

Summer 2019

SHARK RESEARCH INSTITUTE

Newsletter

Shark Research Institute Global Headquarters
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Frustrating Times

by Hunter Noren

Have you noticed fewer bees buzzing around your yard, fewer insect streaks on your windshield after driving on the highway, or fewer fish swimming at your local beach? Such declines happen gradually and may not be immediately obvious. However, a large number of scientists say we are at the brink of a sixth global mass extinction, one caused by humans. As we continue to alter, pollute, and destroy the natural environment, we are accelerating toward our own extinction.



The UN report shows that almost 33% of reef forming corals, sharks and shark relatives, and more than 33% of marine mammals are threatened with extinction. SRI is working hard to protect marine life, including tracking where sharks migrate and then using that data to secure or strengthen protective legislation.

The news out of Paris last month was not good. The UN Global Assessment Report on Biodiversity and Ecosystem Services is bleak. Compiled by 145 experts from 50 countries with input from an additional 310 contributors, the authors reviewed about 15,000 scientific and government sources and also considered knowledge from indigenous peoples and local communities. In the “Summary for Policy Makers,” co-chair Sandra Díaz writes, “The evidence is crystal clear: Nature is in trouble. Therefore we are in trouble.”

The UN report warns that about one million species are in danger of extinction in the near future. For many of these animal and plant species, we are talking decades. We are talking about a scale of decimation never seen before in human history. We are destroying natural environments and weakening junctions in food webs by overharvesting, which can lead to full collapse. Extinctions remove links from food chains which can lead to further destabilization and loss of biomass. The message is not hard to understand. Elementary school students study the interdependence of life. They learn that almost all animal food can be traced back to plants, making it obvious that it is important to preserve both flora and fauna.

Many of the important species that sustain life as we know it are not featured in the news like larger species such as sharks are, but their disappearance will be felt. Terrestrial and marine species are at risk. In the marine environment, sharks have become one of the poster children for unsustainable harvesting and overfishing. There are countless images of sharks being caught only to be thrown back, sometimes still living, after having their fins harvested. This barbaric practice is destroying the food web from the top. Unfortunately, we are also destroying the food web from the bottom by destroying the environments that the food webs are built upon. We are burning the candle at both ends.

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While it may seem futile, there has been some progress in trying to save endangered species. Organizations like CITES (Convention on International Trade in Endangered Species) try to regulate and protect the most vulnerable species or any part of those species. While working on my MS, I collected coral fragments and gametes for genetic analysis. In order to transport them home from a tiny island on the Mesoamerican reef, we had to fill out CITES forms,

Continued on page 2

travel to the capital of Belize to pick them up in person and then keep the paperwork with the samples. While it took considerable time, and an extra flight to get the permits, it was worth knowing that these species were being protected. Currently, CITES covers approximately 5,800 animal species and 30,000 plant species. However, with the present and predicted declines, that number will surely grow exponentially.

We need to change both personally and as a society. While we can make personal decisions daily to help the environment, many aspects are simply out of our hands. Even children understand that the extinction of one species in a food web jeopardizes other life forms. It's beyond frustrating to live in a place and time when science taught in elementary schools is scoffed at or rejected by our elected "leaders." We need to elect policy-makers who will take the best information and research available and use it to enact policy that will benefit nature and man, not man alone at the expense of nature.

To read more about the UN report, go to:

<https://www.un.org/sustainabledevelopment/blog/2019/05/nature-decline-unprecedented-report/>

YIKES! Can you help our tireless scientists working on behalf of endangered species?

As if there is no end to the onslaught of troubling news for our planet, the terrorist bombings in April resulted in the cancellation of the 2019 CITES CoP (Conference of Parties) that was scheduled to be held in Sri Lanka from May 23rd to June 3rd. While some foundations will provide grants for conferences, none will do so for CITES because the outcome is uncertain although for the past 14 years we have succeeded in securing protection for sharks at all but one CITES CoP. As a result, SRI's three representatives to CITES had already paid thousands of dollars each out of their own pockets for flights, despite "flight insurance" (flight insurance doesn't cover cancellations due to terrorist attacks).

We want to share news, stories, pictures, opinions, updates, opportunities, and contests. We want to notify you of events where you can get involved, be entertained, or protest and make your voice heard. We want you on our team. It's not always easy having our fins out for donations but donations support what we do, from tagging sharks and compiling research, to educating and lobbying lawmakers.

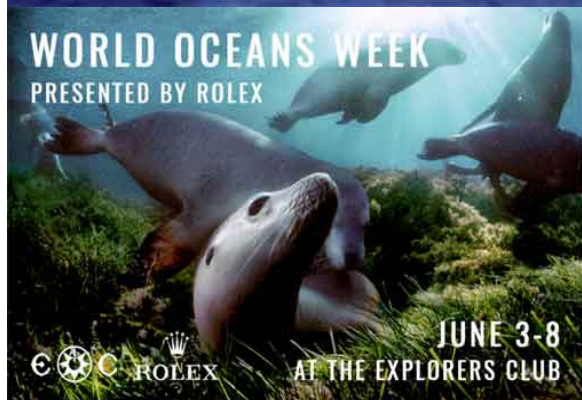
We don't enjoy e-panhandling all the time. But when we consider the alternative—turning our backs on sharks that can't speak for themselves—we overcome our shyness and ask for help. On top of the outrage of the ISIS bombings, and the postponement of this year's CITES gathering, are the aforementioned financial losses. If you are in a position to donate funds earmarked for CITES participation—or airline miles—our scientists will be able to attend the rescheduled conference without having to incur another huge personal outlay. All donations will be graciously accepted and greatly appreciated. Our supporters are the best. You reach into your wallets over and over to show us your love for sharks and the work we do.



WIN THE PRINT
Bring the Marine Herbivores into Your Own Home!

To kickoff our CITES fundraising efforts, Hunter donated a 16"x20" matted print which ties into his Kids' Corner article. Perhaps your child would cherish this print after reading about marine herbivores on page 8. Captured by underwater photographer Chris Gug, this enchanting image shimmers with iridescence. If you would like to go to bed and wake up to "Tender Moment" on your wall, donate to SRI to offset the next CITES meeting. Each \$50 donation gives you a chance to win the print. The winner will be announced in the next newsletter. It's the perfect picture to bring tranquility to living room, nursery, or budding marine biologist's bedroom!

Oceans Week



As we go to press we celebrate World Oceans Week, a global week of ocean celebration and collaboration for a better future. In 2008, the United Nations General Assembly designated June 8th as World Ocean Day but now we celebrate the Ocean for the entire week. In New York, there is the United Nations Oceans Conference, events at the New York Aquarium, culminating with a March for the Ocean on June 8th. From June 3rd to the 8th, The Explorers Club in New York features exhibits, documentary films and presentations by scientists, legendary underwater photographers, and conservationists.

On Tuesday June 4th at the Explorers Club, Dr. Howard Rosenbaum of the Ocean Giants Program describes the return of whales (humpbacks, blue, and northern right whales) in local New York waters, and even into the harbor, how eDNA is revealing much about their lives, and the havoc noise pollution wreaks on their health.

Fabian Cousteau, Aquanaut, Ocean Conservationist, Documentary filmmaker and grandson of Jacques Cousteau describes his experiences living in an underwater habitat. He also observed: "Without the ocean, we are nothing but a lifeless brown rock in space. Every breath you take today and for the rest of your life is due to the phytoplankton in the ocean. We need to stop treating the ocean like a trash can. What we are doing to the ocean is what we are doing to ourselves."



Fabian Cousteau

SRI Trustees David Doubilet and Dr. Jen Hayes never fail to inspire their audience. David has contributed to more than 70 articles to *National Geographic* magazine. The couple has logged thousands of hours underwater. This month's magazine features their stunning images of the Sargasso Sea, the marine life that lives below and within it, and what happens when the huge rafts wash ashore. David and Jennifer's assignments have taken them from the Arctic to the Antarctic, and they have documented the effects of climate change. While there is gloom and doom in some areas, they highlight some positive changes, how they were achieved and the ways to get those stories out to inform and involve the public.



The Fifth International Whale Shark Conference

by Jennifer Schmdt, Ph.D. SRI Director of Science and Research

The global whale shark research community meets every three years to discuss current research and present data, to forge new collaborations, and to catch up with friends and colleagues. The 5th International Whale Shark Conference met May 27th to 31st in Exmouth, Western Australia, along the pristine Ningaloo Reef. During three intensive days of presentations and workshops more than 130 researchers, conservation managers, and local tour operators discussed the current status of whale shark research and set priorities for future efforts and conservation.



The second day of the conference was set aside for an on-water “field trip” for the conference delegates, with everyone taking to local whale shark tour boats to see the Australian version of our favorite big spotty fish. It was an opportunity to observe the oldest and perhaps best-run ecotourism operations, which place strict controls on the number of boats and people interacting with the sharks. In comparison to some

whale shark aggregation sites that can become extremely crowded, the low-density Ningaloo operation was low stress for people and sharks. That evening, several researchers gave short talks for the community at a local venue. The turnout of Exmouth residents was overwhelming, causing the venue doors to be closed for fire codes. The people attending came with a strong interest in understanding “their” whale sharks and many questions for the researchers.

The scientific sessions continued on days three and four and ended with a series of workshops on emerging questions in whale shark research. Highlights of the presentations included a community-managed research and ecotourism operation in Indonesia, a discussion of the pros and cons of provisioning (feeding) whale sharks for tourism in the Philippines and Indonesia, and the analysis of possible social structure among juvenile whale sharks in Djibouti. Several talks described how stable isotope analysis (the heavy and light forms of carbon and nitrogen) are being used to track where whale sharks are feeding, and what they are feeding on. Another presentation showed how sharks that become trapped in nets in Indonesian fisheries can be given brief health evaluations before they are freed.



Changes in population status at different aggregation sites were also debated, from an increase in animal numbers at Ningaloo Reef in Australia, to the disappearance and subsequent return of whale

sharks in the Red Sea. The tolerance of whale sharks to the high temperature and salinity found in the Arabian Gulf was discussed, with likely relevance for many aggregation sites as oceans warm. Plastic pollution was reported at several aggregation sites, and the dangers this poses for surface-feeding whale sharks is clear from microplastic components detected in shark tissue biopsies.

Perhaps the most striking presentation was by researchers who used in-water ultrasonography to examine the large female whale sharks found in the Galapagos. The distended bellies of these females had caused scientists to propose that they must be pregnant. High resolution ultrasound, however, shows that their abdomens are filled with dense connective tissue but no embryos. This work requires that the field reconsider current hypotheses about whale shark reproduction.

In the final session of the conference, I presented the current status of our global population genetics study. Several other genetics and genomics presentations—kinship analysis, sequencing of opsins that regulate vision, and a presentation of the whale shark genome sequence—highlighted the growing use of molecular technologies to study whale sharks.

The 5th International Whale Shark Conference was the largest yet and considered an overwhelming success. A huge thank you to the local researchers, scientists, and staff of the Department of Biodiversity, Conservation and Attractions, all those at the Ningaloo Center, and many generous sponsors who made this event possible. Many new collaborations were formed, and we all came away with new ideas to apply to our own research.

The 6th International Whale Shark Conference will be held in 2022, with the selection process for a host country beginning soon.



From The Cage

The A-team during SRI's recent whale shark expedition to Djibouti

Photo courtesy Iain Leighton



Twenty-seven major organizations and corporations signed a letter of support for A4845, the New Jersey Shark Fin Trade bill, including SRI, American Littoral Society, Humane Society, ASPCA, Surfrider Foundation, and all the aquariums in New Jersey. By continuing to allow the re-importation and sales of shark fins, New Jersey continues to fuel the practice on the high seas and in countries that have lax shark finning bans or no shark management and conservation policies. When the buying stops, the killing will stop too. New Jersey needs to take a proactive approach to end this cruel and unsustainable industry, and join the 12 other states and territories that have passed identical bills. During the past four years the bill has been passed in committee after committee in both the Senate and House, but each time it is sent to the Assembly it doesn't make it to the voting docket. It was supposed to be voted upon by the Assembly on May 23rd, but once again the bill didn't make it onto the voting docket. The Assembly will meet on June 10th so there is a final opportunity to get the bill to a vote before the summer recess. Calls and emails to Speaker Craig J. Coughlin's office really need to be ramped up this month.

Speaker Coughlin's office telephone is (732) 855-7441 and his email is asmcoughlin@njleg.org



We love taking kids on field trips! The Fossil Shark Tooth Hunt on May 25th was fun for all and another is scheduled for June 22, 2019 from 1 to 3 pm.

Registration required. We bring equipment for all participants. (609) 921-3522 to register



Time to End Shark Tournaments

At shark tournaments sharks are slaughtered for prize money and bragging rights for the fisherman who kills the biggest shark. Each tournament has between a few dozen to several hundred competitors and all reinforce the perception that is acceptable to kill animals for enjoyment. Due to the high methyl-mercury content in shark flesh, the sharks aren't edible and are tossed away at the close of a tournament.

These tournaments began back when sharks were viewed as man-eaters, back in the days before it was realized sharks play a critical role in the health of the ocean. As with buffalo hunts of our wild west, shark tournaments belong in the past.

There are about 70 shark tournaments annually on the East Coast of the USA and most are posted on the internet. If you live near where a tournament is scheduled, consider attending with friends, SRI members and like-minded organizations to protest the senseless killing of sharks. Some tournament schedules and locations are also listed on our website along with links to sponsors of each event at:

<https://www.sharks.org/shark-slaughter-for-sport>

Please email the sponsors, express your disgust at these barbaric events and demand that they end.

June 5–9, 2019: 39th Annual South Jersey Shark Tournament

Cape May, NJ

<https://southjerseytournaments.com/shark-tournament/> and
<https://www.capemay.com/eventcalendar/index.php?eID=25610>

June 7–9, 2019: 23rd Annual Mako Mania

Bahia Marina, Ocean City, Maryland

<https://bahiamarina.com/tournament/mako-mania.cfm>

June 13–15, 2019: 33rd Annual Shark Tournament

Star Island Yacht Club, Montauk, NY

<https://www.starislandyc.com/sport-fishing-competition/shark-tournament-montauk-long-island-ny>

June 15–16 and June 22-23, 2019: Mako Mania

Manasquan, NJ

<https://www.facebook.com/MakioManiaNJ/photos/mako-mania-2019-shark-tournament-our-dates-are-set-and-we-now-have-two-weekends-/2211979339017756/>

July 11th–13th, 2019: 6th Annual Block Island Giant Shark Tournament

Block Island, Rhode Island <http://www.blockislandgiantshark.com/>

July 12 to 15, 2019 all-day: North Atlantic Monster Shark Tournament

46 Fishermans Wharf #52, New Bedford, MA 02740

<http://destinationnewbedford.org/event/north-atlantic-monster-shark-tournament/>

July 18–21, 2019: The North Atlantic Monster Shark Tournament

West Island Marina, Fairhaven, MA

<https://www.facebook.com/pages/category/Nonprofit-Organization/The-North-Atlantic-Monster-Shark-Tournament-369636506510036/>



Kids' Corner

Marine Herbivores by Hunter Noren

While sharks and other large predators are exciting and important for marine food webs, there is another group of marine animals that is also incredibly important for a healthy marine environment. Herbivores, or plant eaters, graze on marine plants and algae.

Herbivores come in all shapes and sizes from small snails that eat turf algae to large animals such as green sea turtles, dugongs, and manatees. Many herbivorous animals have specialized mouths or razor-sharp teeth to scrape the algae off rocks or chew tough, fibrous stems. Without herbivores like sea urchins or parrotfish to eat fast-growing algae, in some places the algae would grow and cover coral reefs. That is one reason herbivorous fish are protected in many countries around the world.

There are four groups of marine herbivores: invertebrates (animals without backbones), such as sea cucumbers and some sea snails. Some fish are herbivores, some blennies and angelfish. There are only two mammals that are marine herbivores: dugongs and manatees. As for reptiles, green sea turtles are mainly carnivores upon hatching, but become vegetarians as they grow. And you might want to check out the

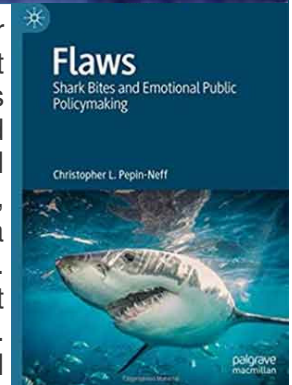
marine iguana; it's a pretty cool marine herbivore.

In addition to grazing down fast-growing algae, herbivores can be an important source of food for larger species such as sharks. So next time you are snorkeling and see fish biting at rocks or eating some green algae, give them a little thanks.



Bookshelf

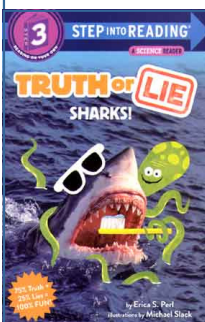
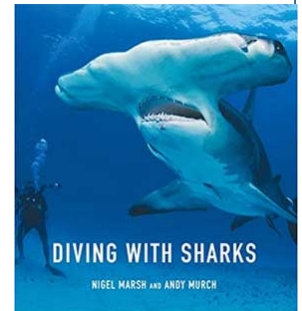
Flaws: Shark Bites and Emotional Public Policymaking by Dr. Christopher Pepin-Neff. \$79.11 hardcover, \$70.55 Kindle on AmazonSmile.com. This is the first book to look at policy responses to shark bites around the world. The book identifies three fundamental “flaws” in how sharks are regarded by the public, the media, and politicians. First is the language. Shark “attack” language is overblown and misplaced because it “conveys a very serious or fatal human-shark interaction, regardless of the details.” There may be no injury, or we may be talking about a shark biting a kayak, and those are very different things. Second is the blame. Politicians and the media “treat sharks like movie monsters” and allocate blame that is intended to fearmonger and sell newspapers. Third is the policy response. Politicians select policy responses “designed to relieve perceived social anxiety and boost public confidence, which often do little to protect the public.”



It is sometimes true that shark bites can have tragic outcomes that directly affect sections of the public. However, from an objective evidence-based analysis, what we are seeing is not a shark bite response but a theatrical political process, whereby an isolated and individual human tragedy is made worse when these incidents are politicized and sensationalized by the media. Pepin-Neff argues that politicians manipulate highly emotional incidents like shark bites to influence public sentiment and protect their own interests. “This book shows how policymakers manipulate highly emotional situations to make it appear like they are protecting the public and doing ‘good’ work. The real ‘sharks’ of this story are the politicians,” he says.

The author focuses on the 2001 “Summer of the Shark” in Florida that led to a ban on eco-shark tourism in the state, the 2004 adoption of the Shark Spotter Program in Cape Town, South Africa, and Sydney’s 2009 “Shark Summer” that led to increased funding for aerial patrols. The book includes a report evaluating policy responses to shark bites around the world. This book comes at a time when communities around the world like Cape Cod are looking for answers to serious and fatal shark bites.

Diving With Sharks by Andy Murch and Nigel Marsh. Hardcover \$20.77 from AmazonSmile.com. Each year more and more divers head underwater to dive with sharks for amazing encounters with white sharks, tiger sharks, whale sharks, hammerheads, and many other species. Divers are traveling to hot-spots around the world: Australia, South Africa, the USA, Mexico, Fiji, the Red Sea, the UK, and the Bahamas. This book is a guide for divers seeking sharks and for everyone interested in these incredible creatures. It includes an indepth introduction followed by comprehensive coverage of all the shark families and species that could be encountered, including many lesser-known sharks, with details of biology, behavior, and where to find them. There is also a listing of top shark diving hot-spots around the world.



Truth or Lie: Sharks! (Step into Reading—on AmazonSmile.com. from Amazon.com. “Baby sharks are toothless at first, right? The TRUTH is, sharks are born with a mouthful of teeth to protect themselves and hunt right away.” In a unique question-and-answer format, young readers are quizzed about sharks, their favorite ocean predators, to see if they can separate fact from fiction. The book’s mascot, the Truth Sleuth, guides readers through this funny and fact-packed Step 3 Reader, filled with photos of sharks in action, as well as kid-appealing art and humor. This series features engaging characters in easy-to-follow plots about popular topics for children who are ready to read on their own.

Upcoming Events

June 3-8, 2019: World Oceans Week at the Explorers Club (see page 3) The link below has the schedule for the week. You can register online for each session with this link.

https://www.explorers.org/events/detail/world_oceans_week_2019_Monday.

June 22, 2019 Fossil Shark Tooth Hunt in Big Brook, NJ. *Registration required. We bring equipment for all participants. (609) 921-3522 to register*

July 13, 2019: Shark Show, A Shark Conservation Benefit Concert for SRI hosted by singer, songwriter, actor Elise Levin. Venue: Bushwick Public House, 1288 Myrtle Ave, Brooklyn, NY 11221

July 13-14, 2019: Shark Con. Venue: Florida State Fair Grounds in Tampa. The event brings together those who love the ocean for a weekend of education and the fun of a Comic Con.

<http://shark-con.com/>

July 13-14, 2019: Shark Celebration. Venue: Jenkinson's Aquarium, Point Pleasant, NJ. Presentations by SRI staff afternoons and evenings.

July 20, 2019 Fossil Shark Tooth Hunt in Big Brook, NJ with shark paleontologist Dr. Dan Ehret
Registration required. We bring equipment for all participants. (609) 921-3522 to register

July 24-28, 2019: Afuera Expedition I. Join Dr. Jennifer Schmidt to snorkel with Whale Sharks in the Caribbean. To reserve your space, contact: Jennifer@sharks.org

July 28-August 6, 2019: Shark Celebrity Auction The link into the auction will be on our website at www.sharks.org

July 30-August 3, 2019: Afuera Expedition 2. Join Dr. Jennifer Schmidt to snorkel with Whale Sharks in the Caribbean. To reserve your space, contact: Jennifer@sharks.org

August 11, 2018: Shark Tooth Hunt in Big Brook, NJ. *Registration required. We bring equipment for all participants. (609) 921-3522 to register*

August 30, 2019: International Whale Shark Day.

September 5-7, 2019: Surf Expo. The world's largest and longest-running Surf Show with 28,600 attendees. Venue: Orange County Convention Center, North Halls A-B, 9899, International Drive, Orlando, Florida. 32819 <https://www.surfexpo.com/>

September-October, 2019: Tiger Shark Identification Expeditions. See page 10 for additional information or to reserve your space, contact: Charlie@sharks.org

November 13-16, 2019: DEMA Show 2019 - Venue: Orange County Convention Center, Orlando FL, United States This is the largest diving show in the world. This event brings together around 650 exhibitors. It is only accessible to professionals of the scuba diving industry.

<https://www.demashow.com/DEMA19>

December 14-16, 2019: Djibouti Expedition. Join a Shark Research Institute expedition to assist with research on this fascinating population of the world's largest shark. To reserve your space, contact: Jennifer@sharks.org



THE 11TH ANNUAL SHARK CELEBRITY AUCTION



In an age of tweeting presidents and other soul-sucking electronic gadgetry, SRI continues to promote an old-fashioned art form: face-to-face communication over a shared meal. Join a shark expert or celebrity over lunch or dinner, talk shark, and take a tax deduction at the same time. Every one of these celebrities really want you to bid on them and getting to know these amazing individuals will invigorate your faith in humanity.

Who are they? You've seen their work in National Geographic magazine, Discovery Channel's Shark Week; Nat Geo, BBC, and most likely read their books too. Here are some of the shark experts and celebrities in the auction:

- Michael Aw—Publisher of *Ocean Geographic* magazine
- David Doubilet—*National Geographic* magazine's top shark photographer
- Ralph Collier—Author of *Shark Attacks of the 20th Century*
- Sandra Critelli—Underwater and topside award-winning photographer
- Scott Curatolo-Wageman—Marine biologist, who was also bitten by a shark
- Chris Fallows—You've seen his Air Jaws documentaries on Discovery Channel's *Shark Week*
- Charlie Fasano—Hawaii's tiger shark expert and expedition leader
- Dean Fessler—Speaker, white shark and sandtiger shark expert
- Lynn Funkhouser—Conservationist and world-class underwater photographer
- Jeff Kurr—Filmmaker, has produced 30+ documentary films for Discovery Channel's *Shark Week*
- Maureen Langevin—Documentary underwater filmmaker
- Pascal Lecocq—Painter of the Blue
- Elise Levin—Shark conservationist, singer, songwriter
- Wayne Levine—Hawaii's premier underwater photographer
- Marie Levine—Founder of SRI, white shark and whale shark expert
- Nancy McGee—Intrepid explorer, filmmaker, and Women Divers Hall of Fame
- David McGuire—Filmmaker and expert with Sea Stewards
- Kevin McMurray—Shark attack and accident investigator
- Amos Nachoum—Animal behaviorist and award-winning underwater photographer
- Dr. Patrick Nason—Expedition leader and anthropologist studying the shark callers of PNG
- Lesley Rochat—Award-winning filmmaker, author and founder of AfriOceans
- Alex Rose—Science editor of *Ocean Geographic* magazine
- Matt Potenski—Award-winning underwater photographers
- Dr. Jennifer Schmidt—Molecular biologist, whale shark expert, and expedition leader
- Paul Spielvogel—World-class underwater photographer
- Mike Tichenor—Caribbean expedition leader
- Jim Toomey—Author, conservationist, and creator of "Sherman the Shark" cartoon strip
- Phil Watson—Creator of the series "Shaaark!"
- Cristina Zenato—Cutting-edge shark behaviorist, conservationist and cave diver

This auction goes live on July 28, 2019 at 9 pm, EST and will close on
August 6, 2019 at 11h59 pm EST.

Look for link on our website when the auction opens on July 28th and start bidding

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Also on the auction block will be lifetime adoptions of some of our favorite sharks. Although none of the sharks are available to meet for lunch, some of the celebrities have a gift for their winning bidder.

TIGER SHARK IDENTIFICATION EXPEDITIONS

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

Multiple dates during September and October 2019

Two 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 (Hawaii) 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 #1 - Eight days-\$3,750 (double occupancy), \$4,250 (single occupancy)

Expedition #2 - Five days-\$2,500 (double occupancy), \$2,900 (single occupancy)

Payments made through PayPal will incur an additional \$50 per person processing fee. All payments are non-refundable. Dive insurance and travel insurance are required.



Included

Resort 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 recommended, and is mandated for five day expeditions.

Not included

Airfare To Kailua Kona, Hawaii. Manta Ray and tethered Blackwater night dives are available at an additional cost.

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

The AFUERA

The Great Massing of Whale Sharks in the Caribbean

**July 24 to July 28, 2019
and July 30 to August 3, 2019**

The largest gathering of whale sharks in the world occurs each June through August in the Caribbean off Mexico's Yucatan Peninsula. Known as the Afuera, more than 600 whale sharks have been observed during a single aerial survey. The sharks mass in a patch of ocean about the size of several football fields where the water is 20 to 60 feet deep, to feed on dense patches of fish eggs, a rare place where you can observe and photograph whale sharks in blue water.



The expedition dates coincide with the peak of the Afuera. Each expedition is five days in length, including three days snorkeling with the sharks (weather and sea permitting) and a travel day on either end.

The expeditions are led by Dr. Jennifer Schmidt, Director of Science and Research at the Shark Research Institute, who has worked with whale sharks for nearly 20 years. By Mexico's regulations, all expeditions and whale shark ecotourism trips are snorkel only because scuba bubbles disturb the sharks when they are feeding. But excellent diving and many other activities are available before and after the expedition.

The cost includes four nights double occupancy hotel in Cancun, three days of whale shark interactions, lectures on whale sharks by Dr. Schmidt, snorkeling at Isla Mujeres, and lunch on whale shark days. It does not include airfare to Cancun, airport transfers, or dinners.

The share per person is \$1,400 if paid by check in USD (\$1,450 if paid online via Paypal) based on double occupancy. A single supplement is \$200. A \$500 deposit is required to hold your space. All payments are non-refundable. Dive and travel insurance are required. Maximum of nine participants per expedition.

These expeditions fill very fast, so reserve your space now!

For more information or to reserve a spot, contact jennifer@sharks.org

Optional side trips are available and can be arranged in Cancun. After the expedition you could dive Manchones Reef, visit the Cave of the Sleeping Sharks of Isla Mujeres, dive one of Mexico's crystal clear cenotes, or visit some of the world-famous Mayan ruins of the Yucatan such as Tulum or Chichen Itza.

DJIBOUTI WHALE SHARK EXPEDITION

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

December 6th — December 14, 2019

Join this expedition led by SRI Director of Science & Research, Dr. Jennifer Schmidt to 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: \$2,200* includes shared accommodation on the boat, double occupancy hotel for the nights of December 6th and December 14th, 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 by ordering a t-shirt, tank top, or hoodie. Sizes range from youth to adult XL. Check out the variety of colors and styles! Plan ahead so you can celebrate International Whale Shark Day (August 30th) in style with a commemorative shirt. There is a limited window for ordering your Bonfire merchandise. Shipping dates vary depending on when orders are placed, but shirts usually arrive within three weeks. Deadline to order is 11:59 pm on June 25, 2019.



Order the shirts through our Facebook page, or for

Infinity logo: <https://www.bonfire.com/sharks>

Save Our Sharks: <https://www.bonfire.com/sharks-save>

Int'l Whale Shark Day: <https://www.bonfire.com/whale-shark-day>

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>



For a unique graduation gift, consider a **Whale Shark Adoption**. Although our researchers have cataloged hundreds of whale sharks, only sharks that have been seen within the past year are put up for adoption. Annual Lifetime Adoptions are \$150 and never need to be renewed. All adoptions include an adoption certificate, fact sheet on whale sharks and a photo of their shark. Each guardian is notified when their shark is sighted again. <https://www.sharks.org/support/whale-shark-adoption>

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. For more information about how your local officials can order the flags, email: tagchum@gmail.com



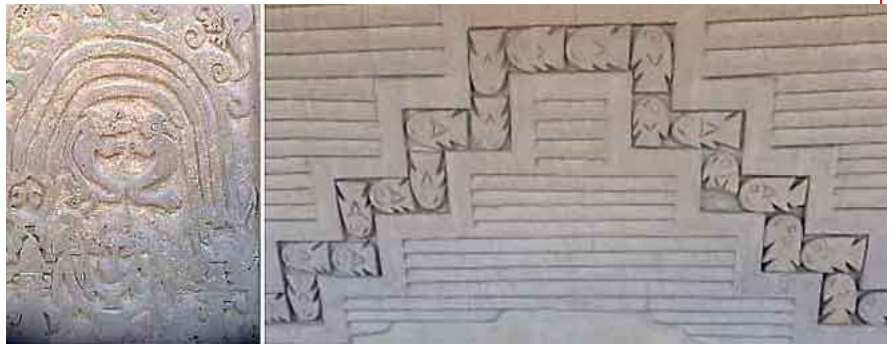
And please remember to support SRI every time you shop at [Amazon.com](https://www.amazon.com). Just go to **AmazonSmile** and choose "**Shark Research Institute**" as your favorite charity. Amazon makes a donation to SRI that costs you nothing!

Surfers, Sharks and Sacrificial Shrines of the Ancient Chimú Fishing Culture of Peru

By Dave Grant

The commercial port of Salaverry on the northern coast of Peru is a regular stop for cruise ships, where passengers can disembark for tours to the interior. It is also the gateway to Trujillo and near some of the earliest and most interesting archaeological sites in the region. Much of the known history of pre-Hispanic Peru is focused on the upheaval of the Inca Empire during the invasion by the Spanish Conquistadors. However, maritime cultures thrived along the Pacific coast for millennia before the Inca Empire was established, and contributed significantly to the peopling of the Americas.

One place where this influence is evident is on the Ruta de Moche (Route of the Moche), along the coast north of the port where successive cultures left their archaeological imprints. Depictions of marine life, including shark teeth, appear on massive adobe structures, artifacts, and in sacrificial burial sites.



Sea gods and fishes, portrayed in adobe walls

For centuries, inhabitants of the Moche valley supported a series of complex cultures through fishing and agriculture that used irrigation systems engineered by the foremost group in the region, the Chimú. Between 900 AD and 1470 AD when they were overwhelmed by the Incas, the Chimú fished and farmed the area. Decades before the Spanish arrived, they constructed the largest adobe structures in the world at their capital Chan Chan to worship both the sea and the moon. Deluge and drought, which still disrupt farming and fishing in the region, presented constant challenges. These regular struggles became the catalyst for various ceremonial offerings; sacrificed children, llamas, and even an occasional shark fisherman were recently revealed in mass burial sites. What the Spanish did not destroy, El Niño weather extremes continue to undermine at Chan Chan. Efforts to protect these delicate mud structures, as well as to support a model for dealing with long-term climate change trends, are ongoing.



Protected and restored adobe temple area.'

Ten enormous walled royal compounds—20-foot high *Ciudadelas*—dominate Chan Chan, and are the major tourist destination in the region. Adorned with images of waves, seabirds, marine mammals and fish, and crisscrossed with supports designed to look like the webbing of fish nets, these adobe enclaves exhibit the Chimú's dependence on the ocean. Sea gods and goddesses are also displayed prominently, and reliefs of fish on the walls honor the forage species, *anchovetas*, which still comprise 80% of the catch today. This vital regional fish continues to support the tremendous oil and fish meal industry of the Humboldt Current. The industry employs thousands of fishermen and accounts for over 10% of the world's tonnage. The reversed directions of the fish schools may represent seasonal

changes in current patterns and extreme weather events like El Niño. Noted artisans in this maritime society used more than mud to exhibit their culture. They fashioned impressive artwork using textiles, ceramics, and the highly prized pink *Spondylus* oyster shells imported from the warmer waters of Ecuador. Not surprisingly, shark teeth are also significant cultural artifacts and are sometimes found in large quantities.



Reed boats and cast nets on the beach at Huanchaco

The trip back to ship at Trujillo along the Ruta de Moche is not complete without a visit to the beach at Huanchaco to observe some living history. A small coastal artisanal fishery remains, utilizing traditional, hand-made, fishing vessels called Caballitos de totora (Little reed horses) that have become a tourist attraction. Artifacts discovered nearby indicate that these little boats precede the Chimú culture by over a thousand years. Locals boast that their ancestors riding the waves back to shore with their catches of sharks and other fishes should be considered the first surfers.

Nicknamed “ponies,” the boats are constructed from tall rushes harvested from wetlands along the coast, and although a fisherman can build a reed boat in hours, the harvested reeds require six months to dry, and the boats typically last for only a few months.



*Riding the pony
A tourist tries his hand at surfing a “Little Reed Horse” – the world’s first stand-up paddleboards (SUPs)*

Unfortunately, the continued disappearance of the coastal wetlands, which are being encroached upon by development and erosion, creates challenges for both fishermen searching for sources of reed, as well as for local vegetable farmers seeking garden plots.



Ceramic shark imagery at the tourist market and museum specimen of the Caballitos de totora (Little reed horse)

I had time to explore the local markets before returning to the ship, and am pleased to report that I did not find any evidence of sharks or shark fins for sale.

At the Rutgers University meeting on Climate Change and Food Security on April 22, 2019, Dave Grant met with Ambassador Gustavo Meza Cuadra, Permanent Representative of Peru to the United Nations, to share his experiences in Peru studying shark harvests, and passing along materials from SRI's Anti-Financing campaign.



Tracking Sharks, Tunas and Billfish in the Gulf of Mexico

Rooker JR, Dance MA, Wells RJD, Ajemian MJ, Block BA, Castleton MR, Drymon JM, Falterman BJ, Franks JS, Hammerschlag N, Hendon JM, Hoffmayer ER, Draus RT, McKinney JA, Secor DH, Stunz GW, and Walter JF. (2019) **Population connectivity of pelagic megafauna in the Cuba-Mexico-United States triangle.** *Scientific Reports*, V.9, No. 1663

<https://www.nature.com/articles/s41598-018-38144-8>

The timing and extent of international crossings by billfishes, tunas, and sharks in the Cuba-Mexico-United States (U.S.) triangle was investigated using electronic tagging data from eight species that resulted in >22,000 tracking days. Transnational movements of these highly mobile marine predators were pronounced with varying levels of bi- or tri-national population connectivity displayed by each species. Billfishes and tunas moved throughout the Gulf of Mexico and all species investigated (blue marlin, white marlin, Atlantic bluefin tuna, yellowfin tuna) frequently crossed international boundaries and entered the territorial waters of Cuba and/or Mexico. Certain sharks (tiger shark, scalloped hammerhead) displayed prolonged periods of residency in U.S. waters with more limited displacements, while whale sharks and to a lesser degree shortfin mako moved through multiple jurisdictions. The spatial extent of associated movements was generally associated with their differential use of coastal and open ocean pelagic ecosystems. Species with the majority of daily positions in oceanic waters off the continental shelf showed the greatest tendency for transnational movements and typically traveled farther from initial tagging locations. Several species converged on a common seasonal movement pattern between territorial waters of the U.S. (summer) and Mexico (winter).

Study on Endangered Porbeagle Shark in Irish Waters

Cameron LWJ, Roche WK, Houghton JDR, and Mensink P. (2019) **Population structure and spatial distribution of porbeagles (*Lamna nasus*) in Irish waters.** *ICES Journal of Marine Science*, fsz046, <https://doi.org/10.1093/icesjms/fsz046>



Porbeagles throughout the North Atlantic have experienced severe population decline through overfishing, with the northeastern population listed as critically endangered. Management of this population is constrained by the paucity of data on porbeagle population structure, distribution, and behaviour in this region. Here we use a long-term (47 year) Irish capture-mark-recapture dataset to investigate the population structure, spatial distribution, and seasonal movements of this species. From 1970–2017, a total of 268 sharks (9 recaptures) were ID tagged, with most individuals

likely being juvenile based on length at maturity estimates (mean total length = 143.9 cm, $SD = 35.4$). Almost all captures were recorded at three distinct locations near angling hubs along the south, west, and north coasts with catches peaking in August. Long-term trends in capture date indicated a shift towards earlier capture dates in the northern site ($n = 153$).

Our findings suggest Irish waters may act as a persistent summer aggregation site for juveniles, which show evidence for seasonal site fidelity, returning to nearby locations between years. These findings demonstrate the utility of such programmes, which can be implemented, with minimal expense by engaging with the angling sector, to elucidate the population structure and distribution of wide-ranging fish species.

Bonnethead Shark is both a Carnivore and a Vegetarian

Leigh SC, Papastamatiou YP, German DP. (2018) **Seagrass digestion by a notorious 'carnivore'**. *Proc. R. Soc. B.* <http://doi.org/10.1098/rspb.2018.1583>

What an animal consumes and what an animal digests and assimilates for energetic demands are not always synonymous. Sharks, uniformly accepted as carnivores, have guts that are presumed to be well suited for a high-protein diet. However, the bonnethead shark (*Sphyrna tiburo*), which is abundant in critical seagrass habitats, has been previously shown to consume copious amounts of seagrass (up to 62.1% of gut content mass), although it is unknown if they can digest and assimilate seagrass nutrients. To determine if bonnetheads digest seagrass nutrients, captive sharks



Beth Swanson/Shutterstock.com

were fed a ^{13}C -labelled seagrass diet. Digestibility analyses, digestive enzyme assays and stable isotope analyses were used to determine the bonnethead shark's capacity for digesting and assimilating seagrass material. Compound-specific stable isotope analysis showed that sharks assimilated seagrass carbon ($13.6 \pm 6.77\%$ $\delta^{13}\text{C}$ mean \pm Bos.d. for all sharks and all amino acid types analysed) with $50 \pm 2\%$ digestibility of seagrass organic matter. Additionally, cellulose-component-degrading enzyme activities were detected in shark hindguts. We show that a coastal shark is digesting seagrass with at least moderate efficiency, which has ecological implications due to the stabilizing role of omnivory and nutrient transport within fragile seagrass ecosystems.

Shape Analysis of Shark Jaws

Duarte-Neto P, Rodrigues J, Lessa R. (2019) **Shape analysis of shark jaws as a tool to identify species involved in incidents with humans.** *J Forensic Leg Med.* [doi: 10.1016/j.jflm.2019.03.008](https://doi.org/10.1016/j.jflm.2019.03.008).

Shark incidents in Recife, Pernambuco state (Brazil), are registered since 1992. The occurrence of those events is in a relatively small area of urban beaches of about 30 km long, making up one of the world's highest indices of shark incidents per unit of area, totaling 64 casualties, of these 24 were fatal. To mitigate shark incidents, the knowledge on shark species involved is crucial given that each species has specific usage of the habitat and dissimilar feeding strategy. Jaws of five species caught along the Pernambuco coast (Brazil), corresponded to 2 specimens of *Carcharhinus acronotus*, 4 specimens of *C. leucas*, 1 of *C. limbatus*, 4 of *Galeocerdo curvier* and 3 of *Sphyrna lewini*. Relative Warps Analysis was applied to enhance possible differences among jaw shapes of the studied species. The consensus configuration from the 14 images was obtained. The first two relative warps components explained 70.17% of the total observed variation. Four distinct groups were clearly observed. Three groups were formed by single species, corresponding to *G. curvier*, *C. leucas* and *S. lewini*, respectively, and one group formed by the combination of *C. acronotus* and *C. limbatus*. As expected, due to its peculiar skull shape, *S. lewini* jaws are very different from other analyzed species, thus all observed individuals of this group were found isolated from the others, considering the horizontal axis. Relative warps and curvature analyses show to be useful tools in the forensic study of shark incidents. In general, jaws shape significantly differed among species.

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