In September, the Australian government hosted a 3-day shark summit at Taronga Zoo to examine methods of reducing shark attacks in New South Wales, part of a pledge made by Premier Mike Baird. In 2015, 12 people have been injured by sharks in New South Wales, including one fatality.

An independent review commissioned by the NSW government considered a range of emerging technologies from around the world and identified a number of options for potential trials in NSW waters, including electrical and physical barriers, sonar detection and tracking.

Under consideration was Aquatek’s shark-repelling system. It disrupts a shark’s electroreceptive sense by blasting water with a magnetic field. Other sealife is said to pass unharmed. The technology has been trialed at Reunion Island in the Indian Ocean, which has witnessed an unprecedented number of shark attacks with seven fatalities since 2011.

Several other products will be or already have been trialed. Global Marine Enclosure’s products: Aquarius Barriers and Bionic Barriers in which hinges allow the barrier to rise and fall with tides and swells.

The Eco Shark flexible plastic wall was trialed at Coogee Beach in Western Australia. The widest opening in the plastic is 12 inches, allowing smaller fish to swim through the wall. The company claims dolphins can identify the wall with their sonar.

Shark Attack Mitigation Systems’ Clever Buoy has been tested in the Sydney Aquarium. Its developers aim to teach it to recognize different species of sharks, and differentiate between a shark and a dolphin. It has also been field tested in Western Australia. The yellow buoy sends sonar alerts to a satellite and a text message to lifeguards on the beach when it detects a moving shark.

Noting that sharks generally swim around kelp forests rather than swim through them, the SharkSafe barrier currently being tested in Cape Town mimics a kelp forest, The barrier extends from the substrate to the surface and magnets within the structure further deters sharks.

The review said none of the products “would provide a single, simple solution that would encompass all types of beaches in NSW” and recommended closer consideration of the...
emerging technologies to complement existing net installations, aerial surveillance and observation towers. Only one deterrent - a shark spotting program - was considered suitable for immediate trial.

The government is tagging sharks, but cannot currently provide real-time tracking. It is hoped 4G technology can be used to transmit shark movements in real time back to a base.

Currently, there are 51 shark nets from Newcastle to Wollongong which cull sharks. There is debate as to their effectiveness because shark can and do swim over, below and around the nets.

"Data that I've seen for the last three years whether it's from WA, whether it's from Sydney or in Cape Town have all said, 'don't kill the sharks'," said Dr. Christopher Neff of the University of Sydney. "The public is sophisticated and the public generally gets it, that there are better alternatives that will make them safer. The only people who are talking about killing the sharks are the politicians, said Dr. Neff.

**Maldives Whale Shark Festival**

More than 500 people from six islands and various environmental committees attended the third annual Whale Shark Festival at Alif Dhaal, Maamigili Island in the Maldives. The festival celebrates and raises awareness of the necessity to protect marine life and the whale sharks in the waters of Alif Dhaal atoll. The islands of Dhigurah, Maamigili, Fenfushi, Dhangethi, Mahibadhoo and Mandhoo participated, along with artists such as Maldivian singer Unoosha.

The event kicked-off with a “ScienceFEST" with researchers, marine biologists and 20 representative from environment groups. “It was really great that we were able to so many people together and be able to generate some really wonderful discussions between everybody,” said Katie Hindle, the In-Field Manager of the Maldives Whale Shark Research Programme.

In addition to cultural shows, festival activities included *bodumas beynu* or 'whale fishing' (a traditional event featuring a large thatched "whale shark" which was paraded and "fished"), reciting *Raivaru* (a traditional poem), dances and an interisland whale shark quiz. A parade through Maamigili included three boduberu groups, a kinetic whale shark sculpture and people in colorful costumes parading and dancing in the streets.

The festival, sponsored by Lux Maldives, concluded with the presentation of awards and prizes to the winners of the quizzes and activities and ended with performances by the boduberu groups and a song from Unoosha.

**Global FinPrint**

Researchers around the world have embarked on a project to count as many sharks as possible. At more than 400 locations throughout the world researchers will be collecting images of sharks for at least the next three years. The researchers know they will not count every shark in the ocean, but they believe the project will produce a sense of shark populations in specific areas. It is hoped the project, dubbed the Global FinPrint, will assist both scientists and policy makers to arrive at informed decisions on how best to protect shark populations.
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Caribbean Shark Sanctuaries

On September 2, 2015, the Dutch State Secretary for Economic Affairs Sharon Dijksma unveiled the shark sanctuary plans in Kralendijk, Bonaire’s capital, and in Fort Bay on Saba. The declarations came in response to official letters written in early 2015 by the governors of the two islands in support of shark protections in their waters.

The sanctuaries will cover the islands’ full exclusive economic zones (EEZs). Once they are implemented, all commercial shark fishing will be prohibited up to 200 nautical miles from each island, a combined total of 22,382 square kilometers (8,816 square miles). “These reserves will teach us more about the important role sharks play in the marine ecosystem,” Dijksma said. “This knowledge will contribute to the better protection of sharks.” Both sanctuaries include protections for marine mammals.
Upcoming Shows

**November 4-7, 2015 — DEMA Show** (Dive Equipment Marketing Association).
Venue: South Halls, Orange County Convention Center, Orlando, Florida. Open only to the trade but sharks & shark conservation are serious topics here. www.demashow.org

**January 14-16, 2016 — Surf Expo**
Venue: Orange County Convention Center, Orlando, Florida.
The show is open only to the trade. For SRI it is key in reaching out to the surfing community. On occasion, sharks have posed a hazard to surfers, nevertheless the surfing community supports shark conservation and is deeply committed to protection of the ocean.

Members Bookshelf

**Shark Detective!** by Jessica Olien Harcover $14.21 on Amazon.com.
This book is earning rave reviews from kids and parents alike! During the day, Shark lives a lonely misunderstood life in the big city, but at night he dreams of being a detective. This charming, sweet and funny story shows children the importance of problem solving with a silly, gentle sense of humor. We can’t help but root for Shark and applaud his persistence to achieve his dreams despite his circumstances. Written for children 4 to 6, it will delight creatures of all ages.

Here are some books on sharks that can be downloaded from Google Books. Print copies are also available from Amazon.com or Barnes & Noble.

**Sharks of the World.** An annotated and illustrated catalogue of shark species known to date (2002)
Volume 2. Bullhead, mackerel and carpet sharks (Heterodontiformes, Lamniformes and Orectolobiformes)
http://www.fao.org/docrep/009/x9293e/x9293e00.htm


**Sharks: Conservation, Governance and Management**, edited by Erika J. Techera and Natalie Klein. A new hardcover copy on Amazon is $120.78, but you can download it (no charge) from Google Books.

**For Kids — Watch Jonathan Bird’s Blue World films on YouTube.** They are both informative, **AND** highly entertaining!
- Great white sharks — https://www.youtube.com/watch?v=qRaJ9p4CWwU
- Whale sharks https://www.youtube.com/watch?v=AvJDAxx1iTQ
- Tiger sharks — https://www.youtube.com/watch?v=jMVziqKUkVI
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- Greenland sharks — https://www.youtube.com/watch?v=711DL1tDdgU
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- Thresher sharks — https://www.youtube.com/watch?v=BQrrW9VRMFQ
- Bull sharks — https://www.youtube.com/watch?v=vrtkQ09zVfA
News from the Cage

Jupp Kerckerinck is busier than ever in Germany with television interviews and lectures, and his book — *Sharks: A Love Story* — is being reprinted again in German.

Cultural anthropologist Patrick Nason will be in New Guinea for the next year, working with and studying the shark callers. He will continue to blog on our website whenever he can get an internet connection. Patrick has been to the New Guinea numerous times, and has offered to lead an expedition of SRI members to the area in late 2016. Call (609) 921-3522 if you’d like to join him in 2016.

Best wishes from all of us to Jeffrey Gallant and Melina Grondin!

Congratulations to SRI Board Chairman Captain Steve Nagiewicz for his superb work in leading the team surveying the wreck of the *R.J. Walker* for NOAA.

Collecting Fossil Shark Teeth

Sharks have been living on Earth for about 400 million years. Sharks lose teeth throughout their lifetime, the teeth fall to the bottom of the sea and are often buried in the sand. Over the course of about 10,000 years, a shark’s tooth fossilizes and takes on the color of the sediment which is why a fossil tooth is grey, black or brown. The teeth can be found on many beaches and in small shallow streams, and searching for them is fun!

If you live in New Jersey you can join SRI on one of our fossil shark tooth hunts and we will teach you how to find fossil shark teeth. If you don’t live close by, locate a shallow brook about 12” to 18” deep in your neighborhood. You won’t need a heavy, expensive sifter and shovel either; Dollar Tree stores sell a colander with a handle for $1 that is ideal. The colanders come in red or white — it is easier to spot tiny fossils in a white one. You will use it to scoop up and wash out the sand to reveal shark teeth. Wear old clothes; you will get wet and muddy. To protect your feet from rocks, wear old sneakers or Crocs (no flip-flops because they tend to float away). Also take along a plastic bag to save the fossils you find. Fossils are often found in the sand or muck near fallen branches.

Fossil shark teeth can also be found on many beaches. Calvert Cliffs on Chesapeake Bay is a legendary its for marine fossils. No special equipment is needed because the beach is littered with Miocene fossils. Spring and fall are the best times. Don’t go in the water during summer when the stinging sea nettles move close to the beach.

You can collect fossil shark teeth on just about any beach in northern Florida. Best times to hunt them are after a storm or at low tide. Check the lines of debris along the beach for black triangles — they are usually fossil shark teeth.

Search the internet for other hotspots to find fossil shark teeth, and links to identification guides for fossil shark teeth: http://www.fossilguy.com or http://paleobiology.si.edu/pdfs/sharktoothKey.pdf
Hope for Sabah's Shark Sanctuary Dashed

In 2012, discovering that the shark population in Sabah declined by 80% during the past three decades, Sabah Tourism Culture and Environment Minister Datuk Seri Masidi Manjun proposed an amendment to the Fisheries Act to ban shark finning. The amendment was put on hold for three years pending a decision by the Federal Government, despite evidence submitted by the Sabah Shark Alliance that more than one third of all large oceanic shark species in Malaysian waters are threatened with extinction.

Testifying at a meeting in Kota Kinabalu, Agro-Based Industry Minister Datuk Seri Ahmad Shabery Cheek claimed the ban is unnecessary. “Sharks are normally caught by accident when they enter the fish nets along with the other fishes. And I don’t think they are purposely caught for their fins, which means, in perspective, there is no need to enforce a ban because the industry doesn’t exist (in Malaysia),” he said.

Ignored at the meeting was a recent study by Traffic showing that Malaysia played a significant role in the global shark trade and was among the top 10 importers and exporters in the world between 2000 and 2009. According to the report, Malaysia caught 231,212 tonnes of sharks from 2002 to 2011, the eighth highest globally, accounting for 2.9% of the total global reported shark catch during that period.

The decision was a setback for sharks. Masidi pointed out that revenue from the diving industry in Sabah was more than RM350 million in 2014, with sharks being one of the biggest lures to dive in the many islands. “I doubt whether (the sale of) shark fins contributed 10% of that to the state economy. Imagine the economic implications after the last shark is caught for its fin,” he said. Although Masidi respects the federal government’s decision not to amend the Fisheries Act and ban shark hunting and finning activities, he is going ahead with plans to set up shark protected areas. The protection will mean shark fishing will only be banned in certain areas and will not make it illegal to fish sharks in the state. “We are taking this one step at a time and hope the federal government will eventually evaluate their stand,” says Masidi.

The True Cost of Queensland’s Shark Control Program

More than 84,800 marine animals have been caught in Queensland Shark Control Program control program since 1962. Catch-data dating back to November 1962, reveals that over 84,800 marine animals have been ensnared in the program, including many, vulnerable, endangered and critically endangered species.

While the majority of marine species caught were sharks, of the 54 species of sharks caught, most were whaler and blacktip reef sharks. The toll also included more than 15,000 tiger sharks, 14,000 hammerhead sharks (including 850 scalloped and 280 great hammerheads which are both rated as endangered by the International Union for the Conservation of Nature), 310 dusky sharks and 265 sandbar sharks, both rated as vulnerable by IUCN, 265 critically endangered grey nurse sharks, 121 mako sharks and 13 whale sharks.

In addition, more than 26,700 other marine animals, including 442 manta rays, 5,000 turtles (including 719 loggerhead turtles and 33 critically endangered hawksbill turtles), almost 700 dugongs, 1,014 dolphins and 120 whales – all of which are federally protected marine species.

The Queensland Shark Control Program offers “perceived protection” from shark attack which benefits the tourism industry, but does little to prevent shark attacks and results in carnage of the marine ecosystem.

In the 1930’s when sharks nets were installed in Australia, little was known about sharks and their role in maintaining the stability of the marine ecosystem, but a lot has been learned about sharks in the past 85 years! Today, new technologies are available that offer better protection for swimmers and surfers and do not destroy marine life.
Dubai Aquarium Launches Assisted Breeding Program for Sandtiger Sharks

An ambitious new breeding project has been launched by the Dubai Aquarium and Underwater Zoo to protect the future of the threatened sandtiger shark (known as a grey nurse shark in the USA and a raggedtooth shark in South Africa). The facility has initiated an assisted breeding program for the species. The sandtiger shark is listed as “vulnerable” on the International Union for Conservation of Nature Red List of Threatened Species and could become extinct in 30 years. Sandtiger females breed every two years, and only give birth to two pups – one reason for the species’ decline.

The long-term project will develop technology that could eventually be used to artificially inseminate various species of sharks. “Artificial insemination has already been used on brown-banded bamboo sharks with a pup successfully born from an egg,” said Paul Hamilton, general manager and aquarium curator. Sperm from male sharks will be frozen in liquid nitrogen at -196°C. It can be stored at that temperature for an indefinite period until it is required to inseminate a female shark. A cryogenic lab has been set up to support the program, and visitors will be able to see the work being done as well as behind-the-scenes operations at the aquarium. It is hoped that the research will lead to new scientific protocols in areas that include handling of sandtiger sharks, sperm collection and its cryo-preservation, ultrasound monitoring of female sharks and live birth of pups.

“We will monitor the reproduction cycles of the female sandtiger sharks in the Dubai Aquarium and collect blood to help replicate hormones,” said Dr. Jon Daly. “Eventually we could inseminate a female sandtiger but that will be further down the line, once we know more about their breeding habits. Hopefully this is an insurance policy in case the worst happens and they do become extinct.” The assisted breeding program will contribute to creating the world’s first shark gene bank through the cryopreservation of the shark sperm, thus supporting international efforts in sustaining biodiversity.

Whale Shark Aggregation in the Persian Gulf

In recent years, aggregations of more than 100 whale sharks have been observed during summer months around several of Qatar’s offshore oil platforms.

The Al Shaheen oil field, located 90km off Qatar’s coast near the country’s border with Iran, is a high-security zone that’s mostly closed to the public. With minimal boat traffic, researchers report that some of the oil platforms are flourishing as artificial reefs, providing food and sanctuary for the giant sharks. “The platforms are attracting a lot of reef species that you don’t see in the sandy Gulf,” said Steffen Bach, a senior environmental advisor with the Maersk Oil Research and Technology Center in Qatar. One of the reasons that it’s important to understand the role of the platforms themselves is that offshore equipment is typically decommissioned and removed once oil fields are depleted. While Al Shaheen is expected to continue producing oil for many years to come, Bach wants to learn more about the relationship between whale sharks and the artificial reefs in the Gulf.

Local researchers are currently working to estimate the size of Qatar’s whale shark population, as well as gain a better understanding of what exactly is attracting the creatures to the area. Next year, they will also host some of the world’s leading experts in the field when the International Whale Shark Conference comes to Qatar in May 2016. This will be the first time the event will be held in the Middle East.
In 1920, a formal proposal to the Olympic Committee for inclusion of surfing was made. Now, nearly a century later, that request may be honored. The Tokyo Organizing Committee has included surfing, alongside four other sports, to be introduced into the games.

“Tokyo 2020’s announcement is an extraordinary moment for the global surfing Community,” said Fernando Aguerre, President of the International Surfing Association. “The ISA has been riding an amazing wave in this journey for Olympic inclusion and we are thrilled that Tokyo 2020 recognizes the exceptional value and youthful lifestyle that surfing can bring to the Games. We are deeply grateful to Tokyo 2020 and the IOC for providing us with this wonderful opportunity. We’re immensely proud of our sport and what it would bring to the Games and we will continue to work closely with the Olympic Movement to achieve our Olympic dream.”

“We are pleased that surfing has been recommended for inclusion in the 2020 Games by the Tokyo Olympic Organizers,” said Kieren Perrow, Commissioner of the World Surf League. “Surfing’s international growth over the past few years combined with its globally recognized athletes makes it an ideal sport to showcase on the Olympic stage. We’re excited to show billions of Olympic viewers the athleticism and artistry of these world-class surfers.”

Although this is a big step forward for the sport, it is not a sure thing just yet. A final decision will be made by the International Olympic Committee in August 2016.

Last month, the body of a five-metre whale shark was found floating about 50 metres off the coast of Cheung Chau in Hong Kong. The shark had a rope around its tail, but it was not possible to determine how it died.

All sharks are believed to be negatively buoyant (which is why their bodies sink after death), but there are numerous occasions in which dead whale sharks have been found floating at the surface.

In 1986, during a necropsy of a dead whale shark that floated into the surf zone off the coast of Natal, South Africa, a layer of tissue beneath its skin looked and felt like whale blubber. Was the “blubber” layer unique to a discrete population of whale sharks? Indicative of an illness? Since then, Geremy Cliff of South Africa’s KwaZulu-Natal Sharks Board said a few of the whale sharks that stranded in the area had a “blubber” layer, although most did not.

The whale shark found in Hong Kong did not sink after death. There is still so much to be learned about sharks and, in particular, whale sharks!
Can Sharks Mitigate Climate Change?


Predators, including sharks, continue to be harvested unsustainably throughout most of the Earth's ecosystems. The killing of sharks and other apex marine predators may lead to the instability in the natural food chain of the ocean, alter the function of the ecosystem, resulting in the releasing of carbon from the sea floor into the earth’s atmosphere. Recent research demonstrates that the loss of these animals could have far-reaching consequences on carbon cycling and, by implication, our ability to counter the effects of climate change.

The influence of predators on carbon accumulation and preservation in vegetated coastal habitats (that is, salt marshes, seagrass meadows and mangroves) is poorly understood, despite these being some of the Earth's most vulnerable and carbon-rich ecosystems. The consequence is what is known as a trophic meltdown. With the loss of around 90 percent of the ocean's top predators from around the globe, the occurrences of trophic meltdowns are now widespread. In the case of sharks and turtles, sharks eat turtles, which in turn eat seagrasses. And when sharks disappear, the turtles overgraze, leading to huge reductions in seagrass carbon stocks.

There is sufficient evidence to suggest that intact predator populations are critical to maintaining or growing reserves of 'blue carbon' (carbon stored in coastal or marine ecosystems), and policy and management needs to be improved to reflect these realities.

Test Results: White Sharks Reactions to Magnetic Barrier


Gill nets are utilized to minimize the potential interaction between a beachgoer and a predatory shark. White sharks (*Carcharodon carcharias*), a protected species in South African waters, is often killed in beach nets in KwaZulu-Natal, South Africa. To address the issue of *C. carcharias* capture in beach nets and to reduce mortality of this species, two related experiments were carried out: the bait experiment and the magnetic-control barrier experiment. Both experiments were aimed to determine the effect of permanent magnets on *C. carcharias*. During the bait experiment, a total of twenty *C. carcharias* interacted with the control and magnetic apparatuses. The results indicate that avoidance and feeding behaviors were significantly associated with treatment type, suggesting that permanent magnets had *C. carcharias* deterrent capabilities. In addition, it was demonstrated that the likelihood of an avoidance behavior on the magnet-associated baits was not significantly correlated with water visibility or conspecific density. For the second experiment, results from stage I of the magnetic-control barrier experiment indicate that behavior was not associated with treatment zone; however, stage II indicated that behavior was significantly associated with treatment type. Results from the magnetic-control barrier experiment clearly demonstrate that although a visual barrier, such as the procedural control barrier, may be sufficient to deter *C. carcharias* from an area, the addition of permanent magnets provide additional successful deterrence of *C. carcharias*. This study demonstrates that *C. carcharias* are sensitive to strong permanent magnetic fields; therefore a large-scale experiment with a substantially greater sample size is warranted to investigate the potential of a non-invasive magnetic barrier to replace detrimental beach nets in KwaZulu-Natal, South Africa. Note: in the same issue several of the authors published a similar article on effectiveness of the barrier on bull sharks.
Biofluorescence in Fish


Bioluminescence, or living light, is produced by a chemical reaction, while biofluorescence is created differently. Biofluorescent organisms absorb blue light and re-emit it as a different color, usually red, orange or green. During multiple expeditions to the Caribbean and tropical Western Pacific (2011–2013), and in living aquarium collections, the authors identified more than 180 species of biofluorescent fishes, including sharks and rays.

They found notably distinct fluorescent emission patterns among closely related species that otherwise strongly resemble each other in daylight which suggests a intraspecific communication/species recognition function. Conversely, biofluorescence appeared to be most evident in well-camouflaged fish that tend to blend in with their surroundings. Based on the finding of the study, the possibility exists that marine fishes are using biofluorescence for a variety of functions, including communication (species recognition, mating), predator avoidance, and potentially even prey attraction/predation.

They Glow in the Dark Even When Its Not Halloween


Critters that dwell hundreds of meters below the ocean’s surface in the abyss are decidedly weird, and the small, slender lanternshark is no exception. For years researchers struggled to understand the purpose of the glowing markings along the sides of lanternshark’s body. They obviously aren’t for camouflage, but could they warn predators to stay away or lure prey? Just what are they for? According to this study, those markings allow the shark to communicate with others of its kind.

The flashy markings (lateral photophores) help facilitate intraspecific communication — communication within the same species. It can’t be easy attracting a partner in the dark; males and females glow from different parts of their bodies and scientists think that this helps them locate a mate. Whatever the reason, the glowing marks have been an evolutionary success story; about 40 species of lanternsharks now produce light shows.