



Annual Report Shark Foundation 2019

September 2020

General

Foundation

The Covid-19 pandemic in 2020 did not spare the Shark Foundation any work. Account revisions, the annual report and hence the annual meeting of the Foundation Board had to be postponed until autumn. All field work on projects supported by the Foundation also had to be stopped. However, positive news reached us at the beginning of September that allowed us to slowly resume work on some of our projects.

Scientific research is expensive, especially with marine organisms. Thus, in addition to effective research materials, there are often costs 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 can usually only be financed by large laboratories which often have several donors. The relatively small Shark Foundation supports or participates, where appropriate, in such larger projects that are specifically aimed at shark protection. Sometimes, however, the small, relatively inexpensive projects such as the analysis of local fish markets and shark landings in poorly studied regions can be even more 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 to do our work for sharks and hence for the protection of our oceans.

We would thus like to take this opportunity to thank all donors and patrons. Without your help our work would not be possible!!

EEA Conference, Rende, Italy

Alexander Godknecht represented the Shark Foundation as Switzerland's representative at the 23rd International Scientific Conference of the European Elasmobranch Society (EEA) in Rende (Italy) from October 16 to 18, 2019.

Publications

In 2019, **five** scientific papers were published based on the results of projects supported by the Shark Foundation. Especially noteworthy is the publication of the genome of great white sharks by the team of Professor Mahmood Shivji in the PNAS (Proceedings of the National Academy of Sciences, USA).

Since 1997, a total of **77** scientific publications, three books, various conference reports and posters as well as various dissertations and theses have been supported by the Shark Foundation.

US Shark Foundation

In 2019 the US Shark Foundation was again registered as a charitable organization seated in Miami, Florida. Gary Adkison is registered as director of the US Foundation. In 2019, the US Shark Foundation was self-supporting and achieved several important successes in shark protection.

Total administrative costs to date: approx. . CHF 58,000

Prof. Samuel "Doc" Gruber

Professor Samuel Gruber, simply called "Shark Doc" by many, died on April 18, 2019, after a long illness. The world famous veteran shark researcher, motor of the Shark Lab on Bimini and good friend, leaves an unfillable gap. The Foundation has been working with Doc in various projects since 2007. We will miss his valuable input and interesting discussions.

Projects

Shark Exhibit

The exhibit has been in storage since September 2016 and we continue to look for new exhibition locations.

From April 2018 to January 2019 a large part of the shark models were rented out to the Dinosaur Museum ("Sauriermuseum") in Aathal, Switzerland, for a special exhibition entitled "Sharks of the Primeval Oceans."

Expenditures/investments to date: approx. CHF 260,000

Population genomics of large shark species

The project, led by the laboratory of Professor Mahmood Shivji, includes molecular genetic analyses of various large oceanic sharks, such as hammerheads, makos, great white sharks or whitetip sharks. The analyses will help in molecular-biological research on global genetic links between populations of especially large oceanic and other shark species.

Many shark species are heavily fished and are globally threatened. Although sharks can travel long distances, it must be assumed that they form local populations (philopatry) and that there is little genetic exchange between populations. The genetic exchange between the separated populations and thus the replenishment of the gene pool is an important factor for the survival of populations in severe decline.

In 2018/2019 Professor Shivji's team studied the populations of short-finned makos, a deep-sea shark species caught by both amateur fishermen and commercial fishing fleets. Significant decimation of the stocks is due especially to the mostly unregulated international fin trade. Macos are listed as globally endangered on the IUCN Red List.

High-resolution genetic analysis (SNP) will be used to analyze population dynamics, i.e. population structures, genetic diversity and the evolutionary history of short-finned makos throughout the Atlantic Ocean. On the basis of this information, authorities and international fisheries commissions will be able to better manage and protect the short-finned makos.

In 2019 a scientific paper on the genome of great white sharks and the reaction of makos to changing environmental factors was published as part of the research work of Professor Shivji with support from the Shark Foundation.

Investments 2019: CHF 12,200

Investments to date: approx. CHF 36,700

Global analysis of large shark migrations

Many shark species are in massive decline worldwide, mainly due to increased fishing pressure due to their meat and especially their fins. As top hunters, however, large sharks grow slowly, become sexually mature late and have few offspring. This makes them particularly sensitive to overfishing.

Hammerhead sharks, among others, are highly threatened. Fishery management authorities and organizations urgently need accurate data on population-level migration routes, preferred gathering areas, and areas of overlap with fishing zones of deep-sea fishing fleets.

Smooth hammerheads (*Sphyrna zygaena*) are globally sensitive (on the Red List: "vulnerable") and there is a risk of extinction. They migrate over larger distances, but almost nothing is known about their migration routes. This study, funded by the Shark Foundation, aims to shed light on the migrations of this shark species and help international fishery authorities to establish protection zones and time frames for this shark species.

Investments 2019: CHF 8,150

Investments to date: approx. CHF 24,400

Shark Nurseries

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

marshlands whose waters flow into these bays were drained over 20 years ago for a land reclamation project. The project failed. It was only a few years ago that the State of Florida decided to restore the original marshlands but this project was severely delayed and to date has not been completed. However, results are beginning to show. The amount of fresh water that used to be 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 the juvenile sharks.

Pat O'Donnell is employed by the State of Florida (Rookery Bay National Estuarine Research Reserve). The project works primarily with enthusiastic volunteers, thus greatly reducing costs. Pat's team collects annual data on the number and species of juvenile sharks in the various regions, thus building up an impressive databank. The Foundation continues to invest in the project as needed.

Investments 2019: CHF -0-

Investments to date: approx. CHF 61,500

Fiji Shark Sanctuary

The Fiji Shark Conservation Park project is now self-sustaining. The Foundation will assist the project financially if necessary. At the end of 2013, Mike Neumann requested continued support for the Fiji Shark Count project which aims 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 of Dalhousie University, Halifax, evaluated the data collected during the Fiji Shark Count.

Investments 2019: CHF -0-

Investments to date: approx. CHF 41,800

Migrations of large coastal sharks in Jupiter, FL, and the Bahamas

Great hammerhead sharks Jupiter/Bimini/Bahamas

Hammerhead sharks are severely overfished in many areas. In March 2014, great hammerhead sharks were listed as endangered in both Appendix II of the CITES Convention and the IUCN Red List. They migrate 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 strong cooperation among all participating countries in their management.

Hammerheads are often found in bycatch, but are also actively fished because their fins command a high market value. Regulating bycatch and demanding that hammerhead sharks be thrown back into the sea makes little sense because their mortality rate of about 90% in bycatch is the highest of all species. For this reason, the locations, seasonal space usage and behavior of this hammerhead species need to be much better known in order to protect them more effectively.

In 2019, due to the death of Professor Samuel Gruber, most work had to be temporarily suspended to allow the Shark Lab and its staff to reposition themselves. The project will resume in 2020.

Investments 2019: CHF -0-

Investments to date: approx. CHF 22,400

Whale Sharks

In 2019, the team consisting of Dr. Simon Pierce, Dr. Chris Rohner, and Dr. Clare Pebble worked on various whale shark projects in the Galapagos Islands (Ecuador), Madagascar, Mexico, Mozambique, St. Helena (United Kingdom) and Tanzania.

Work in 2019 focused on expanding knowledge of whale shark biology employing new physiological techniques. For example, on an expedition to St. Helena – as in a previous trip to the Galapagos in 2018 – an underwater ultrasound device was successfully used to analyze pregnancy in free-swimming adult whale sharks. Blood samples were also collected for various biochemical analyses in the Galapagos and St. Helena. Because of their size and docility, whale sharks are well suited for testing new methods that may later be used on other shark species. Also in 2019, a large-scale collaborative study revealed the vulnerability of sharks to fishing during their migrations.

Another study in Java clearly showed for the first time the danger to whale sharks posed by plastic debris in the sea. Whale sharks in this area swallow about 137 pieces of plastic during one hour of feeding.

The team presented the results of their various projects at the Fifth International Whale Shark Conference in Australia.

With the support of the Foundation, a scientific article (in Nature) was published in 2019 outlining the major risks to migratory shark species from international fishing outside national jurisdictions. Another article on whale sharks in Mozambique appeared in mid-2020.

Investments: No funding requested in 2019
Investments to date: approx. CHF 101,000

White sharks in the North Atlantic: Analysis of hormones and microplastics

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

The goal is to study 60 great white sharks, 20 from each three stages of life, and find answers to the following questions:

1. What are the population genetics of white sharks in the North Atlantic?
2. How do they move, how do they use their habitat and what are their diving profiles?
3. What do they eat, what are their feeding strategies and what does their diet consist of?
4. What does their reproductive cycle look like?
5. Are they healthy and what is their level of environmental toxin accumulation?
6. How does fishing and shipboard work affect their stress levels?
7. What is the composition of their microbiome (all non-disease causing organisms on and in their body)?
8. What general visual impressions do the sharks make?

The subproject leader, Michael Hyatt, is a veterinarian whose "stress through capture and examination" research on lemon, bull and hammerhead sharks in Rookery Bay has already been funded by the Foundation and published in three scientific journals. The project runs for three years and is supported with \$10,000 annually.

The project continued to progress well in 2019. Field trips made to the Carolinas/Georgia/Florida, Massachusetts and Nova Scotia, Canada were successful. An interim report with data from the trips was submitted in late 2019.

Investments 2019: CHF 10,100

Investments to date: approx. CHF 20,100

New 2019: Cape Verde Shark Conservation Project

West Africa's Cape Verde is an archipelago consisting of ten volcanic islands and is home to over 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 country in this region where sharks and rays are not intensively fished, making them a hotspot for these species and one of their last refuges in the northeast Atlantic.

However, threats to the country's shark population are increasing. Illegal and excessive fishing, pollution and climate change – not to mention a rapidly growing tourism industry in the region – are just a few examples of the increased pressure that the Cape Verde's marine ecosystems and species, including sharks, are subjected to.

There are already two nongovernmental organizations involved in the protection of the waters around the Cape Verde Islands, Fundação Maio Biodiversidade (FMB) in Maio, and Biflores in Brava. The project, whose main sponsor is Fauna & Flora International (FFI) is aimed at building up these two organizations to the point where they can take on all conservation tasks independently in the future.

Preliminary objectives in 2019 (1 year):

1. Achieve effective site-based marine management (Marine Protected Areas (MPAs), fisheries, and species-based conservation in priority areas).
2. Improve policies and practices to reduce threats of greater magnitude to species and habitats (national fishery reforms, responsible business practices).
3. Develop the capacity of local conservation organizations (FMB and Biflores) and optimize their operations to assist them in effective marine conservation.

Objectives of the main project 2020:

1. Close knowledge gaps through research and experimentation. To this end, the following activities will be carried out:

- Examine historical shark populations and their diversity in Cape Verde.
- Identify and describe shark nurseries around Brava and Maio, giving priority to these areas.
- Evaluate the feasibility and suitability of a fishing gear exchange program for fishermen in Brava and Maio (hooks, nets, etc.).
- Analyze finning activities in Cape Verde, especially among local fishermen. If needed, develop measures to end finning.
- Analyze the suitability of Brava and Maio for sustainable ecotourism, e.g. shark diving.
- Collect and analyze catch data on the frequency of juvenile fish and catch per unit effort (CPUE) to find out if sharks around Brava are being fished sustainably.

2. Targeted actions to prevent destructive activities and support positive initiatives:

- Educate fishermen in Brava and Maio about existing fishing laws and their rationale, especially as it relates to sharks.
- Address local myths that endanger sharks and encourage fishermen to return sharks caught in bycatch alive to the sea whenever possible.
- Inform local fishermen about sustainable fishing practices (to protect sharks and their prey).
- Hold interviews with fishermen on Maio regarding shark population trends and sizes, as well as bycatch to show trends since 2016.
- Organize meetings with local authorities and enforcement officers in Maio. Sport fishing companies also need to be involved. These must comply with sport fishing laws and follow best practices that are sustainable for sharks and other endangered species.

3. Local capacity building:

- Support continued capacity building at Biflores to form them into Brava's primary marine conservation organization. They are expected to take the regional leadership role in shark conservation in the future.
- Support Maio's "Guardians of the Sea" to monitor and verify project work, identify any new threats, and prevent illegal activities related to sharks and their food base in Maio's MPAs.
- Conduct courses for local fishermen, such as in boat repair and first aid. These are "good will" offerings and primarily serve to foster good cooperation with fishermen and reduce their maintenance costs. This is to ensure continued cooperation also with fishermen in the protection of sharks in Cape Verde.

For this project, the Foundation will cover partial costs for the planned scientific shark studies.

Investments 2019: CHF 10,000

Investments to date: approx. CHF 10,000

New 2019: Indigenous fisheries in Ghana

Ghana is one of the most important shark and ray fishing nations in West Africa. This fishery industry is one of the major employers in the coastal regions and provides livelihoods and income for many of the poorest communities on the Ghanaian coast. The project aims to collect critical baseline information on indigenous fisheries in Ghana, focusing on ecological, cultural, and socioeconomic characteristics of western Ghanaian fisheries. Specific threats to sharks typical of a region will be specifically analyzed. Based on this data, which has been lacking until now, a national strategy will be developed to sustainably protect and manage Ghana's shark and ray stocks.

The project duration is scheduled for 3 years. Data collection began in April 2019, and the project is an excellent complement to the short project analyzing local fisheries in Angola. The two teams are in contact and are working together.

At the beginning of the project, massive uncertainties became apparent in the complex identification of shark and ray species caught in Ghana. It takes a lot of experience to

always correctly identify certain species. However, with the help of the team from Angola and Professor em. Benard Seret (France), the identification error rate was drastically reduced.

Total investments over 3 years: CHF 18,500

Project Manager: Seidu Issah

Investments 2019: CHF 8,300

Short-Term Projects

New 2019: Illegal trade with shark products in Greece

Greek marine waters have a remarkable biodiversity of sharks and rays with 67 species (37 shark species, 30 ray species) confirmed to occur so far. Based on the latest IUCN Red List assessment, 21 of the 37 shark species found in Greek waters are considered threatened (vulnerable, endangered, critical). Sixteen shark species are protected based on national and international legislation (including the Barcelona Convention, the Bern Convention, CITES, GFCM recommendations and presidential decrees). However, no species-specific data is available because there is no specific fishery for these species and most of them are simply discarded at sea due to their low commercial value. Landed species are reported in aggregated categories. In the absence of current data on any protected species landed, there is a high risk of illegal trade in these species.

The project team visited fish markets and auctions between January and December 2019 and collected small tissue samples from the sharks sold. They also conducted interviews with fishmongers and customers and launched a media campaign.

The results of DNA analyses of 274 meat samples clearly showed that protected sharks such as blue sharks were also sold, probably unknowingly.

The interviews showed, among other things, that fishmongers sell their fish under the name on the purchase receipt. These names often only designate categories or are incorrect. Customers do not know exactly what species they are effectively buying.

The project was successfully completed in 2019 and already resulted in the publication of one scientific paper. Two more papers are in the works.

Project Manager: Ioannis Giovos, iSea Greece

Investments 2019: CHF 6,500

New 2019: Catch analyses of sixgill sharks in the Mediterranean Sea

Bluntnose sixgill sharks are not considered endangered in the Mediterranean, according to the IUCN Red List, but fisheries in the Mediterranean are poorly documented and controlled. Sixgill sharks are also frequently found in the bycatch of deep-sea fisheries (up 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 new study will involve interviews and observations to identify trends in sixgill shark landings throughout the Mediterranean and will cover 11 countries: Spain, France, Italy, Greece, Libya, Algeria, Tunisia, Montenegro, Albania, Cyprus and Israel. It will be carried out in collaboration with local researchers and volunteers from each country. The project is coordinated by Ignazio Nuez from the EEA member organization Spain (Submon). The project is not only of great interest for shark conservation but also aims to promote cooperation within the different EEA members in the Mediterranean area, especially between the new EEA members Greece and Israel.

The project is ongoing. Some preliminary data was first presented at the IUCN workshop in Palma de Mallorca in November 2019.

Project Manager: Ignasi Nuez, Msc, Submon Portugal

Investments 2019: CHF 9,650

Ecological analysis of blue sharks in South Cornwall (England)

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

Blue sharks are caught directly for their fins or 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, there is a lack of more recent data, so that 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 with the accumulation of 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.

Objectives of the project are:

- To analyze the general water quality of the southwest coast of Cornwall.
- By means of photo IDs of dorsal fins and population genetic analyses, to determine whether the region is used as a feeding ground by different blue shark populations or whether the local population is homogeneous.
- To determine the health status of the population(s) using chemical and genetic analyses.
- To educate and raise awareness among the local population and fishermen about blue sharks off the southwest coast of Cornwall.

An online photo database was created in order to reach and include a broader public in the identification of blue sharks. This databank will include photos of collected blue shark dorsal fins that will be analyzed later on.

In this project problems are still encountered with the biopsy needles since blue sharks are very fast swimmers. Unfortunately, these problems could not yet be completely solved despite cooperation with the research team from Fiji.

Unfortunately, the year 2019 saw no major progress in this project, partly because the cost of the ships used in the expeditions was too high. The project manager is looking for alternatives and will report progress in the Fall of 2020. The project received no support in 2019.

Project Manager: Dr. Andrea Gaion, South Devon College

Investments 2019: -0- CHF

Investments to date: approx. CHF 13,200

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, as the confluence of the Benguela and Angola Currents creates eddies that bring 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 in the last 10 years (source FAO, United Nations Food and Agricultural Organization). However, accurate data on specific shark fishing is not available and will be collected in the project.

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

Project Manager: Dr. Rima Jabado (Environment Agency Abu Dhabi)

Investments: approx. cCHF 9,500 over 3 years (2017-2019)

Investments 2019: 4'000 CHF

Investments to date: approx. CHF 8,700

Media/Public Relations Work

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

Web Server

In 2019, the Shark Foundation's web server recorded approximately 107,500 definite visitors who viewed 430,000 pages. The visitors stemmed mainly from Germany, Poland, Switzerland and Austria. The Shark Foundation server recorded 60,000 visits with 270,000 page views. The visitors came mainly from the USA, Poland, China and Germany. The leading category visited at Hai.ch was clearly the shark database and at shark.ch it was the home page. The trend compared to 2018 is still clearly declining, due mainly to the lack of support for mobile browsers and thus a poor ranking on Google. On hai.ch 52% of the browsers were mobile versions, while on shark.ch the number remains at 31%. It is astonishing that mobile accesses are by far more frequent in German-speaking countries than in English-speaking countries.

The Foundation's new web pages will most likely go online in the Winter of 2020. We expect the new pages to provide a much better internet presence, thanks to the optimization of Google ranking, SEO and mobile devices.

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 or the sale of products such as T-shirts or soft toy sharks. The Foundation Board works on a voluntary basis and receives neither meeting fees nor salary. The Foundation runs a "shark store" on its internet pages (for T-shirts, soft toy sharks, tear-off blocks, postcards, shark sponsorships). Proceeds from sales go 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 the money coming from donations of the previous year. Until now, no provisions have been made, but all the funds have been released for current projects, investments and administrative expenses.

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