SAVE OUR SEAS FOUNDATION

ANNUAL REPORT 2020

save our seas
foundation

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“AS LONG AS THERE ARE PEOPLE WHO CARE AND TAKE ACTION, WE CAN AND WILL MAKE A DIFFERENCE.” THE FOUNDER I SAVE OUR SEAS FOUNDATION

An oceanic manta ray in the Revillagigedo Archipelago National Park, Mexico.

CONTENTS

A group of whitetip reef sharks resting together on a ledge.

CEO'S FOREWORD

This year has not been the one any of us expected. As I write to reflect on 2020 amidst another lockdown, it is very hard to imagine a time before the current pandemic brought the world to a standstill. It has been a difficult period, with unparalleled loss for many.

But there is hope. Vaccines are rolling out and we continue to adapt. Humanity is resourceful, and it has been humbling to witness the tremendous goodwill and sense of community as people work together to make this better.

Through the Save Our Seas Foundation (SOSF), it has been a pleasure to see people rallying behind marine conservation despite the backdrop of global turmoil. Of course, many projects have had to be adapted, but none of the leaders have rested on their laurels. Many, in fact, have seized the opportunity to promote online outreach and to analyse and write up data, and have found new perspectives as we are all forced to take a step back.

One beacon of hope was the Republic of Seychelles announcing new marine protected areas that now cover 30% of its waters. Much to our delight, these include D'Arros and St Joseph, home to our SOSF-D'Arros Research Centre. This is the culmination of much hard work by many dedicated people and it gives us great joy to know that this jewel of an ecosystem will be protected for future generations.

Right, above: An olive ridley turtle basks at the surface in the open ocean.
Below: A mahi-mahi, or common dolphin fish, cruises the ocean in search of food.
Opposite: An inquisitive humpback whale calf approaches to inspect the photographer.

Our core remains the funding of research projects with direct conservation outcomes and of education that promotes environmentally conscious actions in us all. In this respect we were privileged to award more than 40 grants around the world in 2020. We continued our special focus on sawfish and wedgefish, which represent some of the most endangered elasmobranchs. From surveying sawfish in Colombia to protecting endangered guitarfish in Sri Lanka and tracking sharks on the high seas, our projects represent a global effort to protect charismatic marine biodiversity. Key issues tackled include fisheries mismanagement, population monitoring, genetics and the effects of marine pollution. We were also delighted to see an increase of more than 50% in applications to our keystone grants for the 2021 cycle – I look forward to sharing details on the successful grantees next year.

We have dramatically increased our dedication to communication, with a strong online focus due to the pandemic. This included digital campaigns that aimed to engage people in fun and novel ways, such as the 'Super Sharks' campaign we created for World Ocean Day. This included a short film created by now Oscar-winning director Pippa Ehrlich and a series of playable Super Shark trump cards, together highlighting the role of sharks in maintaining ocean health and how they need our help.

We also created a light-hearted educational video blog called 'The Whole Tooth' by Dr Isla Hodgson, where people, especially kids, pitched their questions about sharks and rays to experts around the world. We are now developing the format further for other outlets such as podcasts.

Far left: Playful Californian sea lions in the waters off the coast of Mexico. Left: Silky sharks are often seen round offshore sea mounts. For two decades, the fins of this species have been the second most common fins traded in Hong Kong markets. The silky shark is now listed on CITES Appendix II, which restricts its international trade.

In addition, our efforts to reach a broader audience resulted in a diverse array of sponsorships. Within Switzerland, we partnered with the Museum of Natural History in Geneva to support an immersive exhibition exploring the complex relationship between our oceans and plastic waste, created by the visionary artist George Nuku. In South Africa, the main shark display of the Two Oceans Aquarium in Cape Town is now officially the SOSF Shark Exhibit. Moreover, we renewed our sponsorship of the Wavescape Festival, which included a beautiful outdoor mural by Chris Auret highlighting how the future of sharks is in our hands, and a stunning outdoor exhibition by National Geographic photographer Thomas Peschak.

In fact, we are delighted to welcome Thomas as our Director of Storytelling, with whom we have exciting plans for next year. We were also fortunate to be joined this year by Sandrine Griffiths as our Grant Programme Manager – her breadth of experience across science, management and business makes her uniquely qualified to help drive our grant-making forward. Furthermore, Henriette Grimmel and Dr Robert Bullock respectively became the new Programme Director and Research Director of the SOSF-D'Arros Research Centre in Seychelles. Having both worked in Bimini, they are well suited to managing these roles and will develop a new direction for the research centre. We were also very pleased to welcome Helena Sims as our Seychelles Ambassador; her work has been critical in establishing greater protection for marine environments in Seychelles.

While much remains uncertain, it has been an honour to serve the foundation this past year and facilitate the great work by our project leaders, partners, centres and communications team. Echoing the sentiment of our Founder, I truly believe that together we really can make a difference.

Dr James Lea
Chief Executive Officer

17 YEARS OF THE SAVE OUR SEAS FOUNDATION

RESEARCH EDUCATION CONSERVATION

SINCE ITS INCEPTION IN 2003, THE SAVE OUR SEAS FOUNDATION HAS FUNDED MORE THAN **340 PROJECTS** IN OVER **75 COUNTRIES** WORLDWIDE AND HAS REMAINED ON THE PULSE OF CURRENT RESEARCH, CONSERVATION AND EDUCATION PROJECTS THAT FOCUS ON SHARKS AND RAYS

3 centres

D'ARROS ISLAND, SEYCHELLES
SOSF D'Arros Research Centre
Showcasing the ecological diversity and importance of D'Arros and St Joseph, with 22 targeted projects and six long-term monitoring programmes to date.

CAPE TOWN, SOUTH AFRICA
SOSF Shark Education Centre
Engaging local communities in marine conservation.

DANIA BEACH, USA
SOSF Shark Research Center
World-leading genetics laboratory, sequencing the first white shark genome in 2019.

5 long-term partners

BAHAMAS
Bimini Biological Field Station Foundation

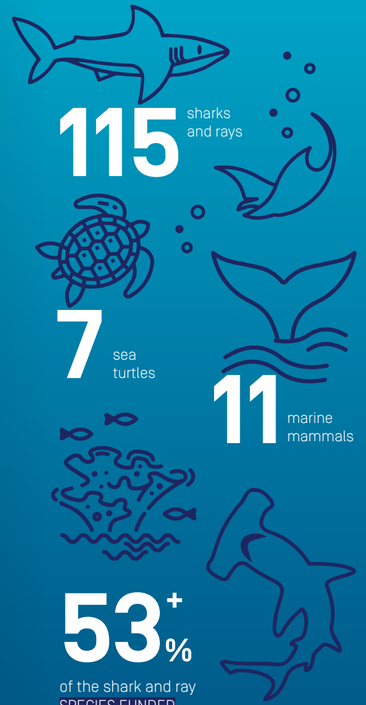
UK
The Manta Trust

SOUTH AFRICA
Shark Spotters

CANADA
North Coast Cetacean Society

SOUTH AFRICA
The Acoustic Tracking Array Platform

Species funded



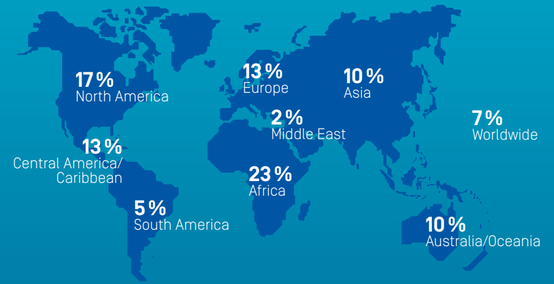
115 sharks and rays

7 sea turtles

11 marine mammals

53+% of the shark and ray SPECIES FUNDED can be considered VULNERABLE TO EXTINCTION.

340+ projects in 75 countries



49 projects in 2020

Small Grants ≤ 18 months
Keystone Projects < 3 years
Partners > 3 years

31 years old

Average age of early career professionals supported by Small Grants.

Grant recipients
48.6% women
51.4% men

AFRICA

GHANA

1 Shark-like ray conservation, Issah Seidu

KENYA

2 Guitarfish conservation, Andrew Temple

LIBYA

3 Angel shark fisheries, Sara Al Mabruk

SEYCHELLES

4 SOSF D'Arros Research Centre

5 SOSF Island School, Terence Vel

6 Coral bleaching, Phil Hosegood

7 Turtle monitoring, Jeanne Mortimer

SOUTH AFRICA

8 SOSF Shark Education Centre

9 The Acoustic Tracking Array Platform, Paul Cowley

10 Shark Spotters, Sarah Waries

TANZANIA

11 Fisheries monitoring, Cyrus Rumisha

WESTERN INDIAN OCEAN

12 Guitarfish conservation, David Ebert

AMERICAS

BAHAMAS

13 Education outreach, Candice Brittain

14 Lemon shark home ranges, Evan Byrnes

15 Bimini Biological Field Station (Shark Lab), Matthew Smukall

16 Silky shark movements, Brendan Talwar

CANADA

17 The North Coast Cetacean Society, Janie Wray

COLOMBIA

18 Sawfish genetics, Juan Cubillos Moreno

COSTA RICA

19 Sawfish conservation, Mario Espinoza

EASTERN PACIFIC

20 Mobulid ray fisheries, Josh Stewart

21 Mobulid ray fisheries, Don Croll & Melissa Cronin

ECUADOR

22 Hammerhead shark nursery, Eduardo Espinoza

23 Whale shark migrations, Jonathan Green

24 Shark fisheries, Kirsty Shaw

25 Marine education, Juan Torres

GUYANA

26 Shark fisheries, Diego Cardeñosa

ST VINCENT AND THE GRENADINES

27 Shark fisheries, Catherine Macdonald

UNITED STATES OF AMERICA

28 SOSF Shark Research Center

29 Bull shark nursery, Lauran Brewster

30 Great hammerhead shark fishery, Jill Brooks

31 Stingrays and pollution, Kady Lyons

32 White shark predation, Gregory Skomal

33 Cownose ray genetics, John Swenson

34 Smalltooth sawfish habitat use, Tonya Wiley

ASIA

BANGLADESH

35 Sawfish conservation, Ruth Leeney

INDIA

36 Ray fisheries, Alissa Barnes

37 Shark and ray fisheries, Sushmita Mukherji

INDIAN OCEAN

38 Devil ray genetics, Ellen Barrowclift-Mahon

MALDIVES

39 Whale sharks and microplastics, Alina Wieczorek

SRI LANKA

40 Bowmouth guitarfish genetics, Emily Humble

EUROPE

GREECE

41 Shark and ray surveys, Ioannis Giovos

NORWAY

42 Beluga rehabilitation, Lindsay Rubincam

THE MEDITERRANEAN

43 Ray fisheries, Chrysoula Gubili

UNITED KINGDOM

44 Flapper skate genetics, Tanja Schwanck

OCEANIA

AUSTRALIA

45 Sawfish community surveys, Veronika Biskis

46 Bottlenose wedgefish biology, Brooke D'Alberto

47 Shark-like ray tracking, Karissa Lear

48 Sawshark migrations, Jane Williamson

WORLDWIDE

49 The Manta Trust, Guy Stevens

50 White shark finprinting system, Benjamin Hughes

51 Mako shark ageing, John Mohan

WHERE WE WORK 2020

The Save Our Seas Foundation was established in 2003 with a mission to protect our oceans by funding and supporting research, conservation and education projects around the world, focusing primarily on charismatic threatened wildlife and their habitats.

49 50 51

WORLDWIDE

OUR CENTRES

REPORTS FROM THE SAVE OUR SEAS FOUNDATION CENTRES AROUND THE WORLD

1. **D'ARROS RESEARCH CENTRE** | SEYCHELLES
2. **SHARK EDUCATION CENTRE** | SOUTH AFRICA
3. **SHARK RESEARCH CENTER** | USA

St Joseph Atoll from the south-east, with a view of St Joseph Island, a prime site for nesting green turtles in the Amirantes.

save our seas
d'arros research centre

ROBERT BULLOCK & HENRIETTE GRIMMEL

SOSF D'ARROS RESEARCH CENTRE

DR ROBERT BULLOCK AND HENRIETTE GRIMMEL

The Save Our Seas Foundation D'Arros Research Centre (SOSF-DRC) strives to achieve its vision to be a centre of excellence for marine and tropical island conservation. Its mission is to preserve and showcase the ecological integrity of D'Arros Island and St Joseph Atoll through research, monitoring, restoration and education. It is this mission that motivates the activities and research undertaken on this small island and in its neighbouring atoll in the Amirantes group of Seychelles.

A significant milestone reached in 2020 was the formal gazetting of marine protected areas for D'Arros and St Joseph. On 26 March, D'Arros Island was declared a Zone 1 (no extractive use) and St Joseph Atoll part of a larger Zone 2 (conditional use). This achievement has been a core priority of the SOSF-DRC since its inception and comes as part of a broader commitment by the Seychelles government to safeguard the island nation's marine environment and resources by protecting 30% of its waters. The designation of these marine protected areas for D'Arros and St Joseph is the culmination of many years of dedicated research by the SOSF that has demonstrated the biodiversity and the ecological value of these islands and it should make a substantial contribution to ensuring their sustainable future.

Despite the difficulties associated with the global Covid-19 pandemic, 2020 was a productive year in that the SOSF-DRC was re-established and multiple research papers were published.

New management for the centre was recruited early in the year in the persons of Dr Robert Bullock and Henriette Grimmel, who took on the roles of research director and programme director respectively. After an initial visit to D'Arros in March, Rob and Henriette began their employment with the SOSF in July. With field activities limited due to the pandemic, during the latter half of the year they were able to focus on preparing for the re-opening of the centre. A research programme and associated SOSF-DRC budget were developed for 2021, research equipment was purchased, updates to the website were made and meetings with key stakeholders and collaborators were held.

Although the pandemic delayed the start of new projects, various long-term monitoring platforms continued to collect data. For instance, the large acoustic receiver array recorded valuable information about the movements of tagged sharks, rays, fish and turtles in the Amirantes throughout the year, while HOBO temperature loggers collected water temperature data from sites around the islands.

Below, left: During a survey of manta rays, an inquisitive reef manta passes by very close to the camera.
Below, right: Research Director Robert Bullock sets out with a fisheye lens to capture images of reef mantas like the one on the left.

A blacktip reef shark cruises along the reef at D'Arros Island.

The large acoustic receiver array recorded valuable information about the movements of tagged sharks, rays, fish and turtles in the Amirantes

2020 also saw the publication of research associated with the SOSF-DRC in scientific journals. The findings described in these papers support ongoing management recommendations, inform conservation decision-making for the region and will help to direct the centre's future research. These studies included uncovering, by means of long-term acoustic tracking, patterns in how sicklefin lemon sharks *Negaprion acutidens* and blacktip reef sharks *Carcharhinus melanopterus* use space and partition habitat (Lea et al. 2020); identifying the regional movements of reef manta rays *Mobula alfredi* (Peel et al. 2020); furthering our understanding of the diet and foraging habits of dasyatid rays (Elston et al. 2020); defining the efficacy of marine protected areas for humphead wrasse *Cheilinus undulatus* (Daly et al. 2020); and the developing and testing of methods for estimating the abundance of reef sharks using baited remote underwater video systems (BRUVS; Gore et al. 2020). The papers in question were:

Daly R, Daly CAK, Gray AE, Peel LR, Gordon L, Lea JSE, Clarke CR, Weng KC. 2020. Investigating the efficacy of a proposed marine protected area for the Endangered humphead wrasse *Cheilinus undulatus* at a remote island group in Seychelles. *Endangered Species Research* 42: 7–20.

Elston C, Cowley PD, Von Brandis RG, Fisk A. 2020. Dietary niche differentiation in a mesopredatory dasyatid assemblage. *Marine Biology* 167: 89.

Gore M, Ormond R, Clarke C, Kohler J, Millar C, Brooks E. 2020. Application of photo-identification and lengthened deployment periods to Baited Remote Underwater Video Stations (BRUVS) abundance estimates of coral reef sharks. *Oceans* 1: 274–299.

Lea JSE, Humphries NW, Bortoluzzi J, Daly R, Von Brandis RG, Patel E, Patel E, Clarke CR, Sims DW. 2020. At the turn of the tide: space use and habitat partitioning in two sympatric shark species is driven by tidal phase. *Frontiers in Marine Science* 7: 624.

Peel LR, Stevens GMW, Daly R, Daly CAK, Collin SP, Nogués J, Meekan MG. 2020. Regional movements of reef manta rays *(Mobula alfredi)* in Seychelles waters. *Frontiers in Marine Science* 7: 558.

Opposite: Blacktip reef sharks and a shoal of small spotted darts patrol the shallows on the northern side of D'Arros Island.
Left, above: Beach-scavenging horned ghost crabs feast on a small fish washed ashore.
Left, below: A hawksbill turtle is caught in the act of digging a pit at 'Sunset', a spot on D'Arros Island's south-western shore.

The first Seychelles Ocean Science Research Symposium was held in November and was organised by the Ministry of Environment, Energy and Climate Change in collaboration with the research foundation Nekton, the University of Seychelles, the Seychelles Conservation and Climate Adaption Trust, Seychelles Fishing Authority and Seychelles Islands Foundation. The SOSF contributed three presentations to the symposium: former research director of the SOSF-DRC Dr Ryan Daly delivered one on the humphead wrasse research conducted in 2018; project leader Dr Lauren Peel gave another on the movement patterns of reef manta rays in Seychelles; and Dr Robert Bullock presented a summary of the activities of the SOSF-DRC over the past eight years. Given that the symposium was attended by scientists from most major marine research and conservation organisations operating in Seychelles, it afforded us a spotlight for our findings and opportunities for future networking and collaboration.

With preparations for various projects being made over the course of the past year, the SOSF-DRC is now well positioned for research to begin again in earnest at the beginning of 2021. One of these projects will assess the role of internal waves on coral reefs and their potential mitigation of bleaching effects. Another will sample coral cores at D'Arros and St Joseph as part of a broader study to improve understanding of the consequences of anthropogenic climate change in the Indian Ocean. We also intend to support research into the effects of habitat complexity on the distribution and movements of reef sharks using the D'Arros and St Joseph site. Finally, we will begin to collect genetic samples of sea turtles as part of our long-term turtle monitoring programme, which contributes to a broader regional collaboration that aims to advance our understanding of the Indian Ocean's turtle populations.

The SOSF Shark Education Centre team ready for action on Dalebrook beach.

save our seas
shark education centre

CLOVA MABIN

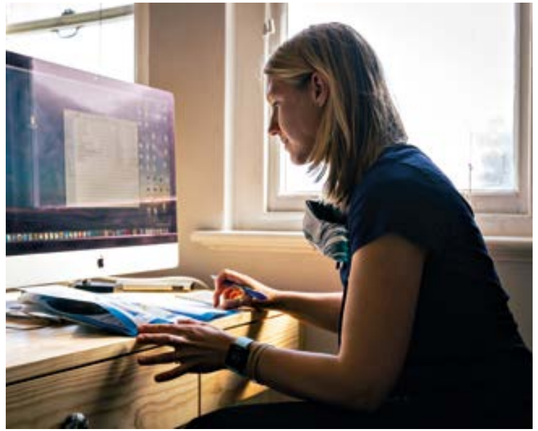
SOSF SHARK EDUCATION CENTRE

DR CLOVA MABIN

The Save Our Seas Foundation Shark Education Centre aims to connect the public to the ocean through experiential education programmes that focus on sharks and local marine ecosystems in order to nurture awareness, encourage environmentally responsible actions and develop a healthy respect for sharks. Our facility can accommodate school groups for an immersive educational experience, with a visit to the Dalebrook rocky shore a definite highlight. We are also open to the public and run several long-term educational programmes with under-resourced communities.

EDUCATIONAL IMPACT

With the strange circumstances that Covid-19 brought to the world in 2020, our working lives looked very different. While parents around the world were suddenly facing the prospect of homeschooling, our team were actually missing working with the groups of school children whose voices usually fill our centre. South Africa was in some form of national lockdown from 23 March until the end of the year. With a hard lockdown for the first two months, staff worked from home if they were able to. Then as restrictions lifted, the team returned to the centre in shifts to limit exposure; we returned in full as of September.



Above, left: Clova Mabin, director of the Shark Education Centre, works on an activity book developed for primary school learners in 2020.
Above, right: Some of the participants in the 2020 Marine Explorers programme having fun even before they enter the water.

Opposite, left: Craig Haley, the centre's Education Coordinator, teaches a class about rocky shore ecosystems.
Opposite, right: The proud owner of a newly developed pocket guide that has been designed for young people to use while exploring the rockpools of the Cape Peninsula.

As a result of Covid-19, visitor numbers this year were unfortunately lower than in previous years. The total number of people reached directly by the Shark Education Centre in 2020 was 1,028. This included 849 school learners in organised groups (both onsite and offsite), with 113 accompanying adults (parents or teachers). In addition, 377 members of the public visited during the year. These numbers would not have been as high had we not had a very busy start to the year, with 601 learners and 222 members of the public visiting us during January and February 2020. We were able to open to visitors again in September under strict Covid-19 protocols, with limited group sizes and a dedicated cleaning schedule.

On the plus side, fewer classes allowed the education team to focus on projects that had been in the pipeline for several years. This included a *Rockpool Pocket Guide*, a *Sharks of False Bay* poster and two primary school activity books. These educational materials will be used to increase our impact after outreach events at under-resourced schools.

With a gloomy outlook for school visits for the remainder of 2020, we decided to use our annual outreach budget to offer five local primary schools a once-off donation to alleviate some of the unexpected Covid-19 costs. The majority of donations consisted of either pre-printed educational materials that were distributed to learners who could not attend school during the lockdown or a supply of paper to print their own worksheets. This support was greatly appreciated by all the schools we worked with and I hope it will be the start of long-term partnerships with these schools.

2020 was also the year we revised our Marine Explorers programme. We decided to try partnering with a local swim squad that worked with teenagers from under-resourced communities. It was a great success and despite Covid-19, we managed to put 14 learners through the programme.

Like most companies, we had to move the majority of our work to online platforms during 2020 in order to continue reaching others. Unfortunately, due to its nature, online content is restricted to learners who have access to a smart device and mobile data or Wi-Fi to view and participate in the lessons. The majority of our target groups do not have these privileges. However, we took the opportunity to trial different teaching techniques with an aim to adapting them in future. One example of this was the water cycle webinar series that we undertook in collaboration with the Cape Town Environmental Education Trust and the Environmental Learning Research Centre. The programme consisted of three sections, with the first an overview of the water cycle and a discussion about global citizenship. The second component ('Home-to-Sea') was hosted by the Shark Education Centre with a focus on impacts that people have on the marine environment from their homes, in terms of pollutants in sewage systems and littering, as well as the positive influences that consumers can have. The final webinar emphasised the 'Source-to-Home' pathway, with a great discussion of water usage. A total of nine learners completed the programme and we hope to develop this into a formal package for teachers to use in future.

Opposite: A Marine Explorers participant tries out the snorkelling gear in a swimming pool before diving into the ocean.

Below, left: Some Marine Explorers participants learn how to use snorkelling equipment correctly at the Pisces Divers pool in Simon's Town. Below, right: Others enter the water at the nearby Windmill beach for their first open-water snorkel.

Left: A youth group helps the Shark Education Centre team collect nurdles from Dalebrook beach.
Above: Nurdles, nurdles everywhere! These tiny plastic pellets are polluting Western Cape beaches following a recent container spill.

FACILITIES UPGRADE

With minimal foot traffic during 2020, we took the opportunity to make several changes to the centre, focusing on our outside facilities where school groups congregate during their visits. The principal objective was to create more seating spaces for groups, particularly with some shelter from rain, while the design allows visitors to experience the False Bay environment from the shoreline to deeper waters. Eight beautiful shark sculptures made of various recycled materials add the final touch and we can't wait to invite school groups back.

After the success of our recent installation of solar panels and a battery, we decided to connect our rainwater storage tanks to the plumbing system. Now all the toilet cisterns, taps and appliances receive filtered potable rainwater and our consumption of municipal water is significantly reduced. Our water storage tanks have been clad to resemble the False Bay beach huts and visitors can use this space (which also houses our recycling station and 'Eco-code') to learn about what we at the centre do to reduce our environmental impact – another teaching opportunity!

Above: The new signage and flags at the Shark Education Centre are helping to draw visitors through its doors.
Opposite: Our talented muralist in action, creating a backdrop for the sevengill cowshark sculpture that will be installed in 2021.

LOOKING FORWARD

As 2020 looked so different for us, and our visitor numbers are much lower than previous years, I hope that we will get the chance to change this in 2021. Our aims for 2021 will be to increase our educational reach in our current programmes as well as to introduce several new projects. These include an increase in our outreach activities with assemblies at schools that have never visited us before (especially high schools), a pilot pop-up roadshow along the False Bay coastline and the development of an Ocean Ambassador programme to increase our messaging in local communities.

Below: Staff check on the animals that live in the Shark Education Centre's touchpool.
Right: Young visitors study the Shark Education Centre's collection of shark biofacts, which include jaws from several species, teeth and vertebrae, as well as skin samples.

SOSF-SRC graduate student Sydney Harned selects shark DNA samples for sequencing.

save our seas
shark research center

MAHMOOD SHIVJI

SOSF SHARK RESEARCH CENTER

DR MAHMOOD SHIVJI

The Save Our Seas Foundation Shark Research Center (SOSF-SRC) takes a multi-disciplinary approach to research, employing methods from genetics, genomics and ecology. This operational strategy is based on our philosophy that a holistic understanding of the animals, their environment and their interaction with anthropogenic influences is necessary for science-based conservation.

In 2020, the SOSF-SRC continued its globally widespread research on several shark species in three broad areas:

- Decoding entire genomes of sharks to obtain a highly detailed view of the genetic basis underlying the biological traits and ecological functioning of these extraordinary, and in many cases endangered, animals;
- Determining the population genetic/genomic dynamics of several large species of exploited sharks;
- Investigating the movement ecology of shark species of conservation concern.

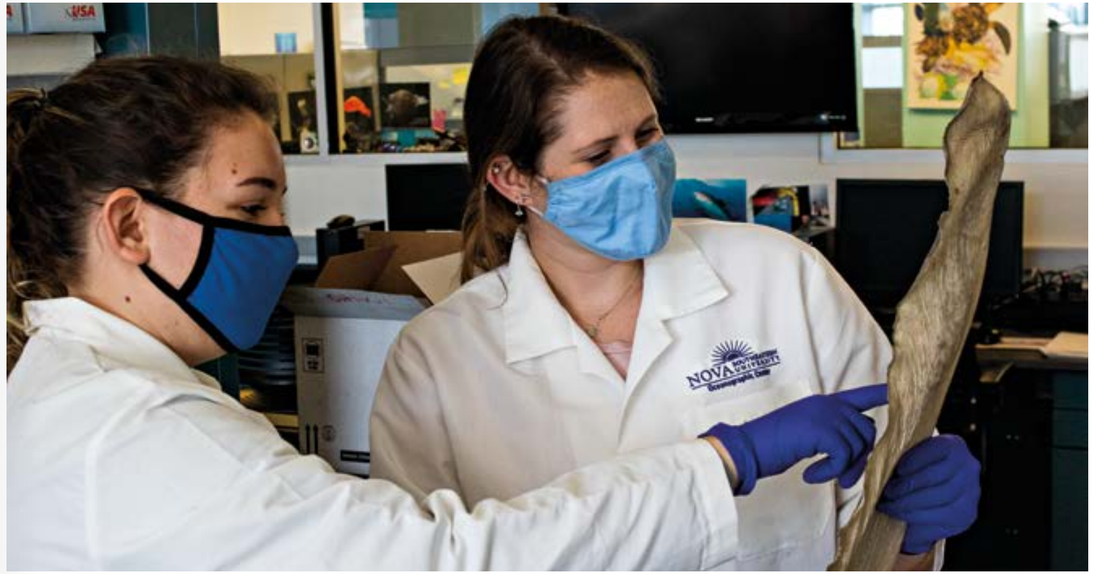
DECODING SHARK GENOMES

During 2020 we made substantial progress on refining our early draft assembly of the genome of the great hammerhead shark, a species listed as Critically Endangered by the IUCN. This was accomplished by combining short read and long read genome sequences with newly acquired genome proximity ligation data, which enabled us to create highly connected DNA sequences over long distances to produce what is known as a high-quality, chromosomal-level genome assembly for this shark.

We also initiated genome sequencing of the Endangered shortfin mako shark. To date we have obtained short read and long read mako genome sequence data, using the latest genome sequencing technology (PacBio HiFi; https://www.pacb.com/smrt-science/smrt-sequencing/hifi-reads-for-highly-accurate-long-read-sequencing/) for the long read data. This new long read sequencing technology offers genome-scale sequencing reads with greater than 99.9% base accuracy. The near-perfect accuracy obtained is predicted to revolutionise the quality of assembled vertebrate genomes, not only allowing greatly improved gene discovery, but also revealing detailed knowledge of the structure of individual genes in mako sharks.

The availability of high-quality genome assemblies will provide a reference for use by the global science community to better understand the biology of these endangered sharks and devise improved conservation measures for them based on the most up-to-date biological information.

Below: Genetic analysis is being conducted on scalloped hammerhead shark DNA. Opposite: SOSF-SRC graduate students Melissa Mehlrose (left) and Sydney Harned (right) examine a confiscated shark fin for DNA sampling.



The availability of high-quality genome assemblies will provide a reference for use by the global science community to better understand the biology of these endangered sharks

Knowledge of the population-level genetic dynamics of exploited shark species is essential

Opposite: The great hammerhead shark is a Critically Endangered species whose genome is being sequenced by the SOSF-SRC.

Above: Tiger sharks are a highly migratory species, but genetic evidence suggests that regional populations mix less than expected.

POPULATION GENETIC/GENOMIC DYNAMICS OF EXPLOITED LARGE SHARK SPECIES

We continued work using genetics and genomics approaches to identify genetically distinct populations and levels of genetic diversity in four species of large-bodied apex predator sharks that are globally exploited and of high conservation concern: the Near Threatened tiger shark, the Critically Endangered scalloped hammerhead shark, the Endangered shortfin mako shark and the Vulnerable broadnose sevengill shark. Knowledge of the population-level genetic dynamics of exploited shark species is essential because individual populations living in different geographic regions can become adapted at the DNA level to their specific environments. Such genetic adaptations and associated diversity are critical for providing species with the evolutionary resilience to survive changes in the environment, thus providing a bulwark against extinction. The identification of such regionally adapted populations is urgent to enable targeted conservation management in the face of high levels of overfishing and rapid changes occurring in the earth's climate and oceanic ecosystems.

To this end, in 2020 we:

- Completed data analysis on the population genomic dynamics of tiger sharks on a global scale and drafted a manuscript for publication (final revisions ongoing and submission planned for early March 2021). This is the first genomics-scale population perspective for this charismatic species. The data show that despite the highly migratory nature of tiger sharks, there exists a large genetic divergence between sharks from the Atlantic and sharks from the Indo-Pacific and, notably, a strong signal of evolutionary genetic adaptation of tiger sharks to each oceanic region. This finding makes it imperative that tiger sharks in each oceanic region receive targeted management to preserve their evolutionary uniqueness and potential.
- Continued genomics-scale data acquisition and analysis of shortfin mako shark populations throughout the Atlantic. This work involves the development (completed) and analysis of SNP markers (ongoing) and obtaining whole mitochondrial genome sequences (also ongoing) to get a high-resolution view of the population structure and demography of the mako shark, a globally Endangered species that is overfished in the western North Atlantic. This population genetic information is of high international management interest.
- Continued population genetic, phylogeography and mating systems research on the Critically Endangered scalloped hammerhead shark in the Eastern Tropical Pacific. This project is a collaboration with Dr Pelayo Salinas de León of the Charles Darwin Foundation. The genetic data have now all been collected and are undergoing analysis.
- Completed and submitted for publication a study (now in press) of the global population structure of the broadnose sevengill shark. This study required a large international collaboration to obtain samples from throughout the species' worldwide distribution. The results indicate significant genetic differences and a lack of gene flow among broadnose sevengill shark populations from the South Atlantic, Oceania and Eastern Pacific regions. Our study provides a resource for managing populations and stocks of broadnose sevengill sharks around the globe.
- Trained high school student Ela Patel in laboratory genetics techniques and introduced her to some genomics-level analysis methods. Her work, guided by the SOSF-SRC team, resulted in a journal publication (listed overleaf) describing the mitochondrial genome of the Endangered grey reef shark. This genome sequence will provide a baseline and genetic resource for future work on the population genetic dynamics of this overfished species.

The SOSF-SRC is studying the genetics of the shortfin mako shark, an Endangered species, throughout the Atlantic.

Successful conservation planning for populations of exploited shark species requires knowledge of their migration patterns and how they use their habitat

MOVEMENT ECOLOGY OF SHARKS

Successful conservation planning for populations of exploited shark species requires knowledge of their migration patterns and how they use their habitat. To this end, in 2020 the SOSF-SRC team worked in collaboration with the Guy Harvey Research Institute to complete data analysis, writing and submission of a manuscript on the first examination of the movement ecology of the Vulnerable smooth hammerhead shark in the western Atlantic. The paper was published (see opposite) and we collaborated with the SOSF administration and media team to disseminate a press release, receiving coverage in US and international outlets. This media team collaboration provided us with a pathway for future efforts to promote brand awareness for the SOSF.

We also continued our collaboration with Dr Pelayo Salinas de León to expand our work on the movement ecology of the scalloped hammerhead shark and develop a new project, based in the Galápagos, to study the movements of the Vulnerable silky shark. These projects are continuing in 2021.

Research by the SOSF-SRC and international collaborators reveals that there are three isolated and genetically distinct populations of the broadnose sevengill shark globally.

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* Graduate student author
** Post-doc author
*** High school student author

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OUR PARTNERS

REPORTS FROM THE SAVE OUR SEAS FOUNDATION PARTNERS AROUND THE WORLD

1. **BIMINI BIOLOGICAL FIELD STATION FOUNDATION** | MATTHEW SMUKALL
2. **THE MANTA TRUST** | GUY STEVENS
3. **SHARK SPOTTERS** | SARAH WARIES
4. **THE NORTH COAST CETACEAN SOCIETY** | JANIE WRAY
5. **THE ACOUSTIC TRACKING ARRAY PLATFORM** | PAUL COWLEY

BBFSF volunteers check a gill net set among mangroves as part of a survey recording the abundance of lemon sharks.

MATTHEW SMUKALL

BIMINI BIOLOGICAL FIELD STATION FOUNDATION

MATTHEW SMUKALL

The Bimini Biological Field Station Foundation (BBFSF) was established in 1990 by Dr Samuel Gruber to advance our knowledge of elasmobranch fish fauna (sharks and rays); educate future scientists; and disseminate our research to advance the field of marine science and raise public awareness about sharks. Dr Gruber passed away in April 2019, but his legacy remains: the BBFSF serves as a USA 501(c)3 (non-profit organisation) and it has a diverse board of directors that will guide the foundation for decades to come.

The past year was a challenge for everyone around the world, but the BBFSF was able to operate a consolidated research schedule while adhering to strict health protocols.

RESEARCH

VEMCO ACOUSTIC MONITORING ARRAY

The BBFSF Vemco acoustic array currently comprises 64 receivers in habitats around the islands of North Bimini and South Bimini and continues to provide valuable data for both researchers and collaborators of the foundation. To date, 244 elasmobranchs have been tagged with Vemco transmitters, including five southern stingrays and 11 lemon, five great hammerhead, one tiger and nine bull sharks, all tagged in 2020.

An additional 14 juvenile lemon sharks were tagged with active tracking transmitters to assess their use of habitat and the impacts of anthropogenic disturbances. Data obtained by the BBFSF in 2005–2007 will be compared with current tracking data to determine how recent habitat destruction has changed the local use of space by juvenile sharks. Nine juvenile lemon sharks in the North Sound nursery were tagged with Vemco V13 accelerometer transmitters to determine their activity throughout the Bimini lagoon and how it varies between heavily disturbed (North Sound) and relatively pristine (Bonefish Hole) habitats.

LONG-LINE SURVEYS

The BBFSF operates a long-term scientific long-line survey to monitor the species composition, population trends and demographics of sharks in the waters around Bimini. Although this survey was temporarily halted to comply with Covid-19 restrictions, we were able to complete seven 24-hour surveys in 2020. The monitoring of shark populations is especially critical in light of recent comments suggesting a short-term relaxation of protective measures for sharks within the Bahamas Shark Sanctuary. Our survey indicates that the relative abundance of tiger sharks in Bimini has remained stable over the past 35 years, rebutting reports that populations are 'out of control' and highlighting the importance of maintaining the sanctuary. A copy of the manuscript has been sent to the Department of Marine Resources.

Below: An adult tiger shark is secured to the side of a BBFSF research vessel so that data can be collected during an overnight long-line survey.
Right: Researchers make a small incision near the base of a tiger shark's dorsal fin in order to implant a passive integrated transponder (PIT)

Opposite: During the annual population census, juvenile lemon sharks are temporarily held in a pen. Above, left: A great hammerhead shark at the local Bimini dive site. Above, right: A great hammerhead is gently rolled in tonic immobility so that an acoustic tracking tag can be surgically implanted in it.

LEMON SHARK PIT CENSUS

The annual juvenile lemon shark census in the Bimini lagoon was delayed and its methodology changed to comply with Covid-19 restrictions. Modifications to the timing, duration and methodology of the 2020 survey make it challenging to compare its results directly with those of previous years as, for example, it documented 46 individuals compared to 187 in 2019. Nevertheless, data obtained from the 2020 census are still contributing to important ongoing research by providing biological samples for genetic, stable isotope and body condition factors, as well as determining growth and survival rates of juvenile sharks.

GREAT HAMMERHEAD RESEARCH

The IUCN Red List classifies great hammerhead sharks as Critically Endangered, yet Bimini has become renowned as a reliable location for interactions with this typically rare and solitary species. Seventeen great hammerheads have been fitted with internal acoustic tags to enable researchers to assess their use of local habitats, affinity to the provisioning site and regional movements, as well as to identify pupping grounds and predatory overlap with the local population of rays. As part of a collaborative research project, the BBFSF has deployed SPOT tags on five great hammerheads to gauge their spatio-temporal overlap with commercial fisheries and the potential efficacy of timed area closures to protect this species.

EDUCATION

VOLUNTEER INTERNSHIPS

In response to the global pandemic and limitations on international travel, we made the difficult decision to stop our volunteer programme in March. Later in the year, after conducting rigorous testing regimes, meeting significant logistical challenges and imposing quarantine periods, we were able to welcome a condensed group of six volunteers to the station from October to mid-December.

STUDENTS

In November former BBFSF doctoral student Félicie Dhellemmes submitted her dissertation, of which two chapters have been accepted for publication and a third is in the final stage of preparation. Former BBFSF students Matthew Smukall (two chapters submitted) and Maurits van Zinnicq Bergmann (one chapter in preparation) continue to make progress on their dissertations. The dissertations of visiting PhD students Dennis Heinrich and Evan Byrnes are close to completion, while the research of Megan Mickle continues to move forward. MSc student Agathe Basset-Rambert successfully defended her thesis, despite her field research being cut short in 2020.

Opposite: BBFSF staff explain to volunteers the process of collecting data for juvenile lemon sharks.
Right, top and middle: A southern stingray is placed in a sling to be weighed.
Right, bottom: A suture is used to close the incision site following the surgical implantation of an acoustic tag in a southern stingray.

Right: Measuring the girth of a juvenile lemon shark.
Opposite: A juvenile lemon shark is placed in a work-up trough so that data can be collected.

COURSES

Most of our visiting courses were cancelled for 2020, but we were able to host shark biology courses for Eckerd College, Berwick High School Academy and Trevor Day High School before Covid-19 restrictions were implemented.

OUTREACH

A large portion of our outreach and education programmes had to be adapted in 2020 in order to adhere to social distancing and lockdown measures. Throughout the global lockdown period the BBFSF outreach and media team transitioned to digital outreach and prepared six weeks of public engagement, producing and sharing educational videos, interactive games and competitions and hosting live question and answer sessions on virtual platforms. These virtual systems that we established in 2020 will endure as a means to broaden our outreach potential around the world.

SCIENTIFIC OUTPUT

The BBFSF contributed to several manuscripts, ranging from animal personality to the regional movements of sharks. 2020 saw eight manuscripts accepted or in the final editing process before publication and another five completed and currently in review. We continue to collaborate on research projects throughout the region in order to leverage our datasets to provide the greatest impact for the conservation and management of sharks and rays.

On behalf of everyone at the BBFSF, I express our tremendous gratitude for the ongoing support of the Save Our Seas Foundation and we look forward to a continued partnership for years to come.

Black morph oceanic manta ray and diver at The Boiler in Revillagigedo Archipelago, Mexico.

GUY STEVENS

THE MANTA TRUST

DR GUY STEVENS

The Covid-19 pandemic had a significant impact on the Manta Trust's operations. The charity is facing a period of economic uncertainty while the species and habitats we are tasked with protecting face greater threats than ever before. Most of our field work around the world ceased in 2020 and tourism activities ground to a halt in the Maldives and at all our affiliate project locations worldwide. However, we have been greatly encouraged by donations from the public and are more grateful than ever for the Save Our Seas Foundation's ongoing support.

Despite these challenges, our team continued to work hard, concentrating in particular on education and awareness and on fostering more communication and collaboration between mobulid-focused projects and fundraising initiatives to support those affiliate projects that were most affected by the Covid-19 crisis. Our Global Strategy and Action Plan continued to guide our charitable efforts and those of our international network of mobulid projects.

Above, left: Friendly bottlenosed dolphins are a common sight at Cabo Pearce in the Revillagigedo Archipelago, Mexico.
Above, right: A tiger shark cruises past divers in Fuvahmulah Atoll in the southern Maldives.
Opposite: The Mexico Caribbean Project team in Isla Mujeres, back from a successful day in the field.

We helped Karen to formulate a proposal that, if successful, will see strict national protection for oceanic manta rays

CONSERVATION ACHIEVEMENTS AND LEGISLATIVE ACTION

The Mexican government made modifications to Annex III of the Official Norm for the protection of species at risk of extinction, adding all mobulids and therefore providing much greater protection for these species in Mexico. Karen Fuentes, the leader of our affiliate Mexico Caribbean Project, worked for many years with the authorities to provide information and push for this legislative gain. In 2020 we helped Karen to formulate a proposal that, if successful, will see strict national protection for oceanic manta rays throughout most of the Caribbean states as part of the Convention for the Protection and Development of the Marine Environment in the Wider Caribbean Region under the Specially Protected Areas and Wildlife Protocol.

In March we celebrated the designation of the waters around D'Arros Island and St Joseph Atoll, the Seychelles Manta Project's primary study site, as protected areas.

Opposite: An oceanic manta ray cruises overhead in Fuvahmulah Atoll, Maldives.
Left, above: The Maldivian Manta Ray Project team searches for manta rays in Baa Atoll, Maldives.
Left, below: The team is based at the Four Seasons at Landaa Giraavaru in Baa Atoll, Maldives.

RESEARCH ACTIVITIES AND SCIENTIFIC PUBLICATIONS

Our Maldivian Manta Ray Project (MMRP) team was unable to carry out research for much of 2020, but we did secure funding for a dedicated research boat for the last two months of the Baa Atoll manta season from our commercial partner Carl F. Bucherer. This enabled some of our researchers to collect valuable data on manta behaviour and movements during a period of reduced tourism. The MMRP reached a significant milestone when it identified the 5,000th Maldives reef manta ray. In September we wrote and presented a report on the impact of the Indian Ocean Tuna Commission's fisheries on mobulid rays and provided recommendations for future management to this Regional Fisheries Management Organisation.

Our IDtheManta Project continues to make progress. The development of manta-matching software with Google DeepMind is ongoing, the database is being grown and tested, data and images are being formatted and a mobile app is being developed.

Joanna Harris, the leader of our Chagos Manta Project, undertook her second field trip in March 2020 and it was a great success, despite being cut short by the pandemic. Joanna significantly increased the reef manta ray database for the region, collected data from current acoustic receivers and deployed more receivers, and gathered tissue samples for DNA and stable isotope analysis. Unfortunately her March 2021 field trip has been cancelled, but she hopes to return later in the year.

2020 saw the publication of 11 research papers of which Manta Trust scientists were the lead authors.

Right, above: The Maldivian Manta Ray Project team after an education day out in North Male Atoll.
Right, below: A student of the project's Marine Education Programme during a field trip.

Opposite: The Marine Education Programme includes numerous field trips and activities such as beach clean-ups.

AWARENESS AND EDUCATION

In February and March we added several new resources to the website, all of which were designed to support and engage people during lockdown. These included Kids' Club, providing free educational activities and games to entertain young children; Book Club, recommending books, documentaries and movies to inspire our team's passion for the natural world; and a series of webinars whose 28 hour-long video sessions connected our supporters with researchers, marine conservationists, policymakers, underwater photographers and filmmakers.

We took over operational responsibility for the Ocean Giants Trust Scholarship, which was created by the now-dissolved Ocean Giants Trust together with Plymouth University. This programme is designed to give students experience in all aspects of working in the marine conservation sector while assisting partner NGOs and fundraising for them. We have been working with Plymouth University to run and develop the programme since September.

To help raise awareness about manta and devil rays we launched the first World Manta Day on 17 September and created a dedicated World Manta Day website with links to 32 marine NGOs, all of which helped us not only to celebrate the day, but also to get manta rays trending.

Our work has featured in several publications, including *Duiken*, *Diver* and *GMT* magazines, *Die Welt*, *Kuoni* and *Kind Traveller* online and *Nobel & Style*.

In June we received a grant from Ernest Kleinwort Charitable Trust to develop new teaching resources. These will be made available for free download from our website and distributed to our affiliate projects in several languages in 2021.

Our team attended a Carl F. Bucherer event for the Geneva Watch Show in August, three dive shows in Germany and Italy in February and September and the Scuba Digital online dive show in October.

We have a social media audience in excess of 104,000 across Facebook, Twitter, Instagram and LinkedIn, which represents a growth of more than 13% since January 2020, and we continue to send a free monthly newsletter to our mailing list of more than 2,000 subscribers. The Cyclone, our donation-based online community, now has in excess of 260 members from around the world.

Opposite: Mass-feeding manta rays in Hanifaru Bay in the Maldives.
Left, above: A reef manta ray barrel-rolls up to the surface to feed on plankton in Fiji.
Left, below: An oceanic manta ray is flanked by trevally in Mexico's Revillagigedo Archipelago.

GLOBAL NETWORK, FUNDRAISING AND COLLABORATIONS

In August we facilitated the first Pacific Network video call, bringing together scientists from 10 research projects in this region to share knowledge and project updates as well as look for opportunities to collaborate with and support each other. We host these calls monthly.

The Manta Trust's global network of affiliate projects continues to grow, as we welcomed the Mobula Conservation Project. We look forward to working with the members of this initiative to increase awareness of the plight of devil rays.

During the course of the year we secured funding from the Paul M Angell Foundation, The Big Give and the Enjoolata Foundation. We also launched a crowdfunding campaign to provide emergency financial support for our affiliate projects that were most affected by the Covid-19 pandemic. This raised approximately $21,500, which was distributed to affiliate projects in Fiji, Peru, Mexico, Brazil and New Zealand.

None of this would have been possible without the Save Our Seas Foundation grant and team, so we would like to say a huge thank you to you all. We hope that 2021 will be a brighter year for everyone.

Shark Spotters deploy and retrieve the Fish Hoek shark exclusion barrier daily to reduce the risk of marine animals getting entangled in it and to avoid potential storm damage.

SHARK SPOTTERS
SAFETY CONSERVATION EDUCATION RESEARCH

SARAH WARIES

SHARK SPOTTERS

SARAH WARIES

There is no doubt that the coronavirus pandemic made 2020 a challenging year for many organisations around the world and Shark Spotters was no exception. For the first time in our history we had to suspend all our safety activities for an extended period of time due to beach closures and national lockdowns. Despite this, we still provided our spotting services on 277 days of the year, at four beaches during winter and an additional two beaches during the summer months. The Fish Hoek shark exclusion barrier was also deployed on 60 days.

The white sharks continued to prove elusive over the past 12 months, with no confirmed sightings recorded at beaches where Shark Spotters was operating. Encouragingly, however, there were a few confirmed white shark sightings in False Bay during the year, including one by an aerial survey in January 2020 and another accidentally caught (and immediately released) by a shore angler in December 2020. These sporadic white shark sightings highlight the importance of continued monitoring of our coastal waters by spotters, not only from the perspective of bather safety, but also to understand the factors driving shark distribution within False Bay and along the whole South African coastline. Bronze whaler sharks were, however, more in evidence: the spotters recorded 38 sightings close to shore, including a number of large specimens of approximately three metres (10 feet) in length.

A total of 39 people were employed during the year, 94% of whom are from previously disadvantaged communities. All our staff are the primary breadwinners in their households, meaning that Shark Spotters directly supports more than 120 individuals. We were pleased to continue supporting the team throughout the lockdown period, both financially and with mental health support, in order to minimise the negative impacts the pandemic has had on communities. While most training activities were interrupted due to lockdown, the spotters did complete a marine field trip with the I Am Water Foundation in March, where they learnt about the ecology of rocky shores as well as kelp forests, which they were able to explore by snorkel. All staff also underwent Covid-specific occupational health and safety training in order to minimise the risk of virus transmission in the workplace, as well as in their own communities.

Our newly formed Coastal Conservation Crew was busy throughout the year conducting proactive and reactive conservation activities that made a significant positive contribution to our fragile coastal environment. These activities included the stabilisation, rehabilitation and planting of sand dunes, the removal of ghost fishing gear, vessel waste and other pollution from the coastal zone, the management of stormwater outlets at the beach interface to reduce land-based pollution entering the sea, the repair and removal of damaged coastal infrastructure after swell or storm damage and the testing of ocean water for quality. The crew's presence has helped to ensure that our coastal habitat is protected from human degradation as well as the effects of climate change, and that our oceans remain healthy for sharks and other marine creatures.

The crew's presence has helped to ensure that our coastal habitat is protected from human degradation as well as the effects of climate change

Below: Many members of the Shark Spotters team got their first glimpse of the underwater magic of the Great African Sea Forest in 2020 on a snorkelling adventure with the I Am Water Foundation.
Bottom: Following a massive nurdle spill in October, the Shark Spotters team played a coordinating role in the clean-up operations, collecting more than 50 kilograms of the small plastic pellets, estimated to amount to over 1.5 million nurdles.

Opposite: One of the main principles of the Shark Spotters' education programme is to teach learners about the impact of their everyday activities on the ocean and its inhabitants. Beach clean-ups are one of the best ways of doing this as they demonstrate how easy it is to protect the environment.

With funding from the City of Cape Town, we plan to add an additional team in 2021 to expand the impact even further.

Our education programme faced the most challenges this year, as the national lockdowns and school closures happened during the winter months, which is traditionally the busiest time for our outreach activities. Despite this we managed to reach 500 beneficiaries directly during the year, as well as many more at outreach activities before the pandemic hit. With face-to-face engagement not possible, we moved to digital education opportunities, recording video lessons that were sent to schools for teachers to use without the need for one of our educators to attend in person. We had great feedback from this, which has enabled us to formulate new ways of conducting our education going forwards, as it is anticipated that face-to-face activities will not be able to resume for much of 2021. We also welcomed a new education coordinator to the team: Taryn van Neel, who previously ran a marine education centre in Durban. We are looking forward to seeing Taryn's skills and experience put into practice at Shark Spotters and are excited for her plans for our education programme in 2021.

Communication and engagement remained a top priority for the programme throughout the year, especially with many people working from home due to the pandemic. We participated in a number of online webinars, engaged regularly with journalists and were mentioned in over 100 media articles and recorded for more than 15 television or radio news segments. We continued to use our social media, mobile app and website platforms to keep beachgoers up

The I Am Water team used the beach as its classroom to teach our spotters the fundamentals of rocky shore ecology in March. With this enhanced knowledge of the marine environment, the spotters are able to act as Ocean Ambassadors, educating beach visitors about how special our coastal environment is and why it needs to be protected.

Pollution is a major challenge to ocean health and our Coastal Conservation team tackled this head on. Its efforts included clearing large amounts of 'ghost' fishing gear from the coastline and dealing with entangled marine animals.

Opposite: Monwabisi, one of our busiest spotting beaches in summer, lies on the northern shore of False Bay and serves the under-resourced community of Khayelitsha.

White sharks remained scarce in False Bay in 2020 and there were only a handful of confirmed sightings. This white shark, estimated at four metres (13 feet) long, was spotted by a South African National Parks aerial patrol in January.

Ten bronze whaler sharks were tagged in 2020 and another 40 tags will be deployed in 2021.

to date on the latest shark alerts, beach closures and other interesting shark safety and conservation information.

Our research programme was kept busy with three ongoing projects this year, in collaboration with the Institute for Communities and Wildlife in Africa at the University of Cape Town, as well as other project-specific collaborators such as the National Research Foundation of South Africa, the Two Oceans Aquarium, the South African Institute for Aquatic Biodiversity, the Research Dive Unit, South African National Parks and the departments of Forestry, Fisheries and the Environment, Agriculture and Science and Technology. These included one PhD project on the spatial ecology of broadnose sevengill sharks *Notorynchus cepedianus* in South Africa, another PhD project on the trophic and spatial ecology of bronze whaler sharks *Carcharhinus brachyurus* and an MSc project to assess the key variables that impact the ability of shark spotters to detect sharks in the inshore zone, which is coupled with the testing of a potential automated camera system for shark spotting. In November 2020 we tagged 10 bronze whaler sharks in Gansbaai, which ranged in size from 2.7 metres (8 feet 10 inches) to 3.1 metres (10 feet 2 inches). One paper was published this year by Tamlyn Engelbrecht on the movement and growth rates of the broadnose sevengill shark, while another MSc student, Kate Sheridan, submitted in February 2020 her thesis focusing on human safety and shark conservation, with an analysis of surfers' perceptions of risk and attitudes towards shark management. We had two abstracts on shark–human conflict accepted for international conferences that were supposed to take place in 2020, but these have been postponed until 2021 due to coronavirus.

So while 2020 had its fair share of curveballs and unprecedented obstacles for the programme, we have persevered and adjusted to operate in the unfamiliar order of the pandemic era. Shark Spotters has always prided itself on its 'adaptive management' approach to its activities and this has certainly been put to the test this year. We have emerged stronger and more resilient and look forward to facing head-on any challenges that 2021 may bring!

An adult humpback whale dives towards our research boat in Verney Pass.

JANIE WRAY

THE NORTH COAST CETACEAN SOCIETY

JANIE WRAY

Founded in 2001, the North Coast Cetacean Society (NCCS) is a non-profit whale research organisation dedicated to research into, protection of and education about cetaceans along the northern and central coast of British Columbia. Our objective is to better understand the seasonal distribution, abundance and social dynamics of cetacean species at risk, as well as the impacts of entanglements and vessel strikes on them.

A VOICE FOR WHALES

We conduct marine and land-based surveys to identify potential habitats of importance for fin whale, humpback whale and orca populations and, by combining genetics methodologies with the traditional ecological knowledge of the First Nations, we aim to better understand how cetaceans use these habitats. The data gathered also inform the development of measures to reduce entanglement and vessel strikes, which pose significant threats to whales. In addition, we collect whale blow and eDNA samples and analyse them to increase our understanding of the genetic structure of subpopulations of the target species. This helps us to improve management of these subpopulations, as they require high levels of genetic diversity if they are to continue recovering.

Our outreach programme has been devised to encourage community stewardship by sharing information we have collected that is relevant to an individual community's region. We recognise the importance of robust scientific research in conjunction with community outreach in having a tangible impact on the protection of habitats for species at risk. This combination of key criteria will, we believe, result in such positive impacts.

During the 2020 field season, the NCCS operated two land-based research stations: OrcaLab on the central coast of British Columbia and Fin Island on the province's northern coast. Although 550 kilometres (342 miles) separate the stations, we scheduled daily scans to occur at the same designated times at both stations to compare results. The sightings enabled us to map the locations and characterise the group sizes and behaviour of humpback, fin and killer whales, Dall's porpoises, harbour and elephant seals and Steller's sea lions in relation to marine vessel traffic.

The NCCS conducted 21 data-collecting surveys on humpback and fin whales to identify individuals and record behaviour, group dynamics, prey and specific habitat use. Photographs were taken from a Mavic Pro drone to detect any scars from vessel strikes or entanglement in fishing gear. We identified 42 fin whales, as well as 141 humpback whales that we'd seen in previous years plus another 31 new arrivals, making a grand total of 172 humpbacks this season. Most significant was the increase in the number of humpback mother/calf pairs. In recent surveys we had seen a dramatic decrease, with an average of only two pairs observed each year; this season we documented 13, and many of these mothers are seasonal residents in the area. This is extremely encouraging, but we continue to investigate the cause of the recent fluctuation.

Most significant was the increase in the number of humpback mother/calf pairs

Right: Each day we scan for whales from the deck of the lab, accompanied by our dedicated canine researcher.
Opposite: Day's end at the lab.

Left: Building supplies for the addition to the research station on Fin Island are ready for use. Right: This hydrophone will be deployed offshore at a depth of 80 feet (24 metres), enabling us to listen to the world of whales 24/7 all year round.

An array of four hydrophones transmits whale vocalisations to the Fin Island station, where the calls are recorded live 24 hours a day. Partnering with the Gitga'at First Nation and WWF, we developed a localisation strategy and algorithms that determine the time differences of arrivals (TDOA) between the four hydrophones. The outcome enables us to localise the vocal signatures of the whales and follow their underwater pathways acoustically.

During the 2020 season vocalisations of orca, humpback and fin whales were recorded. In total, 36,920 signals were detected and analysed, with subsequent localisations yielding the spatial positions of whales for 6,788 signal sources. Further results are still pending. Call rate analysis showed that the three species were present throughout the recording period from the beginning of May until the end of October. The acoustic activity of fin and humpback whales increased from May and peaked for different call types between mid-August and mid-October. A general decline in the acoustic activity of fin whales towards the end of October suggests that this species is not present in Squally Channel in winter. Substantial diel trends in acoustic activity were found for humpback whale bubble-net feeding calls (higher call rates during daylight), fin whale 20Hz calls (peaks in the late afternoon and at midnight) and fin whale 40Hz calls (higher at night).

The NCCS launched a drone-based project to study humpback whales non-invasively from the air. Blow samples were collected and DNA was extracted and sequenced to determine the whales' gender, genetic origins, patterns of relatedness across the study region and site fidelity.

Of the blow sampling attempts, 23 drone flights were conducted from land and 89 from the research vessel. Behavioural responses were carefully monitored by the drone pilot and the sampling assistant, using the following scale:

RESPONSE GRADE	RESPONSE DESCRIPTION	PREVALENCE DATASET WITHIN (%)
0	None detectable	88.78
1	Mild (e.g. early fluking)	10.20
2	Moderate (e.g. tail swish, turning to one side, change in travel direction)	1.02
3	Severe (pectoral fin slapping, tail slapping, breaching)	0

The success rate of amplification of the mtDNA control region (69.32%) and sex (88.64%) shows results (see below) that look promising for our continued work on these samples, particularly microsatellite genotyping for kinship analysis.

n	88
Mean copies/µL of DNA	19.03
Median copies/µL of DNA	5.50
Maximum copies/µL of DNA	375.00
Minimum copies/µL of DNA	0.06
Percentage success (mtDNA)	69.32%
Percentage success (sex)	88.64%

Preliminary droplet digital PCR (ddPCR) results, as well as D-loop and sex PCR percentage success rates (i.e. bands visible out of total samples processed (n)).

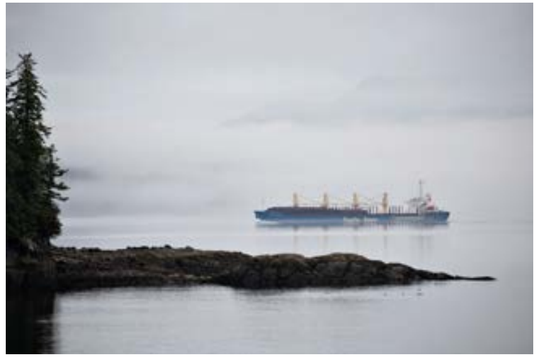
A comparison of preliminary sex PCR results showed a 38:34 female:male ratio, as would be expected on a humpback feeding ground (feeding grounds are known to show gender ratios approaching 1:1; Clapham, Berube and Mattila, 1995; Palsbøll et al., 1997).

In partnership with other NGOs and coastal First Nation communities, the NCCS is developing a hydrophone network to document whale activity acoustically along the entire British Columbia coast. In 2020 we installed nine hydrophone stations in key locations and aim to deploy another five in 2021. The purpose of this network is to build, maintain and contribute to a coast-wide information system, increasing our ability to collect acoustic and visual data on cetacean activity using standardised protocols on consistently calibrated equipment. This acoustic database will enable us to compare the impact of vessel traffic on cetaceans at risk in areas that differ environmentally and acoustically and thus quantify how the ocean soundscape is changing.

We thank the Save Our Seas Foundation for helping us through the 2020 season and continuing to support our research and the recovery of whales along the British Columbia coast.

This acoustic database will enable us to compare the impact of vessel traffic on cetaceans at risk

Previous page: Humpback whales bubble-net feeding.
Left: Installing hydrophones involves ensuring that they are securely in place. Lead acoustician Tom Dakin, with the assistance of Tavish Campbell and Deirdre Leowinata, builds a new mooring.
Right: A tanker for transporting condensate travels past our lab towards the export facility at Kitimat. This is what the future may hold if the liquefied natural gas project moves forward.



SCIENTIFIC PAPERS PUBLISHED

Wray J, Keen EM. 2019. Calving rate decline in humpback whales *(Megaptera novaeangliae)* in northern British Columbia. *Marine Mammal Science* 36(2).
Hendricks B, Wray J, Keen EM, Alidina H, Gulliver A, Picard C. 2020. Automated localisation of whales in coastal fjords. *The Journal of the Acoustical Society of America* 146(4).
Keen EM, Wray J, Hendricks B, O'Mahony E, Picard C, Alidina H. 2020. Determining marine mammal detection functions for a stationary land-based survey site. *Wildlife Research* https://doi.org/10.1071/WR19232.

Papers submitted

Keen EM, Wren J, O'Mahony E, Wray J. catRlog: a photo-identification project management system based in R. *Mammalian Biology.*
Wray J, Keen EM, O'Mahony E. Social survival: humpback whales *(Megaptera novaeangliae)* use social structure to partition ecological niches within proposed critical habitat. *PLOS ONE.*

The South African coastline hosts the largest marine migration on the planet. The annual sardine run, dubbed 'the greatest shoal on earth', is pursued by large numbers of predators, including sharks, whales, dolphins and birds. Here a pack of spinner sharks *Carcharhinus brevipinna* take advantage of a sardine bait ball.

PAUL COWLEY

THE ACOUSTIC TRACKING ARRAY PLATFORM

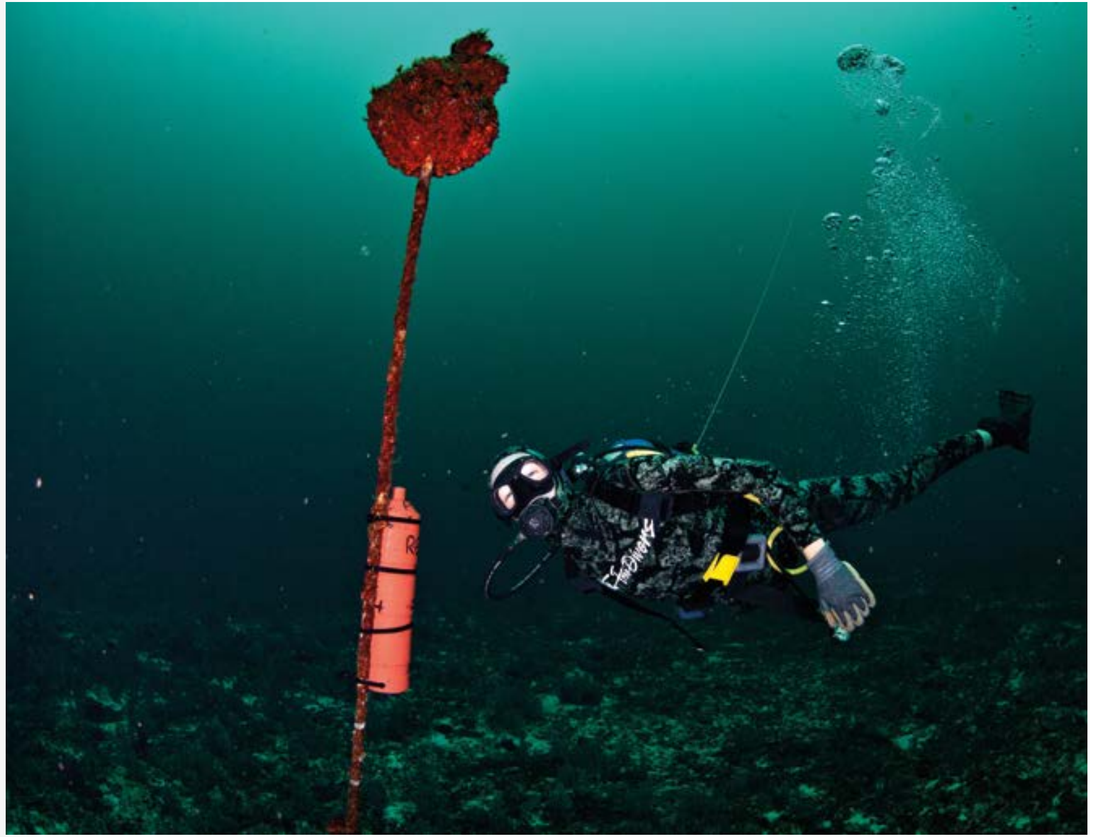
DR PAUL COWLEY

South Africa's Acoustic Tracking Array Platform (ATAP), hosted by the South African Institute for Aquatic Biodiversity (NRF-SAIAB), is a receiver network spanning approximately 2,200 kilometres (1,370 miles) of the southern African coastline with receivers deployed between False Bay (Cape Town) and Ponta do Ouro on the Mozambique border, as well as at 21 estuaries throughout the region. With funding from the Save Our Seas Foundation (SOSF) to maintain the nationwide receiver network, the platform provides a backbone of telemetry hardware to facilitate the large-scale, long-term monitoring of acoustically tagged marine animals. It also currently supports no fewer than 58 individuals (including 12 post-graduate students) from 27 different organisations.

Left: ATAP technician Matt Parkinson retrieves an acoustic receiver from an estuary.
Opposite: An ATAP receiver deployed off the coast of KwaZulu-Natal is retrieved by a diver.

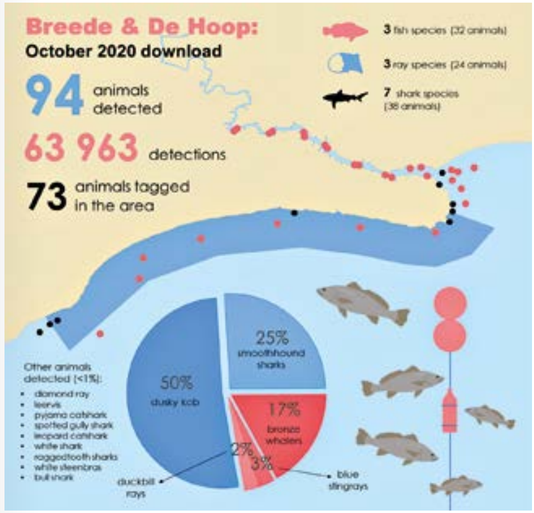
The design of the current large-scale array continues to allow researchers to address a number of key questions pertaining to the movements of marine animals. These include:

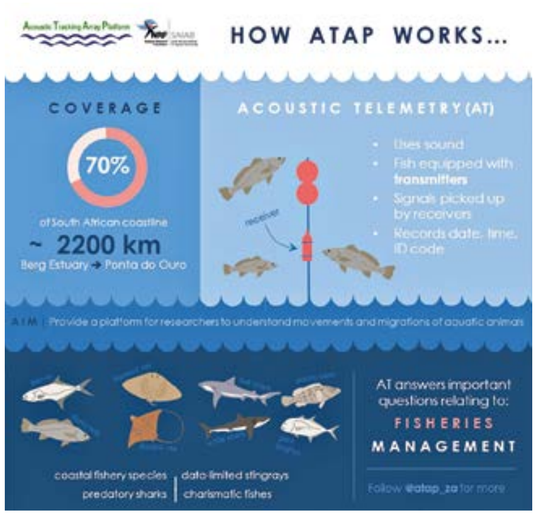
- estuarine–marine and inter-estuary connectivity (https://saveourseas.com/update/the-tale-of-a-home-loving-spotted-grunter/)
- bay-scale movements (https://saveourseas.com/update/shifting-paradigms/)
- movements in relation to marine protected area boundaries (https://saveourseas.com/update/fitbits-for-fish/)
- large-scale annual migrations (https://saveourseas.com/travelling-trevallies/)
- transboundary movements (https://saveourseas.com/update/fine-tuning-the-movement-patterns-of-the-giant-guitarfish/), and
- a host of ecological aspects.



Despite the proclamation of the global Covid-19 pandemic in March, 2020 proved to be another good year for the ATAP. Not only were we and our collaborating partners able to retain normal functioning of the network (i.e. continuation of rollovers), our receivers recorded more than one million detections, bringing the total number of detections in our database to just shy of 25 million. An additional 84 animals from 19 species were tagged, including two new species, the lesser guitarfish *Acroteriobatus annulatus* and the spinner shark *Carcharhinus brevipinna,* both of which are listed as Vulnerable on the IUCN Red List. This brought the total number of animals tagged and monitored to 1,723, representing 45 species (including seven ray and 25 shark species).

The ATAP has always applied considerable tagging effort to estuary-dependent fishery species, including the dusky kob *Argyrosomus japonicus*. A study initiated in 2016 by Dr JD Filmalter and Prof. Paul Cowley in the Breede River estuary to understand the movements of adult fish throughout their South African distribution has come to a close. The findings (not as yet published) revealed the movements of adults to be far more limited than previously believed, which has major implications for their management. This species is currently managed as a single well-mixed stock; therefore, this information has the potential to significantly alter the management of dusky kob in South Africa. A report on this project recently appeared in an SOSF blog (https://saveourseas.com/update/mysteries-of-the-iconic-dusky-kob-in-the-southern-cape).





Opposite: ATAP research partners from the Oceanographic Research Institute in Durban retrieve an ATAP receiver deployed on an acoustic release.
Above: This infographic summarises the data downloaded from ATAP receivers in the Breede River estuary and the adjacent De Hoop marine reserve in the Western Cape.
Above, right: A brief summary of how the nationwide ATAP receiver network works.

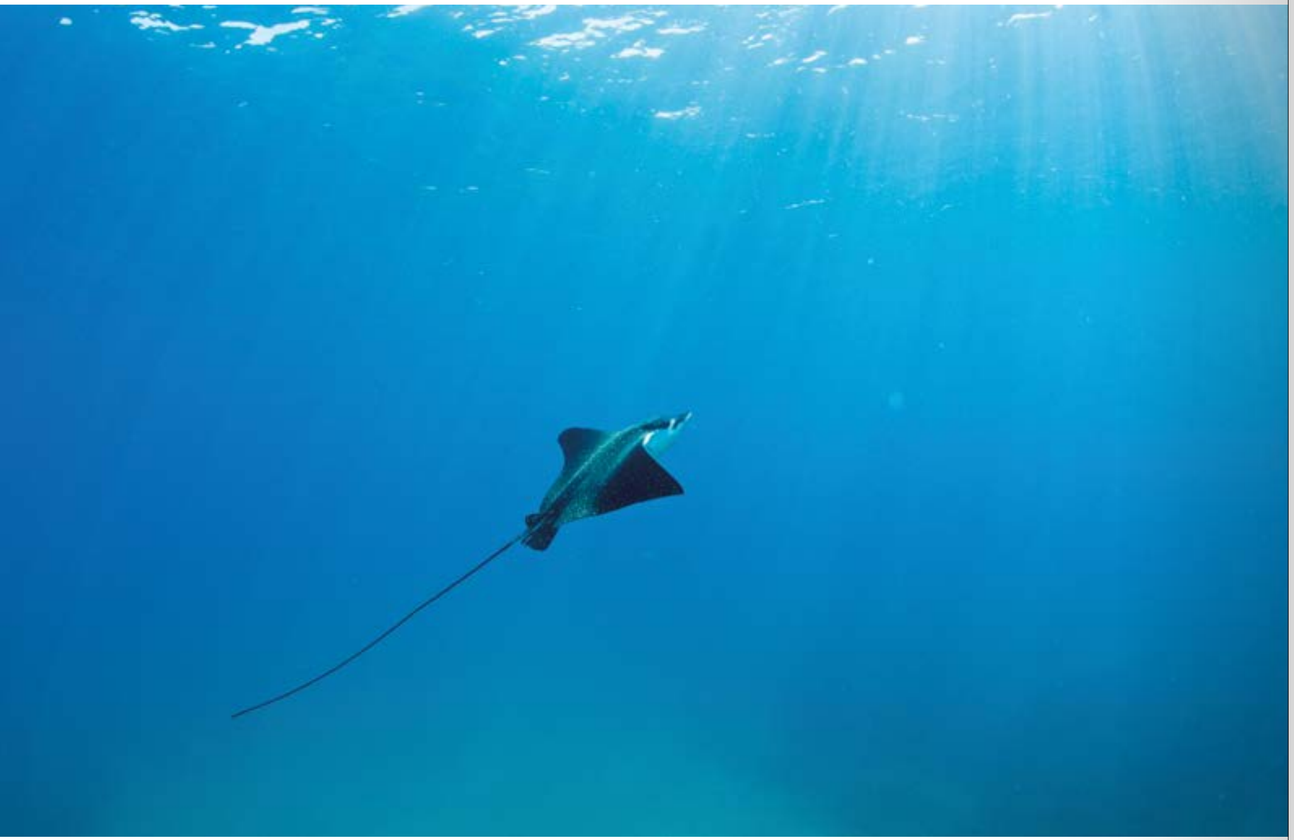
Funding for transmitter allocations was once again received from the SOSF in 2020. Only three applications were submitted for review, with projects ranging from the taxonomy and movements of blue-spotted fantail rays to the movement behaviour of skates and rays around the southern tip of Africa. The 2020 grant was awarded to Adam Trotter of Oceans Research, whose work focuses on identifying priority conservation areas for smooth hammerhead sharks *Sphyrna zygaena* in South Africa.

The ATAP is providing infrastructure and data management support to two newly funded projects managed by the WildOceans programme of the WildTrust, which aims to tag more than 200 new animals in order to investigate the movements and migrations of selected South African threatened endemic elasmobranchs, as well as transboundary movements and connectivity to marine protected areas by selected species. More than 30 animals of seven different species have been tagged to date and significant tagging efforts will continue in 2021.

Left: A juvenile dusky shark *Carcharhinus obscurus* is released after being fitted with an acoustic transmitter and tagged with an external plastic dart tag. Right: The Critically Endangered scalloped hammerhead shark *Sphyrna lewini* is one of many shark species being tracked by the ATAP receiver network.

Still recognised as a mature cooperative telemetry network, the ATAP continues to be mentioned in international literature, including four papers published in 2020. While no papers using data collected by the ATAP were published last year, a number of projects are coming to an end (the transmitters are expiring) and the number of data requests once again increased, from 41 in 2019 to more than 50 in 2020. This being the case, we anticipate an increase in the number of publications over the next three to five years. Last year was quiet in terms of conferences and presentations for the ATAP and associated partners. However, as the world adjusts to working and interacting more online than in person, virtual conferences are fast becoming the norm and we anticipate participating in some conferences in 2021.

Besides its primary role of supporting scientific research, the ATAP engages with the public in many different ways, including via social media, which became increasingly used in 2020. We continue to have a strong online presence, with a steady increase in the number of followers across all social media platforms. Our Facebook page (ATAP – Tracking fish movements) currently has 1,637 follows, our Twitter account (@ATAP_ZA) has 931 followers and our Instagram page (@atap_za) has 430 followers. While social media accounts may seem trivial, they are one of the quickest means of disseminating information and gaining support for various tagging projects. Most of the interactions across the platforms are positive, with members of the public, particularly the angling community, enjoying and engaging with posts where examples of the movements of various species are provided. We aim to increase our reach in 2021.



The global pandemic also resulted in a number of our usual science engagement activities either being cancelled or moved online. Although one of these, the SAIAB Summer School, is a highlight of our year, it unfortunately had to be cancelled in 2020. We are hopeful that, depending on the Covid-19 situation, it will take place again at the end of 2021. The aim of the summer school remains to provide students (predominantly undergraduates from historically disadvantaged universities) with hands-on experience in acoustic telemetry field techniques and introduce them to the research methodology.

The ATAP's acoustic telemetry hardware has been secured from the Ocean Tracking Network, the National Research Foundation's capital equipment grants and the Shallow Marine and Coastal Research Infrastructure. Running expenses and costs linked to servicing the hardware are provided by the SOSF and the African Coelacanth Ecosystem Programme. Collectively, the support from these organisations has enabled us to establish and run a significant marine science platform that has gained an international reputation. We are extremely grateful to all our funders and will continue to acknowledge their contributions.

Opposite: The majestic white-spotted eagle ray *Aetobatus ocellatus* is one of several ray species that has been tagged with acoustic transmitters off the coast of South Africa. Above: This stranded juvenile loggerhead turtle *Caretta caretta* was tagged and released in Algoa Bay in the Eastern Cape after being rehabilitated at Port Elizabeth's Bayworld oceanarium.

PROJECT LEADERS

INTRODUCTION TO OUR PROJECT LEADERS WHO WERE FUNDED IN 2020

SMALL GRANT PROJECTS

1. **SARA AL MABRUK** | LIBYA
2. **ALISSA BARNES** | INDIA
3. **ELLEN BARROWCLIFT-MAHON** | INDIAN OCEAN
4. **VERONIKA BISKIS** | AUSTRALIA
5. **LAURAN BREWSTER** | USA
6. **JUAN CUBILLOS MORENO** | COLOMBIA
7. **BROOKE D'ALBERTO** | SOUTH-EAST ASIA, AUSTRALIA
8. **MARIO ESPINOZA** | COSTA RICA
9. **IOANNIS GIOVOS** | GREECE
10. **EMILY HUMBLE** | SRI LANKA
11. **SEIDU ISSAH** | GHANA
12. **KARISSA LEAR** | AUSTRALIA
13. **KADY LYONS** | USA
14. **JOHN MOHAN** | WORLDWIDE
15. **SUSHMITA MUKHERJI** | INDIA
16. **CYRUS RUMISHA** | TANZANIA
17. **TANJA SCHWANCK** | UK
18. **JOHN SWENSON** | USA
19. **BRENDAN TALWAR** | CARIBBEAN AND WESTERN ATLANTIC
20. **ANDREW TEMPLE & NINA WAMBIJI** | KENYA

KEYSTONE PROJECTS | CONTINUATION

21. **JILL BROOKS AND HANNA MED** | USA
22. **EVAN BYRNES** | BIMINI, BAHAMAS
23. **DIEGO CARDEÑOSA** | GUYANA
24. **DONALD CROLL & MELISSA CRONIN** | EASTERN PACIFIC
25. **DAVID EBERT** | WESTERN INDIAN OCEAN
26. **CHRYSOULA GUBILI** | MEDITERRANEAN
27. **BENJAMIN HUGHES** | WORLDWIDE
28. **CATHERINE MACDONALD** | ST VINCENT AND THE GRENADINES
29. **JEANNE MORTIMER** | SEYCHELLES
30. **KIRSTY SHAW** | ECUADOR
31. **GREGORY SKOMAL** | USA
32. **JOSHUA STEWART** | EASTERN PACIFIC
33. **ALINA WIECZOREK** | REPUBLIC OF MALDIVES
34. **TONYA WILEY** | USA
35. **JANE WILLIAMSON** | AUSTRALIA

KEYSTONE PROJECTS | NEW

36. **CANDICE BRITTAIN** | THE BAHAMAS
37. **EDUARDO ESPINOZA** | GALÁPAGOS
38. **JONATHAN GREEN** | GALÁPAGOS
39. **PHIL HOSEGOOD** | SEYCHELLES
40. **RUTH LEENEY** | BANGLADESH
41. **LINDSAY RUBINCAM** | NORWAY
42. **JUAN TORRES** | GALÁPAGOS

SARA AL MABRUK

ANGEL SHARK PROJECT IN LIBYA, ONE OF THE LAST ANGEL SHARK HOTSPOTS IN THE MEDITERRANEAN

The New Libya Association for Environment and Natural Resources

LIBYA | RESEARCH, CONSERVATION, EDUCATION | ANGEL SHARKS *SQUATINA* SPP.

Sara and her team are surveying the major fish markets along Libya's coast, a stretch that she suspects represents one of the last hotspots for angel sharks in the Mediterranean. Her education campaign will harness the reach of social media, regional radio and magazines and she will meet with fishers to make them aware of angel sharks and their status in Libyan waters.

ALISSA BARNES

CHARACTERISING THE DIVERSITY AND LIFE-HISTORY TRAITS OF RAYS AND THE SOCIO-ECONOMIC DRIVERS OF RAY FISHERIES IN INDIA

Independent researcher

INDIA | RESEARCH | SHARKS AND RAYS

India is one of the world's most significant shark and ray fishing countries and up to 500 trawl boats could be anchored at any one time in Gujarat harbour. Alissa is visiting the sites where sharks and rays are caught along the Maharashtra and Gujarat coast in western India and the Orissa coast in the east to gather crucial baseline information that will help to regulate India's active and influential fisheries.

VERONIKA BISKIS

TURNING TROPHIES INTO MESSENGERS FOR CONSERVATION

Sharks and Rays Australia

AUSTRALIA | CONSERVATION | SAWFISH

Veronika is giving old sawfish trophies a new lease on life by constructing 25 educational cases that will be displayed across Far North Queensland. In doing so, she is hoping to transform these rostra from sawfish of the past into a symbol of hope and caution that connects communities to the conservation of sawfish in northern Australia.

ELLEN BARROWCLIFT-MAHON

BETTER THE DEVIL YOU KNOW: ADDRESSING KEY DATA GAPS FOR INDIAN OCEAN DEVIL RAY MANAGEMENT

Newcastle University

INDIAN OCEAN | RESEARCH, CONSERVATION | DEVIL RAYS

Ellen is coordinating the collection of tissue samples from devil rays at key landing and market sites from different countries around the Indian Ocean. Through DNA extraction, she is confirming the identification of species and investigating the species-specific population structure of otherwise very poorly understood devil rays, and is thus helping to define how their populations are structured across a wide ocean space.

LAURAN BREWSTER

ELUCIDATING THE RESPONSE OF JUVENILE BULL SHARKS TO HARMFUL ALGAL BLOOMS

Florida Atlantic University

USA | RESEARCH, CONSERVATION | BULL SHARK *CARCHARHINUS LEUCAS*

Lauran is attaching accelerometers to juvenile bull sharks in the Indian River Lagoon in Florida, USA. This will help her monitor their body movements and behaviour in response to harmful algal blooms (HABs) in an important nursery area for these sharks.

JUAN CUBILLOS MORENO

HIDDEN IN THE ROOTS: eDNA DETECTION OF SAWFISH DISTRIBUTION IN THE COLOMBIAN PACIFIC

Carl von Ossietzky University of Oldenburg, Talking Oceans Foundation

COLOMBIA | RESEARCH, CONSERVATION, EDUCATION | LARGETOOTH SAWFISH *PRISTIS PRISTIS*

Juan is collecting environmental DNA (eDNA) samples from the estuaries and mangroves of Colombia's Chocó region. He is uncovering the presence and distribution of largetooth sawfish on the Colombian Pacific coast by detecting traces of their DNA left behind as signatures in their environment. This Critically Endangered sawfish – known locally as 'El Guacapa' – is typically found in estuaries and thought to be resident in some of Central and South America's freshwater systems. Knowing exactly where this sawfish occurs is critical to its conservation.

BROOKE D'ALBERTO

LIFE HISTORY OF THE CRITICALLY ENDANGERED BOTTLENOSE WEDGEFISH

James Cook University

SOUTH-EAST ASIA, AUSTRALIA | RESEARCH | BOTTLENOSE WEDGEFISH *RHYNCHOBATUS AUSTRALIAE*

Protecting threatened species means knowing enough about their biology to make informed decisions about how to manage their populations. To help fill the gaps in knowledge about a highly threatened shark-like ray, Brooke will be investigating the biology of two populations of the Critically Endangered bottlenose wedgefish: one from South-East Asia (Singapore, Indonesia and Malaysia) and the other from northern Australia.

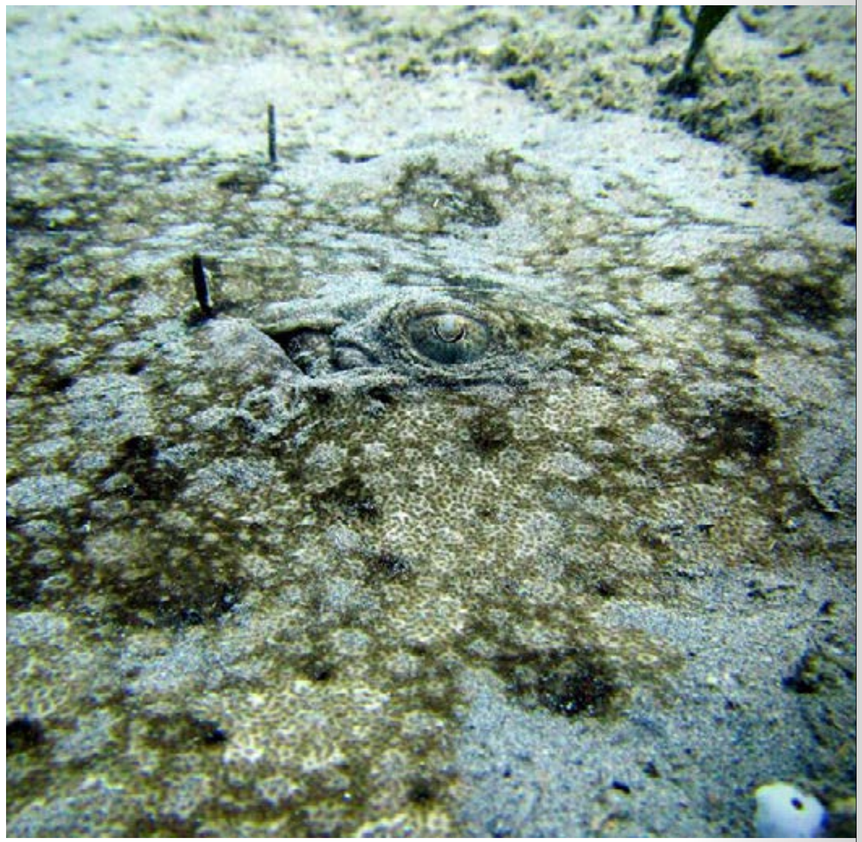
MARIO ESPINOZA

IDENTIFYING THE LAST REMAINING AREAS OF THE CRITICALLY ENDANGERED LARGETOOTH SAWFISH IN COSTA RICA

Costa Rica Wildlife Foundation, University of Costa Rica

COSTA RICA | RESEARCH, CONSERVATION, EDUCATION | LARGETOOTH SAWFISH *PRISTIS PRISTIS*

Few data exist to explain where (and how many) of these sawfish are still found in Costa Rica. Mario's project will use traditional fishing techniques in combination with eDNA (traces of sawfish DNA left behind in the environment) sampling to document where the last habitats for sawfish can be found in Costa Rica. He hopes to involve community leaders, fishers and local educators in the creation of education programmes that will empower people to conserve sawfish locally and help inform proper management protocols to save the species.



IOANNIS GIOVOS

MONITORING THREATENED ELASMOBRANCHS IN GREECE: IDENTIFYING THE CONSERVATION IMPORTANCE OF KOS ISLAND, DODECANESE

iSea Environmental Organisation for the Preservation of the Aquatic Ecosystems

GREECE | RESEARCH, CONSERVATION | SHARKS AND RAYS

In the Mediterranean, species such as guitarfish, the spiny butterfly ray and angel sharks are all Critically Endangered or Endangered, making their conservation management vital. Ioannis is using a combination of local knowledge, BRUVs and scuba surveys to search for key aggregation areas and essential habitats for the elasmobranchs of Kos Island in the South Aegean Sea.

EMILY HUMBLE

POPULATION GENETICS OF THE BOWMOUTH GUITARFISH IN THE NORTHERN INDIAN OCEAN

University of Edinburgh

SRI LANKA | RESEARCH, CONSERVATION, EDUCATION | BOWMOUTH GUITARFISH *RHINA ANCYCLOSTOMA*

Emily is helping to develop a species-specific management plan to support the protection of the Critically Endangered bowmouth guitarfish in Sri Lanka. She is using genetic tools to better understand this species and the trade in it, while also training local marine biologists to use rapid and cost-effective DNA sequencing technology.

SEIDU ISSAH

STATUS AND CONSERVATION OF THREATENED GUITARFISH, WEDGEFISH AND SAWFISH IN GHANA

AquaLife Conservancy

GHANA | RESEARCH, CONSERVATION, EDUCATION | SHARKS AND RAYS

By trawling the fish markets and landing sites of Ghana's coastline, Issah is surveying the patterns in catch composition over time for sharks and rays in artisanal fisheries. In doing so, he is also raising awareness about the best fishing practices that safeguard sharks and rays and he is garnering fishers' support for sharks and the conservation of ocean ecosystems in Ghana.

KARISSA LEAR

IDENTIFICATION OF CRITICAL HABITAT FOR WEDGEFISH AND THE GIANT GUITARFISH IN WESTERN AUSTRALIA

Murdoch University

AUSTRALIA | RESEARCH | SHARK-LIKE RAYS

Karissa is using acoustic telemetry to track wedgefish and the giant guitarfish to find out where these species move and how deep they swim in the Pilbara region of Western Australia. She will be updating anecdotal information that guides where these shark-like rays can be found and will add her findings about how they live, so that the correct management plans can be put in place for the Critically Endangered species.

KADY LYONS

EFFECT OF ENVIRONMENTAL CONTAMINANT EXPOSURE ON ELASMOBRANCH MICROBIOME COMMUNITIES

Georgia Aquarium

USA | RESEARCH, CONSERVATION | STINGRAYS

Kady wants to know how the bacteria and viruses – the microbiome communities – that live in the bodies of all animals may be influenced by pollution and what role they may play in evaluating the health of stingrays (and other sharks and rays) that often swim in contaminated waters. She is looking at the change in the microbiome community in stingrays across both polluted and unpolluted reaches of Georgia's coastline in the USA.

JOHN MOHAN

CONSERVATION IMPLICATIONS OF BIOMINERALISATION PATTERNS IN SHARK VERTEBRAE CARTILAGE

Texas A&M University at Galveston

WORLDWIDE | RESEARCH, CONSERVATION | SHORTFIN MAKO SHARK *ISURUS OXYRINCHUS*

Understanding how sharks age is important for fisheries management, but since sharks and rays don't have true bones, the traditional methods used to age fish don't apply. John is investigating the chemistry of shortfin mako vertebrae samples to attempt to validate age patterns in all ocean basins. This, he hopes, will support fisheries management and adequate conservation of an Endangered and CITES-listed shark.

SUSHMITA MUKHERJI

NOW YOU SEE ME: CHARACTERISING ELASMOBRANCH LANDINGS IN WEST BENGAL

James Cook University

INDIA | RESEARCH, CONSERVATION | SHARKS, RAYS AND SKATES

Sushmita is working closely with fishers along the coast of West Bengal, from the border with Bangladesh to the mangroves of the Sundarbans, to collect information that will help her understand the catch composition of sharks and rays at fish landing sites. She hopes to fill the gaps in what is known of their life history and identify population dynamics of the elasmobranchs of the region, as well as potential threats to them.

CYRUS RUMISHA

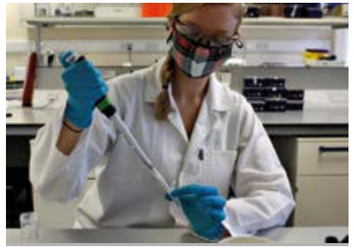
EXPOSING THE BLACK MARKET IN PROTECTED SHARKS TO FOSTER SUSTAINABLE SHARK FISHERIES IN TANZANIA

Sokoine University of Agriculture

TANZANIA | RESEARCH, CONSERVATION, EDUCATION | SHARKS

Cyrus is using DNA barcoding to record which shark species are landed and processed in Tanzania's fisheries and to improve the taxonomic resolution of finned and processed shark products from the country. With interviews and questionnaires, he hopes to identify the illegal supply networks of protected sharks in Tanzania and provide information that is useful to law enforcement officers.

TANJA SCHWANCK



FAMILY TIES OF THE CRITICALLY ENDANGERED FLAPPER SKATE AND THEIR IMPLICATIONS FOR CONSERVATION MANAGEMENT

University of Aberdeen

UK | RESEARCH, CONSERVATION | FLAPPER SKATE *DIPTURUS INTERMEDIUS*

Tanja is learning where the flapper skate moves along the last vestiges of its home range on the Scottish west coast and trying to understand how this affects its genetic diversity. To find out how its declining populations can survive, she is introducing the paternity test to the shark world and exploring whether mating partners, siblings or whole clans are commonly in the same area or if they can be found in different places.

JOHN SWENSON

COUNTING COWNOSE RAYS WITH CLOSE-KIN MARK-RECAPTURE

University of Massachusetts

USA | RESEARCH, CONSERVATION | COWNOSE RAY *RHINOPTERA BONASUS*

John is developing a set of targeted 'capture panels' that focus DNA sequencing efforts on specific regions of the cownose ray genome that can be used to identify related individuals. These panels will facilitate construction of a close-kin mark-recapture model to estimate the abundance of cownose rays along the US East Coast.

ANDREW TEMPLE & NINA WAMBIJI

KENYA'S OTHER RHINO: THE LIFE HISTORY OF THE CRITICALLY ENDANGERED 'RHINO RAY', THE HALAVI GUITARFISH

Newcastle University, Kenya Marine and Fisheries Research Institute

KENYA | RESEARCH, CONSERVATION | HALAVI GUITARFISH *GLAUCOSTEGUS HALAVI*

The halavi guitarfish belongs to one of the ocean's most vulnerable groups of fishes, the shark-like rays in the family Rhinobatidae (dubbed the 'rhino rays'). Little is known about this particular ray and it merits attention on the relatively poorly studied Kenyan coast. Nina and Andrew, co-leaders on the project, are looking into the life history of the halavi guitarfish, acquiring information to help better manage a Critically Endangered species that is targeted for its meat and fins, locally and internationally.

BRENDAN TALWAR

CHARACTERISING THE HORIZONTAL AND VERTICAL MOVEMENTS OF THE SILKY SHARK

Cape Eleuthera Institute

CARIBBEAN AND WESTERN ATLANTIC | RESEARCH | SILKY SHARK *CARCHARHINUS FALCIFORMIS*

Brendan is satellite-tagging silky sharks across the western central Atlantic, Gulf of Mexico and Caribbean to understand where these sharks are swimming. He is also analysing their gut contents and stable isotopes, all in a bid to document their place in the food web and to support silky shark management and recovery across the region.

EVAN BYRNES

HOME-RANGE SCALING IN LEMON SHARKS THROUGH ONTOGENY: TESTS OF BIOENERGETICS MECHANISMS

Murdoch University

BIMINI, BAHAMAS | RESEARCH | LEMON SHARK *NEGAPRION BREVIROSTRIS*

Does body size influence how much energy a shark needs? Evan is investigating how this is linked to the home range size of lemon sharks, and how they use their habitat.

JILL BROOKS & HANNA MED

SURVIVAL OF GREAT HAMMERHEAD SHARKS RELEASED FROM THE FLORIDA LAND-BASED RECREATIONAL FISHERY

American Shark Conservancy, Fish Ecology and Conservation Physiology Lab

USA | RESEARCH | GREAT HAMMERHEAD SHARK *SPHYRNA MOKARRAN*

Working together with anglers in Florida, Jill and Hannah are trying to understand what the impact of catch-and-release recreational fishing is on Endangered great hammerhead sharks in Florida. Their findings will help draft better practices for the future.

DIEGO CARDEÑOSA

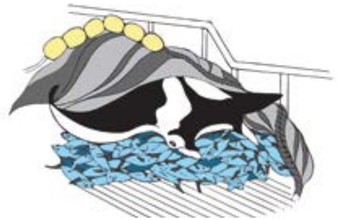
FROM THE BOAT TO THE VOTE: BASIC FISHERY DATA TO INFORM CITES AUTHORITIES IN GUYANA

Fundación Colombia Azul

GUYANA | CONSERVATION | SHARKS AND RAYS

Little is known about the shark and ray fisheries of Guyana. Diego is using a variety of methods to understand the status of shark fishing and trade, helping Guyana to make the best decisions for its ocean life.

DONALD CROLL & MELISSA CRONIN



A POPULATION GENETICS APPROACH TO UNDERSTANDING MOBULID RAY BY-CATCH IN THE EASTERN PACIFIC TUNA FLEET

University of California Santa Cruz

EASTERN PACIFIC | CONSERVATION | MOBULID RAYS

Manta and devil rays are caught as by-catch in the tuna purse-seine fishery. Using new genetic tools to find out which species are caught in the Eastern Pacific, Don and Melissa are working with the Inter-American Tropical Tuna Commission to turn the tide for these poorly understood and highly threatened rays.

DAVID EBERT

PLAYING FOR TIME: GUITARFISH AND VIOLYN SHARKS, IS THIS THE LAST DANCE?

Moss Landing Marine Laboratories

WESTERN INDIAN OCEAN | RESEARCH | GUITARFISH AND WEDGEFISH

These shark-like rays are some of the most threatened species in the sea. In the Western Indian Ocean, Dave is untangling their taxonomy, getting to know where they live and investigating their fisheries status in order to inform better conservation strategies.

CHRYSOULA GUBILI

BATOIDS ON YOUR PLATE: SPECIES COMPOSITION OF THE MEDITERRANEAN RAY TRADE

Fisheries Research Institute, Hellenic Agricultural Organisation | DEMETER

MEDITERRANEAN | CONSERVATION | SKATES AND RAYS

Protecting rays and skates (batoids) is challenging, especially where there are inadequate fisheries regulations. Chrysoula is identifying which batoids are caught in the Mediterranean to understand the effects of fishing practices and what illegal, unreported and unregulated fishing means for vulnerable species.

BENJAMIN HUGHES

FINPRINTING: AN INTERNATIONAL WHITE SHARK PHOTOGRAPHIC IDENTIFICATION CATALOGUE SYSTEM

Save Our Seas Foundation

WORLDWIDE | RESEARCH, CONSERVATION | WHITE SHARK *CARCHARODON CARCHARIAS*

The objective is to promote a better understanding of white shark biology at regional and global scales. The project seeks to do this by providing a collaborative online platform for identifying, managing and sharing large-scale and multi-group photographic white shark mark-recapture data.

CATHERINE MACDONALD

COLLABORATIVE COMMUNITY-BASED MONITORING AND MANAGEMENT OF SHARK POPULATIONS IN ST VINCENT AND THE GRENADINES

Rosenstiel School of Marine and Atmospheric Science, University of Miami

ST VINCENT AND THE GRENADINES | RESEARCH | SHARKS

Shark fishing is becoming increasingly important in St Vincent, but little is known about the shark populations there. Catherine is figuring out which sharks live there and how they are utilised by local communities. She's working with fishermen to achieve sustainable management of these fisheries.

JEANNE MORTIMER

COMMUNITY MONITORING OF NESTING SEA TURTLES AT D'ARROS ISLAND AND ST JOSEPH ATOLL

SOSF D'Arros Research Centre

SEYCHELLES | RESEARCH, CONSERVATION, EDUCATION | TURTLES

The beaches of D'Arros Island and St Joseph Atoll are very important places for female sea turtles to come ashore and lay their eggs. Jeanne is training Seychellois monitors to observe nesting turtles and collect data about them.

KIRSTY SHAW

LAB-ON-A-CHIP TECHNOLOGY FOR RAPID, ON-SITE IDENTIFICATION OF THREATENED SHARK SPECIES

Manchester Metropolitan University

ECUADOR | CONSERVATION | SHARKS

A portable, cost-effective way to identify sharks in the field could improve the current methods of monitoring which threatened species are being caught and sold, of reducing illegal fishing and of tracking CITES-restricted shark products. Kirsty is testing a Lab-on-a-Chip system in coastal communities in Ecuador.

GREGORY SKOMAL

QUANTIFYING WHITE SHARK PREDATION RATES ON PINNIPEDS OFF CAPE COD, MASSACHUSETTS, TO MITIGATE CONSERVATION CONFLICTS

Massachusetts Division of Marine Fisheries

USA | RESEARCH | WHITE SHARK *CARCHARODON CARCHARIAS*

As gray seal populations have recovered, the coastal waters off Cape Cod have become the only known aggregation site for white sharks in the western North Atlantic. Greg is estimating seasonal predation rates of white sharks on seals and identifying which environmental conditions are associated with predatory behaviour in order to improve public safety practices.

ALINA WIECZOREK

MICROPLASTICS A MACRO-DISASTER: A THREAT TO THE LARGEST FISH OF OUR SEAS

National University Ireland Galway

REPUBLIC OF MALDIVES | RESEARCH | WHALE SHARK *RHINCODON TYPUS*

Endangered filter-feeding whale sharks are at risk from the plastic invisible to most of us in the seas. Alina and her colleague Giulia are investigating how these sharks are scooping up microplastics as they feed and trying to find out where these plastics might be coming from.

JOSHUA STEWART

IMPROVING POST-RELEASE SURVIVAL OF MOBULID RAYS IN PURSE-SEINE FISHERIES

The Manta Trust

EASTERN PACIFIC | RESEARCH | MOBULID RAYS

With no real information about whether or how mobulid rays survive after being released from purse-seine fishing nets in the Eastern Pacific, Josh is training fishery observers to assess the impact of this fishery on these by-catch species and to create best-practice release guidelines to improve the survival rate of the rays.

TONYA WILEY

INVESTIGATING THE USE OF TAMPA BAY BY THE ENDANGERED SMALLTOOTH SAWFISH

The Ocean Foundation on behalf of Havenworth Coastal Conservation

USA | RESEARCH | SMALLTOOTH SAWFISH *PRISTIS PECTINATA*

The smalltooth sawfish populations that once spread from Texas to North Carolina have vanished, except for a small reserve in south Florida. However, it seems that protection measures in recent years might be helping this sawfish to recover. Tonya is searching for clues in Tampa Bay, the first place where recovering sawfish populations would extend their range north.

JANE WILLIAMSON

DIVERSITY, DYNAMICS AND DESTINATIONS OF SAWSHARKS FROM SOUTH-EASTERN AUSTRALIA

Macquarie University

AUSTRALIA | RESEARCH | COMMON SAWSHARK AND SOUTHERN SAWSHARK *PRISTIOPHORUS* SPP.

Managing sawshark populations requires good information on where they move and what their relative abundance is. Jane and her colleague Paddy are using a variety of methods to improve our understanding of the conservation status and management of common and southern sawsharks threatened by fishing in south-eastern Australia.

CANDICE BRITTAIN

BUILDING FUTURE CONSERVATION LEADERS IN THE BAHAMAS

Cape Eleuthera Institute

THE BAHAMAS | EDUCATION

Building a generation of critical thinkers and fostering a sense of connection are what Candice's work at the Cape Eleuthera Island School in The Bahamas is all about. By challenging children to seek out the answers to their questions themselves and enabling them to visit important marine ecosystems, Candice is encouraging new advocates for the environment and empowering them to make changes in their world.

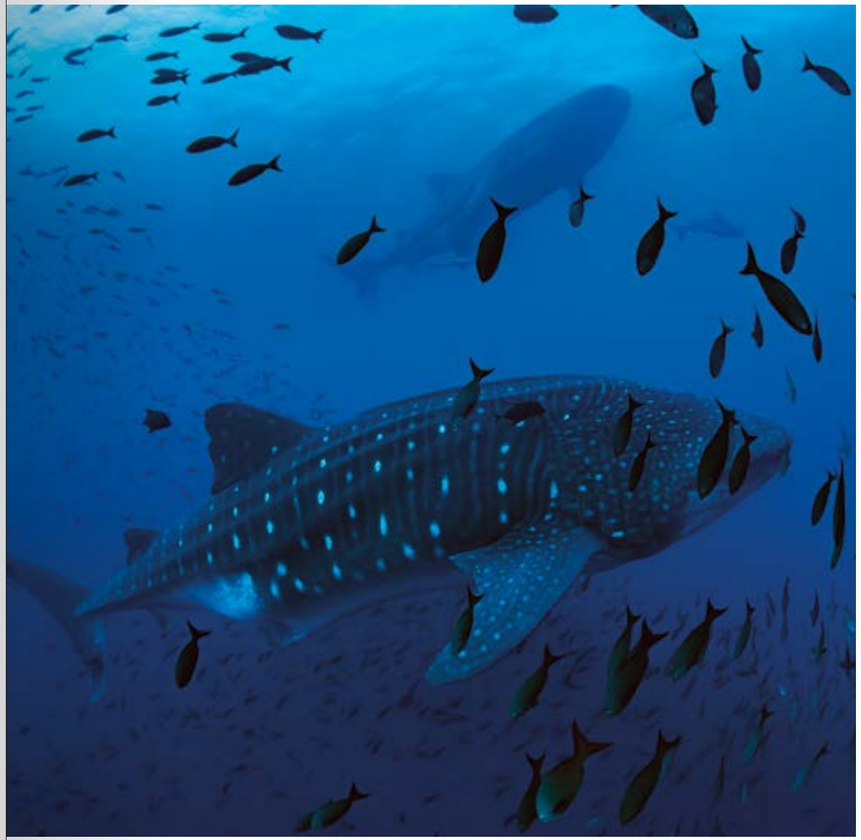
EDUARDO ESPINOZA

CONSERVATION STRATEGIES FOR HAMMERHEAD SHARK NURSERIES IN THE GALÁPAGOS MARINE RESERVE

Galápagos National Park Service

GALÁPAGOS | RESEARCH, CONSERVATION, EDUCATION | SCALLOPED HAMMERHEAD SHARK *SPHYRNA LEWINI*

The scalloped hammerhead shark is listed as Critically Endangered on the IUCN Red List, the barometer of threat for global biodiversity. Hammerheads are generally some of the ocean's most threatened species and on their often long journeys they come into contact with fisheries. Protecting them where they aggregate is therefore a vital conservation strategy. Potential scalloped hammerhead nursery grounds have been identified in the Galápagos Marine Reserve, a UNESCO World Heritage Site. By describing these sites, Eduardo aims to help promote the increased protection of the sharks and generate a conservation strategy for these essential habitats.

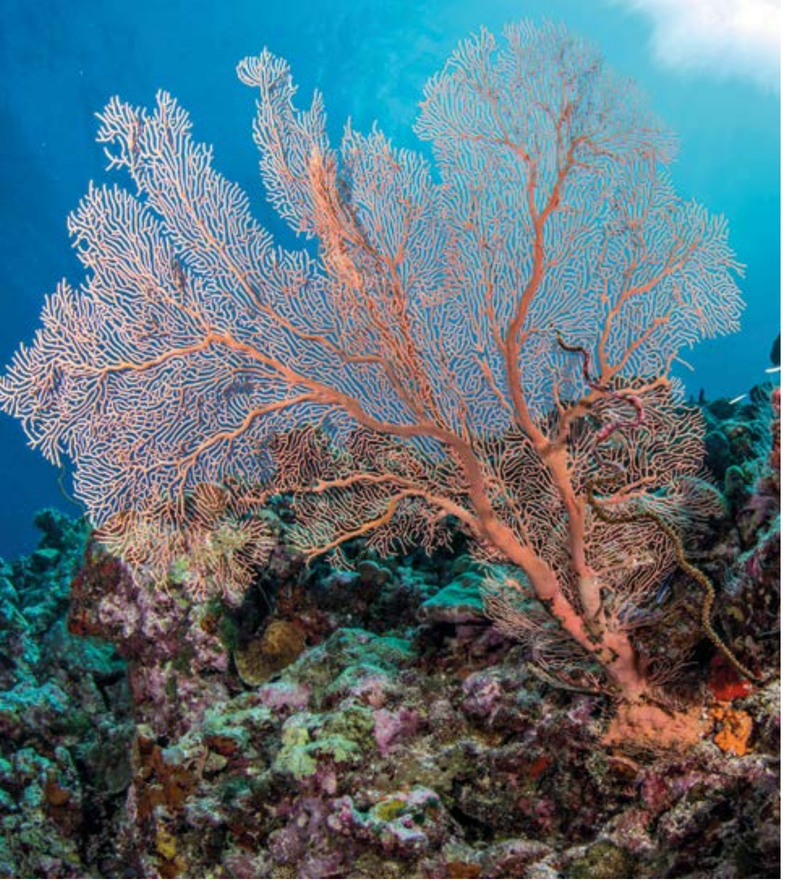


JONATHAN GREEN

SECRETS OF THE WHALE SHARKS OF THE GALÁPAGOS MARINE RESERVE

GALÁPAGOS | RESEARCH, CONSERVATION, EDUCATION | WHALE SHARK *RHINCODON TYPUS*

Jonathan is tracking whale shark movement patterns using different satellite tags to understand where they are moving in and around the Galápagos Marine Reserve. To what depths are they diving? How do they use different habitats? This information is vital to identify key areas for their survival.



PHIL HOSEGOOD

INTERNAL WAVE IMPACTS ON CORAL BLEACHING AT D'ARROS ISLAND

Plymouth University

SEYCHELLES | RESEARCH, CONSERVATION, EDUCATION | CORALS

There is evidence that the ocean might flush the coral reefs of D'Arros Island in Seychelles with cold water. This could provide vital relief from rising sea temperatures and potentially render corals resilient to coral bleaching events. Phil is deploying oceanographic moorings to track temperature, current flow and particles in the water (which may contain coral larvae). He wants to understand whether the ocean's internal waves are indeed bringing cooler water and resupplying bleached surface reefs with new coral larvae from deeper reefs. The results of his research will help prioritise the most critical reefs to protect and build a framework to monitor them.

RUTH LEENEY

BRIDGING THE GAP: FROM RESEARCHING TO CONSERVING SAWFISH IN BANGLADESH

BANGLADESH | CONSERVATION, RESEARCH, EDUCATION | SAWFISH

Sawfish are some of the ocean's most globally threatened shark-like rays and have disappeared from many parts of their historic range. Yet research shows that they are still caught in fisheries around Bangladesh. As the steward nation of some of the world's last largetooth sawfish, Bangladesh is a vital site for conservation education. Ruth is developing a short film to highlight the global plight of sawfish and the unique chance that citizens and fishers have to save them in Bangladesh.

LINDSAY RUBINCAM

HVALDIMIR, THE LOST BELUGA WHALE

NORWAY | RESEARCH, CONSERVATION, EDUCATION | BELUGA WHALE *DELPHINAPTERUS LEUCAS*

Lost and alone, Hvaldimir the beluga whale appeared in Norway in 2019 seeking interaction with people. He had clearly once been captive and leading cetacean expert Lindsay Rubincam and her team are monitoring Hvaldimir's movements, condition and behaviour to ensure his welfare and lend support to determine the best course of action for his rehabilitation.

JUAN TORRES

CONNECTING COMMUNITIES TO CONSERVATION

GALÁPAGOS | EDUCATION | SHARKS

Juan is on a mission: to get local people into the ocean around the Galápagos Islands and thereby spark a connection that will see them want to protect their environment. As the leader of the Charles Darwin Foundation's education programme, he runs experiential marine education activities that tie into the islands' formal and informal education systems. His project funding will help expand his development programmes for learners, helping them to foster a real curiosity about and passion for the ocean.

COMMUNICATION PROJECTS

OVERVIEW OF THE COMMUNICATION PROJECTS WE SUPPORTED IN 2020

MUSEUM OF DISCOVERY AND SCIENCE | FORT LAUDERDALE | USA
TWO OCEANS AQUARIUM | CAPE TOWN | SOUTH AFRICA
NATURAL HISTORY MUSEUM | GENEVA | SWITZERLAND
WAVESCAPE FESTIVAL | CAPE TOWN | SOUTH AFRICA

Art is a powerful tool that can stir emotions and inspire ideas. As part of the 2020 Wavescape Festival, the Save Our Seas Foundation teamed up with Chris Auret to create this vibrant mural of humans' connection to sharks and how their future is in our hands.

save our seas
foundation

SOSF COMMUNICATION PROJECTS

Although the Save Our Seas Foundation has always supported its project leaders, project partners and project centres in their endeavours to share news of the conservation work they do, 2020 brought new opportunities to raise the conservation profile of sharks and rays. We focused communication efforts on broadcasting creative messages about the role that sharks and rays play in the healthy functioning of marine ecosystems and we partnered with organisations around the world on exciting ventures that were both educational and artistic. In each case, the unique biology of sharks and rays was foremost in the messaging, closely followed by their importance in the oceans and their vulnerability to a host of threats. Our current conservation climate, set within the parameters imposed by the Covid-19 pandemic, requires that the foundation and its partners broadcast thoughtful messaging that engages audiences in new ways and nudges viewers to action through awareness.

In Cape Town, the foundation again partnered with the Wavescape Festival to support local artist Chris Auret's vibrant visuals on the busy Sea Point promenade. The mural titled *In Our Hands* reminded passers-by of the unseen diversity of sharks and rays that swim below the sea surface and that we all have the power to shape their future for the better. Over the busy December holiday period, as Capetonians and tourists seeking well-ventilated outdoor spaces took to exercising along the promenade, the usually drab grey seawalls formed a

Capetonians enjoy the Wavescape Festival's Covid-compliant outdoor film screening at Kirstenbosch Botanical Gardens.

gallery that brought Thomas Peschak's photographic exhibition *Wild Seas* to life. The Save Our Seas Foundation also supported several events during Wavescape, keeping sharks and rays topmost in everyone's minds at the festival's Slide Night, the St James tidal pool clean-up with the Beach Co-op and the Galileo Open-air Cinema at Kirstenbosch Botanical Gardens. As a short prelude to the cinema's feature film each night, the foundation's *SuperSharks* Marvel-like trailer extolled the super powers of manta rays and hammerhead, angel, great white and tiger sharks, highlighting our need for them to protect our world as much as they need us to protect theirs.

In Switzerland, art, activism and education came together in a collaboration between the Save Our Seas Foundation and the Geneva Natural History Museum. Maori artist George Nuku created the art installation *Bottle Ocean 2120, Te Ao Maori*, which was supported by the Race for Water Foundation and Oceaneye Association, the Geneva Museum of Ethnography, the Basel Museum of Cultures, the Berne Natural History Museum and the Léman Museum in Nyon, as well as the Save Our Seas Foundation. The installation's vision of recycled plastic bottles and Plexiglass carvings as the basis for our underwater world in

For the 2020 Wavescape Festival, the Save Our Seas Foundation presented *Wild Seas*, an outdoor photographic exhibition by National Geographic photographer Thomas Peschak that documented the beauty and fragility of the oceans.

Sponsored by the Save Our Seas Foundation, the Shark Exhibit at the Two Oceans Aquarium in Cape Town enables people to engage with sharks while learning about their habitats, the threats they face and why they are important for the marine environment.

2120 prompted audiences to re-think our relationship with plastic pollution. The foundation also supported the development of an education leaflet to take the ocean conservation messages developed in this installation to young public audiences and classrooms around Switzerland.

2020 also saw the opening of the Save Our Seas Foundation's Shark Exhibit in South Africa's Two Oceans Aquarium. Hosting five ragged-tooth sharks and several other large fish species, this is the biggest display in the aquarium and it is hoped that both it and the 'Shark Alley' behind it will boost opportunities for visitors to learn about charismatic sharks, shark biology, threats to sharks and human–shark interactions.

The changing conservation status of sharks and rays, most of which continue to show troubling declines, made 2020 a critical year for prompting audiences during their pandemic-enforced pause to reconsider their relationship with the ocean. The Save Our Seas Foundation is committed to the conservation of sharks and rays and in 2020 its aim was to communicate a sense of wonder, curiosity and compassion for these animals in innovative ways, drawing on the expertise and united passion of itself and its partners.

The artist George Nuku and his exhibition *Bottle Ocean 2120, Te Ao Māori*, an immersive marine scene made entirely of recycled plastic and Plexiglass. The panorama raises questions about our relationships with plastic, the marine world and the fragile wildlife that inhabits seas and shores.

OUR TEAM

OUR TEAM CONSISTS OF A PASSIONATE GROUP OF PEOPLE WHO ARE DEDICATED TO MARINE CONSERVATION. OUR CORE OPERATIONS ARE HANDLED BY A SMALL NUMBER OF PEOPLE LOCATED IN VARIOUS OFFICES AROUND THE WORLD.

1. **SOSF HEADQUARTERS** | GENEVA | SWITZERLAND
2. **SOSF SHARK RESEARCH CENTER** | FLORIDA | USA
3. **SOSF SHARK EDUCATION CENTRE** | KALK BAY | WESTERN CAPE | SOUTH AFRICA
4. **SOSF D'ARROS RESEARCH CENTRE** | D'ARROS | SEYCHELLES
5. **SOSF ISLAND SCHOOL** | MAHÉ | SEYCHELLES

SOSF HEADQUARTERS
GENEVA I SWITZERLAND

JAMES LEA
CHIEF EXECUTIVE OFFICER

James is the chief executive officer of the Save Our Seas Foundation. He has had a fascination for the marine realm from a young age and it was this that sparked his ambition to explore the oceans. Having been humbled by encounters with various shark species, he became keen to learn as much as he could about their behaviour and ecology.

James gained a first-class Honours degree in biological sciences from the University of Oxford and then volunteered as a shark researcher at the Bimini Biological Field Station. At Bimini he cut his teeth catching, tagging and tracking sharks, and working with them so closely consolidated his passion and further motivated him to fight for marine conservation.

He then moved to work as a research scientist for the Save Our Seas Foundation, before completing a PhD in marine biology at the University of Plymouth in collaboration with the D'Arros Research Centre. His primary research focus was a comprehensive tagging programme tracking almost 200 sharks of seven different species in Seychelles, aiming to determine the factors that drive their movement behaviour and use this knowledge to inform effective conservation strategies. James's research has helped to contribute to the design of marine protected areas and has revealed previously unknown open ocean migrations of tiger and bull sharks, highlighting the challenge of managing shark populations that span ocean basins. He continues his research as part of the Evolutionary Ecology Group at the University of Cambridge.

James fully realises the importance of actively promoting awareness of marine conservation issues, so he is particularly excited to lead the Save Our Seas Foundation team to help ensure that we can live with healthy oceans for generations to come.

SANDRINE GRIFFITHS
GRANT PROGRAMME MANAGER

Sandrine first became passionate about biology and genetics in college, although from an early age she had always felt a strong need to be immersed in nature. Born in Switzerland, she was lucky to spend long vacations by the Mediterranean Sea, savouring the elements and admiring the marine fauna as she tried to follow her father, a free-diver. Later she travelled less often, so the Swiss mountains and Lake Geneva, one of the largest lakes in Western Europe, fed her need for nature.

A biologist by training, Sandrine taught science to teenagers before joining a biotech company where she acquired strong project management skills. After seven years, an opportunity arose that enabled her to set up her own business and open a sailing and nautical sports store on the shore of Lake Geneva. It was this adventure that reminded her how much she wanted to take care of the many aquatic ecosystems and their wildlife that is degraded by human activity. She is passionate about living creatures in all their forms.

AURÉLIE GROSPIRON
DIRECTOR OF COMMUNICATION

Born and raised in the French Alps, Aurélie developed a strong connection with the natural elements: mountains, lakes and the ocean. She became an expert skier, sailor and diver, loves adventure and also enjoys contact with people who are passionate about nurturing a vision for a better world. Environmental issues, the legacy for the next generation and educational objectives are what matter to this dynamic woman.

Aurélie graduated from an international business school in Paris in 1992 and went on to work mainly with premium brands such as Rolex, Oakley and Dynastar. Her fields of expertise are public and media relations, sponsoring, advertising and event management.

In April 2019, after a career in the sport and luxury industries, she felt it was time for her to reconnect with her personal aspirations and follow a new professional direction. She joined the Save Our Seas Foundation in Geneva to handle its communications strategy and make the organisation's activities and ambitions better known to the general public. For Aurélie it's a new reality that makes perfect sense, a role that matches her preference for exploration, conservation and innovation.

KALK BAY I WESTERN CAPE I SOUTH AFRICA

JADE ROBYN SCHULTZ
CONTENT MANAGER

From a young age when she and her family would go on holiday to nature reserves and the seaside, Jade has felt a very strong connection to the natural world and a great appreciation for its overwhelming beauty. With time however, she realised that this was a view few others shared. Having experienced in particular how little other people know about the wonders of the ocean, she became acutely aware that they know even less about the dangers that the marine realm faces.

With a background in marketing and media experience, Jade understands that the media is extremely powerful when it comes to spreading a message and raising awareness – and, in fact, in today's digital world it is an invaluable conservation tool. She believes that the knowledge and experience that she is able to bring to the Save Our Seas Foundation's Conservation Media Unit, together with the passion and dedication of the other team members, can and will make a positive difference in the mindset of the public – and, ultimately, the health of our oceans.

SOUTH AFRICA

THOMAS P. PESCHAK
DIRECTOR OF STORYTELLING

Thomas P. Peschak is a National Geographic Photographer, Explorer and Fellow who specialises in documenting both the beauty and the fragility of the world's oceans, islands and coasts. For *National Geographic* Magazine he has produced 10 feature stories that cover various natural history and conservation issues, ranging from manta rays to marine protected areas.

Originally trained as a marine biologist, Thomas embraced photojournalism 15 years ago after realising that his photographs could have greater conservation impact than scientific statistics. He is a founding director of the Manta Trust and a senior fellow of the International League of Conservation Photographers. His images have won 17 Wildlife Photographer of the Year and seven World Press Photo awards. Thomas has supplied the photographs and text for seven books, including *Currents of Contrast, Sharks & People* and *Manta: The secret life of devil rays*. He is a popular speaker for National Geographic Live, having presented more than 20 shows in 15 cities on three continents. His official 2015 TED talk, 'Dive into an ocean photographer's world', has been viewed more than one million times.

USA

STEFAN KUBICKI
IT AND WEB OFFICER

Stefan grew up in North Dakota, about as far away as it's possible to get from the coast in the USA. He first developed a fascination with sharks and the underwater world thanks to nature documentaries and well-worn issues of *National Geographic*. He began his career as an analyst at a UN-based NGO in New York before moving to London, where he worked as a web developer and advisor to several startup companies. He joined the Save Our Seas Foundation in 2010. Aside from his work for the foundation, Stefan is an award-winning filmmaker whose films have screened at festivals around the world.

SARAH FOWLER

SCIENTIFIC ADVISOR

Sarah has a first class joint honours degree in zoology and marine zoology from the University College of North Wales, an MSc in conservation from University College London and 30 years of professional experience as a marine biodiversity conservation expert. She has worked in various capacities for government departments, national and international NGOs and a biodiversity consultancy. Having been appointed to the IUCN Shark Specialist Group in 1991, she chaired it for many years and is now its vice-chair for international treaties.

Sarah founded the European Elasmobranch Association and its UK member, the Shark Trust (and is a trustee of the latter). She was appointed Officer of the Order of the British Empire for services to marine conservation in 2004, and a Pew Fellow in Marine Conservation in 2005. She became principal scientist for the Save Our Seas Foundation in 2011.

DEAN GRUBBS

SCIENTIFIC ADVISOR

Dr Dean Grubbs is a fish ecologist with interests in the biology of exploited and poorly studied estuarine and marine taxa. Much of his research addresses specific gaps in biological knowledge necessary for the management and conservation of coastal and deep-water sharks and rays. Dean specialises in the use of fishery-independent surveys to study population dynamics and the drivers of distribution patterns of fishes and to facilitate studies of life histories, reproductive biology, trophic ecology and systematics. Dean has also tagged and released more than 10,000 sharks representing over 40 species during the past 25 years. He employs a variety of tagging and telemetry techniques to examine movement, migration and patterns of habitat use and to delineate essential and vulnerable habitats for exploited, threatened or poorly studies species.

Dean is a native of Florida and his early years spent fishing and exploring the waters of the north-eastern Gulf of Mexico led to an early interest in marine biology. He received Bachelor's degrees in marine science and biology from the University of Miami and a doctoral degree in fisheries science from the College of William & Mary's Virginia Institute of Marine Science. Dean was a post-doctoral researcher and faculty member at the Hawaii Institute of Marine Biology before moving to Florida State University (FSU) in 2007. He is a member of the IUCN Shark Specialist Group, the National Oceanographic and Atmospheric Administration (NOAA) Office of Protected Resources' Smalltooth Sawfish Recovery Team and NOAA's SouthEast Data Assessment and Review Advisory Panel for Highly Migratory Species. Dean is currently the associate director of research at the FSU Coastal and Marine Lab, where he mentors graduate and undergraduate students and maintains an active research programme on the ecology of deep-water and coastal fishes. His research has been featured in many television documentaries, including National Geographic TV, National Geographic Wild, Discovery Channel and the US Public Broadcasting System.

ANDREW CHIN

SCIENTIFIC ADVISOR

Dr Andrew Chin is a fisheries scientist whose work focuses on shark and ray biology and ecology, and how the information from this research can be translated into conservation and sustainability. Specifically, Andrew is interested in how fishes use coastal and marine habitats and how patterns of use affect their vulnerability to pressures such as fishing, habitat loss and climate change. His recent research spans the life history and biology of sharks by means of tagging and acoustic telemetry, as well as risk assessment. As an applied scientist, Andrew is also very interested in how fishes, sharks and rays interact with people and how their populations can be managed, as well as in impacts on their populations.

Andrew grew up in South-East Asia but currently lives in Queensland, Australia, where he received his PhD from James Cook University. He has a diverse marine background, having worked as a marine biologist in the tourism industry and as an education officer in a public aquarium. He also spent 10 years working at the Great Barrier Reef Marine Park Authority, the Australian federal agency charged with protecting the Great Barrier Reef. In 2017, Andrew launched SharkSearch Indo-Pacific, an effort that blends formal research, citizen science and public outreach, and aims to develop a scientifically robust shark diversity checklist and conservation account for every country and territory in the Pacific by 2022. He is also one of the founders of the Oceania Chondrichthyan Society and a member of the IUCN Shark Specialist Group.

SOSF SHARK RESEARCH CENTER

FLORIDA I USA

MAHMOOD SHIVJI

DIRECTOR

Mahmood is professor of marine science at Nova Southeastern University's (NSU) Oceanographic Center in Florida and a director of the SOSF Shark Research Center. He received his undergraduate degree in biological sciences at Simon Fraser University in Canada, his Master's from the University of California, Santa Barbara, and his PhD from the University of Washington. He has been a faculty member at NSU since 1993 and a director of the SOSF Shark Research Center since 2010.

Mahmood credits his life-long fascination with biology to growing up in Kenya, where he was routinely exposed to African wildlife and undersea environments as a child and teenager. His interests in marine science in particular were boosted when as an undergraduate student he assisted one of his professors with kelp-bed ecology research in a pristine part of British Columbia. That experience proved transformative, leading to a career in marine and conservation science and education.

In addition to leading the research and education programmes of the shark research centre, Mahmood directs the Guy Harvey Research Institute, emphasising collaborative projects between the two entities to achieve larger and more impactful research and conservation outcomes. He specialises in integrating laboratory genetics-based and field-work approaches to study and solving problems pertaining to the management and conservation of sharks and rays, billfishes and coral reef ecosystems.

Mahmood's work consistently receives worldwide attention. His research developing rapid DNA forensic methods to identify shark body parts is being used by US and other national fisheries management agencies to reduce the illegal fishing of threatened species. This work is also on exhibit at the Smithsonian Museum's Sant Ocean Hall in Washington DC, and his team's research discoveries have been widely reported in the national and international media.

SOSF SHARK EDUCATION CENTRE

KALK BAY I WESTERN CAPE I SOUTH AFRICA

CLOVA MABIN

DIRECTOR

Originally from Scotland, Clova became fascinated by sharks while working as a diving aquarist in an aquarium that housed ragged-tooth sharks. She came to South Africa in 2005 to work with tiger sharks on the east coast before joining the White Shark Trust in Gansbaai as a research assistant. While in South Africa, she became involved in the wildlife film industry, where she learned the basics of communicating science to a wider audience. Keen to further her education, she went on to complete an MSc in conservation biology and then a PhD focusing on the status and management options for marine species that have invaded South African shores. This applied research made her realise how inaccessible most science is to the general public and how this contributes to the many conservation issues we face today.

Clova loves to travel, but when in South Africa she spends her free time outdoors on the water or in the mountains. She is a certified PADI dive master and South African commercial diver. As a volunteer for several organisations that focus on environmental education and the mother of a nature-loving daughter, she enjoys teaching children about ecology and sustainable lifestyle choices. She is passionate about sharing her love and knowledge of the marine environment, as she believes this is the only way we can change our future.

CLAIRE METCALF

FACILITIES ADMINISTRATOR

Raised in various small West Coast fishing and mining towns of South Africa and Namibia, with parents whose free-range approach to parenting meant lots of time outside exploring beaches, Claire is a firm believer in the power of experiential education in moulding future generations to become effective conservationists. Claire joined the Save Our Seas Foundation Shark Education Centre in May 2016 after almost eight years with Liberty Life Financial Services as a franchise business support administrator. With a diploma in administration and legal studies from Montrose Business College in Cape Town, in her role as the facilities administrator she brings a high level of organisation and structure to the dynamic working environment that is the Shark Education Centre. She is enjoying every minute of the varied opportunities this role brings and, in addition to seeing to facilities maintenance and administration, she has become a vital part of the team, joining school groups as they learn about, explore and appreciate the ocean. She has also made it her personal mission to convince the education centre's resident puffadder shysharks to eat their food. With a family that has earned – and continues to earn – its income almost entirely from the sea, Claire has a vested interest in the conservation of the oceans for current and future generations. She believes that she is in exactly the right place to be able to contribute to this.

SOSF D'ARROS RESEARCH CENTRE
SEYCHELLES

CRAIG HALEY
EDUCATOR

Craig grew up in Cape Town's southern Peninsula, where he had a view of the ocean. As a child, he would often visit the beach, enjoying watersports among the waves and daydreaming of the mystical creatures that lay hidden beneath the water's surface. It was his childhood fascination with the ocean that enticed him to study marine biology, starting with a Bachelor's degree in biological sciences from the University of KwaZulu-Natal. In 2015, he returned to university to further his education and completed a Master's degree in applied marine science at the University of Cape Town.

In between his academic pursuits, Craig indulged a second passion: field hockey. He represented South Africa for six years and played in some of the best domestic leagues around the world. For the past few years he has been coaching hockey in several local schools.

Craig loves adventure and enjoys exploring the natural environment on land and in the sea. He has an advanced diver's certificate and scuba-dives around South Africa's coastline whenever he gets the opportunity. On land, he enjoys hiking, camping, trail running and game viewing. There are so many interesting marine and terrestrial animals around Cape Town, he says, 'it really gives me joy to share with younger generations my knowledge of our wild neighbours'.

NTOMBIZANELE MAYIYA
ASSISTANT EDUCATOR

Zanele was born in the northern part of South Africa's Eastern Cape. Even as a young girl she enjoyed cooking very much, so when she completed her matric she decided to make hotel and catering management her career. In March 2008 she started working for the SOSF as a housekeeper.

By reading SOSF books and watching videos about the ocean environment, Zanele became interested in marine life. In June 2009 she joined Alison Kock on the research boat to Seal Island in False Bay and there she saw a great white shark for the first time in her life. By the end of that trip she had fallen in love with the sea and decided to become an educator so that she can pass her enthusiasm on to the young generations of South Africa.

ROBERT BULLOCK
RESEARCH DIRECTOR

Rob can trace his love for science and the marine world back to his youth and to Sir David Attenborough, whose words instilled a curiosity that soon grew into a passion for learning about nature. As an adult, Rob pursued this passion, studying marine and freshwater biology at the University of Hull. As he learned more about the marine realm and its inhabitants, he became particularly interested in the importance of species in healthy ecosystems and the need for science-based conservation. Through his education he discovered the amazing diversity among sharks, the fascinating roles they play in marine systems and the extreme threats they face.

Rob conducted his PhD research at the Bimini Biological Field Station, where he worked as a Principal Investigator and studied the fine-scale behaviour of young lemon sharks using the Bimini Island nursery sites. He then moved on to broaden his skill set as a post-doctoral research associate with the Marine Biodiversity Unit of the International Union for Conservation of Nature (IUCN), assessing extinction risk to marine species. Rob's career thus far has taken him to the intersection of scientific research and conservation action and he is driven to deliver science with tangible conservation outcomes.

SOSF ISLAND SCHOOL
MAHÉ I SEYCHELLES

HENRIETTE GRIMMEL
PROGRAMME DIRECTOR

Growing up in Germany and Switzerland, where competitive swimming and rowing meant that she spent a lot of time in and on water, Henriette has always had a strong connection to this element. Hiking and camping holidays with her family led to an enduring interest in animals and nature. She first dipped into marine biology while studying in the USA during a high-school exchange year, learning about marine species and snorkelling for the first time in Hawaii.

At university Henriette studied geography and environmental sciences and it took a few more years before she discovered an interest in diving in Lake Zurich and a fascination for sharks. She followed these up with saltwater experiences while volunteering in Mozambique, where she assisted in whale shark research and fish censuses. After further travels and a dive-master internship in Honduras, she went on to complete an Erasmus Mundus Master's in marine biodiversity and conservation, conducting her field study at the Bimini Biological Field Station in The Bahamas. She gained further experience in marine research while working with the Large Marine Vertebrates Research Institute (LAMAVE) in the Philippines, where she helped to monitor a mobulid fishery and assisted in shark research in Tubbataha Reefs Natural Park.

Although it was diving and sharks that got Henriette into marine science, she has always been interested in the complexities of ocean management and how humans interact with the marine world, so she completed a second Erasmus Mundus Master's, this time in maritime spatial planning from the universities of Seville, the Azores and Iuav Venice. Sharks and conservation remain close to her heart, but Henriette also has a very strong interest in understanding ocean processes, ecosystem services and how humans use them, and finding a pathway to governing that use in a sustainable manner.

TERENCE VEL
PROJECT ADVISOR AND EDUCATOR

Before joining University of Seychelles in 2015 as a science laboratory technician and a field lecturer for BSc environmental science students, Terence Vel spent 16 years as a laboratory technician in various secondary schools. Twenty-one years ago he became a founder of Wildlife Clubs of Seychelles and during this time has managed the organisation's projects and coordinated environmental programmes in 40 schools on Mahé, Praslin and La Digue. In 2000 he worked as a technician on a project called 'Avian ecosystems in Seychelles', which was funded by the Global Environment Facility and implemented by the former BirdLife Seychelles. The project involved two distinct phases: in the first, ecological research was carried out on a number of the Seychelles' Inner Islands to investigate their biology and conservation potential; during the second, endemic Seychellois birds were translocated from certain islands to others that were more suitable. In 2008 Terence embarked on studies for a diploma in environmental education and social marketing at the University of Kent's School of Anthropology and Conservation. This led him to The Darwin Initiative Rare Pride Campaign to work on a project called 'Investing in island biodiversity: restoring the Seychelles paradise flycatcher'. The project was based on La Digue Island and aimed to translocate a small population of birds on Denis Island. Terence also conducts outreach programmes that focus on marine education for youth groups from the community.

SEYCHELLES AMBASSADOR
MAHÉ I SEYCHELLES

HELENA SIMS
SEYCHELLES AMBASSADOR

Born and raised in Seychelles, Helena has a deep love for the sea. She has always felt drawn to the ocean, and marine biology was what she wanted to do for as long as she can remember. She first went diving on her 10th birthday and by the time she was 18 she was already a dive master.

She has always been an active volunteer for environmental causes in Seychelles and when eco-clubs started up while she was still at school, she became a founding member. In 2002 she won an eco-school award trip to Aldabra. Her dedication and hard work took her to Australia to study marine biology at James Cook University in Townsville, Queensland, and on her return she worked in the research section at the Seychelles National Parks Authority. A few years later she accepted the position of project coordinator at the Green Islands Foundation, a local NGO, before going on to manage a four-year GOS–UNDP–GEF protected areas project.

Helena has more than 10 years of experience in marine biology and conservation and project management. A highlight of her career was being part of the team to finalise the world's first debt-for-nature swap for a marine area. She is also the first woman to be appointed the chairperson of the Seychelles National Parks Authority. Currently she is working full time on an initiative to develop a marine spatial plan for Seychelles' entire Exclusive Economic Zone and to identify 30% of that area to be protected. The plan aims to balance ecological, social and economic objectives to ensure that the ocean and its resources are used sustainably.

The sea is within all Seychellois, believes Helena. It's not only in their blood, it's their life. She has dedicated her career to helping ensure that this way of life is maintained and preserved. An island girl by nature and profession, she feels blessed to be living and working in such a beautiful country. Her heart, she says, beats to the rhythm of the ocean around Seychelles.

FUNDING SUMMARY

SUMMARY OF ALL THE PROJECTS FUNDED BY THE SAVE OUR SEAS FOUNDATION DURING 2020

SOSF CENTRES

SOSF D'Arros Research Centre – Bullock & Grimmel

SOSF Shark Education Centre – Mabin

SOSF Shark Research Center – Shivji

SOSF PARTNERS

Bimini Biological Field Station Foundation BBFSF | Elasmobranch research, education and conservation in Bimini, Bahamas | Smukall

Manta Trust | A global strategy and action plan for the long-term conservation of mobulid rays | Stevens

North Coast Cetacean Society NCCS | Cetacea Lab | A voice for whales | Wray

Shark Spotters | Finding the balance between recreational water-user safety and white shark conservation | Waries

The Acoustic Tracking Array Platform ATAP | A nationwide marine science platform | Cowley

SOSF SPONSORSHIPS

Conference | American Elasmobranch Society (AES) | 2020

Conference | Sharks International (SI) | 2022 | Ali Hood

Award | AES Eugenie Clark Award | 2020

Event | Museum of Discovery & Science (MODS) | Distinguished Speaker Series

Education | Umwelt- und Bildungszentrum | Verein Child Aid Papua, Raja Ampat, Jonas Müller

Conference | AES Wedgefish and Guitarfish Symposium | 2020 | David E Ebert

Conference/Education | Young Marine Biologist Summit | 2021 | Maya Plass

Book | *Which faces belong in these places?* | Annie Guttridge

Education | AES video podcast | David E Ebert

Comic book | CSULB Shark Lab | Christopher Lowe

Education | Shark MOOC | Joshua K Moyer & William E Bemis

Education | Translating sawfish education into conservation by increasing the availability of sawfish outreach material | Jeff Whitty

Festisub Festival

Two Oceans Aquarium

Natural History Museum of Geneva

SOSF Fellowship | Pelayo Salinas de León

INDEX A

ALL SOSF PROJECTS FUNDED IN 2020
In alphabetical order of the project leaders

** Project delayed to 2021.*

INDEX B

SMALL GRANT PROJECTS

AL MABRUK | Angel Shark Project: Libya, one of the last angel shark hotspots in the Mediterranean

BARNES | Characterising the diversity and life-history traits of rays and the socio-economic drivers of ray fisheries in India

BARROWCLIFT-MAHON | Better the devil you know: Addressing key data gaps for Indian Ocean devil ray management

BISKIS | Turning trophies into messengers for conservation

BREWSTER | Elucidating the response of juvenile bull sharks to harmful algal blooms

CUBILLOS MORENO | Hidden in the roots: eDNA detection of sawfish distribution in the Colombian Pacific

D'ALBERTO | Life history of the Critically Endangered bottlenose wedgefish

ESPINOZA | Identifying the last remaining areas of the Critically Endangered largetooth sawfish in Costa Rica

GIOVOS | Monitoring threatened elasmobranchs in Greece: Identifying the conservation importance of Kos Island, Dodecanese

HUMBLE | Population genetics of the bowmouth guitarfish in the northern Indian Ocean

ISSAH | Status and conservation of threatened guitarfish, wedgefish and sawfish in Ghana

LEAR | Identification of critical habitat for wedgefish and the giant guitarfish in Western Australia

LYONS | Effect of environmental contaminant exposure on elasmobranch microbiome communities

MOHAN | Conservation implications of biomineralisation patterns in shark vertebrae cartilage

MUKHERJI | Now you see me: Characterising elasmobranch landings in West Bengal

RUMISHA | Exposing the black market in protected sharks to foster sustainable shark fisheries in Tanzania

SCHWANCK | Family ties of the Critically Endangered flapper skate and their implications for conservation management

SWENSON | Counting cownose rays with close-kin mark-recapture

TALWAR | Characterising the horizontal and vertical movements of the silky shark in the Caribbean and western Atlantic

TEMPLE & WAMBIJI | Kenya's other rhino: the life history of the Critically Endangered 'rhino ray', the halavi guitarfish

KEYSTONE PROJECTS | CONTINUATION

BROOKS & MEDD | Survival of great hammerhead sharks released from the Florida land-based recreational fishery

BYRNES | Home-range scaling in sicklefin lemon sharks through ontogeny: Tests of bioenergetics mechanisms

CARDEÑOSA | From the boat to the vote: Basic fishery data to inform CITES authorities in Guyana

CROLL & CRONIN | A population genetics approach to understanding mobulid ray by-catch in the Eastern Pacific tuna fleet

EBERT | Playing for time: Guitarfish and violyn sharks, is this the last dance?

GUBIL | Batoids on your plate: Species composition of the Mediterranean ray trade

HUGHES | Finprinting: An international white shark photographic identification catalogue system

MACDONALD | Collaborative community-based monitoring and management of shark populations in Saint Vincent and the Grenadines

MORTIMER | Community monitoring of nesting sea turtles at D'Arros Island and St Joseph Atoll, Seychelles

SHAW | Lab-on-a-Chip technology for rapid, on-site identification of threatened shark species

SKOMAL | Quantifying white shark predation rates on pinnipeds off Cape Cod, Massachusetts, to mitigate conservation conflicts

STEWART | Improving post-release survival of mobulid rays in purse-seine fisheries

VEL | Environmental education in Seychelles

WIECZOREK | Microplastics a macro-disaster: A threat to the largest fish of our seas

WILEY | Investigating the use of Tampa Bay by the Endangered smalltooth sawfish

WILLIAMSON | Diversity, dynamics and destinations of saw-sharks from south-eastern Australia

KEYSTONE PROJECTS | NEW

ARAUZ* | Marine protected areas to conserve highly migratory sharks in the Eastern Tropical Pacific, Cocos Island

BRITTAIN | Building future conservation leaders in The Bahamas

ESPINOZA | Conservation strategies for hammerhead shark nurseries in the Galápagos Marine Reserve

GONZALEZ* | Helping protect the Revillagigedo National Park in Mexico

GREEN | Secrets of the whale sharks of the Galápagos Marine Reserve

HOSEGOOD | Internal wave impacts on coral bleaching at D'Arros Island

LEENEY | Bridging the gap: From researching to conserving sawfish in Bangladesh

RUBINCAM | Hvaldimir, the lost beluga whale

SNOW* | Sharks of the Sulu: Impact media campaign to support elasmobranch conservation in Palawan, Philippines

TORRES | Connecting communities to conservation

** Project delayed to 2021.*

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