

SHARK NEWS

Newsletter
of the IUCN SSC Shark
Specialist Group
#10 | September 2024



IUCN SSC
Shark Specialist Group



Our Vision

A world where sharks, rays, and chimaeras are valued and managed sustainably.

Our Mission

To secure the conservation, management and, where necessary, the recovery of the world’s sharks, rays, and chimaeras by mobilizing technical and scientific expertise to provide the knowledge that enables action.

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Photos by Simon Hilbourne | Manta Trust

Editorial



Artwork by Keith Witmer

Dear readers,

There's something about the month of September that invites reflection. Maybe it's just because I am based in the Northern Hemisphere, and as the summer holidays wind down here, it feels like there is an energy whirl all around. Friends and colleagues are back at work, and inboxes are starting to flood again. Although with many scientists/conservationists, it often doesn't feel like there is a life-work balance ... dedication to the conservation of sharks, rays, and chimaeras transcends the need for a holiday. Fieldwork is the time out, especially if they are lucky enough to work in areas where these animals are still abundant and can be seen. Anyone who has worked in the field with these animals knows how hard but rewarding it is on so many levels. 🦈➡️ Through this issue of Shark News, we can again get a sense of how important landing/market surveys are in understanding the status of sharks and how fisheries are impacting them. At the same time, fisheries-independent tools can give us a better understanding of the distribution of species, their habitat use, and abundance in certain areas. In our Q&A series, Chelsea Stein introduces us to two early career scientist members from Malaysia and The Maldives, each applying different sampling methods to understand species' population status – in a heavily fished area versus a Shark Sanctuary, respectively. From Malaysia and Bangladesh, we learn how landing site surveys provide information on the bycatch of threatened and non-threatened species in small-scale fisheries and how species and their derivative products are utilized and traded. We learn about collaborations and how data sharing can boost conservation knowledge and action through platforms such as eOceans and trackdAT. The Sawfish Conservation Society is also a platform that has continued its critical work to ensure that efforts to conserve sawfishes are scaled up around the world through awareness and the promotion of collaboration amongst researchers globally. We have an update from the ReShark project with information on how this initiative can also benefit other species beyond the Indo-Pacific Leopard Shark. Our fourth series of fact sheets on human impacts on sharks and rays relates to climate change. This is a threat that we are still learning a lot about, and how its impact of environmental variables like water temperature has already potentially changed species distribution and reproductive behaviour. 🦈➡️ In parallel, we have stories from Namibia on chimaeras being preyed on by Cape Fur Seals, the first time such interactions have been recorded. From Asia, we first delve into the cultural significance of wedgefishes in China and Indonesia through the lens of poetry. Then, we have stories from Indonesia on a project working to ensure the protection of rhino rays in a national marine park and how fishers will respond to various management options. Similarly, in Bangladesh, work is underway with fishing communities to understand how to reduce bycatch of hammerhead sharks and find solutions to balance conservation goals and their livelihoods. The Reef Manta Ray conservation work in the Chagos Archipelago highlights a key site for these species and emphasizes the need for enforcement of management measures in remote areas to prevent illegal, unreported, and unregulated fishing from impacting these species. Along these lines, the important area-based management for rays is highlighted for Australian species, many of which are endemic. 🦈➡️ The Important Shark and Ray Areas (ISRA) project continues building momentum and keeps us very busy! It has been so rewarding to work with over 800 contributors from around the world who are so dedicated to shark, ray, and chimaera conservation and who have contributed to delineating over 400 areas (Central and South American Pacific, Mediterranean and Black Seas, Western Indian Ocean, Asia, and Polar Waters regions). We continue putting sharks on the map and have just returned from our workshop to delineate areas in the New Zealand and Pacific Islands region. The team and I keep learning fantastic facts about these species and the habitats they use for different life-history processes so read through about the team's favorite areas so far! 🦈➡️ We provide information on newly published identification guides and posters from Namibia, the east coast of North America, and Guatemala. Finally, we have a small update on the Global Status of Sharks, Rays, and Chimaeras – stay tuned over the next few months for information on its publication. As always, thank you to Michael and Peter Scholl, who continue to make this newsletter a reality despite their hectic schedule. I'm excited about what the rest of 2024 will bring and look forward to hearing more about the wonderful work that everyone has planned for sharks, rays, and chimaeras! ➡️ [Rima](#)



Photo: James Eades | Unplash

Eulogy for Leonard Joseph Victor Compagno [1943-2024]

Written by
David A. Ebert
SJSU Moss Landing Marine Laboratories

Leonard Compagno passed away on September 25, 2024. Born in San Francisco, California, on December 4, 1943, he was a true Giant in the field of Shark, Ray, and Ghost Shark research, whose contributions were nothing short of monumental.

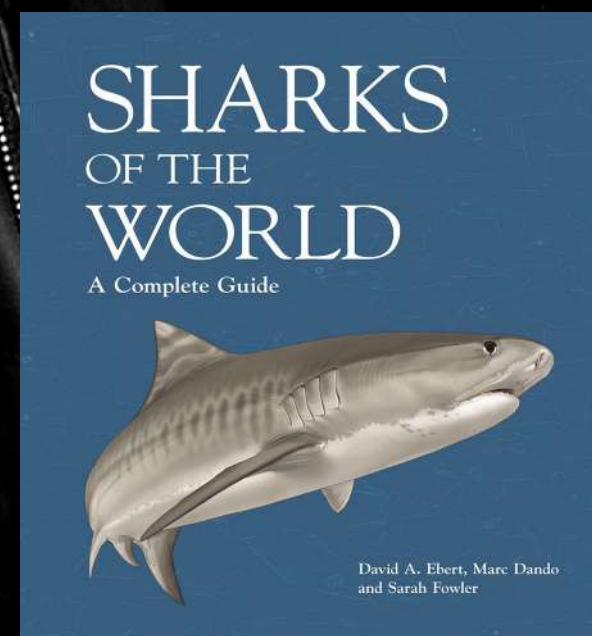
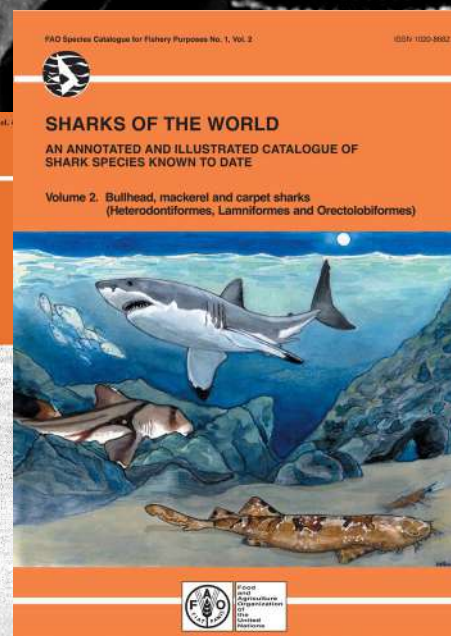
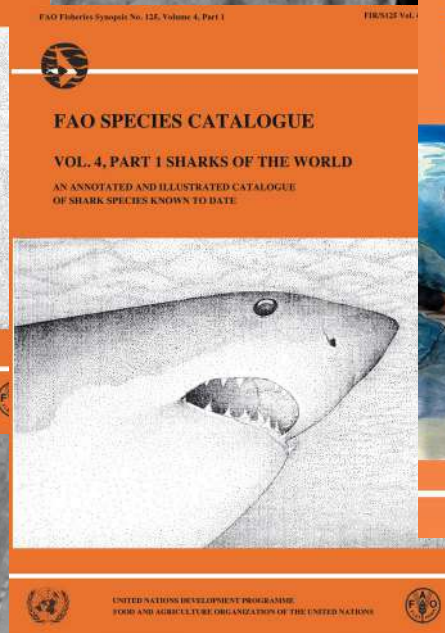
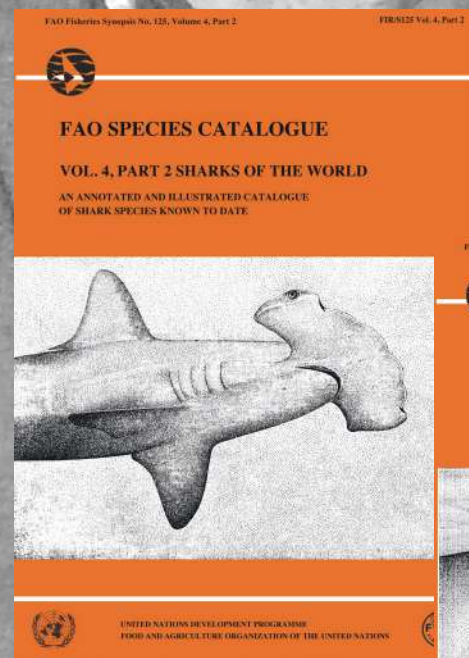
His publications, « Interrelationships of Living Elasmobranchs » [1973] and « Phyletic Relationships of Living Sharks and Rays » [1977], are classics that established the framework and foundation for modern chondrichthyan classification, which remains influential today. His 1990 seminal publication, « Alternative Life-History Styles of Cartilaginous Fishes in Time and Space » [Environmental Biology of Fishes, 28:33-75], is required reading [in my humble opinion] for any serious student of shark research and conservation.

I was very fortunate to have met Leonard as a young MSc student in the 1980s while he was still based in his hometown of San Francisco. At the time, he was working on the FAO Catalogue of the Sharks of the World. I recall thinking how incredible it would be to one day write a book on the Sharks of the World!

Leonard was a fellow traveler whom I met early on in my journey and who became an advisor, mentor, and friend. It was Leonard who provided me with the opportunity to go to South Africa to pursue my Ph.D., and together with Alexandra Macras and Paul Cowley, we launched the "S-Team," ushering in a new era in chondrichthyan research in South Africa. It was a very dynamic period, and I still have fond memories of those times.

He was a "character," for those who knew him, and to students and early-career researchers who didn't have the chance to meet him, I strongly recommend familiarizing yourselves with his contributions and publications, particularly the 1990 paper.

Leonard was a once-in-a-generation researcher in our field, and his contributions will continue to inspire and influence generations to come.





Early career scientists within the SSG

In this Q&A series, get to know members across the group's nine regions | Written by Chelsea Stein

Taking measurements of an eagle ray at the landing port in Sandakan

Q&A

With 237 members from 83 countries and territories, the IUCN SSC Shark Specialist Group is one of the largest specialist groups within the IUCN Species Survival Commission. Across the group’s nine regions, many early career scientists are pursuing exciting work on shark, ray, and chimaera research, policy, and conservation.

In this Q&A series, we’ll showcase some of these members, sharing their roles within the SSG and their ongoing work.

- **Khadeeja Ali**, Senior Research Officer at the Maldives Marine Research Institute, SSG Indian Ocean Region
- **Serena Adam**, Shark and Ray Conservation Officer, WWF-Malaysia, SSG Asia Region

What type of research do you focus on?

Khadeeja: My main research focus is studying the abundance of shark populations and how they respond to sanctuary establishments.

Serena: My research focuses on fisheries bycatch in small-scale fisheries and population assessment of shark and ray species in Malaysian coastal waters. In addition, I investigate trade and local utilization of shark and ray products.

What project(s) are you currently working on?

Khadeeja: My main work involves monitoring the abundance of shark populations. The Maldives Marine Research Institute (MMRI) sets baited remote underwater video camera systems (BRUV) in select-ed parts of the Maldives. I have also been overseeing the deep-sea BRUV project with Nekton Mission and the South African Institute for Aquatic Biodiversity (SAIAB) since 2022. As part of the MMRI, we are also working on relaunching our citizen-science program on reef-associated sharks soon. We are also studying depredation events by sharks in reef-based line fisheries.

Serena: I am currently working alongside the local community in Tun Mustapha Park (TMP) in Sabah to trial the ‘catch and release’ meth-od as part of our effort to reduce bycatch in small-scale fisheries. We are also investigating various measures to assess the feasibility for local adoption in the long term.

Concurrently, we are assessing five key indicator species for their population status, including Grey Carpetshark (*Chiloscyllium punctatum*), Spottail Shark (*Carcharhinus sorrah*), Scalloped Hammerhead (*Sphyrna lewini*), Bottlenose Wedgefish (*Rhynchobatus australiae*), and Whitespotted Whipray (*Maculabatis gerrardi*). This assessment will help us advocate for species protection and/or management in Malaysia. Lastly, with the help

of Sabah State Park, we are attempting to design the first spatial action plan for effectively conserving sharks and rays in TMP. The goal is to pave the way for Malaysia’s Marine Protected Area (MPA) to be effective for these species.

As a member of the IUCN SSC Shark Specialist Group, what does your role involve?

Khadeeja: As a member of the IUCN SSC Shark Specialist Group, I have provided insights on the status of sharks in my country, and I have been part of the Important Shark and Ray Areas (ISRA) process in proposing preliminary areas of interest for sharks and rays in the Maldives.

Serena: I am helping provide species information for sharks in Malay-sia for the Global Status Report of Sharks, Rays, and Chimaeras and the IUCN Red List of Threatened Species Assessments. In addition, my role involves supporting proposals for the recently concluded ISRA regional workshop in Asia.

What gets you excited about sharks, rays, and/or chimaeras?

Khadeeja: Currently, there is a lot of attention on sharks globally, which are mainly known for their predatory function in the ecosys-tem. For me, in addition to their higher trophic level role, I would like to learn more about their critical habitats in the Maldives.

Serena: Sharks are resilient and super adaptable! There is also so much we do not know about them, so it is always exciting to learn something new, especially regarding reproductive biology!

What is your favourite shark, ray, or chimaera species? And why?

Khadeeja: My favorite is the Silvertip Shark (*Carcharhinus albimarginatus*). It is just really mesmerizing to see these animals in the ocean.

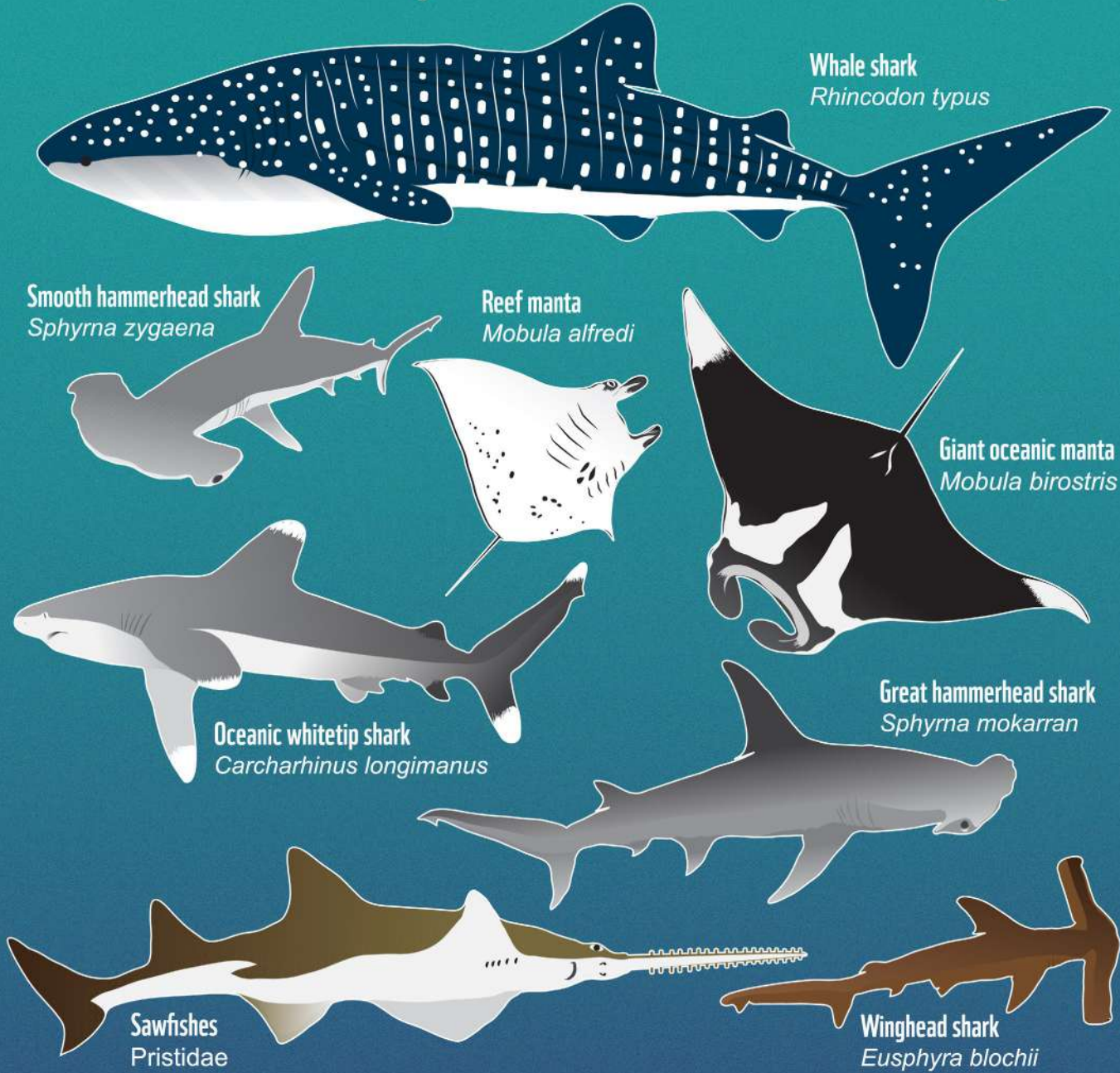
Serena: At the moment (I might change because there are too many species), it would be the Epaulette Shark (*Hemiscyllium ocellatum*) simply because they can walk and survive at low tides for hours! I just find them incredibly adorable and fascinating.

What do you think is the biggest challenge for shark conservation vs. the biggest opportunity?

Khadeeja: The Maldives was one of the first countries to prohibit shark fisheries in its Exclusive Economic Zone, and we remain a shark sanctuary today. As a country where fisheries are integral, conflicts around shark conservation have deepened due to sharks depre-dating catches in line fisheries. The biggest challenge for us is that as sharks increasingly interact with line fisheries, support for the sanctuary is weakening.



Sharks and Rays Protected in Malaysia



All Species above are protected under the Federal Fisheries (Control of Endangered Species of Fish) Regulations 1999, Fisheries Act 1985.

The regulations stipulate that no person shall fish or, disturb, harass, catch, kill, take possess, sell, buy, export or transport any endangered species of fish including their parts.

If any of this species are seen in markets, please contact kawan@wwf.org.my

The dive-tourism sector is our biggest opportunity for conservation in the Maldivian waters, particularly for reef-associated species. Sharks have a very high economic value and are among the prime species tourists want to see in the water. This raises our motivation for conserving sharks versus catching them.

Serena: At least in the local context within Southeast Asia, I think the biggest hurdle is dealing with the complexities of species conservation, human dynamics, and funding opportunities. Sharks and rays have socio-economic importance for many coastal communities in the region, and they are primarily caught incidentally in mixed-fisheries with little to no selectivity, such as trawls. Unfortunately, without clear, tangible solutions, there is little incentive for government protection for the most impacted species.

However, sharks and rays are noticeably gaining support for conservation based on our review of the latest draft of the NPOA-Shark 3 (National Plan of Action for Sharks), which are national commitments towards the conservation and management of sharks. Several action plans highlight the need to reduce the bycatch of juvenile species, protect nursery areas, and promote catch-and-release efforts, among others. Additionally, funding opportunities in our region are increasing and could accelerate areas of research needed to inform decision-making.

What’s something you’re looking forward to this year?

Khadeeja: I am keen on relaunching the citizen-science program for sharks, the Maldives Sharkwatch Programme, whose aim is to collect data on reef sharks around the Maldives through the dive tourism industry.

Serena: I am looking forward to two things: first, to oversee the implementation of catch and release trials for sharks and rays at our project sites, and second, to see the ISRAs approved in Asia!

What’s one fun fact about you?

Khadeeja: My initial research interest was about corals, but while doing so, I had the opportunity to work on sharks, which piqued my interest in them.

Serena: I can easily fall asleep anywhere and anytime of the day. [I wonder what shark or ray species I resemble for this behaviour?]

How can we keep up with your work?

Khadeeja: You can follow my work through the institute’s social media platforms *@mmri_maldives on Instagram, Maldives Marine Research Institute on Facebook, and @MMRI_Maldives on X.*

Serena: You can follow my work *@wwfmy or @serenaadam93 on X and LinkedIn.*



Photo by Gavin Jollis | WWF Malaysia

Q&A





Sorting baskets of small rays at fish landing port in Sabah

Photo: Gavin Jolis WWF-Malaysia

Photos by Dedi, BPSPL Kota Bangun



Identifying guitarfish species

Photo: WWF-Malaysia

Photo: Juariah Hafsyah WWF-Malaysia



In-depth interview with one of fish buyer in Tun Mustapha Park Sabah

Sharks* and the Commission on the Conservation of Antarctic Marine Living Resources (CCAMLR)

*The term 'shark' refers to all species of sharks, rays, and chimaeras

Written by
Alexandra Z.A. Morata

IUCN SSC Shark Specialist Group | Programme Officer

What is the CCAMLR?

The Commission on the Conservation of Antarctic Marine Living Resources (CCAMLR), established in 1982, is the regional fisheries management organization (RFMO) responsible for conserving marine ecosystems throughout its Convention Area. The CCAMLR uses an ecosystem-based management approach to achieve its objectives.

The Convention Area includes the Antarctic and Southern Ocean and is defined as “All waters bounded by the Antarctic Continent to the south, and to the north by a line starting at 50°S 50°W; thence due east to 30°E longitude; thence due north to 45°S latitude; thence due east to 80°E longitude; thence due south to 55°S latitude; thence due east to 150°E longitude; thence due south to 60°S latitude; thence due east to 50°W longitude; thence due north to the starting point.”

To achieve their objectives, the CCAMLR has set out the Convention on the Conservation of Antarctic Marine Living Resources (CAMLR Convention), an international treaty adopted in 1980. At the time, the Convention was developed due to rising concerns about unregulated krill catches negatively impacting fauna in the Convention Area, namely for fish, seabirds, seals, and whales. However, as marine mammals were covered in other conventions (i.e., the International Convention for the Regulation of Whaling and the Convention for the Conservation of Antarctic Seals), the CAMLR Convention directed its efforts primarily to crustaceans, finfish, molluscs, and seabirds.

Structure of CCAMLR

The CCAMLR is governed by the Commission, which consists of the Chair, Vice-Chair, two standing committees, the Scientific Committee, the Secretariat, and its Members.

The **Secretariat** communicates information (i.e., publications, CCAMLR data, events, etc.) between the Members, manages the catch documentation scheme, and monitors compliance to the Commission and its Conservation measures along with the Standing Committees.

The **Standing Committee on Implementation and Compliance (SCIC)** ensures that information is shared across the Commission, provides advice or recommendations, and oversees compliance with CCAMLR’s conservation measures. The SCIC meets annually to review compliance and information about illegal, unreported, and unregulated (IUU) fishing.

The **Standing Committee on Administration and Finance (SCAF)** oversees all financial matters, including advice, budgets, and Secretariat operations.

The **Scientific Committee (SC-CAMLR)** is responsible for providing accurate and updated data to the Commission; meeting annually to advise and recommend actions for their conservation measures; and monitoring fisheries and ecosystems. It currently consists of five working groups:

1. Working Group on Ecosystem Monitoring and Management (WG-EMM): responsible for maintaining ecological relationships with krill, including regulating harvests, restoring populations, etc.
2. Working Group on Fish Stock Assessment (WG-FSA): manages and supports fish stocks through ecological risk assessments, evaluating species’ status, etc.
3. Working Group on Statistics, Assessments and Modelling (WG-SAM): provides quantitative advice on applying statistics to assessments and models.
4. Working Group on Incidental Mortality Associated with Fishing (WG-IMAF): is specifically responsible for seabird and marine mammal conservation.
5. Working Group on Acoustic Survey and Analysis Methods (WG-ASAM): provides advice on research using hydro-acoustic technology, mainly surveys.

Contracting Party

The CCAMLR consists of 27 Member countries plus ten Acceding States (non-Member countries) that comprise the Contracting Parties. Members have the right to take part in CCAMLR’s decision-making process, while the Acceding States do not.

Current Members include Argentina, Australia, Belgium, Brazil, Chile, China, Ecuador, the European Union (EU), France, Germany, India, Japan, the Republic of Korea, Namibia, the Netherlands, New Zealand, Norway, Poland, the Russian Federation, South Africa, Spain, Sweden, Ukraine, United Kingdom, United States of America, and Uruguay.

Current Acceding States are Bulgaria, Canada, Cook Islands, Finland, Greece, Mauritius, Pakistan, Panama, Peru, and Vanuatu.

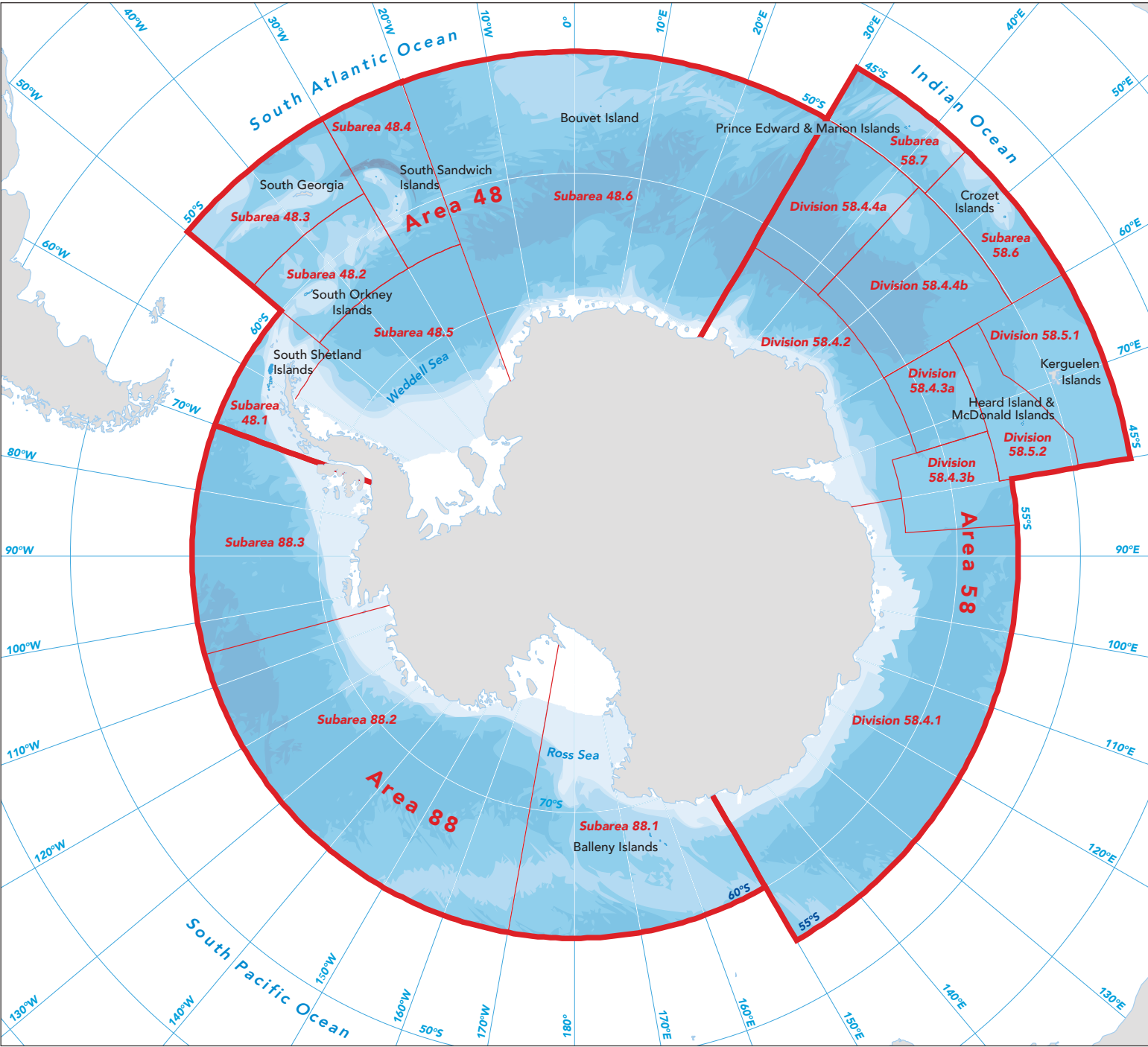
Conservation Measures

The CCAMLR implements a range of legally binding Conservation Measures to support its goals that are reviewed and/or developed annually. There are also non-legally binding resolutions, which Contracting Parties are encouraged to partake in.

Measures are structured as Conservation Measure-xx-yy, where “xx” refers to the year it was implemented, and “yy” the order it was listed that year. Resolutions are structured as a consecutive number followed by the Commission meeting (in Roman numerals), e.g., 22/XXV.

All Conservation measures are available online here.

Currently, skates, rays, and Somniosus spp. are covered by CCAMLR’s Conservation measures in higher taxonomic levels. These are included in four active Conservation Measures, which apply to all species present in the Convention Area.



Convention Area | Statistical Areas | Source: CCAMLR



CCAMLR

Commission for the Conservation of Antarctic Marine Living Resources



<http://gis.ccamlr.org>

0 500 1000 1500 2000 km
1:45 000 000
South Pole Lambert Azimuthal Equal Area projection

Conservation Measure	Title	Entered into force	Status
32-18	Conservation of sharks	2006	Active
33-02	Limitation of by-catch in Statistical Division 58.5.2 in the 2022/23 season	2023	Active Supercedes Conservation measure 41-01 (2008–2022)
33-03	Limitation of by-catch in new and exploratory fisheries in the 2022/23 season	2023	Active Supercedes Conservation measure 33-03 (2000–2022)
41-01	General measures for exploratory fisheries for <i>Dissostichus</i> spp. in the Convention Area in the 2023/24 season	2023	Active Supercedes Conservation measure 41-01 (2008–2022)

Conservation Measure 32-18: Conservation of sharks
Prohibits shark fishing for non-research purposes within the Convention Area. Species incidentally caught in any gear are to be released alive to the extent possible.

Conservation Measure 33-02: Limitation of by-catch in Statistical Division 58.5.2 in the 2022/23 season
Species specified in Conservation Measure 33-02: Skates and rays, and *Somniosus* spp.

Sets a total allowable catch (TAC) limit for skate and ray bycatch to 120 metric tonnes (mt), and 2 mt for *Somniosus* spp. within the Convention Area. Otherwise, that vessel is prohibited from fishing within 5 nm from where they exceeded the TAC for at least five days.

Conservation Measure 33-03: Limitation of by-catch in new and exploratory fisheries in the 2022/23 season
Species specified in Conservation Measure 33-02: Skates and rays, and *Dissostichus* spp.

Sets an incidental catch limit for *Dissostichus* spp. to 5% of total catch. If incidental catch exceeds 1 mt, then the vessel is required to move to another fishing location at least 5 nm away for at least five days. All skates and rays caught within the limit must be landed, regardless of gear type used.

Conservation Measure 41-01: General measures for exploratory fisheries for *Dissostichus* spp. in the Convention Area in the 2023/24 season
Species specified in Conservation Measure 41-01: skates.

In 2023–2024, longline and trawl fisheries are to report their catches, location where species were caught, gear used, etc. and have scientific observer on-board to partake in a tagging programme. All skates caught are to be tagged then released alive. If recaptured, they are to be identified to the species-level (or the lowest taxonomy possible) and biological information gathered (e.g., total length, disc width, weight, sex, etc.). If a vessel violates this Conservation Measure, the fishery is to remain closed for the remainder of the season.

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Table: List of all Conservation Measures applicable to sharks with the date they came into force.



Photo: James Eades | Unplash.com

Ningaloo Maskray

(*Neotrygon
ningalooensis*)



Shark
Spotlight

Written by
Alexandra Morata
IUCN SSC Shark Specialist Group |
Programme Officer

Ningaloo Maskray
[*Neotrygon ningalooensis*]



Photo: Alex Hoschke [CC BY-NC 4.0]

Taxonomy

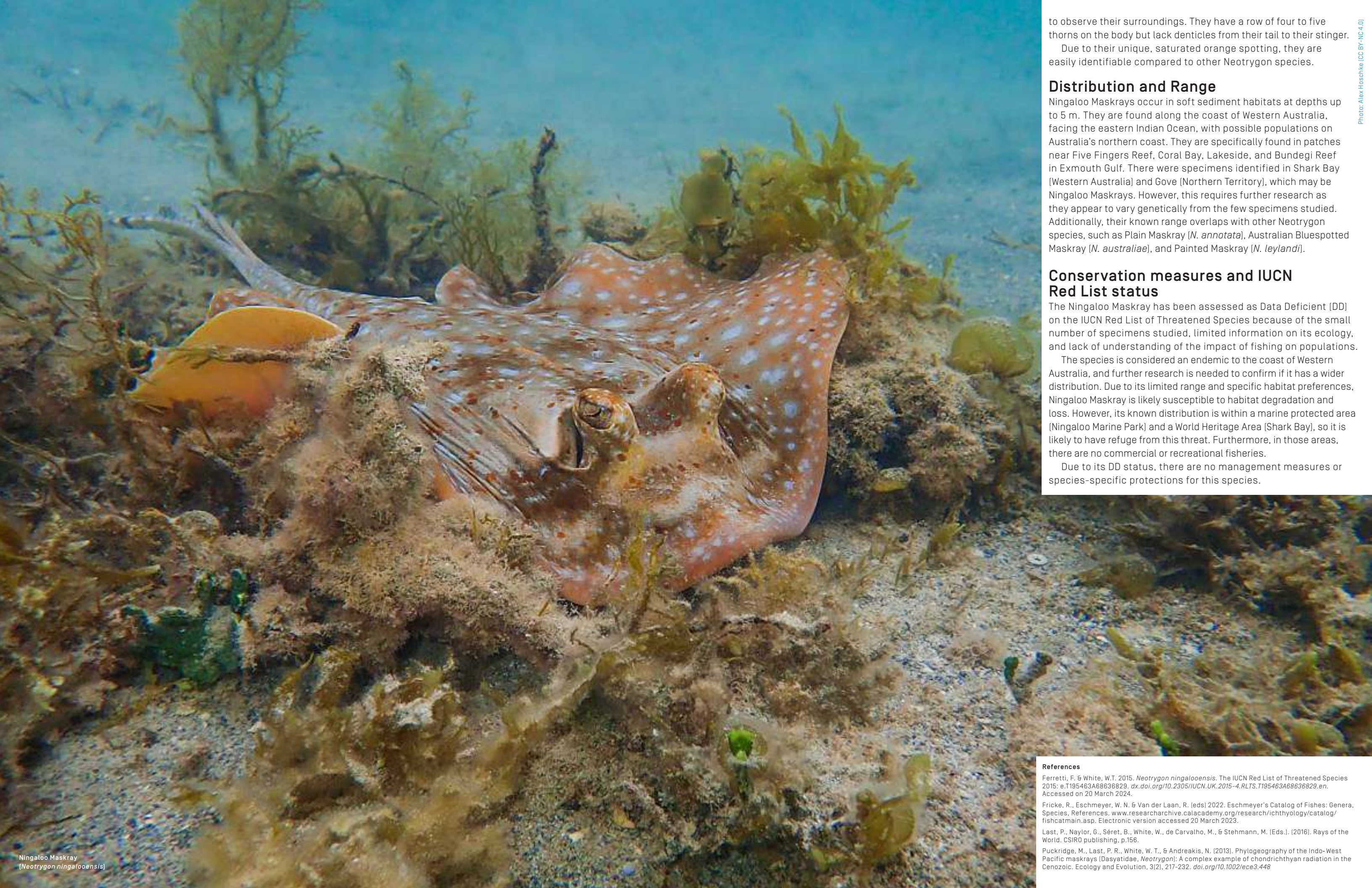
The order Myliobatiformes includes 244 valid species from 39 genera and 12 families: Aetobatidae [pelagic eagle rays], Dasyatidae [stingrays], Gymnuridae [butterfly rays], Hexatrygonidae [sixgill stingrays], Mobulidae [devil rays], Myliobatidae [eagle rays], Plesiobatidae [giant stingarees], Potamotrygonidae [neotropical rays], Rhinopteridae [cownose rays], Urolophidae [stingarees], Urotrygonidae [round rays], and Zanobatidae [panrays].

Neotrygon ningalooensis Last, White & Puckridge, 2010, commonly known as the Ningaloo Maskray, belongs to the family Dasyatidae and is one of the ten species in the *Neotrygon* genus.

Morphology

The Ningaloo Maskray is pale yellowish brown in colour, with a darker brown margin, and dotted with small orange spots and relatively larger white-blue blotches across its dorsal surface. Animals have a white underside with brown margins.

The Ningaloo Maskray is a small-bodied ray with a maximum disc width [DW] of 30.2 cm. On average, the DW is 1.1 times greater than the total length [TL] of an animal. The snout is blunt and weakly angular/rounded. Compared to their size, they have relatively large, protruding eyes. Interestingly, their eyes may provide an advantage that other similar species do not have. Their large eyes allow Ningaloo Maskrays to bury themselves deeper for camouflage and



Ningaloo Maskray
[*Neotrygon ningalooensis*]

Photo: Alex Hoschke [CC BY-NC 4.0]

to observe their surroundings. They have a row of four to five thorns on the body but lack denticles from their tail to their stinger. Due to their unique, saturated orange spotting, they are easily identifiable compared to other *Neotrygon* species.

Distribution and Range

Ningaloo Maskrays occur in soft sediment habitats at depths up to 5 m. They are found along the coast of Western Australia, facing the eastern Indian Ocean, with possible populations on Australia’s northern coast. They are specifically found in patches near Five Fingers Reef, Coral Bay, Lakeside, and Bundegi Reef in Exmouth Gulf. There were specimens identified in Shark Bay (Western Australia) and Gove (Northern Territory), which may be Ningaloo Maskrays. However, this requires further research as they appear to vary genetically from the few specimens studied. Additionally, their known range overlaps with other *Neotrygon* species, such as Plain Maskray [*N. annotata*], Australian Bluespotted Maskray [*N. australiae*], and Painted Maskray [*N. leylandi*].

Conservation measures and IUCN Red List status

The Ningaloo Maskray has been assessed as Data Deficient (DD) on the IUCN Red List of Threatened Species because of the small number of specimens studied, limited information on its ecology, and lack of understanding of the impact of fishing on populations. The species is considered an endemic to the coast of Western Australia, and further research is needed to confirm if it has a wider distribution. Due to its limited range and specific habitat preferences, Ningaloo Maskray is likely susceptible to habitat degradation and loss. However, its known distribution is within a marine protected area (Ningaloo Marine Park) and a World Heritage Area (Shark Bay), so it is likely to have refuge from this threat. Furthermore, in those areas, there are no commercial or recreational fisheries. Due to its DD status, there are no management measures or species-specific protections for this species.

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Ningaloo Maskray
(*Neotrygon ningalooensis*)

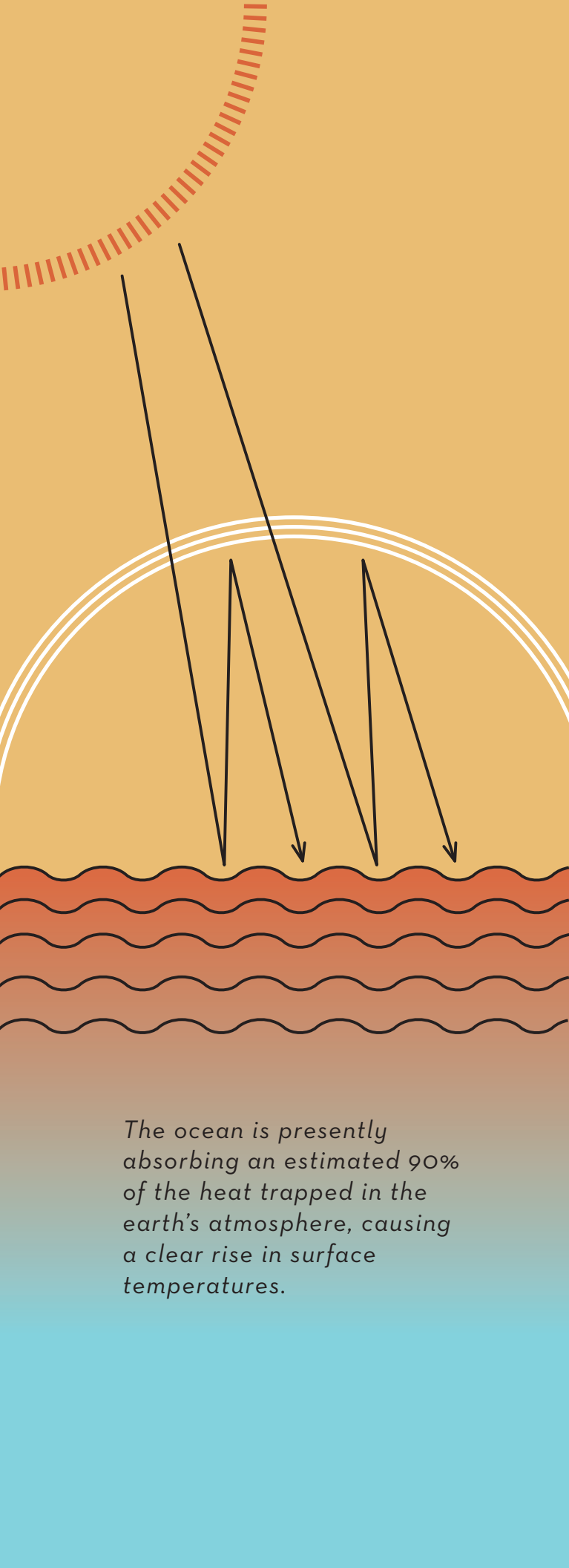
Photo: Alex Hoschke [CC BY-NC 4.0]



THE IMPACTS OF CLIMATE CHANGE ON SHARKS AND RAYS

DR. SIMON J. PIERCE





The ocean is presently absorbing an estimated 90% of the heat trapped in the earth's atmosphere, causing a clear rise in surface temperatures.

CLIMATE CHANGE IS A LONG-TERM SHIFT IN GLOBAL OR REGIONAL CLIMATE PATTERNS. THIS INCLUDES CHANGES IN AVERAGE MEASUREMENTS OF TEMPERATURE, WIND, HUMIDITY, SNOW, AND RAINFALL OVER A LONG PERIOD OF TIME.

Human-influenced climate change is an existential threat to many shark and ray species. Most sharks and rays are cold-blooded (ectothermic) animals, with their biology and metabolism dictated by the ambient water temperature. The ocean is presently absorbing an estimated 90% of the heat trapped in the earth's atmosphere, causing a clear rise in surface temperatures.

Changes in sea surface temperatures are creating newsworthy changes in shark distribution. Warm water species like the Whale Shark (*Rhincodon typus*) have been reported in mainland Europe (Portugal) for the first time, Hammerhead Sharks (*Sphyrna spp.*) and Bigeye Thresher Shark (*Alopias superciliosus*) are increasingly common in Britain, and Tiger Sharks (*Galeocerdo cuvier*) are being caught off Canada in the north and Tasmania, in Australia, to the south.

At the same time, though, some tropical waters are becoming uninhabitable for sharks and rays, while cooler-water species are feeling the squeeze as their habitats contract.

Latitudinal shifts in marine ecosystems are a gradual process, but many effects of climate change are moving much faster. Sea level rise is inundating coastal regions. Marine heatwaves and tropical storms are becoming more frequent, and more severe. Deoxygenated 'dead zones' in the ocean present a barrier to wildlife migrations, while acidification is degrading coral reef ecosystems. These are shared threats to sharks, rays, and people.

The long evolutionary history of sharks and rays, and their ancestor's persistence through several mass extinction events, provide us with some insights into the species

that may be most at risk of human-induced climate change. This time, however, their challenges are compounded by overfishing and habitat modification, that has already depleted shark and ray populations. In this fact sheet, we explore the main threats to sharks and rays from climate change, particularly those listed on the Convention on the Conservation of Migratory Species of Wild Animals (CMS) and the Memorandum of Understanding on the Conservation of Migratory Sharks (Sharks MOU), and how we can shield the most at-risk species.



SHIFTING POPULATIONS

Ocean temperature has a direct effect on physiological and metabolic functions in sharks and rays, including digestion, growth, and reproduction. That makes it difficult to generalize how sharks and their relatives, a diverse group of around 1,250 species, will respond to rising ocean temperatures; it depends on their preferred habitats, diet, and swimming ability, to note just a few factors.

Projections of how each species will be affected by climate change generally rely on modelling their contemporary habitat use, based on fisheries, sightings, or tracking data, then predicting how these habitats will shift based on future change scenarios. Unsurprisingly, given the lack of data available for many sharks and rays, these predictions are only available for a small number of species.

Some open ocean species, like migratory

Blue Shark (*Prionace glauca*), Shortfin Mako (*Isurus oxyrinchus*), Silky Sharks (*Carcharhinus falciformis*), and Oceanic Whitetip Shark (*Carcharhinus longimanus*), can swim towards the poles to maintain their optimal temperature environment. However, pelagic sharks generally have a relatively narrow preferred temperature range. For example, Oceanic Whitetip Sharks spend over 95% of their time within 2°C of the surface water temperature. Pelagic species are all active hunters and, as such, they have naturally high metabolic rates. As water temperature increases, the shark's metabolism does too. They have to swim faster to deliver sufficient oxygen to their bodies, eat more to supply energy, or suppress their growth and reproduction to compensate. Even at the best of times, these sharks live on an energetic knife-edge. Similarly, Oceanic Manta Ray (*Mobula birostris*) also appear to be sensitive to high temperatures, preferring surface

waters under 29°C. While these species can expand their distribution into cooler waters to adjust to rising ocean temperatures, large areas of tropical surface waters are becoming uninhabitable, resulting in an overall range contraction for sharks and rays globally.

Warming oceans are increasing the strength and frequency of acute marine heatwaves, such as the El Niño Southern Oscillation (ENSO). These events provide additional insight into likely species- and community-level effects of longer-term climate change. A case study from Cocos Island off Costa Rica, based on 27 years of diver-recorded shark and ray sightings, investigated the effects of ENSO events on the Scalloped Hammerhead (*Sphyrna lewini*) which has one of the highest metabolic rates among all sharks. This species, which is Critically Endangered according to the IUCN Red List of Threatened Species, had the strongest response to temperature change

in the monitored community. Predicted individual shark counts declined by 10% for a 1°C increase in water temperature, and by 40% with an increase from 25 to 30°C. The probability of observing hammerhead schools (>50 individuals) was 43% more likely at 25°C than at 30°C. During cooler La Niña years, there were twice as many Scalloped Hammerheads present at the island, and schooling behaviour was 118% more likely during strong La Niña events than during strong El Niño conditions.

CLIMATE REFUGEES

Many sharks and rays are dependent on particular habitats, such as coral reefs, which are not continuous. Walking Sharks (*Hemiscyllium* spp.), found only on shallow reefs in the tropical Indo-Pacific, can only shift their range if there is additional reef habitat with suitable environmental conditions that is close enough for these small sharks to swim to. Thermal stress on coral reefs is already evident, such as the well-publicized recent bleaching events on the Great Barrier Reef in Australia, where the 2016–2017 event affected two-thirds of this huge reef system.

Some sharks and rays have very small natural or remnant ranges, such as the Maugean Skate (*Zearaja maugeana*), now found only in a single harbour in Tasmania, and the New Caledonia Catshark (*Aulohalaelurus kanakorum*), thought to be restricted to southern New Caledonia. Others appear to have hugely reduced ranges due to overfishing, such as the Clown Wedgefish (*Rhynchobatus cooki*), which has solely been recorded from the Lingga Archipelago in Indonesia in recent years, and the False Shark Ray (*Rhynchorhina mauritaniensis*) which is believed to be restricted to the waters of a small bay in the Banc d'Arguin National Park in Mauritania. Species in this situation can be left stranded in habitats that push their physiological tolerances.

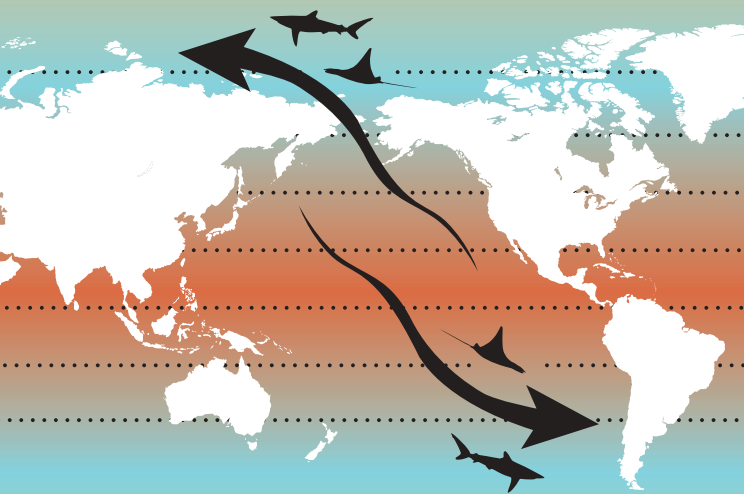
It is analogous to the situation on land, where high-altitude species have been forced higher and higher up mountains, until they simply run out of space to live.

Similarly, there is concern for Critically Endangered species whose ranges have been heavily fragmented by overfishing and habitat loss, such as the Angelshark (*Squatina squatina*) and Common Guitarfish (*Rhinobatos rhinobatos*). These species use warm, shallow protected waters in the eastern Atlantic and Mediterranean as nurseries to speed the development of their pups. The Angelshark was historically known for coastal migrations into northern Europe, where it is now mostly absent. The small contemporary population, decimated by overfishing, is now isolated in pockets of suitable habitat. The species is most commonly sighted in the Canary Islands, where its options for temperature-related adaptive movement are limited by the deep trenches between islands and between the island chain and the African continent.

This emphasizes the importance of maintaining habitat continuity for threatened populations by safeguarding movement corridors between suitable areas, and preserving critical habitats, such as the coastal nurseries used by the pups of many shark and ray species. Inshore and estuarine nursery areas are highly susceptible to climate change. Sea level rise may, in some cases, expand these areas through the

inundation of marshes. However, increased water depth can also reduce the light required by seagrass meadows to maintain photosynthesis, reducing the availability of seagrass-associated prey species for young sharks and rays. Increasing water temperatures are exacerbated by sun exposure in these shallow environments, with associated deoxygenation (discussed in the next section), while coastal areas are susceptible to damage from storms.

In particular, heavy rains expose estuarine habitats to increased runoff and freshwater input. Juvenile Bull Sharks (*Carcharhinus leucas*), which are well-known for being able to move between fresh and saltwater environments, often live in rivers for their first few years of life. Studies of young Bull Sharks in the Logan and Albert Rivers in Australia found that flooding events caused rapid drops in both salinity and the water's dissolved oxygen content that exceeded their ability to adapt, causing several tagged sharks to permanently leave the system, increasing their risk from fishing and predation. Public reports of dead sharks at the Logan River mouth after the flood suggest that not all survived the flood. As storms become fiercer, and more frequent, such events are projected to increase.



Since the 1950s, ocean surface warming has shifted marine taxa and communities poleward at an average of 59 km per decade.

OCEAN DEOXYGENATION

Accelerating water deoxygenation, now seen in all oceans, is one of the most significant ecological consequences of climate change. Projected deoxygenation levels towards the end of this century will mimic conditions that were last found during the end-Permian Period (about 250 million years ago), when a collapse of suitably aerobic habitat caused the largest marine extinction in geological history. In previous mass extinction events, large cold-blooded animals and top predators were among the worst-affected animals by ocean warming and associated deoxygenation. Sharks, of course, are among the largest animals in the marine environment.

Oxygen is less soluble in warmer water, which poses a serious problem for migratory sharks. Open ocean species must constantly swim to maintain the flow of oxygenated water over their gills so they can, in turn,

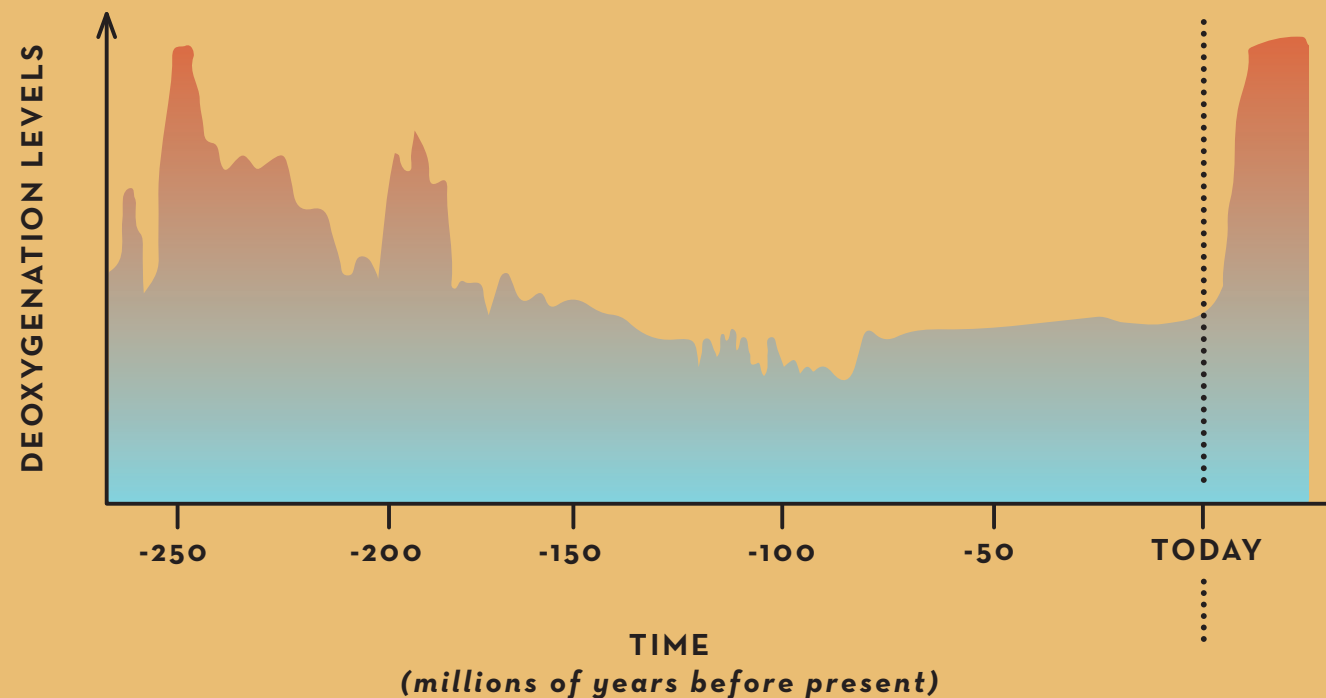
deliver oxygen to their muscles and organs. By itself, their constant swimming requires a lot of energy and oxygen. As water temperature increases, the shark's metabolism does too, but their available gill surface area for extracting oxygen is a physical constraint.

Sharks and rays live in a three-dimensional habitat, so they can normally use depth to avoid high surface temperatures. Blue Sharks, for instance, are one of the world's most widely distributed cold-blooded animals, capable of swimming across entire ocean basins and diving to over 1,600 m depth. With that comes a high tolerance for environmental variation, as they can naturally be exposed to temperatures of 4–30°C. During long-distance migrations, they often remain at ~400 m depth to reduce their energy costs by staying in cooler water. Their metabolic rate at this depth is estimated to be only 40% of that in warmer surface waters. However,

they still require a minimum oxygen level. A reduction in the oxygen content of surface waters, due to heating, is magnified at depth, as oceanic bacteria use up a high proportion of the remaining oxygen. In some regions, this has created permanent 'oxygen minimum zones' (OMZs) between 200–1,000 m depth, in which oxygen levels are too low for pelagic sharks to use routinely. As the oceans warm, OMZs are expanding both horizontally and vertically. In the eastern tropical Atlantic, the OMZ has been expanding for the past 50 years, increasing in thickness (depth range) by 85% between 1960 and 2006. Recent observations have detected such low oxygen content in some oceanographic features within this area that they are referred to as 'dead zones'. Tracking data of Blue Sharks in this region found that their average maximum dive depth in the OMZ was 40% less than the mean depth outside the area, with a greatly reduced frequency of deep diving

(to below 600 m) while inside the OMZ. Restricted dive profiles in OMZs have also been documented from White Sharks (*Carcharodon carcharias*) and Shortfin Mako in the eastern Pacific Ocean.

Deoxygenated zones reduce the habitable space for pelagic sharks and compress their vertical movements. That makes the sharks more susceptible to capture in open ocean fisheries. Blue Sharks make up ~90% of the catch of pelagic sharks in the Atlantic, and their fins are the most commonly traded in international markets. Longline catches of Blue Sharks around the eastern Atlantic OMZ were higher inside than outside it, primarily in areas where shark dive depths were predicted to be shallower, based on the tracking data. As OMZs increase in size, restricting sharks to their edges, or to staying close to the surface if they have to cross these biological deserts, their already depleted populations become more catchable by industrial fisheries.

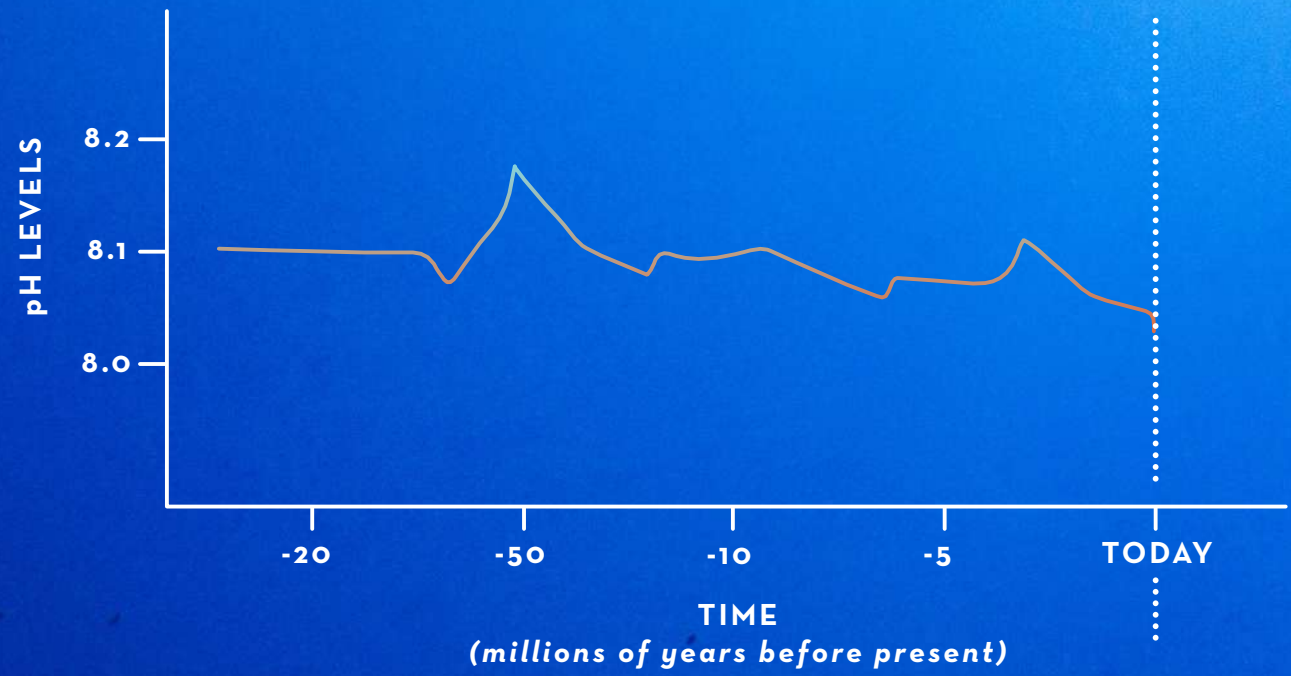


Projected deoxygenation levels towards the end of this century will mimic conditions that were last found during the end-Permian Period (~250 million years ago), when a collapse of suitably aerobic habitat caused the largest marine extinction in geological history.

OCEAN ACIDIFICATION

With levels of atmospheric carbon dioxide on the rise, the ocean is an increasingly large sink, absorbing up to 30% of this atmospheric carbon. When carbon dioxide dissolves into seawater, it forms carbonic acid (H_2CO_3). This reduces the ocean's pH level, which is naturally slightly basic (meaning $\text{pH} > 7$). 'Ocean acidification' is the term used to describe the shift of ocean water closer to pH-neutral. The decreasing pH of the ocean reduces the amount of calcium carbonate in the water, which is used by many marine animals to build their skeletons and shells - including shellfish, many of which are eaten by sharks and rays, and corals, which provide vital habitat for many species.

The ocean has already increased around 30% in acidity since records began, and current estimates indicate that the ocean pH level at the end of this century will be the lowest in more than 20 million years. Generally, laboratory-based research has suggested that sharks and rays show some physiological tolerance to elevated carbon dioxide levels, though there can be negative effects on growth and metabolism through compensatory responses, and a reduced ability to locate food through olfaction. The effects of acidification on larger, more mobile species are yet to be investigated. At this stage, the primary effects of acidification on sharks and rays are thought to be through habitat loss, particularly for reef-associated species like the Porcupine Ray (*Urogymnus asperrimus*), while many prey species are dependent on calcium carbonate, which will of course indirectly affect sharks and rays too.



The ocean has already increased around 30% in acidity since records began, and current estimates indicate that the ocean pH level at the end of this century will be the lowest in more than 20 million years.

Grey Reef Shark (*Carcharhinus amblyrhynchos*) on coral reef in French Polynesia
Hannes Klostermann | Ocean Image Bank

LOOKING FORWARD

Some sharks and rays can adapt or relocate to cope with ocean warming, either by moving into deeper water or through latitudinal shifts. Unfortunately, many habitat specialists who cannot relocate – such as freshwater, estuarine, and coral reef species – are already struggling with overfishing and environmental degradation. Climate change is a multiplier for the existing stressors on threatened sharks and rays.

There are many actions that governments, businesses, and individuals can and should take to reduce climate change. While working towards these measures, we still need to mitigate the present and projected impacts on sharks and rays. There are two main components to this. First, we can ensure that species have safe areas to move to if their preferred habitats become uninhabitable. Second, by improving their conservation status, we can maximize their resilience to change.

Signatories to CMS and the Memorandum of Understanding on the Conservation of Migratory Sharks (Sharks MOU) can lead on both of these initiatives. Migratory sharks and rays require secure habitats that are large enough to span the depths and latitudinal ranges that allow for adaptive movements, and for swimmable corridors to be maintained between such habitats. As an example, the Galapagos Marine Reserve (Ecuador) and Cocos Island National Park (Costa Rica) were both significantly expanded in 2021, with a protected ‘swimway’ created between these iconic UNESCO World Heritage

Areas to safeguard the migratory sharks, rays, and other species that move between them. Proactive management arrangements like this will often extend across national and international boundaries, emphasizing the need for cooperation. Coastal species could also benefit from the protection and maintenance of healthy ecosystems at the poleward extremes of continents, such as the Cape Region of South Africa and in southern Australia, to provide safe refuge for the animals that are forced to move by ocean warming.

Overfishing is a more immediate threat than climate change for most sharks and rays. However, unfortunately, these threats are synergistic; climate change can increase migratory species’ susceptibility to fishing. Scenario planning has begun for sharks in certain locations, such as the Tope Shark (*Galeorhinus galeus*) in southern Australia, in which climate change impacts and fishing mortality are projected to constrain the species to its current Critically Endangered level without further conservation efforts. For pelagic sharks, like the Blue Shark, Shortfin Mako, and White Shark, regional management will have to consider and mitigate the effects of ocean deoxygenation increasing catch rates for these threatened species. Spatial management, such as large offshore protected areas, may be an option for regions where OMZs are present. To ensure the resilience of threatened species going forward, and to prevent more species from declining to that perilous state, we need to turn climate change into climate recovery.



Epaullette Shark (*Hemiscyllium ocellatum*)
from Australia | David Clode

FURTHER READING

IPCC Sixth Assessment Report. The Intergovernmental Panel on Climate Change.
www.ipcc.ch/report/ar6/wg2/

Overfishing drives over one-third of all sharks and rays toward a global extinction crisis. Dulvy NK, Pacoureau N, Rigby CL, Pollom RA, Jabado RW, Ebert DA, Finucci B, Pollock CM, Cheok J, Derrick DH, Herman KB (2021) *Current Biology* 31(21): 4773–87.

Powering ocean giants: The energetics of shark and ray megafauna. Lawson CL, Halsey LG, Hays GC, Dudgeon CL, Payne NL, Bennett MB, White CR, Richardson AJ (2019) *Trends in Ecology and Evolution* 34(11): 1009–21.

ReShark: An international, collective effort to recover threatened sharks and rays around the world

Photo: MVE



photo Djerde Zlatanovic

ReShark Retreat participants, Seattle August 2023

Mark V Erdmann
Conservation International
IUCN SSC Shark Specialist Group |
Oceania regional member

Hap Fatzinger
AZA SAFE Shark and Ray Program;
North Carolina Aquarium

Lisa A Hoopes
IUCN SSC Shark Specialist Group |
Aquarium Working Group | co-Chair

Rima W Jabado
IUCN Species Survival Commission
Shark Specialist Group

Erin Meyer
Seattle Aquarium

Abraham Sianipar
Elasmobranch Institute Indonesia

Rewilding of threatened (i.e., listed as Critically Endangered, Endangered, or Vulnerable on the IUCN Red List of Threatened Species) sharks and rays using conservation translocation techniques that have been pioneered over the past half-century for terrestrial fauna is a concept whose time has come. In the last issue of Shark News, Dudgeon et al. (2024) provided a comprehensive look at the development and implementation of the StAR (*Stegostoma tigrinum* Augmentation and Recovery) project, an innovative collaboration between large public aquariums, shark conservationists, government agencies, and local communities using a combination of *ex-situ* breeding and in situ translocation to recover the population of Indo-Pacific Leopard Shark (*Stegostoma tigrinum*; also known as Leopard Shark) in Raja Ampat, Indonesia. While that project is showing significant progress and signs of early success, there are numerous related approaches currently being considered, including artificial insemination of *ex-situ* animals, translocating adults from stable, healthy populations to areas where that species has been previously extirpated, and “rescuing” Critically Endangered individuals from populations under severe

threat and transferring them to conservation breeding facilities for future translocation efforts. Indeed, the last issue of Shark News highlighted just such an approach being planned for one of the world’s most threatened rays, the Maugean Skate [*Zearaja maugeana*] in Tasmania [Shiffman, 2024].

In contemplating the significant potential of these various techniques to expand the toolbox of shark and ray conservation efforts, the coalition behind the StAR project enthusiastically agreed in 2023 to launch “ReShark” (www.reshark.org) as an umbrella initiative to focus funding, expertise, and lessons learned for rewilding projects specializing in threatened sharks and rays. A “ReShark Retreat” was held in Seattle in August 2023 to bring together a range of shark and ray conservation experts, including many with experience in the StAR project, to brainstorm on the possibilities and begin fleshing out a framework for the development of the ReShark initiative.

From that retreat, a strong consensus emerged that traditional shark and ray conservation techniques (ranging from fisheries management and bycatch reduction efforts to species-specific protections to the development of Marine Protected Areas and shark sanctuaries) remain the first line of defence in protecting sharks and rays. “Resharking”, combining *ex-situ* and *in-situ* techniques, is a valid approach worthy of significant further practical development. The group spent considerable time discussing the criteria (biological, conservation, and cultural) that might qualify a particular species or geography for a shark or ray rewilding project and then brainstormed an initial list of threatened shark and ray species that might conceivably benefit from various combinations of conservation breeding and translocation efforts.

The group then spent the final days of the retreat discussing the optimal governance structure for ReShark. While there was considerable discussion of the potential merits of launching a new ReShark non-governmental organization (NGO), in the end, it was decided to retain and expand the global collaborative approach of the StAR project to encourage the active participation of a broad range of experts from across the spectrum of *in-situ* and *ex-situ* shark and ray conservation. An initial advisory board (the “ReShark Council”) comprised of the six authors of this article was appointed, with plans to expand in the near future (the chairperson/director of any future rewilding projects coming under the ReShark umbrella will automatically have a seat in the Council). The ReShark Council plans to recruit an executive director and global program manager to further develop the funding base and framework for inviting new shark and ray rewilding projects beyond the StAR project into the ReShark collective.

While it’s still very much “early days”, the Council believes ReShark already offers a significant value proposition for nascent shark and ray rewilding efforts to join the collective. As described in detail by Dudgeon et al. (2024), the StAR project was deliberately designed to follow the IUCN’s One Plan Approach and the IUCN SSC Guidelines on the use of *ex-situ* management for species conservation and has moreover carefully incorporated recommendations from a number of IUCN SSC specialist groups ranging from the IUCN SSC Shark Specialist Group to the IUCN SSC Conservation Planning Specialist Group and the IUCN SSC Conservation Translocation Specialist Group. The lessons learned from the past five years of careful planning and implementation of the StAR project have informed the ReShark approach, and we believe it will provide important credibility (and an expansive

knowledge base on everything from developing government support for shark rewilding to shark egg import and quarantine procedures) for additional projects within the ReShark collective.

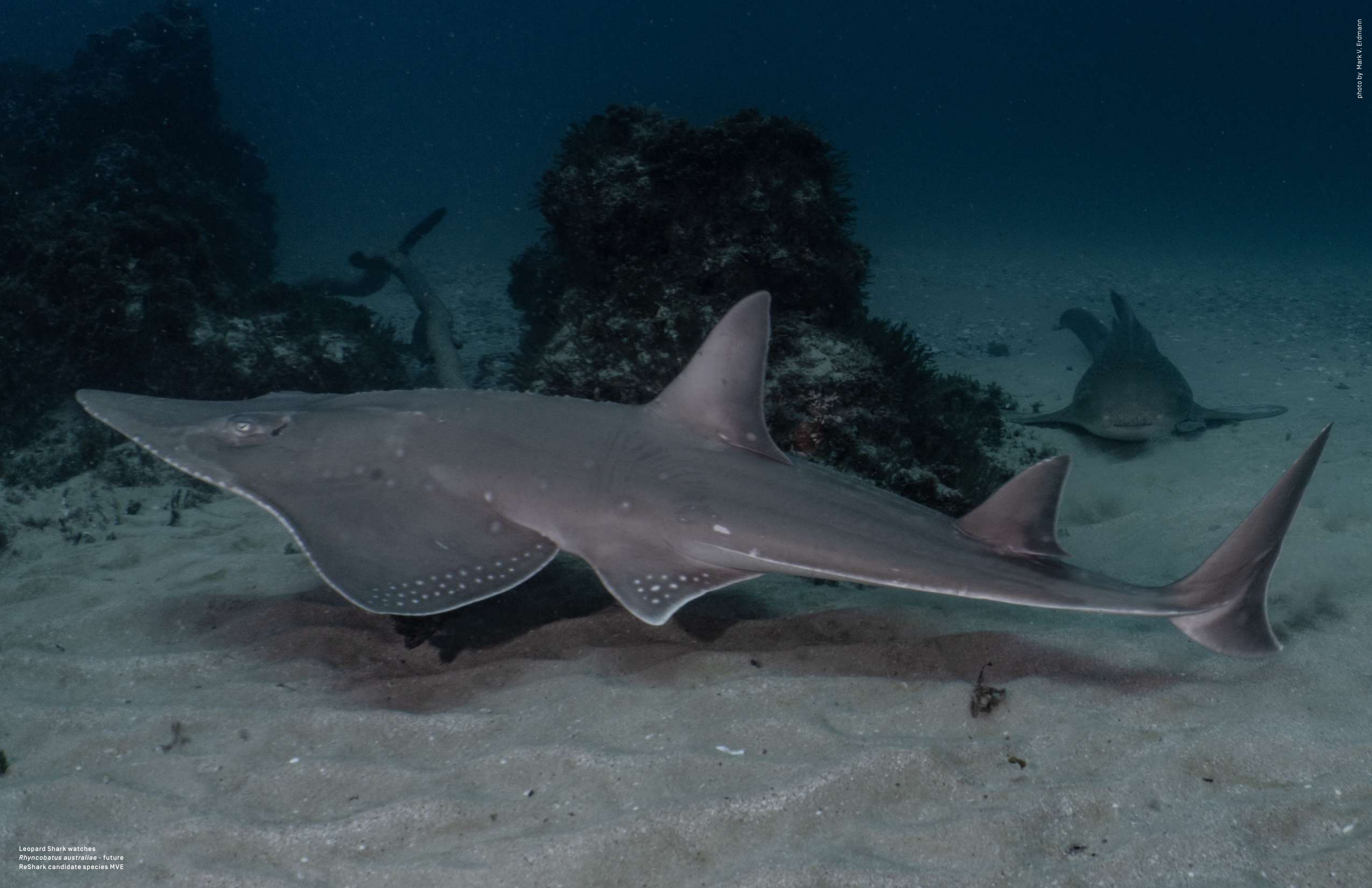
ReShark has invested significantly in developing its social media platforms and producing several short films documenting the steps in implementing a shark rewilding project (www.reshark.org/videos); these platforms will be available for promoting any additional projects joining the collective. Relatedly, the ReShark Council has identified and cultivated a growing number of donors with a strong interest in supporting shark rewilding efforts. Finally, the 90+ partners already involved in the ReShark coalition offer a tremendous breadth of knowledge and expertise to be shared with future projects. In some cases, even the current ReShark infrastructure (e.g., hatcheries, grow-out pens, and acoustic arrays for post-release monitoring) could also be utilized for other species.

In summary, future shark rewilding projects joining the ReShark collective can expect to benefit significantly from the experience (technical, project governance, fundraising, permitting, and government and community relationship-building), brand recognition and infrastructure developed by the ReShark coalition over the past five years. As the ReShark initiative develops and grows, we’ll provide further updates in Shark News. Watch this space!

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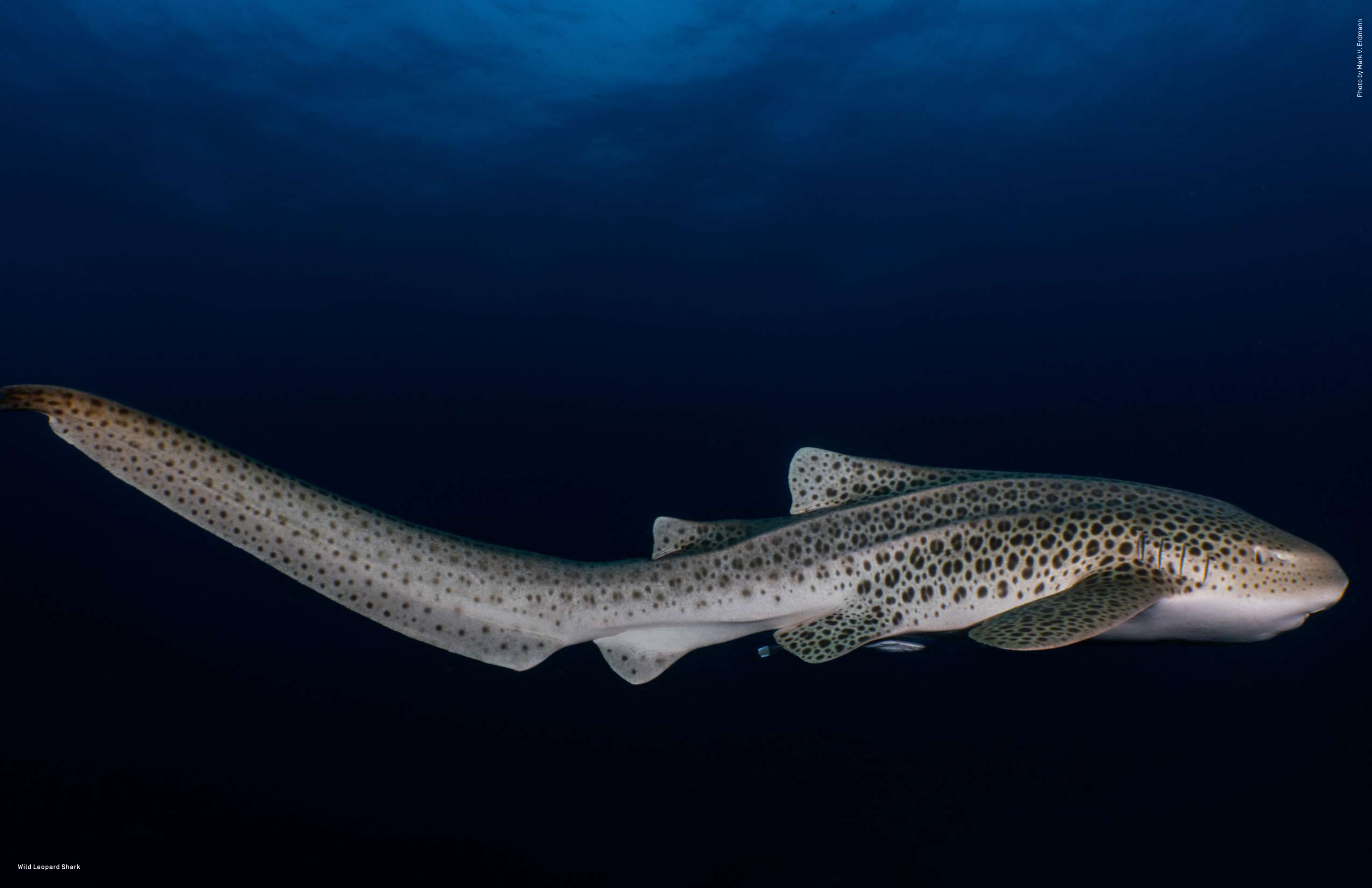
Shiffman, D. (2024). New plan to save one of the world’s most threatened rays from extinction: the Maugean Skate will be extinct in a decade unless we act now. Shark News: Newsletter of the IUCN SSC Shark Specialist Group. #9/January 2024. Pp. 116-123.





Pastinachus ater -
future ReShark candidate species







Hemiscyllium michaeli -
future ReShark candidate species

Bringing sharks into focus

Written by
Chelsea Stein

Revillagigedo, Mexico

Photo by Marta D. Palacios / ISRA

In this feature, nine Important Shark and Ray Area (ISRA) team members provide takeaways from the ISRA process thus far, share some of their favourite ISRAs, and offer a look at what’s ahead.

Imagine what it’s like taking a picture with a Polaroid camera. Yes, I am talking about those clunky yet lovable cameras that would instantly print out a thin photograph after each button snap. Think about how the photo would slide out from the front of the camera, and within a few seconds, you could see the image develop right before your eyes. Colours and details seamlessly emerge to form the picture you just took.

The Important Shark and Ray Areas (ISRA) project is like taking a Polaroid picture – but a bit more complicated and on a much larger scale. Since October 2022, the IUCN Species Survival Commission Shark Specialist Group (SSG) has held four ISRA workshops in strategic locations around the globe, aiming to collaborate and prepare ISRA proposals. So far, this effort has been applied to the Central and South American Pacific, Mediterranean and Black Seas, Western Indian Ocean, and Asia.

Over 700 scientists and experts have partnered with representatives from task forces and governmental units to map the world’s oceans and waterways to better understand what areas need protection to conserve sharks, rays, and chimaeras (hereafter, ‘sharks’). It’s been no small feat, but critical progress is being made to bring a detailed picture of shark behaviour and their critical habitats into focus.

With each workshop, key takeaways and learnings are continuing to emerge. Three major themes have surrounded the ISRA process thus far: the need for shark science and data, the importance of citizen science and community support, and the realization that we still have so much to learn about sharks. In this feature, nine ISRA team members provide takeaways from the ISRA process thus far, share some of their favourite ISRAs, and offer a look at what’s ahead.

Knowledge is power

Most Marine Protected Areas (MPAs) around the world today were set up to manage species other than sharks, so the ISRA project is genuinely the first of its kind, creating a tool for global spatial management through a science-based understanding of sharks to best protect them. To do this, we must know where they are, what they do, and what they need to survive.

“The process of delineating ISRAs has reiterated the importance of high-quality science and data to support the application of the ISRA Criteria,” Dr Peter Kyne said, emphasizing how defining an ISRA requires evidence and defensible data.

Amanda Batlle noted the importance of region-specific data as well. “Giving a regional perspective to shark conservation is beneficial for people to realize that certain common species or



Photo by Marta D Palacios | ISRA

behaviours they see every day at their doorstep are, in fact, unique on a regional or global scale.”

Kyne and Batlle have been involved in all four workshops thus far, where both coordinated proposals for several countries within the regions and Batlle also developed the ISRA workshop web map that allows for visual display of the progress being made, with polygons slowly filling in the map and becoming more refined as the workshop preparations unfold.

Dr Asia Haines has led proposals for several countries across three ISRA workshops. She says what makes this such a worthwhile project is how the data are being used to delineate these polygons. “We know these species must be reproducing and feeding across their distributions, but what places constitute critical habitats for them to undertake these essential life history behaviours? This is one of the distinctions that makes the ISRA process robust and defensible and can truly inform shark protection.”

Workshop attendees bring their expertise and knowledge with them to inform the process and learn from one another. “I’ve learned so much about many species after working with all the collaborators,” Dr Emiliano Garcia-Rodriguez said. “I think the contributors now will take all that we have learned on the ISRA process and will try to get some level of protection or management in each of these areas.” As a spatial analyst, Garcia-Rodriguez attended each workshop and said everyone involved “now knows the type of information that needs to be collected to identify important habitats for these species properly.”

We all know the familiar saying, “Knowledge is power,” and this holds true for the conservation of sharks. The more we collectively know about sharks, the more power we have to protect them. Ryan Charles highlighted how the result of the ISRAs project stands to be incredibly powerful, not just for shark scientists.

“Collating and centralizing this knowledge into one freely accessible place will positively impact our community,” he said. The ISRA e-Atlas allows access to all delineated ISRAs, so “everybody, including scientists, stakeholders, and the general public, will be able to learn about the Important Shark and Ray Areas around the world,” Charles continued. “This will allow for well-informed decisions to be made on shark, ray, and chimaera management and conservation.”

Community strengths

Another theme rising to the surface through the ISRA project has been the importance of citizen science and community support. For many, the level of involvement and support at the workshops has been a testament to the support and enthusiasm of the global shark and conservation community.

“The power of citizen science was a surprise at the Western Indian Ocean workshop,” Dr Chris Rohner said. He has worked directly with regional experts at three workshops to identify ISRAs. “Many areas were supported by data gathered from citizen scientists, and it showed how useful it is for us to look beyond the scientific publications and engage with dive centres and organizations that have citizen science platforms to record sightings.”

Garcia-Rodriguez echoed this reaction: “[What] has surprised me is all the valuable information that has not been published but still



Photo by Jay Clue | ISRA

holds great value to identify ISRAs, and this source of information could only be contributed by the experts working directly with these species. Some examples are the inclusion of local ecological knowledge, information from diving operators or citizen science.”

Sharing the same sentiment, Kyne said, “Something that has pleasantly surprised me is the willingness and enthusiasm of the community to engage in the ISRA workshops and process more broadly. We have already seen hundreds of people giving their time, knowledge, and expertise to identify ISRAs.”

The media also plays an important role in garnering or deterring community support for sharks. Reporters often use fear and negative rhetoric when sharing news about sharks, which can impact the general public’s views and actions. After the Mediterranean and Black Seas workshop, Batlle noted seeing some positive coverage.

“[At the workshop,] I loved learning more about the sharks and rays in Spanish waters, especially the high diversity in the Balearic Islands, and the public doesn’t know much about it. When the Balearic Islands were designated as an ISRA, the local newspaper wrote about it. I was happy to see how ISRAs are helping to give a more positive media presence to sharks and rays.”

Dr Marta Diaz Palacios supported the Asia workshop, helping to outline an ISRA for Bull Sharks (*Carcharhinus leucas*) living in channels and small lakes in Naha, a heavily populated city in Japan. What stood out to her was seeing how the workshop’s efforts would help this community live in harmony with the sharks. “I think this ISRA shows how sharks and people can coexist and demonstrates how everyone can contribute to scientific knowledge through simple sighting or catch reporting.”

For Adriana Gonzalez-Pestana, she has been able to find a community of passionate peers through the process. After attending each workshop and supporting or leading proposal development for candidate ISRAs, she says she has finally “found her squad.”

“In the day-to-day world, I feel a bit weird being so passionate and almost obsessive about sharks – few people in the world understand this feeling,” she said. “[Within the shark scientific community,] we are all crazy about sharks. We have chosen this profession because we are very passionate about sharks and are very committed to conserving them. We are more aware than most people of the amazing creatures they are and how important they have been for the planet. So, in these workshops, you get to know the sharks and the terrific people that study them.”

More to discover

While the ISRA process has brought new findings and learnings to light, the final theme that has emerged is the realization that we still have so much to learn about the world’s 1,260+ species of sharks.

“What is shocking is how little we know about sharks, rays, and chimaeras,” Charles noted. “There seems to be a focus and possible bias towards a dozen iconic species so that lesser-known species can be overlooked. The data drought for deep-sea species and chimaeras was almost to be expected [and should be addressed]. However, I was surprised that even highly abundant coastal or iconic species lack information on their regular and predictable habitat uses.”



Photo by Marta D Palacios | ISRA

Learning species-specific characteristics and behaviours is helpful for protection and conservation and also fascinating and part of the fun of the process. Rohner said that he continues to learn about the biology of sharks through the process. “Perhaps the coolest thing was that Blackchin Guitarfish (*Glaucostegus cemiculus*) neonates/ young-of-the-year leave the water to rest on the wet sand in the Dalia Beach ISRA in Israel. It is unclear why they do it, but the experts who proposed this area as an ISRA are working on finding that out.”

Gonzalez-Pestana pointed out that people will not protect something they fear. As we continue to dive into the diversity of sharks and discover more, this information and knowledge will also help shift the public’s view.

“If people knew more about sharks, they would just love them. From the lantern sharks that glow in the deep dark to skates that lay their eggs in hydrothermal vents, people can choose their favourite shark,” she said. “Once you learn how cool, evolved, and adapted sharks are, you will not want to lose them. We are not just losing some toothy, voracious large fish; we are losing one of the most amazing creatures the planet has ever designed. ISRAs are important because you get to have the small and big picture: from the sharks of a tiny island in the middle of the ocean to all over the world.”

“I have learned that there are numerous range-restricted species of sharks and rays that lack basic information crucial for their conservation,” Palacios added. “These species inhabit limited areas that encompass habitats with special characteristics determined by unique geographical or environmental features. Given their susceptibility to extinction, if their natural habitats are eliminated or significantly disturbed, I believe it’s essential that in the ISRA Criteria, there is a specific criterion focusing just on this attribute, even if other ecological information is missing.”

Beyond exploring the depth and breadth of shark species, the ISRA process also exposes knowledge gaps about the threats that sharks face. Take fisheries, for example, which Haines explained as a surprising hole in the data.

“Given the fisheries pressure in some of the regions the ISRA team has assessed so far, it has been surprising to see a lack of resolution on species caught in these fisheries,” she said. “The ISRA process relies on species resolution data; in many cases, they are unavailable (even when reported catch rates are extremely high). It reminds us how much we still have to learn about fisheries that we know are driving global declines.”

Across the board, the ISRA project is poised to usher in a new wave of momentum for shark scientists and advocates. There will be many opportunities to build upon this foundation and close the gaps needed to make progress in understanding and protecting sharks.

Choosing a favourite ISRA

Perhaps what perplexed these ISRA team members the most was trying to identify their favourite ISRA so far! For some, it came down to how a species uses an area.

“One of my favourites would be the Agig-Ras Kasar ISRA, which borders Eritrea and Sudan,” Charles said. “It is the largest known cluster of contemporary Green Sawfish (*Pristis zijsron*) records in the Western Indian Ocean. It has regional and global importance for this reason!”

Haines chose the Nosy Be ISRA in Madagascar. “This area hosts large aggregations of Whale Sharks [*Rhincodon typus*], Oceanic Manta Rays [*Mobula birostris*] and other mobulids for feeding,” she said. “Given the ephemeral nature of zooplankton blooms in the oceans, it is a unique area when these blooms are reliable enough to host megaplanktivores on a predictable and regular basis.”

While Palacios has only participated in the delineation of ISRAs in the Asia region, she said the Naha and Mukue River in Okinawa Island in Japan stood out. “This ISRA is an important reproductive area for Bull Sharks where neonate and young-of-the-year animals are recorded and caught every year by locals. Bull Sharks are euryhaline species, which means they can live in freshwater, sometimes as far as a thousand kilometres upstream. In this case, they live in channels and small lakes within the city of Naha, which is heavily populated.”

Garcia-Rodriguez picked a few favourite ISRAs from the workshops thus far. “For the Central and South American Pacific, I have to go with one near home, Deep Benthic Midriff Islands ISRA in Mexico. This is a very cool area for me because it is one of the few subsurface ISRAs we have identified and is important for four range-restricted species which we don’t know much about. Despite this, we gathered enough information to identify their important habitat. For the Mediterranean and Black Seas, I’ll go with Palmahim Brine Pools, which is this really small and deep area (1,100 m depth) where Blackmouth Catsharks [*Galeus melastomus*] lay their eggs and Angular Roughsharks [*Oxynotus centrina*] go to the area to feed on those eggs. This small spot has many layers of eggs, which is so cool. Finally, for the Western Indian Ocean, I’ll go with the Rufiji Delta ISRA in Tanzania. This is an important reproductive area for Largetooth Sawfish [*Pristis pristis*], a Critically Endangered species and was identified based on local ecological knowledge of fishers interacting with this species. For me, this type of evidence source shows the great value of identifying ISRAs.”

Others identified their favourite ISRAs based on the diversity of the geographic location and the species found there.

“The Palmahim Brine Pools ISRA is one of my favourites,” Gonzalez-Pestana said. “This ISRA shows how incredible and cool sharks are. It is located in one of the planet’s most extreme environments that resembles outer space, starting at 1,100 m depth, where only a few species can survive in anoxic brines saturated with methane, sulfide, and ammonium. Two species of sharks, one with a very peculiar look, have chosen this location to live, feed and lay their eggs. This is an example of the more I know them, the more amazed I become.”

Kyne said the Chiloe ISRA in Chile was his top choice, especially after visiting there last year. “Stunning Patagonia landscapes surround the area and include deep fjords. This ISRA was delineated based on species that might not be considered charismatic [dogfishes, hound sharks, skates] but is also essential to highlight important areas.”

Personal connections and experiences were what influenced Rohner and Battle’s favourite ISRAs. “If I have to choose one,” Rohner said, “I’ll go with the Kilindoni Bay ISRA in Tanzania because my research contributed to delineating this area.”

Battle said, “The Eastern Rasdhoo Atoll in the Maldives is an area I know very well, as I dived it several times a week for five

years. It is a beautiful reef where aggregations of Grey Reef Sharks [*Carcharhinus amblyrhynchos*], Whitetip Reef Sharks [*Triaenodon obesus*] and Spotted Eagle Rays [*Aetobatus ocellatus*] can be seen daily, together with several ray species and also manta rays during the season. It is one of these sites where everything is possible, as sometimes we even had Whale Shark and Bowmouth Guitarfish [*Rhina ancylostomus*]. It is a special place, and it is important to preserve it for future generations.”

A better world for sharks

Of course, there is more work to be done and more areas to map for sharks, with the latest ISRA workshop held in May 2024 exploring the Polar Waters region. Considering the extreme conditions in such remote locations, this workshop may be the most challenging to date.

“This is an area with a low diversity compared to other regions, and this means that we have less information available,” Garcia-Rodriguez said. “However, there are some very exciting species [skates!] for which I’m sure we will identify important habitats working with all the contributors.”

Kyne added to the excitement, noting that, “While the species diversity is low in Arctic and Antarctic waters, the workshop is an opportunity to delineate important areas for species which are not likely to pop up again in other workshops including range-restricted Sub-Antarctic skates and the iconic Greenland Shark [*Somniosus microcephalus*] of the Arctic.”

Charles is eager to see the ISRA process continue in such a unique region. “It is always a fun challenge to see how the ISRA Criteria can be applied for species in different areas. Areas which are proposed as distinct always generate interesting conversations,” he said. “In every region, contributors give their time and knowledge to the ISRA process. This collaborative international effort towards a central goal is driving the project’s success.”

Vanessa Bettcher has contributed to the Asia workshop, helping define boundaries for polygons on the map and find preliminary Areas of Interest in preparation for the Polar Waters region workshop. She is hopeful that citizen science and community strength will also ensure a successful workshop here. “I hope that in this workshop, we can gather knowledge from researchers who have worked or are currently working in the region, as well as from the local community, to identify new areas of interest that are still relatively unexplored,” Bettcher said. “This will enable further research to be conducted in the near future, especially on species that inhabit the region.”

With the Polar Waters workshop – and upcoming New Zealand and Pacific Islands workshop in August 2024, along with the remaining workshops to be held in the future – the map continues to fill in, and a clear picture is coming into view. As a GIS technician, Battle said it best: “I love maps and their power of communication. The ISRA e-Atlas is a powerful tool that provides a clear message that everyone understands: ‘These areas are important.’”

The ongoing ISRAs project is like snapping a picture on a Polaroid... and the image that’s developing because of this work and global collaboration is a better world for sharks, rays, and chimaeras.

Photo by Marta D Palacios | ISRA



Bay of La Paz, Mexico

The Important Shark and Ray Areas of the Western Indian Ocean

Written by
Ryan Charles

IUCN SSC Shark Specialist Group |
Important Shark and Ray Areas |
Research Assistant

The Important Shark and Ray Areas (ISRA) initiative recently put sharks on the map in the Western Indian Ocean. The aim was to identify discrete, three-dimensional portions of habitat, important for one or more shark species, that are delineated and have the potential to be managed for conservation. The ISRA initiative succeeded in the first two regions investigated: the Central and South American Pacific and the Mediterranean and Black Seas. This innovative approach to place-based conservation takes inspiration from Important Marine Mammal Areas (IMMAs), Key Biodiversity Areas (KBAs), Ecologically and Biologically Significant Marine Areas (EBSAs), and Important Bird and Biodiversity Areas (IBAs).

The Western Indian Ocean was the third of thirteen regions to be investigated. The ISRA team hosted a regional expert workshop in Durban, South Africa, in September 2023. The best available evidence (such as local ecological knowledge, dive data, and peer-reviewed scientific articles) was collated at the workshop, facilitating conversations between the contributors. This was crucial in developing representative proposals of areas that may meet the ISRA Criteria – including the definition of accurate spatial boundaries.

In total, 237 experts contributed to the process, either in-person or online. This international effort resulted in the delineation of 125 ISRAs – the first of the Western Indian Ocean. One area remained a candidate ISRA (cISRA), which will benefit from ongoing research that may help define its importance in the future. Also, 45 Areas of Interest (Aols) were mapped to highlight potential areas for potential future investigation. These areas varied greatly in size (0.25–1,454,950.94 km²), including shallow lagoons (e.g., 0–3 m deep) and deepwater areas (e.g., 0–1,928 m deep), as well as subsurface areas (e.g., 220–1,500 m deep).

The Western Indian Ocean is now mapped on the ISRA e-Atlas. All mapped areas can filtered to display ones specific to your requirements or interest. For example, you can choose areas that were delineated in a particular jurisdiction or ISRA region, filter for areas that meet a particular criteria, or delineated for specific Qualifying Species. Every area has a unique factsheet which details the species, ISRA Criteria met, and geographic information. The recently published compendium entitled 'Western Indian Ocean: A Regional Compendium of Important Shark and Ray Areas' collates all factsheets for the region. This is free to download from the ISRA website (sharkrayareas.org). This information is available to everyone, including scientists, policymakers, and the general public.

Important Shark and Ray Areas in the Western Indian Ocean were mapped for every ISRA criteria. This means that some delineated areas were mapped for those most threatened with

extinction (e.g., Green Sawfish, *Pristis zijsron* and Ganges Shark, *Glyphis gangeticus*) as well as some range-restricted species (e.g., Zanzibar Guitarfish *Acroteriobatus zanzibarensis*). Regular and predictable observations were used to demonstrate the importance of areas for reproductive purposes, feeding, movement, and undefined aggregations. Other areas had special attributes, such as a high diversity of sharks or distinct features. For example, Reef Manta Rays (*Mobula alfredi*) display a unique 'cyclone' feeding strategy at Hanifaru Bay & Anga Faru ISRA in the Maldives.

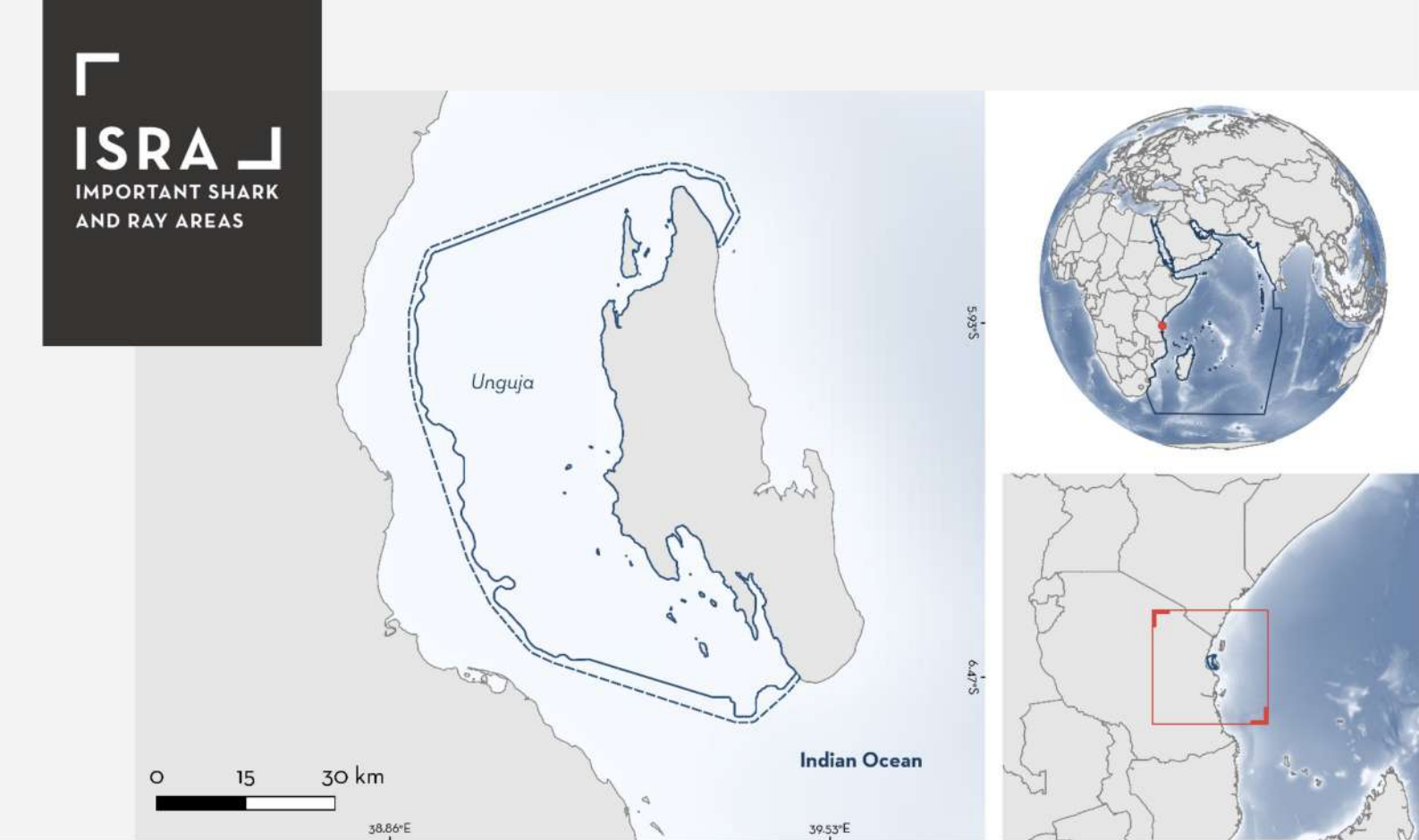
At the time of writing (April 2024), the ISRA team have worked with international experts to map 255 ISRAs, 12 cISRAs, and 76 Aols in two regions of the world. The ISRA team is finalizing proposals after working with local experts in Asia – the fourth region to be investigated. The proposals are being finalized for independent review, before the most Important Shark and Ray Areas for Asia will be put on the map! Then, Polar Waters is the next region that will be investigated.

More information on Western Indian Ocean ISRAs can be found here:

- IUCN SSC Shark Specialist Group. 2023. Important Shark and Ray Areas Regional Expert Workshop Report: Western Indian Ocean. December 2023. Dubai: IUCN SSC Shark Specialist Group.
- IUCN SSC Shark Specialist Group. 2023. Unguja ISRA Factsheet. Dubai: IUCN SSC Shark Specialist Group

References

Jabado RW, Kyne PM, García-Rodríguez E, Charles R, Armstrong AO, Mouton TL, Gonzalez-Pestana A, Battle-Morera A, Rohner CA. 2023. Western Indian Ocean: A regional compendium of Important Shark and Ray Areas. Dubai: IUCN SSC Shark Specialist Group. doi.org/10.59216/ssg.isra.2023.r7



Blue lines indicate the area meeting the ISRA Criteria; dashed lines indicate the suggested buffer for use in the development of appropriate place-based conservation measures

UNGUJA ISRA

Western Indian Ocean Region

SUMMARY

Unguja is located in the Zanzibar Archipelago, Tanzania. The area is characterised by the presence of coral reefs, mangroves, and sandy substrates. The area overlaps with one Ecologically or Biologically Significant Marine Area, two Key Biodiversity Areas, and two protected areas. Within the area there are: **threatened species** (e.g., Bowmouth Guitarfish *Rhina ancylostomus*); **range-restricted species** (Zanzibar Guitarfish *Acroteriobatus zanzibarensis*); **reproductive areas** (e.g., Bluespotted Maskray *Neotrygon caeruleopunctata*); and the area sustains a **high diversity of sharks** (23 species).

CRITERIA

Criterion A – Vulnerability; Criterion B – Range Restricted; Sub-criterion C1 – Reproductive Areas; Sub-criterion D2 – Diversity

UNITED
REPUBLIC OF
TANZANIA

0–60 metres

2,776.34 km²

IUCN SSC Shark Specialist Group.
2023. Unguja ISRA Factsheet. Dubai:
IUCN SSC Shark Specialist Group.

sharkrayareas.org



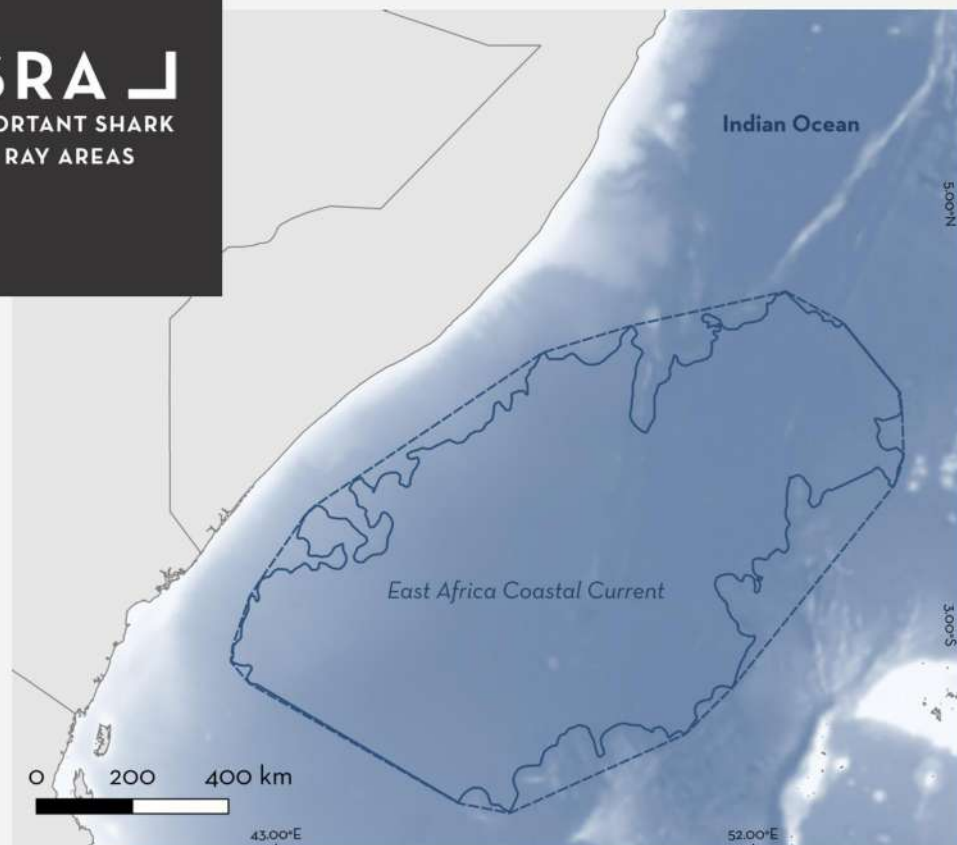
IMPORTANT SHARK
AND RAY AREAS

— —
WESTERN INDIAN OCEAN

A REGIONAL COMPENDIUM OF
IMPORTANT SHARK AND RAY AREAS

— —
IUCN SSC SHARK SPECIALIST GROUP

— —
DECEMBER 2023
— —



Blue lines indicate the area meeting the ISRA Criteria; dashed lines indicate the suggested buffer for use in the development of appropriate place-based conservation measures

EAST AFRICA COASTAL CURRENT ISRA

Western Indian Ocean Region

SUMMARY

East Africa Coastal Current is located offshore from southern Somalia, Kenya, Seychelles, and areas beyond national jurisdiction (ABNJ). This area is characterised by nutrient-rich waters of the Somali Current upwelling system, considered the fifth most important upwelling system in the world. During the boreal summer monsoon, coastal upwelling in Somalia considerably reduces sea temperatures. This area is also considered the strongest seasonal-scale wind-driven upwelling in the world's oceans. Within this area there are: **reproductive areas** (Blue Shark *Prionace glauca*).

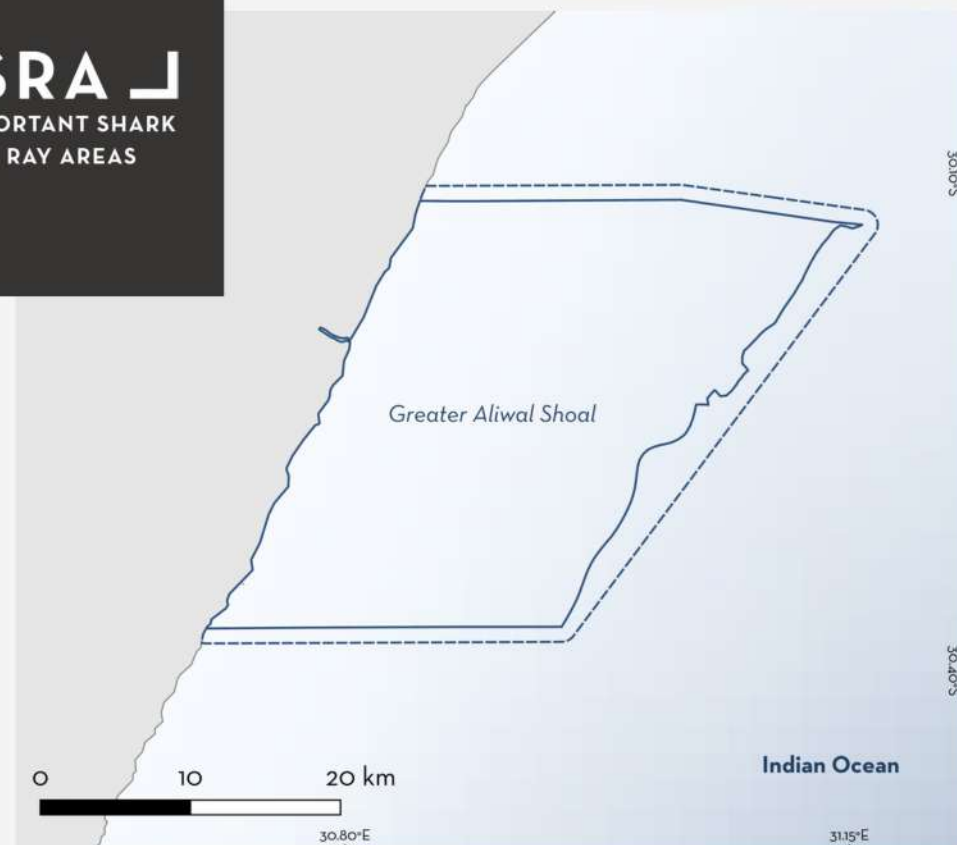
CRITERIA

Sub-criterion C1 - Reproductive Areas

SOMALIA,
KENYA,
SEYCHELLES,
ABNJ

0-300 metres

790,855.39 km²



Blue lines indicate the area meeting the ISRA Criteria; dashed lines indicate the suggested buffer for use in the development of appropriate place-based conservation measures

GREATER ALIWAL SHOAL ISRA

Western Indian Ocean Region

SUMMARY

Greater Aliwal Shoal lies off the KwaZulu-Natal coast of South Africa, within a transition zone between the subtropical iSimangaliso area and the warm temperate reefs to the south. It hosts both shallow and mesophotic reefs, sandy substrates, estuaries, and pelagic waters. Within this area there are: **threatened species** (e.g., Copper Shark *Carcharhinus brachyurus*); **reproductive areas** (Shorthorned Pygmy Devil Ray *Mobula kuhlii*); **feeding areas** (e.g., Spinner Shark *Carcharhinus brevipinna*); **resting areas** (Sand Tiger Shark *Carcharias taurus*); **undefined aggregations** (Spotted Eagle Ray *Aetobatus ocellatus*); and areas with **distinctive attributes** (Shorthorned Pygmy Devil Ray).

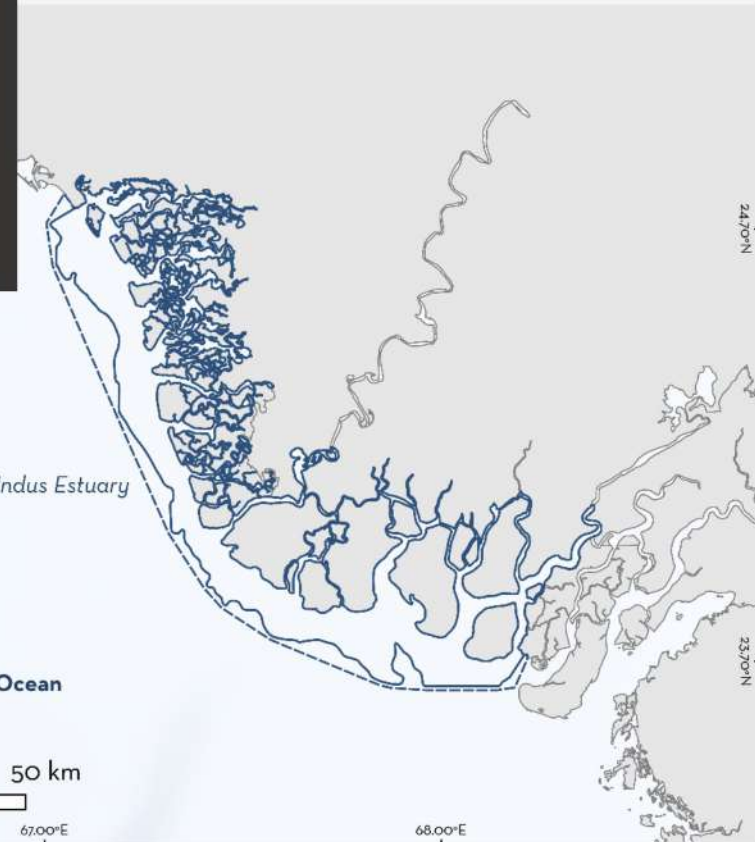
CRITERIA

Criterion A - Vulnerability; Sub-criterion C1 - Reproductive Areas; Sub-criterion C2 - Feeding Areas; Sub-criterion C3 - Resting Areas; Sub-criterion C5 - Undefined Aggregations; Sub-criterion D1 - Distinctiveness

SOUTH AFRICA

0-500 metres

721.38 km²



Blue lines indicate the area meeting the ISRA Criteria; dashed lines indicate the suggested buffer for use in the development of appropriate place-based conservation measures

INDUS ESTUARY ISRA

Western Indian Ocean Region

SUMMARY

Indus Estuary is located in Pakistan and encompasses the wide Indus River delta in the northeastern Arabian Sea. The area extends from Korangi Creek (Karachi) to the Pakistan-India border and includes the lower reaches of the Indus Delta. The Indus River discharges to the Arabian Sea through an elaborate system of creeks which are partially or totally covered with mangroves mostly consisting of Grey Mangrove *Avicennia marina*. Indus Estuary overlaps with two Ecologically or Biologically Significant Marine Areas, one Key Biodiversity Area, and one Ramsar site (Wetland of International Importance). Within this area there are: **threatened species** (e.g., Ganges Shark *Glyphis gangeticus*); and **reproductive areas** (e.g., Bull Shark *Carcharhinus leucas*).

CRITERIA

Criterion A - Vulnerability; Sub-criterion C1 - Reproductive Areas



PAKISTAN

0-10 metres

3,073.76 km²



Blue lines indicate the area meeting the ISRA Criteria; dashed lines indicate the suggested buffer for use in the development of appropriate place-based conservation measures

UNGUJA ISRA

Western Indian Ocean Region

SUMMARY

Unguja is located in the Zanzibar Archipelago, Tanzania. The area is characterised by the presence of coral reefs, mangroves, and sandy substrates. The area overlaps with one Ecologically or Biologically Significant Marine Area, two Key Biodiversity Areas, and two protected areas. Within the area there are: **threatened species** (e.g., Bowmouth Guitarfish *Rhina ancylostomus*); **range-restricted species** (Zanzibar Guitarfish *Acroteriobatus zanzibarensis*); **reproductive areas** (e.g., Bluespotted Maskray *Neotrygon caeruleopunctata*); and the area sustains a **high diversity of sharks** (23 species).

CRITERIA

Criterion A - Vulnerability; Criterion B - Range Restricted; Sub-criterion C1 - Reproductive Areas; Sub-criterion D2 - Diversity



UNITED REPUBLIC OF TANZANIA

0-60 metres

2,776.34 km²

South American Atlantic & Inland Waters

Call for proposals for preliminary Areas of Interest

We are seeking proposals for preliminary Areas of Interest in the South American Atlantic and Inland Waters region which we will be used to delineate candidate Important Shark and Ray Areas.

The deadline to submit proposals is December 10th, 2024.

The workshop will be held in January 2025.

Please submit proposals to
submissions@sharkrayareas.org

Scaling up shark and ray science and conservation

Written by Christine Ward-Paige |
Geoffrey Osgood | eOceans |
Dartmouth | Canada
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eOceans | YouTube | LinkedIn | Facebook | Instagram

Take a look at any shark or ray paper, even those considered “Breaking News” in *Nature* or *Science*, and you will find that the results are many years, even decades, out of date. They also do not readily feed into other or future work, challenging scalability. In today’s rapidly changing environment, the importance of shark, ray, and ocean monitoring, research, and conservation cannot be overstated. However, it must be faster, iterative, and scalable for informed decisions and actions to be relevant and keep pace with changing business, society, and oceans.

We have designed and built the eOceans platform to help make this happen — unlocking incredible amounts of time and collaborative potential.

Stop reinventing the wheel

The study and conservation of sharks, rays, and the ocean have been central to our careers.

We have worked under the umbrella of government, academia, non-governmental organizations (NGOs), fisheries, and industry. We have investigated many things — threats to sharks and rays, policies, fisheries, biodiversity, and pollution. We have contributed to the Important Shark and Ray Area (ISRA) project, the Committee on the Status of Endangered Wildlife in Canada (COSEWIC) reports, the IUCN Red List of Threatened Species, and the Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES), and supported large participatory science projects, gathering millions of observations through the Great Fiji Shark Count, eShark Thailand, eManta, Shark Sanctuary Evaluation, and more.

The most significant problems we faced across these projects were time and the need to reinvent the wheel.

For each project, we expended significant time, energy, and budgets to gather, collect, digitize, standardize, query, scrutinize, clean, analyze, visualize, and map data before we could do our actual job of interpreting results and writing reports or manuscripts for publication.

By publication, the results were already years out of date

Pivot to boost impact

In 2020, we dramatically changed our work to reinvent how we do research — making it collaborative, scalable, and real-time.

Rather than making an application just for sharks and rays, we made eOceans — it works for sharks and rays and any other species, as well as threats, values, the environment, and more. It works on any spatial scale so that users can select their study area.

We did not want other researchers to feel the need to build their own apps — building more silos — so we designed it to be a shared platform.

Because we can all do more together!

A team of scientists in your pocket

Using eOceans is like having a team of scientists on your payroll

working full-time on the data aspects of your project — to scale your capacity massively.
It ensures your data are stored correctly, directed to the projects you are contributing to, and processed in the right way, with minimal effort on your part.

Ethics – You own your data!

With eOceans, you own your data and decide which projects you are sharing with. It also safeguards precise locations to protect species, special places, and to support ethical collaboration.

If you opt to download your data, the output in an internationally standardized format that makes it easy to do self-analysis, archiving, and sharing with other repositories. You can make your data open access, but eOceans does not make that decision for you.

What is possible?

New possibilities seem to arise with each conversation we have, but here are some examples:

- Shark and ray population assessments (e.g., IUCN Red List, ISRA, and COSEWIC) — Try plugging the available data into the platform for each species, and see what comes out! What do the maps and trends look like?
- Protected area performance monitoring— What areas and which species are being protected?
- Shark catch and bycatch tracking — Is illegal, unreported, unregulated (IUU) fishing being eliminated?
- Shark and ray population tracking — How do species richness, relative abundance, frequency of occurrence, and health conditions (e.g., size, sex, behaviour) change through time and space?
- Shark depredation — What are depredation rates, and how do they change by species through space and time?
- Shark and ray threat assessments — What are the threats? Are mitigation strategies working?
- Metadata around tagging efforts — Do not overlook the value of the catch-per-unit effort (CPUE) when tagging.

Other avenues include tracking repopulation efforts, sanctuary effectiveness, threats, the impacts of development, mining, tourism, ghost gear removal, and more.

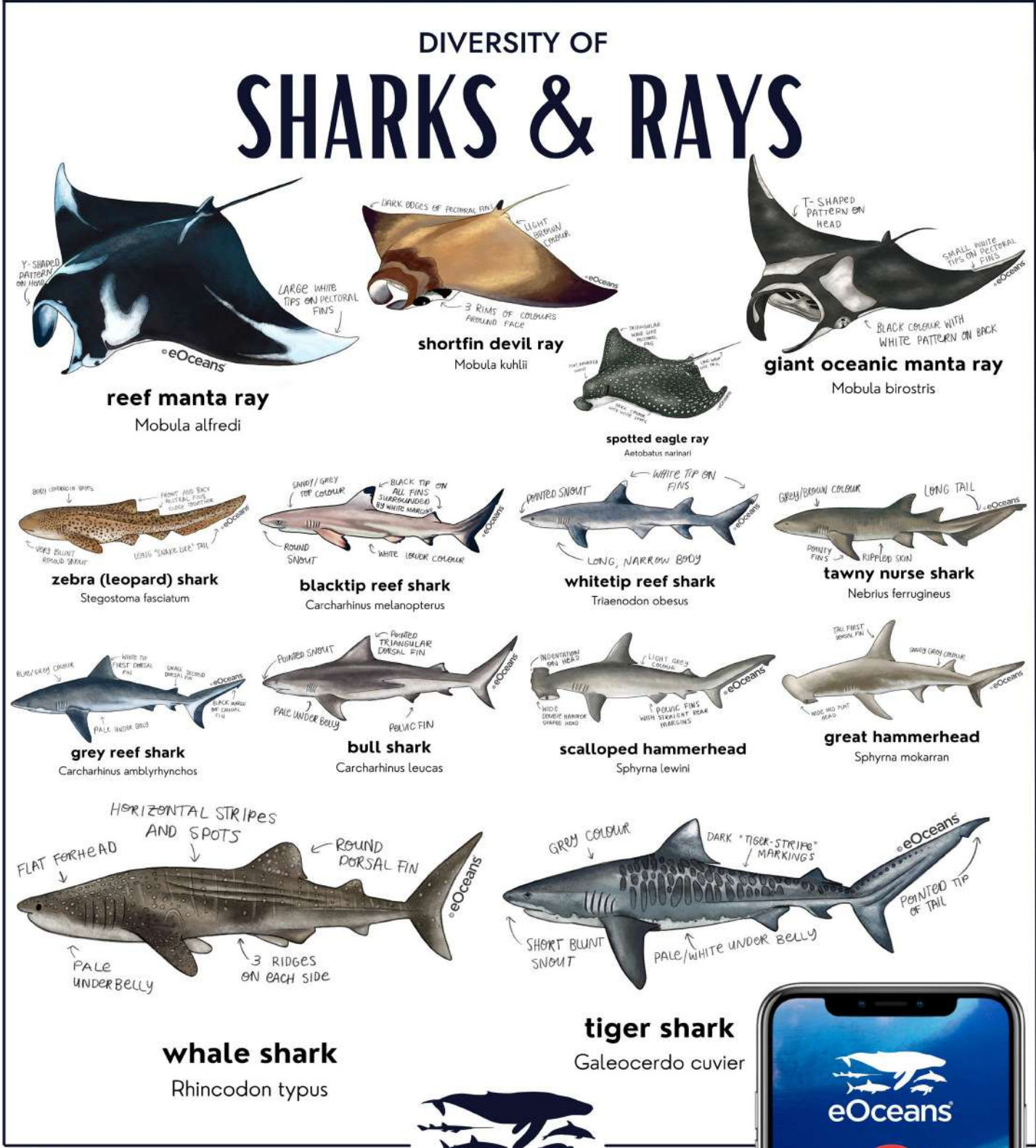
Moving forward

Moving forward, the eOceans app and platform facilitate timely work that advances the study and conservation of sharks and rays, encompassing their health, behaviour, threats, and more.

Furthermore, this framework and system enable a shift towards a more inclusive, ethical, and transparent research approach, relieving researchers from laborious tasks to focus on their impact on sharks, rays, and the ocean.

If you want to leverage the powerful tools provided by eOceans, head over to our website at eoceans.app. Setting up a project takes about one hour. Alternatively, if you would like to contribute to any existing projects, simply download the eOceans app (iOS, Android) and begin logging your ocean observations.

For any inquiries or updates, please contact Christine at christine@eoceans.co or connect with us on various social media platforms. We look forward to hearing from you!





Dr. Christine Ward-Paige
Founder | CEO | Scientist



Geoffrey Osgood
CTO | Quantitative
Ecologist



Sawfish Conservation Society: Bringing Global Awareness to a Critical Species



Jessica Amacker |
Michael I. Grant |
Nicole Phillips
All of their affiliations are
"Sawfish Conservation Society",
plus "IUCN SSC Shark Specialist Group |
Oceania regional member"
for Michael Grant



SCS Research Chair Andrea Kroetz
& SCS Administrative Associate
Tonya Wiley conducting fieldwork

As of 2023, all five species of sawfishes are listed as Critically Endangered on the International Union for the Conservation of Nature (IUCN) Red List of Threatened Species (Harry et al., 2024). While historic declines have led to this dire state, there are still beacons of hope to secure many of their persisting populations. This will require concerted conservation efforts and support for researchers, conservation practitioners, governments, and ongoing public engagement to raise awareness and education about these species.

The Sawfish Conservation Society (SCS) began in 2009 as a Facebook group and was established as a not-for-profit charity in 2018. SCS's primary goal is to bring awareness to the public about these incredible species and support sawfish conservation practitioners to further conservation efforts for sawfishes worldwide. The SCS practices a multifaceted approach to sawfish conservation by offering outreach materials in numerous languages, hosting events to support sawfish education, and providing sawfish researchers with tools and platforms to help them pursue their studies and promote collaboration. As we believe that sawfish conservation is best accomplished through the cooperation of all stakeholders, including the general public, the SCS upholds the motto "conservation through collaboration". This is shown in the diversity of the SCS membership, which consists of sawfish researchers, aquarists, managers, fishers, students, and sawfish enthusiasts from around the world.

The SCS has a typical organizational structure guided by a board of directors of leading sawfish conservationists worldwide. A team of officers made up of the President, Vice President, Treasurer, and Secretary oversee the SCS's strategic projects and focus points. Three committees focused on Communications, Education, and Research, respectively, were recently formed to execute task-based goals with their members. In late 2023, the SCS established our first five-year strategic plan, allowing the team to work more efficiently and reach larger, more established goals in the future. These goals include expanding educational resources to engage community awareness better and increase global community outreach. Additionally, the team at SCS will continue to focus on furthering sawfish research by identifying organizations with like-minded ambitions around the world to partner with and make a greater impact.

At SCS, we are focused on expanding our global reach to target all regions where sawfishes may persist. We aim to provide local researchers, conservation practitioners, and governments with materials and support to assist in their endeavours. For example, the SCS recently offered assistance to the Piku Biodiversity Network in Papua New Guinea on their development of educational materials that aimed to raise awareness of sawfish among fishers and community members. In sharing previously developed outreach material and offering expertise in engagement to sawfish conservation, the Piku Biodiversity Network produced a children's book to share with fishing communities. The success of this book has led to ongoing funding commitments from external sources, as the Piku Biodiversity Network aims to secure a multi-species sawfish stronghold. Over the next few years, we strive to engage with other groups working on sawfish conservation in global priority areas and assist them in developing materials compatible with local language, culture, and threat contexts.

The Sawfish Conservation Society is a leading contributor to the International Sawfish Day (ISD) celebrated annually on October 17th. Each year, the SCS engages the conservation community and sawfish enthusiasts to bring greater awareness to the global threats facing sawfishes. Through localized events in multiple countries, social media campaigns, and online webinars with pioneering sawfish researchers, International Sawfish Day is



SCS President Nicole Phillips
sampling a saw in the lab

always well celebrated! Join us this year in October by following our social media pages listed below and purchasing an ISD swag, with proceeds going to further sawfish research.

The challenges to securing sawfish and their habitats into the future are immense, and the SCS hopes to offer a central organization of committed sawfish enthusiasts ready to assist in the global efforts needed. If you are interested in the SCS and our mission, please follow us on our social media channels below. Also, keep an eye out to join our newsletter list, which is coming soon!

Facebook: *Sawfish Conservation Society* **Instagram:** *sawfishconservationsociety* **Twitter(X):** @sawfishconserv

The Sawfish Conservation Society relies on philanthropic support from our generous donors to make strides in sawfish conservation. By making a donation to SCS or sharing one of our social media posts, you play a part in helping us save these imperilled species. Join us to help make a difference for generations to come.

References

Harry, A. V., Carlson, J. K., Espinoza, M., Grant, M. I., Haque, A. B., Jabado, R. W., & Rigby, C.L. [2024]. All sawfish now Critically Endangered but sustained conservation efforts can lead to recovery. *Oryx*, 58(2), 146-146. doi.org/10.1017/S0030605323001692



Photo by Ann Marie Fearing

SCS outreach event

WHY SAVE SAWFISH?

SAWFISH ARE UNIQUE & AMAZING

Sawfish are some of the largest fishes in the world, growing to **7m/23ft.**

Sawfishes have a 'tooth'-lined saw/rostrum that can detect fish in the dark.

Take pride knowing that such unique and rare fishes live in your waters.

ANCIENT BUT NEARLY EXTINCT

Sawfish have been around for **56-61** million years.

In the past 100 years, sawfish have gone extinct in over **50** countries due to fishing and habitat loss.

MAINTAIN HEALTHY ECOSYSTEMS

As a top **predator**, sawfish can help maintain balance in coastal ecosystems by controlling populations of their prey.

A HEALTHY ECOSYSTEM MEANS MORE HEALTHY FISH

PHOTO CREDIT: RICHARD APPLE
DESIGNED BY MADLEINE PIERCE

YOU CAN HELP SAVE SAWFISH

RELEASE

KEEP THE SAWFISH SUBMERGED IN WATER, ESPECIALLY THE GILLS, IF SAFE TO DO SO. DO NOT REMOVE THE SAW.

CAUGHT ON A LINE?

Cut the line close to the hook.

CAUGHT IN A NET?

LARGE SAWFISH

1. Secure net to side of boat.
2. Use long tool to cut net from body, then from saw.

SMALL SAWFISH

1. Hold tail, base of saw, and net.
2. Turn sawfish upside down.
3. Use tool to cut or free net starting at base of saw.

DISCLAIMER: 1. These release tips are provided to reduce risk of injury to you and the sawfish, but the SCS does not take responsibility for any injury incurred in the use of these suggestions. The reader agrees to these terms when using these tips. 2. Rules on how to handle sawfish can change between countries. Make sure to check the regulations in your country.

RECORD & REPORT

THE SAWFISH TYPE & ESTIMATED LENGTH

DATE / TIME

LOCATION

PHOTOS

SAWFISH ARE NEARLY EXTINCT BECAUSE OF

TRADE

The international trade of sawfish parts is illegal, but sawfish still need local protection in many regions.

BYCATCH

Sawfish are easily entangled in fishing gear and are often caught unintentionally.

HABITAT LOSS

Humans are modifying nearshore habitat needed by young sawfish to survive.

KIDS CAN HELP TOO!

Properly dispose of fishing lines, nets, and garbage that sawfish can get entangled in.

Tell your friends and family about sawfish.

SAWFISH!

Please report your sawfish encounter information to your local fisheries group or to us, and we will send it to the appropriate agency.

Acoustically tagged white shark at the Neptune Islands Group (Ron and Valerie Taylor) Marine Park, South Australia. Acoustic telemetry is used to assess the residency of white sharks for a monitoring program and sustainable management of the Australian white shark cage-diving industry. |

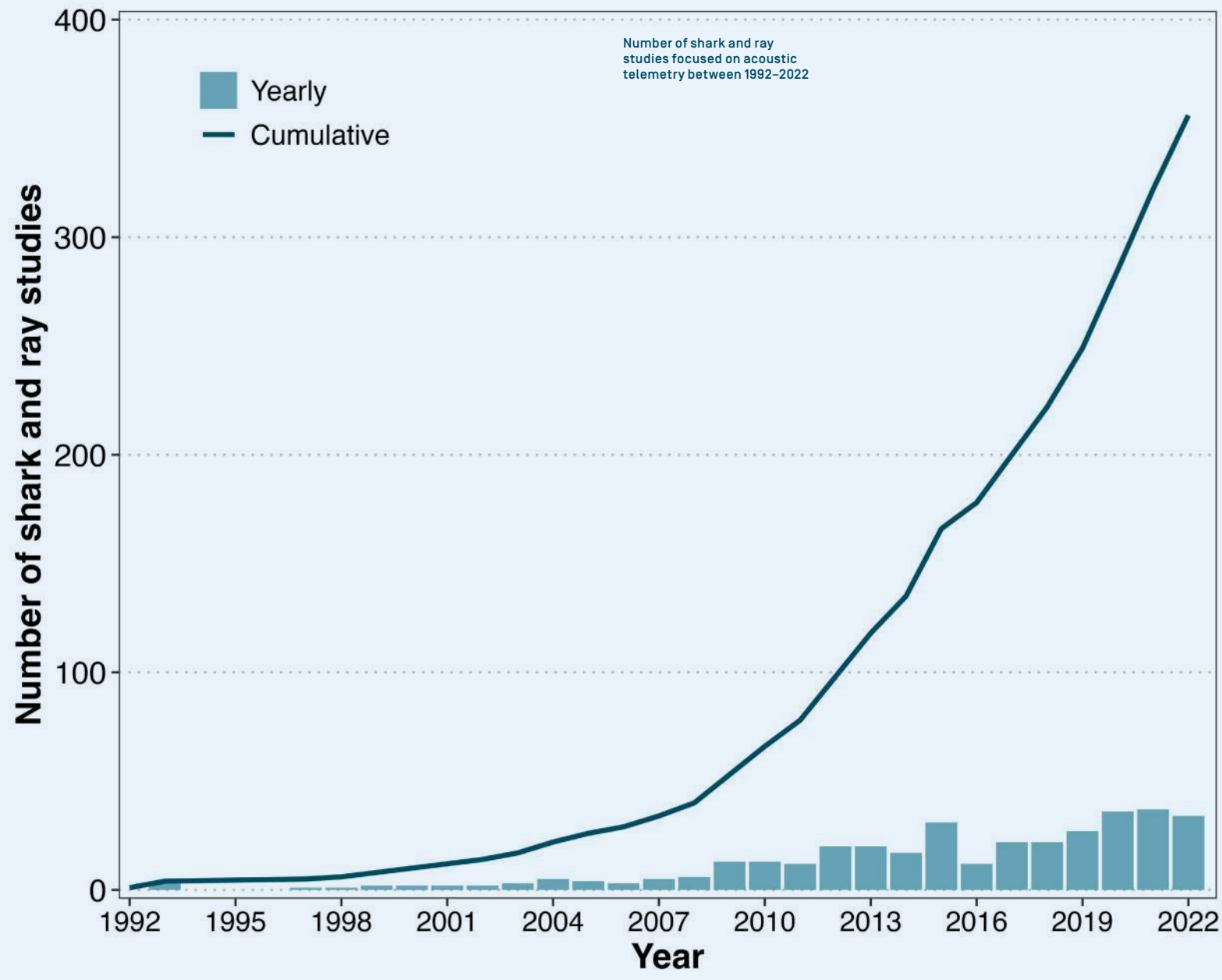
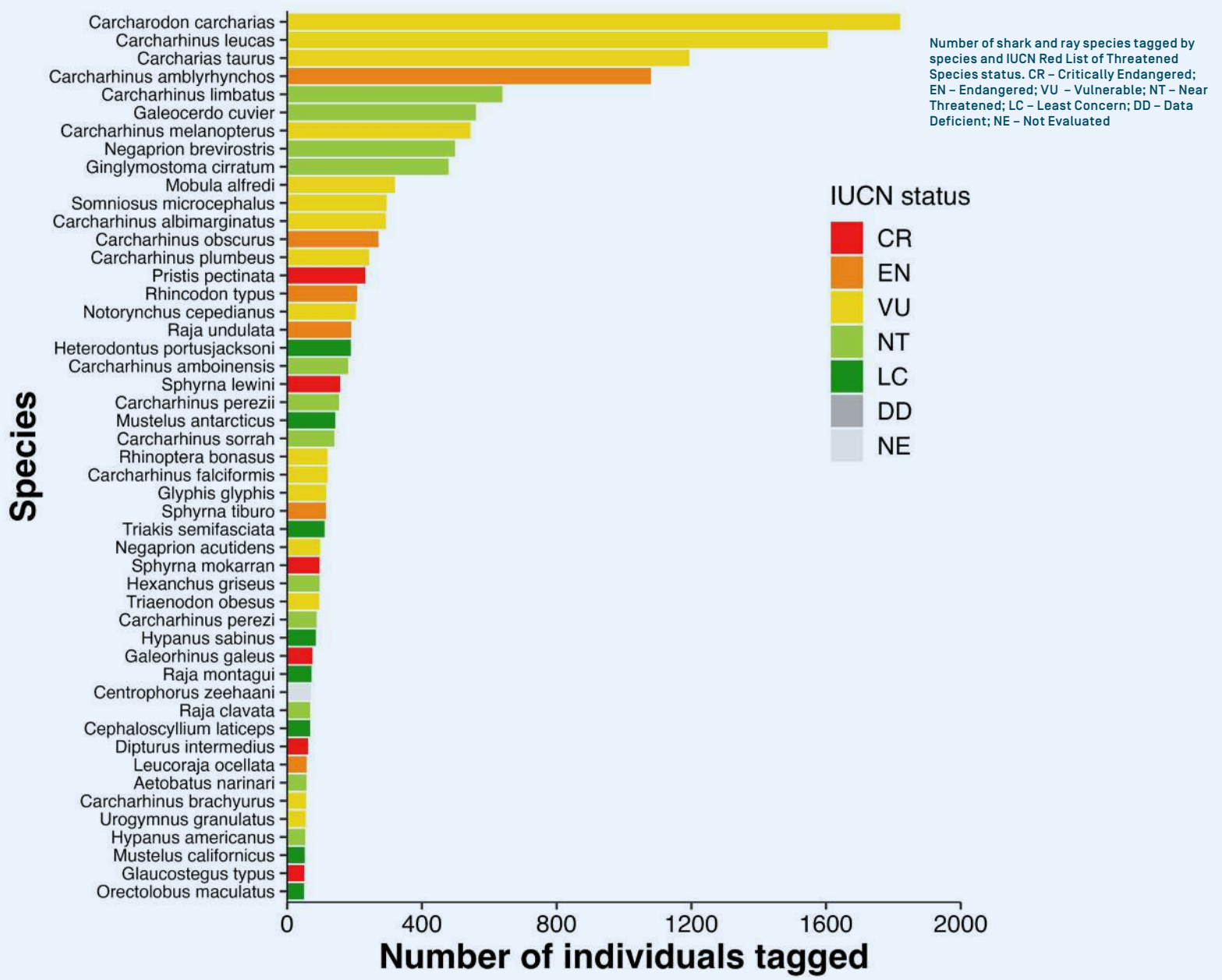
Photo: Andrew Fox (Rodney Fox Shark Expeditions)



trackdAT

TrackdAT: tracking the research that moves sharks and rays

Written by Natalie V. Klinard
Dalhousie University, Halifax NS, Canada [natalie.klinard@dal.ca]
and Jordan K. Matley
Flinders University, Adelaide SA, Australia [jordan.matley@flinders.edu.au]



Aquatic animal tracking

Animals move to acquire food, avoid predation, seek suitable mates, and locate favourable living conditions. The study of animal movements has long provided researchers with insight into ecological and evolutionary processes that scale from individuals to populations and communities to entire ecosystems. Technological advancements in recent decades have revolutionised the ability to study the movements of aquatic animals in their natural environment. Furthermore, unprecedented amounts of movement data are being produced at increasing scales and resolutions, expanding the scope of research questions that can be explored. Acoustic telemetry (AT) has become a leading method for studying the movement ecology of fishes (including sharks and rays) in diverse environments from the polar regions to the tropics. Acoustic signals are emitted from a transmitter implanted internally or attached externally to an animal and subsequently detected by receivers moored in the water when the tagged animal swims by. This form of near-continuous, long-term monitoring (from several weeks to >10 years) provides data on aquatic animals' presence, movements, and behaviour as they navigate freshwater and marine habitats. Acoustic telemetry has been acknowledged for its capacity to

inform the conservation and management of aquatic animals. Yet, knowledge-action gaps that limit translating research into policy still exist worldwide, partly due to a lack of effective communication.

What is TrackdAT?

TrackdAT is an open-source online database hosting metadata from thousands of peer-reviewed Acoustic Telemetry articles, providing users with the tools to visualise, filter, and download useful information about worldwide animal tracking research. This initiative evolved from believing a universal understanding of existing research is needed to optimise future work with real-world outcomes. Our mission is to foster scientific progress in aquatic animal tracking by encouraging global knowledge mobilisation, promoting stakeholder interaction and engagement, increasing opportunities for collaboration, and bridging persistent knowledge-action gaps. Accessible at www.trackdat.org, users are given the ability to search the database through a variety of relevant fields, including taxonomy (species, family, and broad animal group), location (i.e., country, Food and Agriculture Organization [FAO] fishing area, and water body), and publication details (title, author, and research topic). Searches display a comprehensive overview of

information summarising key data from each publication, such as details of study design and tagged animal metrics across spatial and temporal scales. The website also features a global interactive map highlighting the location of over 2,500 articles, revealing research hotspots and evident spatial gaps. Interactive charts further summarise all published research categorised by animal groups, species, publication type, technology, etc. As AT research grows exponentially, TrackdAT aims to provide an easily navigable portal enabling scientists, managers, and other stakeholders to evaluate and communicate current research, identify existing knowledge gaps, and establish priorities for future projects.

What about sharks and rays?

TrackdAT features over 350 publications on sharks and rays, many of which track individuals from multiple species within a single study. These studies were undertaken in 31 countries worldwide, including ~15,000 tagged individuals across 108 species. The most commonly studied species are large-bodied sharks, such as White Shark (*Carcharodon carcharias*) and Bull Shark (*Carcharhinus leucas*), and abundant reef species, including Grey Reef Shark (*Carcharhinus amblyrhynchos*) and Blacktip Reef Shark (*Carcharhinus melanopterus*). Tracking data also provides valuable

insight into the ecology of threatened species to inform spatial management strategies. The majority of shark and ray species tracked fall within the threatened IUCN Red List of Threatened Species categories, i.e., Vulnerable (VU), Endangered (EN), and Critically Endangered (CR).

Benefits and applications

TrackdAT was established to create opportunities to develop and strengthen the application of AT in the field of movement ecology. Users benefitting from TrackdAT range from first-time telemetry users to more experienced researchers and managers. For those newer to the field, TrackdAT can be used as a starting point to learn about AT and movement ecology or conduct synthetic or literature review studies. More established researchers may use the database to highlight previously unknown research relevant to conservation or management initiatives or identify ongoing gaps in research topics, species, or geographic locations. TrackdAT can facilitate collaborations and improve networking by identifying researchers conducting studies of interest and highlighting areas of expertise within the telemetry community. Learning from existing studies and experienced researchers is fundamental to maximising AT research outcomes while



Jordan Matley



Natalie Klinard



Ana Barbosa Martins



Arun Oakley-Cogan

Meet the team

minimising costs. TrackdAT also serves as a citable source to confirm topical research has been conducted. Whether providing evidence to funders of research applications, rationalisation for funding or grants, or detailed metrics for ethics applications, data visualisations and summaries can be readily downloaded from TrackdAT and included as supporting information in several contexts. As technological advancements in telemetry produce increasingly large and complex datasets, TrackdAT also serves as a repository that catalogues recent developments in methodology, technology, and novel analyses to support the rapidly growing field of AT.

The TrackdAT team

TrackdAT comprises a small team of international colleagues who see the value in the ever-growing field of movement ecology in understanding and managing aquatic ecosystems facing critical threats caused mainly by humans. We are dedicated to creating inclusive and accessible resources that optimise the future of AT research worldwide.



Acoustically tagged White Shark at the Neptune Islands Group [Ron and Valerie Taylor] Marine Park, South Australia. Acoustic telemetry is used to assess the residency of white sharks for a monitoring program and sustainable management of the Australian white shark cage-diving industry.

Andrew Fox [Rodney Fox Shark Expeditions]

Convention on Migratory Species Acts to Protect Sharks and Rays

Samarkand, Uzbekistan
February 9-17, 2024

Significant progress was made towards conserving sharks and rays at the 14th Conference of the Parties of the Convention on the Conservation of Migratory Species of Wild Animals [CMS]. A wide range of issues related to sharks and rays were discussed, including ecological connectivity, bycatch, and deep-sea mineral exploitation activities. Major conservation success stories include listing several new species of sharks and rays on the CMS Appendices, adopting a Single Species Action Plan for Angelshark, encouraging the use of Important Shark and Ray Areas in marine spatial planning, supporting Concerted Actions for priority species, and taking action to ensure effective implementation of CMS requirements for the threatened Oceanic Whitetip Shark.

“It is encouraging to see how decisions at CMS are paving the way for the conservation of migratory sharks and rays. Strong protection measures have been adopted, and we look forward to working with our partners around the world to support implementation in the coming years”, said Melanie Virtue, Head of the Aquatic Species team at the CMS Secretariat, headquartered in Bonn, Germany.

Species added to the CMS Appendices

Migratory species can be included on either or both of the CMS Appendices. When a species is listed on Appendix I, Parties [member governments] are required to strictly protect them by prohibiting their take/removal from the wild, conserving them, and where appropriate, restoring their habitats, and preventing, removing or mitigating obstacles to their migration and controlling other factors that might endanger them. When a species is listed on Appendix II, it requires Parties to conclude global or regional Agreements for the conservation and management of individual species or groups of related species. Fourteen species gained new protections at this meeting, including one shark and three ray species considered Critically Endangered according to the IUCN Red List of Threatened Species.

- The global population of Sand Tiger Shark *Carcharias taurus* [also called Grey Nurse Shark in Australia or Raggedtooth Shark in South Africa] was listed on Appendices I and II.

‘We congratulate the CMS Parties for the consensus inclusion of the Sand Tiger Shark on CMS Appendices I and II. These oceanic top predators are assessed as Critically Endangered on the IUCN Red List due to pressure from artisanal, recreational, and commercial fisheries. With this CMS listing, their take is now prohibited for all 133 CMS Party Governments, and we are hopeful that the listing on Appendix II will help enhance international cooperation to both eliminate these threats and conserve their habitats”, noted Dr. Susan Lieberman, Vice President, International Policy with the Wildlife Conservation Society.

Learn more: Proposal for the Inclusion of the Sand Tiger Shark [*Carcharias taurus*] in Appendix I and II of the Convention | CMS

In addition, the global populations of the Blackfin Guitarfish *Glaucostegus cemiculus*, Lusitanian Cownose Ray *Rhinoptera marginata*, and Duckbill Eagle Ray [also known as Bull Ray] *Aetomylaeus bovinus*, were listed on Appendix II, with Mediter-ranean Sea populations of each species listed on Appendix I.

Learn more:

Proposal for the Inclusion of the Blackchin Guitarfish [*Glaucostegus cemiculus*] in Appendix II and the Mediterranean Sea Population of this Species in Appendix I of the Convention | CMS

Proposal for the inclusion of the Lusitanian Cownose Ray [*Rhinoptera marginata*] in Appendix II and the Mediterranean Sea population of this species in Appendix I of the Convention | CMS

Proposal for the Inclusion of the Bull Ray [*Aetomylaeus bovinus*] in Appendix II and the Mediterranean Sea Population of this Species in Appendix I of the Convention | CMS

Angelshark Single Species Action Plan

A Single Species Action Plan for the Angelshark *Squatina squatina* in the Mediterranean Sea was adopted. Angel sharks are one of the most threatened families of sharks and rays. The Angelshark is Critically Endangered according to the IUCN Red List and is listed on Appendix I and II of CMS. The action plan aims to promote the long-term sustainability of Angelshark populations in the Mediterranean Sea and their habitats by reducing the negative effects of human activities through legislation and enforcement, fisheries management measures, research, awareness-raising and capacity-building.

“With this action plan, countries have an opportunity to implement concrete conservation action to ensure that this threatened shark is safeguarded in one of its last remaining strongholds, the Mediterranean Sea”, said Eva Meyers, co-founder of the Angel Shark Project and partner of the Angel Shark Conservation Network [ASCN].

Learn more: Single Species Action Plan for the Angelshark [*Squatina squatina*] in the Mediterranean Sea | CMS

Important Shark and Ray Areas [ISRA]

A resolution in support of the Important Shark and Ray Areas [ISRA] project was adopted. ISRAs are ‘discrete, three-dimensional portions of habitat, important for shark species, that are delineated to be managed for conservation’ (www.sharkrayareas.org). The resolution recommends that relevant Parties (including national, international and regional management organizations) support the identification of ISRAs and consider areas delineated when working towards conserving migratory species and their habitats, including through their National Biodiversity Strategies and Action Plans [NBSAPs] that should be developed under the framework of the Kunming-Montreal Global Biodiversity Framework [GBF].

“We welcome the recognition of ISRAs as an expert-driven approach to identifying areas that are critical for the survival of migratory sharks and rays. With this decision, governments further showed their commitment to implementing the Kunming-Montreal Global Biodiversity Framework by supporting the consideration of ISRAs in marine spatial planning. It’s only by working together and using all the conservation tools available that we will be able to reduce the mortality of sharks and rays and ensure their recovery’, added Dr Rima Jabado, Deputy Chair of the IUCN Species Survival Commission and Chair of the IUCN Species Survival Commission Shark Specialist Group which is leading the Important Shark and Ray Areas project.

Learn more: www.cms.int/en/document/important-shark-and-ray-areas-1

Other key decisions

Parties also recognized the dire state of global populations of the Oceanic Whitetip Shark *Carcharhinus longimanus*, a Critically Endangered species listed on CMS Appendix I. A decision was adopted requesting Parties to report back on national and regional management measures that have been put in place to meet their obligations under CMS and other regional fisheries bodies that have banned the retention of the species.

Learn more: Implementation of the CMS Appendix I-Listing for the Oceanic Whitetip Shark [*Carcharhinus longimanus*] | CMS

Finally, the Conference of the Parties agreed to a series of Concerted Actions focused on rhino rays [sawfishes [Pristidae], wedgefishes [Rhinidae], and guitarfishes [Glaucostegidae and Rhinobatidae]], the most imperilled group of sharks and rays, and the Blue Shark *Prionace glauca*. These priority measures aim to improve the conservation status of species by targeting key intervention points.

What next?

Now that the COP has concluded, preparations for implementing agreed activities in the upcoming triennium will begin. To obtain tangible results, Parties, with support from the Secretariat and Scientific Council, will identify priority activities and facilitate the necessary resources. For instance, Parties can now consider using delineated ISRAs when designing or establishing marine protected areas or using other area-based management approaches. In the case of the Single Species Action Plan for the Angelshark in the Mediterranean Sea, an International Working Group composed of governments, national experts, and stakeholder representatives will be in charge of implementing and tracking the progress of activities and objectives. Parties will also need to update national regulations to protect species listed on Appendix I. In addition, Parties are encouraged to consider migratory species and CMS implementation in the development of their CBD NBSAPs, which must be submitted before the CBD Conference of the Parties in October 2024; this provides an opportunity to further highlight the conservation needs of migratory sharks and rays.



German Federal
Ministry for the
Environment, Nature
Conservation and
Nuclear Safety (BMU)

Head of Unit
'International Species
Conservation'



IUCN SSC
Shark Specialist



COP 14
CONVENTION ON MIGRATORY SPECIES



Side event on Important Shark and Ray
Areas at the CMS COP in Uzbekistan



Photos by Andrea Pauly



Photo by Daniel Fernando

White Shark Global

An international scientific conference

Written by Oscar Sosa-Nishizaki

Centro de Investigación Científica y de Educación Superior de Ensenada, Baja California
IUCN SSC Shark Specialist Group | Central America and the Caribbean region | Regional Vice Chair

Reviewed by Charlie Huveneers

College of Science and Engineering, Flinders University
IUCN SSC Shark Specialist Group | Oceania region | Member

White Sharks Global was the first international White Shark (*Carcharodon carcharias*) conference since the White Shark research community met in Honolulu, Hawaii, in February 2010, 13 years ago. The increasing number of studies focused on White Sharks and the continued and evolving issues around this species were highlighted at White Sharks Global. The conference held in Port Lincoln, Australia, from November 12 to 17, 2023, was a timely opportunity for scientists, managers, industry, and students to meet, exchange knowledge, report on recent scientific studies, and facilitate in-depth discussions of key challenges related to White Sharks (e.g., managing human-shark interactions and supporting the recovery of this threatened species). The organizing committee led by Charlie Huveneers, and including Lauren Meyer, Alison Towner, Greg Skomal, Chris Lowe, and Oscar Sosa-Nishizaki, was helped by an army of student helpers led by Chloe Roberts. This resulted in a successful conference attended by 183 participants from across the world, including New Zealand, South Africa, Croatia, England, Italy, the United States, Canada, Mexico, and local Australian folks, which exceeded the number of attendees at the last meeting. The program (whitesharksglobal.com) included four plenary presentations by Michael Domeier, Senator Peter Whish-Wilson, Alison Kock teaming with Mike Heithaus, and Sara Waries with Christopher Lowe, combined with 57 lightning talks (7 minutes each) and eight standard presentations (12 minutes each) during two very full days. The talks covered various topics, from genomics to population analysis and acoustics to artificial intelligence. The program was complemented by three days with nine workshops on White Shark acoustics, genomics, telemetry, tracking, diet, ecological role, management, and documentaries, with deep discussions and new bonds created among participants. Feedback about the conference has been extremely positive, and a special issue featuring some of the presentations and workshops outcome is currently in preparation.

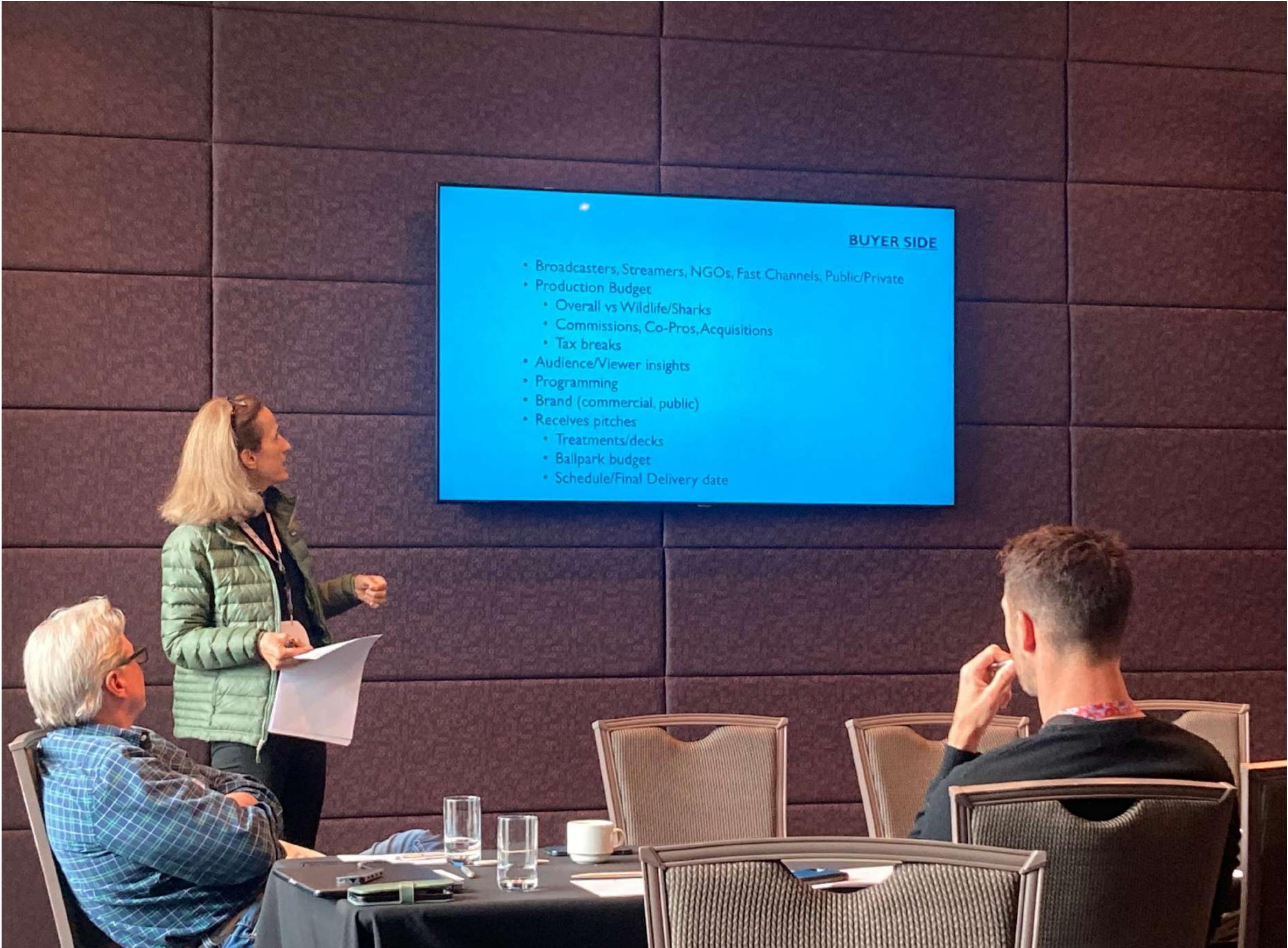
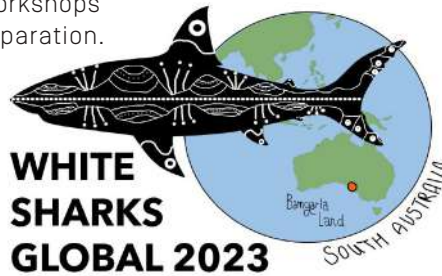


Photo by Oscar Sosa-Nishizaki



Photo by Alexandra Z. A. Morata

The Global Status Report on Sharks, Rays, and Chimaeras: Editing Retreat



Daniel Torobekov | Pexels

Written by
Alexandra Z. A. Morata
IUCN SSC Shark Specialist Group | Program Officer

A road map for future policy and research actions for sharks, rays, and chimaeras

The IUCN SSC Shark Specialist Group (SSG) hosted its third Global Report workshop from November 25–27, 2024, following the Indo-Pacific Fish Conference 2023 in Auckland, New Zealand. This allowed us to bring together the editors of this report to review all submitted nation/region-specific drafts. Eight of the nine editors joined the Global Report Editing Workshop, with six attending in-person and two joining online, representing five SSG regions (i.e., Africa, Indian Ocean, Northern Europe, Oceania, and South America).

The report covers information on fisheries, trade, policy framework and research on sharks, rays, and chimaeras in over 150 countries and territories. More than 355 persons from around the world have contributed and volunteered their time to provide input for their respective sections.

The next step is finalising the Global Status Report of Sharks, Rays, and Chimaeras, which will be available online through the SSG website and published as an official IUCN publication in 2024.

This workshop was made possible due to the funding secured through the IUCN Species Survival Commission Internal Grant. We thank the National Institute of Water and Atmospheric Research (NIWA) for providing the venue. We are also extremely grateful to all the contributors worldwide that have worked hard to ensure that each section of the report is complete with the most up-to-date information.

Workshop participants (from left to right): Rhett Benett, Ana Paula Barbosa Martins, Brittany Finucci, Jim Ellis, Alexandra Morata, Michael Grant, and Rima Jabado

First records of chimaeras as prey for Cape fur seals in Namibia



Written by
Ruth H. Leeney
Namibia's Rays
and Sharks project
IUCN SSC Shark Specialist Group |
Africa region | Member



Region
Update:
Africa



A recently published scientific paper describes interactions between Cape Fur Seal (*Arctocephalus pusillus pusillus*) and a chimaera species known as St. Joseph or Cape Elephantfish (*Callorhinchus capensis*) in Namibian waters for the first time. St. Joseph sharks can reach 120 cm in length and are the only chimaera species regularly encountered in Namibia’s coastal waters.

Ocean Conservation Namibia (OCN) is a non-governmental organisation (NGO) dedicated to disentangling seals and other wildlife ensnared in or injured by illegally abandoned fishing gear and other marine debris. In addition to disentanglement efforts, in 2020, OCN began assisting seals observed to have been impaled by spines, which were later identified as dorsal spines from St. Joseph. Between October 2020 and May 2022, 11 seals impaled by dorsal spines, most likely all from St. Joseph, were recorded by the OCN team. In some cases, the remains of the chimaera were still attached by its spine to the seal’s body. The observations of impaled seals largely overlapped in time with mass die-offs of seals due to food shortages, which was indicated by large numbers of emaciated seals and widespread premature abortion of seal foetuses on beaches along the Namibian coast. Whilst the mortality events are assumed to be linked to a reduction in the availability of prey species, they were not formally investigated. Thus, neither the species that declined nor the causes of this event are known.

The spines were almost always located in each seal’s neck area, above the shoulders and below the chin. Many seal species shake and tear their prey at the surface to stun it and to break it into smaller pieces that can be swallowed. This shaking behaviour likely resulted in the chimaera’s dorsal spine becoming lodged in the seal’s body, most often in the vicinity of the seal’s head or neck. Additional observations of several dead seals impaled with St. Joseph dorsal spines suggest that the spines, or perhaps an infection that results from the injury, may even be fatal to the seal in some cases. We hypothesised that St. Joseph is not a desirable prey for the seals, but that they may provide an alternative, albeit risky, source of food when preferred prey species are unavailable.

This is the first published record of Cape Fur Seals feeding on sharks, rays, and chimaeras in Namibian waters.

This species group forms important parts of marine food webs, such as top and mesopredators. Previous research in other parts of the world has revealed that chimaeras are not an uncommon prey for pinnipeds. It may be unclear whether they form a regular or opportunistic part of the diet of these predators. However, little is known about sharks, rays, and chimaeras in Namibian waters and their role in ecosystem function. Documenting food web linkages between Cape Fur Seals, other predators, sharks, rays, and chimaeras contributes to a better understanding of how impacts on populations of both groups may more broadly affect the structure and function of Namibian marine ecosystems.

The paper’s details are:
Ruth H. Leeney and Naude Dreyer. 2024. Predation on St. Josephs *Callorhinchus capensis* by Cape fur seals *Arctocephalus pusillus pusillus* in Namibia. African Journal of Marine Science 46 [2]:1-6. doi.org/10.2989/1814232X.2024.2329635

The Shark Conservation Fund, a Rockefeller Philanthropy project, funded Namibia’s Rays and Sharks project.

Instagram : @namibia_sharks **Facebook :** Namibia’s Rays and Sharks | For more information on Ocean Conservation Namibia, visit their website: www.ocnamibia.org

Captor and Verse: Wedgefish Exploitation Portrayed in Three Poems

Written by
Matthew T. McDavitt
Sawfish Conservation Society

& **Rex Lee Lee**
National Taiwan Normal University

Bottlenose Wedgefish
[*Rhynchobatus australiae*]

“The annual export value of sharks and rays from Indonesia is around 1.4 trillion [rupiah]... with the highest value obtained from the sale of wedgefish fins... Based on fisheries statistics, the trend regarding wedgefish production over the decade from 2005 to 2016 reveals a decline of 80%.”

Rusandi, Yulianto & Agung 2019:2
translation by authors

Introduction

While the field of zoology employs an array of scientific methods to investigate the range, life history, and status of animal species, an underutilized tool in the conservation calculus is the anthropological field of ethnozoology. This discipline examines human-animal interactions from the studied society’s perspective. Ethnozoologists examine other societies’ folk-taxonomy, attitudes toward and perceptions of animal species, utilization of animal parts, and any symbolic value the taxon might have. Ethnozoology has an important role to play in conservation efforts, as discerning local attitudes toward particular animal species, concern regarding population declines, and the commercial value of a taxon in the local economy are crucial factors to address in planning effective and tailored conservation efforts.

In the following article, we will examine three poems that involve themes of wedgefish exploitation, exploring what such texts reveal about the symbolic and cultural significance of wedgefish, along with their value as a commercial resource in the nations of China and Indonesia.

Qing Dynasty Chinese Poem

In the early 1700s, Niè Huáng, a merchant and artist from Hangzhou, was tasked by the Chinese government with documenting the rich marine life inhabiting China’s abundant seashores. He spent years traversing his country’s coasts, painting the creatures he encountered, illustrations he accompanied with descriptions detailing the anatomy, behaviour, and uses of these taxa. While many descriptions and depictions are charming and realistic, other accounts reflect folkloric misconceptions, and a handful of these catalogued creatures are products of pure fantasy (i.e., mermen and dragons).

Delightfully, the author ended each description with a clever poem, often employing humorous analogy or casting the subject beast as a symbol in some social commentary.

This catalogue of marine life was completed and delivered to Emperor Qianlong in 1726. Volumes 1 through 3 of Niè Huáng’s extraordinary Catalog of Marine Creatures are now stored in the Beijing Palace Museum, China, while volume 4 is held by the Taipei City Museum, Taiwan (Niè Huáng 2014).

The painted plates created by Niè Huáng are wonderfully detailed and reasonably naturalistic, such that the modern species (or at least the genus) can often be discerned. Regarding sharks and rays, the author described and illustrated 15 ray species (including wedgefish and both genera of sawfish) and 13 shark species, including three hammerhead species (Sphyrnidae), several dogfish varieties, and even a Bramble Shark (*Echinorhinus* sp.).

Niè Huáng’s wedgefish description notes the plow-shaped snout of the animal, the high quality of its flesh, the species’ relation to sharks, its ventrally located gill slits, the “nostril” holes atop its head (spiracles), and the fact that this ray’s cloacal anatomy indicates that it births live young!

Though terse, the conventional poem penned by the author regarding this rhynchobatid contains remarkably prescient allusions concerning the value of wedgefish as a commodity and the great impact such exploitation might have in the future. The poem is composed of a title and a couplet of two rhymed lines of eight syllables. The poem reads:

In Praise of Plow-Head Sharks

**The shark called “plow-head” truly resembles the farming tool;
Transforming the sea into mulberry fields,
the Shark-Men will profit!**

This tiny poem is packed with large themes and complex symbolism. The first line is readily understood; “plow-head shark” (tǒu shā) remains a widely used common name for wedgefish in Chinese dialects, and this line merely expresses the resemblance of the ray’s head to the agricultural implement.

The second line, however, evokes unexpectedly insightful themes alluding to the economic usage of wedgefish and the impacts such trade may occasion over time. The reference to the sea being transformed into mulberry fields invokes a conventional Chinese literary idiom used from at least the eighth century A.D. This symbol references a story wherein the goddess Mágū, describing her deathless existence, observed that since she became immortal, she witnessed immense, serial geological changes to the world:

I have seen the Eastern Sea turn into mulberry fields three times... I wonder whether it will turn to dry land once again [Campany & Hong Ge 2002:262].

Therefore, in Niè Huáng’s 16-character poem, this metaphor is invoked to signal the theme that, regarding the status of wedgefishes: “‘time brings great changes to the world’ or that ‘everything is [mutable and] will change’” (Ninhao! 2011). The nature of such change is predicted in the second phrase of the final line: “The Shark-Men will profit!”.

The “shark-men” (jiāo rén) are mythological beings akin to Western mermaids but combining human and shark traits, and in our poem, they act as farmers tilling the seabed with their wedgefish “ploughs, an endeavour that yields great profits. The shark-men cultivate mulberry trees; while the trees themselves are not valuable commodities, mulberry leaves are employed in Chinese culture for silkworm cultivation (Vogt 2018: unpag.), such that the referenced mulberry orchards here indicate that silk is the valuable commodity traded by the shark-men. Just as the term “sharkskin” is used in American slang to denote a variety of shiny fabrics that mimic the metallic sheen of sharks, in China, there is a mythical fabric called “shark silk” (jiāo xiāo) (Nat’l Acad.

for Educ. Res. 2021], a beautiful cloth produced by the shark-men in the South China Sea. This fabric never became wet, even when submerged in water.

Thus, the mulberry orchards mentioned in this poem simultaneously signify that [1] great changes will come to the sea and/or wedgefish over time, when [2] merchants will reap profits from shark products. Although this poem is likely merely a whimsical play on the “plow-head” name of wedgefish in the Chinese language, and Niè Huáng did not directly mention the lucrative Chinese shark fin trade in his poem, such imagery evocatively presages the fact that, along with sawfish, wedgefish produce the highest-grade shark fin, a characteristic eventually leading to targeted fishing and marked population reductions in rhynchobatids.

In the Ming Dynasty [1368-1644 A.D.], just before author Niè Huáng’s time, shark fin became established as a high-status luxury item utilized to create a luscious soup using the fins’ ceratotrichia as transparent, golden noodles, with shark fin celebrated as one of the “eight culinary treasures” of the sea [Rose 1996:49]. This trade is sophisticated, with shark and fusiform ray species sorted into quality classes. It has long been known that the fins of the rhinopristiforms [wedgefish, guitarfish, bowmouth-guitarfish, and both genera of sawfishes] are classed as the highest grade “white fin” [i.e., light beige compared to the lower quality/value steel-grey “black” fins of true sharks]. Thus, the shark fin trade was flourishing when author and artist Niè Huáng composed his poem, such that he is likely alluding to the fact that wedgefish were the source of a novel, high-value luxury food, a trade that might occasion dramatic change to the status of these placid rays in the future.

Niè Huáng’s charming wedgefish poem takes on new meaning in the context that the state of wedgefish populations in Asian waters has indeed changed dramatically, as rhynchobatids have been heavily targeted for the shark fin trade for at least two centuries, leading to significant declines, such that as of 2019, all species of the genus *Rhynchobatus* aside from *R. palpebratus* were listed as Critically Endangered on the IUCN Red List of Threatened Species [Kyne & Jabado, et al. 2020:1349].

Two Modern Indonesian Poems

Among Indonesia’s celebrated poets is Rida K. Liamsi, also a media entrepreneur and culture advocate based in the Riau Archipelago, Indonesia. As a young man, Liamsi worked various jobs, including as a wedgefish fisher based out of Bakong village on Singkep Island [Putra & Amin 2010]. Below are two of Liamsi’s poems featuring wedgefish themes translated into English, supplying evocative insights into the relationship between humankind and these valuable rays in a nation with among the highest levels of shark exploitation globally.

The first poem, entitled “Palm Posts [I]”, uses at its central symbol posts fashioned from the trunks of nibung palms, *Oncosperma tigillarium*, a species employed for its durability in marine environments. These palm stakes are used through the region as mooring posts, as well as marker stakes used by fishers to claim a particular deep hole in or near the rocky reefs where wedgefish are known to congregate seasonally. Such wedgefish holes are called lubuk kemejan in the local parlance [Liamsi 2021]. When so claimed, no other fisher can seek wedgefish there without the permission of the claimant who planted the stake [ibid.].

The imagery in Palm Posts [I] is bleak and desolate, reflecting the anxiousness of idle fishers who eagerly await the seasonal return of the prized and valuable wedgefish to the deep holes in which they congregate, the fishers’ boats drifting unmanned in the gentle currents, a stillness broken solely by the clunking of empty boats against the mooring posts. Commercially, in Indonesia, [1]



Taiwanese Wedgefish
(*Rhynchobatus immaculatus*)

Pancang Nuboung [1]

Pancang nibung
di sudut berdengung
teritip ngelembung
di musim bersambung

sudah beribu perahu
tambat
beribu kail
redam

beribu umpan
lesap
beribu pagut
luput

beribu harap
lepas
beribu tunggu
lalu

Tapi cuma ombak
cabar arus
cuma arus
gempur perahu
cuma perahu
goyang pancang

cuma pancang
koyak jejak
cuma jejak
menjejak redam

tapi cuma bisu
bila kemejan akan
di mana kemejan akan
ke mana kemejan akan

tapi cuma cari
beribu tahan
menunggu kemejan
beribu tangan
menganan kemejan
beribu bisik
membujuk kemejan

Pancang nibung
di surut berdengung
teritip ngelembung
di musim bersambung

Cuma waktu
mencabut mu
dari terumbu

Palm Posts [1]

Palm posts
resound in the ebbing tide
barnacles swell
in the drawn-out season

A thousand boats
moored
a thousand fishhooks
hushed

A thousand baits
vanished
a thousand bites
lost

A thousand hopes
gone
a thousand wait
time wears on...

But only waves
challenge the current
only currents
buffet the boats
only the boats
shake the posts

Only the posts
rend the wakes
only the wakes
trail, hushed

But only mute...
When will wedgefish come?
Where will wedgefish be?
Where will wedgefish go?

But solely searching
a thousand hold out
awaiting wedgefish
a thousand arms
strain for wedgefish
a thousand whispers,
coaxing wedgefish

Palm posts
resound in the ebbing tide
barnacles swell
in the drawn-out season

Only time
will pull you
from the reefs



Taiwanese Wedgefish
[*Rhynchobatus immaculatus*]

Bottlenose Wedgefish
(*Rhynchobatus australiae*)

Kamejan

Ke lubuk paling ceruk manakah kau
akan menyuruk
ke palung paling ujung manakah kau
akan berselindung
Akan sampai juga jejak tempuling
menghentak punggung
membiarkan engkau
melepas dendam zaman
ke puncak laut

Apa lagi rahasiamu memenangkan pertarungan
ini?

Ada pada mu ombak
tapi tak berbadai
Ada pada mu arus
tapi tak berangin
Ada pada mu taring
tapi tak bergeming

Apalagi rahasiamu...
Kecuali lubuk
ke mana sebelum menyerah
kau akan kembali

Kecuali nasib
kepada siapa kau
akan berdamai
Kecuali dendam
ketika kau mengibaskan
ekor mu

ketika kau hitung detak detik
jejak langkah mu
di antara amis musim
di antara ngilu waktu
di antara tikam
dan kilat tempuling

Kecuali pekik pedihmu
:
Tuhan
Inikah nasib ku
Inikah cinta Mu

[1982/1996/2000]

Wedgefish

In which corner of the deep pool will you
hide?
In which remote trough will you
take shelter?
The harpoon will soon arrive
stomping your back
leaving you to
wreak revenge
on the surface of the sea

What secrets do you have to win this battle?

You have the waves,
but it is not stormy
You have the current,
but it is windless
You have your teeth,
yet they remain unmoved

What other secrets do you have...
Except the deep pool
to which you would, before giving up,
return

Except the fate
with which you
must make peace
Except vengeance
when you thrash
your tail
when you count each moment
of your footsteps
in the reeking season
between moments of agony
between stabbings
and flashes of the harpoon

Except your sorrowful cries
:
God
Is this my fate?
Is this your love?

[1982/1996/2000]

wedgefish fins are amongst the highest value fish commodities; [2] wedgefish meat is an esteemed food where it is sold fresh for local consumption or cured for storage so that it may be prepared months in the future, a dish often cooked in a spiced coconut milk; and [3] decorative rings and bracelets are fashioned from vertebral centra, and cigarette mouthpieces are carved from dried wedgefish “bones” (Liamsi 2021). Apprehensively awaiting the appearance of these valuable rays, the fishers whisper earnest prayers and charms, hoping to entice the valuable wedgefish to reappear...

A repeating symbol in the poem is the swelling of immobile barnacles adhering to the nibung mooring posts and wedgefish-pool claim stakes, mirroring the idleness of the anxious and inactive fishing fleet. The fishers in “Palm Posts (I)” eagerly desire the return of the wedgefish, a valuable source of income, but this wish is futile, as the coveted rays will not return until the proper time...

Remarkably, Liamsi’s “Kemejan” poem recounts a wedgefish catch from the perspective of the doomed prey, with the animal coming to terms with the fact that it cannot escape its impending death, as it possesses no defence to repel the advancing hunter, left to thrash impotently on the sea’s surface, crying out to God over the unfairness of its agonizing demise...

The tempuling wielded by the fisher is a single-pronged harpoon (attached to a line) utilized by local fishers to hunt large sea animals such as dugongs, sharks, and wedgefish.

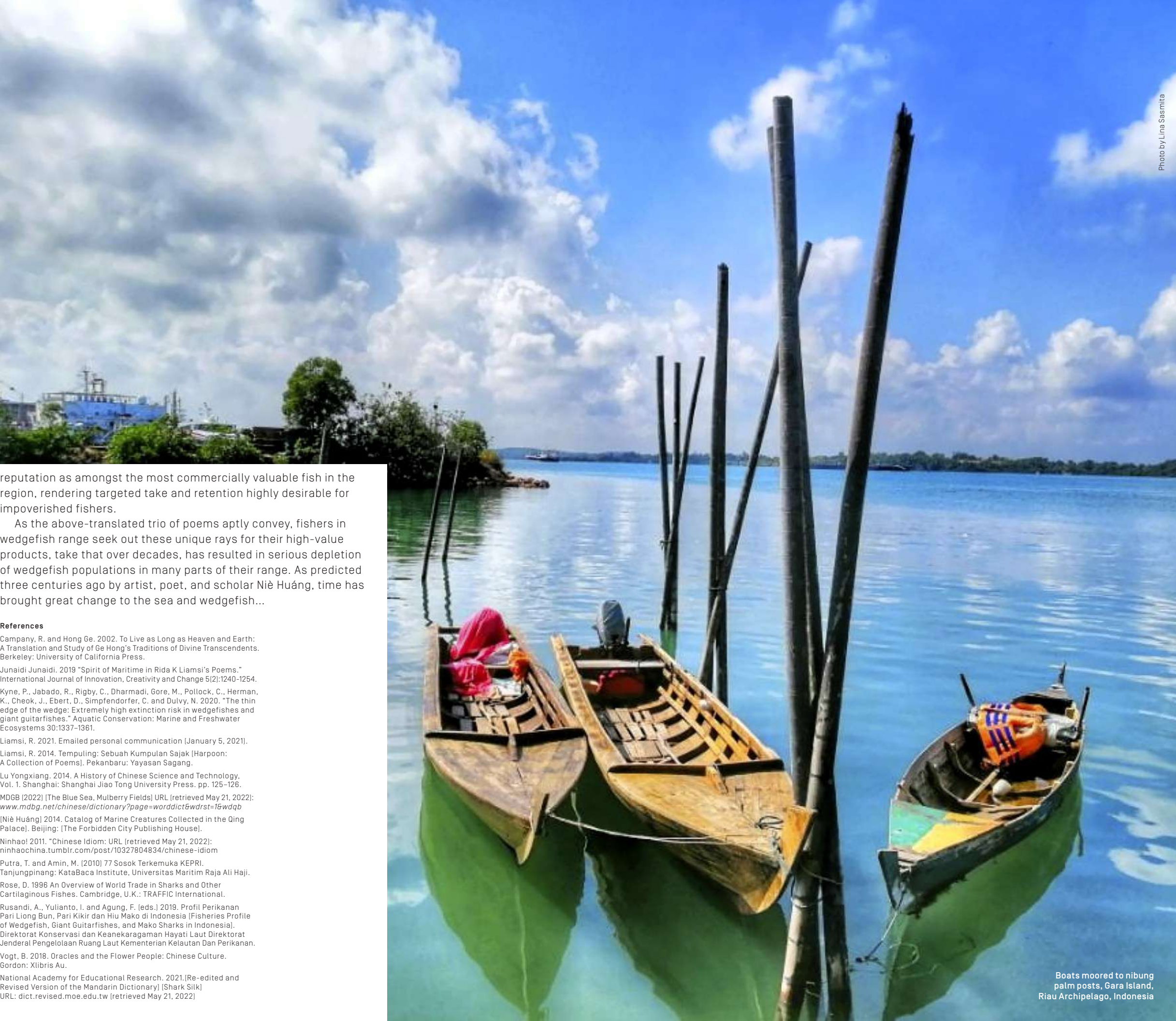
The phrase “reeking seasons” in the poem refers to the stench of the ocean during the bleak winter season when the sea is rough and dangerous, and abundant decaying organic material causes the sea to stink. To the fishers of the Riau Archipelago, the fishy odour of the winter sea is foreboding, an ominous symbol Liamsi uses to signify danger, defeat, and the inescapable death of the ill-fated wedgefish that will imminently be reduced to a corpse (Liamsi 2021).

In Liamsi’s poems, the tempuling harpoon is often a symbol of a person’s determination and clarity of vision in deciding how to live, to “leave a trail”, an attitude to channel one’s energy and talent to accomplish something meaningful (Liamsi 2014:xviii). Indeed, another scholar (Junaidi Junaidi 2019:1251-52) interpreted the harpooning of the eponymous wedgefish in this poem as a metaphor for finding one’s purpose, with the struggle between fisher and ray representing the “power to persist against... natural forces.... depict[ing] the Malay people’s attempts at beating the sharks.” For Junaidi Junaidi, the successful harpooning of the valuable wedgefish by the tenacious fisher represents the triumph of persistence over one’s obstacles to achieve an important goal.

While Western conservationists would likely read “Kemejan” as a mournful verse recounting the sad and inescapable demise of a remarkable and imperilled ray, some Indonesian readers, holding different cultural values, may instead celebrate the fisher’s triumph in accomplishing a dangerous and economically advantageous task, taking a valuable wedgefish through determination and struggle, achieving needed income through the sale of the ray’s valuable meat, fins, and rostrum. Indeed, the conflict between conservation and commercial exploitation of imperilled species is highlighted in these competing interpretations, mirroring the dichotomy between species conservation and the exploitation of animal taxa as an important source of local income in many parts of the world.

Conclusion

In coastal Asia, wedgefish meat has long been esteemed as a quality protein source for local consumption. At the same time, the fins of these charismatic rays have been sought for two centuries as a high-value trade item for the Asian luxury food market. Such economic incentives complicate conservation initiatives due to inherent conflict between (1) the current imperilled status of wedgefish due to decades of overexploitation versus [2] their



Boats moored to nibung palm posts, Gara Island, Riau Archipelago, Indonesia

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Photo: Lufni Fauzil Adhim - Elasmobranch Project Indonesia

Protecting the rhino rays of Karimunjawa Archipelago

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Baited remote underwater video unit deployment process in Karimunjawa National Park

Sharks and rays come in all shapes and sizes, many of which may be unfamiliar to people around the world. Some are massive, like manta rays (*Mobulidae*) or Basking Shark (*Cetorhinus maximus*), and some are remarkably small, such as the Dwarf Lanternshark (*Etmopterus perryi*). Some of them defy the typical image of sharks and rays that most people know; for instance, eagle rays (e.g., *Aetobatidae*) possess heads and mouths resembling actual eagles when they glide through the water column, or angel sharks (*Squatinaidae*) that have flat bodies that lead some people to mistake them for stingrays.

Amongst them all, a group of guitarfish and wedgefish called rhino rays is what some people would describe as a physical fusion between a shark and a ray. These species are often mistaken for sharks. Rhino rays have an elongated and streamlined upper body with two dorsal fins, as many sharks have. However, their underside is flat, with gills located underneath the head, which defines this species group as a ray (Last et al. 2016).

Rhino rays are unquestionably what scientists will call an Evolutionarily Distinct and Globally Endangered (EDGE) species (Stein et al. 2018). This species group, along with some other sharks and rays, is genetically distinct compared to others and has undergone millions of years of evolution. Additionally, rhino rays are considered one of the most threatened sharks and rays, along with sawfishes and angel sharks.

We, from the Elasmobranch Project Indonesia (EPI - Yayasan Hiu Pari Lestari), are presently working to conserve the rhino rays in one of the seven marine national parks in Indonesia, the Karimunjawa National Park (KJNP). KJNP is a multi-use marine protected area (MPA) located off the coast of Northern Central Java in the Java Sea, where multiple species of rhino rays are known to reside in the area based on studies from our team since 2022 (Alghozali et al. 2023; EPI unpub. data 2023). These include the Giant Guitarfish (*Glaucostegus typus*) and three wedgefish species: the Bottlenose Wedgefish (*Rhynchobatus australiae*), Smoothnose Wedgefish (*R. laevis*), and Broadnose Wedgefish (*R. springeri*).

Unfortunately, all of these species are considered threatened with extinction. They are Critically Endangered according to the International Union for the Conservation of Nature (IUCN) Red List of Threatened Species. They were also listed in the Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES) Appendix II in 2019, meaning their populations are prone to extinction if their trade is not regulated.

Information about rhino rays in KJNP was scarce when our team initiated our Rhinorays Project in 2022. Although fishers considered Rhino rays rare to catch or sight in the past decade, they were once abundant (EPI unpub. data 2022). This is also not surprising, considering that fish landings in KJNP are not centralized, making monitoring difficult. Local fishers also mistook rhino rays for sharks, initially making them reluctant to share information about them, as they thought all sharks were fully protected.

Rhino ray catches, exclusively the Giant Guitarfish and wedgefishes, have experienced a steady decline in Indonesia over the past decade despite increases in fishing efforts, indicating population declines (DJPT KKP 2015, 2017). This raises concern from a conservation standpoint, as rhino rays, like any other shark and ray species, are susceptible to overfishing (Kyne et al., 2020). Given that they only produce a small litter of pups, grow slower compared to bony fishes, and can only reproduce at a relatively old age, there are more rhino rays caught than those born in the sea.



Release process of bycaught mature Giant Guitarfish in Karimunjawa National Park



Interview process with local fishers in Karimunjawa National Park Baited

In light of the current threats facing rhino rays, the EPI team assumes that the KJNP could possibly be one of the few areas where rhino rays can give birth and nurse their pups. This assumption is based on finding young-of-the-year animals (less than one-year-old), juveniles (immature individuals), as well as mature animals from our research [EPI unpub. data 2022, 2023].

Our team started the conservation work for rhino rays in KJNP in 2022 by collecting baseline information about the interaction of local fisheries with these species and by assessing abundance through baited remote underwater video surveys (BRUV). The EPI team shed some early understanding of the species in KJNP, where the locals thought of them as a highly valued bycatch or 'jackpot' but not a target species [EPI unpub. data 2022]. Some fishers said, "Not catching rhino rays will not affect our economy as we target other fishes such as the fusiliers, groupers, and snappers". The BRUV surveys also provided the first live encounter evidence with rhino rays and their relative abundance information in KJNP waters, which was assumed to be low due to population declines [Alghozali et al., 2023].

As the local authority, the team informed the KJNP Office about the local communities' willingness to release small-sized rhino rays and their preferences for future species management. Additionally, the local fishers engaged in our projects and even stated their desire to report sightings and catches of rhino rays. Our team is sure that this situation provides an excellent opportunity to involve local communities in any future conservation intervention for rhino rays in KJNP.

The early research laid a solid foundation for conservation efforts for rhino rays in KJNP. Our team believes more research must be conducted before initiating high-level species management. The EPI team is currently assessing the details of the fishery and trade in rhino rays, including the intensity of fishing pressure, their demand, the complexity of the trade and market chain, and whether rhino rays originating from KJNP can be traced by consumers, researchers, and government authorities.

From a scientific point of view, the EPI team also sees the need to further understand rhino ray biology in KJNP. This includes the following questions: What do they feed on? How do they reproduce? How fast can they grow and reach maturity? How genetically connected are they with other populations in the Java Sea? EPI is collaborating with researchers from the National Research and Innovation Agency (BRIN) of Indonesia to conduct laboratory analyses to answer these questions.

Last but not least, the EPI team is also seeking to understand how fishers will respond to various management options and the implementation of an incentive-based approach for rhino ray conservation in KJNP. This aspect of wildlife conservation will enable the team to bridge science into action further, allowing us to consider the best approach with minimal trade-offs to the local communities to achieve better conservation sustainability.

This scientific information will assist the EPI team and the KJNP Office in better understanding the critical references needed to formulate an effective and inclusive conservation intervention, such as a management policy specific to rhino rays in KJNP. Together, we believe that understanding both the species and the local communities in KJNP will enable us to deliver a more significant impact in protecting and conserving rhino rays in KJNP.

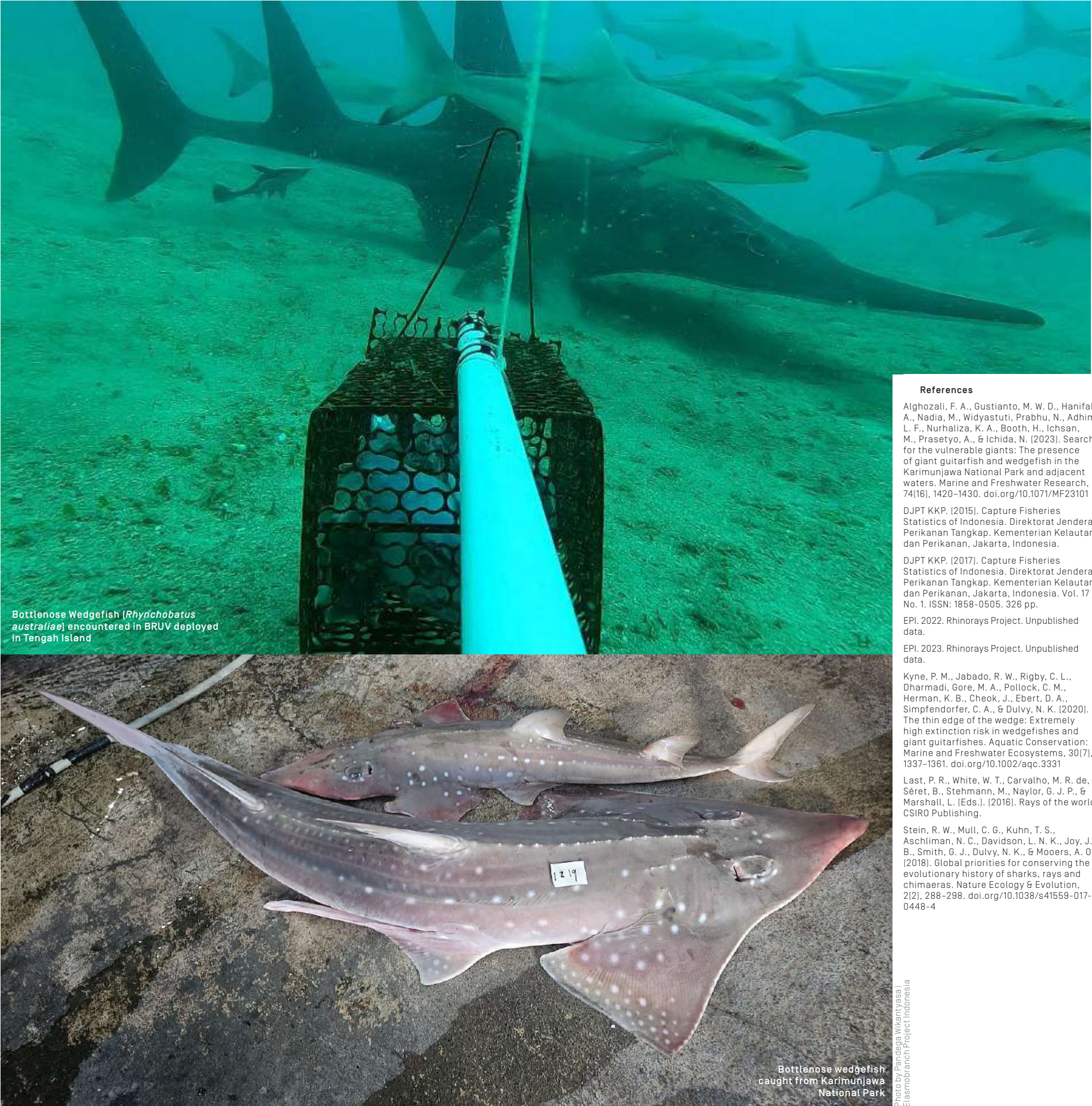


RHINORAYS
PROJECT



Release process of bycaught
young of the year giant guitarfish
in Karimunjawa National Park

Photo by Nabillah Hasnaa Humaimah | Elasmobranch Project Indonesia



Bottlenose Wedgefish (*Rhynchobatus
australiae*) encountered in BRUV deployed
in Tengah Island

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Photo by Faqih Akbar Alghozali



Photo: Siam

Protecting Hammerhead Sharks in Bangladesh



Region
Update:
Indian Ocean

Entangled Scalloped Hammerheads (*Sphyrna lewini*) from coastal fish landing site of Sharankhola, Bangladesh

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In the coastal waters of Bangladesh, where the Bay of Bengal meets the land, a delicate balance exists between livelihood and conservation. Here, amidst the vibrant tapestry of marine life, hammerhead sharks (family Sphyrnidae), majestic rulers of the deep, face an uncertain future.

Amidst the clamour of the fishing industry lies a hidden world bustling with activity – a processing centre where shark meat is dried for sale, fueling a lucrative trade that spans continents. Meanwhile, tranquil scenes of fishing boats at rest during Bangladesh’s 65-day marine fishing ban provide a poignant reminder of the vital measures to protect marine biodiversity, including threatened species like hammerhead sharks.

Engaging in discussions with the coastal fishing community representatives on the conservation and management of hammerhead sharks and other marine megafauna fosters a legacy of ocean stewardship in Bangladesh. Through evidence-based conservation efforts, Bengal Elasmo Lab strives to safeguard its existence and preserve the delicate balance of the marine ecosystem.

My journey – along with the Bengal Elasmo Lab team and my mentor and advisor, Assoc. Prof. Dr Alifa Bintha Haque – into the depths of the Bay of Bengal for my research project revealed a harrowing truth: that hammerhead sharks, once rulers of these waters are now teetering on the edge of extinction. What started as a quest for knowledge became a passionate mission to protect these majestic creatures from the looming threat of overfishing and exploitation.

Research findings revealed a harrowing reality: hammerhead sharks are not intentionally targeted in the coastal waters of Bangladesh. Instead, they fall victim to fishing gears meant for other species, entangled in gillnets and set bag nets. The decline in their population is evident, with catch-per-unit effort data painting a grim picture of their dwindling numbers.

The market demand for hammerhead shark meat further exacerbates the situation, driving some fishers to target these vulnerable creatures intentionally. With several hammerhead species classified as Critically Endangered on the IUCN Red List of Threatened Species and facing extinction, urgent action is needed to reverse this alarming trend.

Drawing inspiration from our collective research efforts, we embarked on a journey to spearhead conservation efforts for hammerhead sharks in the Bay of Bengal. Together, we implemented well-planned fishing bans during breeding seasons, provided alternative sources of income for fishers, and conducted live release training programs to reduce mortality rates. Enforcing year-round catch restrictions and introducing bycatch reduction devices in fishing vessels were crucial steps in minimizing incidental capture of hammerhead sharks.



Controlling trawling activities and strictly monitoring the trade of hammerhead products were also vital components of our conservation strategy. By working hand in hand with the fishing community, we aimed to strike a delicate balance between conservation goals and their livelihood.

We are filled with hope and determination as we reflect on our journey. While the road ahead may be challenging, our commitment to protecting hammerhead sharks in the Bay of Bengal remains steadfast. Together, we can make a difference – one conservation measure at a time and create a brighter future for these magnificent creatures and the ecosystems they call home.

Piles of hammerhead sharks at a shark processing center of Southeast Bangladesh (Chattogram)

Photo: Manirul

Dried shark processing center at south-central Bangladesh (Kuakata)



Discussions with the coastal fishers on the present situation and conservation importance of hammerhead sharks in Bangladesh.



Hammerhead sharks are carried from the landing site to the processing centre, Cox's Bazar, Bangladesh.



Discussions with the coastal fishers on the present situation and conservation importance of hammerhead sharks in Bangladesh



The Bengal Elasmo Lab team behind the research



Dried shark processing center at south-central Bangladesh [Kuakata]



Entangled Scalloped Hammerheads (*Sphyrna lewini*) from coastal fish landing site of Kuakata, Bangladesh

Reef manta ray conservation in the Chagos Archipelago

Written by
Dr Joanna. L Harris
Manta Trust and the University of Plymouth

Abstract

Reef Manta Rays (*Mobula alfredi*) face an uncertain future due to the severe threats from fisheries, particularly in the Indian Ocean. Still, with its vast no-take Marine Protected Area (MPA), the Chagos Archipelago offers a potential refuge to its population. However, illegal fishing activities pose significant risks, and possible future changes to the spatial planning of the MPA may render the population increasingly susceptible to targeted and bycatch fisheries. To address these threats, the Chagos Manta Ray Project, an affiliate of the Manta Trust, has been conducting extensive research in the region since 2019. Long-term tracking using acoustic telemetry at Egmont Atoll revealed that reef manta rays exhibit high residency levels, with activity peaks during the southeast monsoon. The Indian Ocean Dipole (IOD) was found to influence activity patterns, with Reef Manta Rays relying on Egmont Atoll during periods of low prey availability elsewhere. These findings highlight the importance of Egmont Atoll for Reef Manta Ray conservation and inform strategies for mitigating fisheries threats, including regular illegal, unreported, and unregulated (IUU) fishing enforcement and preservation of the current no-take restrictions at this location. Recognising its significance, Egmont Atoll has been designated an Important Shark and Ray Area (ISRA).

Threats to mobulids

Manta and devil rays (collectively known as mobulids) are filter-feeding rays that belong to the monogeneric family Mobulidae [White et al., 2017]. Nine described species and a third putative species (*Mobula cf. birostris*) occur throughout the world’s tropical and subtropical regions [Marshall et al., 2009; White et al., 2017]. Fisheries target all mobulid species, an issue prevalent in the Indian Ocean. Indian Ocean fisheries are one of the most exploited yet poorly managed in the world, and many bordering countries have large targeted fisheries for mobulids [e.g., Fernando and Stewart, 2021]. Mobulid exploitation is frequently driven by the demand for their cartilaginous gill plates (feathery lobe structures used to filter their zooplankton and small fish prey from the water), which fetch a high price in the Asian medicinal trade. This exploitation has led to substantial population declines in recent decades due to the conservative life history traits of mobulids. Mobulids are slow-growing, late to mature, and only have a few offspring in their lifetime, which limits their capacity for recovery [Dulvy et al., 2014; Stevens, 2016].

Reef manta rays

The Reef Manta Ray is a mobulid species that is dispersed throughout the Indian and West Pacific Oceans, where they typically live in small (a few hundred individuals), geographically fragmented and often isolated populations that have a limited home range [Kashiwagi et al., 2011, Couturier et al., 2012, Hosegood et al., 2020, Humble et al., 2023, Whitney et al., 2023]. Aggregation behaviour is characteristic of the species, whereby populations will concentrate the majority of their activities at specific ‘hotspot’ locations that provide essential resources, including enhanced zooplankton productivity and opportunities for activities like cleaning, socialising, and reproduction [Jaine et al., 2014, Perryman et al., 2019, Harris et al., 2020]. Due to their unsustainable depletion, reef manta rays are listed as Vulnerable on the IUCN

Red List of Threatened Species, with a declining population trend [Marshall et al., 2022]. Given that this species has one of the lowest intrinsic rates of population increase and is among the least fecund among all sharks and rays, this declining trend is anticipated to result in local extinctions [Dulvy et al., 2014]. Additionally, anthropogenic activities, such as bycatch, habitat loss, pollution, and unregulated tourism, pose significant threats, further contributing to their decline. Amid these threats and uncertainties, the Chagos Archipelago offers a promising refuge.

The Chagos Archipelago

The Chagos Archipelago is a group of atolls and 58 low-lying islands in the central Indian Ocean 500 km south of the Maldives. The region is predominantly undeveloped and uninhabited with a no-take MPA with onsite enforcement encompassing its exclusive economic zone (640,000 km²), making it one of the largest no-take MPAs in the world. Due to minimal human influence and high levels of protection, this MPA offers a refuge for its Reef Manta Ray population. As a result, this population could serve as the species' stronghold. Nonetheless, IUU fishing is a significant problem, especially for sharks and rays, which are frequently targeted [Collins et al., 2023; Harris and Stevens, 2024].

Furthermore, bilateral negotiations between the United Kingdom and Mauritius governments are currently taking place following a legal dispute over the establishment of the MPA [Strating, 2023]. These discussions could result in changes to the MPA's spatial planning, such as zonation allowing fishing, which could increase the susceptibility of Reef Manta Rays to target and non-targeted fisheries throughout the region, as well as other pressures that threaten the species throughout the Indian Ocean. To help mitigate these threats, the Manta Trust’s Chagos Manta Ray Project [www.mantatrust.org/chagos] and the University of Plymouth, with generous support from the Bertarelli Foundation and the Garfield Weston Foundation, have been conducting extensive research in the region since 2019.

The Chagos Manta Ray Project

Chagos Manta Ray Project is an affiliate project of the Manta Trust, a UK-registered charity formed in 2011 with a vision of a sustainable future for the ocean, where manta rays and their relatives thrive in healthy, diverse marine ecosystems. The Manta Trust collaborates with affiliates worldwide through research, education, and expert advice to drive the policies and practices necessary to conserve manta rays and their relatives [find out more, go to www.mantatrust.org and follow @*MantaTrust*]. The Chagos Manta Ray Project was established by the Manta Trust in 2013 following reports of Reef Manta Ray sightings in the Chagos Archipelago from researchers and enforcement authorities. The Manta Trust then established a reef manta ray photographic identification (photo-ID) database for the region. However, due to the logistical and financial challenges of working in this remote and strictly protected location, only two expeditions designated for Reef Manta Ray research took place before 2019. This research included several photo-ID surveys, which, coupled with observations recorded in the photo-ID database and a limited tagging study, identified Egmont Atoll as a hotspot for Reef Manta Ray aggregations.

Reef manta ray research at Egmont Atoll

Egmont Atoll is a mesoscale (30 km²) atoll situated in the southwest of the Chagos Archipelago that has the highest documented Reef Manta Ray activity in the region with a total of 16 known aggregation sites, including foraging areas where large aggregations (30–50 individuals) have been observed. To develop a detailed understanding of the spatial and temporal dynamics of Reef Manta Ray’s use of these habitats that can help prioritise current MPA enforcement activity and inform future spatial planning, long-term tracking of Reef Manta Ray activity using acoustic telemetry began in 2019. Acoustic telemetry is ideal for monitoring visitation patterns in a specific area. Its application requires the deployment of an acoustic transmitter tag onto the focal animal that emits a sound-based coded signal that can be identified and recorded by hydrophones placed in the area of interest. During this research, 26 female (adults = 9, juvenile = 17) and 16 male (adults = 7, juvenile = 9) Reef Manta Rays were equipped with acoustic transmitters, and an array of hydrophones were deployed around Egmont Atoll. Over the next 2.5 years, more than 200,000 detections of the 42 tagged Reef Manta Rays were recorded by these hydrophones. These were then analysed with environmental data to identify annual and seasonal variations in visitation patterns, the intensity at which the location was utilised, and the environmental factors influencing patterns.

The detection data revealed that Reef Manta Rays used Egmont Atoll year-round. They spent an average of 77% of their tracking days at the atoll, one of the highest residency levels ever observed at a mesoscale habitat. Activity peaks occurred during the southeast monsoon (April–November), particularly on the southwest side of the atoll, and during the northwest monsoon (December–March) on the northwest side.

The Indian Ocean Dipole (IOD), an ocean-atmosphere interaction that alternates between active (positive and negative) and neutral phases, was closely associated with activity at Egmont Atoll, with more activity occurring during a positive phase. This phase is characterised by a deeper mixed layer depth, associated with a depression of productivity in the Indian Ocean, indicating that Reef Manta Rays may rely on Egmont Atoll when prey resources are scarce elsewhere in the archipelago.

Egmont Atoll Important Shark and Ray Area (ISRA)

The findings of this research highlight the significant role of Egmont Atoll in supporting the Reef Manta Ray population of the Chagos Archipelago and provide essential evidence to help mitigate the increasing threat of fisheries. Mitigation includes regular IUU monitoring and enforcement at Egmont Atoll, particularly during the southeast monsoon and ensuring that future changes to the MPA preserve this habitat. This has been recognised by the IUCN Species Survival Commission Shark Specialist Group (SSG), who designated Egmont Atoll an Important Shark and Ray Area [ISRA; sharkrayareas.org/portfolio-item/egmont-atoll-isra] based on this research and proposal collaboration with the SSG coordinator for Mauritius, Théophile Mouton.

The full version of this study is available for open access [onlinelibrary.wiley.com/doi/full/10.1002/aqc.4089]

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Don't forget the sharks in the dark

Written by Brittany Finucci

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IUCN SSC Shark Specialist Group | Red List Authority Coordinator
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The deep ocean is the largest and one of the most complex environments on Earth, yet it remains one of the least researched places on the planet. This is also the case for deepwater sharks and rays, even though these species make up nearly half of the recognized diversity of all cartilaginous fishes (sharks, rays, and chimaeras) we know today. Deepwater sharks and rays have remained mainly out of sight and out of mind.

Our work recently published in *Science* – *Fishing for oil and meat drives irreversible defaunation of deepwater sharks and rays* – shows that humans' reach and impact on the deep ocean is growing. Using the International Union for Conservation of Nature (IUCN) Red List of Threatened Species, we reveal that the number of threatened deepwater sharks and rays has more than doubled from 22 to 57 (i.e., 4% to 11% of total deepwater diversity) between 1980 and 2005, in line with emergence and expansion of deepwater fishing. Deepwater sharks and rays are now the most comprehensively assessed of any major deepwater lineage assessed to date. Today, there are currently 60 (14.1%) threatened species, i.e., those that have been assessed as either Critically Endangered, Endangered, or Vulnerable.

Deepwater sharks and rays are among the most sensitive marine vertebrates to overexploitation. This is due to their long lifespans (possibly 450 years for the Greenland Shark, *Somniosus microcephalus*) and low reproductive outputs (many have only 1–2 pups every couple of years). These traits make some deepwater sharks more similar to marine mammals in terms of their limited ability to withstand and recover from exploitation. For example, the population growth rates of the Greenland Shark and the Leafscale Gulper Shark (*Centrophorus squamosus*) are comparable to the Sperm Whale (*Physeter macrocephalus*) and the Walrus (*Odobenus rosmarus*), respectively. However, many marine mammals have been protected for years, if not decades, while deepwater sharks remain largely unprotected.

Our work reveals overfishing is the main threat to deepwater sharks and rays. The group is used for their meat and high-value liver oil. Even though both coastal and deepwater sharks are targeted for their liver oil, the deepwater species are preferred in the trade due to the high quality of their oil, also known as the compound squalene. This squalene has a wide range of uses, including cosmetics (e.g., sunscreens, lipsticks) and pharmaceuticals (e.g., anti-ageing, omega-3 supplements, and vaccine adjuncts). These medical applications are continuously used due to the failure to determine any potential human health risks, as deepwater sharks can bioaccumulate heavy metals at levels near or above regulatory thresholds. Two-thirds of the threatened deepwater sharks have been used in liver oil products. The history of fisheries for these species is rapid steep population declines over short (<20 years) timeframes that are essentially short-term mining and collapse.

There have been many wins for shark conservation, for example, in tackling the challenges of the global fin trade that threatened coastal and pelagic species. Yet deepwater sharks have been largely left out of the conservation conversation. There is an urgent need for their trade to become legal, traceable, and sustainable, a far cry from where it is now. The Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES) is a possible tool in the management toolbox to regulate the trade, ensure it is sustainable, and prevent further population declines. National-level regulations, including catch regulations and fisheries monitoring, are also needed to avoid declines.

Deepwater spatial closures have also been proposed to provide refuge from fishing pressure, thus reducing mortality and promoting recovery. It would be beneficial to include these closures in areas of critical habitats for deepwater sharks and rays,

e.g., in thermal vents where skate egg nurseries are suspected to occur. The capture of deepwater sharks while targeting other species (incidental capture) threatens almost every deepwater shark species. While retention bans have been implemented in some regions as a mitigation strategy, these bans do not prevent the mortality of prohibited species brought to the surface from great depths by fishing gear. Efforts are needed to prevent these animals from being caught. A global push is now to protect 30% of the ocean by 2030 (30x30). Our study indicates that protecting 30% of the deep ocean between the depths of 200–2,000 m would give ~80% of deepwater shark species some spatial protection. Further refuge could be provided by a ban on fishing below 800 m worldwide, which would provide 30% vertical protection to one-third of threatened deepwater sharks and rays.

Deepwater shark and ray extinction risk is much less than their shallow-water relatives. Still, their potential for recovery from overexploitation is much lower due to their long lifespans and low fecundity. It was estimated it would take at least 63 years for the Little Gulper Shark (*Centrophorus uyato*) to recover to just 20% of its original population size, which is in a marine reserve with no fishing pressure. We now have the scientific evidence to trigger change. Proactive action is needed for deepwater sharks and rays to prevent their further endangerment. Precautionary conservation, management, and trade actions are necessary in the deep ocean to safeguard half of the world's sharks and rays and maintain the biodiversity of the deep ocean, the largest ecosystem on Earth.

The full publication can be found here:
www.science.org/doi/10.1126/science.ade9121.



A Bluntnose Sixgill Shark
[*Hexanchus griseus*]
off Puget Sound, USA

Photo by Greg Aertman



Photo by Elias Neuman



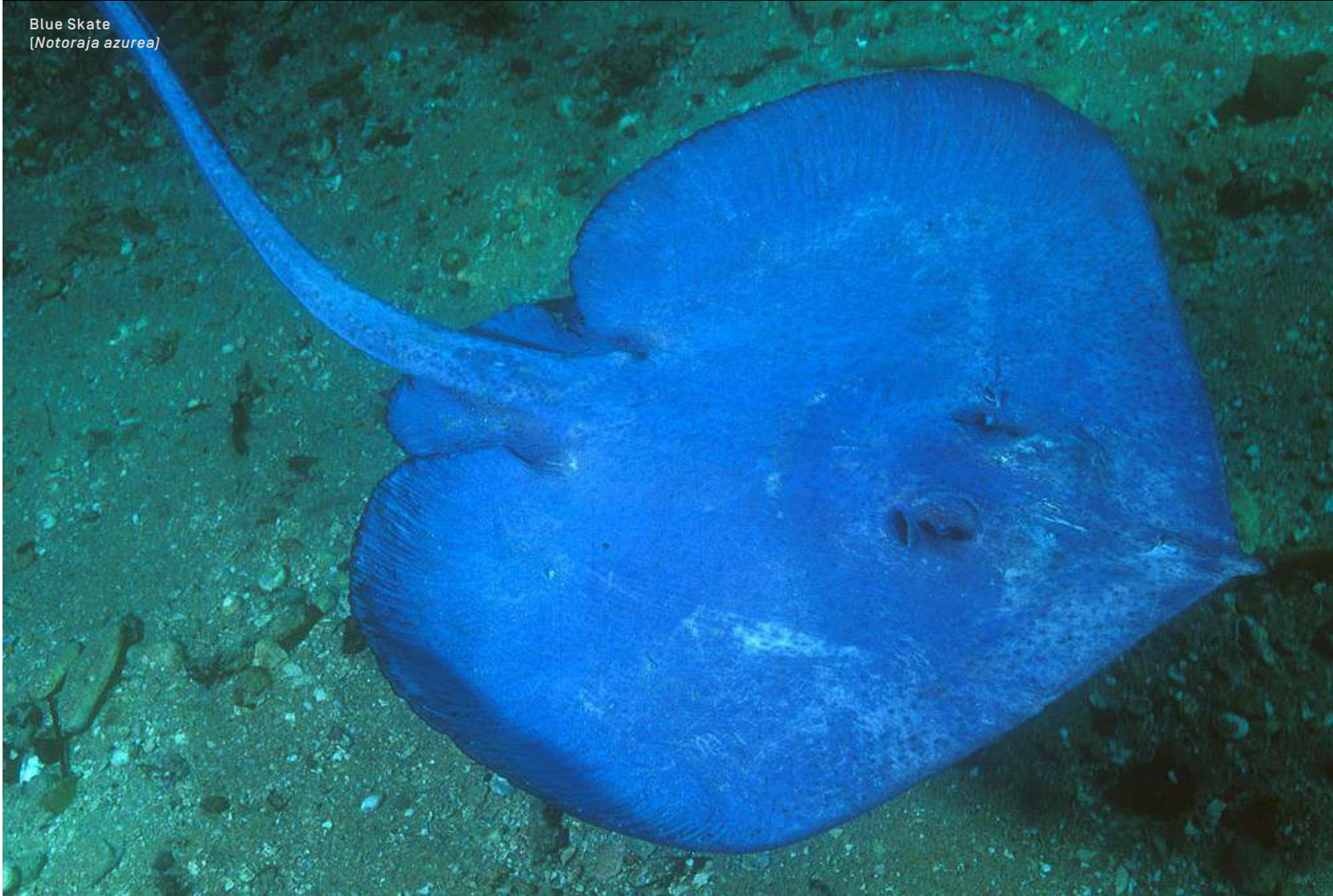
Velvet Belly Lanternshark
[*Etmopterus spinax*] photographed
at 20 m in Trondheim, Norway



Longnose chimaeras
[*Rhinochimaeridae* sp]



Frisled Shark
[*Chlamydoselachus anguineus*]



Blue Skate
[*Notoraja azurea*]



Prickly Dogfish
[*Oxynotus bruniensis*]



Bramble Sharks (*Echinorhinus brucus*) caught in the deepwater shark liver oil fishery in India, stored in boxes after auction and en route to oil extraction plants

Management solutions to protect and recover Australia's threatened endemic sharks and rays.

Written by Ciaran Hyde

An Eastern Angel Shark, (*Squatina albipunctata*), Cabbage Tree Bay, Manly, New South Wales, April 2017



Region
Update:
Oceania

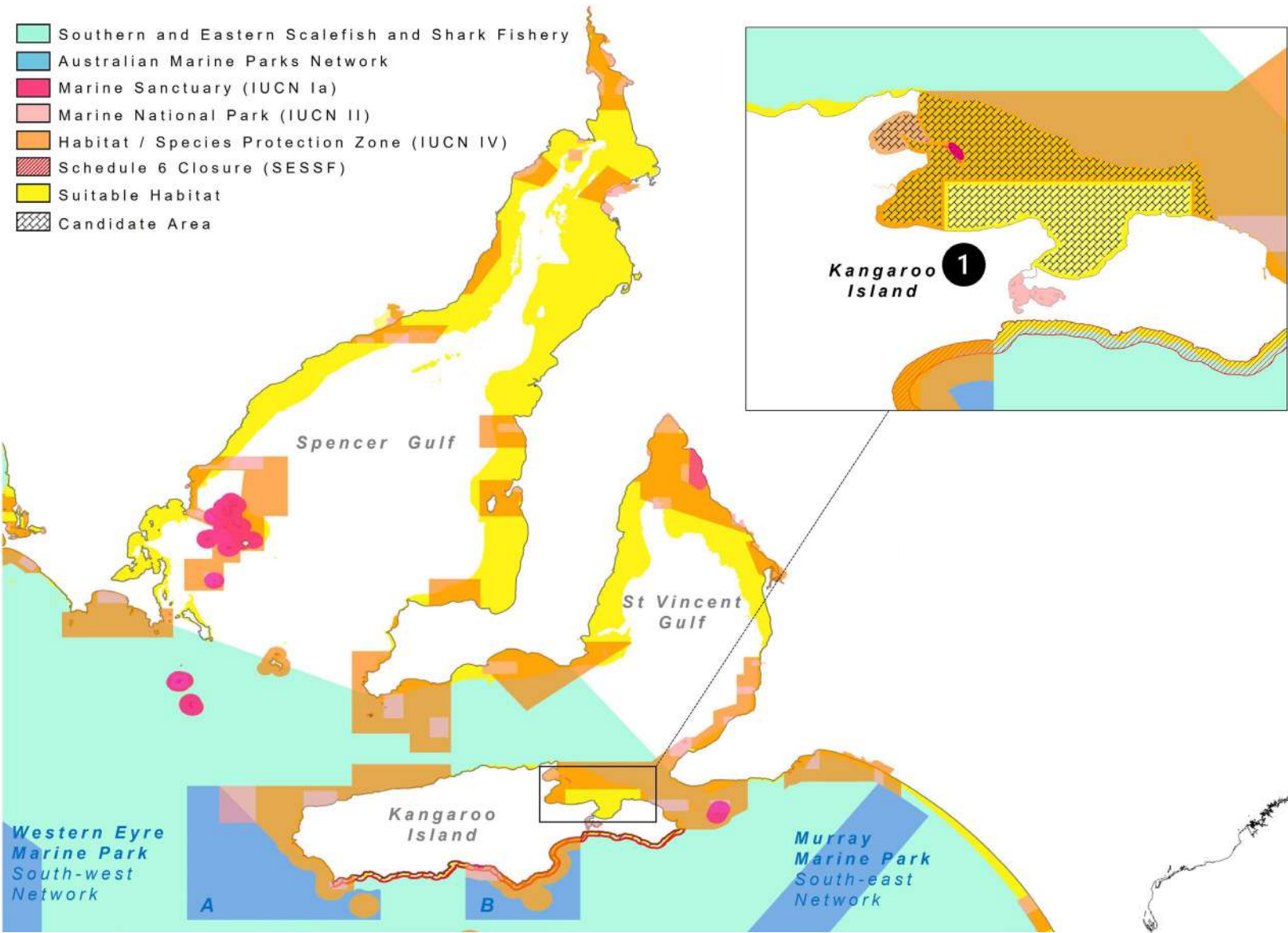
Australia is a hotspot of diverse and evolutionarily distinct sharks and rays. Almost half of the 320 species found in Australian waters are endemic, many of which, including the Whitefin Swellshark (*Cephaloscyllium albiglunum*), Eastern Angel Shark (*Squatina albiglunata*), and Coastal Stingaree (*Urolophus orarius*), are threatened species according to the IUCN Red List of Threatened Species. Multiple fisheries which operate in Australian waters have been impacting the conservation status and hindering the recovery of these species for over 40 years. For some endemics, population declines of up to 90% have already occurred as a direct result of fisheries impacts.

In a new report commissioned by the Australian Marine Conservation Society and Humane Society International – Australia, titled Fishery and spatial management solutions to Inform the Protection and Recovery of Australia's Threatened Endemic Elasmobranchs (Daley and Hyde, 2023), solutions for the protection of ten threatened Australian endemic species which interact with one of Australia's largest fisheries, the Southern and Eastern Scalefish and Shark Fishery (SESSF) are presented. Whilst the SESSF does not directly target the ten species, they are regularly caught as bycatch, and their demersal habitats are damaged by both trawl and net fishing. In recent years, spatial and temporal fishery closures have somewhat reduced risks to these species. Still, the placement of these and existing State and Commonwealth marine parks is proving inadequate in providing refuge to safeguard them from ongoing threats. Like all endemic sharks and rays, their conservation is highly prioritised as their smaller populations and geographical confinement place them at greater risk of extinction.

Aimed at improving the conservation status of the ten endemic species by moving them to lower threat categories or seeing them removed from threatened species status, the report considers how to approach their spatial management, including the selection of location, size, number, and connectivity of closures and protected areas, as well as addressing jurisdictional complexities involved in implementing them across State and Commonwealth boundaries. All ten threatened endemics are under-represented in Australian management and conservation arrangements, and there is minimal overlap between their critical habitats and existing spatial protections (e.g., SESSF closures or marine park networks). By assessing the threats associated with SESSF activities and identifying and mapping areas of habitat where existing spatial closures would support breeding success and connectivity between juvenile and adult habitats, the report identifies six Candidate Areas which would limit or halt declines and support the recovery of the threatened endemics in Australian waters.

Drawing insights from the approaches of Important Shark and Ray Areas (ISRAs) and the Shark and Ray Recovery Initiative (SARRI), a set of selection criteria which identified the species' critical habitats was developed and then used to identify the Candidate Areas. The size and extent of the two areas were also justified by recent tracking data for the Whitefin Swellshark and Greeneye Spurdog (*Squalus chloroculus*), which revealed that current management approaches to protect 30% of their habitat were not enough to conserve these species. The Candidate Areas also represented locations where existing closures or protected areas could be modified by zoning review to include the endemic sharks and rays specifically.

NORTH-EAST KANGAROO ISLAND CANDIDATE AREA 1





Coastal Stingaree
Urolophus orarius

EN

Endemic to South Australia with a restricted distribution to shallow inshore, coastal waters between 16-18°C and 5-50m depth.



Melbourne Skate
Spiniraja whitleyi

VU

Endemic to southern Australia (NSW, VIC, TAS, SA, WA) on the continental shelf and slope in waters 14-18°C and 0-345m depth.

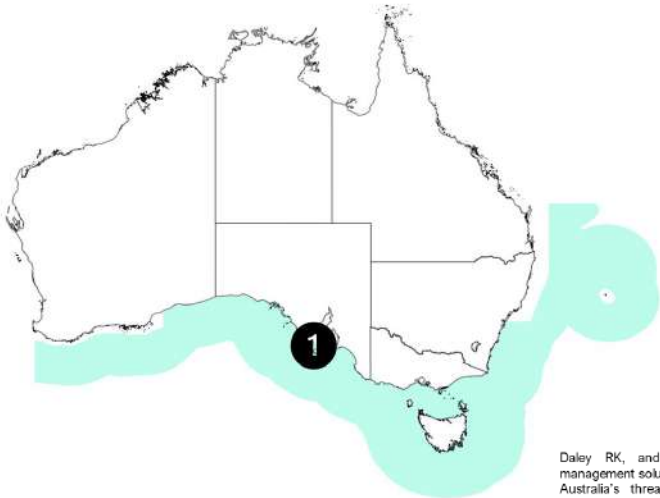
- Criterion 1: Suitable Habitat ✓
- Criterion 2: Biological Importance ✓
- Criterion 3: Ecological Importance ✓
- Criterion 4: Abundance and Extent ✓

This area was primarily considered for *Urolophus orarius* as it encompasses a sufficient proportion of the species geographic range and suitable habitat, as well as for the occurrence of *Spiniraja whitleyi*. Inshore conditions are representative of essential breeding habitat and nursery areas as identified elsewhere for other *Urolophus* species. Given the very restricted geographic range and suitable habitat of *Urolophus orarius* it can be assumed that all vital functions for the species occur in the area.

Minimal suitable habitat of *Urolophus orarius* occurs outside of the Southern and Eastern Scalefish and Shark Fishery (SESSF) boundaries apart from in St Vincent and Spencer Gulfs which are in South Australian State waters. The area is partially included into the South Australian State-managed Encounter Marine Park which is primarily zoned for Habitat Management (IUCN IV) with small sections zoned as no-take Marine Sanctuary (IUCN Ia) or Marine National Park (IUCN II). *Urolophus orarius* or *Spiniraja whitleyi* are not listed or recognised in any current South Australian State MPA Management Plans.

The area is currently closed to SESSF gillnet, longline and trawls (Schedule 5 South Australian Gillnet Closure – Backstairs Passage) to protect breeding school sharks and sea lions. It is also outside of current Australian Marine Parks jurisdiction being too far inshore (<3nm) for inclusion into the current South-west or South-east AMP networks. The entire bay from North Cape to Kangaroo Head should be considered under fisheries and MPA spatial protection. A continued lack of adequate spatial protections for *Urolophus orarius* place this species' entire global population at high risk of extinction thus impacting shark/ray and regional biodiversity.

Candidate Area 1 meets: Criterion 1 Suitable Habitat; Criterion 2 Biological Importance for (a) Breeding Habitat, and (b) Essential Habitat; Criterion 3 Ecological Importance for (a) Threat, and (b) Diversity; and Criterion 4 Abundance and Extent

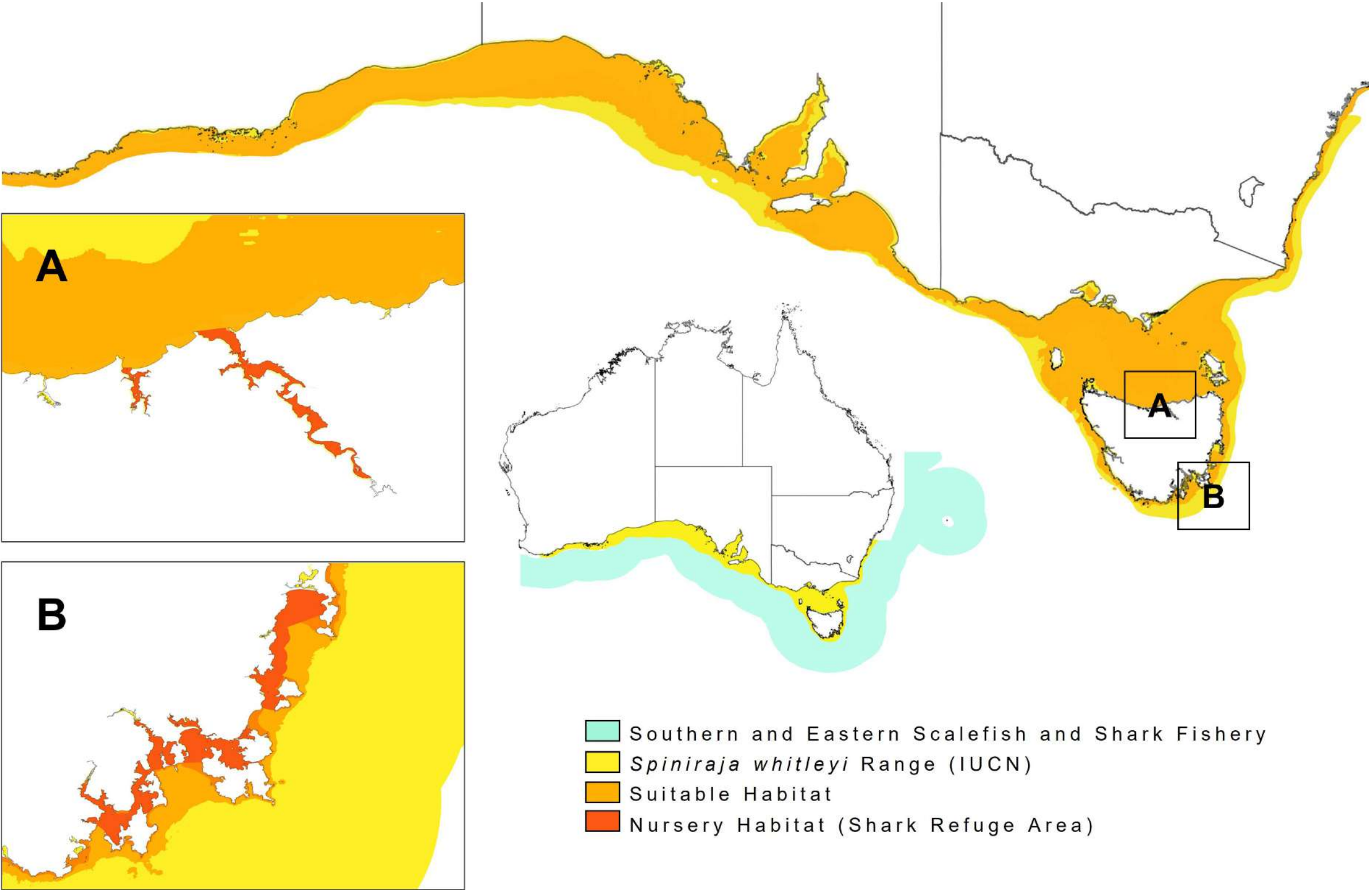


Daley RK, and Hyde CA (2023). Fishery and spatial management solutions to inform the protection and recovery of Australia's threatened endemic elasmobranchs. Australian Marine Conservation Society and Humane Society International.

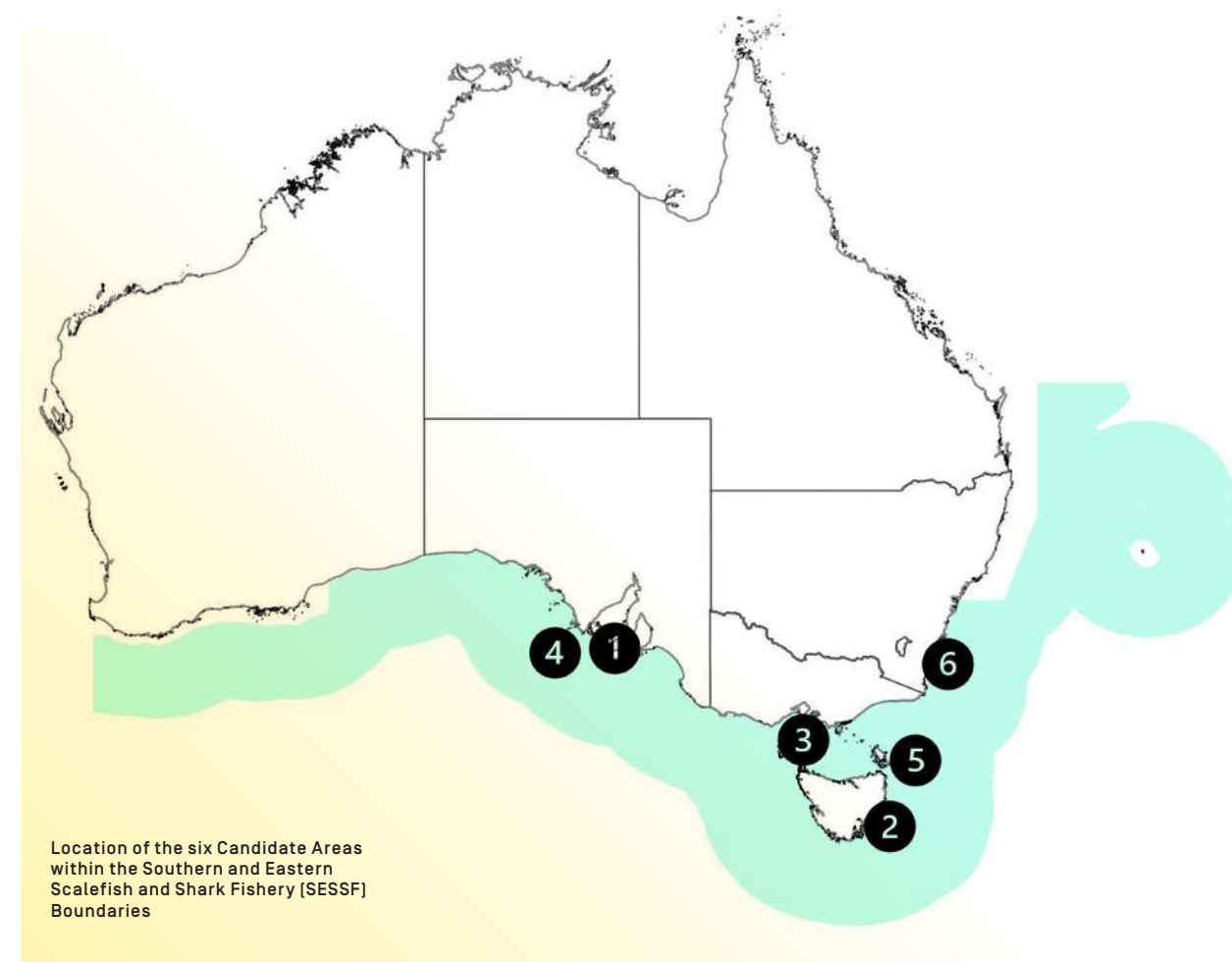
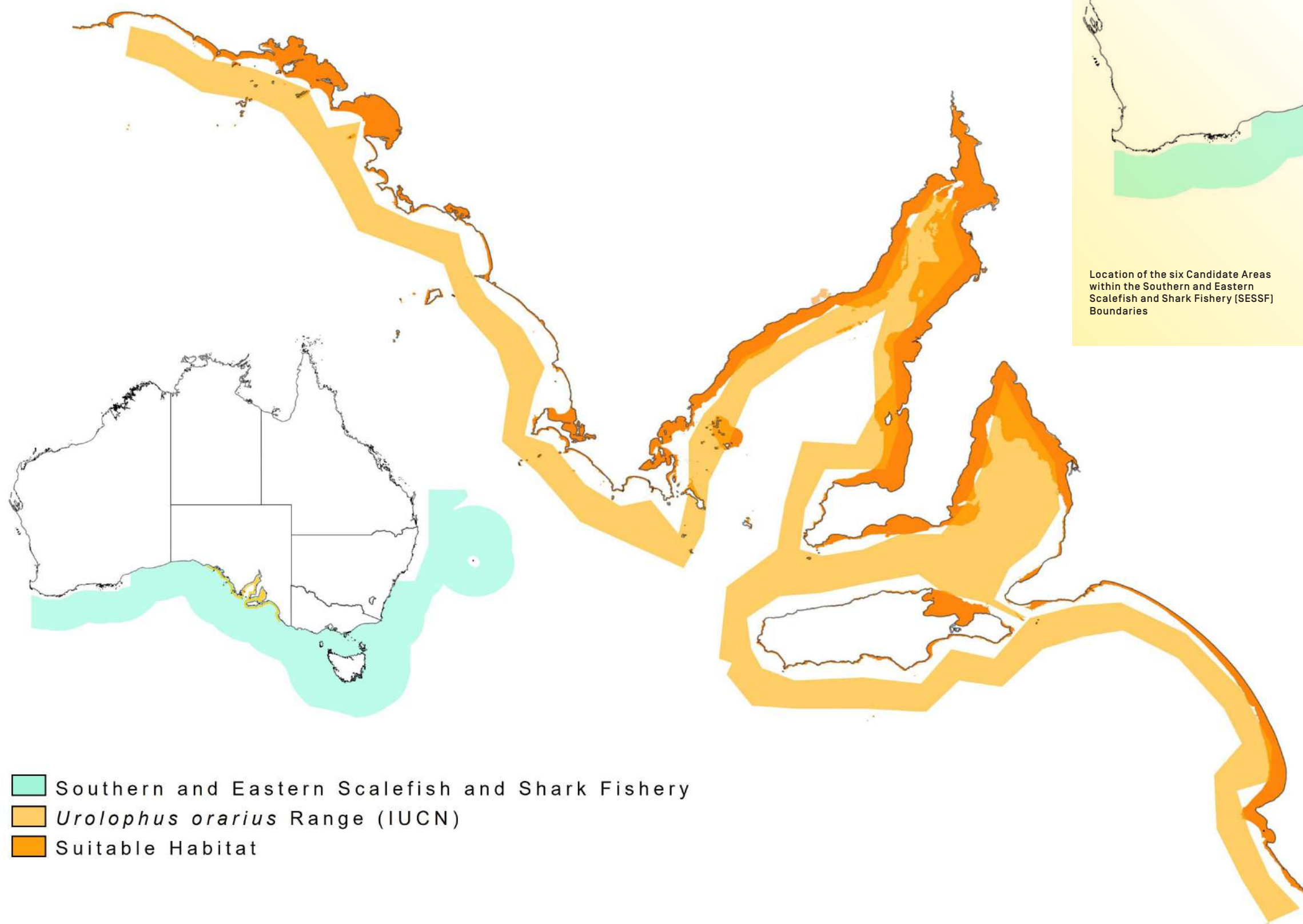
Improved conservation and management of the threatened endemics will occur in the near future. With further application of the criteria and identification of additional Candidate Areas, the conservation needs of the threatened endemic sharks and rays can be comprehensively met. Additionally, all ten endemics identified in the report are recommended for listing or prioritised for data collection under the Environment Protection and Biodiversity Act 1999 (EPBC Act), with five now updated to be awaiting assessment. Once listed on the EPBC Act, the species are legally protected in Australia, and their conservation and recovery are facilitated and promoted. With the report having been sent out to multiple jurisdictional and governing bodies of Australia, and through its collaboration with the Australian Marine Conservation Society and Humane Society International – Australia’s Shark Champions initiative (sharkchampions.org.au), the protection and safeguarding of Australia’s threatened endemics will be achieved.

Acknowledgements
We thank the Commonwealth Scientific and Industrial Research Organisation (CSIRO) for providing tracking data and the Australian Fisheries Management Authority (AFMA) for providing the fisheries data used in the report. We thank the Australian Marine Conservation Society, Humane Society International – Australia, and the Shark Conservation Fund for their generosity in funding the report.

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Daley R.K, and Hyde C.A. 2023. Fishery and spatial management solutions to inform the protection and recovery of Australia’s threatened endemic elasmobranchs. Australian Marine Conservation Society. Brisbane, Australia. 2023.



Range and extent of suitable habitat for Melbourne Skate (*Spiniraja whitleyi*)



All sawfish now Critically
Endangered but sustained
conservation efforts can
lead to recovery



Region
Update:
Oceania





In November 2021, the IUCN Species Survival Commission Shark Specialist Group held a series of online workshops to reassess the Red List status of the five sawfish species (family Pristidae). This process concluded in December 2023 with the publication of the final assessment, for the Narrow Sawfish *Anoxypristis cuspidata*. This new update on sawfish species has been published in the journal *Oryx*.

Source:

Harry A.V., Carlson J.K., Espinoza M., Grant, M.I., Haque, A.B., Jabado, R.W. and Rigby, C.L. All sawfish now Critically Endangered but sustained conservation efforts can lead to recovery. *Oryx*. 2024;58(2):146-146. doi:10.1017/S0030605323001692

Largetooth Sawfish
[*Pristis pristis*]

Community Illustrative Posters of Guatemala

Written by Elisa Areano
Fundación Mundo Azul

Fundación Mundo Azul is a non-profit organization based in Guatemala, whose mission is to contribute to the sustainability of marine and coastal resources and artisanal fisheries in Guatemala, the eastern Pacific, and Mesoamerica through the generation of relevant knowledge, policy and advocacy and improving the quality of life of coastal communities. The organization has been monitoring, jointly with trained community fishers, shark, ray, and chimaera landings in Guatemala's waters within the Atlantic Ocean since 2014 and the Pacific Ocean since 2017.

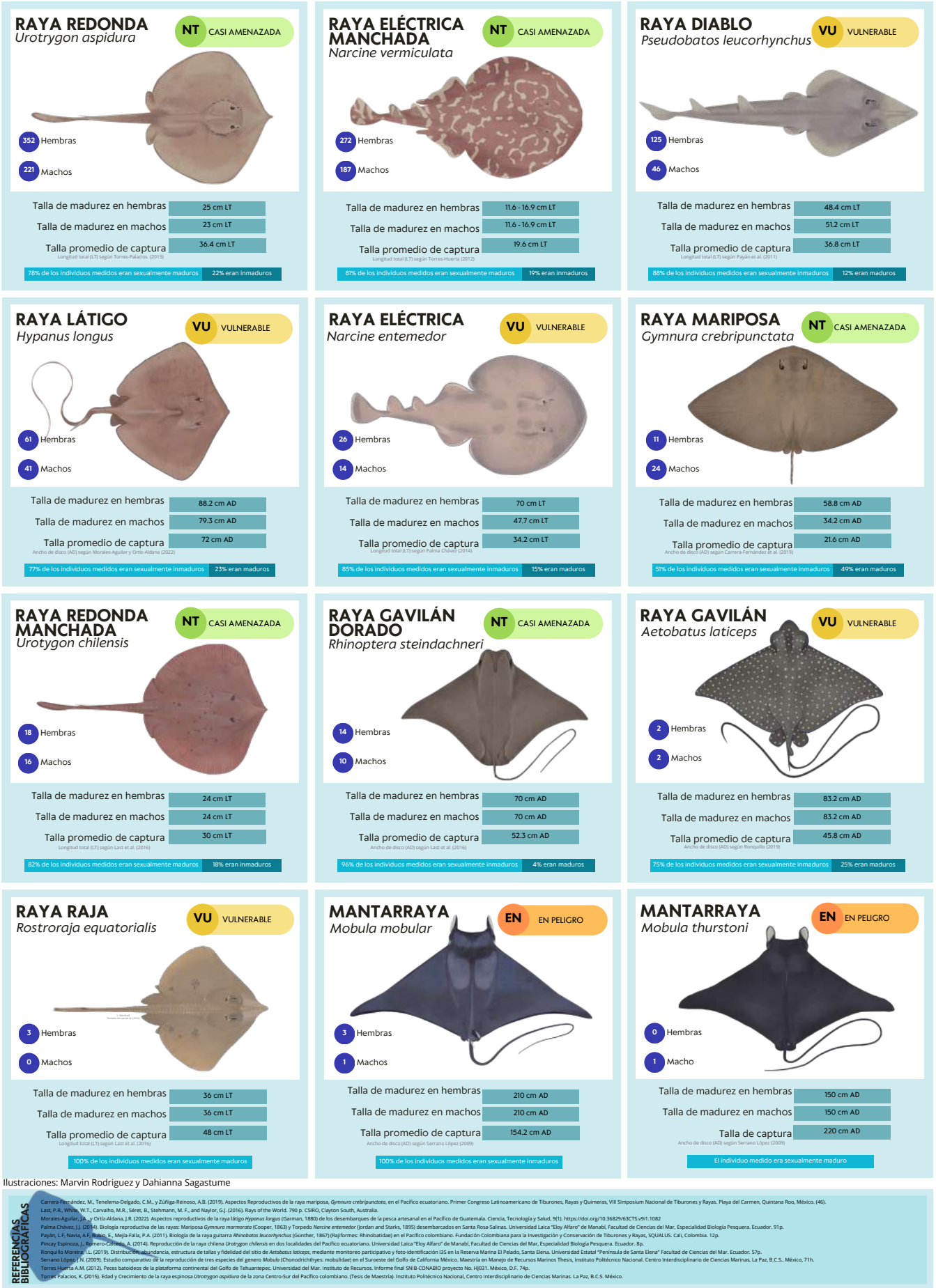
Our joint work with fishers relies on our built trust and has allowed us to collect information on species abundance and diversity captured during landings monitoring from Guatemala.

To share our collaborative results with the five communities where we work, we annually make an illustrative poster per community to show the results of their efforts. The intention is that, through the posters, they can see the most captured species, their sex, and their sexual maturity. This raises awareness among fishers regarding their target fisheries and the implications this may have on their livelihoods. These campaigns have targeted the communities of Las Lisas, El Quetzalito, Buena Vista, Sipacate, and Santa María del Mar.

This work is possible thanks to the financing of the United States (US) Fish and Wildlife Services, the Luis von Ahn Foundation, and the Shark Conservation Fund.



RAYAS Y MANTARRAYAS REPORTADAS EN Las Lisas 2023





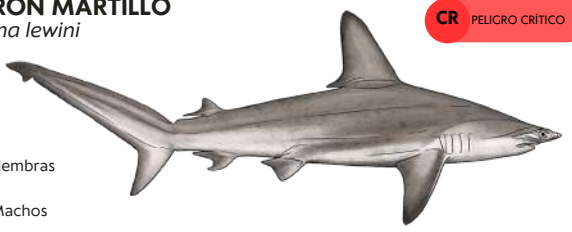
TIBURONES REPORTADOS EN Las Lisas 2023

TIBURÓN MARTILLO
Sphyrna lewini

191 Hembras

146 Machos

CR PELIGRO CRÍTICO



Talla de madurez en hembras190 cm LT

Talla de madurez en machos170 cm LT

Talla promedio de captura55.5 cm LT

Longitud total (LT) según Anislado y Robinson-Mendoza (2001)

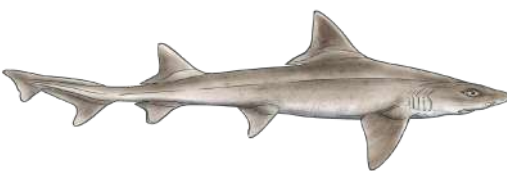
100% de los individuos medidos eran sexualmente inmaduros

TIBURÓN MAMÓN
Mustelus lunulatus

2 Hembras

2 Machos

LC PREOCUPACIÓN MENOR



Talla de madurez en hembras80 cm LT

Talla de madurez en machos82 cm LT

Talla promedio de captura73.2 cm LT

Longitud total (LT) según García-Vázquez (2018)

100% de los individuos medidos eran sexualmente inmaduros

TIBURÓN PUNTA DE ZAPATO
Rhizoprionodon longurio

3 Hembras

1 Macho

VU VULNERABLE



Talla de madurez en hembras80 cm LT

Talla de madurez en machos82 cm LT

Talla promedio de captura59.8 cm LT

Longitud total (LT) según Mejía-Salazar (2007)

100% de los individuos medidos eran sexualmente inmaduros

TIBURÓN PUNTAS NEGRAS
Carcharhinus limbatus

2 Hembras

0 Machos

VU VULNERABLE



Talla de madurez en hembras120 cm LT

Talla de madurez en machos135 cm LT

Talla promedio de captura71.2 cm LT

Longitud total (LT) según Ebert et al. (2021)

100% de los individuos medidos eran sexualmente inmaduros

TIBURÓN PUNTA
Nasolamia velox

1 Hembra

0 Machos

EN EN PELIGRO



Talla de madurez en hembras135 cm LT

Talla de madurez en machos125 cm LT

Talla de captura67.2 cm LT

Longitud total (LT) según Ruiz-Alvarado (2000)

El individuo medido era sexualmente inmaduro

Ilustraciones: Marvin Rodríguez y Dahianna Sagastume

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TIBURONES REPORTADOS EN Buena Vista 2023

TIBURÓN MARTILLO
Sphyrna lewini

545 Hembras

467 Machos

CR PELIGRO CRÍTICO



Talla de madurez en hembras190 cm LT

Talla de madurez en machos170 cm LT

Talla promedio de captura59 cm LT

Longitud total (LT) según Anislado y Robinson-Mendoza (2001)

100% de los individuos medidos eran sexualmente inmaduros

TIBURÓN PUNTAS NEGRAS
Carcharhinus limbatus

30 Hembras

49 Machos

VU VULNERABLE



Talla de madurez en hembras120 cm LT

Talla de madurez en machos135 cm LT

Talla promedio de captura67.8 cm LT

Longitud total (LT) según Ebert et al. (2021)

99% de los individuos medidos eran sexualmente inmaduros
1% era maduro

TIBURÓN SEDOSO
Carcharhinus falciformis

18 Hembras

23 Machos

VU VULNERABLE



Talla de madurez en hembras190 cm LT

Talla de madurez en machos180 cm LT

Talla promedio de captura91 cm LT

Longitud total (LT) según Galván-Tirado et al. (2015)

100% de los individuos medidos eran sexualmente inmaduros

TIBURÓN PUNTA
Nasolamia velox

1 Hembra

3 Machos

EN EN PELIGRO



Talla de madurez en hembras135 cm LT

Talla de madurez en machos125 cm LT

Talla promedio de captura65.5 cm LT

Longitud total (LT) según Ruiz-Alvarado (2000)

100% de los individuos medidos eran sexualmente inmaduros

TIBURÓN TORO
Carcharhinus leucas

0 Hembras

1 Macho

VU VULNERABLE



Talla de madurez en hembras257 cm LT

Talla de madurez en machos234 cm LT

Talla de captura88 cm LT

Longitud total (LT) según Pirog et al. (2019)

El individuo medido era sexualmente inmaduro

Ilustraciones: Marvin Rodríguez y Dahianna Sagastume

REFERENCIAS BIBLIOGRÁFICAS

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El individuo medido era sexualmente maduro.

Shark Cartoons in Sri Lanka

Illustrations by: Zev Landes

The Parrotfish Collective (www.instagram.com/parrotfishcollective/)

Written by: Daniel Fernando

Blue Resources Trust

IUCN SSC Shark Specialist Group | Indian Ocean region | Regional Vice Chair

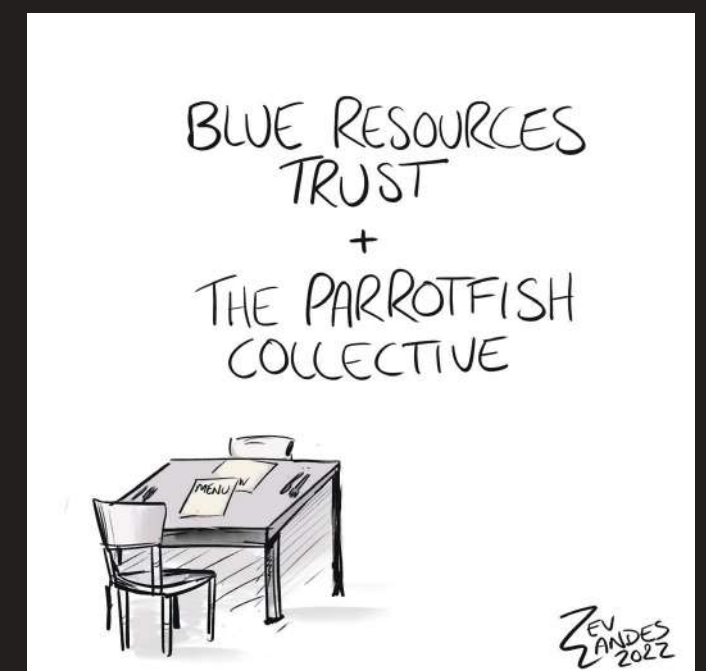
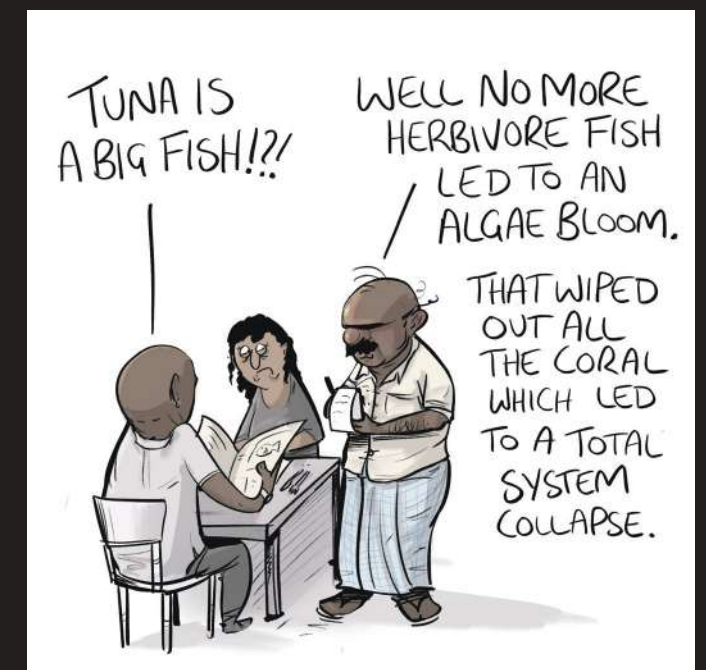
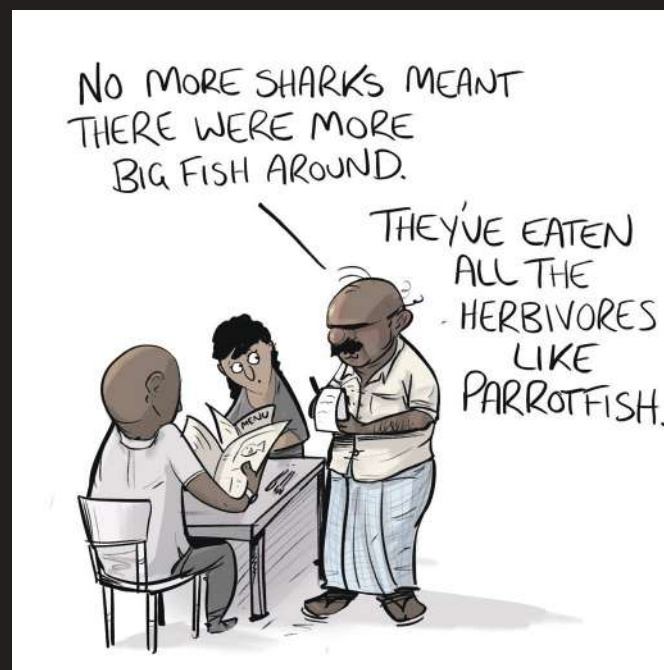
Zoom out, and you realise that not just a “few” sharks and rays are being fished. In fact, this happens every morning, off several thousand fishing boats across several landing sites in each country worldwide.

We have ~50,000 fishing vessels in Sri Lanka and over 900 landing sites. While our fishery is officially classified as “small-scale” artisanal, considering the number and range across the Indian Ocean, it is far more reasonable to term them as “large-scale” artisanal fisheries with consequences similar to industrial fisheries. Sri Lanka’s fishing fleet is one of the largest operating fleets in the Indian Ocean. Further compounded by the effects of high-impact fisheries from other Indian Ocean nations, there is little doubt that overfishing is the primary reason for declines in shark and ray populations in this region. The techniques used (gillnets and longlines) enable the capture of sharks and rays, either intentionally or unintentionally.

This is an issue because sharks and rays have extremely slow life cycles – they live long, mature late, and birth few offspring. Their life cycles are more akin to leopards, dolphins, and elephants than most fish. Yet, they do not have the same level of protection. It is disheartening to see that only five of the 105 species of sharks and rays in Sri Lankan waters receive legal protection. It is time to give these species the protection they deserve and transition to a sustainable fishery that doesn’t overfish them from our oceans, given their important roles within the marine ecosystem.

The global IUCN Red List of Threatened Species categorised over a third of all sharks and rays (~1,250 species) as threatened with extinction. Three species are even categorised as Critically Endangered ‘Possibly Extinct’, which means they are likely extinct, but additional confirmation is still necessary. If Extinct, they would be the first global marine fishing extinctions caused by overfishing. Data from Blue Resources Trust shows that of the ~105 species of sharks and rays, and even one chimaera (ghost shark), confirmed in Sri Lanka, over 65% are threatened.

While we make full use of sharks and rays that are landed (meat is consumed fresh or dried, fins, skins, and oil and cartilage are exported), we cannot justify the unsustainable exploitation. We need stringent management that includes full protection of vulnerable species, reductions in catches of other species by reducing our fishing effort and changing our methods to sustainable ones.



This will require very difficult and unpopular decisions. But, if we do not control fisheries now, we are looking at a future without sharks and rays, which in turn would have more significant consequences across marine ecosystems. The loss of such species would impact many of our coastal communities' livelihoods and national food security.

Sawfishes are probably among the most unique and bizarre marine animals to exist. Did you know that they are actually a type of ray? They can grow up to ~7 m in length. But what truly sets them apart is their distinctive “saw”, also known as a rostrum, on their head!

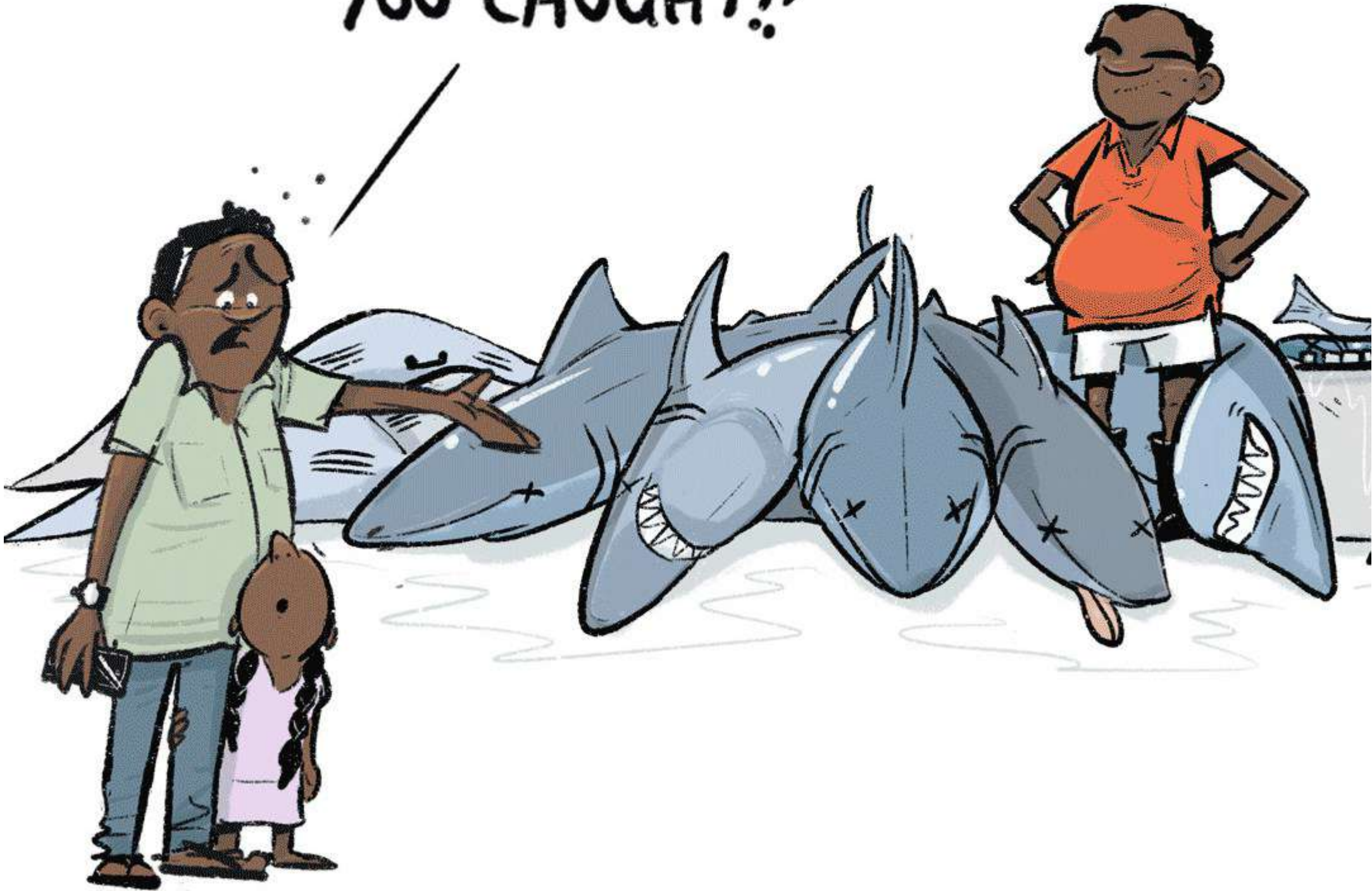
Much like one would expect, their rostrum is used for hunting in a back-and-forth swiping motion. This allows them to either cut prey or dig through sediment. Unfortunately, this very saw makes them extremely prone to entanglement in almost any type of fishing gear.

Sawfishes are among the most threatened marine animals in the world. While they used to occur in Sri Lanka until the early 1990s frequently, their populations have since collapsed and are now likely locally extinct. These declines are attributed to overfishing, compounded by the development of the aquaculture industry that accelerated coastal habitat degradation. All that remains of our sawfishes are their rostra, often discovered in church collections, where, ironically, they were donated by fishers for good luck.

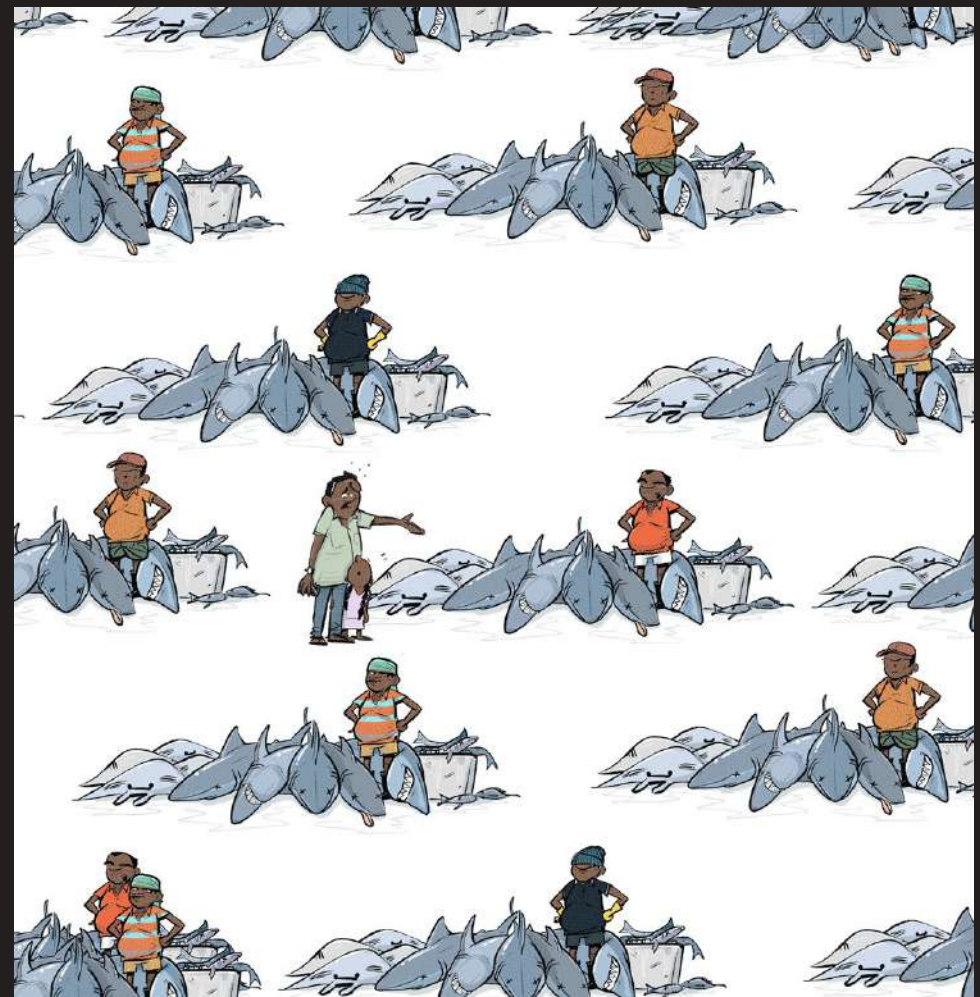
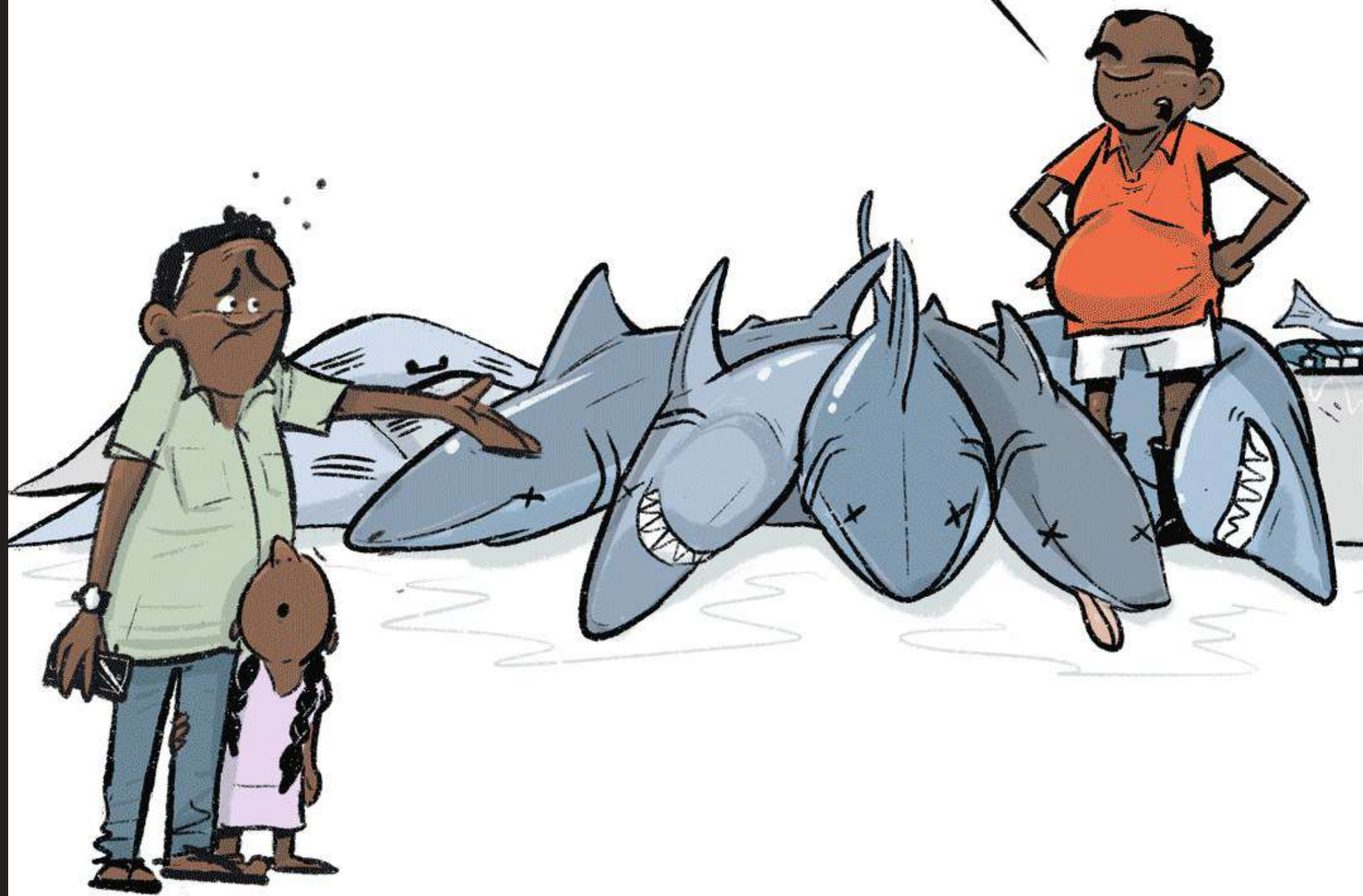
In some parts of the world, there is a ray of hope! Stringent protection of sawfishes and their associated habitats in the United States [US] and Australia are good examples of how effective management can halt population decline and enable recovery. However, these species have not received any protection in Sri Lanka. Their close relatives, the guitarfish and wedgefish, are now following similar alarming trends. Immediate action to protect them could prevent us from repeating the same tragic mistake

We hope that sawfishes will not just serve as a morbid reminder of what the future holds if we do not take action but become a symbol for action to protect better our other sharks and rays facing a similar fate!

THIS IS HORRIBLE!
LOOK AT ALL THESE
SHARKS AND RAYS
YOU CAUGHT!!



DON'T WORRY
I'M JUST A SMALL
SCALE FISHER.



Sharks, rays and chimaeras of Namibia – An identification guide

Written by Ruth H. Leeney

IUCN SSC Shark Specialist Group | Africa | Member
NaRaS - Namibia's Rays and Sharks
Namibia Nature Foundation

The first-ever identification guide to Namibia's chondrichthyans (sharks, rays, and chimaeras) was published in February 2024. As a key output of Namibia's Rays and Sharks (NaRaS) project, the guide provides individual descriptions of 88 species known to inhabit Namibian waters, from the shallow coastal zone to the deep sea. Previously published guides, which included sharks, rays, and chimaeras, have covered all marine resources' in Namibian waters or 'southern Africa', a large region encompassing two significantly different current systems and assemblages of species. This guide is based on an up-to-date species list, compiled using historical research records from Namibian waters and records from recreational anglers, and includes records of three species that have been documented for the first time in Namibian waters during research conducted by the NaRaS team.

Sharks, rays, and chimaeras have, until recently, been paid very little attention in Namibia, and as such, baseline data on these species are scarce. Some sharks and skates are fished commercially in Namibian waters, but no species-specific data on catch rates are available. Our research over the past two years has revealed that many other species are incidentally caught as bycatch (incidental catch of non-target species) in several industrial fisheries. The fishing industry is one of Namibia's main employers and is an important contributor to the country's economy. More research and monitoring of shark, ray, and chimaera populations in Namibian waters is essential to support these species' sustainable use and sustain the health and function of marine ecosystems.

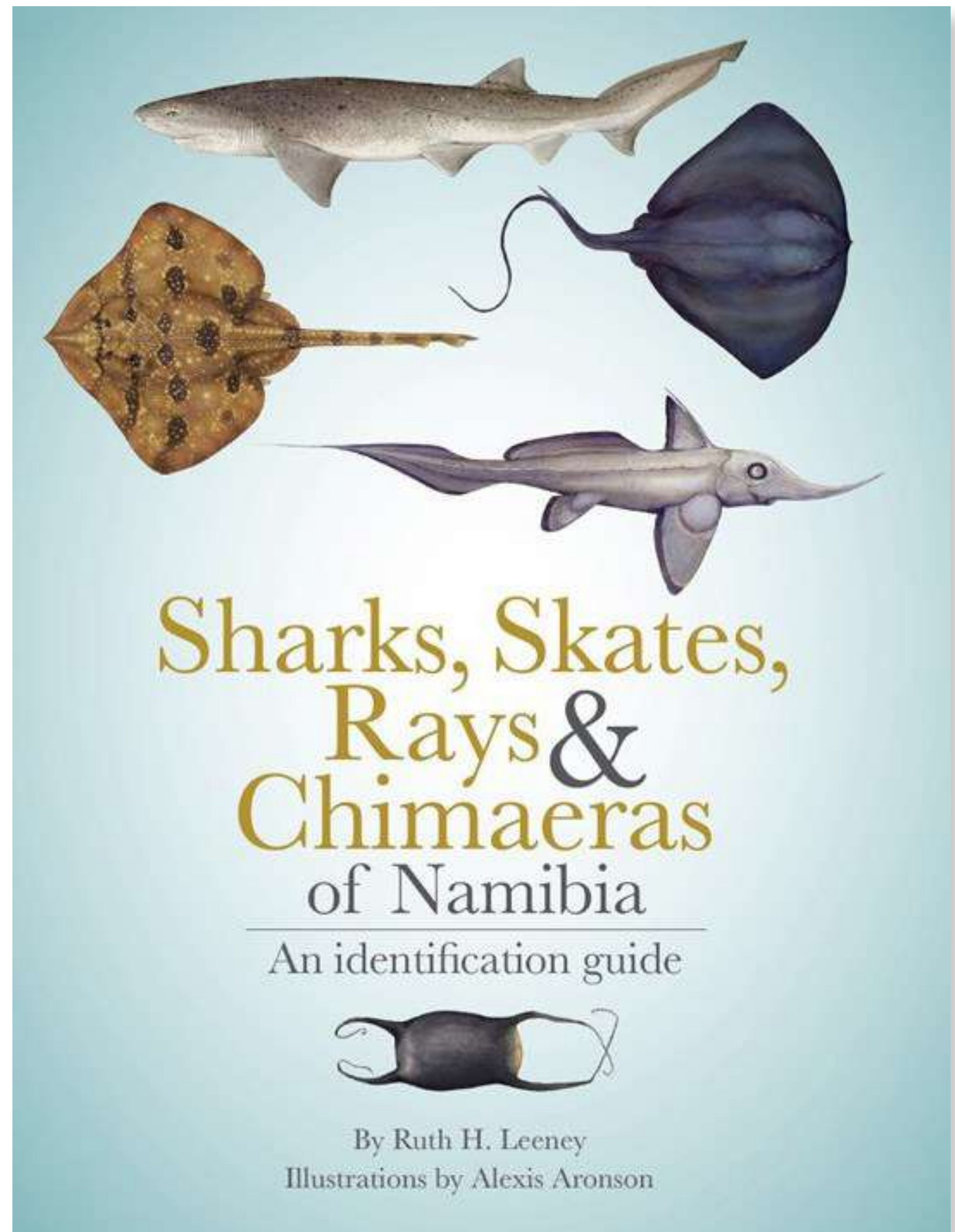
This guide provides basic information on each species, including a morphological description, maximum size, global distribution,

preferred habitat and IUCN Red List of Threatened Species status. For species that produce egg cases, we also included an illustration and description of the egg case. This work revealed the paucity of knowledge on many deepwater shark, skate and chimaera species, and in many cases, no published description or images of their egg cases were available. I hope this guide will highlight the many knowledge gaps in this region and encourage the next generation of researchers to address them.

This guide is intended for a wide readership, including any member of the public interested in learning more about Namibia's sharks, rays, and chimaeras. However, one of the primary drivers for producing this guide was to support researchers and students of marine life locally in research activities focusing on this species group. The purpose of this guide is, therefore, twofold. For the general public, I hope that this guide will raise awareness, increase their fascination for sharks and their relatives, and deepen understanding amongst Namibians of the incredible diversity of life found just beyond the coastline. For Namibia's scientific community, including researchers, fisheries observers, and biology and fisheries science students, this guide will be an invaluable reference for identifying animals caught as bycatch in commercial fisheries and specimens captured or recorded during scientific surveys. I hope this resource will support students, researchers, and managers to conduct high-quality research on sharks, rays, and chimaeras in Namibian waters and that the resulting information contributes to management and conservation actions that ensure a healthy, productive ocean for all Namibians.

An electronic guide version is available for free from the author's ResearchGate page.

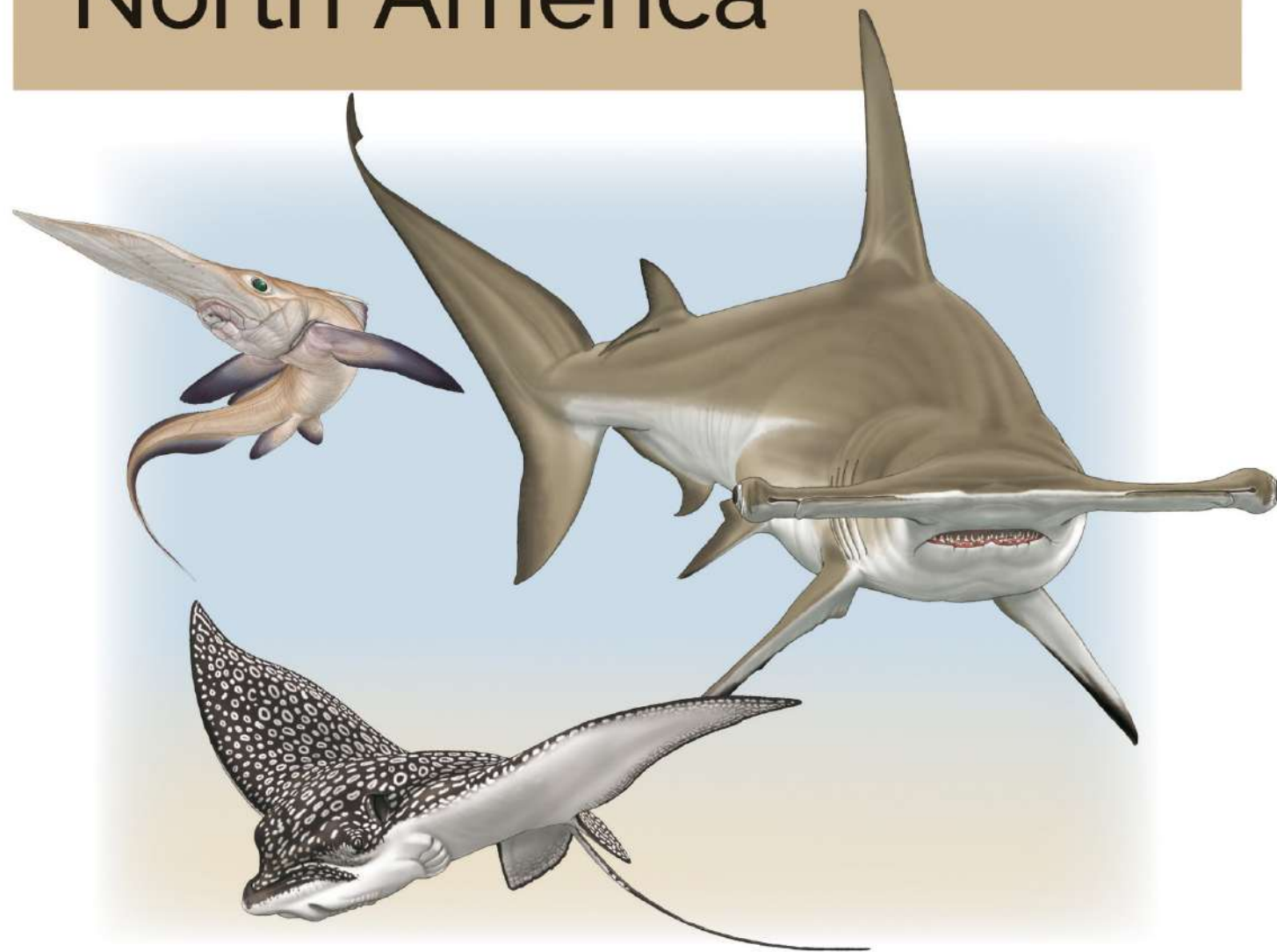
Follow *Namibia's Rays and Sharks* on Facebook or @namibia_sharks on Instagram for updates on the other research activities and outputs of the NaRaS project.



FIELD GUIDE TO

SHARKS, RAYS & CHIMAERAS

of the East Coast of
North America



David A. Ebert and Marc Dando

Field Guide to the Sharks, Rays and Chimaeras of the East Coast of North America

Written by David A. Ebert

IUCN SSC Shark Specialist Group (SSG) | North America
Regional Group | Member
Pacific Shark Research Center | Director
South African Institute for Aquatic Biodiversity | Honorary
Marine Fishes Curator, Chondrichthyes
Moss Landing Marine Laboratories | Research Faculty

and Marc Dando

Wild Nature Press

The waters off the East Coast of North America are home to an amazing variety of sharks, rays, and chimaeras. This groundbreaking field guide is the first of its kind dedicated to all 173 species of sharks, rays, and chimaeras found along the eastern seaboard of the United States and Canada, including Bermuda and the Bahamas, and extending throughout the Gulf of Mexico to the Yucatan Peninsula of Mexico. These species are variably distributed from shallow coastal waters, estuaries, and the open ocean out to depths of approximately 200 m along the continental shelf and hundreds to thousands of meters down the continental slope where many extraordinary and unusual-looking deepsea species occur. While some species found in these waters have a global distribution, others are endemic to the region. Many are well known, often with a long history associated with fisheries, whereas other species have only recently been documented in the region, including some new to science.

The field guide includes 173 species (92 sharks, 72 rays, and nine chimaeras). It is lavishly illustrated throughout, featuring hundreds of colour illustrations and photos, and describes key features, dentition, colour patterns, habitat, biology, and conservation status. This also includes depth guides, at-a-glance icons, distribution maps, illustrated key guides, species comparisons, and dentition

plates. It also features illustrated key guides that enable users to identify species accurately and comparison plates of similar species. This is the definitive guide to eastern North America's sharks, rays, and chimaeras.

Given the enormous North American continental landmass between the Atlantic and Pacific Oceans and the geographic distinction of the two faunas, it was decided that separate books were in order. Therefore, a companion volume – Sharks, Rays, and Chimaeras of the West Coast of North America and Hawaii – will be published separately at a later date.

We hope this field guide will encourage and inspire more people to take an interest in this fascinating group of fishes, whether as a casual observer or more actively through research, education, fisheries management, or conservation.

Funding Opportunities



Asian Species Action Partnership
Conserving species on the brink

ASAP Species Rapid Action Fund
🔗 speciesonthebrink.org/asap-grants/rapid-action-fund/

Status: Open

During a conservation project, conservation emergencies or a need for unforeseen activities may arise. In such cases, time is of the essence. Fast action can make all the difference to a species' chance of survival. That is why ASAP is offering grants of up to SGD 13,500 to ASAP Partners for urgent and emergency conservation of ASAP species. The fund will provide rapid disbursement of small amounts of funds to address urgent requests from the field for conservation actions. Grants can be used in the following ways:

- To address unforeseen conservation emergencies where urgent action is needed; and
- For the seamless continuation of important current conservation actions. Proposals to support the on-going costs of a long-term conservation project are not eligible except where there is an unforeseen funding gap, and where the seamless continuation of activities is imperative for the ongoing or long-term conservation of the ASAP species in question. They invite ASAP Partners to submit proposals to the ASAP Species Rapid Action Fund. Proposals will be reviewed on a rolling basis throughout the year; they can be submitted at any time.

ASAP Species Conservation Grant
🔗 speciesonthebrink.org/asap-grants/asap-species-conservation-grants-2023/

Status: Open

ASAP Species are some of the most at risk of extinction on the planet. The ASAP Species Conservation Grant is designed to support ASAP Partners in their efforts to conserve ASAP Species and their habitats. To be considered for an ASAP Species Conservation Grant, an organisation must be an existing ASAP Partner. ASAP Partners are invited to submit pre-proposals for a maximum of SGD 16,000. The duration of the ASAP-funded project or project component should be 12 months or less. The priorities for ASAP Species Conservation Grants are:

- projects within Southeast Asia, but priority conservation actions for ASAP species outside this region will be considered where there is strong justification.
- projects submitted by national organisations and those where the Project Lead is from the country in which the conservation actions take place.
- ASAP Species that are receiving less conservation attention globally than is average for ASAP Species, and to applications making a clear case that the species in question is severely under-supported globally.

Please note that funding for this opportunity is limited and the grant will close once funding is allocated.

ASAP Species Continuation Grant
🔗 speciesonthebrink.org/asap-grants/asap-species-continuation-grants-2023/

Status: Open

The ASAP Species Continuation Grant is open to ASAP Partners who have previously received funding from either the ASAP Species Conservation Grant or the ASAP Species Rapid Action Fund. There are two components to the ASAP Species Continuation Grant: funding to enable follow-up conservation activities for ASAP Species and funding to address the organisational needs or priorities of ASAP Partners. Applications must address both components. Proposals should be submitted in Singapore Dollars for a maximum of SGD 30,000 a year, with activities relating to project implementation and organisational development included in each year of the grant. Up to SGD 20,000 a year can be for project activities, with up to SGD 10,000 a year to support organisational development. Proposals can be for a maximum of three years.

ASAP Partner Networking Grant
🔗 speciesonthebrink.org/asap-grants/asap-partner-networking-grant-2023/

Status: Open

The ASAP Partner Networking Grant is designed to facilitate collaboration and networking between ASAP Partners to catalyse conservation action for ASAP Species. To be eligible:

- All applicants must be ASAP Partner organisations.
- The application must detail how the collaboration will further the conservation of ASAP Species. This can be for a single or multiple ASAP Species.

Proposals should be submitted in Singapore Dollars for a maximum of SGD 13,500. The duration of the ASAP-funded activities should be 6 months or less.

Funding Opportunities



Quick Response Fund for Nature



RAINFOREST TRUST

Preventing Extinction Fund: Protected Area Conservation Action Grants
🔗 quickresponsefund.org/preventing-extinction-fund/

Status: Open

The Quick Response Fund for Nature and Rainforest Trust jointly launched The Preventing Extinction Fund, to protect habitat for the world's most threatened species. Priority will be given to "Rare Species Sites" as defined on the Global Safety Net. The Protected Area Conservation Action Grants will support actions that establish or expand protected areas during the timeframe of the grant. Projects will help improve the status of threatened animal species and their habitats. Two levels of funding are available:

1. Rapid Response Awards (funds up to \$50,000): 100% of funding must go directly towards establishment or expansion of protected areas.
2. Extended Awards (funds \$100,000 to over \$1,000,000): funding is available for protected area creation and management costs.

Preventing Extinction Fund: Species Planning Grants
🔗 quickresponsefund.org/preventing-extinction-fund/

Status: Open

Applications endorsed by IUCN Species Survival Commission (SSC) or World Commission on Protected Areas (WCPA) Specialist/Working Groups or Task Forces will be viewed favorably as will applications with a clear linkages to other IUCN Commissions and the KBA Secretariat. The Species Planning Grants, of up to USD 10,000, will be provided to IUCN Specialist Groups, KBA regional focal points or local Civil Society Organizations to support the identification and assessment of priority sites for protected area establishment. These grants are intended to provide groups with the opportunity to identify key sites and begin the process of protection. protection.

Upcoming Meetings

Please visit the respective websites and communication from the host organisation for more information



Seventh (7th) International Marine Conservation Congress (IMCC)
October 13–18, 2024
Cape Town, South Africa
icriforum.org/events/imcc7-2024/

The 7th International Marine Conservation Congress (IMCC7) will be held from 13-18 October 2024, in Cape Town, South Africa. The meeting is the Society for Conservation Biology Marine Program's main event in the calendar and is held every two years. The overall theme of IMCCs is Making Marine Science Matter. For marine conservation to be effective, marine conservation science must matter to stakeholders, policy makers, and practitioners. IMCC seeks to engage everyone involved in marine conservation to share ideas and promote action for the long-term health of our oceans! Below you can find a brief list of just some of the topics that might be covered at the conference, its breadth highlights the wide range of interests of our delegates!



European Elasmobranch Association [EEA] Conference
October 22–24, 2024
Thessaloniki, Greece
isea.com.gr/european-elasmobranch-association-conference-2024

This year's annual European Elasmobranch Association Conference will be held in Thessaloniki, Greece, from 22nd to 24th of October, by the Environmental Organisation iSea, with the aim to bring together the scientific community and other stakeholders working with sharks, rays and chimaeras around Europe and the Mediterranean. The EEA 2024 Conference topic is "Stronger collaboration for better conservation" focusing to bring together not only an increased number of experienced scientists and other stakeholders from different fields of shark and ray research and conservation, but also give an advanced role to younger researchers that will have the opportunity to better meet the EEA community and the most recent results of their work. This year's aim is also focused on increasing the participation and the scientific input from data-poor areas and countries that are not highly represented within the EEA community and thus researchers from the Balkans, Eastern Europe, North Africa and the Middle East will be invited and encouraged to participate. EEA 2024 and its overall content; panels, workshops and keynote speakers, were built on the common values of diversity, equity and community, that EEA members share. Find more details on the important dates, locations and agenda here : isea.com.gr/european-elasmobranch-association-conference-2024



Australian Society for Fish Biology [ASFB] Conference
November 18–24, 2024
Newcastle NSW, Australia
asfbconference.org.au

This year's theme, 'Fish Frontiers' will feature the suite of contemporary research and management talks ASFB is renowned for, however this year there will be a focus on the future, including:

- Digital tech, sensing, A.I. and data-analytics.
- Impacts and adaptations to a changing climate.
- Genetic and molecular advances – from aquaculture to eDNA.
- Recreational, commercial, and cultural fisheries management.
- Biosecurity risks and solutions to protect and enhance fisheries.
- Advancements in habitat restoration and management

Their hope is to bridge tradition and innovation as we continue our collective exploration of new discoveries, ideas, visions, and best practices. Together, we can chart a course for a more sustainable future for fish and people!



IUCN
World Conservation Congress
October 9–15, 2025
Abu Dhabi, United Arab Emirates

"Held every four years, the IUCN Congress is the world's largest conservation event. It brings together leaders from government, civil society, Indigenous peoples' organisations, business and academia to determine the world's most pressing environmental and development challenges, and actions to address them. The IUCN Congress will address ways to deliver the Global Biodiversity Framework, adopted by over 190 countries last December. The Framework comprises targets to scale up the conservation of ecosystems, species and genetic diversity." For further details it can be found online here (www.iucn.org/press-release/202306/united-arab-emirates-host-iucn-world-conservation-congress-2025)

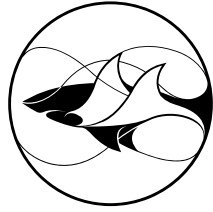


IUCN SSG Sponsors & Supporters



The IUCN SSC Shark Specialist Group is fiscally sponsored by Re:wild, a 501(c)(3) non-profit organization with headquarters in Austin, TX, USA (tax ID: 26-2887967).

The IUCN SSC Shark Specialist Group achievements over the last 30 years have been possible due to the generous support of funders, members, and other volunteers from countless organizations. Our members volunteer their time, effort and expertise to advance our mission and vision. We would like to express our most sincere gratitude for the generous grants, collaborations, and support to our group, our teams, our projects, and our efforts. We appreciate the support that has been provided over the years and look forward to continuing our journey and endeavors together into the future.



Shark Conservation Fund



Sharks and rays need you. Please donate and help us make a difference.

Sharks and rays are some of the most threatened species in the world, more so than land animals. Populations are declining at alarming rates and 37% of species are already threatened with extinction. With your support we can find solutions and take actions to conserve these incredible animals before it is too late.





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