for the presences at one time of the dwarf sawfish (*Pristis clavata*), representing a global range extension for the species.

The Solomon Islands checklist now includes 50 species of sharks and rays of which 36 are confirmed species, seven are provisionally confirmed (species that may need taxonomic revision); and seven are 'likely' but need to be confirmed (Hylton et al. 2017). Fishing appears to be the main threat to Solomon Islands sharks and rays but there could also be impacts from habitat loss. Sharks and rays also have social and cultural values, but these vary widely across the Solomon Islands archipelago.

This checklist and *Status Overview* provide an important reference account for the Solomon Islands because they provide a systematic review and reference point.

This information is important for Solomon Islands, especially in national functions of both the Ministry of Fisheries and Marine Resources (MFMR) and the Ministry of Environment, Climate Change, Disaster Management and Meteorology (MECDM).

This information can assist programs for shark identification, research, conservation and management programs of both Agencies. These programs and efforts include:

- National Observer Program which records shark interactions and shark bycatches from purse seine and longline fishing vessels. Observers' onboard tuna fishing vessels complete these records during fishing, port samplings and transshipment in port. This is a reporting requirement under the Western and Central Pacific Fisheries Commission as part of on-going shark conservation measures.
- Convention of International Trade of Endangered Flora and Fauna Species (CITES) – Appendix II shark species require export/import trading permits and must be verified and checked by both Agencies.
- Improved Shark research – future shark research can build on these data and information to inform protection and management measures such as the elimination of finning of pelagic sharks.
- Biodiversity Conservation programs – These records are an update of sharks' biodiversity in country and can guide efforts in establishing of national marine protected areas for protection of sharks from targeted fishing (local).

- Illegal, Unregulated and Unreported (IUU) – The Solomon Islands' Monitoring Compliance and Surveillance (MCS) program will also benefit from this information, as this will become a hand-on-guide for accurately recording sharks and curb any illegal, unregulated and unreported (IUU) activities. There is currently strong enforcement underway nationally in implementing the Fisheries Management Act 2015, Fisheries Management Regulations 2017 and National Plan of Action for Sharks that is currently near finalization. These national efforts contribute to both regional and international effort to protect and conserve sharks and IUU efforts.

Other sectors such as Tourism will also benefit from this information. Sharks are amongst many other national attractions for both local and international divers. Artisanal and recreational fishers will also find this information useful.

This information is useful for public awareness and schools. This can be integrated into the different school curricula, primary, secondary, tertiary schools, in and around Solomon Islands. An appreciation of the wealth and biodiversity of the country's ocean is a national goal.

To make sure that this information is always available, all SSIP publications will be made available as *Open Access* articles that can be downloaded by anyone for free from the SSIP Website, and the Solomon Islands synthesis paper and status overview are already available (see https://www.sharksearch-indopacific.org/solomon-islands). However, the checklist and webpages are not static – they will be updated as new information is provided. This is essential. For example, within months of the paper and checklist being published, the SSIP team received a photo of *Mobula Kuhlii* from Andrew Short who was on a dive trip in the Solomon Islands. This photo provides hard evidence that this species exists in the Solomon Islands, and thus the checklist has had one more species added, bringing the Solomon Island's total to 51 sharks and rays. As more checklists are built and more photos are accumulated, we envisage that the number of sharks known in each country will slowly grow.

While the Solomon Islands checklist and status overview are valuable reference points, it is important to remember that they are largely desktop studies. Several species are still only considered as 'Likely' or 'Provisionally confirmed', and without more extensive field studies in the Solomon Islands, this list and overview should be considered only as a starting point. Given that the checklist has already had species added within months of its publication, it is clear that more work needs to be done to properly describe and account for the sharks and rays of the Solomon Islands.

As for the rest of the Pacific, SSIP has draft checklists and overviews prepared for Fiji, French Polynesia, Tuvalu, and Niue, with working continuing on checklists. In 2018, the programme is planning checklists and overviews for Palau, Kiribati, Singapore and Tonga. SSIP is actively interested in locating more in-country partners for these countries, so if you are working in, or have data or expertise for these countries, please contact us at:

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References

Brunnschweiler J.M. 2010. The Shark Reef Marine Reserve: a marine tourism project in Fiji involving local communities. Journal of Sustainable Tourism 18:29–42. doi: 10.1080/09669580903071987

Hylton S., White W.T. and Chin A. 2017. The sharks and rays of the Solomon Islands: a synthesis of their biological diversity, values and conservation status. Pacific Conservation Biology 23: 324–334. doi: https://doi.org/10.1071/PC17012

Last P.R., White W.T. and Naylor G. 2016. Three new stingrays (Myliobatiformes: Dasyatidae) from the Indo-West Pacific. Zootaxa 4147:377–402. doi:

Vianna G.M.S., Meekan M.G., Pannell D.J., Marsh S.P. and Meeuwig J.J. 2012. Socio-economic value and community benefits from shark-diving tourism in Palau: A sustainable use of reef shark populations. Biological Conservation 145:267–277. doi: 10.1016/j.biocon.2011.11.022

Vieira S., Kinch J., White W. and Yaman L. 2017. Artisanal shark fishing in the Louisiade Archipelago, Papua New Guinea: Socio-economic characteristics and management options. Ocean & Coastal Management 137:43–56. doi: http://dx.doi.org/10.1016/j.ocecoaman.2016.12.009

White W.T., Appleyard S.A., Sabub B., Kyne P.M., Harris M., Lis R., Baje L., Usus T., Smart J.J., Corrigan S., Yang L., Gaylor G.J.P. 2015. Rediscovery of the threatened river sharks, *Glyphis garricki* and *G. glyphis*, in Papua New Guinea. PLoS ONE 10, e0140075. doi: 10.1371/journal.pone.0140075