

Newsletter

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Sharks, Soot and Silt on the Amazon River

By Dave Grant – Conservation Director

“Every young man in the world is fascinated with either sharks or dinosaurs.” ...Peter Benchley

Peter Benchley could have had me in mind when he wrote that line years ago, so while studying up on the Amazon before sailing up it, I collected information on one of the river’s most enigmatic inhabitants, the bull shark (*Carcharhinus leucas*). Known around the globe by various local names from other waters – the Zambezi, Lake Nicaragua and Rio San Juan shark—the stocky and aggressive bull, with its reputation for attacking humans, is the bad boy of coastal, warmwater elasmobranchs.

I first became aware of peculiar “freshwater” sharks when hearing about the experiences in Central America of our grandfather and great-grandfather, and their exploits and commercial dealings during the Panama Canal construction and development of the region’s fruit plantations. Over the years, more reports of bull sharks piqued my curiosity: Locally, as a possible culprit in the infamous 1916 shark attacks along the New Jersey coast; and while traveling, learning of unusual catches reported in rivers as far from the sea as St. Louis, Missouri, and St. Petersburg, Russia.

Over a dozen references to sharks in the Amazon River are found in the scientific literature. Some merely document a jaw in a museum or a photograph, but others are rather intriguing:

- 1970 – Shark jaws displayed in “Indian villages” in the region;
- 1969 – Shark meat marketed in Bogotá and Leticia, Columbia as “freshwater fish” and “dried catfish”;
- 1966 – “Sharks taken by collectors near the mouth of the Rio Negro river.”
- 1948 – And by far the most interesting: “Heavy fish kill following after-effects of earthquake included several sharks in Rio Ucayali.”

Recently, the Amazon River has become a hot ticket for cruise companies, and equipped with a fish guide, pictures of shark teeth, a plankton net and microscope, I hitched a ride upstream from the river mouth at Belem, Brazil. Although the river is quite wide; a bar at the mouth, strong currents and a large tidal range, mean that ships must plan their transit carefully. Although we

had onboard two local pilots, we did run aground for a day.



River ferry at Belem

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The estuarine and tidal portion of the Amazon reaches more than 100 miles upriver, as indicated by the diatoms and copepods in plankton I collected while make short hops on small, crowded and over-worked local ferries. Typically, these were short and adventurous crossings, interspersed with frequent allisions (What the coast guardsmen call glancing blows) between other vessels jostling to dock at the crowded landings. On the stern, I'd be joined by a few to spend extended periods there.

Visits to fish markets here are like perusing the pages and plates of William T. Innes' classic *Exotic Aquarium Fishes*, but missing, were any signs of sharks. Instead, they hawked typical tourist fare like cheap jewelry, carvings, and sadly, mounted fishes. At most tourist stops, these offerings are so ubiquitous that we jokingly referred to them as part of a Piranha-Industrial Complex—and a terrible waste of noble fishes.



Zooplankton, silt and soot sample the estuarine waters at Manaus

I also approached locals along the shore. As angler and writer Dery Bennett liked to say “A fisherman knows everything there is to know...Just ask him!” and most of them immediately recognized what I was seeking and vigorously gestured downriver and out to sea to indicate where to find tubarões.

Surprisingly, I had better luck finding teeth at bazaars, by searching the stashes of enthusiastic young people whom the Brazilians label “hippies” (Venezuelan expatriates and adventurers escaping the troubles back home and supporting themselves by making jewelry.). Among their hoard of artifacts being fashioned into objets d'art, they produced some teeth, but all were either from “crocodiles”, otters, pigs, or the distinctive teeth of tiger sharks; not triangular bull shark shapes I sought.

The earliest scientific report about sharks near Belem is from 1897, but there have been other sightings halfway up the river in Manaus, and anecdotal reports all the way upriver to the foot of the Andes in Iquitos, Peru—over 1700 miles inland (As the macaw flies). Over two dozen marine elasmobranchs are known to enter brackish or freshwater for short periods, but the bull shark is one of the few to spend extended periods there. These may be mostly younger individuals from their robust physiology to thrive as a euryhaline species, and avoid competition, as well as predation, by larger sharks in the ocean.

The main channel of the Amazon is sometimes referred to as “whitewater” because of the presence of massive amounts of silt washing down from the Andes. December is the dry season and the soot from brush fires that created striking red sunsets was also evident in the plankton samples I gathered. In spite of the load of suspended materials, the silty waters lacked much phytoplankton, but teemed with zooplankton; leading me to speculate that the aquatic food web is detritus-based this time of year. The water's pH is mid-range and near neutral (6.5-7.3) and locals say it supports more fish than the “blackwater” tributaries like the Rio Negro River.

The river mouths where these great waters meet have become popular tourist stopovers, and most tours include lingering at the interface when sailing through



Meeting of great waters at the mouth of the Rio Negro

them. Samples I took were silt-free and clear, but deeply stained with tannin from plant material; much like the waters of the NJ Pinelands back home. It is also acidic (pH 4.0-4.5) and indigenous people refer to the tributaries as “hungry rivers” because they support fewer fish and wildlife.

Over a quarter of the Brazilian Amazon is supposed to be set aside for indigenous people, and there is a fledging tourism industry along some of the tributaries. Here, family groups have been concentrated along beaches in “villages” to entertain tourists. I have mixed feelings about visiting such places because in the Amazon region, research has shown that even simple commercialization like this can negatively impact local ecosystems and communities. Also, I travel light and never return home with any folk art, but instead have found that donating simple school items and sewing kits are welcome gifts to exchange for taking a few photographs.



Boto, the Amazon's pink dolphin

Although they are over-harvested and scarce, I snorkeled the blackwater at one beach, hoping to catch a glimpse of another odd freshwater elasmobranch, an Arraia—the freshwater stingray. Instead, I attracted the attention of a Boto (*Inia geoffrensis*)—the fabulous pink dolphin of the Amazon. To entertain tourists, locals feed fish to these curious and formidable creatures. Three others joined us and I quickly discovered that they have little respect for personal space if they think you have fish to share; and there was a hierarchy among them that involved considerable bumping and splashing.

I have issues about interacting with wild animals that will become habituated to people, but admittedly, not so strong that I passed up the opportunity to swim with the them. They repeated some learned behaviors like spy-hopping to beg for fish; which, while entertaining, is rather intimidating when you are in the water. However, I learned later that in some places on the river, they are still butchered for catfish bait; so, things could certainly be worse for the inquisitive Botos.

If we could communicate, I'm certain the dolphins would teach me much more about the river and where to find sharks; but another surprise of the trip was waiting for me when I returned home. Previously, I came across an ambiguous reference to a half-century old photograph taken near Leticia, Bolivia by notable fish collector and writer Herbert R. Axelrod; and after some effort, was able to track it down at the library of the University of Alabama. It is labeled “An Amazonian Indian holding a 60-cm, brightly colored carving of a shark...indicating that the Indians are well aware of the shark that travels far inland in South America.”

Mission accomplished!



Erich Ritter, Ph.D.
December 30, 1958 - August 28, 2020

The shark world mourns the passing of Dr. Erich Ritter, an extraordinary scientist, the world's leading shark behaviorist, educator and strong shark advocate. Few outside his family were aware he had a serious heart condition when he passed away in his sleep at his home in Pensacola, Florida.

Erich grew up in Zollikon, Switzerland. He studied zoology at the ETH Zürich, paleontology at the University of Zürich, and received his Ph.D. from the University of Miami's Rosenstiel School in the field of fish behavioral ecology.

Erich was the world's leading expert on shark behaviour, especially regarding shark/human interactions and as the scientific director of Sharkproject e.V., he focused shark-human relationships. In 2002 Erich had an accident in the Bahamas while filming a series for Discovery Channel's Shark Week. A bull shark, snapping at bait, bit his calf instead. Although he lost 60% of his blood, he survived this accident minus his calf. The accident gave his research with sharks new momentum and direction.

In the Bahamas, he operated the Shark Education and Research Center (SERC). A PADI diving instructor, an EMT and DAN oxygen instructor, he taught courses on how to interact safely with sharks. SERC evolved as the Shark School where he continued to provide courses for divers, lifesavers, Special Forces and the US Navy on shark behavior.

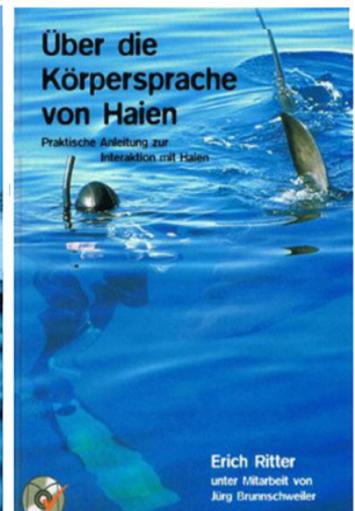
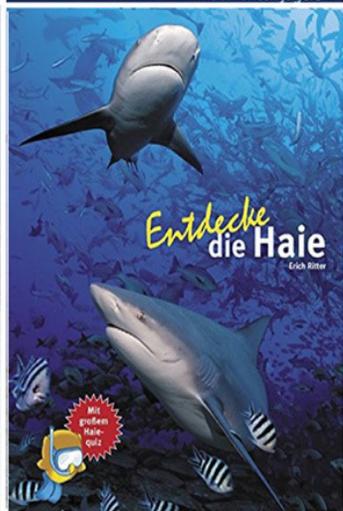
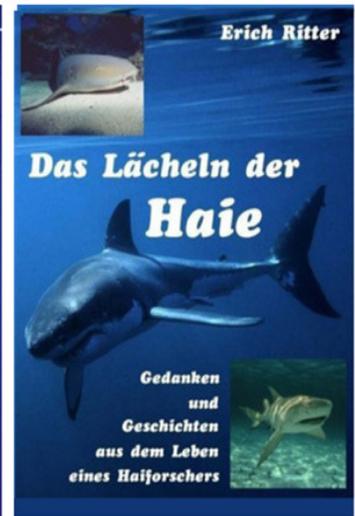
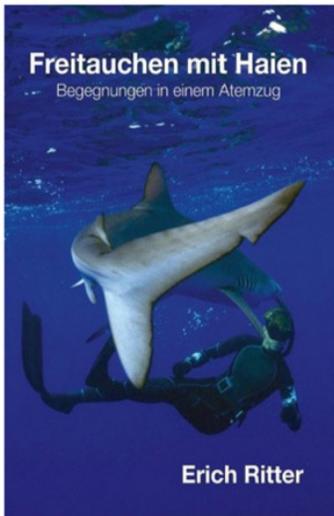
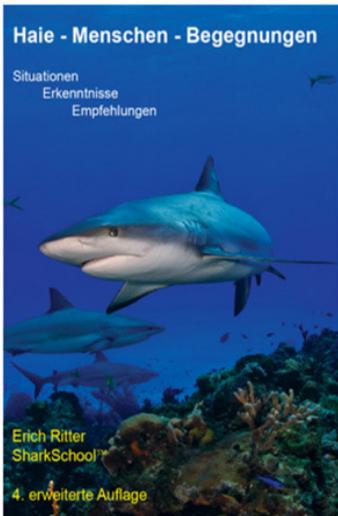
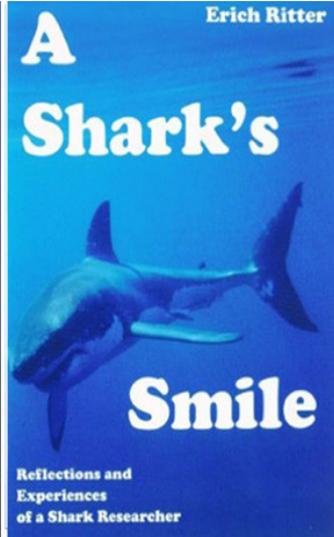
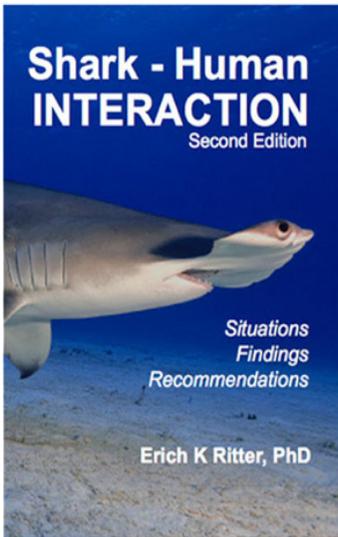


From his research, the results, analyses and reconstructions of shark accidents, carried out with and often with interactions with the animals "in the wild", primarily in the Bahamas, Egypt and South Africa, he developed strategies to avoid dangerous situations involving sharks. He made the results available to those bitten by sharks and their families and published his findings in the Global Shark Attack File.

Erich developed ADORE-SANE interaction concept, rules of conduct for swimmers and lifeguards that enabled them to respond appropriately in potentially dangerous situations. Erich's research confirmed that sharks are not the mindless monsters portrayed in the media, instead his results showed sharks were intelligent, sentient animals and contradicted the negative representations that were being disseminated through the media and the film industry.

Erich was deeply committed to the preservation and protection of sharks and, in particular, the issue of shark finning. Erich's passing is a massive blow to the shark advocacy movement. Just how deeply Erich was loved and respected throughout the scientific community and the public was evident when, within 2.5 hours of notice of his passing was posted, there were more than 500 messages of condolences from around the world.

Rest In Peace, Erich Ritter. You accomplished far more in your life than most individuals. The legacy of your work lives on, as do the lessons you taught and our memories of you.



Erich also authored books and magazine articles, produced scientific journal articles, and many of his videos, talks, workshops, essays and podcasts are still available at <https://www.letstalkshark.com>

A Virtual Conversation with Crystal Dombrow

By Emma Claisse



As you may or may not already know, over the past few months, I've reached out to various women involved in shark research and conservation. I've gotten to speak with some really interesting people who are dedicated to doing incredibly important work for our oceans. My third interview was with Crystal Dombrow. Crystal Dombrow has worked with various conservation groups and is a lead ambassador for One Ocean Global, an organization dedicated to ocean conservation through outreach and education. She also recently got her Master's degree in marine biodiversity and conservation from Scripps Institution of Oceanography. I was so lucky to be able to speak with her and find out more about her work and her story.

Shark Research Institute does not promote the consumption of sea life, as the fishing industry has an extremely negative impact on the oceans. Though I myself avoid seafood, and would encourage all readers to as well, I acknowledge the important role of those who work in fisheries management. Eating seafood is still extremely common, but encouraging stricter bycatch limits, for example, is a step in the right direction for the conservation of sharks.

Could you talk a little bit about who you are and what you're doing right now?

CD: "Right now, I am working with a conservation organization in Hawai'i called Mālama Pu'uloa. We're restoring the shorelines and waterways surrounding Pearl Harbor. What I love about this project is that it's also working to restore native Hawaiian fishponds. The reason that many shark species face population decline is because of fishing pressure from discarded bycatch. My goal in conservation is to learn as much as I can about fisheries and fisheries management. I also volunteer with One Ocean Global, a conservation outreach project of a shark snorkeling company on O'ahu, Hawai'i called One Ocean Diving. I love that their tours are educational for both science and conservation. I originally helped manage their social media content and ambassador program, now I partner with and support various shark conservation campaigns of scientists and shark conservation groups, all of whom I met through my graduate studies. For example, last Fall, I supported a zero catch limit campaigns for shortfin mako sharks through ICCAT (International Commission for the Conservation of Atlantic Tunas), which is a regional fishery management organization (RFMO). RFMOs are established by international treaties that manage fishing effort in international waters. I wrote to and spoke with various delegates to try and get the legislation passed. Unfortunately, it wasn't passed last year so there is more work to be done. Luckily there is an ICCAT meeting every year, so we'll try again."

How did you get to where you are now?

CD: "I had been working at an art museum for six years. I became increasingly interested in politics and wanted to use my time and energy contributing to something bigger than me. I visited a friend on O'ahu, and after a lot of convincing, she got me to go on a tour with One Ocean Diving. I fell in love with being in the ocean and wanted to help protect it. I weighed my options and decided to make a career change to marine conservation. I applied for jobs, and they all required a graduate degree. I continually felt drawn to considering conservation through the lens of policy and environmental mediation. I found a graduate program that trains students in various important aspects of what it means to do conservation work, with a foundation in policy, science, and economics. Luckily, I got into that program, and I finished that degree last June."

Congratulations! So, have you always been interested in this particular field? Did you know conservation was something you wanted to pursue when you were my age?

CD: "I didn't! I first became interested in marine conservation when I was 28, and it felt like it came out of nowhere. But it didn't; I was raised on the ocean. My dad was a deep sea tournament fisherman and we were always on a boat. The only seafood I ate was his catch, and to this day he loves nothing more than fishing. My dad was fascinated by sharks, and every year we would watch Shark Week. Growing up, I was captivated by science and it was often my strongest subject in school. But my teachers and parents never encouraged me to pursue it. I'm so happy now that I found my way back to working in that realm even though I prefer to focus on its applications in policy and management."

What advice would you give students who would want to follow a similar career path to yours, or just who want to make a difference for conservation, the environment, and similar fields?

CD: "Follow your curiosity! When I started, I was living in New York City and I didn't know a single person who was interested in this work. So I took my own initiative to learn. I volunteered with Surfrider Foundation at their local events and chapter meetings and became an ambassador for One Ocean Global when they launched. I started following conservation organizations on Instagram and scientists on Twitter. Before I started my graduate program, I traveled to Australia and South Africa to volunteer with several shark conservation projects and ecotourism companies. At first it was a passion project that I invested my spare time in. It took me four years to get where I am today, from first hearing about marine conservation issues to graduate school and an internship in a NOAA lab to paid conservation positions. Even at my school, there were only two shark researchers and they focused on biology and ecology. Our niches of study and work are often small, so I jumped at every opportunity to learn about it through events, networking, courses, webinars, and conferences. You need to be your own researcher because no single book, organization, internship, or class will tell you everything you need to know."

Could you talk a little bit more about your work as an ambassador for One Ocean Global?

CD: "The One Ocean Global ambassador program supports conservation advocates around the world in organizing and leading marine conservation projects in their community. For example, I noticed that garbage bins on New York City beaches didn't have lids and winds would blow trash out of the bin to create litter that high tides would sweep into the ocean. So I started searching for a solution, which involved discussions with City government offices and fellow conservation advocates. When volunteering with Surfrider's New York City chapter, I lectured on shark conservation to a group of high school students. I also co-organized a remote beach clean up when I first moved to the Hawaiian Islands."

What can ordinary people do to help our oceans and sharks?

CD: "For the ocean, I would suggest reducing your waste as much as you can. Seemingly small lifestyle changes such as reusable grocery bags and cutlery have a large cumulative impact. Reducing waste is a matter of personal reflection. I often ask myself how can I reuse or repair a product, or replace it with an alternative that lasts. This is particularly true for single-use plastics. For shark conservation, I suggest monitoring the source of your seafood, especially tuna. A number of seafood guides online give sustainability ratings and trace the probability of bycatch that could include sharks. Pay attention to how the guide defines sustainability. Ideally, it will mean that there is little discarded bycatch in the fishery, that national and international fisheries management regulations are implemented and enforced, there are no human rights violations, and the fishery supports local economic livelihoods. If it's locally caught, it's probably the most sustainable option."

I truly appreciated the opportunity to speak with Crystal. Her story is so important to me and other young women who want to make a positive impact on our oceans.

News from SRI Headquarters



Welcome to Cherilyn Chin, our new Webmaster. Cherilyn has always been drawn to the ocean and its animals. Her love of all things aquatic began with winning a goldfish at her school fair, trips to the tidepools off of the California coast, and trips to the Monterey Bay Aquarium. After graduating from the University of California at Berkeley with an undergraduate degree in the Environmental Sciences with an emphasis in Biology, Cherilyn's dream to work at the Monterey Bay Aquarium came true. She worked there as an aquarist intern and water quality technician. Cherilyn has held a 3-day-old sea otter pup in the palm of her hand, taught an octopus to open a jar for food, and even has a manta ray and whale shark named after her!

Cherilyn started her blog, "Ocean of Hope: Marine Animals Voice Their Wishes on Ocean Conservation Issues," over a decade ago. She is now a website developer, strategic content copywriter and digital marketer at Wordsmith for Wealth.

And a warm welcome to Chris Hebel, Social Media Director. Chris holds a degree in Wildlife & Fisheries Sciences from Texas A&M University. He has worked as a Fisheries Observer for the National Marine Fisheries Service assessing the impact of commercial trawlers and long-liners on fish stocks and marine mammals in the Bering Sea. Chris has technical and business experience in both biopharmaceutical and molecular diagnostics development and has started several companies developing biotechnologies and providing services to life science researchers conducting genomics and proteomics research. He now operates a digital marketing consulting business providing web design, programming, and strategic guidance. Chris is an avid shark diver and supporter of shark research and conservation.



We also have two new interns from Lake Forest College who are working remotely. Hannah Gurholt, a double major in Biology and Sociology/Anthropology and Kylie Morgan (currently in lockdown in North Carolina) is also working with Clay Creswell, GSAF case investigator for the Carolinas.



LAKE FOREST
COLLEGE

DIVE BOOK AUCTION

Anxious to get back underwater? Reading any of these books may be the next best thing. The auction features current dive books and several from the early days of scuba diving, art, posters and collectibles.

The auction is open and will close at 10 pm EST on September 15th.

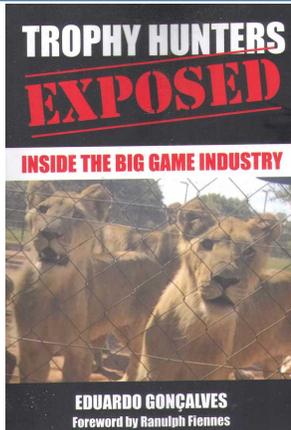
Register and start bidding at

<https://www.biddingforgood.com/Shark/Shark-10>

Stay Informed

To receive our *Weekly* newsletter—**Shark & Ocean News**—sign up on the home page of our website: www.sharks.org

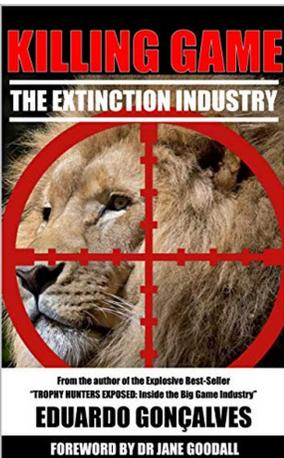
Bookshelf



Trophy Hunters Exposed: Inside the Big Game Industry by Eduardo Gonçalves, foreword by Ranulph Fiennes. Kindle \$5.99, Paperback \$9.99 on AmazonSmile

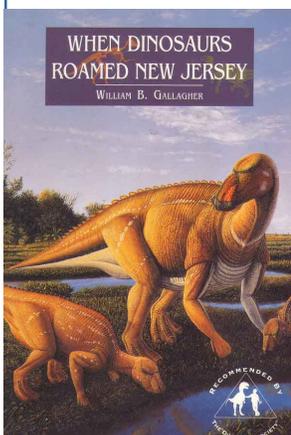
As many as 1.7 million animals have been killed by trophy hunters over the past decade. Hundreds of thousands of these are from species threatened with extinction and protected by law. We now face a biodiversity crisis every bit as serious as the climate crisis but the slaughter continues. This book is an explosive investigation into the trophy hunting industry, it takes aim at the hunting industry and takes it on, including its key players and donors, and how it is stripping endangered animals of the protections they need. It reveals lobbyists posing as 'conservation' groups, and how the industry boasts it ploughs more money into US elections than some of the world's biggest corporations, how a top fundraiser for Donald Trump, Vladimir Putin's right-hand man, the head of a paramilitary death-squad and a former WWF Director

have shot record-breaking lions, elephants, rhinos and leopards. The trophy hunting industry's 'conservation' facade is comprehensively dismantled in this fast-paced forensic investigation. The author presents compelling reasons for abolition of this cruel and sordid pastime. Trophy hunters take their "kills"; now thanks to Gonçalves, it is possible the hunting industry is about to suffer the same fate.



The Killing Game: The Extinction Industry by Eduardo Gonçalves, foreword by Jane Goodall, Kindle \$7.49, Paperback \$10.99 on AmazonSmile

Trophy hunting is putting some of the world's most threatened species on a fast-track to extinction. Scientific studies have demonstrated the links between trophy hunting and population declines, yet exports of hunting trophies continue to increase. The annual lion hunting quota is now equivalent to one third of the males that can be hunted. For the good of conservation, the days of the 'great White Hunter' should be brought to a close." It also explores the links between the trophy hunting industry and some wildlife groups and how both tried to block moves to protect lions, elephants, rhinos and giraffes, "Virtually everyone agrees that Trophy Hunting is cruel and immoral," says Eduardo Gonçalves. "We now have incontrovertible proof of trophy hunting's devastating impact on wildlife. What more will it take for governments to finally act?" Royalties from book sales will be donated to the Campaign to Ban Trophy Hunting.



When Dinosaurs Roamed New Jersey by William B. Gallagher. Paperback, \$18.57 on AmazonSmile.

Few people know that New Jersey is the nursery of American vertebrate paleontology! This book provides a succinct and readable history of the geology and paleontology of New Jersey from the time the region was covered by Cambrian seas, 543 million years ago, to the Pleistocene Ice Age only 10-15,000 years ago. Gallagher tells the stories of professional and amateur fossil hunters, their discoveries, and their impact on the history of paleontological thought. He points out places in New Jersey and nearby where specimens characteristic of each era were found.

Upcoming Expeditions, Dive and Surf Shows

Most scheduled events in the USA have been cancelled due to Covid-19. Those listed below are tentative, depending on what the virus decides to do and how soon a vaccine will be available.

September 2020: Three expeditions to catalog tiger sharks in Hawaii (see next page)



September 16-18, 2020: Surf Expo. Due to the Pandemic, Surf Expo September will be a virtual event. <https://www.surfexpo.com/>. Surf Expo January 6-8, 2021 is still on schedule at the Orange County Convention Center, N/S Concourse, Orlando, Florida. Surf Expo is , the largest and longest-running board sports and beach/resort lifestyle trade show in the world with 1,000 exhibitors, 9,500 store fronts and +25,400 attendees.

October: Fossil Shark Tooth Hunts. Check our website for dates and locations but right now it looks like they may be rescheduled for the spring of 2021.



RESCHEDULED: Beneath the Sea, the largest scuba show in the USA. Due to the pandemic, BTS originally scheduled for March 2020, then moved to October 2020, is now rescheduled for March 2021



October 16-18, 2020, **Adex India.** Venue: The Bombay Exhibition Centre, Mumbai, India. This is India's largest dive expo. <https://adex.asia/india/>



October 24-25, 2020. **The Birmingham Dive Show.** Venue: NEC National Exhibition Center, Marston Green, UK. <https://www.showsbee.com/fairs/Birmingham-Dive-Show>



The Diving Equipment and Marketing Show (DEMA) scheduled for November in New Orleans has been cancelled. Instead, November 17-20, 2020, **DEMA Show Online** will host a four-day virtual trade show and vendor networking event. This show is open only to the trade. <https://www.dema.org/news/520879/DEMA-Announces-Virtual-Event-DEMA-Show-Online.htm>



November 21-22, 2020. **The Blue Wild Ocean Adventure Expo.** Venue: Palm Beach County Convention Center, West Palm Beach, Florida. <https://www.Thebluwild.com>



November 17-29, 2020. **EUDI-European Dive Show 2020.** Venue: BolognaFiere S.p.A, Bologna, Italy. <https://10times.com/eudi-show-bologna>

December 11-13, 2020. **DRT Show Hong Kong** (Diving, Resort and Travel) Venue: Hong Kong Convention and Exhibition Centre, Hong Kong. This is the largest dive expo in Asia. <https://www.drtextpo.com/hongkong>



TIGER SHARK IDENTIFICATION EXPEDITIONS

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

Multiple dates during September 2020

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



Charlie Fasano, Expedition Leader

Location

Kailua Kona, Hawaii

Cost

Expedition Alpha: Sept 9 -14 (6 resort days, 5 nights, 9 dives)
\$3250 double; \$3950 single occupancy.

Expedition Bravo: Sept 16 - 21 (6-days) \$3250 double; \$3950 single occupancy.

Expedition Charlie: Sept 23 - 28 (6-days) \$3250 double; \$3950 single occupancy.

Kama'aina (For local residents who do not need accommodations): \$1100 (3-dive days, 3-dives-per-day). Kama'aina expedition members are still afforded all presentations.

Included

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

Not included

Airfare To Kailua Kona (KOA), Hawaii. Manta Ray and tethered Blackwater night dives are available at an additional cost. Alcohol and meals, Gratuity, Dive gear (available for rental), Concierge activity services. **NOTE:** Dive insurance and travel insurance are required.

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

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

Shark Shop



Shirts to Show You Care

Support SRI by ordering a t-shirt, tank top, or hoodie. Sizes range from youth to adult XL. Check out the variety of colors and styles! Shipping dates vary depending on when orders are placed, but shirts usually arrive within three weeks.

Order a shirt on our Facebook page or use the links below:

Infinity Sharks

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

Save Our Sharks

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

Ban the Shark Fin Trade

<https://www.bonfire.com/sharks-ban/>

Protect Great White Sharks

<https://www.bonfire.com/protect-sharks/>

I Love Sharks

<https://www.bonfire.com/i-love-sharks/>

Ray of Hope-1 (White on dark-colored shirts)

<https://www.bonfire.com/ray-of-hope-1/>

Ray of Hope-2 (Black on light-colored shirts)

<https://www.bonfire.com/ray-of-hope-2/>

White Hai (White on dark-colored shirts)

<https://www.bonfire.com/white-hai/>

Kai's Shadow (Black on light-colored shirts)

<https://www.bonfire.com/kais-shadow/>



Looking for a truly distinctive gift? Consider a Lifetime Adoption of a whale shark or a tiger shark tagged or cataloged by Shark Research Institute field researchers. Your gift includes a photograph of the shark, a certificate suitable for framing, a fact sheet about the species, and the recipient will be notified when and where their shark is seen again. All sharks available for adoption have been seen in the past year.

Adopt a whale shark <https://www.sharks.org/adopt-a-whale-shark>

Adopt a tiger shark <https://www.sharks.org/adopt-a-tiger-shark?rg=adopt>

And please remember to support SRI every time you shop at Amazon.com. Simply go to [AmazonSmile](#) and choose “**Shark Research Institute**” as your favorite charity. Although no extra charge is added to your bill, Amazon makes a donation to SRI!

New Genus of Late Cretaceous Angel Shark

Maisey, John G.; Ehret, Dana J.; Denton, John S. S. (2020) **A new genus of Late Cretaceous angel shark (Elasmobranchii; Squatinidae), with comments on squatinid phylogeny.** (*American Museum novitates*, no. 3954) <http://digitallibrary.amnh.org/handle/2246/7230>

Three-dimensional Late Cretaceous elasmobranch endoskeletal elements (including palatoquadrates, ceratohyals, braincase fragments, and a series of anterior vertebrae) are described from the Late Cretaceous University of Alabama Harrell Station Paleontological Site (HSPS), Dallas County, Alabama. The material is referred to the extant elasmobranch Family Squatinidae on the basis of several distinctive morphological features. It also exhibits features not shared by any modern or fossil Squatina species or the extinct Late Jurassic squatinid Pseudorhina. A new genus and species is erected, despite there being some uncertainty regarding potential synonymy with existing nominal species previously founded on isolated fossil teeth (curiously, no squatinid teeth have been documented from the HSPS). A preliminary phylogenetic analysis suggests that the new genus falls on the squatinid stem, phylogenetically closer to Squatina than Pseudorhina. The craniovertebral articulation in the new genus exhibits features considered convergent with modern batomorphs (skates and rays), including absence of contact between the posterior basicranium and first vertebral centrum, and a notochordal canal which fails to reach the parachordal basicranium. Supporting evidence that similarities in the craniovertebral articulation of squatinoids and batomorphs are convergent rather than synapomorphic (as "hypnosqualeans") is presented by an undescribed Early Jurassic batomorph, in which an occipital hemicentrum articulates with the first vertebral centrum as in all modern sharklike (selachimorph) elasmobranchs. The fossil suggests instead that the batomorph synarcual evolved by fusion of the anterior basiventral and basidorsal cartilages prior to the reduction of the anterior centra and loss of the occipital hemicentrum, not afterward as predicted by the hypnosqualean hypothesis.

Interactions Among Reef Sharks

Sabando MA, Rieucou G, Bradley D, Caselle JE, Papastamatiou YP. (2020) **Habitat-specific inter and intraspecific behavioral interactions among reef sharks.** *Oecologia*. <https://doi.org/10.1007/s00442-020-04676-y>

Behavioral interactions such as dominance are critical components of animal social lives, competitive abilities, and resulting distribution patterns with coexisting species. Strong interference competition can drive habitat separation, but less is known of the role of interference if agonistic interactions are weak. While most theoretical models assume interference abilities to be constant in an environment, few consider that the extent of interference can vary by habitat and change model predictions. Using baited underwater cameras, we show a consistent dominance status between two sympatric reef sharks at an uninhabited Pacific atoll.

Blacktip reef shark (*Carcharhinus melanopterus*) and gray reef shark (*Carcharhinus amblyrhynchos*) relative abundance showed an inverse relationship to each other but the strength of this relationship varied by habitat. Reef shark relative abundance declined more rapidly in the presence of heterospecifics on forereef habitats as opposed to backreefs. In all habitats, gray reef sharks were more likely to bite bait cages than blacktips when both species were present, and appeared to be the dominant species. Intraspecific interactions were also apparent, with individual willingness to bite bait decreasing as the number of conspecifics increased. Gray reef sharks may exert differential control over blacktip foraging success in different habitats. Habitat-specific behavioral interactions may partially explain patterns of spatial separation between competing species where interference is weak.

Reef Sharks Status

McNeil A, (2020) **Global status and conservation potential of reef sharks**, *Nature* <https://doi.org/10.1038/s41586-020-2519-y>

Decades of overexploitation have devastated shark populations, leaving considerable doubt as to their ecological status^{1,2}. Yet much of what is known about sharks has been inferred from catch records in industrial fisheries, whereas far less information is available about sharks that live in coastal habitats³. Here we address this knowledge gap using data from more than 15,000 standardized baited remote underwater video stations that were deployed on 371 reefs in 58 nations to estimate the conservation status of



reef sharks globally. Our results reveal the profound impact that fishing has had on reef shark populations: we observed no sharks on almost 20% of the surveyed reefs. Reef sharks were almost completely absent from reefs in several nations, and shark depletion was strongly related to socio-economic conditions such as the size and proximity of the nearest market, poor governance and the density of the human population. However, opportunities for the conservation of reef sharks remain: shark sanctuaries, closed areas, catch limits and an absence of gillnets and longlines were associated with a substantially higher relative abundance of reef sharks. These results reveal several policy pathways for the restoration and management of reef shark populations, from direct top-down management of fishing to indirect improvement of governance conditions. Reef shark populations will only have a high chance of recovery by engaging key socio-economic aspects of tropical fisheries.

Potential Health Risks of Shark Fin Soup

Barciaa LG, Argiroa J, Babcock EA, Caic Y, Shea SKH, Chapman DD. 2020. **Mercury and arsenic in processed fins from nine of the most traded shark species in the Hong Kong and China dried seafood markets: The potential health risks of shark fin soup**. *Marine Pollution Bulletin*, <https://doi.org/10.1016/j.marpolbul.2020.111281>



Shark fin is one of Asia's most valued dried seafood products, with over 80 shark species traded in Hong Kong [HK]. We analyzed processed shark fins from mainland China and HK markets (n = 267) for mercury, methyl-mercury, and arsenic, to inform consumers, policy makers and public health officials on the health risks of ingesting fins from nine of the most common shark species in the fin trade. Fins from all species frequently exceed Hg limits established by HK authorities. Most of the mercury found is in the form of methyl-mercury (69.0 ± 33.5%). Five species surpass methyl-mercury PTWIs and blue shark

fins can exceed inorganic arsenic BMDL0.5. Species-of-origin was a significant predictor of heavy metal concentrations, with higher mercury concentrations associated with coastal sharks and lower arsenic levels found with increasing shark trophic level. Species-specific labeling would help consumers avoid shark fin products that pose the highest health risk.

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