

Fall 2018

# SHARK RESEARCH INSTITUTE

# Newsletter

Shark Research Institute Global Headquarters  
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## SRI hosts a delegation from China

By Dino Rulli, Ph.D.



The Shark Research Institute (SRI) has been conducting research and advocating for shark conservation throughout the world for nearly 30 years. But like a message in a bottle, it's often hard to tell how far the message travels. Recent events have shown that our message has gone pretty far. In fact, all the way to the other side of the planet. A delegation from the Hainan Province in China not only heard our message, but made its way to the United States and met with SRI to discuss shared interests in ocean and marine life conservation.

Hainan is the smallest and southernmost province in the Peoples Republic of China (PRC). The province consists of several islands in the South China Sea. The largest of them, Hainan Island, is roughly 50% larger than NJ, and at 20°N latitude, is at the same latitude as Cozumel. The southern part of the province is in the tropical climate zone, and smaller islands extend even further towards the equator. Hainan was granted separate province status from Guangdong in 1988. At that time it was designated as a Special Economic Zone to promote investment. As an island province, the health of the ocean waters and life within them is of considerable importance to the people living there. And it is of considerable importance to the thriving tourist industry, with miles of beaches and the cleanest air in China.

To benefit from the experience of experts here, a contingent of 20 government officials from Hainan visited the U.S. to share and exchange ideas about management and protection of marine ecosystems. Their main interests were to share experiences in both countries regarding regulations protecting ocean life and conservation experiences.

The officials representing Hainan were from a wide variety of disciplines, including the Foreign Affairs Office, Press and Publicity Division, Policy Research, Environmental Resources, Marine and Regional Economic Development, Construction, Industry, Environmental Monitoring and Protection, Maritime Affairs, Municipal Planning, the Coast Guard, and others.

Jenkinson's Aquarium generously offered its conference room for the meeting, and there could not have been a better venue. Prior to the meeting, our visitors were able to take in the sights of the ocean, arcades and gift shops of the famous boardwalk. At the aquarium, they wound their way past the penguins, sharks and numerous exhibits to the conference room on the second floor.



*Li Jinsong, Environment Protection Division, Department of Ocean and Fisheries, discussing the large number of whale sharks seen off Hainan*

Packets of information about SRI, current programs and pending ocean and shark legislation in the U.S. were given to each attendee. Faced with the challenge of presenting to this diverse group was Dean Fessler, Deputy Director of SRI. The more than 20 years of experience Dean had as the Director of Education of SRI served him well, as he was able to take the visitors on a

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journey of discovery through SRI's history, research, shark conservation, and hopes for future collaborations with this distinguished group, all while working with a superb interpreter who translated Dean's talk for those who did not speak English. An informal estimate during the talk showed that about half of the guests laughed at Dean's amusing comments when spoken by him in English, and all laughed when translated into Chinese. And all came away impressed by the quality and depth (pun intended) of the work being done by SRI.



*Dean with Li Jianfei, Deputy Division Chief, Foreign Affairs Office*

The questions during the talk and in the Q&A afterwards reflected the diverse nature of the group. Questions regarding the biology or tracking of sharks came predominately from the marine and conservation representatives. However, those in policy or business raised questions that we rarely get when “talking shark.” Regarding SRI funding, they wondered which government agency, Federal, State, or other provides our support!



This perhaps reflects the nature of funding in China. That so much of SRI's revenue comes from individual contributions highlighted the difference in how conservation and education efforts are funded in the U.S. compared to China. The two different sources of funding – either from governments providing the direction “from the top down,” or from the citizens fighting for the proper direction expected of their government – illustrate both ends of the battles to be won. Governments have to support the conservation efforts needed to protect natural resources and people need to convince their governments that conservation matters. Meetings like the one held between SRI and representatives from Hainan are critical to the success of these efforts.

The meeting was coordinated by Sunels International Inc. ([www.sunels.com](http://www.sunels.com)), established and approved by the U.S. government in 2000 to develop and manage business and educational programs between China and foreign countries.

The time available to meet with this group was short and passed all too quickly. But personal relationships were forged and will hopefully grow as opportunities arise (or are created) to continue towards our shared goals.



## Tackling Beach Cleanups



Photo credit: Galveston County Daily News

Readers of this newsletter may remember that last year the Shark Research Institute adopted a stretch of the upper Texas coast on the Bolivar Peninsula near Galveston. SRI Director of Science and Research Jennifer Schmidt lives there, and with help from neighbors maintains the area free of trash with weekly cleanups. This is just one of the ways SRI is involved in not only shark conservation, but ocean ecosystem health. Keeping even a mile of beach clean is not a trivial job. Texas beaches are heavily used during the summer months by both residents and tourists. Many visitors unfortunately do not understand the dangers that beach debris poses to marine wildlife, and a busy weekend can leave the beaches strewn with trash.

In addition to resident volunteers, beach cleaning was also being done with heavy equipment. This method removes beach sand and can damage bird and turtle nests, however, and was opposed by environmental and wildlife groups. Mechanical cleaning was recently discontinued, replaced by the gentler but more tedious hand picking of trash. Much of this work fell to the beach adopters and local volunteer organizations...it was an overwhelming job.

Credit Galveston County with an ingenious labor source: in July, inmates from the Galveston County Jail began cleaning the beach, with an arrangement to continue through the tourist season! (To be fair, residents and local groups had made this suggestion long ago.) In a true win-win situation, non-violent trusted offenders get to spend their work days on the beach, and residents get assistance with the never-ending cleanup process. In just one day where numbers were tallied, the inmates collected 87 bags of trash from the beaches!

Along the coast of Florida, county parks and recreation groups, and companies such as People Ready and Crowder Gulf, are helping to clean up the destruction caused by the algal bloom that killed hundreds of manatees, turtles and dolphins this summer. Tons of marine life have washed up on Florida's west coast beaches from Pinellas county in the north to Collier county in the south.



<http://floridawatercoalition.org>

## News from the UN : Possible Expansion of UNCLOS Mandate & Unesco Conference

The high seas encompass the international areas beyond the 200-nautical mile Exclusive Economic Zones of coastal nations. These areas are critical to life on our planet, but face threats from pollution, declining oxygen levels, ocean acidification, as well as deep-water trawling and overfishing. Deciding how to conserve and sustainably manage the high-seas biodiversity presents a challenge.



The 1982 United Nations Convention on the Law of the Sea (UNCLOS) defined the rights and responsibilities of nations with respect to their use of the world's oceans. The contentious 1994 Part XI of the Convention related to exploration and deep-sea mining of minerals on the seabed outside any state's territorial waters. At present, however, there are still important gaps in protection of the ocean, including conservation of species and habitats. Over the next two years, representatives of UNCLOS member nations hope to hammer out a binding agreement to secure more protection of the high seas and prevent their over-exploitation.

The High Level Scientific Conference “*From COP21 towards the United Nations Decade of Ocean Science for Sustainable Development (2021-2030)*” took place September 10-11 in Paris, France. at UNESCO. The conference synthesized scientific progress on ocean and climate interplays, and discussed ways to move from science to action. Key points from the conference included establishing new networks to promote knowledge-sharing while engaging with existing ones to improve the narrative on “why ocean matters”; enhancing communication among citizens, scientists and decision-makers; and provide decision-makers with data that enables them to support science. Also discussed were ways to significantly increase funding for ocean-related activities and encourage new tools for funding beyond governments.

## Nurse Sharks of Bikini Atoll



Between 1946 and 1956, the USA detonated 23 nuclear devices in the air, on the sea and underwater at Bikini Atoll in the Marshall Islands. The bombs rendered Bikini unfit for habitation, contaminating the soil and water, and resulted in contamination of 15 additional islands and atolls.

In 2017, Steve Palumbi, Stanford University professor of marine sciences and his graduate student, Elora López, using DNA sequencing of the rate and pattern of

mutations, examined what effect the radiation exposure has had on the DNA of Bikini's corals compared with corals from American Samoa which was beyond the radiation zone. Fish are able move in and out of Bikini's waters and no DNA samples were taken from fish. However, the Stanford scientists reported fish in the mile-wide Bravo crater appeared abundant and healthy to the naked eye. The possible exception were some nurse sharks.

Nurse sharks have two dorsal fins, but during the study apparently healthy, but possibly mutated, nurse sharks with only a single dorsal fin were observed. Footage of the nurse sharks may be seen on Amazon Prime Video: 'Big Pacific,' Season 1, Episode 2.



## Science, Conservation and Sharky Fun at SharkCon 5

by Mike Tichenor



Sharks get a bad rap. From the early “Jaws” movies to the recent Sharknado series, sharks have been depicted as mindless, vicious creatures, seeking out humans to attack. In reality, sharks are simply animals, key members of the ocean ecosystem concerned with surviving and reproducing. Sharks do not seek out humans, and the extremely rare shark bite is

typically a case of mistaken identity. While people love shark movies, it is important to remember that sharks are in real danger of extinction. The populations of many iconic shark species have dropped to a fraction of their numbers in a few decades. Shark conservationists must constantly fight against the bad image of sharks. So how can we make the public care about saving animals they fear?

One way is through education. Events that inform the public about the threats facing sharks and the essential role sharks play in ocean health can help scientists convey the dire situation sharks are in. If these events can also be entertaining while they educate that’s even better. Enter SharkCon, held yearly in Tampa, Florida. SharkCon combines serious educational seminars by shark researchers and conservationists, exhibits on shark biology and ocean ecosystems, toys and games for children, and even appearances by shark movie heroes. Yes sharks can be scary, SharkCon says, and it’s fun to be scared but, more importantly, sharks need protection. SharkCon has the goal of raising money for shark research and education while providing a fun and interactive experience for the public.

SharkCon 5 was held in July at the Florida Fairgrounds and there was something for everyone at this event. There was a 22-foot inflatable shark slide, the Megalodon Monster Jam truck, educational activities from groups such as Sharks4Kids, and science exhibits from Busch Gardens and the Clearwater Aquarium. The Shark Conservation Center brought dissection models of actual sharks for people to explore...inside and out! Go Dive Now set up a pool with an Explore Scuba experience that let people see what it’s like to breathe underwater in a safe environment.



Many not-for-profit organizations were present to discuss their research and conservation work including Oceana, Sea Shepherd, the Guy Harvey Ocean Foundation, and, of course, Shark Research Institute. The SRI booth was an obvious hit with people of all ages. A constant stream of attendees stopped by to talk about sharks, hear about our whale shark research and expeditions, sign our Stop Shark Finning petition, and grab a small shark toy or gummy shark. It was amazing to see how much the kids already knew about sharks; many came to the booth eager to tell us all about their favorite shark!



Scientific talks were presented by Dr. Jennifer Schmidt, SRI Director of Science and Research, Dr. Dominique Keller of Busch Gardens, Alex Suh of Fins Attached, Jillian Morris Brake of Sharks4Kids, Stephanie Arne of Mutual of Omaha’s Wild Kingdom, and others. Underwater photographers Tanya Houppermans, Jim Abernethy and others gave presentations of their work. Fun events included an appearance by Richard Dreyfuss, who played marine biologist Matt Hooper in Jaws, as well as several stars of the Sharknado series. At the end of the two-day event, several of the female scientists came together for the well-attended “Women of Science and Sharks” discussion and question/answer panel. It was encouraging to see so many

young women coming to the microphone to ask questions about sharks and about how to become a shark researcher!

SRI is already making plans to attend SharkCon 6 next July, which promises to be bigger and better than ever. If you can be in the Tampa area next July 13th and 14th, be sure to join us there!

## Plankton, Plastics and Puffins in Viking Waters

By Dave Grant

“The real voyage of discovery consists not in seeking new landscapes, but in having new eyes.”

*Marcel Proust*

This summer, at the invitation of Adventure Canada, I represented SRI as a Scientist in Residence, an innovative program aboard the *Ocean Endeavour* as she sailed among the beautiful islands of the North Atlantic. Adventure Canada is a pioneering ecotourism company offering many travel expeditions that include opportunities for passengers to interact with and benefit local and indigenous communities through cultural exchanges. The *Ocean Endeavour* is a 199-passenger ice-class vessel engineered to explore polar regions. Our voyage began in Aberdeen, Scotland and passed through the Shetlands and Faeroe Islands before crossing the Norwegian Sea to circumnavigate Iceland.

My objectives included collecting plankton and comparing water clarity at different locations to gauge the productivity of the waters, as well as identify plastic pollution. I also visited local fish markets to catalogue which species local fishermen are taking, paying particular attention to shark catches.

Sampling included measuring some of the most basic oceanographic parameters, which was accomplished from Zodiacs used to ferry passengers for landings at the shore, and observations at seabird colonies. Water turbidity was measured with a secchi disc (Perfected by Angelo Secchi, a Jesuit scientist in Rome over a century ago) which helps determine what is suspended in the water column that affects light penetration and the productivity of phytoplankton. The hue of the water was measured using a Forel-Ule scale—vials of tinted liquid to quantify open water—producing a 21-color index that helps classify transparency and gross plankton productivity. Nets with different mesh sizes facilitated the collection of phytoplankton and zooplankton. Plastic was collected by skimming nets at the surface as well as analyzing water samples under the microscope.

We made a dozen port stops and most had fish markets and restaurants where local fish landings could be assessed. I also met dockside with locals as they unloaded their catch. Turbidity varied significantly with location. Water clarity in fjords ranged from low to high depending on geological and geographical settings. Isolated waters with limited mountain runoff in the Shetlands and Faeroes tend to be clear and blue in color, indicating low nutrient and sediment inputs, and productivity. Along the south coast of Iceland, glacial milk—the silty runoff of “rock flour” in Jökulsárlón lagoon—entirely blocked visibility in the water of the terminal lake of the deteriorating Vatnajökull glacier.



*Puffins at Grimsey Lighthouse - on the Arctic Circle*

Water conditions were reflected in plankton samples too. Besides transporting north the warm, salty, equatorial waters that drive our climate; green, plankton-rich Gulf Stream water flows between the Faeroes and Iceland, fueling shoals of forage fish like capelin and sand eels that support the enormous populations of puffins and other seabirds. Not surprisingly, the busiest harbors had some of the least transparent water but most visible plastic concentrations: generally flotsam and jetsam related to the fishing industry, but also micro-beads.



*Lumpfish*

Plankton is always a pleasure to observe under the microscope, but the largest and most curious catch was a tiny lumpfish (*Cyclopterus lumpus*). Called Rognkelsi in the Faeroes, it is important commercially for its roe and marketed as Icelandic or black caviar.

Plankton populations varied significantly too. In the North Sea waters of Scotland and the Faeroes, we observed a mix of phytoplankton: mainly diatoms, and zooplankton, particularly copepods. Around Iceland, zooplankton predominated, especially in two locations: Heimaey in southern Iceland, and Grimsey Island on the Arctic Circle. At mid-summer this far north, 24-hours of sunlight suppresses the diurnal movement of zooplankton to the surface; but on a magical Zodiac venture into the dark cave at the mouth of Heimaey harbor, we collected a rich sample of crab larva, pteropods, polychaete worms, comb jellies, nauplius and cyprid barnacle larva, and a variety of copepods.



*Plankton tows in an Icelandic sea cave*

Off the puffin and fulmar nesting cliffs of Grimsey Island, 66 degrees North, we encountered a red feed, a condition the fishermen use to describe swarms of the reddish copepod (*Calanus finmarchicus*), which completely dominated the plankton haul. These small crustaceans are the mainstay of capelin and herring (as well as basking sharks and some northern baleen whales) and are the critical link in the Icelandic marine food web.



*Calanus –  
A northern copepod*

Over a fifth of Iceland's cod, haddock, and halibut landings are in the northwest Vestfirir (West Fjords) coast by local fishermen jigging, long-lining, purse seining and yarn-fishing (gill nets). On a small fishing boat out of Stykkishólmur (Piece Island Harbor) we used a benthic trawl to land a huge catch of shellfishes, urchins and sea stars. Most were returned unharmed to the sea with the exception of the sea scallops, which quickly became Viking sushi.

In scenic Isafjordur (Ice Fjord), jellyfish dominated the plankton samples. Fulmars (Icelandic: Foul gull) gathered to feed on them and the offal from the fish processing plant. Charles Darwin, who thought the "little albatross" (*Fulmarus glacialis*) might be the most abundant bird in the world, observed at the time that it was expanding its range along with the offshore whaling industry. Fulmars also are important as the storm birds in the mythology of Sedna, the sea goddess of the Inuit people.

Also in Isafjordur, I was able to make inquiries with fisheries managers about Greenland sharks (*Somniosus microcephalus*). Fortunately, only two of these ancient and remarkable titans of Arctic waters were landed last year. They are processed into Iceland's national dish Kaestur hakari (fermented shark), labelled by food critic Anthony Bourdain as "the single worst, most disgusting and terrible thing" he ever tasted. And for good reason! Like other elasmobranchs, Greenland shark flesh contains considerable amounts of ammonia. This is processed out of the strips of dried flesh by burying the catch in the ground to ferment for months. Hakari was an important staple of early Viking settlers, but has limited appeal to adventurous tourists today. We know from their descriptions that eating it is like "chewing a urine-soaked mattress." What we don't know is enough about the life history of this ancient, fascinating and slow-reproducing fish to understand what effect we might be having on its population.



*Greenland shark being cleaned dockside*

**NOTE:** Special thanks to Brittany Manley and Adventure Canada for making this opportunity possible, and Dr. Pam Damon and Professor Trish McLeod of Vancouver, Canada for their contributions to the research.

*Kid's Corner***Boyan Slat and the Dr. Seuss Cat***by Gail Noren*

When I first heard of Boyan Slat I thought about “The Little Dutch Boy,” a story about the boy who became a hero in Holland when he plugged a hole in the dike with his finger, saving his town. However, that’s a made up story while Boyan Slat is a real, live Dutch boy. But before I go on about him, I wonder if you remember the part in *The Cat in the Hat* when the fish said,

. . . *this mess is so big*  
*And so deep and so tall,*  
*We can not pick it up.*  
*There is no way at all!*

“Yes, yes,” I hear you saying, “but what does it have to do with Boyan Slat?” Okay, okay! In 2011, while diving in Greece, Boyan saw more plastic bags than fish! If you think he was exaggerating, you should know that Ellen MacArthur predicted there would be more plastic than fish in the sea by 2050! You never heard of Ellen MacArthur? Well, she dreamed of being a sailor when she was four. And she saved her lunch money to buy her first boat. In 2005, she broke the record for sailing alone nonstop around the world, so you know she’s spent a lot of time on the ocean. If Ellen says we’re headed for a sea full of more plastic than fish, we probably are. In fact, do you know about the Great Pacific Garbage Patch? It’s a HUGE hunk of trash, mostly plastic, floating in the ocean!

*Boyan Slat*

There are actually FIVE ocean garbage patches, but the Great Pacific is the largest. It floats between Hawaii and California and measures over twice the size of Texas! Before you ask again what this has to do with Boyan Slat, I’m going to tell you! Boyan wondered what anyone was doing about all the plastic in the oceans. But everyone pretty much shrugged as if to echo the Dr. Seuss fish, “This mess is so big and so deep and so tall, we can’t pick it up; there’s no way at all!” Boyan, who dreamed of cleaning up the ocean since he was sixteen, disagreed.



Boyan Slat dropped out of college to study the problem. He didn’t know if he could solve it, and all those negative voices saying he couldn’t certainly didn’t make the task any easier, but Boyan figured he had to try. Instead of listening to all the naysayers, he tuned them out the way you turn off the television when the news is too depressing. Then he set out to clean up the ocean.

If you remember *The Cat in the Hat*, you know the cat came back with a crazy contraption—a modern invention—that actually DID clean up his big mess. And guess what! After more than seven years of

ignoring the pessimists, Boyan Slat and his employees measured the problem, designed a contraption to remove the plastics from the ocean, and raised enough money to get it started.

The important point Boyan makes is: **When you make a mess, you clean it up!** That's true in your home, friends' homes, school, the park, and everywhere else; why should the ocean be any different? We don't dump garbage into OUR living rooms! The ocean is HOME to fish, corals, octopuses, whales, penguins, sea lions, dolphins, and sharks, among many other animals. How do you think they feel about the trash we keep tossing into their home? Sea turtles eat plastic bags that they mistake for jellyfish. Eating plastic bags kills turtles. When plastics break down into tiny pieces, called microplastics, marine animals ingest them. Therefore, it's no surprise that scientists have discovered microscopic pieces of plastic in the seafood we eat. Consuming plastic is not safe for anyone. Everyone agrees on that, but we don't agree on how to get all the plastic out of the ocean.



Even if Boyan Slat's invention works, which many people have doubts about, it's not going to fix the problem anytime soon. It's going to take years and years, decades even, to remove all the plastic from the sea. And what are we going to do with all that plastic trash? We need to stop polluting with plastic to begin with! Ellen MacArthur is one of many people working on that problem. What can YOU do to help make the ocean healthy again for all animals, including humans? Perhaps you have a dream of your own. Perhaps like Boyan Slat, you aren't afraid of failure and you never give up. Listen to Boyan's TED TALK. Watch him on YouTube. Then tell us what you think. Will his invention work? We would love to hear from you.

If you love the earth, if you love the ocean, if you love the animals and plants that live there, if you love stories about kids who never give up, if you have a dream of your own, be inspired by Boyan Slat.

What can YOU do? Observing and researching is how scientists begin to solve problems.

Here are some online articles to start your research:

<https://www.businessinsider.com/great-pacific-garbage-patch-view-study-plastic-2018-3>

<https://medium.com/@simonpaulsutton/boyan-slat-the-largest-clean-up-in-history-bc3a6d4d2b34>

<https://mnn.com/earth-matters/wilderness-resources/blogs/remember-kid-who-invented-way-clean-ocean-plastic-hes-back-and-its-happening>

<https://www.fastcompany.com/40419899/boy-genius-boyan-slats-giant-ocean-cleanup-machine-is-real>

<https://www.theguardian.com/business/2016/jan/19/more-plastic-than-fish-in-the-sea-by-2050-warns-ellen-macarthur>

<https://www.theguardian.com/environment/2017/dec/30/ellen-macarthur-its-shocking-its-horrendous-fight-against-plastic>

<https://www.theoceancleanup.com/system001/?>

[utm\\_source=newsletter&utm\\_medium=email&utm\\_campaign=toc\\_system001&utm\\_term=web&utm\\_content=button\\_system001\\_08-08-2018](https://www.theoceancleanup.com/system001/?utm_source=newsletter&utm_medium=email&utm_campaign=toc_system001&utm_term=web&utm_content=button_system001_08-08-2018)

<https://conserveturtles.org/information-sea-turtles-threaes-marine-debris/>

## Summer Fossil Shark Tooth Hunts



Week after week, our summer fossil shark tooth hunts were rained out. By the weekend of August 18-19, we had 94 people waiting to join a hunt. Morning and afternoon sessions were scheduled for Saturday and Sunday. Then a wild summer storm Friday night threatened postponement again. But Saturday morning brought blue skies. And best of all, the torrential rain had washed countless fossils out of the cliff and into the brook.

Marie Levine coordinated the Saturday hunts while Heather Cifuentes and her team led the Sunday sessions. *Everybody* found fossils! Goblin shark teeth, angel shark teeth, crow shark teeth, thresher shark teeth, crinoids and bryzoans, belemnites, fossil oysters, scallops, clams, gastropods and *Inoceramus*, an extinct bivalve. Also found was a mammal jawbone and the tooth of a mosasaur, a large marine reptile.



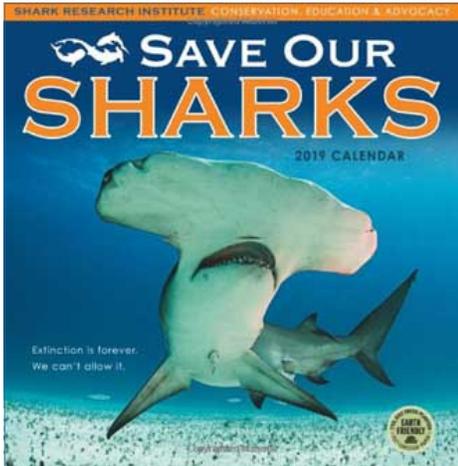
Alex and Lana show off some of their fossil finds



"This is so cool," said Sandra Gilian. "With each fossil I find, I feel like I am reaching back through time to touch a specific animal that lived millions of years ago!"

The last fossil shark tooth hunt of the season will be held on October 7th. To register, be notified of upcoming fossil shark tooth hunts, or arrange a trip for a class or scout troop, email [info@sharks.org](mailto:info@sharks.org) with "fossil shark tooth" hunt in the subject line.

## Shark Research Institute 2019 Wall Calendar



Each month the SRI wall calendar features information about a different shark and a stunning 12" x 12" photograph of the shark by SRI members: Michael Aw, Vince Canabal, Amanda Cotton, Alessandro de Maddalena, David Doubilet, Mike Gerken, Amos Nachoum, Matt Potenski, Lesley Rochat, and Paul Spielvogel.

The calendar lists US and Canadian legal holidays, phases of the moon, and important observances of the world's major religions. It is printed on paper sourced from a combination of sustainably managed forests and recycled materials, and published by

Amber Lotus, an independent carbon-negative US company that has planted more than half a million trees since 2008.

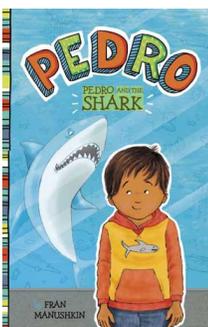
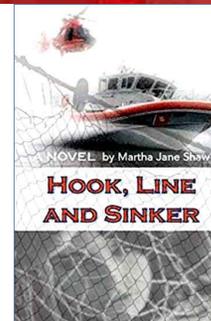
The calendar is \$14.99 at Barnes & Noble (online & in stores) and Amazon.com. Your purchase supports the Shark Research Institute's efforts to promote shark and ocean conservation.



## Members Bookshelf

**Hook, Line and Sinker** by Martha Jane Shaw, \$20 paperback, \$2.99 Kindle from [Amazon.com](http://Amazon.com).

PhD candidate Natalie Scott has only months left to turn in her thesis, when something fishy happens to her data. Pacific bluefin tuna, the subject of her research, have dropped off the radar. When Natalie takes drastic measures to solve the mystery, she is caught in a global web of scandal spanning the far reaches of the ocean. The action takes you from La Jolla to San Diego Harbor, to the Bering Sea, to Rio de Janeiro, to a tuna conference in Paris, and to Tokyo's Ginza District where bluefin tunas are worth their weight in gold. While this novel is fiction, the threats it describes that face the Pacific bluefin tuna population are all too real.



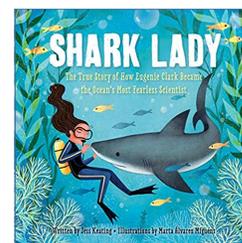
**Pedro and the Shark** by Fran Manushkin. \$5.95 paperback from [Amazon.com](http://Amazon.com).

Pedro is excited about his class trip to the aquarium. But his class disappears when he's not paying attention, leaving him alone with a shark! Sealife comes to life in this easy-to-read chapter book.

The author, Fran Manushkin, a long-time member of SRI, is one of the most successful authors of children's books today. Kids in her books address problems that kids have to deal with, from bullying to getting the flu. Especially popular are her *Katie Woo* series and the *Pedro* series. Other popular titles include *Baby, Come Out!*; *Happy in Our Skin*; *The Tushy Book*; *Big Girl Panties*; and *Big Boy Underpants*.

**Shark Lady: The True Story of How Eugenie Clark Became the Ocean's Most Fearless Scientist**, by Jess Keating, illustrated by Marta Alvarez Miguens. \$11.77 from [Amazon.com](http://Amazon.com)

An inspiring story about finding the strength to discover truths that others aren't daring enough to see. Includes a timeline of Eugenie Clark's life and many fin-tastic shark facts! *Named a Best Children's Book of 2017 by Parents Magazine!*



*You can support SRI every time you shop on Amazon. Simply go to AmazonSmile, choose Shark Research Institute as your charity, then make your purchase. No additional cost is added to your purchase but Amazon donates a percentage of the cost to SRI.*

## Upcoming Events

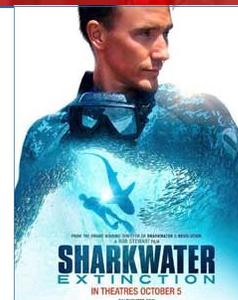
**October 5, 2018: Sharkwater Extinction** opens in the USA. This is the film our late Advisory Board Member Rob Stewart was working on when he perished during a deep dive off Florida.

**October 7, 2018: Fossil Shark Tooth Hunt** in Big Brook, NJ. Contact [info@sharks.org](mailto:info@sharks.org) to register. \$10 per person or \$20 per family. Free to children and SRI members.

**November 14-17, 2018: DEMA Show 2018** - Las Vegas, Nevada. This is the largest diving show in the world, bringing together around 650 exhibitors. It is only accessible to professionals of the scuba diving industry.

**November 15, 2018: Winter Auctions:** See [www.sharks.org](http://www.sharks.org) for links into auctions.

**November 30-December 8, 2018: Djibouti Expedition:** see page 13 of this newsletter.



## The AFUERA

### *The Great Massing of Whale Sharks in the Caribbean*

### July and August 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 [info@sharks.org](mailto:info@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 RESEARCH EXPEDITION***

**November 30 to December 8, 2018**

Join this expedition led by SRI Director of Science and Research, Dr. Jennifer Schmidt to study the whale sharks that aggregate in the Gulf of Tadjoura. Djibouti hosts a fascinating aggregation of the youngest whale sharks found anywhere; most sharks are between three and five metres in length, with two metre animals occasionally seen.

Participants will act as research assistants, documenting the whale sharks by photo identification, collecting and analyzing plankton samples, and observing night feeding behavior. Research goals are to understand where these animals come from, why young sharks congregate in this area, and where they go when they leave.



Our home for this liveaboard expedition is the *M/V Deli*, a Turkist 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. Payments made through PayPal will incur an additional \$50 per person processing fee. All payments are non-refundable, and both trip and dive insurance are required.

**INCLUDED:** Shared accommodation on the boat, double occupancy hotel for the nights of November 30<sup>th</sup> and December 7<sup>th</sup>, all meals onboard the ship, hotel and port transfers, and a tax-deductible donation to the Shark Research Institute.

**NOT INCLUDED:** Airfare, Djibouti visa, soda and beer, and meals off the ship.

*Post-expedition excursions may be arranged 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. Don't miss this unique wildlife experience to a stark and beautiful corner of the world.

For more information or to reserve your space, contact expedition leader:  
Dr. Jennifer Schmidt at [Jennifer@sharks.org](mailto:Jennifer@sharks.org)

## Cage Diving Off Limits in New Zealand

New Zealand's Court of Appeals has ruled shark cage diving is an offense under the Wildlife Act and the director-general of Conservation has no power to authorize the activity. The ruling ends a long running legal skirmish between Stewart Island Pāua divers, the Department of Conservation and two companies: Shark Dive New Zealand and Shark Experience. Paua Industry Council chief executive officer Jeremy Cooper welcomed the decision, saying, "having sharks primed and ready to hurt people is not good." "Sharks were increasingly likely to approach boats and people in the water since the diving began," said a Stewart Island tour operator. "We've noticed a change in behaviour, definitely. I think the sharks come first ... they should be left alone." (Paua is known as abalone in other countries.)

## White Shark Behavior

Huveneers, C, Watanabe Y, Payne NL, Semmens JM. (2018) **Interacting with wildlife tourism increases activity of white sharks.** *Conservation Physiology*, 6:coy019.  
[DOI:10.1093/conphys/coy019](https://doi.org/10.1093/conphys/coy019)

Wildlife ecotourism is a rapidly growing activity that can be financially quite lucrative. Shark tourism, swimming or diving with sharks and rays, is a significant component of the wildlife ecotourism market. In the perfect situation, shark ecotourism helps ensure the animals' protection, by redefining them as an income-producing living resource. Well-managed tourism operations endeavor to have minimal effect on the natural behaviors of the animals involved, but this can be difficult to assess. Particularly for sharks, who may interact only briefly with tourists, it is hard to know the overall tourism impact on their health and survival.



Andrew Fox

Working in South Australia, the authors investigated the effects of cage-diving ecotourism on white shark behavior. They fitted 10 white sharks (*Carcharodon carcharias*) with data logging tags that could measure location, depth, temperature, swimming speed, and acceleration as gauged by tail beat frequency. The tags were left on the sharks up to nine days, during which time the animals interacted with three dive operations in the area. Two operators use bait to attract the sharks, but as feeding the sharks is prohibited by law, they do not allow the sharks to eat the bait. A third operator uses sound to attract the sharks without a food source.

The tag data obtained showed that the amount of time individual sharks interacted with the diving operations varied greatly with some animals present the entire time a cage was in the water while others spent little time at the cages. The authors found that several measures of shark activity were increased during time spent at the cages when compared with behaviors away from the tourism area. Overall body acceleration and burst (a sudden and dramatic increase in speed) were both increased when sharks were present in the dive tourism areas.

Acceleration was increased by 61%, and the number of burst events increased between 10 and 60-fold. Such increased activity could exert a metabolic toll on the animals, particularly for frequently interacting sharks. This energy expenditure is not compensated by feeding on baits and may additionally distract the animals from regular hunting behavior. Further studies will refine the energetic toll that white shark cage diving operations take on this species.

## Behaviors of Basking Sharks

Gore M, Abels L, Wasik S, Saddler L, Ormond R. (2018) **Are close-following and breaching behaviours by basking sharks at aggregation sites related to courtship?** *Journal of the Marine Biological Association of the United Kingdom*. DOI:10.1017/S0025315418000383



Youn Jacob

Basking sharks are the world's second largest shark, after the whale shark, and can reach 8 m in length. Unlike the more tropical whale shark, basking sharks occur in northern and southern temperate waters. They migrate seasonally, with largely regional movements, and aggregate in the boreal summer off the coast of Britain and Ireland. Up to 200 individuals have been seen at one aggregation, though numbers of 10 to 20 are more typical. At their aggregation sites, basking sharks are sometimes seen closely following one another, or swimming side by side, which have been suggested to

be pre-mating behaviors. Basking sharks at aggregations will also occasionally perform full breaches, coming entirely out of the water

It has been proposed that breaching is also involved with reproduction, perhaps signaling a readiness to breed to potential mates. Little is known about reproduction in the second largest shark. As with the whale shark, basking shark mating has not been observed, nor has a female been seen giving birth. Any information about breeding behaviors would further the understanding of this species.

Detailed observation and drone video footage have now shed some light on the meanings behind these potential mating behaviors. The authors observed basking shark behavior off Scotland over a four day period, using snorkelers in the water to determine the sex of the animals by the presence or absence of claspers. They found that individuals would often swim purposefully toward another shark and stay near that individual for a period of time, indicating these behaviors are directed and not random interactions within a group of individuals. Interestingly, however, there was no correlation between the sex of the co-swimming individuals, i.e. these cannot be mating behaviors. Breaching was also found to be unrelated to sex, or to the presence of other sharks nearby. While it cannot be entirely ruled out that basking shark feeding aggregations serve a reproductive function, the specific behaviors examined are not breeding-related. The authors propose that individuals may follow one another for hydrodynamic benefits that reduce water resistance, similar to birds flying in formation. Swimming side by side may also be advantageous for feeding, as planktonic organisms evading the leading shark can be caught by the second animal.

## Movements of Young White Sharks Along the East Coast of the USA

Curtis TH, Metzger G, Fischer C, McBride B, McCallister M, Winn LJ, Quinlan J, Ajemian MJ. (2018) **First insights into the movements of young-of-the-year white sharks (*Carcharodon carcharias*) in the western North Atlantic Ocean.** *Scientific Reports* 8:10794. DOI:10.1038/s41598-018-29180-5

Population numbers of Atlantic white sharks have begun to increase after years of conservation measures. This is great news and provides scientists with additional opportunities to study these animals. One unanswered question about white sharks, about most shark species actually, is the habitats used by newborn and first-year (often called young-of-the-year or YOY) sharks. Researchers know far more about the lives of adult animals than about a shark's first year. To help understand these young animals' movements, Curtis et al applied satellite and acoustic tracking tags to ten YOY

white sharks off Long Island, NY in August. Previous data had indicated a population of YOY white sharks in this area during the boreal summer. Monitoring of the tagged sharks between August and October (2016) showed that they remained resident in the New York Bight, the continental shelf area between New York and New Jersey. The sharks generally stayed within 20 km of Long Island, in waters between 5 and 75 m deep. By October, tags of five sharks were still providing data and showed these animals moving south along the shelf. They arrived at an apparent overwintering ground off the coast of North Carolina by December and remained in that area for several months. In May of the following (2017), three of the five sharks began moving north again. Only one tagged shark could be followed throughout the return migration. That animal had returned back to Long Island by the end of May and continued to a position along the coast of Massachusetts in June. The New York Bight and coastal waters between New York and North Carolina represent key habitat for YOY white sharks and fulfill the established criteria for a nursery area. Similar coastal north-south migrations of YOY white sharks have been observed off California and Australia, suggesting such seasonal loops are a characteristic of the species.

### Plastics in Blue Sharks

Bernardini I, Garibaldi F, Canesi L, Fossi M, Baini M. (2018) **First data on plastic ingestion by blue sharks (*Prionace glauca*) from the Ligurian Sea (North-Western Mediterranean Sea).** *Marine Pollution Bulletin* 135:303-301. DOI:10.1016/j.marpolbul.2018.07.022

Anyone concerned about marine ecosystems is aware that ocean plastic pollution has reached catastrophic scale. Marine species are increasingly trapped, sickened or killed by plastic entanglement and ingestion. Plastic in the throat or stomach can block feeding and nutrient uptake, and many plastics release chemicals that are believed to be harmful. Plastic effects on marine mammals and sea turtles have received the majority of scientific study and media coverage, but sharks are also exposed to plastic hazards.



Mark Conlin/NMFS

The blue shark is a wide-ranging pelagic shark; it is found in all oceans and from the surface to depths of more than 600 meters. Despite being one of the most common of the large sharks, the blue shark is in danger from overfishing and bycatch. It is listed as Near Threatened globally by the IUCN, but the restricted Mediterranean Sea population is considered Critically Endangered. Bernardini et al asked to what extent a previously uncharacterized threat, ocean plastic toxicity, is a concern for the management of Mediterranean blue sharks. They studied blue sharks in the Western Ligurian Sea, off the Italian coast, where they worked with fishing vessels to analyze the stomach contents of 139 sharks over a 15-year period. Sharks sometimes empty their stomachs upon capture. Of the 95 sharks with food in their stomachs, plastic items were found in 25% with between one and 30 items per shark. Juveniles had more plastic per individual than did adult blue sharks, perhaps because they are naïve to what constitutes proper food sources. Most of the plastic fragments were polyethylene mesoplastics, between 5 and 25 mm in size, and were colorless and “sheet-like.” Sheet-like plastics are components of disposable grocery bags, and food and package wrapping, and are the most abundant type of plastic pollution within the Mediterranean Sea. The lack of a standardized nomenclature for ingested plastics make it difficult to compare studies, but the finding of plastic in the stomachs of 25% of animals exceeds nearly all other analyses of plastic ingestion by sharks. The authors speculate that such high levels of plastic ingestion may result from feeding in the upper levels of the water column, where plastic collects, or from acquiring secondary plastics by eating affected prey.

## Shark Shop



SRI shirts from **Bonfire.com** in a variety of sizes (from youth to adult XL), more colors and new styles including tank tops, unisex, womens slouchy, womens slim fit, V-neck and pullover hoodies.

Order the shirts through our Facebook page or <https://www.bonfire.com/shark-research-institute-campaign2/>

Shipping dates vary depending upon when your order is placed but your shirts usually arrive within three weeks.



And our **Café Press** store is now open. Show your love of sharks and support of the Shark Research Institute with our cool new logo gear. Available are mugs, glasses, smartphone cases, hats, toys, clothing, blankets, pillows, and much more.

Shop now at: <https://www.cafepress.com/SharkResearchInstitute>

For a unique 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>



With summer winding down there is still plenty of shark fishing and surf fishing from swimming and surfing beaches. These activities attract marine predators, possibly putting people at needless risk.

Recognizing that some municipalities still permit such activities, SRI member Jerry Taggart designed a series of **Warning Flags** to alert marine resource users when these hazards are present. For more information for your local officials about how to order the flags, email: [tagchum@gmail.com](mailto:tagchum@gmail.com)

Would you like a guest speaker at your company, restaurant, Rotary Club meeting, dive club, school, or scout group? Would you like one of our staff to teach students about careers in marine science, to lead a field trip for your class, instruct students on how to use a seine net, or help organize a beach clean-up?

Contact SRI at [info@sharks.org](mailto:info@sharks.org)

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