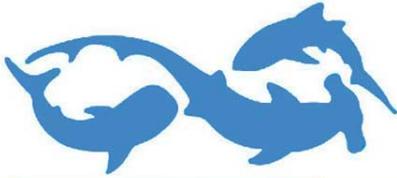


Newsletter



Shark Research Institute Global Headquarters
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Injuries to Whale Sharks

By Jennifer Schmidt, Ph.D.

Whale sharks are filter feeders that aggregate where abundant food is available. Planktonic organisms such as copepods, tiny shrimp and fish eggs float on the ocean surface, massing in areas where currents meet. Whale sharks target these areas, spending weeks or months feeding at the surface. They are charismatic animals that present no threat to humans, and the ease with which they can be seen has led to lucrative tourism in many countries. When properly regulated, whale shark tourism can provide an economic benefit to keeping whale sharks alive, even in countries where they were historically fished.



Whale shark with severe propeller injury to first dorsal fin

Photo courtesy Iain Leighton

The surface-feeding strategy of whale sharks, however, exposes them to potential injury. Slow-moving whale sharks are an easy target for legal and illegal fisheries, and they suffer attacks by their only natural predators, large sharks and orcas. Whale sharks are also vulnerable to collisions with boats, and the most commonly seen injuries are from boat propellers. As whale sharks migrate between feeding sites they cross major shipping lanes, and whale shark tourism puts additional boats at aggregation sites. Strikes by large ships are rarely documented, and are assumed to result in the death of the animal. Strikes by small boats result in lacerations and/or amputations from the propeller, most commonly along the back of the shark or the caudal fin. Ship strikes are not only recent hazards for whale sharks; in 1937 Gudger reported a whale shark killed by a large ship off Sri Lanka.⁽¹⁾ Shipping traffic and the size of ships has increased over the decades, however, and large and small fishing boats ply nearly all waters.

A significant percentage of animals at every aggregation site studied shows propeller injuries. In Djibouti, 65% of animals had injuries that appeared to be due to boat strikes or fishing gear.⁽²⁾ In the Red Sea, 27% of sharks showed severe lacerations and amputations that were attributable to boat propellers.⁽³⁾ A study of several Indian Ocean sites found that all sharks had significant levels of scarring, but with different causes. In the Seychelles aggregation, 45% of whale sharks had major scars, while in Mozambique 23% had scars. At both sites, most of the injuries were due to boat propellers. Only 23% of Australian whale sharks had scars, and the most common cause was bites from predators.⁽⁴⁾ It is important to ask if the incidence of boat strikes on whale sharks is increasing with growing tourism. Few studies have addressed this question, but one group found increasing whale shark injuries in the Atlantic Ocean off Mexico.

In 2005 researchers saw that 13% of sharks had scars. In 2006 the number rose to 26%. In 2007 it was 33% and in 2008 it was again 26%. The apparent increase in injuries at this site correlates with a rise in local ecotourism, though this has not been proven to be the cause.⁽⁵⁾ It is important to remember that whale sharks are migratory, and

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without direct observation it is impossible to know where in its travels a shark was injured. Whale sharks also suffer subtler anthropogenic injuries. In Indonesia, where sharks feed from fishing nets, they show scarring around the mouth that appears to be damage from rubbing against the nets.⁽⁶⁾ Some sharks in Mozambique show scars suggesting entanglement in nets, either by accident or from unsuccessful capture attempts.⁽⁴⁾ In the Philippines, where sharks are fed by hand from small boats for tourist viewing, they show abrasions to their faces and heads from collisions with the feeding boats (JVS unpublished).

There is evidence that sharks heal quickly from even life-threatening injuries. A whale shark seen in the Maldives was impaled through the abdomen with a wooden harpoon that appeared to be broken inside the shark. This animal was emaciated, with likely internal injuries, but was resighted a year later with both pieces of the harpoon gone and the entry and exit wounds healed.⁽⁷⁾ Off Ningaloo Reef in Australia, a whale shark was seen that had been attacked by another shark. It had multiple injuries, with most of the dorsal fin removed by a single bite.

The same shark was observed repeatedly over time, and one year later the wounds had completely healed.⁽⁸⁾ Several measures can reduce boat strike injuries to whale sharks if they are consistently employed. Aggregation sites can be designated as protected areas, with reduced traffic and speed limits. Many feeding aggregations are seasonal, so restrictions may be employed only during the whale shark season, to reduce their economic effects. Small boats can also be outfitted with propeller cages, devices that cover the boat propeller and prevent the blades from injuring marine animals. These devices reduce engine efficiency, however, so they are resisted by fishermen unless regulations are enacted.



Shrimp net embedded in whale shark
<https://www.youtube.com/watch?v=h83qz918OTs>

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7. Riley MJ, et al. (2009) **Evidence of continued hunting of whale sharks *Rhincodon typus* in the Maldives.** *Environmental Biology of Fishes* 86:371–374. DOI:10.1007/s10641-009-9541-0
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CITES: An Important Weapon for Conservation

The single most powerful tool to protect threatened species is the United Nations treaty known as The Convention on International Trade in Endangered Species of Flora and Fauna (CITES). The listing of a species on a CITES Appendix carries teeth; CITES decisions are enforceable by all member nations. The delegates to CITES, scientific authorities from 183 nations, will meet May 23 to June 2, 2019 in Colombo, Sri Lanka to decide the fate of many marine species, as well as elephants, rhinos, birds, trees, and other species in danger of extinction. CITES meets once every three years.

SRI has sent our scientists to CITES every year since 2002 and in 2019 we hope to send three of our scientists to the meeting in Sri Lanka. Since 2002, they have presented delegates with peer reviewed scientific evidence which has resulted in international protection for the whale shark (*Rhincodon typus*), basking shark (*Cetorhinus maximus*), white shark (*Carcharodon carcharias*), seven species of Sawfishes (*Pristidae* spp.), Oceanic whitetip shark (*Carcharhinus longimanus*), Porbeagle shark (*Lamna nasus*), Scalloped hammerhead shark (*Sphyrna lewini*), Great hammerhead shark (*Sphyrna mokarran*), Smooth hammerhead shark (*Sphyrna zygaena*), all Manta rays (*Manta* spp.), Silky shark (*Carcharhinus falciformis*), all three species of thresher sharks (*Alopias* spp.), and all Devil rays (*Mobula* spp.).

In Sri Lanka, Mexico is proposing protection for mako sharks, and it will be a hard fight. Nations have until December 31, 2018 to submit proposals so we don't know what other species may be considered for CITES protection. We also have to hold the line to prevent de-listing of other endangered species. Attendance at CITES is expensive (airfares, hotel, required documents for every delegate and UN fees): nearly \$10,000, so we are most grateful for any assistance provided by members or corporations. We wish every one of you could be with us to fight for sharks and other endangered species. What keeps us going? That's easy. Our motivation is two-pronged. First of all is our fiery desire to uphold a compassionate world; like the super heroes you know and love, we at SRI are tireless do-gooders defending our vulnerable animal brethren. The second thing that keeps us fighting against the Evils of the illegal wildlife trade—and yes, that's Evil with a capital E—is the unending support we get from you. So in effect we do take every one of you with us when we go to CITES to battle against ignorance and cruelty. Thank you for the love and support.

To learn more about CITES, visit: www.cites.org

Tackling Beach Cleanups

by Jennifer Schmidt



Each spring and fall, the Texas General Land Office (GLO) organizes the Coastal Cleanup along the nearly 400 miles of the Texas Gulf coast. Readers of this newsletter may remember that the Shark Research Institute adopted a mile of beach near Galveston that is regularly maintained.

Beyond these weekly cleanings, SRI staff and members also participate in the formal GLO events. This fall's

cleanup was postponed by bad weather, but the targeted area on the October 6th "rain date" was the Bolivar Peninsula North Jetty. This popular fishing pier is also a prime spot for birders viewing the adjacent marshes.



A recent stop I made there found more than 20 species of shorebirds, including herons and egrets, sandpipers and plovers, and several individuals of the amazing long-billed curlew. A full day of cleanup could not remove all the accumulated trash at this site, but SRI efforts made a significant difference in leaving the area cleaner and safer for people, birds, and sea life.

Kids' Corner

Red Tide in Florida, Ask a Scientist Interview with Hunter Noren



This child is ready to build a sand castle on a Florida beach. But the water is a rusty color. What's going on? Is it okay to play on the beach when the water is reddish in color? Let's ask marine biologist **Hunter Noren** to explain "red tide" to us.

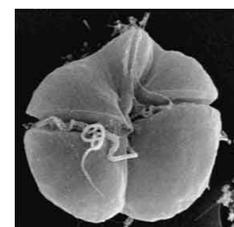
SRI: Hunter, what can you tell us about red tide?

HN: Red tide has been in the news recently because Florida has been suffering from increasingly widespread and devastating red tide events with the current red tide being one of the worst. Red tide is a type of Harmful Algal Bloom (HAB) caused by abnormally high population explosions of dinoflagellate algae.

SRI: That's quite a mouthful. For our readers who want to be scientists someday, click on this link to hear the pronunciation of dinoflagellates:

<https://www.youtube.com/watch?v=KF2JfjOmgUU>

HN: While red tide can be caused by multiple different species of algae, the most common and well known is called *Karenia brevis* which is naturally found in low concentrations throughout coastal waters. However, when large amounts of artificial nutrients are introduced, these tiny algae use those nutrients to replicate at an incredible rate. *K. brevis* can become so dense that they color the water red, hence the name red tide.



K. brevis

SRI: Why is Red Tide Harmful?

HN: Algae blooms happen all the time, both naturally and due to artificial inputs, but the tiny algae that are responsible for red tide have a defense mechanism which is to release a toxin called *Brevetoxin* into the surrounding waters. When there are high concentrations of *K. brevis*, the amount of toxins increases as well. Brevetoxins are capable of killing fish, turtles, seabirds, and marine mammals.

SRI: What marine mammals have been affected? What about sharks and humans?

HN: Manatees and dolphins have been killed by red tides. In July, a 26-foot dead whale shark washed up on Sanibel Island. *Brevetoxin* was found in the shark's muscles and organs, leading scientists to suspect red tide as the culprit in the death of the 26-foot long animal. *Brevetoxins* are also harmful to humans. When the algae are close to shore they can get caught in the waves. Inhaling salty sea air is normally good for people, but ocean water full of these toxins produces a sea spray that causes coughing, shortness of breath and eye irritation in people.





SRI: Can you summarize the impact of red tide for us?

HN: Red tide is very serious. It can kill massive populations of fish and other marine animals. This, of course, has devastating consequences for the ecosystem. In Florida, our beaches and ocean are among our most valuable resources. Beaches covered with rotting fish and sea breezes that cause coughing, watery eyes, and breathing difficulties are beaches that nobody wants to visit. Here are two videos to give you an idea of the impact: <https://www.youtube.com/watch?v=G-aEtx7dN8M> and <https://www.youtube.com/watch?v=0QEEkKbbChs>

SRI: How can we reduce red tide?

HN: While red tide is naturally occurring, there are things we can do to decrease the extent and severity of red tides. A portion of the fertilizers that we use on our lawns washes off and enters our oceans where it feeds algal blooms. By reducing our fertilizer usage and especially by not fertilizing during heavy rains, we can reduce the HABs. While we can reduce personal nutrient inputs, it is also important to consider who we elect and whether or not our elected officials are committed to protecting our waterways.

SRI: Back to the child in the picture, is it okay to stay and play on the beach when the water has a reddish color?

HN: It's not a good idea. However, if you are planning to visit a Florida beach, you can check the FWC website for the current status of red tide:

<http://www.myfwc.com/research/redtide/statewide/>

Red Tide in Florida



Hunter Noren has been a supporter of SRI for more than a decade, writing essays for our newsletter and donating items to raise funds for research and education. He will have a Q&A section on our new website that will go live later this year.



Small Scale Shark Fisheries of the Southeast Pacific

by Dave Grant

This past spring, I sailed the Pacific Coast to survey catches by local fishermen, and visit a variety of fish markets and landings in coastal towns and cities. Departing from Cabo San Lucas on the tip of Baja, Mexico, our last harbor was 2,300-miles south at the commercial port of the coastal town of Paracas, Peru.



A pangas beached for repairs

Two types of shark fisheries operate in this region. The so-called artisanal fishermen operate small, open, outboard boats called *pangas*, while the larger industrial outfits operate longline fishing vessels that mainly target pelagic sharks.

During the month-long transit, I visited a dozen seaports and found fishes, fishers and sharks at every spot. Marketplaces revealed much about the local economy due to their proximity to the rich upwelling waters of the Humboldt Current south of the Equator where, historically, about 20% of the world's annual catch is landed. Although the bulk of Pacific landings are the

industrial harvest of anchovies and sardines for fishmeal, these forage fishes support an extremely rich ecosystem of predatory fishes like tuna, billfishes and sharks, as well as the world's greatest diversity of seabirds.

Most of Mexico's large-scale industrial fleet is based in the Gulf of California. It relies on large vessels deploying purse seines and long-lines to harvest large pelagic species like sharks as well as forage fishes like sardines and anchoveta (a small anchovy). Scattered among these commercial operations are thousands of locals in much smaller boats, setting traps, beach seines, gill and cast nets, and of course, hand-lines. These small-scale, low tech fisheries account for about 97% of the marine fishing fleet. Their catch is significant and tends to be marketed locally. Coastal fisheries throughout Latin America are highly dependent on local resources and are affected by weather extremes like El Nino; while vulnerable to collapse, these small fisheries can also serve as models for gauging impacts of changing climate.



A local net-caster in Oaxaca, Mexico

Owing to local features like the upwelling of nutrient-rich deep waters from the *Papagayo* (offshore winds pouring out from the Caribbean between the peaks of the cordillera that divides the region), the Pacific Coast is more productive. Fishermen on the west coast and the Gulf of Tehuantepec land more than twice the tonnage of those on the Caribbean and Gulf coasts.

Inshore, demersal fishes and shrimp are typically sold in small shops and individual stands at docks and beachfronts. Like business-minded fishermen (and fisherwomen) everywhere, local fish mongers here

proudly display their catches of inshore species like mullet, mackerel, octopus and shrimp, oftentimes accompanied by a local mariachi band. The festive atmosphere made it easy to get photographs and answers about catches.

Farther south, I encountered large commercial markets with one of the biggest and most interesting on the waterfront next to the old town in Panama City. Taking pictures required some dumpster diving! I also purchased lunch for my guide, a young entrepreneur who interpreted fish names. Perusing the market is akin to a semester's course in fisheries biology as they harbor a wide variety of inshore and offshore fishes, shellfishes and sharks. None had heads or fins, so identification was problematic.



The main fish market in Panama City, Panama



Local greeters at Manta, Ecuador

Ecuador is the fishing capital of the Southeastern Tropical Pacific, harboring the largest tuna and artisanal fisheries in the region. There are over 230 fishing villages and ports along the coast employing over 60,000 workers. These small-scale operators take about 93% of the total tonnage of sharks that are harvested in the area by all methods.

Manta bills itself as the “tuna capital of the world” and secures Ecuador's place as a major exporter of fish. Queued up at the quay is a continuous line of trucks loading the catch from tuna purse seiners. My biggest challenge was leaving the port and running the gauntlet of taxi drivers insisting on diverting me to the tourist bazaars. However, a mile down the beach I spotted a cloud of vultures and frigatebirds—

sure sign of an outdoor market—where I was met by two locals offering their catch.

The market had a tremendous assortment of fishes and shellfishes, and of course, a great quantity of scombrids (tuna and mackerel), but the real action was on the beach where some large sharks were being auctioned off. Again, these were already butchered, making identification challenging but surprisingly, some had tail portions piled nearby.

In the culinary sphere of *yú chī tang* (Chinese shark fin soup), the most valuable parts of the shark are the first dorsal, pectorals and lower lobe of the tail. The “chips”—second dorsal, anal and ventral fins—sell for less. The upper lobe of the tail, containing no fin “needles, is the least marketable. It quickly became obvious that anyone not bidding was not particularly welcome to eavesdrop or question the buyers or sellers, so I retired back up the beach to share a hot bowl of *sopa de mariscos* with the wake of vultures lurking overhead.



Shark auction—Manta, Ecuador



Local fishermen diving in the Ballestas Islands

thresher (*Alopias vulpinus*), and the angel shark (*Squatina californica*) represent 98% of total shark landings.

The commercial port is off limits, but I was able to pick the brain of a local captain who moonlights by taking tourists out to the guano islands to see the *Guanayes*, the seabirds that Robert Cushman Murphy called “the most valuable bird in the world.. The late NJ writer, environmentalist and SRI Trustee, Dery Bennett used to joke that “a fisherman knows everything there is to know...just ask him!” Our skipper was no exception. Guarded about shark harvesting, he provided a wealth of information about the local ecosystem.



Trawler, long-liner and panga at Paracas, Peru

He did volunteer that they take primarily blue sharks locally, referring to them as “*Diamantes*,” reflecting their market value. They make up over 42% of the catch, followed by shortfin mako (20%) and smooth hammerhead (15%). He remarked that they are sold for *medicina*, which I assume referred to fins for the Asian markets. He spoke freely when I quizzed him about the ecology of local sharks, but dismissed as myth the surfers’ tales of a legendary giant white shark that haunts the coast. He did point out that warmer waters during El Ninos attract *toro* (bull sharks) to the area. I ended the boat tour with a wealth of information.

While weaving through the impromptu marketplace of local goods that always forms around the gangplank as I prepared to board ship for the last time, I met a delightful pair of students displaying jewelry from a charity that employs disabled youth (www.sumaqui.pe). I was happy to spend my last Peruvian *sols* on a very worthwhile cause before heading home.

Spotlights on our Members



The World Wildlife Fund has named long-time SRI member **Barbara Beck** as the 'action figure' in their November 2018 issue of *World Wildlife Magazine*. Below are excerpts from the article. We think Barbara is pretty terrific too!!

Why do you feel connecting people and nature is important? I was lucky to feel connected to nature at an early age, and as a result I have always cared about wildlife, the environment, and the future of the planet. I know many people haven't had similar experience and feel disconnected from the natural world. I hope, in some small way, my actions can help fix that problem. Getting people involved and encouraging them to make small changes in the way they live and the resources they use can also have an impact. Seemingly small changes—from minimizing the use of plastics to using energy efficiently—make a difference when embraced by many people. Each of us has the power to make good things happen.

What gives you hope for the future of the planet? I've traveled all seven continents, from Africa to Antarctica to the forests of Pennsylvania. I have seen how people light up when they connect with nature. Not only that, but there's a groundswell of good intent to protect our planet. On social media and other platforms, grassroots movements are mobilizing thousands in support of conservation. We are not apathetic. We do care about the fate of nature, and we're taking action to protect it.

Barbara has always tried to live her life in a way that helps the planet and recently started bee-keeping. If you have a Save-Our-Sharks t-shirt (see Shark Shop on page 18) you are wearing one of Barbara's designs.

The Siena International Photo Awards (SIPA) is a photographic competition with the highest international participation. In 2018, nearly 48,000 images were submitted by amateur and professional photographers from 156 countries.

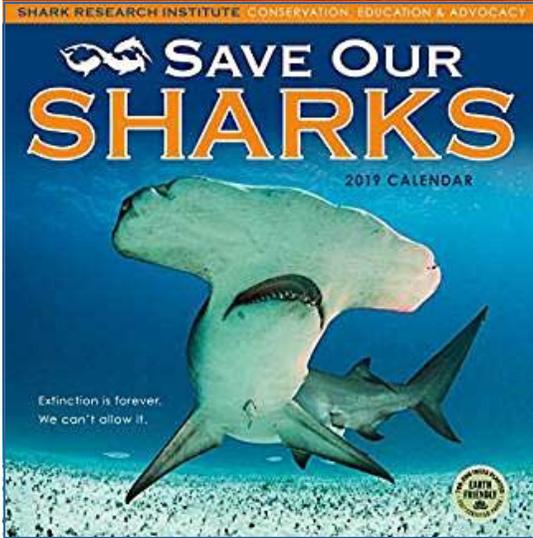
"Facing Reality" by SRI member **Amos Nachoum** took first place in Animals in the Environment!

Amos is a member of SRI's Advisory board and is the owner of Big Animals Expeditions. He has been one of our strongest supporters for more than two decades. To see more of his images or join one of the superb expeditions he offers, see: www.biganimals.com.



NOTE: SRI Director of Media Production Lesley Rochat will be leading one of Big Animals expeditions to South Africa's Sardine Run from July 10-21, 2019. If you book a space on her expedition through SRI, you will receive a 10% discount on the land and sea cost.

Shark Research Institute 2019 Wall Calendar



SRI's **Save Our Sharks 2019 Wall Calendar**. \$14.99 at Barnes and Noble, \$11.21 at Amazon.com. Elegant, mighty, and majestic, sharks glide silently through their underwater kingdom. Often misperceived as aggressive and fearsome, these graceful giants are in fact social, intelligent, curious, and playful. 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 along with their commentaries about their subjects and insights into the urgent need to protect sharks.

The frameable, art book-quality images are printed on recycled paper using soy-based inks. Featuring American and Canadian legal holidays, phases of the moon, and important observances of the world's major religions, the calendar is published by Amber Lotus, an independent, carbon-negative company. You can feel good about your purchase by sharing the company's commitment. They proudly boast: We planted 100,000 trees in 2017 which increased our total number of trees planted to 750,000. The trees planted in 2017 are about 42 times greater than the estimated 2,357 trees used to produce our 2017 product line...We have committed to planting an additional 50,000 trees in 2018." Buying the calendar supports SRI's efforts. In fact, go to AmazonSmile, choose Shark Research Institute as your charity, and support SRI each time you shop on Amazon! Nothing is added to your total, but Amazon will donate a percentage of its profit on your items to SRI.

Sea Stories told at the Explorers Club



Drs. Mauricio Hoyos Padilla and Dean Fessler, Deputy Director of SRI. At right, freediver Meghan Heaney-Grier, who established the first US freedive record for both men and women in the constant weight category in 1996, Dean, and Mark Fowler, the Explorers Club VP for Conservation, Wildlife, and Sustainability.

New York City, November 10th: The Explorers Club hosted its annual Sea Stories, an event focused on exploration, conservation, scuba diving, shipwrecks and marine life. Speakers included: Explorers Club VP Mark Fowler; freediver Meghan Heaney-Grier; Richard Lungren, one of Europe's most experienced divers and underwater videographers, who told of exploring *Mars the Magnificent*, a Swedish warship sunk in 1564; Jeff Goodreau and Ryan King, who located and explored the wreck of the *SS William H. Machen* in 300 feet of water 75 years after she sank east of New Hampshire and Maine, and Andrew Stevenson, whose research provided a window on humpback whales' mid-ocean, migratory lives as they pass Bermuda. Dean especially enjoyed spending time with his long-time friend and dive buddy, Mauricio Hoyos Padilla, who spoke about his research on the behavior of ten species of sharks across Mexico, including Guadalupe Island, Revillagigedo Archipelago, Clipperton Atoll and the Mexican Caribbean.



Upcoming Events



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

November 27, 2018: SRI Winter Auctions - Need unique holiday gifts? Auction I on Charity Buzz features great dive destinations to Indonesia, Philippines and the Bahamas, art and collectibles. Auction II features more dive trips, art and books. See www.sharks.org for direct links into auctions opening on November 27th.

November 27, 2018: Giving Tuesday. *Please consider donating to SRI programs.*



November 30-December 8, 2018: Djibouti Expedition: Djibouti's Gulf of Tadjoura hosts a fascinating aggregation of the youngest whale sharks found anywhere. Participants analyze plankton samples, observe night feeding behavior and document individual whale sharks using photo identification. The objectives are to understand where these animals come from, why young sharks congregate in this area, and where they go when they leave. This year's expedition is full. If you'd like to join us next year, contact Jennifer@sharks.org.



January 10-12, 2019: Surf Expo. Convention Center, Orlando, Florida. The show features more than 2,000 booths and special events. It is only open to the trade. <https://www.surfexpo.com/>



March 29-31, 2019: Beneath The Sea. Venue: Meadowlands Exposition Center, Secaucus, New Jersey. This is the largest consumer dive and travel show in the USA. Features workshops and seminars, imaging competition, film festival, scholarships. <http://www.beneaththesea.org/>



April 11-14, 2019 ADEX Ocean Festival: Venue: Suntec Convention Centre, Singapore. The largest dive expo in Asia with an estimated 62,000 attendees. Features dive sports goods and accessories, dive travel, presentations from the world-renowned photographers, ocean artists, marine conservationists, scientists, technical divers, freedivers, plus hands-on educational activities for children.

<https://10times.com/adex>

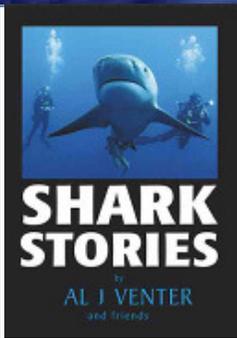
May 4 - 11, 2019: Cathy Church's Underwater Photo Fest. Venue: Sunset House, Grand Cayman. If you really want to learn underwater photography, this is for you! cathychurch.com/index.php/uwoverview/uw-photo-fest

May 23-June 3, 2019: CITES CoP. Colombo, Sri Lanka. www.cites.org
(See page 3)



May 28-31, 2019: Fifth International Whale Shark Conference. Exmouth, Western Australia. The focus of IWSC5 will be bringing together the world's leading whale shark scientists, conservationists, natural resource managers and tourism managers to develop collaborations, explore all aspects of whale shark biology and ecology, and decide how this can translate to direct, on-ground conservation efforts. It is timed to showcase Ningaloo's world's best practice whale shark management program and will follow the Ningaloo Whaleshark Festival, an annual community event that celebrates these magnificent animals.

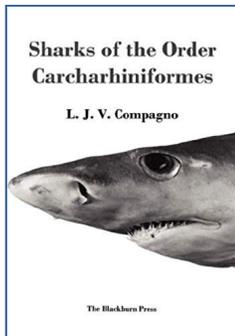
Members Bookshelf



Shark Stories by Al J. Venter. \$28.79 paperback from Amazon.com

Al Venter has been free-diving with sharks for 40 years. The international author known for his war writing now turns his efforts on highlighting their importance to the world's ocean ecosystems. He regards the shark as one of our greatest oceanic assets: remove the shark from the maritime environment and an ecological disaster will follow. For decades, the waters around South Africa have had more sharks--and a greater variety of these predators--than any other coastline in the world. There are several reasons, one being the annual sardine run up the east coast. The sharks draw many South Africans and others from around the world, among them Brad Pitt, Leonardo DiCaprio and King Abdullah of Jordan. Working with specialist divers and friends, as well as world-class photographers, Venter has

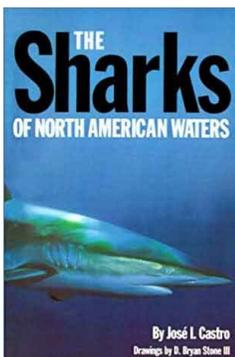
created a book on sharks that is not only instructive but also breathtakingly beautiful and fascinating. Photographers featured include Fiona Ayerst, Morne Hardenberg and the shark warrior Lesley Rochat.



Sharks of the Order Carcharhiniformes by L.J.V. Compagno. \$74.94 hardcover on Amazon.com.

This is a reprint of the book first published in 1988. The book is a general review, taxonomic revision and phylogenetic analysis of the carcharhinoids, the largest group of living sharks, which comprises almost 60% of the known shark species. Students of shark biology have been hampered by the lack of a comprehensive and rigorous account of shark morphology. With this work, Dr. Compagno offers not only the most comprehensive and detailed account of this important group but also one of the most comprehensive modern anatomic and phylogenetic studies on cartilaginous fishes available. It is an essential reference not only for researchers on carcharhinoids but also for those who study other families of sharks and for paleontologists interested in this ancient group of

fishes. The book begins with a general account of carcharhinoid sharks and includes detailed discussions of character systems used in taxonomic and phylogenetic analysis of carcharhinoids, defines the Order Carcharhiniformes, lists its families and includes a taxonomic key to the families, the eight carcharhinoid families and an extended discussion of the phylogeny of carcharhinoids with cladistic analysis of taxa at various levels. The author is currently Director of the Shark Research Institute.



Sharks of North American Waters by José Castro. Four formats available on Amazon.com. For many years, brief encounters between sharks and humans could leave the latter with a vivid memory of the much-maligned fish but no convenient means of identifying it more specifically. With the publication of *The Sharks of North American Waters* in 1983, everyone from the experienced ichthyologist to the weekend angler had access to concise descriptions and accurate, detailed drawings in this handy field guide to more than one hundred species.

All species that have been reported within five hundred nautical miles of U.S. and Canadian shores (plus a few deep-water species from adjacent areas) are illustrated, with summaries of diagnostic characteristics, similar species, geographic range, biology, reproduction, utility, and fishing methods. An illustrated key to the families of sharks, family descriptions, and species characteristics makes field identification simple. Also included is a general account of the evolution of sharks, their anatomy, reproduction, and distribution.

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

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.

SRI Contest: Show us the LOVE

We've gathered eight of our favorite Sylvia Earle quotes. Read them and select one that resonates with you:

1. "Sharks are beautiful animals, and if you're lucky enough to see lots of them, that means you're in a healthy ocean. You should be afraid if you are in the ocean and don't see sharks."
2. "Once you know what you know and see what you see, it's irresponsible not to do what you can to share that knowledge."
3. "No water, no life. No blue, no green."
4. "Why is it that scuba divers and surfers are some of the strongest advocates of ocean conservation? Because they've spent time in and around the ocean, and they've personally seen the beauty, the fragility, and even the degradation of our planet's blue heart."
5. "Scientists never stop asking. They are little kids that never grew up."
6. "Far and away, the greatest threat to the ocean, and thus to ourselves, is ignorance. But we can do something about that."
7. "We need to respect the oceans and take care of them as if our lives depended on it. Because they do."
8. "With respect to the ocean being the heart of our blue planet: We are often asked, 'How much protection is enough?' We can only answer with another question: How much of your heart is worth protecting?"

Consider these words of Sylvia Earle. Ponder them. Put them into practice. Or simply respond to them. Pick a quote and talk it up. In the case of Quote Number 2, maybe you've already "shared the knowledge." We'd love to hear your story. If you're not a tooter of your own horn, tell us about someone else you've observed sharing knowledge for the greater good. Many of our readers are surfers or divers or both. Does Quote Number 4 speak to you? Speak to us about it!

Are you a little kid who never grew up, even though you may not be a scientist? What does Quote Number 5 elicit from you? Prefer to discuss the heart of the matter? Maybe Quote Number 8 inspires passion in your heart. Feel like sounding off about ignorance? Grab Quote Number 6 and run with it.

Aim for 300 or fewer words but don't sweat it if you go over. We are not imposing a lot of rules. We're offering a soapbox and we're your audience. Actually, we're a family, there's a lot of love here. We really, really, really do want to hear from you. Let your ideas percolate for a while. Then cut them loose and send them our way.

Inspire us. Entertain us. Amuse us. We'll print in the spring newsletter whatever you pen. And we'll send a specially selected **PRIZE** to the person who authors the most compelling submission, no matter what shape it takes. We place no limits on your creativity; express yourself with a poem, cartoon, prose story, joke, confession, observation, **WHATEVER!** Everyone is eligible to enter. Hit us with a tidal wave of raw talent, and then surf your way right into our collective heart.

Why are we doing this? Because we need something to feel good about, something to make us smile, something to counterbalance the negativity which daily bombards us. Also, we want to get to know you better; and that's a bit hard to do when we're the ones doing all the talking! Send your submission to info@sharks.org with the subject line: Love the Ocean.

Live “Ghost Shark” Filmed in its Natural Habitat



Researchers from Monterey Bay Aquarium Research Institute sent an ROV (remotely operated vehicle), on several dives off the waters of central California and Hawaii capturing footage from depths of up to 6,700 feet. On film was what appeared to be a species of ghost shark previously only caught in the southwestern Pacific Ocean.

Chimaeras or “ghost sharks” are chondrichthyans that diverged from sharks and rays over 400 million years ago. The scientists believed they had captured on film a live pointy-nosed blue chimaera, a species never before filmed alive in its natural habitat.

The footage was released by the Monterey Bay Aquarium Research Institute, along with a paper by researchers at the institute: Reichert, AN, Lundsten L and Ebert DA. (2016) **First North Pacific records of the pointy nosed blue chimaera, *Hydrolagus cf. trolli* (Chondrichthyes: Chimaeriformes: Chimaeridae)** *Marine Biodiversity Records*.

<https://mbr.biomedcentral.com/articles/10.1186/s41200-016-0095-5>

Three chimaera experts who watched the footage believed the fish was a pointy-nosed blue chimaera, but Lundsten and others were not 100 percent certain that the fish captured on film has been correctly identified, despite its similar physical characteristics. Because of that, the paper refers to the fish they recorded as *Hydrolagus cf. trolli*, rather than its scientific name, *Hydrolagus trolli*.

Public Sympathy Shifts to Sharks

Pepin-Neff C & Wynter T. (2018) **Save the sharks: reevaluating and (re)valuing feared predators**, *Human Dimensions of Wildlife*,

<https://www.tandfonline.com/doi/full/10.1080/10871209.2018.1539887>

Much of the history of the human–shark relationship has been based on fear. For centuries, the goal has been to kill sharks that come near boats or beaches. Yet, there is a growing trend of more positive feelings toward local shark populations. In this article, we demonstrate that feelings of pride toward sharks can serve as an opposing force to fear, and can moderate the way fear affects support for policies to kill sharks. This study reports on two surveys of pride toward sharks from Eastern and Western Australia. These highlight a new and emerging story for people and sharks. We argue that the combination of shifts in the understanding of sharks’ motives during human–shark interactions and higher levels of pride support a new political dynamic in which the public prefers nonlethal responses to shark bites in support of a burgeoning “Save the Sharks” movement.

Coercive Mating?

Ritter, EK & Amin, RW (2018) **Mating scars among sharks: evidence of coercive mating?** *acta ethologica*. pp 1–8 <https://doi.org/10.1007/s10211-018-0301-z>

On rare occasions, during mating season among sharks, “mating scars” appear on female sharks’ bodies caused by the males holding onto them. The low frequency of sharks bearing such scars indicates that those markers are not part of regular mating efforts. These scars are mostly deeper cuts and punctures, indicating a more forceful motivation such as coercive mating from the male’s side. We discuss scenarios based on mating scars from three Carcharhinid species, describe and explain the arrangement of these bite scars, and consider plausible mating strategies used by males, including coercive mating.



Influencing Policy Regarding Sharks

Pepin-Neff, CL, Wynter, T. (2018) **Reducing fear to influence policy preferences: An experiment with sharks and beach safety policy options.** *Marine Policy*, 88, pp. 222-229. <https://doi.org/10.1016/j.marpol.2017.11.023>

This article reports on new research that finds certain messages reduce fear of sharks, key to promoting conservation-minded responses to shark bites. Here it is argued that the sophistication in public feelings toward these highly emotional events has allowed new actors to mobilize and given rise to the “Save the Sharks” movement. In a unique experiment coupling randomly assigned intent-based priming messages with exposure to sharks in a “shark tunnel.” We investigate a potential path to reduce public fear of sharks and alter policy preferences. Priming for the absence of intent yielded significant fear extinction effects, providing a viable means of increasing support for non-lethal policy options following shark bite incidents. High levels of pride and low levels of blame for bite incidents are also found. In all, this article provides a step towards improving our understanding of fear and fear reduction in public policy.

Test Results from Five Shark Protection Devices for Surfers

Huveneers C, Whitmarsh S, Thiel M, Meyer L, Fox A, Bradshaw CJA (2018) **Effectiveness of five personal shark-bite deterrents for surfers.** *PeerJ*. <https://peerj.com/articles/5554.pdf>

The number of shark-human interactions and shark bites per capita has been increasing since the 1980s, leading to a rise in measures developed to mitigate the risk of shark bites. Yet many of the products commercially available for personal protection have not been scientifically tested, potentially providing an exaggerated sense of security to the people using them. We tested five personal shark deterrents developed for surfers (*Shark Shield Pty Ltd [Ocean Guardian] Freedom+ Surf*, *Rpela*, *SharkBanz bracelet*, *SharkBanz surf leash*, and *Chillax Wax*) by comparing the percentage of baits taken, distance to the bait, number of passes, and whether a shark reaction could be observed.

We did a total of 297 successful trials at the Neptune Islands Group Marine Park in South Australia, during which 44 different white sharks (*Carcharodon carcharias*) interacted with the bait, making a total of 1413 passes. The effectiveness of the deterrents was variable, with the *Freedom+ Surf* affecting shark behaviour the most and reducing the percentage of bait taken from 96% (relative to the control board) to 40%. The mean distance of sharks to the board increased from 1.6 ± 0.1 m (control board) to 2.6 ± 0.1 m when the *Freedom+ Surf* was active. The other deterrents had limited or no measureable effect on white shark behaviour. Based on our power analyses, the smallest effect size that could be reliably detected was ~15%, which for the first time provides information about the effect size that a deterrent study like ours can reliably detect. Our study shows that deterrents based on similar principles—overwhelming a shark's electroreceptors (the ampullae of Lorenzini) with electrical pulses—differ in their efficacy, reinforcing the need to test each product independently. Our results will allow private and government agencies and the public to make informed decisions about the use and suitability of these five products.

Table 1 Characteristics of the five commercially available deterrents tested.

Deterrent type	Brand/product	Website	Abbreviation	Characteristics
olfactory	<i>Chillax Wax</i>	http://www.facebook.com/commonsensesurf	<i>Wax</i>	ingredients: eucalyptus, chilli, cloves, cayenne pepper, neem, tea tree oil, citronella, coconut, and beeswax
magnetic	<i>SharkBanz - bracelet</i>	http://www.sharkbanz.com.au/products/sharkbanz-2	<i>Magnet band</i>	grade C8 barium ferrite; BaFe ₂ O ₄
magnetic	<i>SharkBanz - leash</i>	http://www.sharkbanz.com.au/products/modom-shark-leash	<i>Magnet leash</i>	grade C8 barium ferrite; BaFe ₂ O ₄
electric	<i>Ocean Guardian Freedom+ Surf</i>	https://sharkshield.com/shop/freedom-surf-bundle/	<i>Surf +</i>	type: alternative current; voltage: 115 V; frequency: 1.6 Hz; pulse duration: 1.5 ms
electric	<i>Rpela</i>	http://www.rpela.com	<i>Rpela</i>	type: direct current; voltage: 200 V; frequency: 14.5 Hz; pulse duration: 0.2 ms

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, women's slouchy, women's 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.

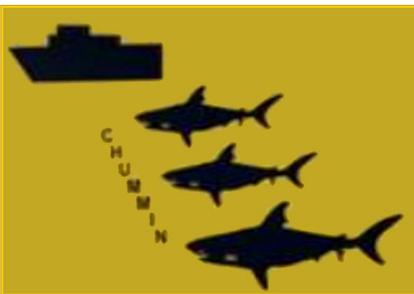


Our **Café Press** store is now open. Show your love of sharks and support of the Shark Research Institute with our cool new logo gear. Available are mugs, glasses, smartphone cases, hats, toys, clothing, blankets, pillows, and much more.

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 resighted. 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 autumn 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 about how your local officials about how to order the flags, email: 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, 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

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