

SHARK

Newsletter
of the IUCN Shark
Specialist Group [SSG]
#1/2021

NEWS

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.



Juvenile Lemon Sharks (*Negaprion brevirostris*) in Bimini, The Bahamas caught by the Bimini Biological Field Station (BBFS) during their long-term annual PIT program in 2019
Cover photos by Michael Scholl | Save Our Seas Foundation

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Editorial

A note
from the Chair

Dear readers,

Welcome to the first quarterly issue of Shark News of 2021, the official IUCN Species Survival Commission (SSC) Shark Specialist Group (SSG) newsletter!

🦈 My first interaction with the SSG was in 2010 in Galway, Ireland, where the European Elasmobranch Association (EEA) meeting took place. My PhD supervisor, Dr. Aaron Henderson, suggested that I attend the conference and present my preliminary results investigating the shark fisheries in the United Arab Emirates. Back then, few researchers were involved in shark science in the Arabian Peninsula, and I often felt very isolated when it came to interacting with researchers doing similar work. Little did I know that there was a huge community of scientists with similar stories and struggles working worldwide. A community of scientists, researchers, and policy makers zealously working together to conserve sharks, rays, and chimaeras through the SSG and beyond. 🦈 We are a growing community with over 240 members from 86 countries and territories but still a small one relative to groups worldwide that work on conserving other marine megafauna like sea turtles or cetaceans. But our group of volunteers has been incredibly productive, and so much has been accomplished in the last 30 years of the SSG. This year, I was honored to have been appointed as Chair of the SSG, and I am thrilled to have the opportunity to serve and lead this group into the next quadrennium and fourth decade. I am proud of what this community represents and excited to continue being part of it and work with so many passionate and committed individuals in the fields of research, conservation, and education. 🦈

This first issue of the newsletter focuses on acknowledging the work accomplished by previous leaders and members while introducing the new SSG team and structure. We also have a feature story on sawfishes showcasing what scientists are doing to conserve one of the last remaining populations off Florida in the United States. Despite the many twists and turns the global pandemic has thrown at us all, it is clear that there is still some incredible research and conservation work taking place around the world. We also take a closer look at some of the work members are doing across the Mediterranean Sea, Pakistan, Sri Lanka, and Russia. 🦈 Shark News was the official SSG newsletter from June 1994 to October 2004. It was a testament to Sarah Fowler's, one of the founding members of the SSG and former Chair, dedication and passion for sharks. We have decided to revive it to provide a forum for the exchange of information on all aspects of shark, ray, and chimaera conservation matters for SSG members and the general interested audience. This would not have been possible without Michael Scholl's support, who is now the Chair of the Communication Working Group, and I can't thank him enough for his efforts so far! 🦈 I hope that through this newsletter, we can showcase the incredible stories, successes, and projects that the SSG community is involved in.

I would like to see this newsletter grow, to be shaped by your stories. I hope that you will all contribute so future generations of scientists, conservationists, and educators worldwide can hear about the fantastic work you are doing and be inspired. **Rima**



Meet the SSG's new Chair: Rima Jabado

Rima brings a
passionate energy
and vision that will
lead the group for
the next 4 years.



By Chelsea Stein, contributor



"I like to be ambitious, so I have a lot of things that I would like to accomplish, and I'll only be able to do this because of the legacy of others before me and the dedication of our members, partners, donors, and really the whole shark community," said Dr. Rima Jabado, founder and lead scientist of The Elasmobranch Project and the IUCN Species Survival Commission Shark Specialist Group's (SSG) newest Chair.

Rima has spent over 17 years developing and working on conservation initiatives around the world. She has visited more than 80 countries – including the Bahamas, South Africa, U.S., Australia, and India – and is currently working to make a difference for elasmobranchs – a group of cartilaginous fish that includes sharks, rays, and chimaeras – in many others.

Rima's passion for sharks has been shown in over 45 scientific, technical, and popular publications, and in various local and international media outlets including National Geographic, BBC, and Scientific American. She published a book on marine ecosystems in the United Arab Emirates (UAE), an identification guide for sharks in the Arabian Seas Region, an IUCN report on the conservation status of sharks, rays, and chimaeras in the Arabian Sea and adjacent waters, and an identification guide to wedgefishes and giant guitarfishes.

In addition, she is a member of the IUCN Marine Conservation Committee, sits on the Advisory Committee for the Convention on Migratory Species Sharks MoU as a representative of the Asia region, and was recently appointed as Scientific Councilor (Fish) at the Convention on the Conservation of Migratory Species of Wild Animals.

Now, as she embarks on her four-year term as Chair of the SSG, she is bringing a passionate energy and vision to build upon what the group has accomplished in its 30-year history to date. She is looking forward to expanding the work of the SSG and creating a foundation for the group to continue making a difference for years to come.

"I would like to leave a legacy," she said. "What I want to have accomplished in these four years is to have a framework in place so that the SSG is clear on what needs to be done in terms of shark conservation, what the priorities are and how they should be accomplished."

From seeing a fish out of water to finding a passion

Growing up in Greece, Rima was always near the water and was obsessed with sharks from a young age. But as it turns out, her first encounter was seeing a fish out of water at a market.

"I knew of sharks because of Jaws as cliché as it sounds," she said. "I remember seeing just a head – and now, I know that it was a six-gill shark – but it was just a head on ice at the market and I thought, 'This looks nothing like Jaws!'"

She was hooked – from that day, Rima was interested in sharks and would read anything she could get her hands on to learn more. She knew that if she wanted to make a difference for them as a species, she had to understand policy.

"I didn't start my career as a shark scientist. I did my bachelor's in political science and earned a few graduate diplomas to understand more for what needs to be done in communication and messaging."

While earning her degree, Rima volunteered for various marine projects, including studying dolphins in the U.S. and great white sharks in South Africa, which led her to realize that applying hands-on work and science to help enact policy was her passion.

"When I finally decided to jump into the science of it, I tried to work at this interface where I was collecting data and doing research but at the same time making it accessible to decision-makers," she said. "Whatever information I was collecting was framed in a way that could support the key management measures that were needed in the specific countries where I was working."

Two degrees later – a Master of Applied Sciences in Natural Resource Management and a Ph.D. in Environmental Science and Ecology – Rima made waves to help sharks in the UAE, the fourth-largest exporter of shark fins in the world.

Here, she conducted the first long-term study of sharks and rays in the northwest Indian Ocean, helped to enact various legislations to protect shark species, facilitated a seasonal ban on the fishing of sharks during periods of high reproduction, and assisted in developing a national plan of action with the government.



Photo by Elasmobranch Project | elasmobranchproject.com



During her Ph.D., Rima founded The Elasmobranch Project in 2010, to dedicate efforts to understand shark and ray species, abundance and distribution in the Arabian Sea and adjacent waters, a largely understudied region of the world. Over the years, this mission has expanded to include 14 projects across 8 countries, working directly with fisheries stakeholders and governments to inform policy at regional, national, and international levels.

“The work we’ve done as partners, nonprofit organizations, donors, and governments in the last 10 years has been incredible – and it’s been such a team effort,” Rima said. “It’s really putting sharks on the agenda; it was needed for such a long time and it’s finally happening.”

Beyond translating her scientific work into real, actionable knowledge and materials for legislation, Rima deeply enjoys being able to work with the younger generation of scientists, hoping to inspire them to follow their passions too. Under her direction, The Elasmobranch Project’s initiatives are led by local students or early career scientists to ensure capacity building and knowledge transfer.

“It’s great being able to have students working in remote areas and finally answering questions about areas that no one has worked in or no one knows about,” she said. “I work with so many students who are excited about sharks, which makes me excited too, and I want to help get them started in this field because it’s not an easy field to work in. I just hope that I can get them to make it their future career too.”

Involvement with SSG and vision as Chair

In 2012, Rima was invited to be a member of the SSG and then asked to serve as the Regional Vice-Chair for the Indian Ocean group in 2017, coordinating 15-20 members across the region. In this role, she led the first regional assessment for sharks and rays, compiling data from the group’s members to find

that the region had the second-most threatened population of sharks and rays in the world.

“It was great to have that data to be able to go back to governments and say we need to do something now,” she said. “We have something that shows these species are at risk and I think it has made a big difference.”

Now, as Chair, Rima is eager to tap into the knowledge that has been compiled and collected by the SSG overall to build out a strong foundation for action going forward.

“Over the last four years, the previous chairs have largely focused on the Global Sharks Trends Project to reassess all sharks and rays by the end of 2021. This was an incredible project to accomplish and results will be published in the next year,” she said. “It will be great to know the status of species so that we can move into action. We can finally say what our priority species are, start conservation planning, and act on the various threats, challenges, and issues across the different regions.”

Rima’s first priority for the SSG includes communicating shark research and findings in a way that people can understand, regardless of expertise or background. She is hoping to do this by creating materials and tools that can be used across regions to inform the public and keep momentum going for the group.

“I’m looking forward to the group communicating about sharks in a way that makes sense to donors, policy makers and the public in general,” she said. “I also want to have tools developed so that anyone that comes into this field can take on a project and be able to do it in a way that informs policies and leads to changes.”

Secondly, she is hoping to increase awareness about the issues facing shark species today. While finning was considered the major threat to shark species 20 years ago, Rima says

today there are many other issues bubbling up that people must understand to protect sharks effectively.

“There’s been such an evolution in the challenges and the issues we have in shark conversation and we really need to focus on highlighting those problems,” she said. “We have problems with meat consumption, illegal fisheries, problems understanding why we even have issues – it’s such a complex thing to manage and we need to take so many different approaches to address it.”

Finally, Rima is working to restructure the SSG to form working groups to foster increased engagement and commitment from members. She acknowledged how the diversity of members’ skillsets and knowledge, along with the group’s regional approach, are strengths that she wants to lean into further.

“I’ve created a list of working groups based on a survey where members identified key issues. I want members to be able to contribute to solving the issues they are knowledgeable about but also to compliment the work they do day-to-day

so that it doesn’t take extra time. We are all volunteers after all.”

Some of the key working groups on the horizon include those focused on bycatch, livelihoods, communications, and partnerships with aquariums. Across all, Rima’s vision is for the working groups to consolidate information, identify lessons learned from projects thus far, and craft guidelines for working with partners or communities so that the SSG has a lasting impact.

“I want to work with everyone to put things in writing – outlining the key priorities for research, species and for conservation in each of the nine SSG regions,” she said. “It’s really about being able to lead the path for the future. So many early career scientists are finally coming into the shark world and so it’s about guiding them to take the reins as the future leaders of the SSG.”



Photo by Ester Serrao



The Co-Chairs' view of a decade of shark conservation

Written by:

Prof. Nicholas Dulvy

SSG Co-Chair 2009–2020

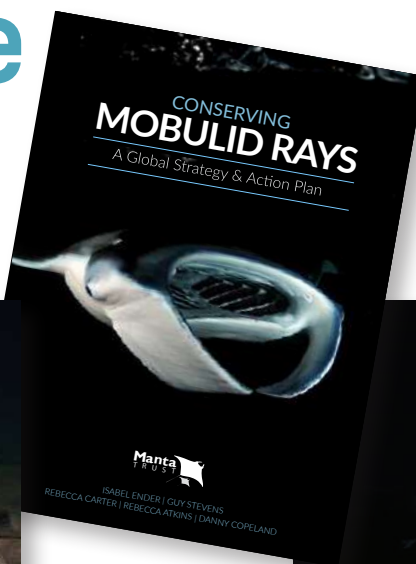
Simon Fraser University, Canada

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SSG Co-Chair 2013–2020

James Cook University, Australia

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After about a decade at the helm of the Shark Specialist Group (SSG) we thought it would be useful to reflect a bit on our journey. We have met many amazing people, been inspired by the work that our members do (be it research, on the ground conservation, policy work, communications, etc.) and tried to achieve as much as possible to promote awareness and solutions to the plight of sharks and rays. There have also been challenges, some related to the volunteer nature of the SSG, some to the availability of funding, some to the lack of knowledge on what is still a poorly understood group of species. Below is a bit of what we have learned along the way, and we hope that it might be useful to you and the SSG going forward.

As one of the three great lineages of fishes – the sharks, rays and ghost sharks (Class Chondrichthyes) – embody many assessment and conservation problems. For the past decade, it has been our pleasure to contemplate these paradoxes and to learn from the members of the SSG and the IUCN Species Survival Commission (SSC) on how to turn these challenges into conservation opportunities. Here we summarize some learnings and lessons along the Assess, Plan, Act journey of the SSG.

ASSESS | The first twenty years were a very heavy lift for the first co-chairs, whose successes included building a membership drawn from all over the world, producing a global status report, and a comprehensive global Red List Assessment of all 1,000 or so known species. The Red Listing was done but beyond the assessors and report writers, few knew of the status of sharks.

After a few false dawns the summary paper was eventually accepted in the new journal *eLife* (elifesciences.org/articles/00590). Then the hard work really began – we spent three solid weeks developing a communications strategy for this work, with an IUCN press release, a newswire release, our institutional press releases, infographics, YouTube videos, and factsheets. This combination of strong science well communi-

cated worked and has been a template of our science communication successes over the past decade. Our training taught us that trustworthy science advice is founded upon published science. Hence, we didn't unleash communications unless there is an underlying science product. Fortunately, in six years this paper has been viewed 32,000 times, downloaded nearly 4,000 times and cited nearly 800 times and now many people know that at least a quarter of sharks and rays are threatened. We have just completed the first reassessment and are working on the calculation of a Red List Index for 1970–2020 and we hope to provide a fuller summary of this capstone project in a later newsletter.

PLAN | This *eLife* paper laid the foundation for our work program for the decade. We identified which families were most likely to disappear entirely. The most at-risk families were dominated not by sharks as many had believed, but instead were mainly what we branded as #flatsharks -- the rays and dorsoventrally flattened angel sharks. Once we understood the status of all species, and especially the taxonomic and spatial priorities, we had the scientific basis for setting priorities and planning for conservation. The highest ranked families included sawfishes, wedgefishes, giant guitarfishes and angel sharks and these became the focus of much of our conservation planning work.

We toyed with the idea of starting conservation planning for sawfishes. Few scientists knew anything about them, apart from Co-Chair Colin Simpfendorfer and Deputy Chair Sonja Fordham and the few others who sat on the US Sawfish Recovery team. But the case was made that if we can't make the argument to conserve sawfishes based on their Endangered and Critically Endangered status then it would be hard to make it for any other taxa. We scrutinised the recently published *Strategic Planning for Species Conservation: A Handbook* and many SSC

action plans and felt overwhelmed by the granularity. Many terrestrial plans focused on a single species in a single country, yet we had five species spread across 90 tropical countries and only 59 peer-reviewed papers published on these species. Nevertheless, we took the attitude of “build it and they will come” and this approach served us well throughout our tenure.

After a year of lead-in work, by Programme Officer Lucy Harrison, over 125 SSG and Species Survival Commission members engaged through knowledge surveys and through the regional focal points who wrote sections of the report. The Zoological Society of London (ZSL) stepped up by hosting and funding, along with funding from the Save Our Seas Foundation and the National Oceanic and Atmospheric Administration (NOAA) in the US. The workshop was a staggering success, the first output was a revision of the Red List assessments. With a new base of knowledge, the next few days focused on conservation planning. Ideally, we would work with local Non-Governmental Organizations (NGOs) and governments to develop a plan of work to be implemented by local actors. But with five species distributed across what we now know to be 90 countries, and only 25 participants this was a bridge too far. Almost no-one in the world knew about these fishes, let alone had the capacity to volunteer for or fund the actions. The team thus set about writing the report which, in retrospect, was part situational analysis part coarse conservation planning. But the planning could only be generic, we were unable to tie actions to a species or place, or identify partners to deliver or donors to fund.

What we have found with sawfish, and every group we have focused on since, is that we can't really do the granular conservation planning needed until we have a strategic global situational analysis. Seven years on we are struggling to bring sawfish conservation to the ground at the scale more similar to other IUCN SSC Action Plans and Conservation Strategies. Many



Prof. Colin Simpfendorfer

donors will not pay for planning, but there is no point in funding local conservation that occurs in a vacuum outside of global strategic situational analysis. This is what SSC Chair Jon-Paul Rodriguez calls, “random acts of kindness”. Two key challenges remain. First, to impress upon funders that planning is an ongoing process of building conservation capacity and thus that it needs dedicated funding. Second, to make it clear that strategic global planning to guide regional and local actions is the antidote to “random acts of kindnesses”.

From these humble beginnings, donors started to fund the ‘great sawfish search’, especially the Save Our Seas Foundation which poured US\$600,000 into the quest. Scientists, funded or on their own initiative, sought sawfishes all over the world using a multitude of techniques mostly centred on historical ecology and social science surveys of ecological knowledge. Since 2014, there have been 252 documented search activities across 64 nations. We now know that sawfish are extinct in 55 of the 90 nations where they were once found, amounting to extinction from nearly 60% of their former range. Conservation progress has been slow, but considerable capacity has been built around the world, donors are increasingly engaged as are aquaria all over the world. The aquarium community with the Sawfish Conservation Society and the SSG launched International Sawfish day on 17th October 2018. The next year there were over 100 tweets from 500 tweeters with engagement from nearly 9,000 users and 11 million impressions. We could never have conceived that so many people would be engaged in sharing the plight of sawfishes just five years after our first workshop!

ACTION | The Red Listing process led by SSG founder, Sarah Fowler, and the subsequent high-profile paper sowed the seeds for international trade regulation. The Convention on International Trade in Endangered Species of Flora and Fauna (CITES) reached its 50th birthday in 2014, but despite its longev-



Prof. Nick Dulvy

ity and success for terrestrial plants and animals there were no commercially exploited marine fishes listed on the CITES appendices despite clear evidence of poor conservation status and significant international trade of exploited marine fishes. The IUCN holds a privileged advisor role, along with TRAFFIC, at CITES and this need to be an 'honest broker' of the scientific advice shapes the way the SSG works in this forum.

Our approach of strong science carefully communicated served us well at CITES with the provision of advice at various stages, including the development of a series of influential 'productivity analyses', with the help of Dave Kulka, John Carlson, Sebastian Pardo, and Brooke D'Aberto, which showed that many sharks and rays have incredibly low maximum rates of population increase. A key barrier to listing was the apparent lack of credibility of the extinction risk assessments of commercially exploited marine fishes. During our tenure many more marine fisheries experts have become increasingly comfortable with the Red List criteria. First, the publication of a series of analyses that showed harmony between fisheries management criteria and the thresholds of the Red List Criterion A. Second, at the 2013 CITES Conference of Parties in Bangkok, we counted at least 20 members of the SSG on national delegations, a small but non-trivial fraction of the 2–3,000 delegates. While we all understand that people wear different hats, it was comforting to know that governments were getting advice from colleagues that had been involved in the Red Listing process. The power of Red Listing is partially in the status assessments, but more importantly it lies in the data stories assessors tell their colleagues in fisheries agencies and environment departments.

Now, after a decade of effort by many organisations, including the SSG, there are 45 sharks and rays on the CITES Appendices and these listings are driving efforts to assess and deliver sustainability across many nations. The key now will be translating listings to conservation action and finally conservation success. With most of the listed species being widely distributed and highly migratory this will not be a simple task but one that SSG members worldwide can contribute to.

The past decade as Co-Chairs of the Shark Specialist Group has been an incredibly rewarding experience. In this time, we have achieved a lot, largely because of the energy, passion, and hard work of the membership, thematic Vice-Chairs, Regional Vice-Chairs, Emeritus members, programme staff and partners. We thank everyone for their support and efforts, especially Deputy Chair Sonja Fordham who taught us a huge amount about what it takes to deliver conservation success for sharks and rays. Sonja critically provided a coherent backbone of policy positions and the tireless crafting of all of our press releases. We thank all of the Programme Officers who toiled under uncertain funding conditions at all hours of the day and night to implement our visions and keep the membership informed and engaged: Lucy Harrison, Rachel Walls, Julia Lawson, Riley Pollom, Zoe Crysler, Helen Yan, Wade VanderWright, as well as Ruth Leeney [Sawfish Conservation officer]. Many thanks are due to Red List Authority Coordinators over the past decade [Rachel Walls, Peter Kyne, Riley Pollom & Cassie Rigby] and other Global Shark Trends staff [Jess Cheok, Danielle Derrick, Brit Finucci, Rima Jabado, Nathan Pacoureau, and Sam Sherman].

During this period the SSG developed the first conservation plans for highly threatened lineages, helped develop a global conservation plan for sharks and rays, reassessed the status of all species and contributed to international efforts to improve conservation outcomes [CITES, Convention on Migratory Species [CMS],



Mediterranean Angel Sharks Regional Action Plan workshop

CMS Sharks Memorandum of Understanding]. Here are a few details on some of the activities and progress over the past decade.

- Publication of the summary of the first assessment of all sharks, rays, and ghost sharks, identifying key priority species groups and places most deserving of conservation effort.
- Reassessment of all (>1,200) of the species through the Global Shark Trends project funded by Shark Conservation Fund.
- Development of strong partnerships officially with Georgia Aquarium, with Al Dove and Katelyn Herman, as well as pivotal partnerships with the Wildlife Conservation Society, Zoological Society of London, Dallas World Aquarium, and Sydney Aquarium/Sealife Centres.
- Development of a global plan for the conservation and management of sharks and rays as founding partners of the Global Shark and Ray Initiative (www.globalsharksraysinitiative.org). The plans developed as part of this collaboration with the Wildlife Conservation Society, World Wildlife Fund (WWF), TRAFFIC, Shark Advocates International and Shark Trust have informed priorities for funders, researchers, advocates and practitioners.
- Identified major priority species and undertook conservation planning for four groups of highly threatened elasmobranchs – sawfishes, angel sharks, rhino rays, and mobulid rays.
- Created the first index of Evolutionary Distinctiveness enabling the creation and launch of EDGE Sharks fellowship program by Zoological Society London (www.edgeofexistence.org/sharks-and-rays).
- Working with the broader IUCN-TRAFFIC team to provide independent advice on the listings of 45 sharks and rays on CITES appendices.
- Advice to the CMS Shark MoU Conservation Working Group and participation in Shark MoU Meeting of Signatories.
- Provided advice to numerous governments, NGO's and even businesses, such as Cathay Pacific, as well as contribution to the Food and Agriculture Organization (FAO)-IUCN Ad Hoc Joint Technical Working Group and the Red List Technical Committee.
- Hosted more than 15 Red List and Conservation Planning workshops with more than 350 participants from over 80 countries.
- Wrote over thirty reference letters in support of Pew Marine Fellowships, National Geographic Species Conservation awards, EDGE fellowships, Future for Nature Awards, Darwin Awards, Future Conservationist Award, and job applications.

As the SSG enters its 30th year, we look forward to seeing the group continue to bend-up the shark biodiversity loss curve and we wish the new leadership team all the best.



A thank you note to all Regional Vice-Chairs stepping down

Introduction text by Rima W. Jabado

For over a decade now, the SSG has been structured around 13 biogeographical regions. Regional Vice-Chairs (RVCs) were appointed for each of these regions to coordinate SSG member's regional work, represent the SSG within their communities and among regional stakeholders, and serve as the official link between their respective region and the IUCN Species Survival Commission. This subdivision was critical so that each regional group could focus on supporting assessments of sharks, rays, and chimaeras in each region. With the completion of the Global Shark Trends Project, which aimed at assessing all known species of sharks, rays, and chimaeras, the SSG will be focusing more on regional priorities for action and conservation planning.

After much consultation with the current RVCs, we have decided to merge certain regions by priority issues rather than species biogeography. We now have nine regions to represent the work of the SSG. Specifically, we have merged [1] the Northwest Atlantic and Northeast Pacific groups into the North America Regional Group, [2] the Western South America and Eastern South America groups into the South America Regional Group, [3] the West Africa and Sub-equatorial Africa groups into the Africa Regional Group, and [4] the Northwest Pacific and Southeast Asia groups into the Asia Regional Group.

As we move forward with restructuring the SSG, it also means that several roles and responsibilities within the group have shifted. Some RVCs have decided to step down due to other work commitments, and I wanted to take this opportunity to recognize their contributions. I have deep respect and gratitude for all they have done over the last years to support the SSG work. Without their diligence, hard work, and contributions, the SSG would not have been able to achieve all that it has. Thank you all for your tremendous commitment to shark conservation, and I look forward to continuing working with you as members of the SSG or as colleagues.



Dr. Ahmad Ali
Role: Regional Vice-Chair
Southeast Asia Region

I would like to take this opportunity to express my thanks and appreciation to IUCN SSG for giving me a task as a Regional Vice Chair Southeast Asia Region since 2013. Many congratulations to all members and non-members for our success and achievements, especially in taxonomy, collecting landings data and evaluating species for the IUCN Red List in 2020 before and during the Covid-19 pandemic. All members and non-members, especially in Cambodia, Indonesia, Malaysia, Myanmar, Philippines, Thailand, and Vietnam, work closely with the Southeast Asian Fisheries Development Center (SEAFDEC) to collect landings data, conduct market and socio-economic surveys. All data and information are used to develop a Regional Plan of Action for Sharks and National Plans of Action for Sharks and other fisheries management strategies in the region. I hope the new RVCs and members will continue to work as a team, and you all have the capabilities to handle many new activities in the region and the world.



Dr. Dave Ebert
Role: Vice-Chair Taxonomy
and Regional Vice-Chair
Northeast Pacific Region

After 20 years of being actively involved with the IUCN SSC Shark Specialist Group, I have decided to step down from my roles as the Vice-Chair of Taxonomy and Regional Vice-Chair of the Northeast Pacific Region; positions I have held since 2010. My involvement started as a committee member of the Northeast Pacific Region in 2001. I attended my first regional workshop in Durban, South Africa, in 2003, and since then, I was involved in over 15 workshops and contributed to over 200 Red List assessments. During my tenure, I involved over 30 of my students who also contributed to Red List assessments; it was their first publication for many. Allowing my students to participate in and contribute to a process that has real-world implications was one of the highlights of my time with the SSG. Another rewarding aspect of my involvement with the SSG was the relationships built over this time from which collaborations and friendships developed; one of these friendships was with the new Chair, Rima Jabado, and I could not be happier to know the SSG will be in her good, capable hands going forward. It has been a fantastic journey for me, but now is the time to transition to a new generation to take the SSG's helm as it builds on the foundation of the past and now moves in an exciting new direction. I plan to stay involved during this transition period, and I wish Rima and the continuing and new members all the best as the journey continues!



Dr. Dave Kulka
Role: Regional Vice-Chair
Northwest Atlantic

I became involved with work on elasmobranchs and with species at risk issues late in my career. As a designated expert for the Grand Bank Thorny Skate fishery at NAFO (Northwest Atlantic Fisheries Organization), I observed a decline in this population. However, it became the first elasmobranch fishery at an Regional Fisheries Management Organization (RFMO) to be placed under quota management in the early 2000s, a significant step forward. This fishery continues to this day. At the time, as for many others, it was Jack Musick who encouraged and inspired me to get involved with the SSG as RVC in 2007. My focus with the SSG was Red Listing, co-authoring, and reviewing many assessments over the years. Interests lay with deepwater demersal sharks and skates for which there is often little information. An early involvement was for Barndoor Skate, a species that had nearly disappeared in the early 1990s. However, it turned out to be a good news story when at a 2019 workshop, we could downlist it from Endangered to Least Concern, a remarkable recovery. One highlight during my time as RVC was to participate as a United Nations Food and Agriculture Organization (FAO) expert panellist, evaluating elasmobranch species being proposed for listing under CITES, working with global experts. The collective experience was enhanced in working with and getting to know many scientists and friends.



Dr. Peter Kyne
Role: Red List Authority
Coordinator and Regional
Vice-Chair – Australia and
Oceania Region

At a conference two decades ago, I introduced myself to SSG Programme Officer Rachel Cavanagh and asked how I might help with the SSG. Thus began 20 years of SSG membership and service, centred around the group's Red Listing work. I have had the privilege of working with some of the most inspiring people in our field while also enduring some of the most significant challenges of my career. It was an honour to work alongside leaders such as Sarah Fowler and the late Jack Musick, who appreciated the SSG network's value. I thank all members for the amazing knowledge, experience, and wisdom they have shared with me in my SSG roles. We commit to the SSG for the conservation of biodiversity, which has always been my guiding principle. There is a great deal that the SSG needs to do to advance an inclusive, transparent, engaged, respectful, and diverse community, but I have every faith in Rima as a leader to ensure that outcome. I am also delighted that Christine Dudgeon and Al Harry are the incoming RVCs for the Oceania region and know that they will do a great job facilitating and engaging a regional network of members. So long, and thanks for all the fish.



Dr. Chris Lowe
Role: Regional Vice-Chair
Northeast Pacific

It was an honor to serve on the Shark Specialist Group since 2007 as a co-chair for the Northeast Pacific region. During that time, my students and I developed Red List reassessments on seven elasmobranch species found in the Northeast Pacific. I authored the first draft of the global White Shark reassessment, ultimately published in 2018 and participated in two IUCN SSG workshops for Northeast Pacific species reassessments.

I was also pleased to be able to be part of the Sawfish Conservation Strategy. The last few decades of work by so many scientists has been necessarily focused on understanding chondrichthyans, their diversity, and documenting the various ways that they are in trouble. The big challenge for the SSG now is to plan and act to try and address their declines on the ground, through an increased focus on practical approaches like social science, mitigating gear interactions (especially for gillnets), and on-the-ground conservation projects. This will need someone based in the region, and I wish them all the best for success in starting to address some of these challenges.



Dr. Alexei Orlov
Role: Regional Vice-Chair
Northwest Pacific

My work in the IUCN Shark Specialist Group began with my participation in a workshop on deep-sea chondrichthyans (Dunedin, New Zealand, 2003), which preceded the large international conference «Deep-Sea 2003» (Queenstown, New Zealand). Then there were several more meetings in Cape Town, South Africa (2004), Peterborough, Great Britain (2006) and Batangas, Philippines (2007), in which I participated as an expert. Shortly after, I was appointed Regional Vice-Chair for the Pacific Northwest, the other RVC being Dr Hajime Ishihara. Even though the group was relatively small, it was able to achieve some success during its existence. The elasmobranch fauna of the Northwestern Pacific is not remarkably diverse compared to other areas (for example, tropical Indo-Pacific, Oceania or Africa). Nevertheless, the group members (Hajime Ishihara, Sho Tanaka, Yamin Wang and others) made significant contributions to the preparation of the Red List assessments of deep-sea shark and batoid species, as well as Northwestern Pacific sharks, skates, rays, and chimaeras during respective workshops. I will always remember with gratitude the warm and friendly atmosphere of these meetings and the joy of our collective work results. I would like to

express my special appreciation to Atsuko Yamaguchi for organizing the Red List assessment workshop in Nagasaki in 2019. To my great regret, I could not participate and once again plunge into the atmosphere of collective creativeness. However, this meeting was attended by two of my Russian colleagues, who, I hope, will be able to join the group in the future. I would like to take this opportunity to thank the late Jack Musick, Sonja Fordham, Rachel Cavanagh, Sarah Fowler and other colleagues who supported me during my early years at the SSG. Special thanks to Nick Dulvy, Lucy Harrison, Claudine Gibson and Sarah Valentine for their comprehensive help related to the SSG. Many thanks to my colleagues Hajime Ishihara, Dave Ebert, Matthias Stehmann, Bernard Seret, Peter Kyne, Will White, Peter Last, Chip Cotton and many others for their joint publications, help and advice, without which my research on elasmobranchs would not have been possible. As I leave the RVC position, I still hope to remain an active member of the group and continue working in it as an expert.



Dr. Simon Pierce
Role: Regional Vice-Chair
Sub-equatorial Africa

It's been an enormous honour to serve as a Regional Vice-Chair for the Sub-equatorial Africa Region. As I'm no longer based on the continent full-time, it's a great time to hand over to others who can push the SSG's conservation efforts forward. Thanks to all the SSG members that contributed to the Global Shark Trends' assessments of the many incredible regional endemics and the tireless team from Hermanus and the Western Cape to organize and host this and other meetings. The Sub-Saharan Africa region is home to a diverse array of talented researchers and poorly-known chondrichthyan species. It's been fantastic to see increasingly active engagement both with and from national and local government officials in Southern Africa over the past few years, not least in Mozambique, where a suite of threatened elasmobranch

species recently received legislative protection. As the SSG focus shifts towards facilitating and building capacity for on-the-ground conservation projects, the African region can be a showcase for successful and high-impact projects led or mentored by the SSG membership.



Dr. Atsuko Yamaguchi
Role: Regional Vice-Chair
Northwest Pacific Region

During my four-year term as an SSG Regional Vice-Chair, the Northwest Pacific Assessment Workshop at Nagasaki University in Japan was held in 2019, and I was a host. This workshop was a part of the global reassessment of all chondrichthyans for the IUCN Red List of Threatened Species being undertaken through the Global Shark Trends Project. SSG members and other experts from Russia, China, South Korea, Taiwan, and Japan, project team partners, and I assessed the extinction risk of endemic elasmobranchs in the Northwest Pacific and contributed to revising their assessments. It was challenging, but my pleasure to work with many old or new friends here in Nagasaki. I will continue my research on elasmobranch biodiversity, life history, ecology, fisheries, and conservation in the Northwest Pacific and Southeast Asia waters, and I would like to continue my efforts and contribute to the conservation planning of biodiversity and ecosystems. Although I am stepping down from the RVC position, I will continue to be part of the SSG as a member and support the new RVC. I look forward to working with SSG members in the future. I want to thank all of you for your support over several years, and I wish the new Chair, RVCs, and members all the best.



Dr. Alec Moore
Role: Regional Vice-Chair
Indian Ocean

Since I became involved with the SSG in 2007, knowledge on elasmobranch diversity, biology, fisheries and conservation in the Indian Ocean has increased hugely, thanks to the dedicated work of many past and present members. The Indian Ocean SSG has been a great opportunity to get to know about the work of knowledgeable scientists working across the region, from Sudan to Oman to Iran and India – meeting like-minded colleagues working towards shared goals at a Red List workshop in Abu Dhabi was a highlight. My hope is that the SSG will be able to further expand its network to build capacity in places like Yemen and Somalia, where major fisheries align with rich and threatened diversity. Like many members who do the same, most of my input to the SSG has been to Red List assessments;

A welcome note to all the new Regional Vice-Chairs

As we transition into this new quadrennium, I would also like to welcome our new Regional Vice-Chairs (RVCs). With so many qualified and dedicated shark researchers and conservationists around the world, decisions on RVCs were not easy to make. So, I would like to thank everyone who provided suggestions and recommendations on who would be best suited to fill these important leadership roles. I would also like to thank the new RVCs for their willingness to serve in the SSG and support our work over the next four years.

Below is a short profile of each new RVC along with a message they have added for SSG members.

Dr. Christine Dudgeon Oceania Region

'I feel fortunate to live in the Oceania region, home to one of the most biodiverse assemblages of elasmobranchs globally.

I am excited to be a part of the next phase of the IUCN SSC Shark Specialist Group - transitioning from assessing the status of species to conservation action - and I am looking forward to working with all the SSG members and broader community'.



Chris is a research fellow and lecturer at the University of the Sunshine Coast and the University of Queensland (UQ), Brisbane Australia. She investigates the ecology and evolution of populations and species in marine organisms with emphasis on sharks, rays and chimeras. Her research informs fundamental science questions about the evolution and maintenance of biodiversity and has application for wildlife management through the identification and description of taxonomic units. Chris obtained her BSc Hons (1998) at James Cook University in the fields of marine biology, zoology and genetics. Her long-term interest in sharks then led to her to UQ and a PhD focused on the population ecology and evolution of the leopard shark, *Stegostoma tigrinum*, where she was able to combine her interests in genetics and field work. Since completing her PhD in 2009 she has combined her research and conservation activities with raising two children, completing two post-doctoral fellowships at UQ, and lecturing for the University of Virginia on their Semester at Sea program. She is passionate about science communication, promoting research and education through citizen science programs, and was a founding member of the Oceania Chondrichthyan Society. Chris has been a member of the Oceania SSG since 2015.

Mr. Daniel Fernando Indian Ocean Region

'The Indian Ocean has a rapidly growing community of chondrichthyan researchers, and I am honored to work alongside them. We all share the common goal of using science to advise conservation action, and I look forward to sharing our experiences and learning from the broader SSG community'.



Daniel is a Sri Lankan marine biologist and the co-founder of Blue Resources Trust; a marine research and conservation organisation, where he leads the Sri Lanka Elasmobranch Project and is working to encourage a shift toward sustainable fisheries. Since 2013 he has been providing technical support for elasmobranch management policy at conventions such as Convention on International Trade in Endangered Species of Flora and Fauna (CITES) and the Convention on the Conservation of Migratory Species of Wild Animals (CMS), and the Indian Ocean Tuna Commission (IOTC); thereby helping bridge the gap between science and policy. He has served as a ministerial advisor, has been a member of the IUCN SSC Shark Specialist Group for the Indian Ocean Region since 2017, an Marine Conservation Action Fund Fellow, and the Vice Chair to the Sessional Committee of the CMS Scientific Council.

Dr. Alastair Harry Oceania Region

'I am excited and honoured to be taking on a Regional Vice-Chair role and hope to continue the legacy of the previous Oceania RVCs. I am looking forward to working with SSG members to continue to provide high-quality scientific advice that can help provide a solid foundation for developing strategies to conserve the amazing biodiversity of chondrichthyans in the Oceania region'.



Alastair is a fisheries scientist based at the Western Australian Fisheries and Marine Research Laboratories in Perth, Western Australia and an Honorary Research Fellow at the Harry Butler Institute, Murdoch University. Alastair has a long-held interest in the conservation and sustainable management of sharks and rays. He holds a PhD cum laude from James Cook University in Fisheries Biology (2011) and a BSc Honours (First Class) in Marine Biology from Flinders University (2005). Alastair has worked in a variety of roles related to ecosystem-based fisheries management including in stock assessment, bycatch and threatened species monitoring, third-party fishery certification, harvest strategy development, and marine park monitoring. His expertise is primarily in coastal fisheries in Australia and the Indo-Pacific region. Despite stints working

at the interface of science and policy and in quantitative modelling, Alastair is a field biologist at heart. His current work involves coordinating fisheries and ecological monitoring in Marine Parks in Western Australia. Alastair has been an Oceania regional member of the IUCN Shark Specialist Group since 2009, over which time he has participated in Red List workshops, authored and reviewed Red List assessments, and provided expert review on a range of analyses and proposals.

Ms. Elisabeth Fahrni Mansur Indian Ocean Region

'The Indian Ocean region is globally significant for sharks and rays in terms of habitat suitability, species diversity but also the intensity threats. We need to engage with governments and communities for bridging the gap between science and policy, for enabling innovative and locally effective conservation actions grounded in robust science, and for improving compliance with

regional and international agreements. I am committed to facilitate collaborations with our members across the Indian Ocean, who represent diverse communities and expertise that are vital for accountable science, inclusive policies and conservation successes.'



Elisabeth is the Senior Manager of the Marine Conservation Program for the Wildlife Conservation Society (WCS) in Bangladesh, which aims to discover and protect threatened marine megafauna and inspire science-based equitable solutions for a healthy ocean supporting healthy people. She works closely with national and international development partners to support communities directly affected by climate change, loss of biodiversity and conservation management regulations, and collaborates with government agencies to implement marine species and habitat protection plans and combat illegal wildlife trade in compliance with regional and international commitments. Her formal training as educator, teacher's trainer and principal in Switzerland and former position as CEO of a renowned local nature tourism company, benefit WCS Bangladesh in the development of effective management strategies for connecting wildlife conservation with sustainable resource use. Elisabeth is a Kinship Conservation Fellow trained in market-based tools for conservation and leadership, a member of the Society of Marine Mammalogy Education Committee and the International Whaling Commission (IWC) South Asian river dolphin task team.

Ms. Sophy McCully Phillips Northern Europe Region

'As we move into the next quadrennium under the new leadership of the IUCN SSG, I am really thrilled to be taking on the role of RVC. The Northern Europe Group has many leading authorities in elasmobranch science as members

and I am therefore confident that with expertise and knowledge within the Group that we can set some ambitious targets to ensure that we are all working together in fulfilling the vision "where sharks, rays, and chimaeras are valued and managed sustainably".'



Sophy has been working as a senior fisheries scientist at the Centre for Environment, Fisheries and Aquaculture Science (Cefas) since 2005 and for most of this time has specialised in the field of elasmobranch

biology, ecology and assessment. She has been a member of the ICES Working Group for Elasmobranch Fishes (WGEF) since 2009 undertaking several assessments for elasmobranchs around UK waters. Similarly, she joined the IUCN Regional Group and participated in the EU Chondrichthyes Red List Workshop in 2014 in Plymouth, assessing many elasmobranch species in Northern European seas. Her role encompasses end-to-end science, from data collection (including leading scientific RV surveys) to data analyses and method development, to assessment and advice to government to inform policy. Her research has covered reproductive biology, diet, movement ecology, data-limited assessment and prioritisation of species at risk and where future research efforts should focus. Therefore, her background aligns well with the vision of the IUCN SSG and she hopes to do the role justice over the next quadrennium.

Ms. Chelsey Young North America Region

'I'd like to take this opportunity to welcome members, both old and new [myself included!], to the newly formed North America Group! I'm incredibly honored and excited to take on this new role of Vice Co-Chair under the new direction of the SSG - to take what we've learned from the science in recent Red List assessments and apply that knowledge to conservation planning initiatives over the next quadrennium. Given the broad

and diverse issues that we continue to face in elasmobranch conservation, I believe, collectively, we have the brightest minds for collaborating on best ways forward for tackling these issues using tools of science, innovation, and creativity. I look forward to working with all of you!'



Chelsey is an Endangered Species Biologist at the U.S. National Marine Fisheries Service (NMFS) in Honolulu, Hawaii, with over a decade of experience in the conservation and management of imperiled species including elasmobranchs, corals and marine mammals. She specializes in implementation of the U.S. Endangered Species Act (ESA) for ESA-listed species and is the lead ESA policy expert on elasmobranchs in the Pacific Islands region. She is also the regional recovery coordinator for the threatened Oceanic Whitetip Shark and Giant Manta Ray. In her role at NMFS, Chelsey has led national teams of experts to assess whether various species meet the criteria for listing under the ESA, and has completed assessments for 10 elasmobranch species to date, including species not found in U.S. waters. She has also planned and successfully executed regional stakeholder workshops for recovering one of the most endangered pelagic shark species - the Oceanic Whitetip Shark. Chelsey also served as the NMFS lead to the Protocol Concerning Specially Protected Areas and Wildlife (SPA Protocol) of the Cartagena Convention for three years, where she assessed proposals and negotiated listings of numerous elasmobranch species in the SPA Annexes, including Smalltooth and Largetooth Sawfish, Whale Shark, Giant Manta Ray, Oceanic Whitetip, and three species of hammerheads. Chelsey is also currently a member of the Western and Central Pacific Fishery Management Council's Oceanic Whitetip Shark working group, which is tasked with developing recommendations to end overfishing of the species in the Pacific, including domestic and international measures. She is also a member of the Pelagic Plan Team, which makes recommendations to sustainably manage pelagic fisheries (including bycatch species such as sharks) and make amendments to Fisheries Management

Plans. Although Chelsey is primarily a policy expert/manager, she actively collaborates with scientists in developing grant proposals to support research projects for the conservation of sharks and rays, publishes papers in scientific journals, attends and presents at scientific conferences and has participated in several research expeditions, including ones for endangered Smalltooth Sawfish and Oceanic Whitetip Sharks in the Bahamas.

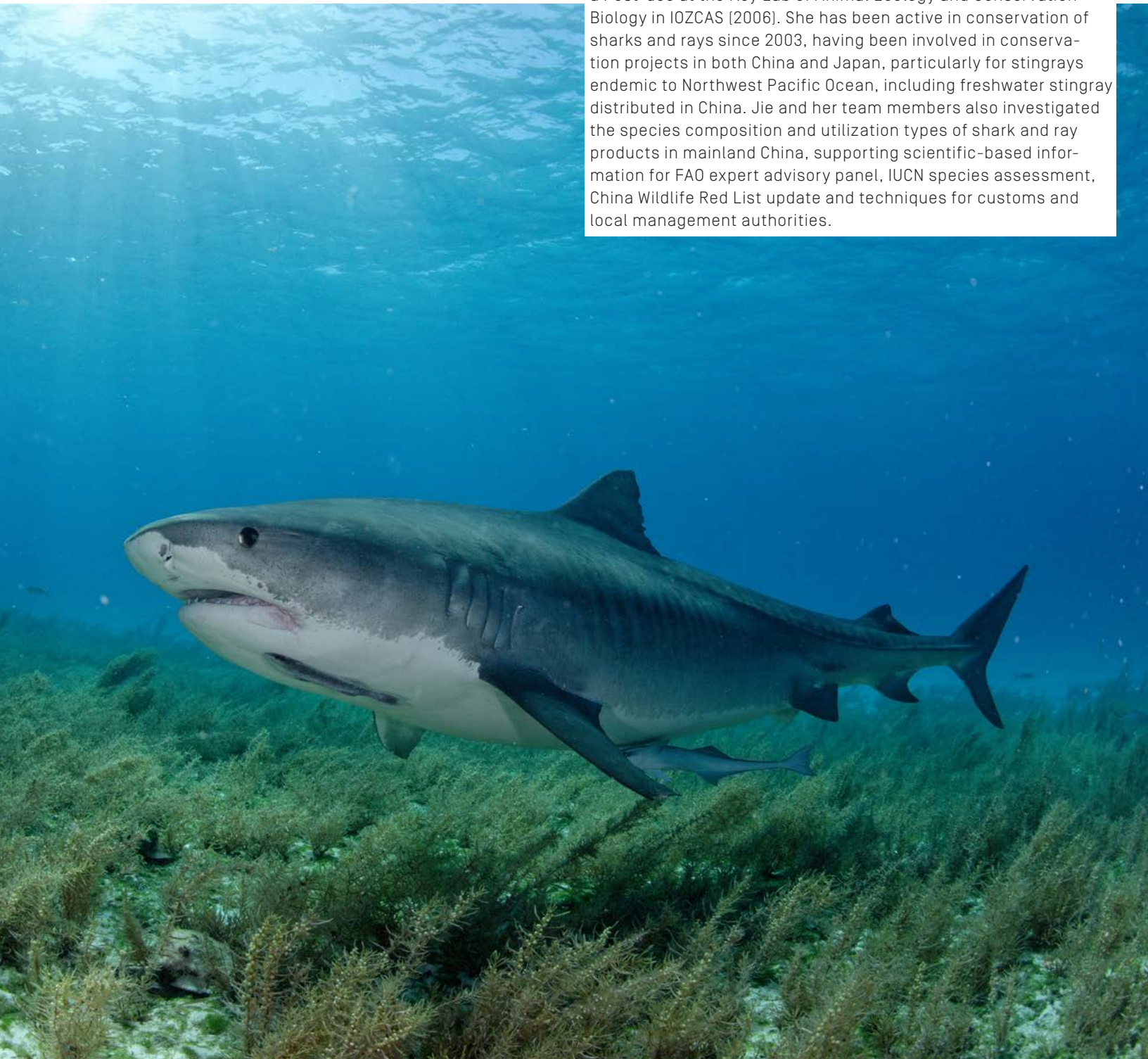
Photo by Michael Scholl | Save Our Seas Foundation

Dr. Jie Zhang Asia Region



'More understanding, more efforts, and more effects! Sharks and rays conservation need you, need me, need all of us!'

Jie is an associate professor at the Institute of Zoology, Chinese Academy of Sciences, Beijing, China. She is an ichthyologist, and the author or co-author of more than 50 publications dealing with a broad field of fish biodiversity-related topics (taxonomy, eco-morphology, conservation biology, molecular phylogeny and population genetics, fish genome). Jie received a Bachelor of Agriculture in Fishery in 1990 from Huazhong Agricultural University, Wuhan, China. She has a MSc in Fishery Science, Nagasaki University, Japan (1998) and completed a PhD in Marine Zoology, Nagasaki University (2001) and a Post-doc at the Key Lab of Animal Ecology and Conservation Biology in IOZCAS (2006). She has been active in conservation of sharks and rays since 2003, having been involved in conservation projects in both China and Japan, particularly for stingrays endemic to Northwest Pacific Ocean, including freshwater stingray distributed in China. Jie and her team members also investigated the species composition and utilization types of shark and ray products in mainland China, supporting scientific-based information for FAO expert advisory panel, IUCN species assessment, China Wildlife Red List update and techniques for customs and local management authorities.



Regional Vice-Chairs

2021-2024



Dr. John Carlson



Ms. Chelsey Young



Mr. Fabrizio Serena



Prof. Alen Soldo



Ms. Heike Zidowitz



Dr. Sophy McCully Phillips



Dr. Jie Zhang



Mr. Fahmi

North America

Mediterranean

Northern Europe

Asia

Central America
and the Caribbean



Dr. Mario Espinoza



Dr. Oscar Sosa-Nishizaki

South America



Dr. Patricia Charvet



Dr. Vicente Faria



Dr. Carlos Bustamante

Africa



Dr. Melita Semoilys



Dr. Mika Diop

Indian Ocean



Mrs. Elisabeth Fahrni Mansur



Mr. Daniel Fernando

Oceania



Dr. Christine Dudgeon



Dr. Alastair Harry

Introduction text
by Rima W. Jabado

Working Groups



Dr. Simon Weigmann

As conservationists, we face many challenges when working towards the conservation of sharks, rays, and chimaeras. However, there are also many opportunities for us to forge ahead and tackle some these.

As some of you might remember, in December 2020, I reached out to SSG members through an online survey to help identify some of the key priority issues that the SSG should be focusing on in terms of research and conservation (thank you to all those that provided input!). After additional consultation with the Regional Vice-Chairs and various members, eight Working Groups have been established to cover some of these key issues and priorities.

Working Groups are designed to bring together members possessing the relevant expertise, knowledge, and skills who will act collectively to undertake tasks and activities to achieve the SSG targets for the next quadrennium. Working Group Chairs (WGCs) have been designated to coordinate groups of members, help identify global and regional priorities within their 'themes' and provide guidance and act as the SSG's expert network for their respective topics.

Below is an introduction to each of these Working Groups along with a message from the Chairs. Members should note that the objectives and tasks listed below as initial 'ideas' and can be changed based on input from members. Members of the SSG are welcome to directly contact the Working Group Chairs to indicate their interest and willingness to contribute to the Working Groups.

The SSG recognizes that these Working Groups are not exhaustive and is open to the establishment of new ones provided there is sufficient interest and expertise amongst the current membership available to lead on them. Members who are interested in establishing such Working Groups are encouraged to liaise directly with the Chair.

Aquarium Working Group

Co-Chairs: Dr. Lisa Hoopes | based in the USA
(North America Region member)

Mrs. Paula Carlson | based in the USA
(North America Region member)

Public aquariums are increasingly playing an important role in the conservation of species and many are becoming recognized as major contributors to this field. Specifically, public aquariums can play a major part in public education, the provision of holding facilities for species, and the captive breeding of some threatened species. Many have developed research programs and projects to reintroduce species into the wild while focusing on conservation education and public engagement.

The tasks of this Working Group will be to:

- Develop a position statement for the SSG on the role of zoos/aquariums in elasmobranch conservation;
- Compile aquarium life history information for Critically Endangered elasmobranchs to inform conservation action, with a focus on sawfishes, rhino rays (wedgetfishes and guitarfishes), and South American freshwater stingrays;
- Develop SSG position statement on ex situ elasmobranch release, rescue, and re-introduction; and
- Develop SSG messaging and graphics on elasmobranch conservation for zoo/aquarium exhibits, outreach, and education programs.

'It is truly an honor to be continuing my service on the IUCN SSC Shark Specialist Group, especially in the capacity of Co-Chair of the Aquarium Working Group. As someone who was once a young girl who dreamed of working with sharks, to someone who has made a career out of it, I have come to see my work as more of a calling and I feel incredibly fortunate to be able to help create awareness for marine conservation by fostering collaborations between professional aquarists and other related industries. I am excited to be a part of this

group and am looking forward to what the future holds for the conservation of elasmobranchs'. Paula Carlson

'I am delighted to become member of the IUCN SSC Shark Specialist Group as the Co-Chair of the Aquarium Working Group. I believe that zoos and aquariums have an important role to play in elasmobranch conservation and am looking forward to bringing the collective experiences of the aquarium sector to the conversation as the IUCN SSG moves from assessments into planning and action'. Dr. Lisa Hoopes



Assess Working Group

Chair: Dr. Cassandra Rigby | based in Australia (Oceania Region member)

The IUCN Red List of Threatened Species is the most comprehensive information source on the global extinction risk status of animal, fungus, and plant species. The SSG is responsible for the assessment of all known shark, ray, and chimaera species for the Red List. Assessments are an important component of the SSG workplan as the assessment process is essentially continuous. Each assessment only has a lifespan of 10 years and therefore species need to be reassessed every decade. Furthermore, assessments are needed for newly described species and taxonomic changes. Members of this group will have broad regional and taxonomic coverage and will eventually serve as the Red List Authority for the SSG, led by the Red List Authority Coordinator.

The tasks of this Working Group will be to:

- Develop and facilitate a Red List training program for Working Group members;
- Administer the global shark, ray, and chimaera list of Red List status and reassessment scheduling;
- Coordinate the timely production of 25+ new species assessments and taxonomic concept changes per year; and
- Complete Red List reassessments for current species assessments expiring in 2021–2024.

'Forming the Assess Working Group provides a new and exciting opportunity for SSG members to be more actively involved in the work of the Red List Authority Coordinator and directly contribute to Red List Assessment of chondrichthyans. I am looking forward to working with SSG members to keep our Red List assessments up to date and the key resource for extinction risk status of sharks, rays, and chimaeras.' Dr. Cassandra Rigby

Bycatch Working Group

Co-Chairs: Dr. Dave Kulka | based in Canada (North America Region member)

Dr. Juan-Carlos Perez Jimenez | based in Mexico (Central America and the Caribbean Region member)

The 1995 FAO Code of Conduct for Responsible Fisheries calls for the sustainable use of aquatic ecosystems and requires that fishing be conducted with due regard for the environment. This includes conservation of biodiversity of ecosystems by minimizing fisheries impacts on non-target species. Bycatch and discards threaten the long-term sustainability of marine species and this is particularly the case for elasmobranch species as they are commonly taken incidentally or in mixed fisheries. The issue is complex, and the scope global as sharks, rays and chimaeras constitute bycatch in many world fisheries, such as industrial and artisanal that employ many kinds of capture methods. Fisheries management is often inadequate, and even basic monitoring of the bycatch removals is deficient or non-existent; records of capture are often minimal or lacking, making evaluation of extinction risk uncertain. International Guidelines on Bycatch Management and Reduction of Discards lays out a detailed set of objectives and actions for bycatch management for States and RFMOs who have jurisdiction over the particular resources. However, that control over the fisheries does not exist for the SSG and so our initial focus will be on an understanding of the issues.

A Working Group on Bycatch has been instituted to examine ways to better understand bycatch levels, particularly in terms of removals at a species level, and to examine ways to mitigate the issues. The scope of the WG is elasmobranchs taken as bycatch in global artisanal, industrial and other fisheries in particular rare, threatened, or protected species. The aim is to identify bycatch and discard issues, problems that constrain the evaluation of elasmobranch status. Through expert knowledge as well as literature searches the aim is to identify the type and quality of the information that currently exists, including considering the availability of expertise and information from participants in the fisheries, conservation groups, and other stakeholders, with the goal to ensure appropriate information sources are available for risk assessment.

The tasks of this Working Group will be to:

- Formulate research priorities and examine shark bycatch research trends, and specify research needs as they apply to species at risk;
- Identify threatened species taken as bycatch, look at ways to improve species identification, and undertake studies on distributions and ranges of species taken as bycatch;
- Identify population-level effects on bycatch species and determine where bycatch of threatened species is most prevalent to identify elasmobranch hotspots;
- Describe fisheries and gear types resulting in the highest bycatch of elasmobranchs and formulate guidelines on how to obtain catch information from various fleets with case studies showing what has worked and where and why; and
- Identify strategies to reduce elasmobranch bycatch.

'Bycatch in fisheries, whether discarded or landed, is the least understood component of mortality due to fishing and elasmobranchs are most commonly taken as bycatch or in mixed fisheries. For this reason, we feel that it is important to develop ways to quantify bycatch of elasmobranchs to evaluate their risk of extinction better.' Dr. Dave Kulka and Dr. Perez-Jimenez



Communication Working Group

Chair: **Michael Scholl** | based in Switzerland
(Northern Europe Region member)

The Communication Working Group was initiated to establish a coherent and effective communication strategy for the IUCN SSC Shark Specialist Group (SSG), not only to its members but to a broader audience also. Science communication is part of a scientist's everyday life – scientists must give presentations at conferences and workshops, write articles in peer-reviewed journals, produce proposals, communicate with various audiences, and educate others. But this communication was, and still, unfortunately, is often limited to peer-to-peer. In the past few decades, communication adapted to a broader and often non-scientific audience has grown through varied new channels – television, press, social networks, websites, etc. – and has indeed become a condition for most funding opportunities.

The SSG vision is 'a world where sharks, rays and chimaeras are valued and managed sustainably'. Our mission is '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.' SSG members are primarily scientists, and their mission is to 'provide the knowledge that enables action'. This action is directly linked to policy, political decisions, and public engagement; hence, understanding their scientific communication plays a crucial role in applying these actions by non-scientific professionals.

The tasks of this Working Group will be to:

- Promote the SSG brand recognition, update SSG Brand Guidelines and develop a Communication Strategy;
- Update, maintain, and expand the website and improve the SSG's reach on social networks (Facebook, Twitter, Instagram, LinkedIn, YouTube and Vimeo) by creating and developing content;
- Coordinate the design and publication of the quarterly 'Shark News' newsletter with contributions from members;
- Showcase the SSG conservation efforts and achievements and promote related scientific publications;
- Design communication guidelines and templates for species profiles, policy briefs, reports, and information documents;
- Identify and secure funding specific for the Communication Working Group, as well as in conjunction with global grant opportunities for the SSG;
- Develop the communication team with interested members, external contributors and partners while mentoring early-career professionals interested in communication; and
- Develop partnerships with non-profit organizations, non-governmental organization and philanthropies to share and combine targeted communication efforts that encompass our vision, mission and objectives.

'My career developed alongside the Shark Specialist Group's history since 1991, and my late mentor, Dr Samuel H. Gruber, was also its founder, starting my career at the Bimini Biological Field Station. I started my career as a research biologist working with White Sharks in South Africa. Still, soon, my motivations and priorities shifted ever more towards conservation, and during the past decade, my activities have evolved towards the communication of science, conservation and education on elasmobranchs. Today, I am deeply honoured to join the SSG family and team. I am very excited to pursue my passion for sharing and promoting the dedicated work conducted by scientists and conservationists worldwide towards a new equilibrium and sustainability.' Michael Scholl



Deep Sea Chondrichthyans Working Group

Chair: **Dr. Brit Finucci** | based in New Zealand
(Oceania Region member)

Deep-sea sharks and their relatives represent nearly half of the global chondrichthyan diversity, but their presence amongst the scientific community is greatly underrepresented. Many species are data poor, their status remains uncertain, and the threats and trade that affect deep-sea species unknown. Without sufficient data, localised declines have gone largely unnoticed and management action (where it exists) is often implemented long after a fishery has been depleted or collapsed.

The IUCN SSG Working Group for Deep Sea Chondrichthyans (WG DSC) was initiated to establish a global network of like-minded researchers with a wide range of expertise applicable to the conservation, management, and where needed, recovery of deep-sea sharks and their relatives.

The tasks of this Working Group will be to:

- Publicly heighten the plight of threatened deep-sea sharks and their relatives, with a focus on gulper sharks (family Centrophoridae);
- Map supply chains for deep-sea chondrichthyan trade, with focus on liver oil and fins, so market data can be used to supplement or verify catch assessments. We know very little about the national and international liver oil trade. We need these data to better quantify the impacts of the liver oil trade and identify alternatives to reduce pressure on deep-sea chondrichthyans;
- Establish best handling practices and post-release survival rates for deep-sea chondrichthyans;
- Reach out to, and establish collaborations with, ongoing and upcoming global deep-sea initiatives (e.g. Global Seamounts Project). These projects may have access to locations where little is known about the deep-sea chondrichthyan diversity and may collect data that could give further insight into deep-sea chondrichthyan ecology (e.g. habitat use);

- Support and grow the next generation of deep-sea chondrichthyan researchers. Research on deep-sea chondrichthyans is under-represented in scientific forums and often restricted due to high costs and accessibility of samples. The WG should encourage research on the ~500 taxa represented here (including public engagement) and explore alternatives means of creating opportunities for students; and
- Evaluate and establish a baseline understanding of non-fishing anthropogenic threats to deep sea chondrichthyans, such as climate change and deep sea mining.

'I'm thrilled to start my second term with the SSG as Chair of the Deep Sea Chondrichthyan Working Group. I look forward to leading a global network of SSG members with an interest in the deep sea to establish a greater profile for some of our highly threatened deep dwelling species and encourage more research on our data poor ones (chimaeras included!)' Dr. Brit Finucci

Future Leaders Working Group

Chair: **Dr. Rachel Graham** | based in Panama
(Central America and Caribbean Region member)

The field of conservation today is challenged by an aging workforce but with a younger generation of potential talent waiting to be mentored, supported, and encouraged to participate in shark research. The SSG would like to create a space for early and mid-career scientists to have an opportunity to bring their passion and skills to effect positive change. A space where individuals can connect with SSG members, mentors, and colleagues who are doing outstanding work and become the next generation of prominent researchers in shark conservation. Ensuring the identification of future leaders and developing a broad base of enthusiastic and capable shark researchers and conservationists is critical to ensure strong succession planning. We hope to build a more robust, diverse, and inclusive shark community that can support our work on the most pressing conservation challenges.

The tasks of this Working Group will include:

- Identify a cohort of keen and diverse supporters to support with coordinating the Working Group;
- Create a robust and welcoming global network of young and talented elasmobranch research and conservation practitioners;
- Establish a process for identifying and supporting new members and matching them with mentors, work opportunities and funding;
- Build the capacities to lead, manage and evaluate projects and identify and nurture new talent through training and mentoring; and
- Track the trajectory and impact of the members over the quadrennium and beyond.

'I am thrilled to lead the new SSG group «Future Leaders Working Group» dedicated to the identification and nurturing of the future leaders in shark and ray research and conservation. These passionate and committed individuals represent a key cornerstone in the SSG's succession planning, who will carry forward the work of the SSG to inspire and implement critical elasmobranch research, management and conservation in the coming decades.' Dr. Rachel Graham

Human Dimensions Working Group

Co-Chairs: **Ms. Hollie Booth** | based in the United Kingdom
(Northern Europe Region member)

Dr. Divya Karnad | based in the India
(Indian Ocean Region member)

Understanding how people's knowledge, values, and behaviors influence and can be affected by decisions and measures related to the conservation of sharks is critical. Considering human dimensions in conservation is needed to increase support of local communities and relevant stakeholders, avoid conflicts, and ensure the success of conservation initiatives. This Working Group recognizes the need to identify and include these considerations as we move forward in tackling complex situations at local scales.

The tasks of this Working Group will include:

- Facilitate and conduct virtual training on the human dimensions of shark conservation;
- Organize an online seminar series for SSG members to share their work/case studies relating to human dimensions of shark conservation;
- Compile a repository of key papers and resources on understanding and addressing human dimensions/using socio-economic methods for shark conservation; and
- Develop simple guidelines on asking and answering management (and policy)-relevant questions about the human dimensions of shark conservation.

'It is increasingly recognized that tackling conservation problems requires understanding human behaviour and involving local communities. Incorporating human dimension is crucial for achieving shark conservation, where fisheries, including those of sharks, deliver social welfare outcomes such as income and food security for billions of people. We're delighted to join forces for this innovative and important working group within the IUCN SSG. We hope to use our experiences from academia and conservation practice to inspire and mentor SSG members across the globe to adopt inter-disciplinary approaches to shark conservation. Please feel free to reach out to us if you have any questions, and we look forward to working with all of you over the coming four years!' Holly Booth and Dr. Divya Karnad



Ms. Hollie Booth

Integrative Taxonomy Working Group

Chair: **Dr. Simon Weigmann** | based in Germany
(Indian Ocean Region member)

Taxonomy is defined as the "theory and practice of classifying organisms". In other words, this discipline describes the fundamental units of life – the species – and provides an essential foundation for all other life sciences. More precisely, the definition and differentiation of known species, as well as the formal description of new species in accordance with the International Code of Zoological Nomenclature, are key examples of taxonomic work. Despite the importance of taxonomic research, there is a worldwide shortage of taxonomic knowledge and trained taxonomists, in combination with decreasing funding. Of greatest concern is the impact of this shortage on our ability to conserve, use and share the benefits of biodiversity – a situation described as "taxonomic impediment" in the Convention on Biological Diversity.

In classic taxonomic research on chondrichthyans, morphometrics (the measurement of living organisms and their parts) and meristic counts (countable traits such as number of tooth rows, vertebrae, fin rays etc.) are two of the most important variables. Based on radiographs and/or dissections, skeletal morphometrics and meristics are also taken, possibly highlighting differences between two related species, for example by means of vertebral counts. Focusing on skates, other important characteristics are found in the copulatory organs, the claspers, of adult males. Accordingly, much time is spent examining, describing and illustrating the external and skeletal clasper features. If fresh or recently collected material is available, conclusive genetic analyses provide a valuable addition to classic, morphological taxonomy, substantiating the results through mutual evidence. As a combination of genetic and morphological, morphometric and meristic evidence should be considered ideal, this integrative taxonomic approach is the basis of our group.

The tasks of this Working Group will be to:

- Stay updated regarding taxonomic changes (descriptions, redescrptions, resurrections, synonymizations);
- Evaluate the validity of newly described chondrichthyan species for future assessments;
- Advise the Red List Authority Coordinator to initiate changes to existing assessments (including uncovering junior synonyms, range extensions...) and plan for future assessments;
- Coordinate communication between different regional groups and working groups if taxonomic knowledge is required;
- Maintain an updated list of chondrichthyan species and provide yearly updates on taxonomic changes to SSG members.

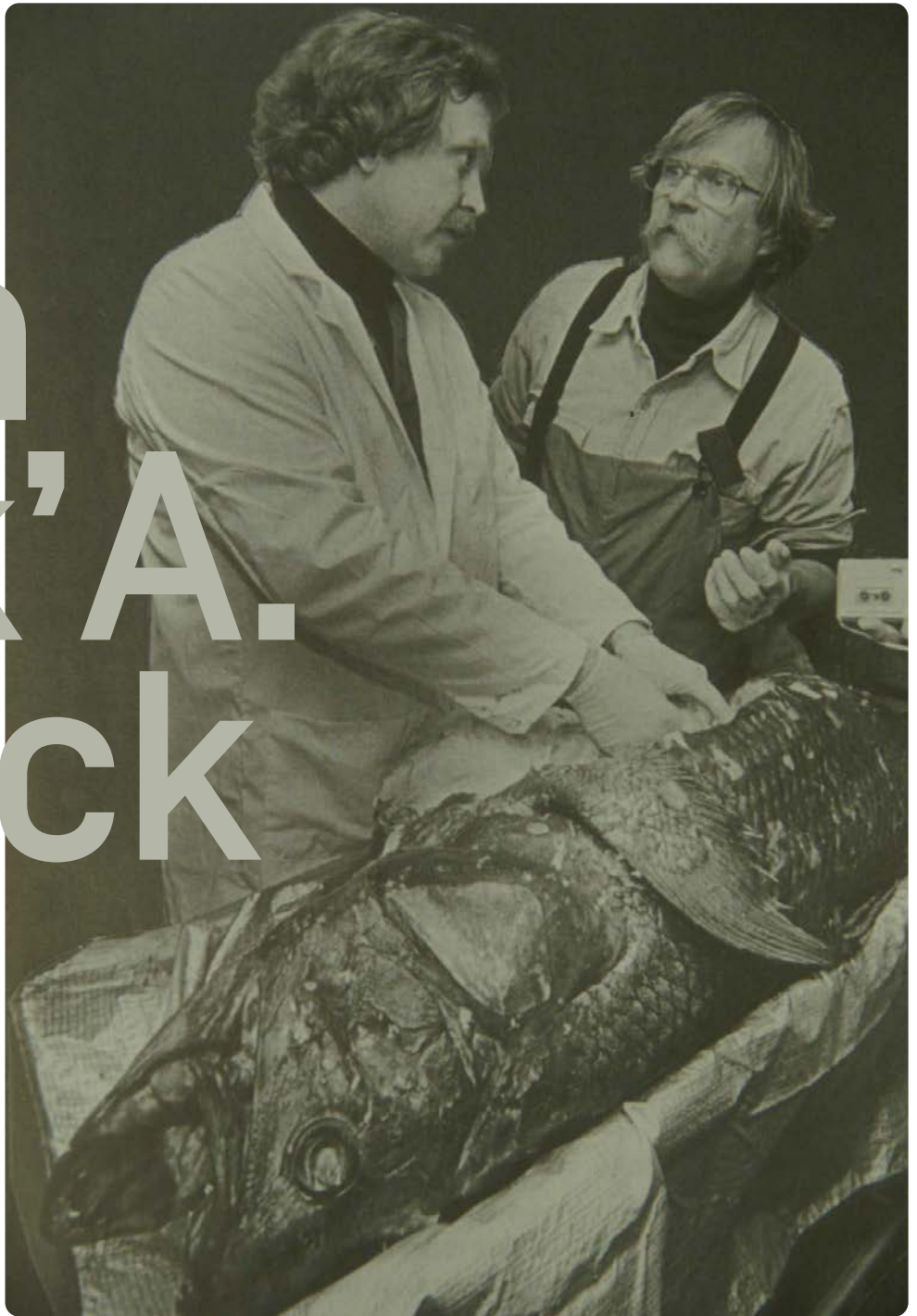
'I am delighted to have been appointed the chair of the new Integrative Taxonomy Group within the IUCN SSC Shark Specialist Group. One of the main reasons I am drawn to taxonomy is piecing together the subtle differences between poorly known elasmobranch species. It is like doing a puzzle, trying to find missing pieces to connect things – to find links between animals. Sometimes you see that something is different between animals, but you do not even know what is different. Such detective work is among the reasons why taxonomy is a fascinating field of research. I look very forward to working together with my colleagues in this new group and collaborating and exchanging with other IUCN SSC SSG groups.' Dr. Simon Weigmann

John 'Jack' A. Musick

January 12, 1941 - February 13, 2021

Faculty Emeritus | Fisheries Science |
Virginia Institute of Marine Science (VIMS)
Emeritus Member | IUCN SSC Shark
Specialist Group (SSG)

Written by Beverly McMillan Musick



Photos by Jack Musick through Dean Grubbs

John Andrew Musick, known to all as Jack, passed away at home in Gloucester, Virginia, on February 13, 2021. Jack had celebrated his 80th birthday a couple of weeks earlier, feted by a flock of plastic flamingos on the front lawn and cheered by his wife, Beverly, his daughters Kate and Susanna, and their families, a video tribute from dear friends who could not be present, and a raucous cocktail-time motorcade of those closer to home. Anyone who knew Jack at all well won't be surprised to learn that a couple of fingers of Lagavulin, an excellent, smokey single malt, were in the glass he lifted to the passing parade.

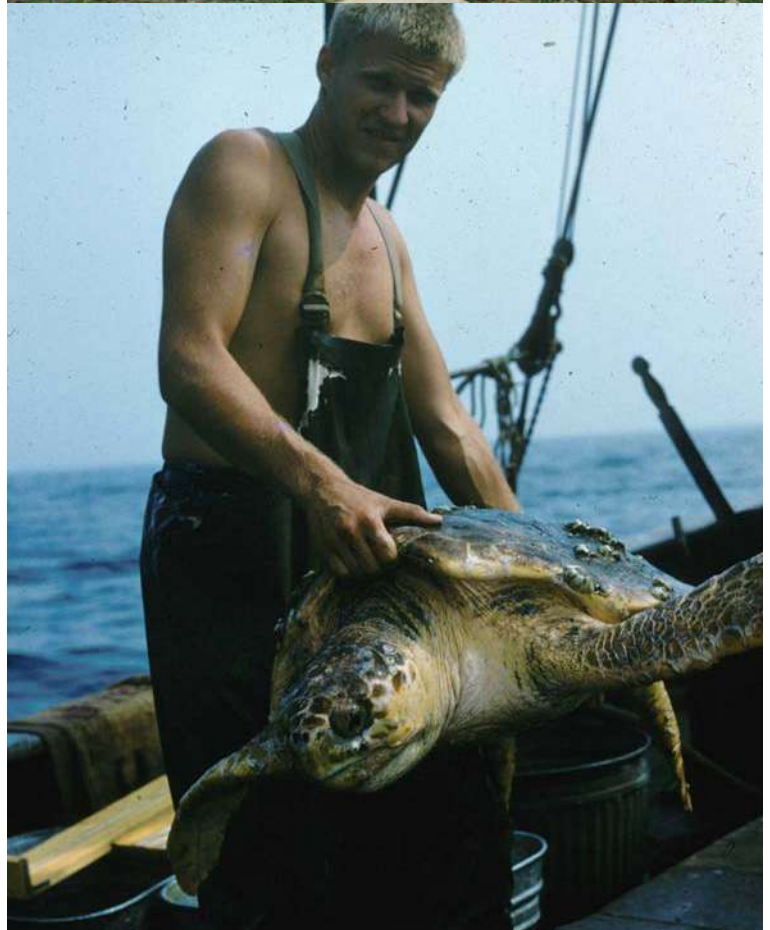
Jack's entire life was a lesson in excellence and the many spiritual and intellectual rewards to be gained by following your bliss no matter where it leads. Born in Trenton, New Jersey, the only child of Helen Blaskovitz Musick and his lawyer father John A. Musick, Jack spent his boyhood prowling the (then) nearby natural areas in search of critters large

and small, including any snake he could stuff into a pocket (a lifelong habit that included transporting a "rescue reptile" cross-country on United Airlines before the advent of TSA searches) as well as frogs, toads, worms, cool bugs and the occasional moribund bird that his extraordinarily loving and tolerant parents allowed him to bring home for hours of further study in the cellar.

After his father's untimely passing when Jack was 12, his mother marshalled uncles and friends to help nurture Jack's blossoming interest in fishes, particularly the marine species that he could catch along the Jersey shore. An undergraduate degree from Rutgers University and a masters and PhD from Harvard University prepared Jack to live his bliss: A life's work as a marine scientist, starting with doctoral work at Woods Hole Oceanographic Institution and then a lowly instructor's position in the marine science program carried out at the small Gloucester Point facility overseen at the time by the



Jack Musick makes music during a 1961 fisheries cruise



University of Virginia. Over the next 42 years at what evolved into the prestigious Virginia Institute of Marine Science (VIMS) of the College of William and Mary, Jack's passion for studying all things fishy would lead him to establish the VIMS fish collection (now the renowned Nunnally Ichthyology Collection) which today contains approximately 350,000 specimens used for study and research by scientists around the world.

Over time Jack attained every possible academic rank, from assistant and associate professorships to Professor of Marine Science and head of Vertebrate Ecology and Systematics. In 1999 he was named to the first Marshall Acuff Chair in Marine Science, which he held until his retirement in 2008. He was senior author or coauthor of 170 scientific papers, served as coauthor and editor of 14 scientific books and proceedings, and coauthored 8 trade books, four of them with his wife Beverly, a science writer. Their book *The Shark Chronicles* detailed Jack's life and times studying sharks with a posse of other prominent researchers. He was also an author and editor of the seminal *Field Guide to Fishes of the Chesapeake Bay*.

In addition to his research and publishing work, Jack wholeheartedly embraced teaching and mentoring students in the VIMS graduate School of Marine Science. In the classroom, on longlining cruises and in other field work, he found deep personal satisfaction in training new generations of marine scientists, encouraging them to publish their work in the scientific literature and watching them grow into accomplished researchers and fine teachers themselves. All told Jack served as a Major Advisor to 50 graduate students awarded the PhD and 38 awarded master's degrees.

Jack's abiding fascination with sharks drove much of his research and scientific publications through the decades. He was a founding member and early president of the American Elasmobranch Society (sharks and their kin). An ardent advocate for shark conservation, Jack was instrumental in convincing Congress to pass legislation regulating commercial shark fisheries along the eastern seaboard while supporting recreational fisheries. In the early 1970s he established what became the world's longest time series of annual shark surveys, a tool that to this day continues to help with global shark management. This and other seminal research led to Jack serving many years as co-chair of the Shark Specialist Group of the International Union for the Conservation of Nature (IUCN), for which he traveled the globe in support of shark research and conservation efforts.

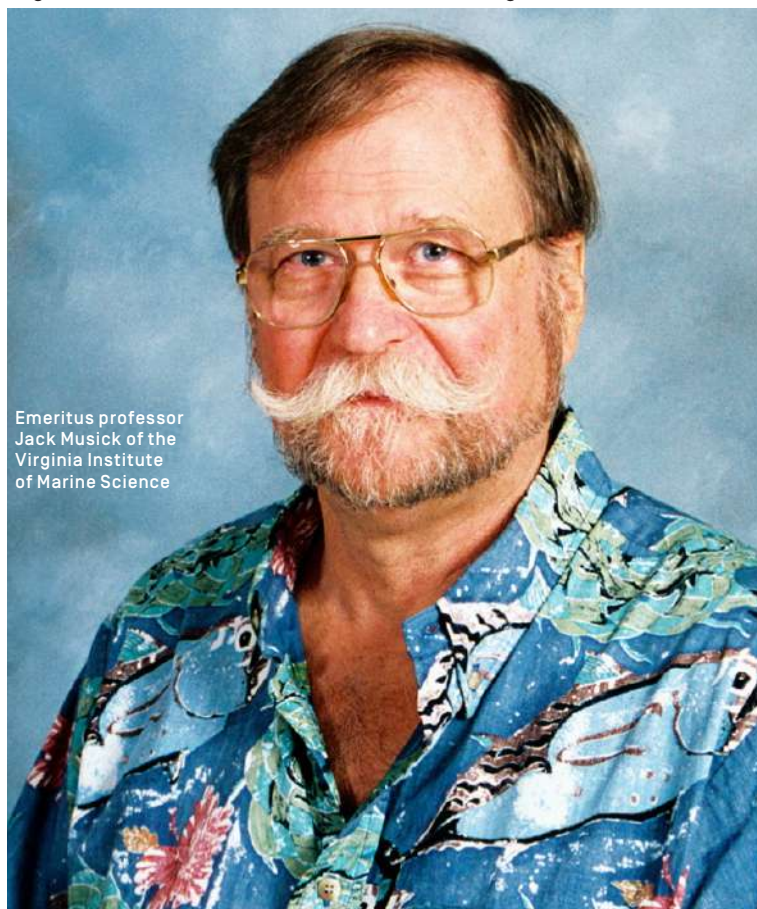
Not content to stick solely to sharks and other fishes, in the late 1970s Jack responded to a graduate student's wish to study sea turtles by launching a VIMS research program on those endangered marine reptiles. He eventually cofounded and served as president of the International Sea Turtle Society (ISTS) and helped pioneer the use of satellite tracking to better understand the biology and life history of leatherback and loggerhead sea turtles. For more than 25 years he served as Regional Coordinator for Virginia for the National Marine Fisheries Service Sea Turtle Stranding Network. In 2017 Jack received the ISTS lifetime achievement award in recognition of his lifetime of accomplishment toward the study and conservation of sea turtles.

These few facts barely scratch the surface of the career Jack pursued with so much passion and brilliance. His many awards include the Outstanding Faculty Award bestowed by the State Council on Higher Education in Virginia (SCHEV), the Thomas Ashley Graves Award for Sustained Excellence in

Teaching, the Lifetime Achievement Award in Science, Commonwealth of Virginia, the American Elasmobranch Society Distinguished Service and Leadership Award, and the Distinguished Service and Excellence in Fisheries Education awards of The American Fisheries Society, which elected Jack as a Fellow in 2015. Jack was also a National Fellow of the Explorers Club (New York) and a Fellow of the American Association for the Advancement of Science.

Jack was a beloved husband, father, stepfather, Pop-Pop and bonus grandpa, roles he cherished with all his heart. In addition to his wife Bev, he is survived by his daughters Kate Musick and Susanna Musick Pearson; Susanna's husband Mark Pearson; Kate's children Zane and Zoe Musick-Williams and Susanna and Mark's son Alex Pearson. Jack was an attentive stepfather and bonus grandpa to the family's California contingent: Sean Azarin and his sons Connor Azarin-Burdine and Seneca Azarin-Burdine. He also deeply valued his lifelong connection with the Musick cousins in New Jersey: Tom and his wife Deb and their sons Andrew, Matt, and Phil; Phil's wife Heidi and their son Peter. His French Brittany spaniel Goldie was his constant companion, following along wherever the Big Dog went.

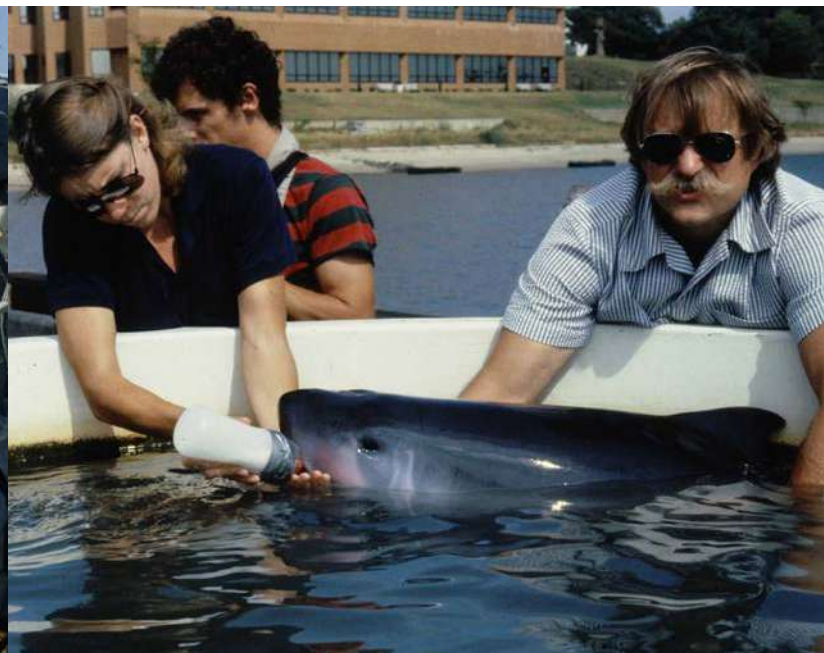
In accordance with Jack's wish to keep things simple, no funeral is planned. Jack always loved a party, though, and such a huge life deserves a huge celebration, which is being planned for later this year when and where people can gather more safely. To anyone wishing to make a memorial contribution, please consider donating in Jack's memory to any of the following: The VIMS Foundation/General Graduate Student Fund, Attn. Susan Maples, P.O. Box 1346, Gloucester Point, VA 23062; the Nature Conservancy (support.nature.org/donate), Friends of the Dragon Run (www.dragonrun.org), The Society for Conservation Biology (www.conbio.org) or any other worthy organization dedicated to environmental good works.



Emeritus professor
Jack Musick of the
Virginia Institute
of Marine Science



Gavin Naylor, Jack Musick
and José Castro, 2017



Jack Musick and students prepare
to release a tagged sea turtle.





David Ebert and the Flapnose Houndshark taken in 2020 in Kwa-Zulu-Natal, South Africa. This shark was tagged and released for the Shark Week program "Extinct or Alive: Land of the Lost Sharks".

Curious about what shark species occur in South Africa? First SA Shark checklist – Published

A first ever dedicated checklist of South Africa's chondrichthyan fauna provides a current list of all sharks, rays, skates and ghost sharks that occur in South African waters, their distribution and current IUCN Red List status.

Makhandla, South Africa – David Ebert, (Research Associate to SAIAB) who is popularly known as the Lost Shark Guy spearheading global efforts to find and discover little and unknown sharks, has published a first of its kind monograph for South Africa's chondrichthyan fauna. The monograph titled, "An annotated checklist of the chondrichthyans of South Africa" provides a current list of all sharks, rays and ghost sharks that occur in South African waters. Ebert said, "The monograph provides a quick one-stop reference to determine what species are found in South Africa, their distribution and their current IUCN Red List status. The monograph provides not only the current scientific names, but also the historical names, so you can trace the shark's genealogical name." The publication of the monograph means that conservationists now have a quick reference to determine if a scientific name is still correct or whether it may have changed. In describing each species, the monograph provides some interesting remarks about it. Among the many interesting facts about South African sharks listed in the monograph, in describing the Whale Shark for example, the monograph states: "Did you know Andrew Smith named the Whale Shark the world's largest fish in 1828 from a specimen caught in Table Bay? Yes, the world's largest fish was named from a specimen caught in South African waters."

Following public concern about shark populations along the South African coast, the South African Department of Environment Forestry and Fisheries (DEFF) recently released the official report on the National Plan of Action for the Conservation and Management of Sharks (NPOA-Sharks) in South Africa. Information on the population status and impact of fisheries on sharks is sparse. This is mainly because sharks are mostly caught as bycatch and the management and conservation of sharks is hindered by a lack of data. As a result, for any conservation plan to be effective, it requires accurate knowledge of the species involved. Therefore, for fishery and management agencies to develop improved conservation and management policies to achieve the actions of the NPOA-Sharks, a monograph like this is critically important as it shows what species exist within South African waters.

Speaking on what the publication of the monograph means for South Africa and the country's understanding of sharks, Ebert said, "Many of the lesser-known species, those that

I refer to as Lost Sharks, may be disappearing before our eyes without anyone paying any real attention. For example, two sawfish species were historically known to occur in South African waters, but none have been seen since 1999, making us wonder what other species are disappearing or have gone extinct without us even knowing they existed." This means that there is still much more to be discovered about these 'Lost Sharks' that may be disappearing globally and how their absence is causing serious repercussions on the environment.

The publication of the monograph also highlights the importance of taxonomy in shark conservation, as the classifying and naming of species is integral to wildlife conservation and in providing the bedrock for our understanding of sharks. In order to develop proper conservation or management policies, it is vital to know what species exist and how they are related and thus, scientists can understand their role within the ecosystem. As one of the leading shark taxonomy specialists in the world, Ebert said that when he started working with the IUCN Shark Specialist Group 20 years ago, "there were Red Listed species that did not even exist. The scientific names had been synonymised and the species were no longer valid." Ebert added that, "known species that should have been assessed were not being assessed." Therefore, combined with the most recent IUCN Red List assessment, this monograph provides the most up-to-date list of all known shark species in South Africa's waters, which will form a foundation to develop future research and improved conservation and management policies. This is particularly important as South Africa has a high number of endemic species, "it is crucial for shark conservationists to know the names of the species they are trying to develop conservation plans for," said Ebert.

South Africa is one of the top five global hotspots for chondrichthyans, only sitting behind Australia, Indonesia, Japan and Brazil. South African waters harbor 191 chondrichthyan species and one-third of the global fauna. Of these, 70 are endemic to southern Africa, meaning they are unique to the waters of southern Africa. There is also a high degree of endemism [16 species] in South Africa and near-endemism of the species represented in this monograph. Some of the unique shark species, most of which only occur in South Africa's waters and which are listed in the monograph are the Shy Sharks



Austin's guitarfish (*Rhinochimaera austini*), Durban, South Africa

(*Haploblepharus*) and other endemics include the Flapnose Houndshark (*Scylliogaleus quecketii*) and the Ornate Sleeper Ray (*Electrolux addisoni*). These two species only occur along a couple of hundred kilometers of our coastline and nowhere else in the world. The monograph lists that, “45% [50 of 111 species] of all shark species and 33% [24 of 72 species] of all ray species in South African waters are at risk of extinction.” These numbers vividly highlight why it is important to know what species occur within South Africa. Ebert said, “Knowing the species that occur here will help [in the short term] to give names to the individual species, so that we know what species are involved. The long-term benefit is that this monograph has laid the foundation for future research, management and conservation of South Africa’s shark fauna.”

South Africa has a long rich history of Shark research going back to the early 1800s.

Did you know that the Longnose Pygmy Shark (*Heterosymnoides marleyi*), an entirely new genus and shark species, was found on a beach near Vetch’s Pier, Durban in 1923? It is one of the rarest sharks in the world with only six known specimens to date.

How about the Velvet Dogfish (*Zameus squamulosus*), first recorded from South Africa based on four partially digested specimens found in the stomach of a Sperm Whale harpooned off Durban in 1971.

One of the most amazing discoveries was the Taillight Shark (*Euprotomicroides zantedeschia*), discovered in 1963 off Cape Town, its name comes from a bioluminescent fluid it secretes from glands located at the base of its pelvic fins; this is a true glow-in-the-dark shark.

There is still more to look forward to, as South Africa’s next newly named shark species will be published in the next issue of the journal Marine Biodiversity, adding one more species to the South African fauna. Are there still more new species to be discovered in South African waters? Ebert believes there definitely are.

Support for this project was provided by SAIAB, the South African Shark and Ray Protection Project implemented by WILDOCEANS (a programme of the WILDTRUST) and funded by the Shark Conservation Fund, which supported Ebert in the compiling and writing this monograph.

“It was a privilege for the WILDOCEANS’ Shark & Ray Protection Project to contribute to this product and to support the amazing work of David Ebert,” said Dr Jean Harris of the WILDTRUST. “This is the first published paper linked to the project – which is hugely exciting for us and South Africa. Considering that sharks and rays are one of the most endangered taxa on the planet and South Africa has the opportunity to be a sanctuary for the species, this valuable product could not have come at better time.”

Acknowledgements

A monograph of this magnitude was the result of decades of research and help from numerous people, and Ebert thanks all those who have shared their knowledge and information.

He said, “There are several people and organizations who were especially helpful to me in getting this monograph through to fruition. At the top of the list is my good friend Paul Cowley, who I started out with on this journey to study South Africa’s shark fauna 35 years ago. Roger Bills and the collections staff at SAIAB, especially Mzwandile Dwani, Nkosinathi Mazungula and Vuyani Hanisi who were instrumental in helping me access specimens in the SAIAB Collections Facility. A big thank you to Angus Paterson and Alan Whitfield for their research support over the past 10 years. Elaine Heemstra for patiently answering my numerous pesky questions on specimens she and her husband, Phil, had collected. My good friends and colleagues, including Robin Leslie and Sheldon Dudley (DEFF), Bruce Mann and Sean Fennessy (ORI), Jeremy Cliff (Sharks Board), and Rhett Bennett and Dave van Beuningen (Wildlife Conservation Society, South Africa). Finally, I want to give a big thanks to my co-authors, Sabine Wintner and Peter Kyne, for their huge efforts and knowledge in compiling this monograph.”

The monograph can be found from these links:
mapress.com/j/zt/article/view/zootaxa.4947.1.1
doi.org/10.11646/zootaxa.4947.1.1

To take action and learn more, follow:

@LostSharks (Facebook), @LostSharksGuy (Twitter) and @LostSharkGuy (Instagram)

The @SHARKATTACKCAMPAIGN (Facebook & Instagram), @SharkAttackSA (Twitter) and sharkattackcampaign.co.za/take-action/.

Putting a face to a name



Egg capsule and different maturity stages of *Bathyraja arctowskii*, clockwise from the eggcase on the right: egg capsule, 77.6 mm long, ZMH 9014; near-term male embryo, 120 mm total length (TL), ZMH 9014; juvenile female, 236 mm TL, ZMH 121822; subadult male, 424 mm TL, ZMH 121822; adult male, 533 mm TL, ZMH 120216. Scale bar: 5 cm.

Description of a new species of skate hitherto known only from egg cases described over 100 years ago

Written by Simon Weigmann

Chair | Integrative Taxonomy Working Group |
IUCN SSC Shark Specialist Group (SSG)
Associate Scientist | Center of Natural
History | University of Hamburg
Chair | German Elasmobranch Society (D.E.G.)



B*athyraja arctowskii* is an exceptional case in skate taxonomy as it was named by Dollo in 1904 based only on three empty egg capsules of tiny size from off the Antarctic Peninsula. The species as such remained undescribed for more than 100 years. The reason was the lack of specimens that could be assigned to Dollo's small egg capsules. Although Southern Ocean skates have generally been studied relatively well and are not as diverse as those in other areas, this species had been misidentified as a larger congener, *B. griseocauda* [Norman], or a new species for more than a century. In contrast, the species name *Raja arctowskii* was either neglected or considered a nomen nudum as it was not possible to link the empty egg capsules to any skate specimens. According to the International Commission on Zoological Nomenclature, a nomen nudum is a term used for a name that is not available due to the lack of a description, reference or indication.

In the first edition of "Fishes of the Southern Ocean", Stehmann & Bürkel [1990: 88, 94] mentioned, keyed out and commented on a *Bathyraja* sp., which appeared to be the most abundant skate species in the Atlantic sector of Antarctic waters, primarily in the Weddell Sea. A specific account was not given by Stehmann & Bürkel [1990] due to its unresolved nomenclatorial problem. Later, Matthias Stehmann was able to find a gravid female of a small *Bathyraja* sp. that contained two small egg capsules and linked the egg capsules to those described as *Raja arctowskii* by Dollo back in 1904. Thus, Matthias Stehmann, Gavin Naylor and I teamed up to finally resolve this issue and comprehensively redescribe the species.

The Zoological Museum Hamburg [Germany] has an extensive collection of skates, including 276 complete specimens and 40 egg capsules of a small *Bathyraja* sp. When I examined this material, however, I could not find the gravid female that Matthias Stehmann had detected years ago and which we planned to use as evidence for the conspecificity of this small skate species with Dollo's *Raja arctowskii*. Therefore, other evidence was needed, which I finally found while examining the 40 small – about 8 cm long and 4 cm wide – egg capsules at ZMH: one of the egg capsules, which were conspecific with the syntype egg capsules of Dollo's *R. arctowskii*, contained a near-term embryo. And when we compared the embryo in detail with other specimens of different maturity stages and sexes, we could prove their conspecificity (Figure 1). This enabled us to describe *R. arctowskii*, including external and skeletal morphology, morphometrics and meristics, clasper morphology and skele-

ton, scapulocoracoid (shoulder girdle) pelvic girdle, as well as genetics. Based on the claspers' characteristics, assigning the species to the genus *Bathyraja* Ishiyama unambiguously was possible. Growing to just 61 cm long, it represents the smallest known species of this species-rich deep-water skate genus. Some specimens of *B. arctowskii* are quite heavily spotted, making the species more strongly patterned than many of its plain dark congeners. Considering their occurrence in deep waters, pronounced color patterns are rarely needed.

Detailed examinations of the syntype egg capsules in the IRSNB collection in Brussels [Belgium] were planned but prevented by the SARS-CoV-2 / COVID-19 pandemic. Nevertheless, Thomas Reinecke and I still intend to get back to this topic, combined with more detailed examinations of the microscopic morphology of teeth, denticles, and thorns in the future.

Several further issues still exist in this genus, including a possibly undescribed species in Antarctic waters, which we briefly characterized in our paper on *Bathyraja arctowskii*, as well as a general issue with the validity of the two genera *Bathyraja* [currently containing 53 valid species] and *Rhinoraja* Ishiyama [now comprising four valid species]. As both genera's differentiation solely relies on the presence or absence of segmented rostral cartilage, the separation into two genera has been questioned. The hypothesis of congenerity is supported by unpublished mitochondrial molecular data, which indicate that at least two of the four species of *Rhinoraja*, *R. longicauda* Ishiyama and *R. taranetzi* Dolganov, are deeply nested within *Bathyraja*. An ongoing collaborative project with several further colleagues on the differentiation of these genera and the validity of several poorly-known species aims to collect molecular and morphological data for all four species of *Rhinoraja* and compare them in detail to a large set of data taken from various valid species of *Bathyraja*. The project will also investigate several other issues related to many species of *Bathyraja*, particularly several possible synonymies and the elevation of subgenus *Arctoraja* Ishiyama to full generic rank.

Main reference: Stehmann*, M.F.W., Weigmann*, S. & Naylor, G.J.P. [* equal contribution authors] First complete description of the dark-mouth skate *Raja arctowskii* Dollo, 1904 from Antarctic waters, assigned to the genus *Bathyraja* (Elasmobranchii, Rajiformes, Arhynchobatidae). *Marine Biodiversity*. 51, 18 [2021]. doi.org/10.1007/s12526-020-01124-1

Founding

By Jasmin Graham



The Context

I've been in shark science now for seven years. It's been an interesting journey. I enjoy working with sharks and rays, and I've met some incredible people along the way, but it has not been all rainbows and butterflies. A lot of that has to do with things that I'm dealing with that add extra stress to being a scientist with nothing to do with my abilities and have everything to do with my identity as a Black woman and how people react to that identity. I think it is important to say that my experience is different from a lot of people because I am a woman and because I'm a person of color. I think that is something that we don't acknowledge a lot in science. I'm telling you all of this to set the stage for the founding of MISS. To understand the mission of MISS, you have to understand the context that many women of color exist in. Many people want to believe science is a perfect meritocracy, where it doesn't matter who you are or where you come from; if you work hard, you will succeed. Unfortunately, that is not true. There are different issues that women of color have to deal with. For women of color in shark science, the field can feel isolating at best and hostile at worse.

When these things are brought up, which is thankfully happening more and more, people become dismissive, but the matter is that marine science, particularly in shark research, is not diverse. We have many challenges to deal with to protect sharks, and we need all hands on deck. We need all voices, we need all backgrounds, and we need all ideas. Diversity in scientists leads to diversity in thought, which is the only way true innovation can happen. The mission of MISS is to support women of color interested in shark research to make sure their voices are valued, recognized and heard.

The Origin Story

When Carlee Jackson, Amani Webber-Schultz, Jaida Elcock, and I found each other on Twitter, we felt the feeling of isolation lift for the first time. We had no idea how isolated we felt and how much we needed community until we found it at that moment on Twitter. It's like when you're thirsty, and you get that first sip of water, and you realize just how thirsty you were. When we began our journey, we had one goal: to host a free workshop for women of color to build community, get professional development training and experience in the field. The financial barriers to getting involved in this field are insurmountable for many, so we wanted to make sure that participants didn't have to pay for travel, food or anything else. To make this happen, we decided to launch a fundraiser. We quickly raised more than enough money to host the workshops, and we started talking about other ways we could support women of color in shark science. We decided to expand our goals. We also began taking members, and we were amazed at just how many people responded. We now have about 250 members representing 18 different countries. MISS gives women of color a collective voice to address the problems facing women and people of color in shark research. The ugly truth is that many concerns expressed by people from marginalized communities are ignored or explained away. Still, if you have 250 people with the same experience, you can't ignore it.



Photo by Kristin Palmrose

The End Goal

People often ask me what the end goal of MISS is. The end goal is that one-day, MISS doesn't need to exist anymore. We will have been successful when the barriers are removed, and it is just as likely for a person of color or a woman of color to get into shark science as it is for a white man. When science spaces become places where people don't feel isolated and where they feel welcome and respected and equally valued, that's when the work of MISS will be finished. That's the goal. Our goal is not for us to run forever. Our goal is for us to run until the rest of the field catches up. I'm optimistic; things are starting to change, and as we continue to call for things to change collectively, things will get better.

The Effect

To understand the effect the creation of MISS has had, I want to share the thoughts of one of our MISS members, Triana Arguedas:

«I was incredibly excited when you announced that MISS was a thing now. The system was not built for us or made for people like us, and I saw it as an opportunity to mentor other women of color. I have had unique experiences as a first-generation Mexican-American, a Jewish person and a woman. I can, therefore provide a unique perspective and





empathize with people who have similar backgrounds.

I saw people leaving professional societies because they felt isolated and excluded, and they needed something like MISS when they were in fledgeling stages of their professional career. I am one of the lucky few where my undergrad mentor is a person of color, but he was, and I think still is, the only person of color in the department. He very much is why I am still in shark science today because having someone that looks like you or at least someone that you can align with really makes a difference in how you internalize your differences. It doesn't seem unrealistic anymore because they did it, so why can't I?»

The Future

In 2021 we will be hosting two workshops on the Field School's R/V Garvin and providing fellowships to five women of color to participate in research experiences at Bimini Biological Field Station and Oceans Research. We will continue to host monthly professional development and networking events for our members as well. Besides, we are launching our Gill Guardians program, which will serve as an educational hub for the general public to learn about elasmobranchs and elasmobranch conservation. Content will be available for students in grades K-12 as well as for adults. We hope to expand this program and

offer a summer camp in 2022 for students to learn about elasmobranch conservation. As we continue to grow, we will speak out against discrimination in shark research, work to mitigate financial barriers to make the field more accessible and engage with kids beginning at a young age to make sure future generations are good stewards of the marine environment.

Get Involved

If you would like to get involved with MISS, you can visit our website or follow us on social media. There are several ways to support our organization, including becoming a Friend of MISS, making a donation, joining our mailing list, amplifying our mission in your networks or volunteering. We are always on the lookout for great partnerships and collaborations as well as sponsors. If you or your organization wants to work with MISS to support our mission of diversifying the field of shark research, feel free to email us at execboard@misselasma.org. Lastly, if you identify as a woman of color*, we also invite you to become a member of our vibrant community.

*We recognize that both race and gender are social constructs. Identity is personal and doesn't always fit into boxes. If you want to be part of this group, we have a place for you.

Jasmin Graham is a marine biologist and environmental educator who specializes in elasmobranch (shark and ray) ecology and evolution. Her research interests include Smalltooth Sawfish movement ecology and hammerhead shark phylogeny. She is a member of the American Elasmobranch Society and serves on their Student Affairs Committee as the Early Career Representative. Jasmin has a passion for science education and making science more accessible to everyone. She is project coordinator for the MarSci-LACE project, which is focused on researching and promoting best practices to recruit, support and retain minority students in marine science. Jasmin is the CEO of Minorities in Shark Sciences, an organization dedicated to supporting women of color in shark sciences. She is excited to help open doors for more underrepresented minority students to join the exciting field of marine science. Jasmin's work encompasses the areas of science communication, social justice, outreach, education and conservation. She cares deeply about protecting endangered and vulnerable marine species, particularly elasmobranchs. She works in collaboration with Havenworth Coastal Conservation to study movements of elasmobranchs in Sarasota Bay. She has been featured on «Dive In with Sylvia Earle» and «StarTalk with Neil DeGrasse Tyson» as well as several other podcasts and webinar series. She was also an organizer for the 2020 «Black in Marine Science Week» and is a member of Black Women in Ecology, Evolution and Marine Science [BWEEMS]. Jasmin graduated from the College of Charleston in 2017 with a B.S. in Marine Biology and a B.A. in Spanish. She went on to receive her MSc. in Biological Science from Florida State University in 2020 through the National Science Foundation's Graduate Research Fellowship Program.



Recently published

Field Guide to Sharks, Rays, & Chimaeras of Europe and the Mediterranean by David Ebert and Marc Dando

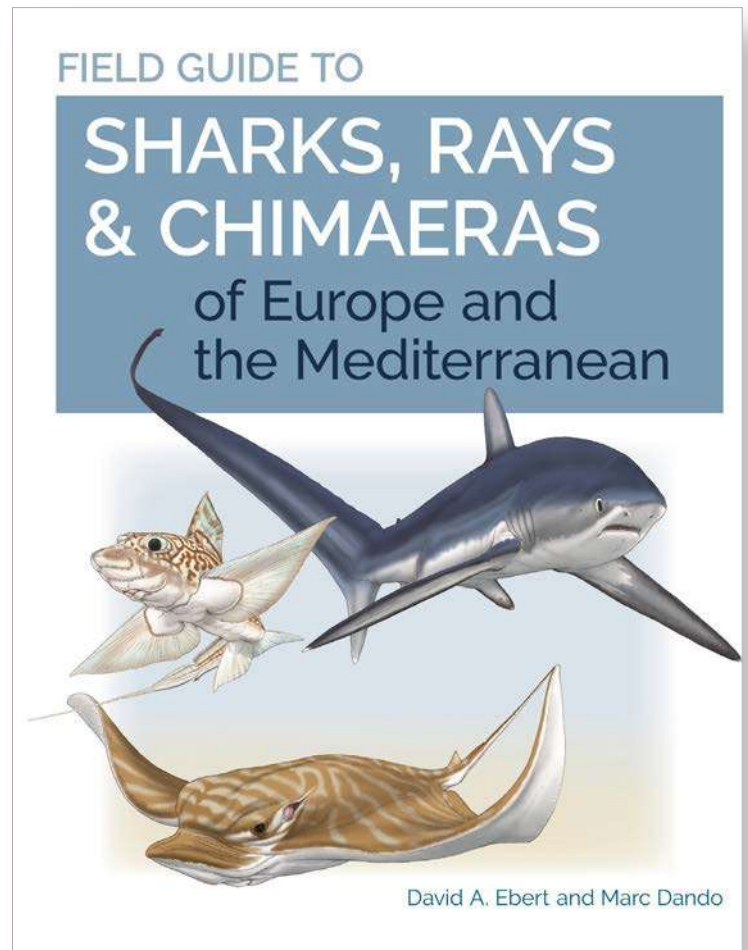
The waters of the Northeast Atlantic and Mediterranean Sea are home to an amazing variety of sharks, rays, and chimaeras. The newly published *Field Guide to Sharks, Rays, & Chimaeras of Europe and the Mediterranean* covers all 146 species found in the Mediterranean, the waters of the European Atlantic and Iceland, along all the Scandinavian coasts, in the Black Sea and as far south as the Canary Islands. The region can lay claim to the 10th most diverse chondrichthyes fauna in the world; representing nearly 12% of all known species, including about 25 endemic European Atlantic and nine endemic Mediterranean Sea species.

During the preparation of the book several vagrant species new to European Atlantic waters were recorded for the first time and have been included in the guide: the Crocodile Shark [*Pseudocarcharias kamoharui*], Night Shark [*Carcharhinus signatus*] and Sicklefin Chimaera [*Neoharriotta pinnata*]. Three Lessepsian migratory species, which have immigrated into the eastern Mediterranean through the Suez Canal from the Indian Ocean, one of which is the Blacktip Reef Shark [*Carcharhinus melanopterus*], are also included. African Gulper Shark [*Cetorhynchus lesleiei*], the most recently described shark known to occur in the region, and Duhamel's Catshark [*Scyliorhinus duhamelii*], a rare endemic Mediterranean Sea species only recently found to be distinct from the well-known Smallspotted Catshark [*Scyliorhinus canicula*] are also included.

Lavishly illustrated this guide is packed with an extraordinary level of detailed information. Following an introduction on biodiversity and habitats is an extensive section on conservation and management in the region by Ali Hood [Director of Conservation at the Shark Trust]. The introduction is concluded with a How to Use this Book section including a comprehensive topography of chimaeras, rays and sharks, and a subsection on tooth types.

Key guides are a fundamental and integral part of this publication. Our aim is to enable any reader to be able to identify any cartilaginous fish to species level. The key guides start with a fully illustrated dentition and eggcase guides to the main groups in this book. The reader is then taken onto the start of the species illustrated key guides. These appear throughout the publication and are designed as a step-by-step process [dichotomous] for aiding identification; from order to family, genus and finally species. Some of the species such as the demon catsharks [*Apristurus* spp.] are extremely difficult, even for experts to identify. The key guides contain the most current information available to aid identification of these more challenging species. Scattered throughout the book are also comparison plates to further help identification.

Each species has a full-page account, which includes comprehensively labelled colour illustrations, at-a-glance information icons, a depth guide, size guide, and distribution map.



Accompanying text describes the key external characteristics, information on habitat, biology [including reproductive mode, age and diet], and the IUCN Red List status for the region.

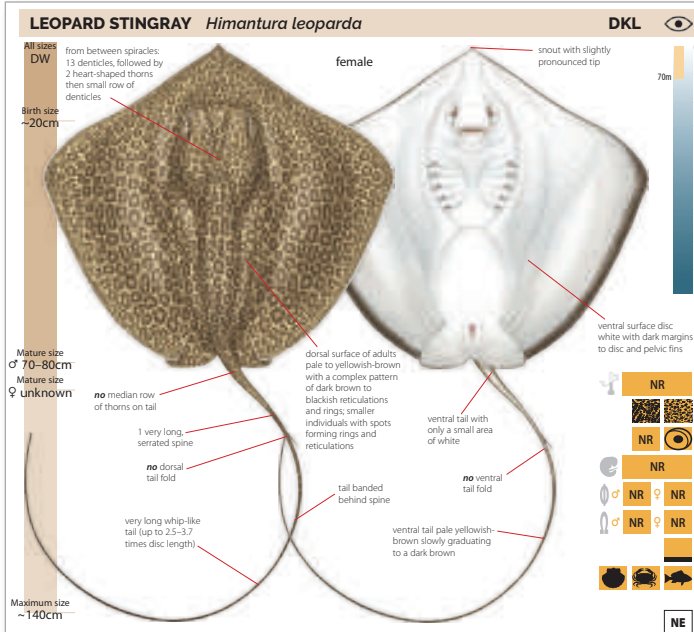
Finally four appendices cover: a glossary; maps showing regional depths, sea currents, average salinity, sea surface temperatures, marine climate zones, and continental shelf and oceanic zones; field observations which includes a general introduction, a best practice handling guide and a comprehensive illustrated key measurements guide; and a regional shark fin identification guide.

This guide is an essential resource for fisheries management, trade regulation and shark conservation, and anyone with a keen interest in learning about sharks and their relatives occurring in European Atlantic waters and the Mediterranean Sea. As Paul Cox of the Shark Trust says "This book is the definitive field guide to the sharks, rays, and chimaera of Europe and the Mediterranean."

David A. Ebert is program director of the Pacific Shark Research Center and a research faculty member at Moss Landing Marine Laboratories. Twitter @LostSharksGuy Instagram @LostSharkGuy Facebook @LostSharks

Marc Dando is a scientific illustrator and publisher whose books include Guide to the Manta and Devil Rays of the World and A Pocket Guide to Sharks of the World. Twitter @dando_marc Instagram @marc.dando.92

Field Guide to Sharks, Rays, & Chimaeras of Europe and the Mediterranean by David Ebert and Marc Dando is available now from all good bookshops including direct from Princeton University Press.



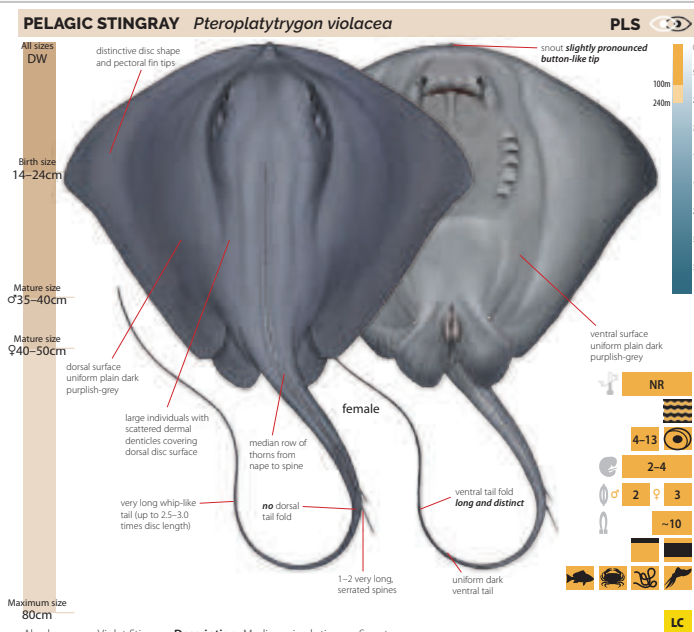
LEOPARD STINGRAY *Himantura leoparda*

DKL



Description Large stingray. Snout broadly triangular. Disc weakly diamond-shaped; pectoral fin tips broadly rounded. A whip-like tail 2.5–3.7 times disc length with one very long, serrated spine on base. Mid-disc with two heart-shaped thorns, preceded by a single row of up to 13 smaller, similar shaped denticles, followed by a smaller row of denticles. **Colour** Dorsal surface in adults whitish to yellowish brown with complex pattern of dark brown to blackish reticulations and rings; maturing individuals with spots forming reticulations and rings; newborns with mostly large black spots; tail with banding pattern behind stinging spine. Ventral surface mostly white. **Dentition** 56–59 rows in each jaw. **Habitat** Inshore waters along coastal and insular shelves. Found on soft bottoms from close inshore to about 70m. **Biology** Viviparous, but nothing else known. Feeds mainly on benthic crustaceans, molluscs and fishes. **IUCN Red List Status** Not evaluated in the Mediterranean Sea.

148 STINGRAYS AND RELATED SPECIES MYLIOBATIFORMES

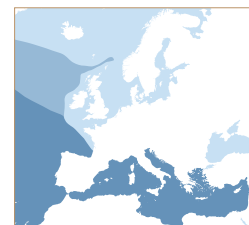


PELAGIC STINGRAY *Pteroplatytrygon violacea*

PLS

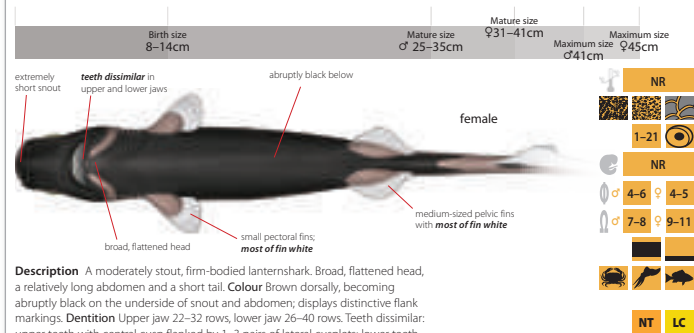
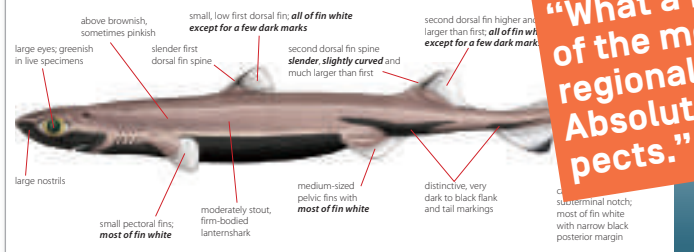


Also known as Violet Stingray. **Description** Medium-sized stingray. Snout very short, bluntly rounded. Disc with a subtriangular shape; pectoral fin tips acute. Whip-like tail 2.5–3.0 times disc length with 1–2 very long, serrated spines at base and a long, distinct, membranous ridge on ventral tail past the spines. Larger individuals with scattered dermal denticles on dorsal disc surface and a median row of small thorns from nape to tail spine origin. Ventral surface smooth. **Colour** Both surfaces are a uniform plain dark purplish. **Dentition** Upper jaw 25–34 rows, lower jaw 25–39 rows. **Habitat** Pelagic and oceanic, unique among stingrays. Found in the open ocean and off continental and insular shelves in the upper 100m of the water column; possibly deeper. **Biology** Reproductive period of 2–4 months and litter size of 4–13 young. Males and 3 years for females, with pelagic invertebrates, crustaceans, jellyfish, and small fish. **Distribution** Due to its widespread, almost circumglobal,



DASYATIDAE STINGRAYS 149

VELVET BELLY LANTERNSHARK *Etmopterus spinax*



Description A moderately stout, firm-bodied lanternshark. Broad, flattened head, a relatively long abdomen and a short tail. **Colour** Brown dorsally, becoming abruptly black on the underside of snout and abdomen; displays distinctive flank markings. **Dentition** Upper jaw 22–32 rows, lower jaw 26–40 rows. Teeth dissimilar: upper teeth with central cusp flanked by 1–3 pairs of lateral cusplets; lower teeth blade-like with a single cusp. See p.222.

Habitat A common species found on, near or well off the bottom along the outer continental shelf and slopes at depths of 70–2,000m, but mostly between 200–600m.

Biology Viviparous, with litters ranging from 1–21, averaging 7–8. Reproductive cycle undefined; it is speculated these sharks may have a 2–3 year period between pregnancies. Age at maturity is 4–5 years for females, 4–6 years for males, with a maximum age of 9–11 years and 7–8 years, respectively. Diet consists of small benthopelagic bony fishes, suggesting the species feeds well off the bottom, as well as cephalopods and crustaceans. Diet changes with growth; smaller sharks feed more on shrimps, medium-sized sharks consume bony fishes and crabs, and large individuals feeding on bony fishes, cephalopods and crustaceans.

IUCN Red List Status Near Threatened in the Northeast Atlantic due to possible declines in some areas. **Least Concern** in the Mediterranean Sea, with population densities and structure remaining stable despite fishing pressure in some areas.



226 DOGFISH SHARKS AND RELATED SPECIES SQUALIFORMES

“A marvellous book, rich in illustrations, beautiful, and scientifically detailed.”
Fabrizio Serena | IUCN SSC Shark Specialist Group (SSG)
Regional Vice-Chair for the Mediterranean Region
“What a fantastic book. One of the most comprehensive regional guides I have seen. Absolutely superb in all aspects.” Mark Harris, FFC Elasmobranch Studies

Shark species comparison

to identify and only then with very close examination. The group not only includes the most poorly understood. Deepsea spined sharks are caught in mixed deepsea trawls and bottom-set longlines that have expanded throughout the Northeast in these fisheries are decreasing – probably due to catch restriction measures in place for over 200m, although population decline may also be a factor.

size order. Sharks on this page are all less than 85cm in length; p.228 lists species sizes those exceeding 120cm.

SMOOTH SHARK *Squaliolus laticaudus*

- Maximum size 28cm
- dark coloration with obscure black markings
- most fin webs pale/white
- 2nd dorsal fin very long
- very small 1st dorsal fin spine; no 2nd dorsal fin spine



VELVET BELLY LANTERNSHARK *Etmopterus spinax*

- Maximum size 45cm
- pale above, abruptly black below
- white fin webs
- 2nd dorsal fin larger
- 2nd dorsal fin spine larger



SMOOTH LANTERNSHARK *Etmopterus pusillus*

- Maximum size 50cm
- dark coloration with obscure black markings
- pale dorsal fin webs
- 2nd dorsal fin larger
- fin spines roughly similar



SHORTNOSE SPURDOG *Squalus megalops*

- Maximum size 77cm
- lighter below; no spots; edges of pectoral fins white
- 1st dorsal fin larger
- 2nd dorsal fin larger
- lateral keels on caudal peduncle



VELVET DOGFISH *Zameus squamulosus*

- Maximum size 84cm
- uniform coloration, very dark to black, no distinct markings
- dorsal fins small
- fin spines very small



DEEPSEA SPINED SHARK SPECIES COMPARISON 227



The IUCN Red List of Threatened Species and Sharks*

Text by Rima W. Jabado

What is the IUCN Red List of Threatened Species?

The International Union for Conservation of Nature (IUCN) Red List of Threatened Species is the world's most comprehensive global information source on the conservation status of plant, fungi, and animal species. Each species is assessed against the IUCN Red List Categories and Criteria to determine their relative **extinction risk**. The aim is to identify which species face an elevated risk of extinction [i.e., most likely to become extinct in the near future] and use this information to inform and catalyze biodiversity conservation action.

The IUCN Red List is **not a list of species that are high priorities for conservation action**. While extinction risk is an important factor to consider when determining which species to invest in, establishing conservation priorities ultimately depends on other important factors, including financial, cultural, logistical, biological, ethical, and social considerations, to ensure conservation actions can be maximized.

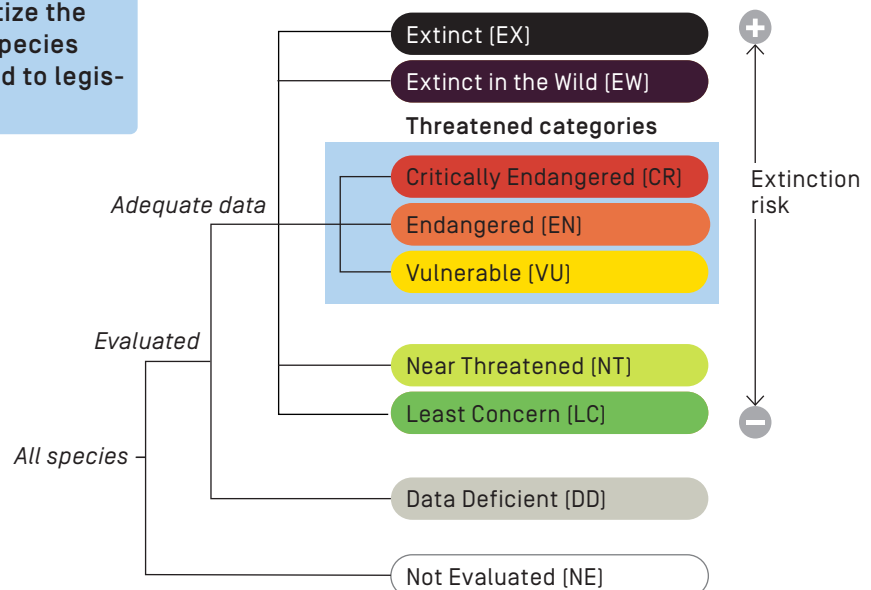
The IUCN Red List does not have a legal status. A species assessment does not imply that a species should be protected or is protected in a country or region. In fact, most countries have their own national lists to assess and prioritize the conservation of species that may then lead to legislative protection.

What does each IUCN Red List category mean?

The IUCN Red List Categories and Criteria are intended to be an easily and widely understood system for classifying species at high risk of global extinction. All of the world's species fall into one of **nine IUCN Red List Categories** based on five criteria [A-E] linked to population trend, population size, and geographic range [Figure 1]. Each criterion has a set of quantitative thresholds that determine which (if any) of the threatened categories [Critically Endangered, Endangered, or Vulnerable] a species qualifies for. If none of the thresholds are met, then it must be decided which of the Red List Categories is appropriate for that species.

IUCN Red List Categories are official terms and, when cited, should be treated as proper nouns and capitalized without quotation marks [e.g., Data Deficient].

Figure 1: The IUCN Red List of Threatened Categories in increasing order of risk from bottom to top [Source: IUCN, 2012].



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

Extinction risk and sharks

To date, extinction risk has been evaluated for more than 128,500 species, around 6% of the world's known species. The majority of the world's species currently sit in the Not Evaluated (NE) category and these are **not listed** on the IUCN Red List.

The IUCN Species Survival Commission (SSC) Shark Specialist Group (SSG) is responsible for the assessment of sharks for the IUCN Red List. By 2021, almost all known sharks (~1250 species) have been assessed using the IUCN Red List Categories and Criteria. These assessments have been completed at the global level, that is, for the species' entire global range and population. Additionally, some species have also been assessed at the sub-global level, for example a specific region (e.g., Europe), country, or subpopulation (e.g., some species like the Largetooth Sawfish [*Pristis pristis*] has a global assessment and separate assessments for each of its four subpopulations).

Assessments are an important component of the IUCN SSC Shark Specialist Group workplan as the assessment process is essentially continuous. Each assessment only has a lifespan of 10 years and therefore species need to be reassessed every decade. Furthermore, assessments are needed for newly described species and taxonomic changes. This effort is only possible because of contributions from IUCN SSC Shark Specialist Group members as well as non-member conservation scientists and experts from around the world who provide

the best available scientific information on the taxonomy, distribution, population size and trends, habitat and ecology, threats, use and trade, and current and future recommended management measures.

The IUCN Red List is published online **at least twice a year**. Anyone looking to understand the status of sharks should regularly consult this resource since the status of individual species may change as they are reassessed.

Data Deficient is not a category of threat. Listing of taxa in this category indicates that more information is required and acknowledges the possibility that future research will show that threatened classification is appropriate.

If a species is not listed on the IUCN Red List website, it means that the species sits in the **Not Evaluated** category and that an assessment has yet to be completed.

Further reading

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EX

A taxon is **Extinct [EX]** when there is no reasonable doubt that the last individual has died (including all captive and herbarium individuals). A taxon is presumed Extinct when exhaustive surveys in known and/or expected habitat, at appropriate times [diurnal, seasonal, annual], throughout its historic range have failed to record an individual. Surveys should be over a time frame appropriate to the taxon's life cycle and life form.

EW

A taxon is **Extinct in the Wild [EW]** when it is known only to survive in cultivation, captivity, or as a naturalized population [or populations] well outside the past range. A taxon is presumed Extinct in the Wild when exhaustive surveys in known and/or expected habitat, at appropriate times [diurnal, seasonal, annual], throughout its historic range have failed to record an individual. Surveys should be over a time frame appropriate to the taxon's life cycle and life form.

CR

A taxon is **Critically Endangered [CR]** when the best available evidence indicates that it meets any of the criteria A to E for Critically Endangered, and it is therefore considered to be facing an extremely high risk of extinction in the wild.

EN

A taxon is **Endangered [EN]** when the best available evidence indicates that it meets any of the criteria A to E for Endangered, and it is therefore considered to be facing a very high risk of extinction in the wild.

VU

A taxon is **Vulnerable [VU]** when the best available evidence indicates that it meets any of the criteria A to E for Vulnerable, and it is therefore considered to be facing a high risk of extinction in the wild.

NT

A taxon is **Near Threatened [NT]** when it has been evaluated against the criteria but does not qualify for Critically Endangered, Endangered or Vulnerable now, but is close to qualifying for or is likely to qualify for a threatened category in the near future.

LC

A taxon is **Least Concern [LC]** when it has been evaluated against the criteria and does not qualify for Critically Endangered, Endangered, Vulnerable or Near Threatened. Widespread and abundant taxa are included in this category.

DD

A taxon is **Data Deficient [DD]** when there is inadequate information to make a direct, or indirect, assessment of its risk of extinction based on its distribution and/or population status. A taxon in this category may be well studied, and its biology well known, but appropriate data on abundance and/or distribution are lacking.

NE

A taxon is **Not Evaluated [NE]** when it has not yet been assessed under the IUCN criteria. Currently, this applies to most of the world's described species. We don't know whether these species are at a high or a low risk of extinction, or if they are already extinct.



Dorsal view of *Rhinobatos nudidorsalis*. Specimen collected from the Mascarene Ridge during trawl surveys in 2008 (South African Institute for Aquatic Biodiversity SAIAB Collection)

Photo by Rima W. Jabado

The Bareback Guitarfish

Written by Michelle Scott

Taxonomy

The order Rhinopristiformes (rhino rays) includes 65 species from 12 genera belonging to five families: Pristidae [sawfishes], Glaucostegidae [giant guitarfishes], Rhinidae [wedgfishes], Trygonorrhinidae [banjo rays], and Rhinobatidae [guitarfishes].

Rhinobatos nudidorsalis, commonly known as the Bareback Guitarfish is one of 35 species within the family Rhinobatidae. The family is divided into three genera, *Acroteriobatus*, *Pseudobatos*, and *Rhinobatos*, the latter of which contains *R. nudidorsalis*. Rhinobatids have a name derived from the Greek 'rhinos' meaning nose, and 'batis' meaning ray. They have a dorso-ventrally flattened diamond-shaped or disk-like body and a long flattened tail. Phylogenetics places the Rhinobatidae within the rays though morphologically, they resemble an intermediate between a shark and a ray; hence they may be referred to as the 'shark-like rays'.

Description

The Bareback Guitarfish is a small, demersal species known only from a limited number of specimens. Morphometric analysis identified several features that distinguish it from other group members, including, but not exclusive to, an almost entirely naked, denticle free dorsal surface, a pale plain coloured wedge-shaped disc and large eyes. From the limited data available, the maximum known total length is reported as 50 cm (mature male specimen).

Distribution

The Bareback Guitarfish is found in the Western Indian Ocean and is possibly endemic to the Mascarene Ridge. The Mascarene Ridge is a large submarine plateau in the southwestern Indian Ocean. Extending for 2,300 km between Seychelles and the Mascarenes, lying northeast of Madagascar, the shallow ridge covers 115,000 km² with depths ranging between 8-150 m. The actual range of the Bareback Guitarfish across the Mascarene Ridge is unknown, but it was caught at a depth of 125 m. More data are required to confirm its distribution and population size.

Threats and IUCN Red List status

Most rhinobatids are exploited for their meat and fins and populations are showing drastic declines due to fishing pressure. Of the three genera and 35 species of the family Rhinobatidae,

23 have been assessed in a threatened category [Vulnerable, Endangered, or Critically Endangered] on the International Union for Conservation of Nature (IUCN) Red List of Threatened Species. Of the remaining species, four have been assessed as Near Threatened and only two as Least Concern.

The Bareback Guitarfish is one of three rhinobatids classed as Data Deficient on the IUCN Red List. The other two species are Austin's Guitarfish [*R. austini*] and the Slender Guitarfish [*R. holcorhynchus*]. A lack of data is an obstacle for the management of these species and currently there are no species-specific protections or conservation measures in place for *R. nudidorsalis*.

Fishing is one of the main Mauritian economic activities targeting both pelagic and demersal species, with specific fisheries targeting the Mascarene Ridge's shallow banks. Given the high value of fins and meat, guitarfishes are subject to intense fishing pressure which tends to be unregulated across most of their distributions. Current data regarding declining population sizes for most of the rhinobatids indicate that the population size of *R. nudidorsalis* needs to be monitored and specific protection measures developed if necessary.

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Safe havens for Sawfishes

All creatures on earth require specific conditions in which they can thrive, and the Smalltooth Sawfish is no exception. Finding out what these conditions are is one challenge for researchers, and protecting areas where they occur – critical habitat – is another. Andrea Kroetz and John Carlson of the NOAA Southeast Fisheries Science Center in Panama City, Florida, are responding to these challenges.

Words by Dr. Andrea Kroetz
& Dr. John Carlson



Critical Habitat for juvenile Smalltooth Sawfish consists of shallow, euryhaline waters in close proximity to mangroves, as seen in the photo. Researchers set scientific gillnets on a mudflat in Ten Thousand Islands National Wildlife Refuge to capture, sample, and tag juvenile Smalltooth Sawfish within this nursery habitat.

Sawfishes, a small group of large batoids [flat-bodied cartilaginous marine fishes] that occur in tropical and subtropical coastal waters, are members of the family Pristidae and are unique in that they are the only living batoids that possess a toothed rostrum. Only five living species of sawfishes occur in the world, and all five are threatened with extinction.

The Largetooth *Pristis pristis* and Smalltooth *P. pectinata* sawfishes are endemic to the Atlantic Ocean, but only the smalltooth is currently found in US waters. At the turn of the last century the species was common along the Atlantic coast from Texas to North Carolina, with some records as far north as New York. However, through a combination of habitat loss and mortality associated with both direct and incidental capture by fishing, the population has been reduced by perhaps as much as 95 per cent over the past hundred years.

In 1999, the National Oceanic and Atmospheric Administration's (NOAA) Fisheries Service received a petition from the Ocean Conservancy [then the Center for Marine Conservation] requesting that the North American population of Smalltooth Sawfish be listed as endangered under the US Endangered Species Act (ESA), which would mean that it is considered to be in danger of extinction throughout all, or a significant portion, of its range. Consequently, NOAA Fisheries Service conducted a formal status review and determined that the US Distinct Population Segment (DPS) of Smalltooth Sawfish was endangered.

A listing as threatened or endangered triggers an analysis under the ESA to determine whether there are any 'critical habitats' for that species. As defined by the ESA, Critical Habitat describes a specific area that contains features essential to the conservation of the species in question and that may require special management or protection. It can include space for the growth of individuals and populations;

areas that are protected to improve survival; habitat that caters to special nutritional or physiological requirements of a species; sites suitable for breeding and the rearing of offspring; and areas that are protected from disturbance or are representative of a species' past geographical and ecological distribution. Critical Habitat may also include areas that are not currently occupied by the species but contain elements that are essential for its recovery.

Under the ESA, NOAA Fisheries Service is responsible for determining whether certain species within their jurisdiction are threatened or endangered; if they are, NOAA Fisheries Service is also responsible for designating Critical Habitat for them. Once Critical Habitat has been designated, measures can be put in place to help manage, protect and conserve it.

When the Smalltooth Sawfish was listed under the ESA in 2003, we knew very little about the specific types of habitat it was utilising as nurseries, where the nurseries were located, or what habitat was needed for larger juveniles and adults. As there was an immediate need to determine Critical Habitat and very little research had been done at that stage, we had to rely on the use of non-traditional approaches. Fortunately, colleagues at Mote Marine Laboratory and the Florida Fish and Wildlife Conservation Commission had been building a database of sawfish encounters as part of a citizen science programme, which gave us an idea of where sawfishes were located and the habitats they were occupying.

While this approach may be subject to bias, we were not the first to have relied on citizen science to determine Critical Habitat for an endangered species. For example, sighting hotlines were established for assessing the distribution and habitat use of snail kites in the Everglades, while Critical



Photos by Michael Scholl | Save Our Seas Foundation





↑ A juvenile Smalltooth Sawfish is seen swimming over a shallow (<0.5m) mudflat in nursery habitat within the Ten Thousand Islands National Wildlife Refuge. Shallow mudflats in close proximity to mangroves serves as important Critical Habitat and nursery areas for juveniles as these habitats provide refuge from large predators.

↓ A scientific gillnet is used to encircle and capture a juvenile Smalltooth Sawfish spotted on a shallow mudflat. Gillnets are the primary way juveniles are captured in our fishery-independent survey as their toothed rostrum easily becomes entangled in the net. Once captured, sawfish are carefully and safely removed from the net, measured, sampled, tagged, and released.



Photo by Michael Scholl | Save Our Seas Foundation

Photo by Olivier Born | Save Our Seas Foundation

Habitat designations for Nelson bighorn sheep were based on sightings information from the Santa Rosa Mountains.

Thus, to define Critical Habitat and its associated features, we first determined where the greatest density of juvenile sawfish encounters were identified by the public throughout south Florida and then mapped those encounters by year to establish where repeat usage occurred. Years of encounter data suggested an abundance of juvenile Smalltooth sawfishes in the shallow coastal waters of Florida, whereas larger sawfishes appeared to be seen in far more diverse habitats. From this information we were able to identify the habitats that were most essential to adult sawfishes and focused our Critical Habitat designations for conserving the nursery areas for juveniles.

Next, NOAA Fisheries Service assessed which physical and biological features correlated with juvenile sawfish encounters. The results indicated that juvenile sawfishes were most abundant in water no deeper than three feet [0.9 metres] and where there was a shoreline, or buffer, of red mangroves plus a wide salinity range with an inflow of fresh water. The areas with the highest repeat occurrences were along the south-western coast of Florida between Charlotte Harbor and Florida Bay, including Ten Thousand Islands and Everglades National Park. As a result, two units of Critical Habitat for the Smalltooth Sawfish were designated: Charlotte Harbor Estuary, covering approximately 221,459 acres [89,621 hectares] of coastal habitat; and Ten Thousand Islands/Everglades, which comprises approximately 619,013 acres [250,506 hectares] of coastal habitat.

Shallow habitats with red mangroves and a wide salinity range were identified as essential to the conservation of Smalltooth Sawfish because they function as a nursery area for juveniles. We believe that the main reason for juveniles occupying shallow water is probably to avoid predators such as lemon and bull sharks and potentially American alligators and American crocodiles. Very small juveniles of 2 feet 11 inches [less than 90 centimetres] total length have been observed moving among the prop roots of red mangroves at high tide; the roots too are likely to exclude large predators and thus provide a refuge. Mangroves are also important habitat for many species of small fishes and crustaceans, and juvenile sawfishes may use these areas for foraging.

From the encounter data and subsequent independent monitoring surveys, we have developed a general idea of how small juvenile Smalltooth sawfishes use suitable habitat in southern and south-western Florida. Yet questions remain about features at a smaller scale within these environments that determine why some areas are used and not others. We know that the juveniles associate with some very specific mangrove islands while seeming to ignore others. What makes one mangrove island more suitable than the next? What habitat features are the most important for juvenile sawfishes?

Identifying these features and the environmental requirements of threatened and endangered species is crucial for the designation and preservation of Critical Habitat and thus the conservation of the species and recovery efforts on its behalf. This is particularly true for the Smalltooth Sawfish, whose range has been significantly reduced.

To gain a better understanding of what kind of environment sawfishes use, we measure a myriad of abiotic parameters at sampling locations throughout the Ten Thousand Islands/



Drs. Andrea Kroetz and John Carlson of NOAA Fisheries - Panama City Laboratory are about to release a juvenile Smalltooth Sawfish implanted with a 5-year acoustic tag.

Everglades unit of Critical Habitat, including temperature, salinity, dissolved oxygen, depth and water clarity. Given the high correlation of juvenile sawfishes and mangroves, we have been quantifying mangrove properties, such as the density of red mangrove prop roots, the density of black mangrove pneumatophores and the amount of mangrove canopy overhang that extends out over water within a 16-square-foot [1.5-square-metre] quadrat, to see if they influence juvenile sawfish habitat use.

These parameters are currently being used in a species distribution model we are developing using boosted regression trees, which will help us identify which environmental features influence juvenile sawfish distribution. Species distribution models and spatial predictive modelling can forecast the suitability of an environment for threatened and endangered species in space and time, which makes them a powerful tool. By using survey data in these models, we are able to examine relationships between the distribution of juvenile sawfishes and the environmental and mangrove variables that influence this distribution. We can, moreover, predict the probability of capture at locations outside our survey where we may be able to find sawfish based on envi-



Photo by Michael Scholl | Save Our Seas Foundation



Photo by Olivier Born | Save Our Seas Foundation



Photo by Michael Scholl | Save Our Seas Foundation

ronmental influences. For example, areas with the highest mangrove prop root and pneumatophore density coupled with warm, shallow waters tend to be where the most juvenile sawfishes are captured. With this information, the model can point to locations throughout Florida, and eventually to any other area of interest, where the probability of capture is the highest based on these parameters. Once completed, this model will provide highly valuable information that managers may be able to use to refine Critical Habitat. This will not only be useful for small juvenile sawfishes, but may be applicable to large juveniles as well as adults, for which Critical Habitat has not yet been defined.

Since the original designations of Critical Habitat for Smalltooth Sawfish in 2009, we have been conducting fishery-independent research to assess the relative abundance and distribution of juvenile Smalltooth sawfishes and researching specific habitats and environmental features important for the species so that we may better refine the juveniles' habitat use. Our research has focused on the Ten Thousand Islands/Everglades unit of Critical Habitat, given that this area is one of the primary strongholds for Smalltooth Sawfish in the western Atlantic. We use gillnets to catch juvenile sawfishes, as this gear type is the most effective for capturing individuals of less than 6 feet 6 inches [two metres] total length in shallow water less than three feet [one metre] deep, and we monitor them closely.

When a sawfish is captured, we quickly and carefully remove it from the net, keeping it submerged at all times. Morphometric and meristic data are recorded, the animal's gender is determined and photographs are taken of the rostrum and other anatomical features for identification purposes. In every sawfish we capture, we insert a Passive Integrated Transponder (PIT) tag [similar to a microchip tag used in pets] so that if it is recaptured we can easily identify it as one for which we already have data. In addition, all sawfishes are tagged with an external mark-recapture tag for easy identification upon recapture.

Since the inception of our survey, more than 450 juvenile Smalltooth sawfishes have been captured, tagged and released. The majority of these animals were individuals captured for the first time and thus not yet recorded in our survey, which supports our hypothesis that pupping is occurring in this region and that the Ten Thousand Islands/Everglades unit of Critical Habitat serves as a nursery area for the species. Several of the sawfishes that we have tagged and released have been recaptured and have provided invaluable data on the growth of juveniles. From tag recapture data, we know that juvenile Smalltooth sawfishes grow incredibly fast during their first year, doubling in length from 2 feet 3 inches [0.7 metres] to 4 feet 11 inches [1.5 metres]. With this rapid growth, it is likely that the juveniles will expand their habitat use beyond the nursery where they were born.

Researchers studying highly mobile marine species use electronic [acoustic and satellite] tags to collect data on their subjects' movement and behavioural ecology over the course of several years. Passive acoustic receiver arrays have been deployed in various habitat types around the world and the receivers identify the electronic tags when they come within range. Thus researchers can participate in international collaborative telemetry networks, sharing data among colleagues. Although this technology has been utilised for a variety of marine species for a number of years, it has only recently been made available for sawfish research in the USA.

One of the high-priority goals of our research is to investigate the habitat use and movement ecology of Smalltooth Sawfish in order to designate Critical Habitats for all its life stages, and acoustic telemetry will help us to accomplish this. Our own acoustic array, which spans the area from Ten Thousand Islands through Everglades National Park and down to Florida Bay, in combination with arrays maintained by collaborators, greatly enhances our ability to track sawfishes as they mature.

In 2016, we began using acoustic transmitters that can transmit data for as long as five and 10 years. Their longevity is particularly important to our investigations into shifts in habitat use and migration patterns as the sawfishes grow. To date, our team has implanted these long-term transmitters in more than 50 sawfishes in south Florida, ranging from small juveniles to large adults. Twenty-two tagged juveniles have been providing us with data about their habitat use and movements as they mature. Juveniles less than 4 feet 11 inches (150 centimetres) total length tend to stay within a relatively small area (approximately 1.9 square miles; 4.9 square kilometres). Those larger than 4 feet 11 inches begin to move further away as they explore new habitats, covering distances ranging from 75 to 150 miles (120 to 240 kilometres)! We have seen this change in movement pattern in several individuals that were tagged as small juveniles; now in their second and third years of life, they travel the long distance from Ten Thousand Islands down to the Florida Keys.

Acoustic technology is providing a wealth of information about the habitat use and movements of juvenile sawfishes and how they change as the individuals develop. These gains in our understanding will continue for the five- to 10-year lifespan of the tags, provided that the collaborative acoustic arrays remain active and in place and that tagged sawfishes pass within the arrays. In the years ahead we will certainly learn more from these sawfishes and be better able to provide information about their habitat needs at different life stages.

Habitat destruction is one of the key factors affecting the recovery of Smalltooth Sawfish. The essential features of juvenile Critical Habitat (red mangroves and shallow water with varying salinity) are susceptible to impacts from activities that include dredging, coastal construction, land development and changes in the discharge of fresh water into coastal habitats. These impacts combined with natural factors such as hurricanes and harmful algal blooms could significantly affect the quality and quantity of the essential features and their ability to provide nursery functions. Unfortunately, coastal development and the negative impacts on the essential features are occurring and will continue to do so. The functional elimination of nurseries through habitat destruction could push Smalltooth Sawfish populations to a tipping point. We therefore continue to study and monitor the population within the known Critical Habitat units to ensure that it remains healthy and, hopefully, is moving towards recovery.

All research activities and images were taken under the authority of NMFS ESA Permit No. 22078 and EVER-2018-SCI-0006.

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↓ A juvenile Smalltooth Sawfish is ready to be measured, sampled, tagged, and released back into its nursery habitat.



Photo by Olivier Born | Save Our Seas Foundation



↑ Researchers have been internally tagging Smalltooth Sawfish with long-term acoustic tags since 2016 to track their movements and habitat use through ontogeny. Here, a small incision [1-2 cm] is carefully made on the ventral side of the sawfish to allow for tag insertion.

↓ A 5-year V13 [InnovaSea-Vemco] tag is inserted into the peritoneal cavity of a juvenile Smalltooth Sawfish.





↑ The small incision is carefully closed with 2-3 degradable sutures. The sawfish seen here is in a state of tonic immobility and does not react to the surgical procedures. More than 50 Smalltooth Sawfish have been internally tagged in this manner since 2016.

↓ Post-surgical implantation of a 5-year acoustic tag, this Smalltooth Sawfish is ready to be released. Post-surgery and sampling, sawfish are monitored for ~2 minutes prior to release to ensure the animal is in good condition.





Each Smalltooth Sawfish captured is tagged externally with a mark recapture tag and internally with a Passive Integrated Transponder [PIT] tag for long-term identification. Each tag has a unique serial number that can be linked to individual sawfish.



Data is recorded for each sawfish captured and sampled including length measurements, rostral tooth counts, tag numbers, and any identifying features unique to individual sawfish.



Once sawfish are sampled and tagged, they are ready for release. All sawfishes are released back into the habitat in which they were captured. Here, a juvenile Smalltooth Sawfish is released back into shallow waters lined with red mangroves, typical nursery habitat for this species.



↑ Researchers take a moment to smile with a juvenile Smalltooth Sawfish prior to release. Each sawfish provides valuable information that contributes to the overall understanding of the ecology of this species with the ultimate goal of population recovery.



← Safe handling, release, and reporting guidelines for Smalltooth Sawfish are posted at marinas, docks, and water entry locations throughout southern Florida to bring awareness to the public.

Sawfish Are Endangered

Respect • Release • Report

Sawfish are protected by State and Federal laws:
It is illegal to harm, harvest, or handle sawfish



You Can Help Save Smalltooth Sawfish

Angler Guidance:

- ▶ Release sawfish immediately
- ▶ Never lift from the water or drag ashore
- ▶ Do not use gaffs or ropes to secure
- ▶ Cut the line as close to the hook as possible

Diver Guidance:

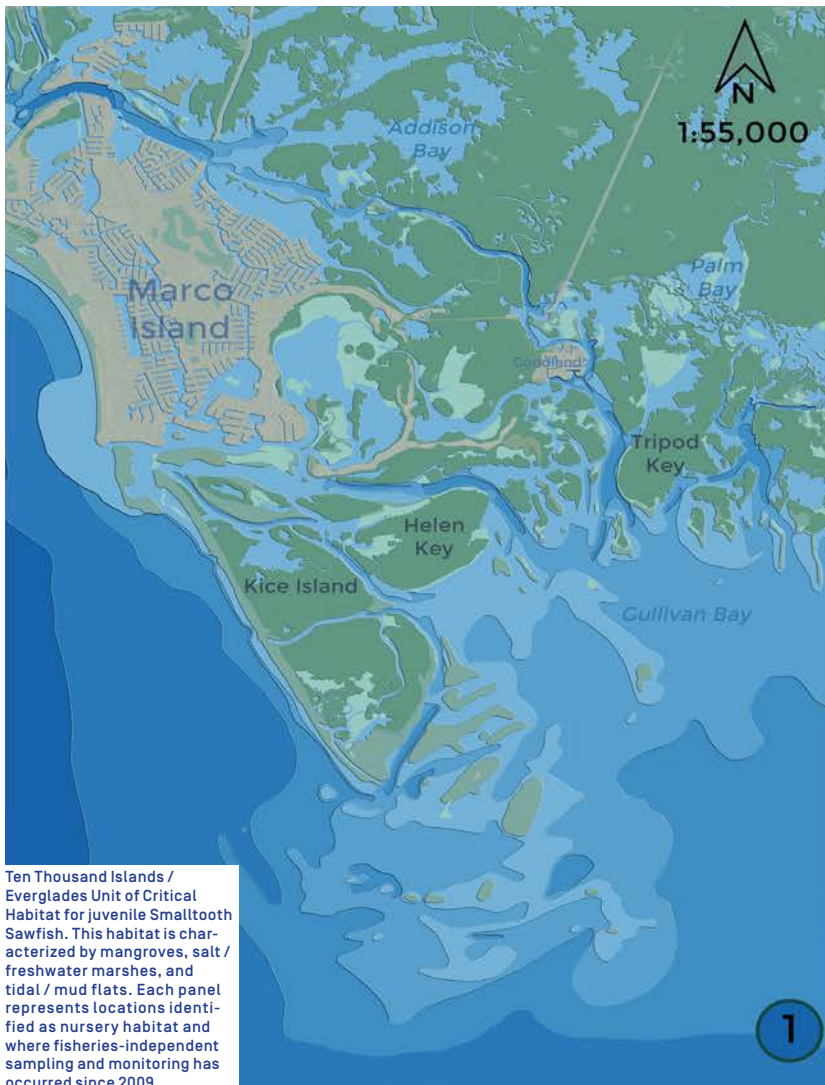
- ▶ Keep your distance
- ▶ Avoid disturbing sawfish
- ▶ Do not chase or pursue
- ▶ Never feed or touch

Share Information About Your Encounter

1-844-4SAWFISH

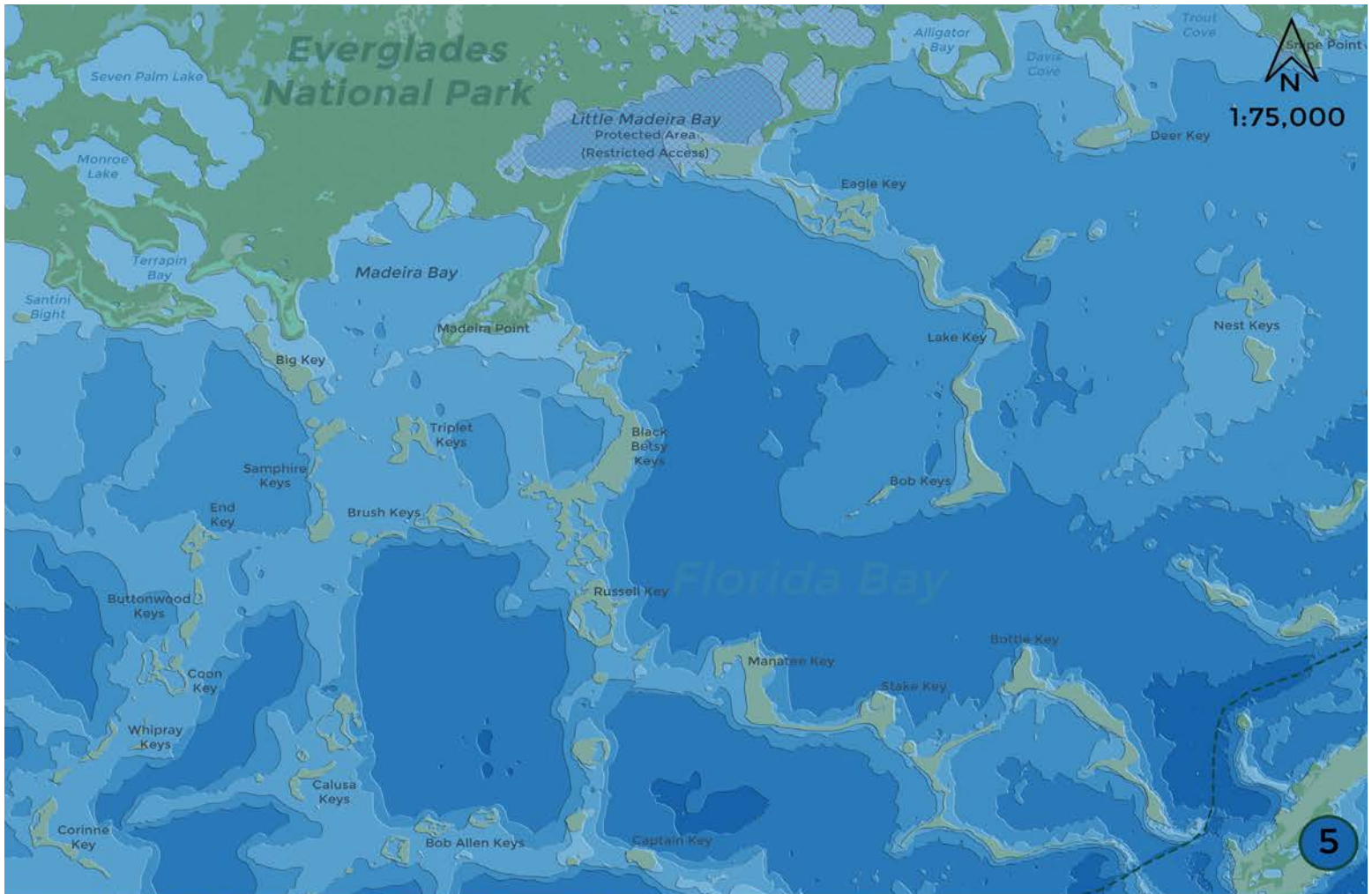
www.SawfishRecovery.org

The information you provide helps scientists track sawfish recovery



Ten Thousand Islands / Everglades Unit of Critical Habitat for juvenile Smalltooth Sawfish. This habitat is characterized by mangroves, salt / freshwater marshes, and tidal / mud flats. Each panel represents locations identified as nursery habitat and where fisheries-independent sampling and monitoring has occurred since 2009.





Mangroves



Salt Water Marsh



Fresh water Marsh



Tidal Flats



**>2.5
2.5 - 2
2 - 1.5
1.5 - 1
.5 - 0
in Meters**





Photo by Sahan Thilakaratna | Blue Resources Trust | blueresources.org

Research for conservation and management

Written by Daniel Fernando
Blue Resources Trust | Co-Founder and Director
IUCN SSC Shark Specialist Group (SSG) |
Regional Vice-Chair | Indian Ocean

Region
Update:
Indian
Ocean



Despite being an island nation, Sri Lanka often lacks the scientific data and tools necessary to monitor the marine environment and effectively conserve and manage its ocean resources. And it was a combination of this need for data, along with the challenges encountered when attempting research as an independent marine biologist, that led to the establishment of Blue Resources Trust (BRT).

BRT is a not-for-profit marine research and conservation organisation based in Sri Lanka. It has expanded rapidly since its conception in 2016, creating long-term datasets to monitor

elasmobranch fisheries and coral reef health and using data to inform scientifically sound international, regional, and national policy. It also operates the only private, open-access marine research station in the country. This provides a platform to expand science in the Indian Ocean and has opened the door for capacity building through opportunities for young, early-career scientists, primarily through the BRT Research Internship and Scholarship Program. This program is helping build a strong conservation foundation for the coming decades. BRT also engages in multiple national and international collaborations with

universities and even government agencies. Such partnerships have helped foster an environment where knowledge, expertise, and technical capacity can be exchanged.

And it is under the BRT Fisheries Programme that the Sri Lanka Elasmobranch Project (SLEP) operates. This project was initiated back in 2010 in partnership with the Manta Trust as the Sri Lanka Mobulid Ray Project. However, in 2017, having attended an IUCN SSG regional Red List workshop in Abu Dhabi, it was pretty apparent there was a big gap in data from other non-mobulid species from Sri Lanka. Therefore, partly thanks to inspiration from the IUCN SSG, this project was expanded to encompass all sharks and rays!

BRT-SLEP is now undertaking the first and only long-term and systematic study of all sharks, rays, and chimaeras in Sri Lanka. To recommend management that will halt current population declines, enable recovery, and encourage sustainable fisheries, we collect data on species diversity, population size and structure, life history parameters (e.g., age and growth), feeding ecology, and work on identifying critical habitats and species range. And our long-term monitoring enables us to evaluate trends and any impacts of management. This project has also established the first private elasmobranch specimen collection in Sri Lanka and already includes one designated paratype, several voucher specimens, and over 5,000 tissue samples, all of which are made available for collaborations.

Preliminary data from 67 landing sites (30 towns across the island) and over 24,000 specimens have revealed 99 species. According to the IUCN Red List, the specimens comprise 10% Critically Endangered, 28% Endangered, and 39% Vulnerable. Landings also include ten Convention on International Trade in Endangered Species of Flora and Fauna (CITES) Appendix

II species, comprising over 24% of the total catch, and seven species listed on Convention on the Conservation of Migratory Species of Wild Animals [CMS] Appendix I comprising 11% of total catch; the latter species should be fully protected. Our species count also includes ten that were not previously recorded in the country and five species potentially new to science, with the need to resurrect another possibly. All this highlights Sri Lanka's high marine biodiversity, together with the challenges of trying to conserve the unknown species.

And with a significant proportion of the 21.4 million inhabitants in Sri Lanka living along the coastline, an Exclusive Economic Zone (EEZ) around eight times the area of our terrestrial surface, there is a considerable reliance upon marine resources. Fish contributes 50% of the total annual protein consumed, and products, including shark fins and meat, generate revenue. Therefore, regulations that restrict fisheries in any form are often discouraged by national policymakers. However, growing awareness of the need to improve elasmobranch management and some small but positive steps provides a glimmer of hope for the future.

And as BRT continues to expand, the next phase includes establishing Sri Lanka's first marine genetic laboratory to conduct species barcoding. This will increase capacity-building opportunities while enhancing our database's quality and enabling stakeholders such as monitoring and enforcement agencies to use our facilities for identification. With genetic tools to improve compliance and long-term data to support decision-making, the introduction of practical and effective fisheries management can be strongly encouraged and will hopefully provide sharks, rays, and chimaeras with a more positive future.

Photo by Daniel Fernando | Blue Resources Trust | blueresources.org



Pakistan- Sawfish status and update

Muhammad Moazzam Khan

WWF-Pakistan | Technical Advisor

Member of the IUCN SSC Shark Specialist Group (SSG)

Photo by Muhammad Moazzam Khan

Sawfishes have become one of the rarest groups of marine animals with many populations at high risk of extinction. Three species of sawfishes, i.e. Narrow [*Anoxypristis cuspidata*], Largetooth tooth [*Pristis pristis*] and Green [*Pristis zijsron*], are known from Pakistan. Information about sawfishes in Pakistan is available through the work efforts of Moazzam and Osmany [2014]. However, because of overfishing and habitat degradation, populations of sawfishes has decreased substantially, and they are now considered to be nearly locally extinct. In the past twelve years, only five authentic records of their occurrence in Pakistan have been recorded.

- On September 11, 2009, a 1.4-meter long *Pristis pristis* was landed at Gwader Fish Harbour;
- In June 2013, a large specimen of sawfish was caught at Khajr Creek near the mouth of the River Indus;
- A Largetooth Sawfish was landed at Karachi Fish Harbour on May 11, 2015;
- A 10-foot long Largetooth Sawfish was caught dead by a fisherman on January 17, 2016, near Surbandar Gwadar.
- A 15-feet long Largetooth Sawfish was caught on May 26, 2018, between the mouth of Turshian and Khajar Creek

The Largetooth Sawfish used to be the most dominating species of sawfish occurring in Pakistan. It inhabits coastal waters but sometimes ascends rivers. In 1962, a large specimen of sawfish was caught at Hyderabad near Ghulam Muhammad Barrage about 170 km from the coastline.

Historically sawfishes used to dominate among shark and ray species. Because of the introduction of motorized fishing vessels and nylon nets, their populations started to dwindle, and now, these species are almost extinct. The main areas of sawfish fish-

ing in Pakistan were Miani Hor [Sonmiani], Kalmat Khor, Jiwani, Gwadar, and the Indus Delta, especially Khajar Creek. Sawfish meat used to be exported to Sri Lanka along with other sharks in salted, dried form. Fins used to be exported to Hong Kong.

WWF-Pakistan has initiated a programme to record any authentic record of such threatened sawfish in Pakistan along with a study on historical data on sawfish through interviewing retired fishers. This survey was carried out in Karachi, Damb [Sonmiani], Gwadar, Ibrahim Hayderi and other coastal villages. The information so far collected has revealed that sawfish fisheries were flourishing about 40 years back, but these species had become locally extinct by the 1980s. Sawfishes were so abundant that fishers used to use the saws [rostra] as posts of their houses' boundary in some coastal villages. Fishers used to place rostra in religious shrines, believing that this will bring prosperity and good fortune. WWF-Pakistan has also gathered information about such rostra in sacred shrines.

Considering that there is no legal protection for sawfishes in Pakistan, WWF-Pakistan persuaded provincial governments to develop species-specific legislation. In 2016, laws were promulgated protecting sawfish – now, there is a ban on fishing, marketing, trade and export. Considering the significant decline in sawfish catches, WWF-Pakistan has also initiated a programme to create awareness among stakeholders such as fishers, exporters, traders, students and the general public [see poster on the next page].

WWF-Pakistan has also initiated an environmental DNA (eDNA) study from major fishing grounds in 2019; however, no tangible results were obtained. In the second phase, extensive sampling for eDNA will be undertaken in 2021.



Region
Update:
Indian
Ocean

Protected species of Sharks and Rays of Pakistan

The catching, landing, marketing and trading of the species or groups of species depicted in this chart are prohibited and punishable by law.

Notification No: 5 (3) SO (FISH) /L&F/ of the Sindh Fisheries Ordinance 1980, and notification No: SO(Coord:)Fish/2-1/2013/3148-54 of the Balochistan Sea Fisheries Ordinance 1971.



❌ Pari/Dumbi/Mushk
Pelagic Thresher,
Alopias pelagicus



❌ Pari/Dumbi/Mushk
Bigeye Thresher,
Alopias superciliosus



❌ Khair/Khail/Kairi
Wedgefish,
Rhynchobatidae Spp.



❌ Khair/Zahro,
Guitarfish,
Rhinobatidae Spp.



❌ Tilli/Kaali tilli/Kanaitar
Silky Shark
Carcharhinus falciformis



❌ Jagri Ham/Ham,
Oceanic Whitetip, *Carcharhinus longimanus*



❌ Bhuttar/Kanti/Maish,
Hammerhead Shark,
Sphyrnidae Spp.



❌ Scalloped Hammerhead,
Sphyrna lewini



❌ Winghead,
Eusphyra blochii



❌ Great Hammerhead,
Sphyrna mokarran



❌ Smooth Hammerhead,
Sphyrna zygaena



❌ Wakhan/Liyara/Bulindo/Suddo,
Sawfish, *Pristidae Spp.*



❌ Andhi Mangar/Baran,
Whale Shark,
Rhincodon typus



❌ Bhuth-Khair/Kohbaradi,
Bowmouth Guitarfish
Rhinidae Spp.



❌ Karainj, Mobulid Ray,
Mobula Spp.

Report on the meeting of the Working Group on Recreational Fishing

Fabrizio Serena

Co-Regional Vice-Chair | IUCN Shark Specialist Group for the Mediterranean
National Research Council | Institute of Marine Biological Resources and
Biotechnologies

Monica Barone

Member of IUCN Shark Specialist Group
Fisheries Resources Consultant



Photo by Ratko Mrzljak | @ratkodeep

Recreational fisher with a 15Kg Porbeagle Shark (*Lamna nasus*) unhooked from Sabiki Rig hooks that were in his fins and subsequently released alive, off the island of Blitvenica, Žirje, Croatia. This species is strictly protected and catch is prohibited in the Mediterranean under the International Commission for the Conservation of Atlantic Tunas (ICCAT) and European Union (EU) regulations, demonstrating the urgency to raise awareness in both recreational fishers and enforcement officers.

An online meeting of the Working Group on Recreational Fishing (WGRF) was held on 25 and 26 of February 2021. The General Fisheries Commission for the Mediterranean (GFCM) coordinated the meeting. The Working Group's main objective is to fill the main data gaps in this activity and produce helpful advice to support the sustainable management of recreational fisheries from an Ecosystem Approach to Fisheries perspective.

Among the different objectives, the most important have been:

- Evaluate the biological and ecological impacts of Recreational Fishing (RF) activity on fish stocks [priority species in particular] and habitats;
- Evaluate the socio-economic impact on coastal communities and related sectors;
- Reach to sustainable recreational fisheries management;
- Evaluate and monitor potential conflicts for resources, spaces and gears, between RF and Small-Scale Fishing (SSF).

The main contributions were produced by Spanish, Moroccan, Algerian, Tunisian, Turkish, Croatian and Italian colleagues. A methodological standard showed that the three data acquisition modes, offsite, onsite and spearfishing, are the primary sources.

The discussion developed mainly on the existing interaction between RF and SSF regarding captured species, frequented areas, and gear. Another critical consideration was the need to limit or eliminate Illegal, Unreported and Unregulated (IUU) fishing.

A program to monitor any existing conflicts between SSF and RF is necessary to plan data collection using shared methodologies. In this sense, stakeholders' involvement is essential to obtain more detailed and precise information about the species captured. Again, everyone agrees on the need to create a list of priority species, allowing a comparison between SSF and RF activities to assess any overlapping interests.

Finally, it was pointed out (by the Shark Trust) that elasmobranchs are not present in the faunal lists, if not in a minimal part, from the various speakers' results. This aspect is not understandable, as we know from the MEDLEM (MEDiterranean Large Elasmobranchs Monitoring) program that the RF also catches elasmobranchs, including protected species such as shortfin mako. In this sense, it has been suggested (by the IUCN-SSG) that

the GFCM and EU regulations must also apply to RF and not only to professional fishing. Anyway, it requires understanding why elasmobranchs don't appear on the RF capture lists?

Currently, the elasmobranch species prohibited in «Italian seas» that «shall not be retained on board, transshipped, landed, transferred, stored, sold or displayed or offered for sale» are listed in several European Union regulations, resulting in difficulty of implementation. Enforcement officers facing different species in different regulations have many doubts about species identification and the actual application of the regulation to various circumstances.

Regarding recreational fisheries, the species clearly prohibited in Italy (and other EU countries) by the European Union regulation are *Carcharodon carcharias*, *Cetorhinus maximus*, *Mobula mobular*, *Pristis pectinata*, *Pristis pristis*, and *Squatina squatina*. Moreover, the ICCAT species *Alopias superciliosus* and the three hammerheads sharks are also clearly prohibited. The species that should be released alive when caught by recreational fishers and for which the prohibition in the ICCAT regulation is more softly indicated are *Alopias vulpinus*, *Isurus oxyrinchus* and *Prionace glauca*. These are also the species more frequently caught by recreational fisheries in Italy; therefore, we proposed them as priority species to be monitored. We have established a good collaboration with the Italian national authorities for a common understanding of the management measures in place to obtain a clarification on the prohibition of their retention if caught by recreational fisheries, also in view of a proposal for the update of the national law for this sector.

Finally, when considering the species listed on Annex II of the SPA/BD Protocol of the Barcelona Convention, for which the Recommendation GFCM/42/2018/2 applies prohibiting to professionals the retention, transshipping, landing, etc. of 24 shark species, its application to recreational fisheries is not specified in the GFCM recommendation. Therefore, if caught by recreational fisheries in European Union waters, their prohibition is not implemented in the relevant European Union regulation [Regulation (EU) 2015/2102].

Update from the IUCN SSG Africa Region

Globally, reef sharks are least abundant in East Africa: restoration possible through conservation and policy measures

By Kennedy Osuka,
CORDIO East Africa



Photo by Melita Samoilys

A first global study published in *Nature* found reef sharks were absent on almost 20% of the 371 coral reefs sampled in 58 nations across the world. The study provides conclusive evidence of a severe decline in reef sharks on a global scale which is directly linked to fishing, but confirms protected areas and fishing gear restrictions are effective in maintaining healthy reef shark populations. The results were based on 15,165 hours of baited remote underwater video (BRUV) footage around the world.

The severe depletion of reef sharks was particularly high in parts of the Western Indian Ocean (WIO) where 22.6% of BRUVs were expected to record sharks. Based on this regional expectation, some populations were found to be “functionally extinct”. For example, Kenya was ranked as one of the 11 “zero reef shark” countries in the world while only 8.1% of BRUVs in Tanzania recorded sharks. In contrast, Seychelles and South Africa populations had densities greater than regional average at 60.0% and 32.1%. Populations in Mozambique were moderately depleted with 18.2% of the BRUVs recording sharks. A similar case was found in Madagascar and Mayotte (France) where 17.9% and 17.3% respectively recorded sharks. It is notable however, that sampling in the WIO was very sparsely spread compared to other regions.

The regional average number of shark species in the WIO was 7, comparable to those recorded in Madagascar. Mozambique

and South Africa populations had the most species at 10 each, which was above the regional scores. Countries that recorded the least number of species than the regional scores included Seychelles [6], Mayotte [3], Tanzania [1] and Kenya [0].

Coastal sharks comprise two thirds of species traded globally and their widespread decline, which had remained undocumented on a global scale, will have great socio-economic implications on communities directly dependent on them as important food resources or tourism attractions. In addition, the loss of reef sharks will have considerable ecological knock-on effects in these ecosystems because of their important role as top predators.

Overfishing by longlines and gillnets was the main cause of loss of reef sharks. The study also revealed the decline to be strongly related to socio-economic conditions including the size and proximity to the nearest market, poor governance, and the density of the human population. Factors that promoted high numbers of sharks were good governance, remoteness and presence of directed shark fisheries management or shark sanctuaries¹.

There is a clear lack of established management schemes for reef sharks in most WIO countries, however positive effects of conservation were evident in Madagascar and Mayotte. These two nations showed increased benefits if they were to

¹) No targeted catch or trade in shark or shark products.

invest in shark fisheries management, large no-take Marine Protected Areas (MPAs), or become Shark Sanctuaries. No-take MPA was in place in these countries, and the study noted reef sharks were healthy in large and high compliance MPAs. Similar positive effects of management were seen in South Africa where both no-take MPAs and domestic shark regulations were present. Gear restrictions, specifically bans on gillnets and long lines in certain areas, are recommended. Indeed, the FinPrint study found these gear restrictions were associated with higher numbers of reef sharks, and in some cases were more effective than no-take MPAs. The benefits of no-take MPAs increase by twofold when their size is large (~20,000km²) to cover the home range of reef sharks. Overall, shark sanctuaries were found to be an effective conservation tool with the greatest benefits at national scale, and could be considered in the WIO.

The good news is that restoration of reef shark populations is possible and can be achieved through dedicated conservation approaches and effective management measures provided key socio-economic aspects of reef shark fisheries are understood and incorporated. Economic policy measures to improve governance conditions are also essential in the restoration and management of reef sharks. In summary, the study provides a global benchmark for the status of reef sharks and specific guidance on the relative effectiveness of long-term conservation measures for their protection and recovery.

The paper was lead by Aaron MacNeil with co-authors from Global FinPrint project (globalfinprint.org/findings/index.html#2) and over 100 other co-authors who participated, including 3 CORDIO staff members.

MacNeil et al. 2020. Global status and conservation potential of reef sharks. *Nature*, pp.1-6. Available at nature.com/articles/s41586-020-2519-y

Regions Where Sharks Were Least Abundant

Of the 371 reefs that Global FinPrint surveyed, the regions below were least abundant with sharks, the area size is scaled to the relative percentage of decline in abundance for that region.



Regions Where Sharks Were Abundant

Of the 58 countries and territories that Global FinPrint surveyed, the regions below were more abundant with sharks, the area size is scaled to the relative percentage of increase in abundance for that region.



Contribution of the Russian SSG team to elasmobranch research during last decade

by Alexei M. Orlov Former Regional Vice-Chair | Northwestern Pacific



In the Russian Federation, there is currently almost no targeted scientific research of cartilaginous fish, which is due to a number of reasons. First, the fauna of cartilaginous fish in the waters of Russia is quite poor, since most of its seas are located in temperate and cold waters, which are characterized by a low species diversity of the considered group of fish. Secondly, there is no specialized fishing of cartilaginous fish in Russia, which are caught as by-catch in trawl, net and longline fisheries. In the domestic market, products made from shark and ray meat are in very low demand, so most of them are sold in Asian fish markets.

However, studies of cartilaginous fish in Russia are carried out, as this is required to justify the volume of total allowable catches, with the help of which the regulation of fishing [by-catch] of sharks and rays is carried out. The collection, synthesis and analysis of the obtained commercial and biological information are carried out on a regular basis, but only a few enthusiasts are engaged in publishing the results in scientific journals as a hobby.

Currently, Russia is represented in the SSG by three specialists (one permanent member and two who have been involved in the preparation of IUCN Red List assessments).

In general, over the past decade, the main research of the Russian team has focused on the following areas.

- 1) Studies of species diversity of cartilaginous fish in general in the waters of Russia and its particular regions [Grigorov & Orlov, 2013; Dyldin & Orlov, 2016, 2018, 2021; Orlov & Tokranov, 2019; Dyldin et al., 2018, 2020].
- 2) Studies of the morphology, distribution and biology of sharks and skates in the Pacific waters of Russia: mud skate *Rhinoraja taranetzi* [Orlov & Tokranov, 2010], Alaska skate *Bathyraja parmifera* [Orlov & Smirnov, 2011; Grigorov et al., 2015], Pacific spiny dogfish *Squalus suckleyi* [Orlov et al., 2011, 2012], Okhotsk skate *Bathyraja violacea* [Grigorov et al., 2017], Pacific sleeper shark *Somniosus pacificus* [Orlov & Baitaliuk, 2014], Simushir skate *Bathyraja sexoculata* [Misawa et al., 2020].
- 3) Studies of morphology, distribution, and biology of rare deep-water skates of the Mid-Atlantic Ridge based on the material obtained during international project MAR-ECO [Census of Marine Life] [Orlov & Cotton, 2011, 2013, 2015; Orlov et al., 2011; Orlov, 2011, 2014; Porteiro et al., 2017].
- 4) Preparation of IUCN Red List assessments [Dulvy et al., 2020a,b,c,d,e,f,g,h,i,j,k,l,m,n,o,p].
- 5) Other publications [Rusyaev & Orlov, 2013; Orlov et al., 2017].

List of publications of the Russian SSG team, 2010–2021 Monographs:

DYLDIN, Yu.V., ORLOV, A.M., VELIKANOV, A.Ya., MAKEEV, S.S., ROMANOV, V.I., MORUSI, I.V., & HANEL L. (2020) Ichthyofauna of the Aniva Bay [the Sakhalin Island, the Sea of Okhotsk]. Novosibirsk, Zolotoi Kolos, 396 pp. doi.org/10.31677/isbn978_5_94477_271_8

Porteiro, F.M., Sutton, T.T., Byrkjedal, I., Orlov, A., Heino, M.P., Menezes, G.M.M. & Bergstad, O.A. (2017) Fishes of the Northern Mid-Atlantic Ridge collected during the MAR-ECO Cruise in June–July 2004. An annotated checklist. Arquipelago. Life and Marine Sciences. Supplement 10. University of the Azores: Ponta Delgada. 125 pp. ISBN 978-989-99834-0-3.

Publications in peer-reviewed journals:

DYLDIN Yu.V. & ORLOV A.M. (2021) Annotated list of ichthyofauna of inland and coastal waters of Sakhalin Island. 1. Families Petromyzontidae – Salmonidae. Journal of Ichthyology, 61 (1): 48–79. doi.org/10.1134/S0032945221010057

DYLDIN, Y.V., ORLOV, A.M. & FORINA, Y.Y. (2020) Brief history of studies of cartilaginous fishes (Chondrichthyes: Elasmobranchii, Holocephali) of Sakhalin Island and adjacent waters with taxonomic notes). Vestnik Sakhalinskogo Muzeya, 4: 172–192.

MISAWA, R., ORLOV, A.M., ORLOVA, S.Y., GORDEEV, I.I., ISHIHARA, H., HAMATSU, T., UEDA, Y., FUJIIWARA, K., ENDO, H. & KAI, Y. (2020) *Bathyraja* [Arctoraja] *sexoculata* sp. nov., a new softnose skate (Rajiformes: Arhynchobatidae) from Simushir Island, Kuril Islands (western North Pacific), with special reference to geographic variations in *Bathyraja* [Arctoraja] *smirnovi*. Zootaxa, 4861 (4): 515–543

ORLOV, A.M. & TOKRANOV, A.M. (2019) Checklist of deep-sea fishes of the Russian northwestern Pacific Ocean found at depths below 1000 m. Progress in Oceanography, 176: 102143 DOI: 10.1016/j.pocean.2019.102143

DYLDIN, Yu.V., ORLOV, A.M., VELIKANOV, A.Ya., MAKEEV, S.S., ROMANOV V.I. & HANEL L. (2018) An Annotated List of the Marine and Brackish-Water Ichthyofauna of Aniva Bay [Sea of Okhotsk, Sakhalin Island]: 1. Petromyzontidae–Agonidae Families. Journal of Ichthyology, 58 (4): 473–501.

DYLDIN, Y.V. & ORLOV, A.M. (2018) An Annotated List of Cartilaginous Fishes (Chondrichthyes: Elasmobranchii, Holocephali) of the Coastal Waters of Sakhalin Island and the Adjacent Southern Part of the Sea of Okhotsk. Journal of Ichthyology, 58 (2): 158–180

ORLOV, A.M., AFANASIEV, P.K. & PELENEV, D.V. (2017) First record of the goblin shark, *Mitsukurina owstoni*, (Mitsukurinidae) with notes on its distribution. Journal of Ichthyology, 57 (2): 329–332 DOI: 10.1134/S0032945217020138

GRIGOROV, I.V., BAITALYUK, A.A. & ORLOV, A.M. (2017) Spatial distribution, size composition, and dynamics of catches of the Okhotsk skate *Bathyraja violacea* in the North Pacific Ocean. Journal of Ichthyology, 57 (5): 706–720 DOI: 10.1134/S0032945217050071

DYLDIN, Y.V. & ORLOV, A.M. (2016) Ichthyofauna of Fresh and Brackish Waters of Sakhalin Island: an Annotated List with Taxonomic Comments: 1. Petromyzontidae–Clupeidae Families. Journal of Ichthyology, 56 (4): 534–555 DOI: 10.1134/S0032945216040032

ORLOV, A.M. & COTTON, C.F. (2015) New Data on the Rare DeepSea Skate *Amblyraja jenseni* (Rajidae) from the North Atlantic Ocean. Journal of Ichthyology, 55 (4): 478–496 DOI: 10.1134/S0032945215040086

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ORLOV, A.M. & BAITALYUK, A.A. (2014) Spatial Distribution and Features of Biology of Pacific Sleeper Shark *Somniosus pacificus* in the North Pacific. Journal of Ichthyology, 54 (8): 526–546 DOI: 10.1134/S0032945214040080

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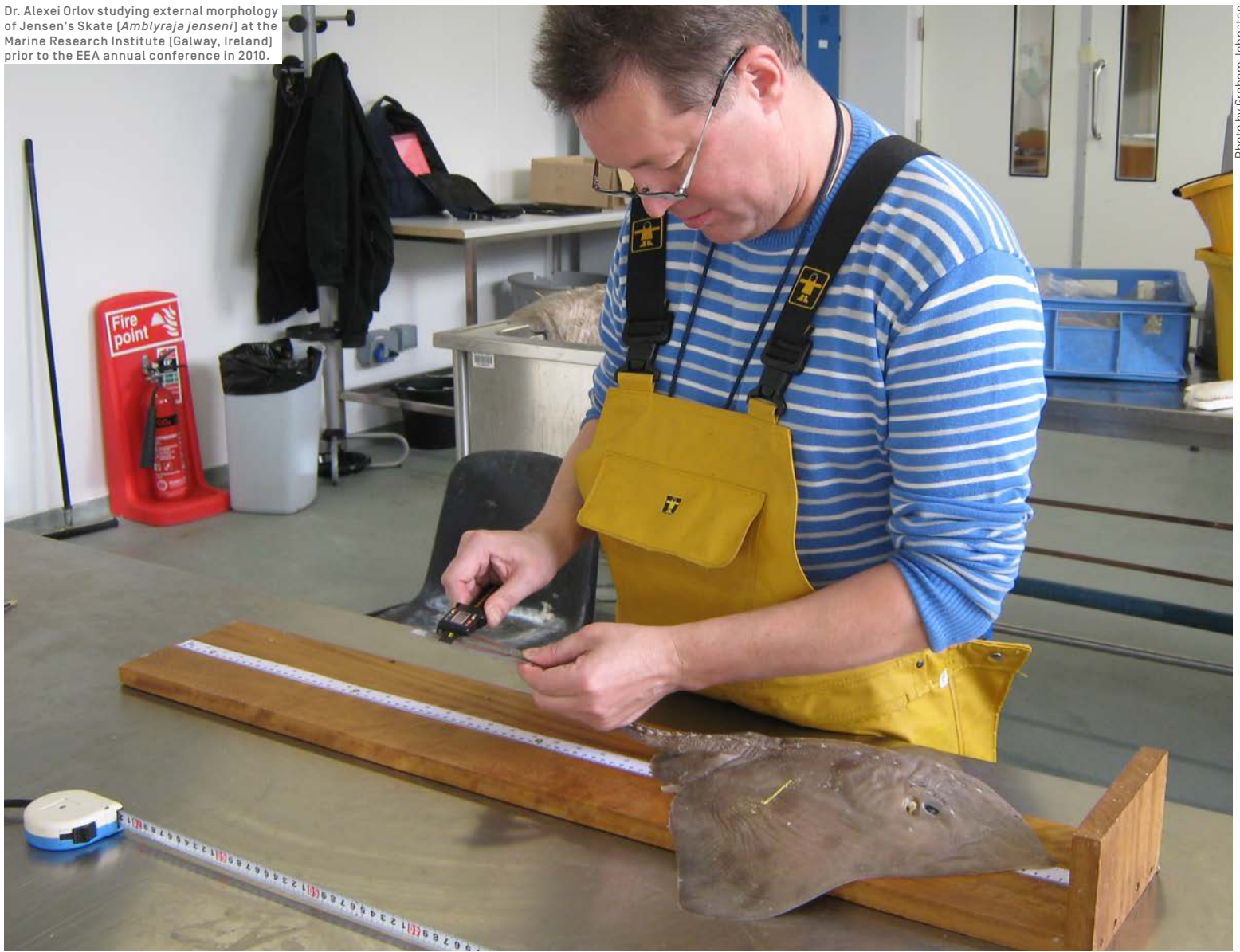
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Upcoming Meetings 2021

All meetings are subject to change due to the impacts of the coronavirus [SARS-CoV-2 | COVID-19] situation that varies in location and time. Please visit the respective websites and communication from the organising host for more information.



36th Annual Scientific Meeting
American Elasmobranch Society (AES)
July 21 – 25, 2021 [TBC]
Phoenix, AZ, USA
elasmobranch.org

The American Elasmobranch Society is a non-profit organization that seeks to advance the scientific study of living and fossil sharks, skates, rays, and chimaeras, and the promotion of education, conservation, and wise utilization of natural resources.



IUCN World Conservation Congress
September 3 – 11, 2021
Marseille, France
iucncongress2020.org

The IUCN World Conservation Congress is where the world comes together to set priorities and drive conservation and sustainable development action. IUCN's 1300+ government, civil society and indigenous peoples' Member organisations vote on major issues, action which guides humanity's relationship with our planet for the decades ahead. IUCN's unique and inclusive membership gives the Congress a powerful mandate as it is not solely government or non-government, but both together.



IX National Symposium of Sharks and Rays
II Latin American Congress of Sharks, Rays and Chimeras
The Sociedad Mexicana de Peces Cartilaginosos, A. C. [SOMEPEC]
September 6 – 10, 2021
Puebla, México
somepec.org/ix-simposium-ii-congreso-latinoamericano/

The Sociedad Mexicana de Peces Cartilaginosos, A. C. [SOMEPEC] is a non-profit organization that seeks to promote the scientific study of sharks and rays, as well as their rational use. Faithful to its objective of creating spaces for the exchange of experiences and advances in the different lines of research on sharks and rays, which are developed in Mexico and the rest of the world, it organizes the IX National Symposium of Sharks and Rays, and II Latin American Congress of Sharks, Rays and Chimeras.



Oceania Chondrichthyan Society [OCS]
8th World Fisheries Congress [WFC]
Session 58: "Global Status, Recent Developments and Future of Shark and Ray Fisheries"
September 20 – 24, 2021
Adelaide, Australia
oceaniasharks.org.au/wfc2020 | wfc2020.com.au

The Oceania Chondrichthyan Society was founded in 2005 and is a joint venture between Australia, New Zealand, Papua New Guinea and the Pacific Islands to promote and facilitate education, conservation and scientific study of chondrichthyan fish.

The 8th World Fisheries Congress will be the largest gathering of research, industry and management sectors to discuss the latest advances in fisheries world-wide. The World Fisheries Congress is the key international fisheries conference. Aiming to foster cooperation and engagement in commercial, recreational and indigenous fisheries. Providing insightful presentations and inspiring forums on key developments needed to ensure the future sustainable development of the world's oceans, lakes, estuaries and rivers.

The goal of the "Global Status, Recent Developments and Future of Shark and Ray Fisheries" session is to assemble shark fisheries scientists from around the globe to discuss novel research and provide insight on how they study their local shark fisheries. This session will provide a platform for shark and ray scientists to discuss recent research techniques, findings, and their implications for the future of shark and ray fisheries.



24th Annual Scientific Meeting
European Elasmobranch Association [EEA]
November 2 – 5, 2021 [TBC]
Leiden, The Netherlands
elasmobranch.nl/eea2021/

The European Elasmobranch Association [EEA] is a non-profit umbrella organisation of European organisations dedicated to the study, management and conservation of sharks, skates, rays and chimaeras [cartilaginous fishes or chondrichthyans]. The EEA is not a public membership body, but an association of national organisations within Europe and the North-east Atlantic, some of these are scientific bodies, others are public membership organisations. EEA member bodies take turns to host the annual scientific meeting.



6th Southern African Shark & Ray Symposium [SASRS]
November 17 – 19, 2021
Gansbaai, South Africa
sharkandraysymposium.com

The Southern African Shark and Ray Symposium is a biennial meeting of the academic community of Southern Africa who are currently conducting research on these taxa.

The SASRS will be composed of a combination of oral and poster presentations, workshops, and public events – with plenty of added fun and adventure planned for attendees. Keynote presentations will be scheduled throughout the Symposium.

Funding Opportunities



Shark Conservation Fund

Shark Conservation Fund (SCF)

2022 Small Grant

sharkconservationfund.org/small-grant-rfp/

The Shark Conservation Fund (SCF) is a collaboration of philanthropists dedicated to solving the global shark and ray crisis. Our goal is to halt the overexploitation of the world's sharks and rays, prevent extinctions and restore imperiled species through strategic and catalytic grantmaking. Our objectives are to:

1. Ensure effective regulation of global trade in shark and ray products through listing the top species of sharks and rays in global trade on CITES Appendices and implementing those listings;
2. Prevent the extinction of the most imperiled sharks and rays by enhancing legal protections in priority countries and at international forums; and
3. Combat unsustainable shark and ray fishing globally through the adoption and implementation of conservation and management measures through international forums and in priority countries.

The Small Grant Fund supports these objectives by providing grants that do not exceed \$20,000 and are one-year in duration. Up to 5 grants may be funded through this request for proposals. Types of projects eligible for Small Grants include:

- Emerging conservation opportunities;
- Small scientific studies, reports, or evaluations that are directly linked to efforts to advance shark and ray conservation policy;
- Scoping larger shark and ray conservation and management projects; and
- Capacity building for small NGOs, especially in develop-

ing countries. Priority will be given to:

1. Applicants that have not previously received funding from the SCF;
2. Projects that help implement the SCF's investment strategy, especially projects that implement listings of sharks and rays on CITES;
3. Projects that are directly linked to efforts to improve shark and ray conservation policy; and
4. Small NGOs in developing countries.

To apply, please complete a Letter of Interest form by **5:00 pm ET Monday, April 26, 2021**.

The Letter of Interest form opens on Monday, April 5, 2021 at 10:00 am ET.

If a proposal is requested, applicants will be notified by Monday, May 3, 2021 and asked to complete an on-line application form by Monday, May 31, 2021, also by 5:00 pm EST.



save our seas
foundation

Save Our Seas Foundation (SOSF)

2022 Small Grants

saveourseas.com/grants/funding-applications/small-grants/

The Save Our Seas Foundation (SOSF) offers a series of grants dedicated to research, conservation and education projects worldwide. Projects should integrate at least two of these components and focus on charismatic marine megafauna, particularly sharks, rays and skates.

The Small Grant is designed for short (12- to 18-month) and small (grants average US\$5,000) projects dedicated to early career scientists (within five years of a degree being awarded). Aimed at original and innovative start-up projects, the grant presents early career scientists, conservationists or educators with an opportunity to prove themselves. It targets local

projects conducted by local project leaders. Whether or not the project is part of a larger endeavour, SOSF Small Grants are for specific and finite projects. Only projects concerned with marine chondrichthyan species (sharks, rays, skates, sawfishes and chimaeras) will be considered.

The Small Grant application process consists of a two-stage online application: The SOSF will consider small grant applications that, inter alia, aim to undertake the preliminary investigations necessary before a larger, longer-term project can be developed.

Successful applicants for small project grants, including scoping projects, are not eligible to submit a Small Grant application the following year, but are not excluded from submitting a new Keystone Grant application.

Only one application will be accepted from any one applicant.

All applications will be reviewed by the SOSF scientific committee and require final approval from the Foundation's Board of Directors. Stage I applications for the 2022 Small Grants are due by **June 30, 2021 at 18:00 CET**.



American Elasmobranch Society (AES)

Student Research Awards

elasmobranch.org/sac-student-funding | elasmobranch.org/student-research-award

Each year the AES Grant Fund Committee will award two separate \$1000 awards — the **Henry & Anne Mollet Elasmobranch Research Award** and the **AES Student Research Award** — for research on chondrichthyan fishes. In addition, the Donald R. Nelson Grant Committee will award a \$1000 award for research

on the behavior and sensory biology of chondrichthyan fishes — the **Donald R. Nelson Behavior Research Award**.

The award winners will be announced and the awards presented at the annual meeting banquet. Students who are currently enrolled in a degree program (undergraduate or graduate) and are members in good standing of AES (i.e., paid dues by December 31 of the prior year) are eligible to apply. Students are eligible to receive each award once per degree.

Applications for the 2021 American Elasmobranch Society Student Research Awards are due by **May 1, 2021**.



Shark Foundation | Hai Stiftung

hai.ch

The Foundation's purpose is to contribute to the protection and preservation of sharks and their natural habitats through its own projects and through the active support of third parties.

In this sense the Foundation supports scientific work domestically and abroad both financially and in an advisory function. Through such public relations activities as organizing and carrying out courses, lectures, touring exhibits, as well as a show of presence in the mass media, etc., a broad segment of the public is to be informed of the threat to many shark species and their habitats. This public relations work should also help find donors who help finance the Foundation and its various projects.

Finally, together with similar institutions and official authorities, the Foundation can enter into cooperations which correspond to its objectives.

The Foundation welcomes funding applications at any time.



IUCNSSG.org



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IUCN SSC

Shark Specialist Group

