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SHARK RESEARCH INSTITUTE

Newsletter

Shark Research Institute Global Headquarters
PO Box 40 • Princeton, NJ 08542 • USA • Phone: 609-921-3522 • www.sharks.org

Swimming with Whale Sharks: A Marine Biologist's Firsthand Experience

By Emily Olson

I had a dream that I would be able to knock off my #1 bucket list item in a very specific way. I would be snorkeling, SCUBA diving, or even just bathing somewhere out in the sea, when suddenly, unexpectedly, in the clear blue distance, a massive shape (or two) would emerge—my first ever whale shark! No tour, no guide, no chasing; just me, the sea, a little bit of nature's magic and a lot of luck. It was a nice thought, but when I found myself in La Paz, Mexico, this past April, with my friend excitedly shouting he had found a lancha to take us out into the Bahia de La Paz, I had to make the decision to keep living in that dream or reckon with reality. It really didn't take much convincing. I hopped in the boat, giddy as could be—I was finally going to see a whale shark!

Getting onto the lancha, I was unabashedly a tourist. However, I am also a marine biologist, and I can not easily take that hat off, especially when I am on or in the water. My excitement at seeing a whale shark was tempered by some ethical and ecological concerns. How aggressively would the boats pursue sharks? What constituted harassment of the animals to the tour operators? And, most worryingly, would there be evidence of interaction-based injury or behavioral change with the sharks? Just how much was tourism affecting the ecology of the species and the bay itself?

In speaking to our guide and the boat operator, I admit that I was surprised to see just how passionate these people were about the whale sharks. They weren't locals looking to make a buck off tourists; they obviously had respect for the animals, beyond the economic incentive of keeping them there. Our guide was very explicit in telling us "No le toca!" as well where to swim in relation to the shark. He was in the water with us, keeping an eye on what was going on (and obviously enjoying the experience himself). That did not prevent some people, however, from trying to interact inappropriately with the sharks—one member of our group deliberately tried to swim under a shark, but the sudden movement in and out of ts field of view caused it to violently bank and dive away from us. Though it was frustrating to watch that negative behavioral interaction and know that similar events probably happen frequently, the fact that the guide rebuked the client gave me hope for the local industry's attitude towards watching for and mitigating harassment.

I can't say that the guides and boat operators did everything to minimize the stress of the animals. With paying tourists aboard, it is understandable that they will go to lengths to give their clients what they want. We did "chase down" several individuals, including one we had already encountered that had swam away. I also cannot comment on whether local laws and regulations were followed to a T, or how

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appropriate those laws are in the context of the species' behavioral ecology. In my observations, the sharks did not evidence any stress when we jumped in the water near them, and seemed nonplussed with a group of six people flanking them. Never having seen whale sharks in any other natural context, however, I do not have a behavioral baseline to compare my experience to. Nor did the guides offer an assessment of how tourism has affected the ecology of the bay overall, and I could not comment on the apparent health of the ecosystem having never seen another mid-latitude, coastal desert climate for comparison.

One concerning observation was that injuries were pervasive. We swam with predominately juvenile sharks, and every single one had some sort of scarring or mutilation. The guides asserted that the shipping industry was the main culprit. As whale sharks are large, slow-moving, and frequently surface-dwelling animals, this is quite convincing, but it is still a depressing reminder that wild animal interactions with humans are primarily negative. However, judging by the excitement of the clients and the enthusiastic questioning of the guide for information about the sharks' biology, ecotourism remains a primarily positive and enriching experience for humans that can bolster positive attitudes towards conservation... and that benefits everyone in the end!

Am I happy that I chose to have my whale shark encounter this way? Yes! While it is still a dream to encounter one by pure chance in the wild and be able to observe it in a natural state, I walked away from this experience feeling positive overall. The local industry in La Paz appears to be invested in proper management of itself for the conservation of its unique economic resource. Academic research continues to be done on the effects of human interactions on whale sharks, and such research must continue to be incorporated into laws and regulations. It is then up to the consumer/tourist to support the companies who faithfully follow these rules and respect the animals as more than a dollar sign.

Shark Fin Sales Elimination Act of 2019

The Shark Fin Sales Elimination Act of 2019 H.R. 737) would ban the selling or buying of shark fins nationwide, with a fine of up to $100,000. (That's the maximum fine for each offense in section 307 of the magnuson Act, the law under which buying or selling shark fins would now be classified.)

The bill would still permit sharks to be caught for either subsistence purposes—for example some indigenous island populations who traditionally eat the animal—or for scientific research.

To read the text of the bill, see: ***https://www.govtrack.us/congress/bills/116/hr737/text***

"Destroying millions of sharks simply for their fins is a wasteful practice that our indigenous Chamorro and Rafaluwasch cultures in the Marianas would never have allowed," says Rep. Sabla of the of the Northern Mariana Islands, sponsor of H.R. 737 in the house. "We would have used as much of the shark as possible for food, tools, and other purposes. The strong, bipartisan support for this legislation sends a clear message that we have to pay more attention to protecting the Earth's oceans and the life within those oceans," he continued. "Banning the sale of shark fins is important, but just a small step towards giving the oceans the full respect they must have in federal law." Opponents to the bill argue the bill could raise the value of shark fins thereby creating a black market.

On November 20th, the U.S. House passed H.R. 737 by a vote of 310 to 107. The identical bill, now known as S.877, moves to the the Senate where a third of the members have signed onto it as the parallel bill.

We urge our members to contact your senators and voice your support of S.877.

https://www.senate.gov.general/contact_information/senators_cfm.cfm

NRDC Report Uncovers How the U.S. Plays a Role in the Illegal Shark Fin Trade

A recent report from the Natural Resources Defense Council confirms that the U.S. is an important transit hub for the global shark fin trade, as shark fins pass through our ports en route from source countries in Latin America to end markets in Hong Kong and beyond. Countries that ship shark fins through U.S. ports are major players in the global shark fin trade, both as shark-fishing nations, and as suppliers of fins—including the fins of protected species. Fins from protected sharks appear to be common in the shipments that transit through U.S. ports—often undeclared and commingled with the fins of non-regulated shark species. Although both U.S. and international law regulate much of the shark fin trade in order to ensure that it is legal and sustainable, *in-transit shipments* are rarely monitored or inspected.

What is needed is a coordinated, collaborative action along the entire length of the global supply chain. When shark fin shipments transit U.S. ports unmonitored, the U.S. becomes a weak link in that supply chain. But the U.S. has the resources and the strong legal framework required to shut down the illegal shark fin trade within our borders and to support international efforts to ensure the legality and sustainability of shark products in trade. And we have a global responsibility to do just that. By increasing our efforts to identify and seize illicit shark fin shipments and penalize the traffickers who are pillaging the oceans to enrich themselves, we can take advantage of a critical opportunity to help end global exploitation of sharks—rather than missing the boat.

The NJ Shark Fin Trade Bill

While federal law already bans finning in U.S. waters, our nation continues to be an end market for shark fins, with shark fin soup still appearing on the menus of some restaurants. The United States also serves as a destination for shark fins obtained on the high seas where finning is unregulated, or from countries lacking good policies or enforcement on finning. Since 2014, bills to ban the shark fin trade in New Jersey have won the required majority vote in all relevant legislative committees and the State Senate, but none made it on the docket of the NJ General Assembly.

Finally, the latest version of the bill, A4845, went to the NJ General Assembly on Monday November 25th! And it PASSED: 53 in favor, 18 against and one abstention. The time, effort, passion, of dedicated people from SRI, The Humane Society of the United States, The American Littoral Society and Jenkinson's Aquarium worked together tirelessly on this bill and scored a big one for the sharks. the sharks. We are also grateful to the sponsors and many people throughout the state who supported this bill.

Next, the bill goes to the desk of governor Phil Murphy. We will keep you updated!

Bermuda's Shark Oil Barometers

For more than 300 years, many in Bermuda have relied on shark oil for meteorological warnings. Barometers, by definition, are expected to measure changes in atmospheric pressure. Keeping track of pressure changes helps to forecast the weather for the upcoming 12 to 24 hours. High air pressure generally brings fair weather. Low, or dropping pressure, indicates the approach of windy, stormy, or wet weather.

So how to read a Bermuda shark oil barometer? Clear oil in Bermuda's barometers means fair weather. Cloudy or shifting oil means turbulent weather. One theory suggests that shifts in the atmosphere affect the oil in a live shark, which then acts as an alert for the animal to move to deeper water before a storm. The oil may retain this function when removed and the change remains visible, the oil transitioning from a clear golden color, like cooking oil, to milky white. However, little research has been done into the oil's composition and origins. Users claim that to be accurate, oil must be taken from a shark during certain conditions, such as during a full moon.

Mark Guishard, a meteorologist and former director of the Bermuda Weather Service, and college intern Shane Antonition paired up to take a look at these peculiar barometers to determine how useful they are at forecasting storms. Capturing the changing appearance of the oil enabled a comparison between the device and detailed weather data provided by the Bermuda Weather Service (including information about humidity, sea level pressure, temperature, and dew point). While they found no link between barometric pressure and Bermuda's devices. "There's no question that the oil reacts to changing weather," said Guishard. "Is there something to the patterns we see? Or is it like trying to read tea leaves?"

News from the Shark Cage (i.e. HQ)

Jordyn Vermut, our newest intern, is a Sophmore at The Lawrenceville School in New Jersey. She has always been extremely interested in the ocean and marine life, especially sharks, and plans on being a Marine Biologist. Jordyn plans to get her advanced scuba certification this winter. She knows that she will learn a lot from the Shark Research Institute and hopes that she can help as much as possible to educate people about the need to protect sharks.

Mike Tichenor attended DEMA where he met with several of our Advisory Board members and sponsors.

Director **Len Compagno** is working on a new book.

Trustees **David Doubilet** and **Jennifer Hayes** are leading a National Geographic expedition, and **Jupp Kerckerinck** has been giving more presentations on sharks on German television.

Dr. Jennifer Schmidt is on her way to Djibouti to study and catalog whale sharks and **Taylor Neisen** is working in Sierra Leone.

Advisory Board member **Amos Nachoum** is traveling throughout the USA, appearing at premieres of *Picture of His Life,* the documentary film describing his work. The film, *The Shame of Point Reyes*, by **Skyler Thomas** won at the World's Independent Film Festival in San Francisco, California.

Ralph Collier spent the last week diving and photographing white sharks at Guadalupe Island. **Charlie Fasano** will be working in Thailand from December through April and has set up three new expeditions to catalog tiger sharks in Hawaii. **Elise Levin** is re-locating from New York to Hawaii.

Carolyn Nickels has been kept extra busy setting up our Holiday Auctions. **Rich Miller** continues to tweak our new website and has created a new PowerPoint for SRI presentations. **Chris Hebel** is fine-tuning our Social Media, and our editor **Gail Noren** has been working overtime proofing new SRI publications.

Heather Cifuentes, already arranging next spring's field events is busy getting ready for her new baby in January. Local volunteers are working wherever needed and have sent out a slew of shark adoptions—great gifts for the holidays!

Dean Fessler continues to give numerous presentations throughout the tri-state area, including one for the *entire* Princeton High School. On Saturday November 23th Dean and SRI staff participated in the ***Mermaid Shellebration*** at Jenkinson's Aquarium.

Kid's Corner: You Think Santa Doesn't Exist? HA!

By Gail Noren

Have you started your letter to the jolly old man who favors red suits? ***What?*** You've analyzed the facts and concluded that one very old, out-of-shape person cannot *possibly* deliver presents to everyone on the Good Kids List? Keep reading! *Some* things even *science* can't explain.

I know. Around the whole world in one night seems crazy. But could a colossal crew pull it off? A giant group of old, young, fat, thin, jolly, dull, men, women, elves, and all sorts of people in between, **all working together**: could *they* do it? Maybe your parents or teachers secretly work for Santa. Maybe even your dentist! After all, an awful lot of letters sent to Santa *do* get results.

As far back as I recall, presents have been popping up beside fireplaces, beneath Christmas trees, in stockings, even in wooden shoes! In fact, only magic can explain what happened the year my two children tried to catch Santa Claus. The poor old man (elf, helper, SRI scientist, or whoever) might have been killed. Or seriously injured. I'm not joking; the search for truth can be a dangerous pursuit.

We were living in Sweden, which is close to the North Pole. My mischievous kids rigged trip wires! Trip wires to release buckets of Legos and marbles. Legos and marbles to clatter upon hard floors, creating a racket! A racket to alert them of Santa's arrival. Hunter and Hillary set their traps, dragged out sleeping bags, camped under the tree, and lay in wait. Clutching flashlights and cameras, they pretended to sleep.

Why? Good question. They had a question they hoped to answer. Having researched Santa for years, they had formed an opinion: *There is no Santa Claus!* (Even though, year after year: presents!) They decided to prove or disprove their hypothesis once and for all. Poor Santa blundered into every trap! Thundering crashes woke my husband. "Reindeer on the roof," he said, falling back to sleep! The kids slept through it all. Luckily, no one had to pee in the night; the floor was a minefield. Despite our dangerously booby-trapped house, Santa managed to stuff the stockings. He left gifts on the roof and wedged between the front doors. Considering all the marbles skidding about, it's a miracle we didn't find any injured elves.

Don't do anything so foolish, and don't take any chances; write your letter to Santa! You have enough toys, games, clothes, and books, right? Okay, maybe not books. We can never have too many books! Don't make a long list. Santa likes to surprise you. Can you think of one thing you truly want and let that be enough? That's what I did. This isn't school, so go ahead and copy my letter if you want:

Dear Santa,

What I want most is a whale shark of my very own from the Shark Research Institute. You probably know the amazing SRI volunteers who travel the world doing good deeds. They specialize in delivering scientific facts to people who struggle to do what's right. Because selfish people act in ways that only serve themselves and people who can't help being stupid are constantly harming sharks, SRI's work is never done.

I've been pretty good. To help the earth, I pick up trash on my walks. I'm grateful for what I have. I remind myself to appreciate the beauty and wonders of the world while trying to figure out the other stuff. So, about that shark! If you adopt a shark for me, which I think you can afford, it will make me happy ***and*** *you'll be supporting the SRI scientists who're busy trying to educate the people on your Naughty List. And that will make sharks very happy!*

With love,
Gail Noren

p.s. Just mail the adoption packet; you never know what my kids might be up to!

Asking Questions, Collecting Facts, and Making Progress, Step by Step

The Scientific Method is a series of steps used by scientists to explore a question and maybe find an answer. The scientific method acts as a guideline. It aims to prevent false results. The scientific method was first described in the 17th century. Using it helps scientists make more accurate conclusions and can lead to important discoveries. If you have a question you would like to explore, you can do so with the six steps below. Using the scientific method, you can practice being a scientist!

1) ***Ask a question:*** The first step is finding a problem or question that can be tested.

2) ***Do your research:*** Gathering information is an important step that can save you a lot of time. Many people are curious, like you. It's possible someone has already thought about your question and even answered it! You can sometimes answer your question in this step. Researching not only saves you time and effort; a great benefit of research is that it also gives you a better understanding of the subject.

3) ***Construct a hypothesis:*** After you have identified a problem or question and made sure no one else has answered it, you are ready for the third step. Based on your research of the subject, make a prediction, or hypothesis. In other words, guess the answer. Because of your research, your hypothesis will be an *educated* guess.

4) ***Experiment:*** In this step you design and conduct an experiment to test your hypothesis. Make a list of materials you need. It's important for scientists to keep careful notes. Write down your method or procedure in case someone else wants to try your experiment. Scientists must be careful watchers! Write down everything you observe.

5) ***Analyze your results:*** After performing your experiment, collect the facts. Study what you learned and write about it. Sometimes scientists put their facts in charts or graphs. Does your experiment prove or disprove your hypothesis? Do the results surprise you?

6) ***Share your conclusions:*** Now that you have done all the work and answered your question, share what you found with others. Your conclusions will help other people who have the same question. Sharing saves other scientists the trouble of going through the whole process. They can build on your conclusions or explore another problem.

The scientific method enables us to increase our understanding of the world. Science progresses in a series of small steps. Now that you know what the steps are, you can see it's not too difficult. Anyone can use the scientific method. Science mainly requires you to be curious. It always starts with a question!

Hunter Noren
Research Assistant II
Halmos College of Natural Sciences and Oceanography
Nova Southeastern University

Upcoming Events

November 26 to December 13, 2019: Shark Research Winter Auctions.
Bid on some truly wonderful and exotic destinations and more in our auction at:
Charity Buzz: ***https://www.charitybuzz.com/support/2509***
And/or bid on other dive trips, art, books and dive gear in our auction on
Bidding for Good at: ***https://www.biddingforgood.com/Shark***
or for Mobile bidding at: ***https://bforg.com/Shark***

The links into both auctions are also on our website.

December 3, 2019: Giving Tuesday, the global day for donating to non-profit causes.

January 8-10, 2020: Surf Expo. Venue: Orange County Convention Center, N/S Concourse, Orlando, Florida. This is largest watersports and beach/resort tradeshow with 1,000 exhibitors, 9,500 store fronts and 28,600+ attendees. ***Surfexpo.com***

February 15-22, 2020: Convention of Migratory Species (CMS) CoP13. Venue: Gandhinagar, Gujjarat, India. ***https://www.cms.int/en/upcoming-events***

February 29 - March 1, 2020: Our World Underwater. Venue: Chicago Mariott O'Hare, 8535 W Higgins Rd, Chicago, IL 60631 ***Ourworldunderwater.com***

March 7-8, 2020: Boston Sea Rovers. Venue: DoubleTree by Hilton Boston North Shore, 50 Ferncroft Road, Danvers, Massachusetts 01923. The event showcases dive equipment and travel. ***Bostonsearovers.com***

March 7-22, 2020: SRI Annual Book Sale. Special thanks to Mike Stewart, Marie Levine and Dean Fessler who contributed many boxes of books from their personal libraries.

March 27-29, 2020: Venue: Beneath the Sea. Venue: The Meadowlands, Secaucus, New Jersey. America's largest consumer Scuba and Dive Travel Show. ***Beneaththesea.org***

April 17–19, 2020: ADEX Singapore. Venue: Suntec Convention & Exhibition Centre Singapore Halls 401 – 40. Celebrated for more than two decades in Asia since its inception in 1995, this is the largest and the longest-running dive show in Asia. ***https://www.adex.asia/2020/***

April through September: Fossil Shark Tooth Hunts. Check our website for dates and locations.

May 27-31, 2020: Seventh Annual North Carolina Wreck•Shark Shootout, hosted by Mike Gerken at Olympus Dive Center, Morehead City, NC. ***http://www.evolutionunderwater.com/***

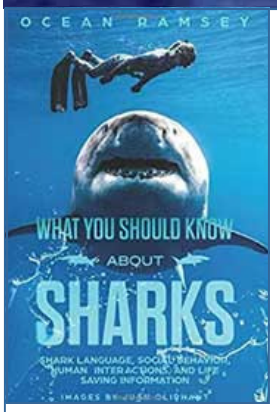
May 30-31, 2020: Scuba Show. Venue: Long Beach Convention Center, Long Beach, California. ***scubashow.com***

June 18-20, 2020: Annual Meeting of the Undersea & Medical Society Meeting. Venue: Sheraton San Diego & Marina, San Diego, California. ***https://www.uhms.org/meetings/annual-scientific-meeting/uhms-annual-scientific-meeting-information.html***

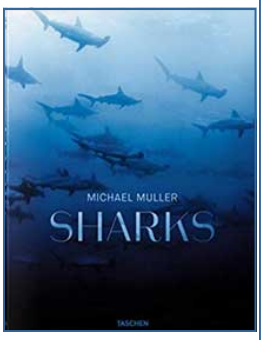
July 20–26, 2020: American Elasmobranch Society Meeting. *(Date subject to change)* Venue: Norfolk, Virginia.

Although the 2019 Djibouti Expeditions are full, there are spaces available on the 2020 expeditions. To reserve your space, contact: ***Jennifer@sharks.org***

Books and Films



Book: **What You Should Know About Sharks: Shark Language, Social Behavior, Human Interactions and Life Saving Information,** *by Ocean Ramsey and Juan Oliphant.* Paperback. $39.95 from Amazon.com
This is a full color version of the highly-acclaimed bestselling book released earlier in 2019.



Book: **Sharks** *by Philippe Cousteau, Jr., Dr. Alison Kock, Arty Nelson & Michael Muller (Photographer)* Available in two formats from AmazonSmile.com.
This collection of Muller's images features a photograph of a great white breaching at night. Arranged geographically, it follows Muller's ocean adventures from blacktip and sandtiger sharks in South Africa to great hammerheads in the Bahamas, with narratives documenting the challenges and near-misses along the way.

To compliment Muller's work, the images are contextualized with essays from Philippe Cousteau, Jr. and marine biologist Alison Kock, who discuss exploration and conservation of our oceanic kingdom. Culture writer Arty Nelson contributes an overview of Muller's work, while a technical section explains the precise equipment behind these spectacular shots. These texts and awesome images offer a record of breathtaking photographic feats, a tribute to the beauty and might of the shark, and a rallying cry for its fragile future. This book is also available in a signed Collector's Edition and two Art Editions, each including a signed and numbered print.

Film: **Picture of His Life.** Amos Nachoum, the world's finest wildlife photographer, is gearing up for the most challenging expedition of his career: photographing a polar bear in his natural habitat, underwater in the Canadian Arctic. The polar bear is the only animal in which humans are its natural prey.

Nachoum has long been fascinated by the spectacular beauty of nature and its most striking creatures. Having communed with sharks, killer whales, crocodiles, and the like, he captures photographs that have been featured in the world's leading nature magazines. His expeditions have also received widespread acclaim for dispelling the myth of dangerous wildlife and demonstrate the joy of harmonious interactions between man and animal. Approaching his subjects with utmost respect and admiration has enabled Nachoum to achieve a rare level of intimacy in his imagery, allowing the full splendor of these animals to shine through.

In this fascinating portrait of a man dedicated to his photographic dream, filmmakers Dani Menkin and Yonatan Nir, with the support of producer Nancy Spielberg (sister of Steven Spielberg, director of JAWS), follow Nachoum on his quest to get the picture of his life, an undertaking deemed extraordinarily daring by even the photographer himself. As the journey unfolds, we learn of the infinite patience, preparation, and sacrifice that goes into the making of his work and the passion that drives this self-professed soldier of Mother Nature in his perilous quest for redemption and inner peace.

The film is now premiering throughout the USA.

TIGER SHARK IDENTIFICATION EXPEDITIONS

Join a Shark Research Institute expedition in Hawaii to assist with research on tiger sharks

Charlie Fasano, Expedition Leader

Multiple dates during September 2020

Three expeditions will be led by Charlie Fasano, SRI Regional Director-Hawaii. Citizen scientists participate in cataloging individual tiger sharks. The objective is to determine tiger sharks' annual use of the area. The project will also increase the biological information available to guide conservation efforts for this species, on both a regional (Hawaiian) and global scale, with important data such as life history, species distribution, abundance and diversity, population productivity, and extinction risk. This information will then be used to inform international conservation forums such as CITES, as well as local fishery risk assessment and management plans. An education and awareness campaign on the status of Hawaii tiger sharks will be conducted in conjunction with the survey to increase awareness of the habitat use of the species.

Location
Kailua Kona, Hawaii

Cost
Expedition Alpha: Sept 9 -14 (6 resort days, 5 nights, 9 dives) $3250 double; $3950 single occupancy.
Expedition Bravo: Sept 16 - 21 (6-days) $3250 double; $3950 single occupancy.
Expedition Charlie: Sept 23 - 28 (6-days) $3250 double; $3950 single occupancy.
Kama'aina (For local residents who do not need accommodations): $1100 (3-dive days, 3-dives-per-day). Kama'aina expedition members are still afforded all presentations.

Included
Accommodations at King Kamehameha Kona Beach Hotel Courtyard Marriott, Kailua Kona, HI (garden room; upgrades available). All passengers embark and disembark at the hotel pier. The expedition includes daily boat dives to catalog resident tiger sharks of Big Island, Hawaii. Tiger sharks and dolphins will be viewable. Nitrox is available and required.

Not included
Airfare To Kailua Kona (KOA), Hawaii. Manta Ray and tethered Blackwater night dives are available at an additional cost. Alcohol and meals, Gratuity, Dive gear (available for rental), Concierge activity services. **NOTE:** Dive insurance and travel insurance are required.

A $500 deposit is due to reserve your space. Balance due 60 days prior to departure, 50% of the deposit will be returned if canceled before 60 days prior to departure.

For additional information or to reserve your space, contact: Charlie@sharks.org

DJIBOUTI WHALE SHARK EXPEDITIONS

Join a Shark Research Institute expedition to assist with research on this fascinating population of the world's largest shark

November 27 to December 5, 2020 or December 4 to 12, 2020

Join an expedition led by SRI Director of Science and Research, Dr. Jennifer, study the whale sharks that aggregate in the Gulf of Tadjoura, Djibouti, Africa. Djibouti hosts an aggregation of the youngest whale sharks found anywhere. Most sharks are between three and five metres with two metre animals occasionally seen. Participants will act as research assistants, documenting whale sharks by photo identification, collecting and analyzing plankton samples and hopefully observing night-feeding behavior. Research goals are to understand where these animals come from, why young sharks congregate in the area, and where they go when they leave.

Our home for this liveaboard expedition is the *M/V Deli*, a Turkish gulet that accommodates 12 people in shared rooms with private baths. The chef prepares a daily menu of local and continental cuisine. Whale shark interactions are snorkel only, but excellent diving is available from the boat at sites such as Ras Korali, Turtle Point, Moucha Island and La Faille, a convergence of tectonic plates. Whale shark interactions and diving are available each day, and participants may choose any combination of activities.

Cost: $2,300* includes shared accommodation on the boat, double occupancy hotel for the nights of November 28th and December 4th or December 5th and 11th, all meals on the ship, hotel and port transfers, and a tax-deductible donation to the Shark Research Institute. Not included are airfare, Djibouti visa, soda and beer, and meals off the ship. Post-trip excursions are available to explore the geologic formations and vast salt lakes of the East African rift valley.

The site is remote, and accommodations basic, but the experience is unmatched. Share this unique wildlife expedition to a stark and beautiful corner of the world.

For more details or to reserve your space, contact the expedition leader at ***Jennifer@sharks.org***

*Payments made through PayPal will incur an additional $50 per person processing fee.

Shark Shop

Support SRI and show you care about sharks by wearing a t-shirt, tank top, long-sleeve shirt, v-neck or hoodie. Sizes range from youth to adult XL. Check out the variety of colors and styles! More designs will be added every few months.

Shipping dates vary depending on when orders are placed, but shirts usually arrive within three weeks.

Order an Infinity Sharks shirt: ***https://www.bonfire.com/shark-research-institute***
Save Our Sharks: ***https://www.bonfire.com/shark-research-institute-Save***

Aware that some municipalities still permit shark fishing from swimming and surfing beaches, putting people at needless risk, SRI member Jerry Taggart designed a series of **Warning Flags** to alert marine resource users when these hazards are present. The flags may soon be appearing in Florida and New Zealand. For more information about how your local officials can order the flags, email: ***tagchum@gmail.com***

For a unique Holiday gift, consider our **Adopt a Whale Shark** program. Although our researchers have cataloged hundreds of whale sharks, only sharks that have been seen within the past year are put up for adoption. Guardians are notified as sharks are re-sighted. Annual Adoptions are $50. Lifetime Adoptions never need to be renewed and are $150. All adoptions include an adoption certificate, fact sheet on whale sharks and a photo of your shark. ***https://www.sharks.org/support/whale-shark-adoption.***

Our **Café Press** store is open. Show your love of sharks and support of the Shark Research Institute with our cool new logo gear: mugs, glasses, smartphone cases, hats, toys, clothing, blankets, pillows, and much more. Shop now at: **https://www.cafepress.com/SharkResearchInstitute**

And please remember you can support SRI every time you shop at ***Amazon.com***. Just go to **smile@amazon.com** and choose **"Shark Research Institute"** as your favorite charity. Amazon makes a donation to SRI that costs you nothing!

A Basking Shark's Trans-Ocean Journey

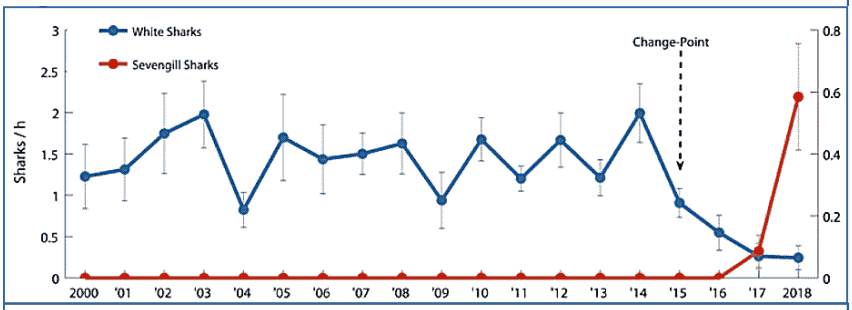
Johnston EM, Mayo PA, Mensink PJ, Savetsky E and Houghton JDR (2019). **Serendipitous re-sighting of a basking shark *Cetorhinus maximus* reveals inter-annual connectivity between American and European coastal hotspots.** *Journal of Fish Biology.* **DOI: 10.1111/jfb.14163**

Transatlantic stock mixing in basking sharks *Cetorhinus maximus* is supported by low genetic diversity in populations throughout the Atlantic Ocean. However, despite significant focus on the species' movements, >1500 individual sharks marked for recapture, and >150 individuals equipped with remote tracking tags, only a single record of transatlantic movment has been previously recorded. Within this context, the serendipitous re-sighting of a female basking shark fitted with a satellite transmitter at Malin Head, Ireland 993 days later at Cape Cod, USA is noteworthy.

Changes in an Ocean Ecosystem following decline of an apex predator

Hammerschlag N, William L, Fallows M and Fallows C (2019). **Disappearance of white sharks leads to the novel emergence of an allopatric apex predator, the sevengill shark.** *Scientific Reports*, Vol. 9, No. 1908. **doi:10.1038/s41598-018-37576-6**

Despite global declines of apex predatory sharks, evidence for ecosystem consequences remains limited and debated. This is likely a result of both the logistical difficulties of measuring such processes in marine systems and also due to shifting baselines, whereby the ecosystem changes have occurred prior to monitoring. Between 2000–2018, we conducted standardized monitoring of white shark (*Carcharodon carcharias*) abundance patterns (N = 6,333 shark sightings) and predatory activity (N = 8,076 attacks on seals) at Seal Island, a cape fur seal (*Arctocephalus pusillus pusillus)* colony in False Bay, South Africa. Over the 18-year study, declines in white shark abundance and attack rates were documented between 2015–2018, with anomalous lows occurring in 2017 and 2018. This included prolonged periods of complete white shark absence from Seal Island. The disappearance of white sharks from Seal Island coincided with the unprecedented appearance of sevengill sharks (*Notorynchus cepedianus*; N = 120 sightings), an otherwise allopatric kelp-associated apex predator in False Bay. We also recorded a sevengill shark attacking a live seal in the absence of white sharks. These data provide empirical evidence for behavioral shifts in an allopatric marine predator following the decline and disappearance of white sharks from a foraging site. This study demonstrates the importance of historical data and long-term monitoring for disentangling ecological consequences of apex predator declines.



Annual white shark and sevengill shark relative abundance over 18 years of monitoring at Seal Island in False Bay, South Africa. Data are mean ± standard error of white shark sightings per hour (left y-axis) and sevengill shark

Yo-Yo Movements of Basking Sharks

Doherty PD, Baxter JM, Godley BJ, Graham RT, Hall G, Hall J, Hawkes LA, Henderson SM, Johnson L, Speedie C, and Witt MJ (2019). **Seasonal changes in basking shark vertical space use in the north-east Atlantic**. *Mar Biol* (2019). 166: 129.
https://doi.org/10.1007/s00227-019-3565-6

Mobile marine species can exhibit vast movements both horizontally and vertically. Spatial analysis of vertical movements may help improve an understanding of the processes that influence space use. Previously, vertical space use of basking sharks (*Cetorhinus maximus*) in the north-east Atlantic described movements largely within waters of the continental shelf during summer and autumn months, with few records of detailed vertical behaviour during winter. We use archival satellite telemetry data from 32 basking sharks (12 females, 6 males, and 14 of unknown sex measuring 4–5 m ($n = 6$), 5–6 m ($n = 10$), 6–7 m ($n = 7$), 7–8 m ($n = 8$), and 8–9 m ($n = 1$) estimated total length) tracked over four years (2012–2015). The satellite tags provided depth and temperature data for a cumulative 4489 days (mean 140 ± 97 days per shark, range 10–292 days) to describe vertical space use and thermal range of basking sharks in the north-east Atlantic. **Basking sharks exhibit seasonality in vertical space use, revealing repeated 'yo-yo' movement behaviour with periods of occupancy at depths greater than 1000 m in late winter/early spring.** Describing seasonal vertical space use in marine megavertebrates can increase knowledge of movements throughout their environment including physiological and morphological constraints to movement, nutrient transfer, and overlap with anthropogenic threats to inform future conservation strategies.

Blacktip Sharks at SC Fishing Piers

Witt MJ, Martin KL, Abel DC, Crane D, Hammerschlag N, Burge EJ (2019). **Blacktip shark, *Carcharhinus limbatus,* presence at fishing piers in South Carolina; fidelity and environmental drivers.** *Journal of Fish Biology*.
https://onlinelibrary.wiley.com/doi/abs/doi.org/10.1111/jfb.13917

We tagged 12 *Carcharhinus limbatus* with acoustic transmitters and monitored their presence at five piers along the north - east coast of South Carolina, USA in 2016 and four piers in 2017 using acoustic receivers. Data were analysed with pier association indices (PAI), mixed models and fast Fourier transformation analyses to identify potential factors related to residence time and presence at piers and any cyclical patterns in visits to piers. While the majority of monitored *C. limbatus* were infrequently detected at piers, three (25.0%) were highly associated with piers (PAI ≥ 0.50). Of the *C. limbatus* that were detected after initial capture, three (25.0%) recorded detection events only at the pier where they were tagged and two individuals (16.7%) recorded at least one detection event at all monitored piers. The best-fit model explaining *C. limbatus* residence time at piers included terms for pier location and diel cycle ($w_i = 0.88$), whereas the best fit model explaining presence–absence of *C. limbatus* at piers included terms for tidal height, diel cycle, barometric pressure and angler count ($w_i = 0.98$). *Carcharhinus limbatus* did not appear to display cyclical patterns in their visits to piers. Along the northeast coast of South Carolina, association of *C. limbatus* with piers is a phenomenon for a proportion of mature individuals, but continued research is necessary to understand if this behaviour is driven by attraction to and feeding on angler discards or increased foraging opportunities resulting from the attraction of potential prey to the physical structure provided by piers.

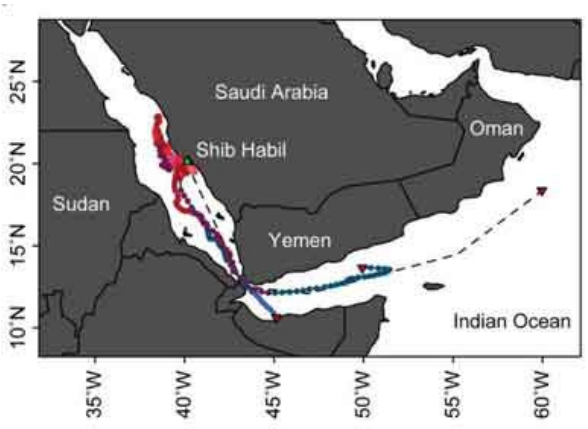
Heavy Metals in White Sharks

Merly L, Lange L, Meÿer M, Hewitt AM, Koen P, Fischer C, Muller J, Schilack V, Wentzel M, Hammerschlag N (2019). **Blood plasma levels of heavy metals and trace elements in white sharks *(Carcharodon carcharias)* and potential health consequences.** *Marine Pollution Bulletin;* 142: 85-92. ***https://doi.org/10.1016/j.marpolbul.2019/03/018***

Heavy metals may adversely affect health in marine organisms. As top predators, sharks may be especially vulnerable to exposure over long lifespans. Here we evaluate plasma levels of 14 heavy metals and 12 trace elements in white sharks, *Carcharodon carcharias*, in South Africa to determine whether they are related to sex, body size, and/or body condition and other health parameters. High levels of mercury and arsenic were found in shark blood at levels considered toxic in other vertebrates. Heavy metal concentrations were not related to body size or sex. Metal concentrations were not related to body condition with exception of copper, which was positively correlated. Protective effects of elements such as selenium, zinc, and iron were not detected. No negative effects on health parameters, such as total leukocytes or grranulocyte to lymphocyte ratios were observed. Results suggest that sharks may have protective mechanisms that mitigate harmful effects of heavy metal exposure, providing new opportunities for future studies.

Whale Sharks in the Red Sea

Cochran JEM, Braun CD, Cagua EF, Campbell MR Jr, Hardensteine RS, Kattan A, Priest MA, Sinclair-Taylor TH, Skomal GB, Sultan S, Sun L, Thorrold SR, Berumen ML (2019). **Multi-method assessment of whale shark *(Rhincodon typus)* residency, distribution, and dispersal behavior at an aggregation site in the Red Sea.** PLoS One. 2019. Sep 9:14(9):e0222285. ***doi: 10.1371/journal.pone.0222285. eCollection 2019.***



Whale sharks (*Rhincodon typus*) are typically dispersed throughout their circumtropical range, but the species is also known to aggregate in specific coastal areas. Accurate site descriptions associated with these aggregations are essential for the conservation of *R. typus*, an Endangered species. Although aggregations have become valuable hubs for research, most site descriptions rely heavily on sightings data. In the present study, visual census, passive acoustic monitoring, and long range satellite telemetry were combined to track the movements of *R. typus* from Shib Habil, a reef-associated aggregation site in the Red Sea. An array of 63 receiver stations was used to record the presence of 84 acoustically tagged sharks (35 females, 37 males, 12 undetermined) from April 2010 to May 2016. Over the same period, identification photos were taken for 76 of these tagged individuals and 38 were fitted with satellite transmitters. In total of 37,461 acoustic detections, 210 visual encounters, and 33 satellite tracks were analyzed to describe the sharks' movement ecology. The results demonstrate that the aggregation is seasonal, mostly concentrated on the exposed side of Shib Habil, and seems to attract sharks of both sexes in roughly equal numbers. The combined methodologies also tracked 15 interannual homing-migrations, demonstrating that many sharks leave the area before returning in later years. When compared to acoustic studies from other aggregations, these results demonstrate that *R. typus* exhibits diverse, site-specific ecologies across its range. Sightings-independent data from acoustic telemetry and other sources are an effective means of validating more common visual surveys.

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