



Annual Report of the Shark Foundation 2021

April 2022

General

Foundation

The Covid-19 pandemic continued to strongly impact the Foundation's work on shark protection projects in 2021. Many researchers found it impossible to conduct their fieldwork as planned due in particular to travel restrictions as well as uncertain and rapidly changing quarantine requirements.

Scientific research is expensive, especially when it concerns marine organisms. Thus, in addition to effective research materials, costs may also ensue for boats, crew, fuel, travel, etc. Molecular biological research, such as the analysis of population dynamics or the study of large-scale migrations using satellite transmitters, consumes vast amounts of research funds and usually can only be financed by large laboratories which often have several donors. Where appropriate, the relatively small Shark Foundation supports or participates in such larger projects that are specifically aimed at shark protection. Sometimes, however, the small and relatively inexpensive projects (e.g. the analysis of local fish markets and shark landings in poorly studied regions) can be very interesting. These are rarely supported by large donors, especially by national research institutes. By funding such projects and by networking the project leaders among themselves and with larger laboratories, the Foundation can contribute substantially to shark conservation with relatively little effort.

The Shark Foundation has been committed to the worldwide protection of sharks since 1997. Without the support of many small and large donors it would be impossible for us to carry on our work for sharks and hence to protect our oceans.

Thus we seize this opportunity to thank all our donors and patrons whose generous support makes our work possible!

New Foundation Web Pages

In April 2021 the completely redesigned, responsive - i.e. optimally adapted to various end devices - web pages of the Foundation went online in German and English.

Almost all pages were newly created and adapted to the Joomla Content Management System. The database programming and pages also had to be completely recreated in the form of PHP modules. The new appearance called for the restructuring and repeated updating of the database. New photos were also procured and now include almost all key species. In addition, some distribution maps were also integrated.

As for the Shark Online Shop it is now an independent, professional open-source solution, integrating PayPal, Stripe, bank transfer and payment slips for use in Switzerland. Donations can also be made and processed in a separate module using PayPal and Stripe.

Although work for maintaining and testing the web pages has massively increased, the attractive store and donation pages are used much more frequently than before.

EEA Conference (Leiden, Holland)

As already mentioned in our last annual report, the annual conference of the EEA (European Elasmobranch Society) planned for the fall of 2020 in Leiden, Holland, had to be cancelled due to Covid 19. An online version of the conference could also not be realized. Finally, in January 2021

the Annual General Meeting of the EEA took place via video conference. An actual live conference was later held on location in Leiden (Holland) at the Naturalis Biodiversity Center from November 3 to 5, 2021, shortly before Holland strongly retightened corona measures. Dr. Alexander Godknecht (Shark Foundation) represented Switzerland at this conference.

Publications

The publication of scientific results that have been checked by specialists before publication (peer review) is one of the most important goals of research. Only through such publications can other scientists and the public benefit from any results. The Shark Foundation is thus very proud to report that to date at least **88** scientific publications have resulted from the projects that it supports.

In 2021, **4** publications stemming from Shark Foundation projects appeared on the following topics:

- Shark Meat Trade in Greece (iSea)
- Population Analysis of Sixgill Sharks, and
- Tiger Sharks (Professor Shivji), and the
- Great White Shark Project (Ocearch).

Three scientific projects supported by the Foundation were presented in the IUCN Shark Specialist Group Newsletter 3/2021:

- The Analysis of Local Fisheries in Ghana
- Shark Meat Sales in Greece, and the
- Whale Shark Project, headed by Dr. Simon Pierce.

U.S. Shark Foundation

In 2021 the U.S. Shark Foundation was reregistered as a nonprofit organization seated in Miami, Florida. However, the Board of Trustees of the Shark Foundation and the Director of the U.S. Shark Foundation, Prof. Mahmood Shivji, have now decided to discontinue the U.S. Foundation at the end of 2021. The costs incurred in the U.S. (registration/lawyer's office/legal fees) have exceeded any income or donations for years and the money is better invested directly in shark conservation projects rather than in administrative costs. The registration of the U.S. Shark Foundation as a nonprofit foundation in Florida will thus not be renewed for 2022 and the U.S. Foundation will be dissolved.

Total administrative costs to date: approx. CHF 60,000

Projects

Shark Exhibit

The exhibit is in storage and we are continually searching for new exhibit locations.

Expenditures/Investments to date: approx. CHF 270,000

Population Genomics of Large Shark Species

Under the direction of Professor Mahmood Shivji, this project is being carried out in his laboratory and includes molecular genetic analyses of various large oceanic sharks, e.g. large hammerheads, makos, great white sharks, sixgill sharks or whitetip sharks. The analysis will help in molecular biological research on global genetic links between populations of especially large oceanic and other endangered shark species.

Genetic connections provide information on whether individual populations are isolated or if they mix with other populations which would enable them to compensate any losses through the integration of other species. Although both laboratory and field work were possible, they were considerably hampered by extensive interruptions due to Corona. Prof. Shivji's team published two scientific papers in 2021 on the genetic linkages of global sixgill shark populations and global population structures of tiger sharks.

Expenditures 2021: CHF 10,000
Investments to date: approx. CHF 58,400

Global Analysis of Large Shark Species Migrations

Numerous shark species are in massive decline worldwide due to overfishing. Their meat and especially their fins are a highly valued commodity and their high demand puts increased pressure on their populations. However, large shark species are top predators but they mature slowly, become sexually mature much later and also have fewer offspring. This obviously makes them more susceptible to population decline caused by overfishing.

High-sea sharks in particular are often found in regions where international fishing fleets are also active. Analyzing their migration routes is thus especially important. Laboratory and field work performed in Professor Mahmood Shivji's laboratory in 2021 was possible but was subjected to long Corona-based interruptions.

Expenditures 2021: CHF 8,370
Investments to date: approx. CHF 40,600

Shark Nurseries

The shark „nursery“ project in Rookery Bay, 10,000 Islands, Florida, has been managed by Pat O'Donnell since 2000 in cooperation with the Mote Marine Lab. This region is used by sharks as a primary nursery (newborns) and secondary nursery (juvenile sharks one year and older). The study region includes Fakahatchee, Fake Union and Pumpkin Bay.

The marshlands, whose waters flow into these bays, were drained over 20 years ago for a land reclamation project which, however, failed. It was only a few years ago that the State of Florida decided to restore the original marshlands. This project has been severely delayed and to date has not been completed but results are slowly beginning to show. The amount of fresh water that is diverted to the sea through canals to drain the swamp is decreasing. The goal of this research is to determine how any salinity change in these nursery areas affects juvenile sharks.

The Foundation continues to invest in this project whenever required.

Expenditures 2021: CHF -0-
Investments to date: approx. CHF 61,500

Fiji Shark Sanctuary

The Fiji Shark Conservation Park Project is now self-sustaining, but the Foundation will continue to provide financial assistance as required. At the end of 2013 Mike Neumann requested continued support for the Fiji Shark Count Project in order to inventory all sharks in the region as of 2012. The Fiji Shark Count is ongoing and was co-funded by the Foundation in 2013/14. In 2015 Christine Ward-Paige from Dalhousie University, Halifax, evaluated the data collected during the Fiji Shark Count.

The Foundation continues to invest in this project whenever necessary.

Expenditures 2021: CHF -0-
Investments to date: approx. CHF 41,800

Migration of Large Coastal Sharks in Jupiter, Florida, and the Bahamas

Great hammerhead sharks around Jupiter/Bimini/Bahamas

Hammerhead shark species are strongly overfished in many regions. In March 2014 great hammerhead sharks were put on the list of endangered species in both Appendix II of the CITES Convention and the IUCN Red List. They migrate over long distances through the territories of various nations. For this reason they are also listed in Annex I of the UN Convention on Highly Migratory Species which calls for all participating countries to cooperate strongly in their management.

Hammerheads are often found in bycatch, but are also actively fished because their fins achieve a high market value. Regulating bycatch and demanding that hammerhead sharks be thrown back into the sea makes little sense because they have a mortality rate of about 90% in bycatch which is the highest of all shark species. For this reason their locations, seasonal activity range and behavior must be more thoroughly known in order to provide them more effective protection.

The project got off to a good start. However, after the death of Professor Samuel Gruber in April 2019 and the ensuing 2020/2021 pandemic, it fell severely behind schedule. In 2021 Professor Gruber's successor, Matthew Smukall and his team, along with some additional researchers, published four scientific papers on the subject.

Expenditures 2020-2021/22: CHF 18,700

Investments to date: approx. CHF 86,200

Whale Sharks

Studies on whale sharks conducted by Dr. Simon Pierce and Dr. Chris Rohner continued to be strongly affected by the corona pandemic in 2021.

Some highlights: The marine region around Inhambane, Mozambique, was chosen as the "hope spot" of Silvia Earle's "Mission Blue" thanks to the research of Simon Pierce and his team. Simon Pierce co-authored the comprehensive book on whale sharks, "Whale Sharks: Biology, Ecology and Conservation" which was published by CRC Press in 2022. Based on the work of Simon's team, among others, the protected marine region around the Galapagos was expanded, and a protected waterway for endangered marine animals was established as far north as the Cocos Islands.

Meanwhile, the Marine Megafauna Foundation opened a new environmental center in Tofo, Mozambique, offering education, information and training opportunities to all interested parties.

Based on analyses of genetic sequences, it was possible to show that the whale sharks of Mozambique are close relatives of the whale sharks roaming in the Red Sea.

Expenditures 2021: approx. CHF 9,200

Investments to date: approx. CHF 120,100

White Sharks in the North Atlantic: Analysis of Hormones and Microplastics

As top predators of the oceans, white sharks are found at the end of the food chains. As such they accumulate environmental toxins such as mercury and microplastics. Surveys of great white shark populations conducted in cooperation with Ocearch are expected to provide more information on their health status.

Veterinarian Michael Hyatt will be assisted in his research on the accumulation of microplastics in great white sharks, in the analysis of the population's general health status, and in studies on stress endured by sharks during capture and on-board examinations.

The project was scheduled to continue until the end of 2022 since the goal of analyzing 20 each of one-year-old, young, juvenile and adult white sharks has not yet been achieved. By the end of 2021, 73 sharks from different age groups had been analyzed and results were presented at four conferences held by the American Elasmobranch Society, as well as published in one scientific journal. Further publications are expected in 2022/23 when hopefully the various analyses on microplastics and mercury contamination, stress hormones, nutritional physiology, etc. in the different age groups will have been completed.

Preliminary analyses show that great white sharks accumulate microplastics which can not only clog the gills but can also enter the bloodstream. The danger lies in the fact that microplastics bind dangerous environmental toxins which can enter the body's cells to cause long-term damage.

Studies on the migrations of the different age groups and sexes in the eastern North Atlantic brought new insights into mating areas, habitats of pregnant females and one-year olds. The distribution area was extended to the far north of Canada. These new findings will help to better protect great white

sharks in the North Atlantic. In 2022 the Oearch team plans to search for great white sharks in the Mediterranean.

Expenditures 2021: CHF 9,300

Investments to date: approx. CHF 29,400

Cape Verde Shark Conservation Project

West Africa's Cape Verde is an archipelago consisting of ten volcanic islands and is home to more than 60 species of sharks and rays, including whale sharks, tiger sharks and manta rays. These species have been exploited uncontrollably in West Africa for many years. However, the Cape Verde Islands – particularly Brava and Maio – are exceptional in that they are the only regions where sharks and rays are not intensively fished. This makes them a hotspot for these species and one of their last refuges in the northeast Atlantic.

After the various corona lockdowns in 2020/21 the project was slowly resumed at the end of 2021. Various activities in the field of public relations, protection of prey fish of sharks and the fight against illegal industrial and sports fishing are beginning to bear fruit.

Expenditures 2021: CHF 10,000

Expenditures to date: approx. CHF 20,000

Indigenous Fisheries in Angola

In West Africa an alarming decline of sharks is being observed, mainly due to the ever-increasing demand for shark fins in the Asian region. Great hammerheads, lemon sharks and bull sharks are experiencing an especially threatening decline, but many other shark species are also affected.

Angola is located in the northern part of the so-called Benguela Current Large Marine Ecosystem (BCLME). The BCLME is an extremely productive marine region thanks to the confluence of the Benguela and Angola currents which create eddies that transport nutrient-rich deep water to the surface.

The demand for shark fins has led to a massive increase in local coastal fishing in Angola, especially over the past 10 years (source FAQ, United Nations Food and Agricultural Organization). However, no accurate data on specific shark fishing is available and the project aims at collecting such data.

The project is progressing well. A second interim report with data from various ports in Angola is now available.

In 2021 Ana Lucia Furtado Soares was accepted into the IUCN Shark Specialist Group and will write her dissertation on the basis of her work in Angola.

Project Management: Ana Lucia Furtado Soares

Preliminary Cost Projection (for 3 years, 2017-2019): approx. CHF 9,500

Expenditures 2021: CHF 5,100

Investments to date: approx. CHF 13,800

New 2021: Social Behavior of Bull Sharks in Fiji

Bull shark populations in Fiji have been studied extensively and like all bull sharks their status on the Red List of the IUCN is "almost threatened." However, the bull sharks in Fiji are considered more endangered as they do not mix with the nearest bull shark populations due to the latter's distance from Fiji. This means that their losses cannot be compensated.

Although we know a great deal about bull sharks, very little is known about their social behavior. It is known that sharks often develop social structures, form groups and cliques, learn from others, and that they differ in individual behavior.

Managing this project is Natasha Dominique Marosi. In her dissertation she will examine in detail the social behavior of bull sharks in Fiji with the aim of answering the following questions: Are there group and clique formations and what are the criteria for bull sharks to join such a group/cliue? Do group/cliue formations remain the same over time or do they fluctuate? To what

extent do personality traits of individual sharks play a role in group selection? Are there roles or hierarchies in these groups/cliques and are they stable or do they change? What are the advantages of groups/cliques for bull sharks?

Project Management: Natasha Dominique Marosi

Cost Projection (from 2021 to 2023): approx. CHF 15,000

Expenditures 2021: CHF 5,100

Investments to date: approx. CHF 5,100

Project successfully completed

Artisanal Fisheries in Ghana

Ghana is not only one of the most important shark and ray fishing nations in West Africa, but these fisheries are also one of the biggest employers in the coastal regions. They secure the livelihood and income for many of the poorest communities on the Ghanaian coast.

The project aimed at collecting critical basic information on indigenous fisheries in Ghana, focusing on ecological, cultural and socioeconomic characteristics of such fisheries in western Ghana. Specifically analyzed were special, typical dangers for sharks in a particular region. Based on this data, which up until today has been nonexistent, a national strategy should now be developed to help sustainably protect and manage Ghana's shark and ray populations. Results of the project were published in 2022 in two scientific papers.

Project Management: Seidu Issah

Expenditures 2021: CHF -0-

Expenditures to date: approx. CHF 16,450

Short-term Projects

New 2021: Critical Regions for Sharks in Greece

Sharks are threatened worldwide, but in the Mediterranean their numbers have seen an even more dramatic decline for years due to severe overfishing. The sea around Greece is known for its rich populations of sharks and rays (67 species). This makes the region especially important for the preservation of biodiversity. The western part of the Mediterranean is relatively well studied with regard to sharks and rays, but not the eastern part. That is why the waters around Greece are particularly interesting.

The project will examine the Ambracian Gulf for possible shark nurseries. This is a partially closed shallow water area in the Ionian Sea and is home to many large marine species such as dolphins, sea turtles and at least six species of rays. However, nothing is known about the presence of any shark species there. The project team plans to study shark populations, especially the endangered and unprotected sandbank sharks (*Charcharhinus plumbeus*) in the Mediterranean. With the help of bycatch analyses, markings and so-called citizen science (e.g. the analysis of private shark photos posted online on social media), an attempt will be made to establish the long-term monitoring of shark populations there.

Project Management: Ioannis Giovos, iSea, Greece

Expenditures 2021/22: CHF 5,200

Ecological Analysis of Blue Sharks in South Cornwall (England)

Blue sharks (*Prionace glauca*) are large deep-sea sharks and top predators found worldwide in temperate and tropical waters. Like other shark species they are an important regulating factor in their marine ecosystems.

Blue sharks are either caught directly for their fins, or they perish in the bycatch of deep-sea fishing fleets. Their status on the Red List of Threatened Species is "near threatened," i.e. close to, or with a strong tendency towards "endangered." However, the lack of more current data means they might already have to be classified as "endangered."

In addition to the threat posed to blue sharks from fishing, these top predators also encounter a major problem in that they accumulate environmental toxins. High concentrations of arsenic and mercury, far above European limits, have already been measured in blue sharks. PCBs (polychlorinated biphenyls), PAHs (polycyclic aromatic hydrocarbons) and DDT (dichlorodiphenyltrichloroethane) can also accumulate in top predators, affecting their health and fertility.

2021 turned out to be another year which saw no major progress on this subject. This was partly due to the exorbitant costs of renting any ships needed for the expeditions. In addition, taking tissue samples on-board from fast moving and sinuous free swimming blue sharks proved to be a very challenging task. In 2021, the plan was to switch to taking tissue samples at fish markets or directly from blue sharks that have already been caught.

Project Management: Dr. Andrea Gaion, South Devon College

Expenditures 2021: CHF -0-

Investments to date: approx. CHF 13,200

Successfully Completed: Catch Analyses of Sixgill Sharks in the Mediterranean

Although according to the IUCN Red List, bluntnose sixgill sharks are not considered endangered in the Mediterranean, we must point out that fisheries there are poorly documented and controlled. Sixgill sharks are also frequently found in the bycatch of deep-sea fisheries (down to 2000 m). Considering the declining trends of most other shark populations in the Mediterranean (which have shrunk to 10-20% of their former size) this positive assessment seems rather unlikely and outdated.

This particular study included interviews and observations designed to identify trends in sixgill shark landings throughout the Mediterranean. It covered 11 countries: Spain, France, Italy, Greece, Libya, Algeria, Tunisia, Montenegro, Albania, Cyprus and Israel. Conducted in cooperation with local researchers and volunteers from each country, the project was coordinated by Ignazio Nuez from the EEA member organization in Spain (Submon). Not only was it of great interest for shark conservationists, but it also aimed at promoting cooperation among the various EEA members in the Mediterranean area, especially between the new EEA members Greece and Israel.

The project was completed and an initial presentation of preliminary data was presented at the IUCN Workshop in Palma de Mallorca in November 2019. A report on the project was scheduled for publication in 2022.

Project Management: Ignasi Nuez, Msc, Submon, Spain

Expenditures 2021: CHF -0-

Total expenditures: CHF 9,650

Public Relations: Shark Foundation and Shark Info

Media/Public Relations

The Foundation and Shark Info answered questions, edited articles in various media, and provided expertise and tips on the theme of sharks and shark protection.

Web-Server

The new web pages went online in April 2021, while the gradual uploading and redirecting of **hai.ch** and **shark.ch** pages lasted until the beginning of October. The number of visitors for **hai.swiss** and **shark.swiss** increased accordingly from October 2021 onwards.

During the transition phase it was unfortunately difficult to make any precise evaluations. Now we can present them as follows: From October to November 2021, **hai.swiss** recorded about 42,000 visitors who viewed around 590,000 pages, while **shark.swiss** had 22,000 visitors who viewed about 161,000 pages.

For **hai.ch** and **shark.ch** visitors and page views decreased accordingly. In 2021 a total of almost 200,000 users accessed almost 980,000 German-language pages, while 110,000 users accessed almost 400,000 English-language pages. It appears that visitors inform themselves longer on our new pages, looking at an average of 8 to 11 pages. Mobile devices accounted for the largest share on both sides. By the end of 2022, comparable data for 2020 and earlier years should be available on the new pages.

Administration

Shark Foundation Financial Policy

The Shark Foundation was established on August 29, 1997. As an internationally active foundation, it is subject to the supervision of the Federal Department of Home Affairs / Foundation Supervision, Bern, and can accept tax-deductible donations. Once a year it submits its annual report and financial statements to the supervisory authority for approval.

The Foundation finances all its activities through donations, lectures and/or the sale of products such as T-shirts or soft toy sharks. Members of the Foundation Board work on a voluntary basis and receive neither meeting fees nor a salary. The Foundation runs a Shark Online Shop on its internet pages, offering T-shirts, soft toy sharks, tear-off blocks, postcards and shark sponsorships. Proceeds from sales flow directly back into the Foundation's account. As a rule, a mailing goes out once a year to all interested parties with a payment slip and donation request.

At the first meeting of the respective year, the Board of Trustees of the Shark Foundation decides on the use of the profit carried forward and money coming from donations from the previous year. Until now, no reserves were set aside; instead all funds were released for current projects, investments and administrative expenses.

The Foundation's accounts are audited annually by the auditing company Revisal (Gossau).
