



Text by Ila France Porcher

With the loss of at least 90 percent of sharks worldwide, it would seem to be urgent to protect the ones that remain. Every global study of their status has reported a more dire situation than the last, and that the targeted hunt for the shark fin trade is responsible for their catastrophic depletion. Only one-third of shark species are considered safe, and the most threatened are those accessible to fishing—those within about 1,000m of the surface, or, for seafloor dwellers, 3,000m in depth.

Shark fins are among the most expensive seafood products. The total declared value of the world trade in shark products is close to US\$1 billion per year and it is associated with much illegal activity, including murder. To supply the trade, intense shark fishing spans all oceans. Yet, as top predators, sharks have incalculable ecological importance and their removal has grave effects on the ecosystems where they once lived, as the consequences of their absence cascade down through the inter-tangled networks. Yet,



Can Commercial **Shark Fishing** *Be Sustainable?*

those who profit from the shark fin trade continue to promote shark fishing, claiming that it is already widely sustainable, and will be more so. But is this true, or just political promotion by industrial interests?

The fisheries' arguments

Whenever shark fishermen are threatened with the loss of their shark fin profits, they protest. Usually, this involves claim-

ing that if they do not continue to kill the sharks, the animals will soon be out by the beaches, eating people's babies, and this is currently the case in the United States. The strong movement to put an end to the shark fin trade in the United States has resulted in the Shark Fin Sales Elimination Act of 2019, which has just been passed by Congress, and is now before the Senate.

But shark fisheries are fighting back, arguing that the shark fin trade should continue for the profit of American fishermen, even claiming that it is good for sharks. Led by coalitions such as the Sustainable Shark Alliance (SSA), which represents shark fishermen, dealers and processors, and those who advocate their views (shark fisheries scientists, lawyers and lobbyists), they promote H.R.

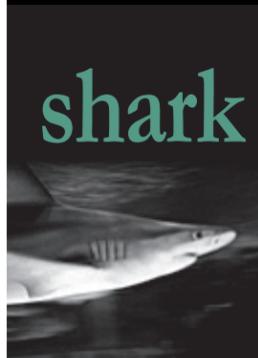
788, the Sustainable Shark Fisheries and Trade Act of 2019, and actually admit that without the profit from shark fins, shark fisheries in the United States will be shut down.

They reason that American shark fishermen fish sustainably, so they should be able to sell their shark fins on the lucrative shark fin market. They promote the idea that if only shark fins from sustain-

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shark tales



able fisheries are used for shark fin soup, this will put an end to shark finning worldwide, and those countries who continue to practise it will suffer.

However, the numbers reveal that the large market for shark fins in the United States could never be filled by fins from sustainable shark fisheries, for only a few of them temporarily exist.

Fisheries advocates claim that:

- If the shark fin trade is banned, more sharks will be killed, because fishermen will have to catch more sharks to make the same amount of money.

- The fins should be used because of the general principle that the whole shark should be used.

- Sharks are really being killed for meat, not for their fins.

- If American fishermen do not kill the sharks and supply the shark fin trade, "bad actors" will kill them.

But these arguments are not based on science, facts or logic, and rely on political bias and rhetoric. While it sounds like a good idea to import, export and sell products that only come from "sustainable" fisheries, the Sustainable Shark Fisheries

and Trade Act of 2019 is completely unrealistic to put into practice.

Problems with the Act

The problems of who would set the standard, who would lobby other countries to accept the US evaluation of what is sustainable, and who would monitor the programme, research and pay for it, are all unaddressed. Whether the American public would be willing to finance it through their tax dollars has not been mentioned.

Fisheries governance regimes are very expensive to set up and operate, and the cost varies depending on the type of measures implemented, ranging from scientific advice and management to monitoring, control, surveillance and enforcement. Every country in the world with a shark fishery would need to be lobbied to pass sustainable shark fisheries management legislation. When laws are in place and enough data has been collected to determine what the sustainable catch rates might be for each species caught in every shark fishery, development and funding of management plans would need to be put in place, including staffing, training, purchase of equipment and so on. Then, enforcement plans would need to be developed, implemented and funded. These costs tend to fall on the public sector while the benefits are enjoyed by fishermen.

All that is involved in the Sustainable Shark Fisheries and Trade Act—putting American practices into play on a global scale—would need to be maintained long-term, while somehow requiring every country to keep politics, financial self-interest and corruption (to say nothing of criminality) out of the process.

There is no international body that can

force sovereign countries to do anything on this scale. Some countries, especially those with large fisheries, have consistently been resistant to controls on fishing based on scientific data.

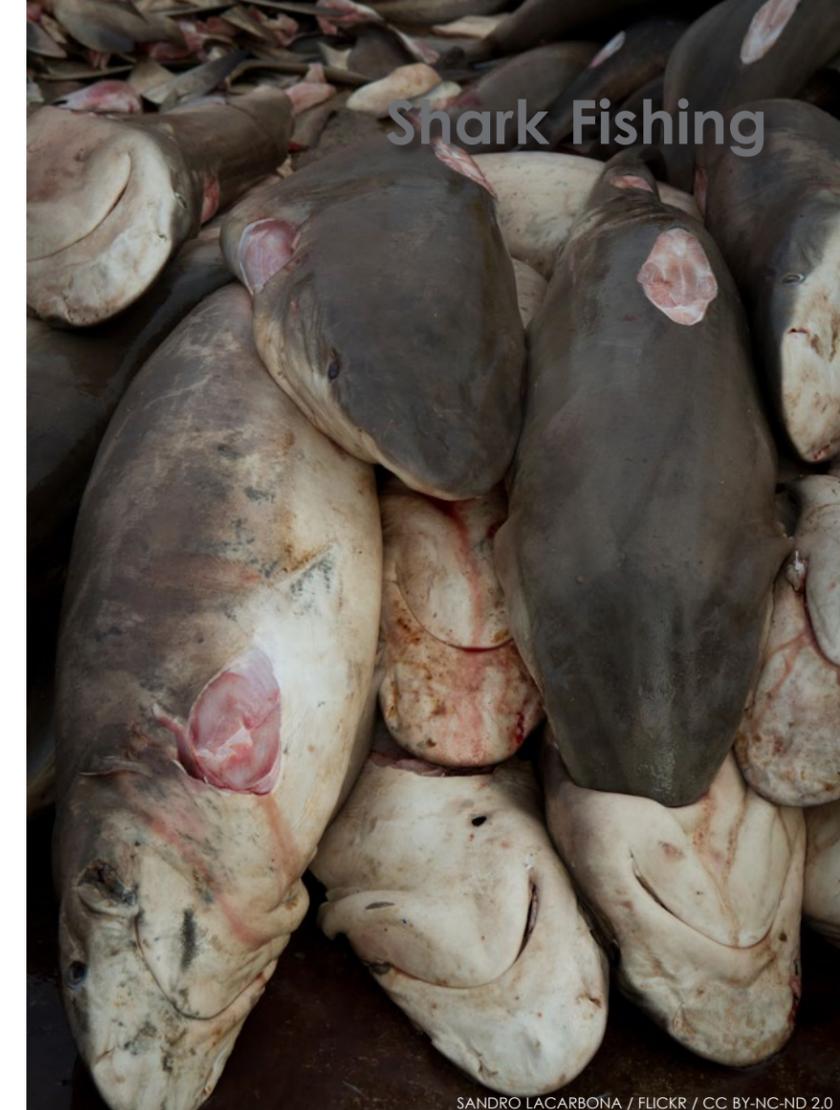
Europol reported in 2018 that illegal fishing of tuna was twice that of legal fishing in the Atlantic. If it is not possible to effectively manage a species for which there is probably more data than any other, the idea that the United States will create sustainably managed fisheries for all 500 shark species (and all fish species) throughout the entire world is absurd.

Conflict with WTO agreements

Furthermore, World Trade Organization (WTO) agreements require that no country can favour the imports of one nation over another, nor ban imports of a product while still locally producing and exporting the product. The Sustainable Shark Fisheries and Trade Act would appear to be in direct violation of those agreements, and fisheries advocates have not stated how the United States will get around this.

Misleading US shark fin records

To complicate matters, the United States itself obfuscates its records of its involvement with the shark fin trade. It records trade in dried shark fins only, under just one commodity code, while its exports of raw, frozen shark fins are classified as meat. Thus its official records are very misleading, so that fisheries advocates can easily make the case that the country



Shark Fishing

A large catch of sharks with their fins removed (right); Shark fins, which are the prized ingredient in shark fin soup, considered a delicacy in parts of the Asian community, are shown in a shark conservation display at the Monterey Bay Aquarium (below)

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scarcely contributes to the shark fin trade.

However, other countries have reported exporting large amounts of shark fins to the country. In 2007, for example, other countries reported exporting 1,012 metric tons of shark fins to the United States, 35 times the figure of 28.8 metric tons reported by National Oceanic and Atmospheric Administration (NOAA).

At least several hundred tons of shark fins are consumed annually in the United States, and imports have been rising each year, in spite of the bans in such major centres as California and New York. Ninety-three percent of imports enter through the Los Angeles customs district, and in 2017, one-third of species traded in the Hong Kong shark fin market (the central Asian market for fins) was found to be threatened with extinction.

Replacing fish with sharks

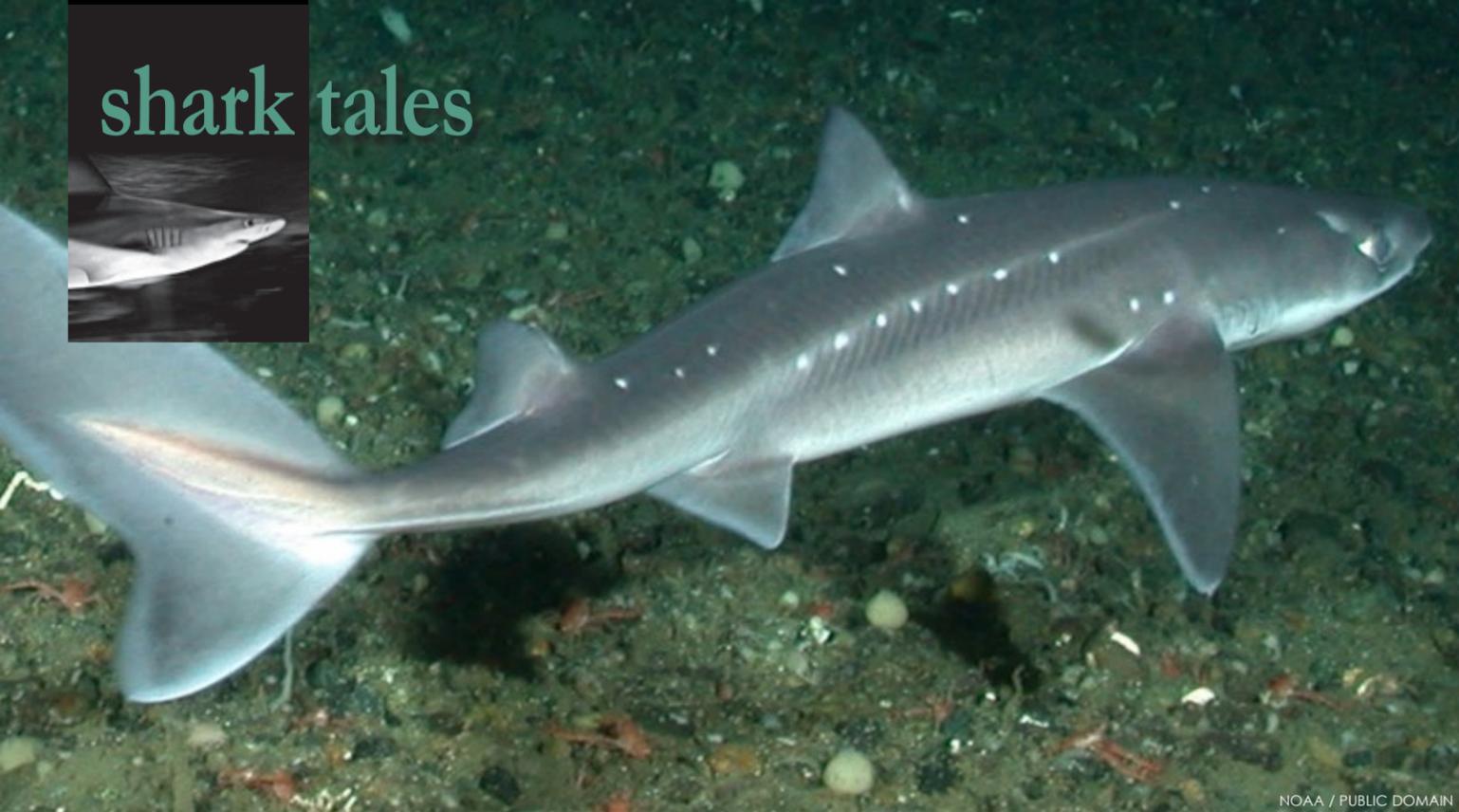
An examination of the best global scien-



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shark tales



NOAA / PUBLIC DOMAIN

Spiny dogfish produce fewer young per pregnancy and live longer than other sharks.

tific studies reveals that no shark fishery serving the shark fin market is sustainable. The markets for shark fins and shark meat have always been separate, and involve different species. Those currently considered sustainable are only a few that have targeted sharks for meat, in Australia and the United States. However, they are now being propped up by the value of the sharks' fins and their long-term viability is questionable.

Sharks have become so valuable that they are now sought only for the money for their fins, producing a surplus of meat on the market.

For example, the spiny dogfish fishery, on the US Atlantic coast, is currently considered one of the most notable sustainable shark fisheries. The meat is sent to Europe and the fins to Asia. This fishery markets shark meat as a replacement for cod, the once plentiful fish from that region which is now gone. Since there is little market for shark meat in the coun-

try, the meat is sold under different names, such as "rock salmon."

But the stock of spiny dogfish in the western Atlantic Ocean shows wide fluctuations. It collapsed in the 1990s, and NOAA and the US Department of Commerce declared it to be rebuilt in 2010. However, globally, the species is listed by the International Union for Conservation of Nature (IUCN) as being vulnerable to overfishing, and the spiny dogfish is critically endangered just across the Atlantic Ocean. Therefore, the population off the US East Coast is unlikely to be stable, either.

Dogfishes, like other species in the deep, cold waters of the northern continental slopes, have relatively low productivity. They produce fewer young per pregnancy and are longer lived than many other shark species. The bio-accumulation of mercury in their body tissues is greater too, making this shark highly questionable as a choice to offer on the market as food.

Fisheries' failures

Global analyses have shown that the level of threat to sharks through overfishing is usually greater than what is predicted by the fisheries' assessments. Such local assessments can underestimate the risk of collapse of global stocks of any given species, and have often caused such a collapse.

For example, sharks are already extinct at St. Paul's Rocks, where no carcharhinid reef sharks have been seen in past decades, though they were formerly plentiful. Such local extinctions are the warning signs of fisheries management failure and are the first steps on the road to global extinction.

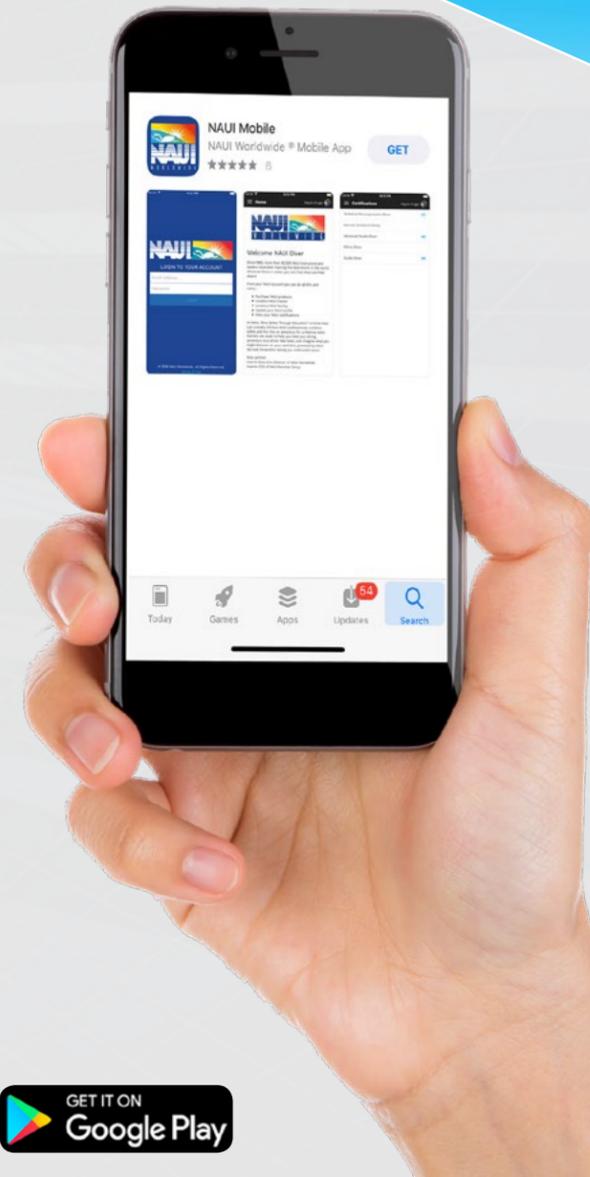
What becomes evident in the current political situation in the United States, in which shark fishing advocates are lobbying hard for the perpetuation of the shark fin trade, is that American fisheries are focusing on sharks with the intention of profiting from their fins, while the over-abundance of shark meat in the market is being

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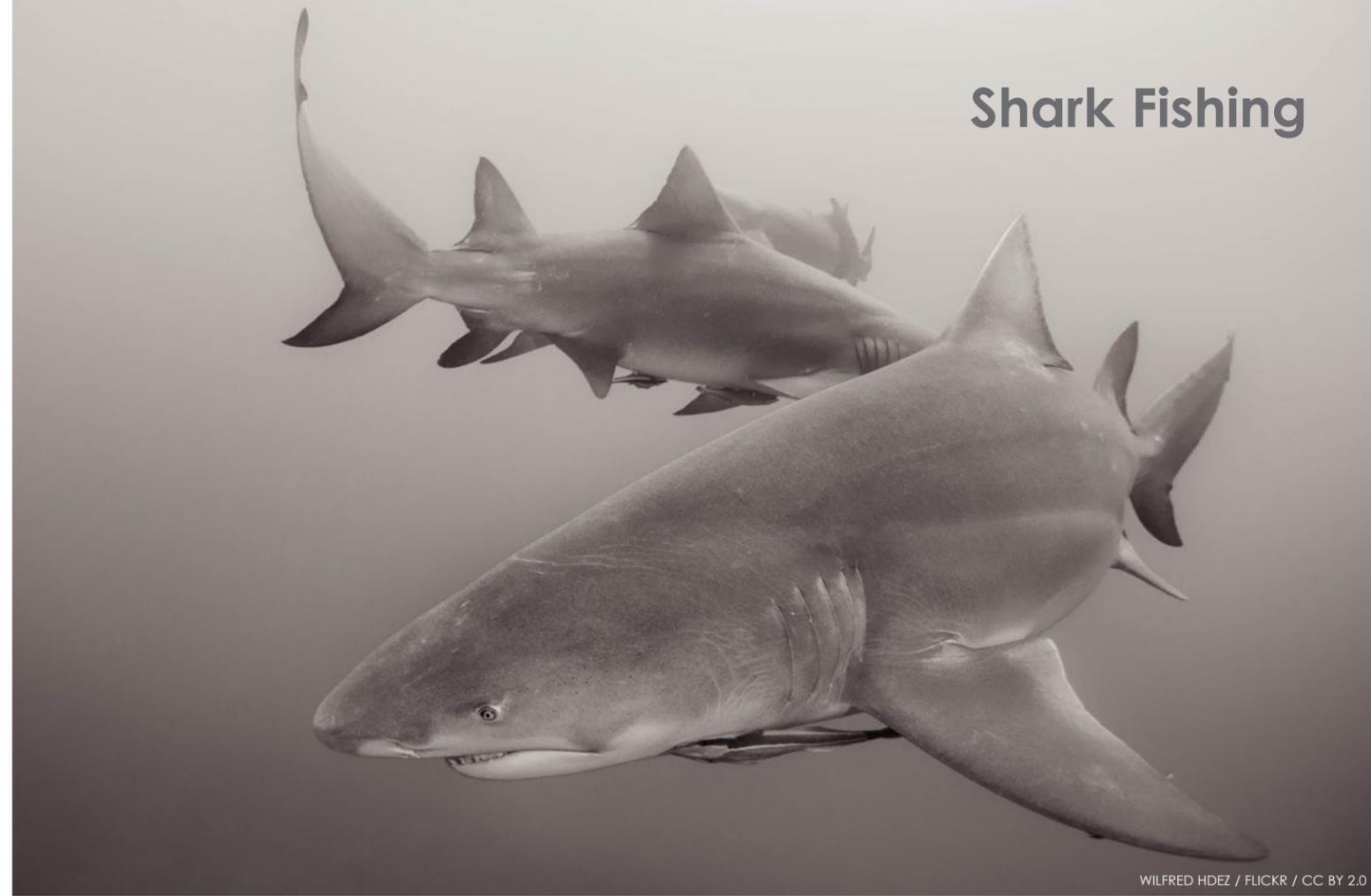
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Lemon sharks
(right and
below)

Shark Fishing



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used in everything possible from makeup to dog food.

American fisheries' current policy of taking the top predators, now that they have depleted the fish, is ecological folly. Shark production is much lower than fish production, and if these industrial interests have their way, sharks will soon go the way of cod and many other species that they have fished out.

Fishing effort must lessen

Two World Bank studies, *The Sunken Billions* (2009) and *The Sunken Billions Revisited* (2017), have found that unsustainable fisheries management practices have led to globally depleted

fish stocks that produce US\$83 billion less in annual net benefits than would otherwise be the case. Ninety percent of fisheries are overexploited. To address this global crisis, the main requirement is that the fishing effort is diminished, while at the same time, fish stocks must be rebuilt, and coastal ecosystems returned to a state of health.

These studies specify that little is known about the actual carrying capacity of most fish stocks that are subject to commercial exploitation, and that fisheries' data are often highly uncertain.

The Sunken Billions predicts that social unrest will result from the necessary reduction of fishing

effort that must come, because some fishermen will have to turn to other occupations. So, the current outcry from the shark fishing industry has been predicted, and is understandable, but indefensible. The World Bank recommends that the fishing subsidies that have facilitated overfishing in the past be used to ease this social transition.

Only their fins are wanted

When only the fins of the shark are valuable, and you apply the wise adage to use the whole animal, the question becomes not "what do you do with the fins," but "what do you do with the rest of the shark?"

Texas recently passed a law that required that all dead sharks shipped through the state have their fins naturally attached, so that the fishermen lost the profit from the sale of the fins. This income loss effectively closed down the Western Gulf of Mexico shark fishery in 2019, revealing the degree to which the shark fin market drives shark fisheries.

In Costa Rica and other South and Central American countries, sharks were considered unde-

sirable and were not used for food prior to the 1980s. Then, the inflated price of shark fin resulted in sharks from a wide variety of habitats being targeted for their fins alone. The "fins attached" policies obligated fishermen to land fins attached to the bodies. So, the shark fin industry's surplus meat was put on the market for domestic consumption, resulting in merchants pushing the meat on local consumers and relying on the use of various other names to sell it. Now, Costa Ricans alone are consuming about 2,000 tons of shark meat a year and the situation is similar in many other countries.

This is a problem with mandating a "fins attached" policy: it does not properly address overfishing. Worldwide, the tendency now is less discarding of the body of the shark, but without a lessening of mortality.

Toxic meat

The problem with loading shark meat into the local markets is that it is poisonous. For example, the Florida Fish and Wildlife Conservation Commission's fishing rules specify a minimum size limit of 54 inches for about half of the shark species caught. At the same time, Florida's Fish Consumption Advisories recommend that no species of coastal shark longer than 43 inches should ever be eaten by anyone. Thus, fishermen are specifically advised to catch large sharks, which are breeding females, and are too toxic to eat.

This makes it clear that large species such as lemon and tiger sharks are being killed only for the value of their fins. Thus, fisheries interests lobbying for the perpetuation of the shark fin trade are targeting an animal that is too toxic to eat, and is globally threatened,

for the benefit of relatively few industry employees.

Problems with sustainability

While the idea of sustainability sounds good, the facts as found by the best science simply do not support the notion that sustainable shark fishing is possible to put into practice long-term. The scientific studies done to research the matter have revealed how few such fisheries are.

To begin with, pirate fishing takes one-fifth of the total fishing revenue. Twenty-six million tons of catch are thought to be taken illegally each year by pirate industrial-scale fishing, and there is no effective authority to police international waters.

Secondly, the documented shark fin trade shows that fisheries' assessments have underestimated the numbers of sharks being killed by at least 400 percent, another



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The shortfin mako shark (left and below), which was once considered sustainably fished, is now listed as "Endangered" by the IUCN.

Shark Fishing

ten other countries, effectively demonstrating the hollowness of American claims about how it is making shark fishing sustainable.

It is thought by ICCAT scientists that the population of shortfin makos in the North Atlantic could take 50 years to recover, even if fishing is stopped completely. Like other cold-water sharks, shortfin makos are slow-growing and so are especially vulnerable to overfishing. They are killed for sport as well as for their meat and fins, and though they are fished by many nations worldwide, they are not subject to international fishing quotas.

Using them as an example of "sustainable shark fishing" has been highly misleading.

CITES protection

Listings by the Convention on International Trade in Endangered Species (CITES) are currently the

only protection available for sharks. But in practice, such a listing only protects the animal from exportation, not from being fished in the first place. Protecting an animal with high market value is extremely difficult and such listings are opposed by shark hunting nations due to the high commercial value of the fins, so increasing effort is required to obtain them. Protection must be gained one species at a time, and only a few species are currently listed, while the shark fin market demands fins from all species.

Once separated from the shark, it is difficult to determine from which species any given fin has been taken, so enforcement is weak. Furthermore, the only protection granted by a CITES listing is the need for a "Non-detrimental" finding before the fins can be exported. This often

undermines the protection originally intended for the species by the CITES listing.

Conclusions

Given that sharks have already been depleted by at least 90 percent, the question arises as to how anyone can talk about continuing their slaughter and calling it sustainable. How low do their numbers have to fall before it will become self-evident that we have already lost far too many?

Sharks reproduce much more slowly than fish. While fish lay thousands of eggs, sharks are more like mammals. Female sharks take many years to reach reproductive age, then give birth to just a small number of offspring every one or two years. When fish stocks are commercially exploited, the most valuable stocks and larger individuals are targeted

illustration of the unreliability of fisheries' data.

Furthermore, only a small fraction of the shark fin trade is documented. Most fins are imported from Asia where they have been sourced from many shark-hunting nations, most of which do not keep species-specific catch statistics, so are impossible to trace.

Then, there is the problem of by-catch. The quantities of most shark species taken as by-catch are not recorded, so some species can be at high risk of depletion without this being recognised.

The inherent uncertainties

For a fishery to be sustainable, shark fishing mortality must be equal to, or lower than, the number of dead sharks that make up the "maximum sustainable yield." But in the case of sharks, those reference points are often not known or are very uncertain. The global studies done on shark depletion have emphasised the problems inherent in assessing the true situation, providing detailed

descriptions of the difficulties at every level.

For example, in 2015, the International Scientific Committee for Tuna and Tuna-like Species in the North Pacific Ocean analysed shortfin mako stocks using the most complete data available but it found that due to missing information, untested indicators and conflicts in the available data, the assessment was impossible to make at all.

The shortfin mako was assessed on the IUCN Red List in 2000 as being "Lower Risk/Near Threatened," and in 2009, it was reclassified as "Vulnerable."

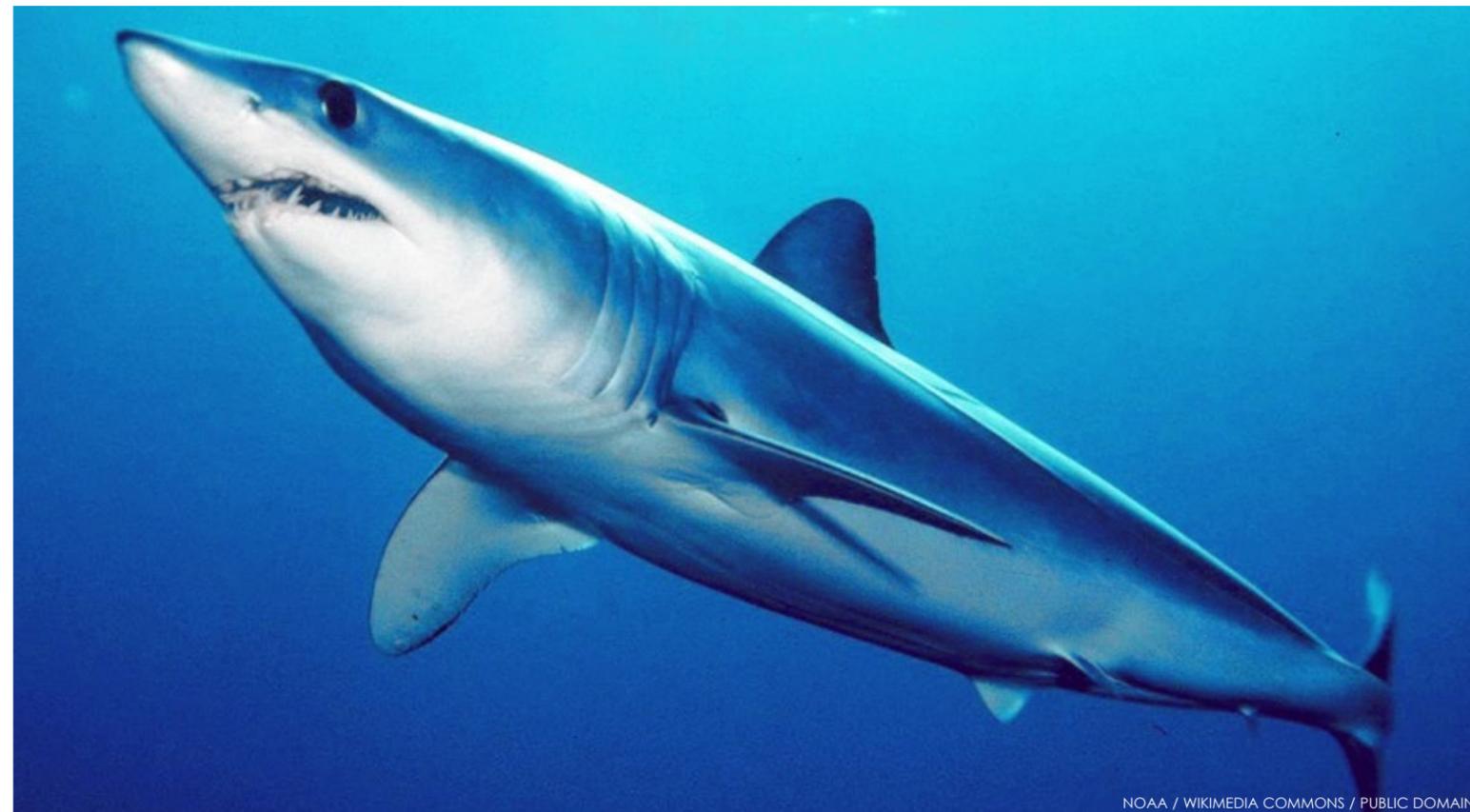
Yet in 2017, the shortfin mako fishery in the North Atlantic Ocean was reported in a scientific journal to be a "bright spot" of sustainable shark fishing and was used by fisheries' advocates to promote the idea that sustainable shark fisheries exist "all over the world" and that most other shark fisheries can be made sustainable too, with the United States in the lead. But in that same year, the

stock assessment on the NOAA Fisheries website showed that this shark was overfished and that overfishing was occurring.

The IUCN then re-classified the shortfin mako from "Vulnerable" to "Endangered" worldwide, with a decreasing population trend. But it was not until 2019 that US fisheries began working on a management plan and urged fishermen to reduce catches voluntarily in the meantime.

Thus, fisheries management in the United States, which claims to be the best in the world, allowed this species to go from "Lower Risk" to "Vulnerable" to "Endangered" in less than 20 years, with no conservation action. It became clear that the "sustainable shark fishery" management approach was not working to maintain shark populations.

Then, at the annual meeting of the International Commission for the Conservation of Atlantic Tunas (ICCAT), the United States, along with the European Union, blocked protections for the North Atlantic shortfin mako shark put forth by



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shark tales



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Blacktip reef sharks

first. With this pattern applied over decades, global marine catches over time have comprised an increasing proportion of juvenile sharks, while the breeding adults are vanishing.

Sharks have high importance ecologically due to radial evolution into new vacant niches in the aftermath of several planet-wide extinctions. As a result, they are interwoven throughout the world's aquatic ecosystems. As large animals at the top of the food chain, their removal is causing whole ecosystems to collapse. Furthermore, due to the continuously increasing human population, the pressure upon them is likely to grow more intense as the years pass.

A variety of indicators show an accumulation of extinction risk throughout the oceans as a result of many decades of overfishing. These are complicated by the effects of climate change—the melting icecaps, the changes in major oceanic current systems, ocean acidification, coral death, warming waters and rising sea levels. Along with industrial and plastic pollution, these changes pose serious threats to marine life, including sharks. The World Bank's recommendation that fish-

ing effort be reduced to a point that allows the healthy recovery of coastal ecosystems, including their top predators, should be adopted until, with careful management and the allocation of many more Marine Protected Areas, the oceans regain a state of ecological stability.

Priority should be given to local fishers who depend on the sea for their protein. Western consumers, who are already eating too much protein, would just choose something else if fish was not on the menu. These are wild animals, and with the human population already so bloated, and growing fast, no wild animal should be expected to support us.

For these reasons, no large-scale shark fishery is going to prove sustainable in the long-term. If history has taught us anything, it is that no species can stand up to sustained, targeted, commercial killing—not whales, not turtles, not fish, and not sharks. At the very least, sharks should be given the same protection now granted to sea turtles—complete protection from international trade. ■

Ila France Porcher, author of The Shark Sessions and The True Nature of Sharks, is an ethologist

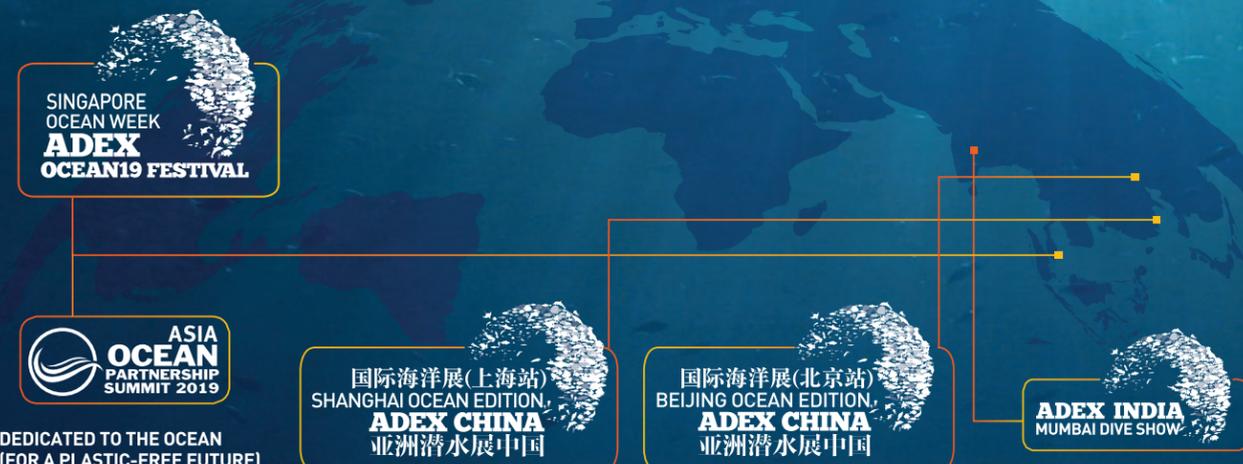
who focused on the study of reef sharks after she moved to Tahiti in 1995. Her observations, which are the first of their kind, have yielded valuable details about their lives, including their reproductive cycle, social biology, population structure, daily behaviour patterns, roaming tendencies and cognitive abilities. See: ilafranceporcher.wixsite.com/author.

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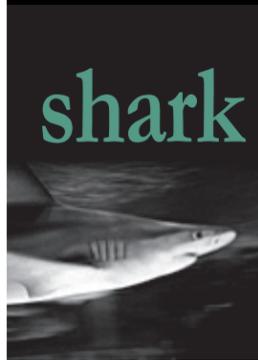
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Photo courtesy of Matthew Smith





shark tales

Blacktip reef sharks are often observed with deep open skin injuries.

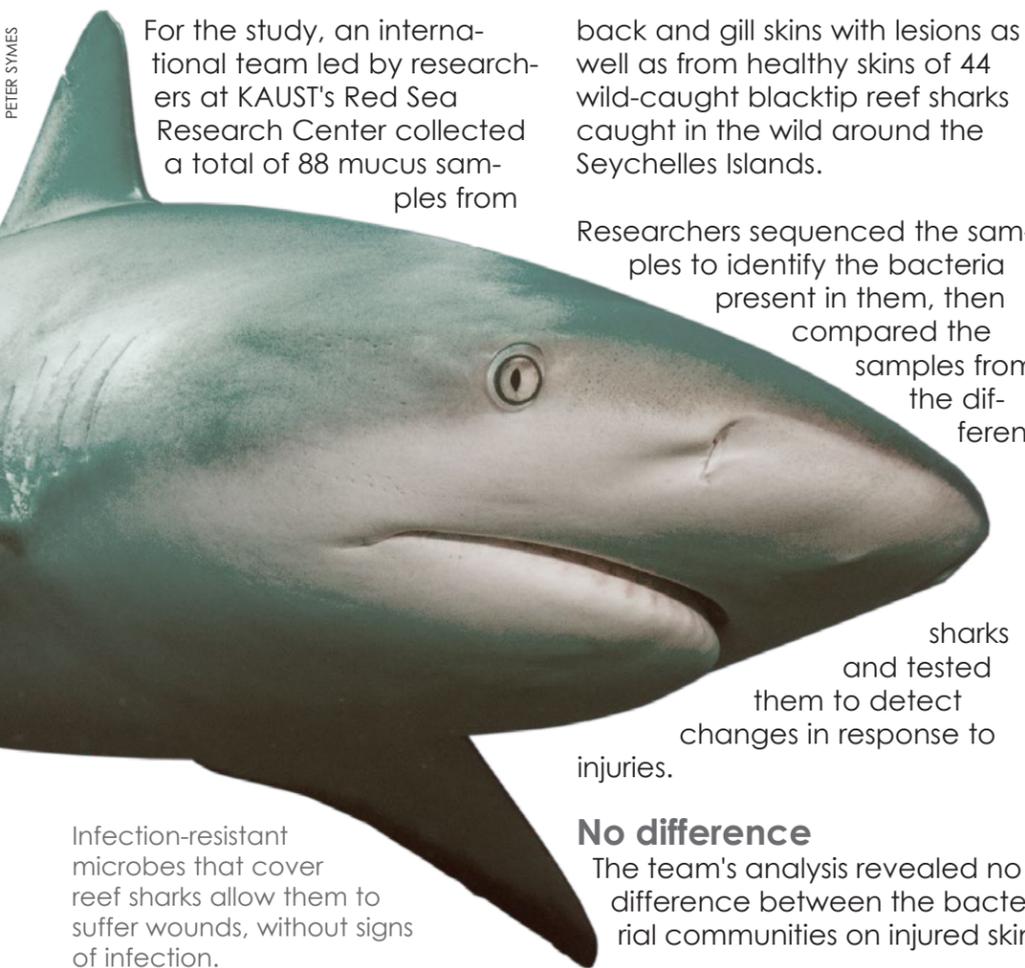


CLAUDIA POGOREUTZ, ET AL

Bacteria behind the remarkable resilience of shark wounds to infection

While sharks can often be seen with open wounds in the wild, it is quite rare to see obvious signs of infection on them. Clearly, shark skin harbours properties that prevent infection, so shark researchers set out to investigate the possible contribution of the sharks' skin bacterial community to the ability to heal fast.

PETER SYMES



For the study, an international team led by researchers at KAUST's Red Sea Research Center collected a total of 88 mucus samples from

back and gill skins with lesions as well as from healthy skins of 44 wild-caught blacktip reef sharks caught in the wild around the Seychelles Islands.

Researchers sequenced the samples to identify the bacteria present in them, then compared the samples from the different

sharks and tested them to detect changes in response to injuries.

No difference

The team's analysis revealed no difference between the bacterial communities on injured skin

on gills and uninjured gills or backs. In other words, there was no evidence of infection around the wounds. "We were surprised not to find any substantial change in the skin bacterial communities," said Claudia Pogoreutz, the postdoctoral fellow who led the study.

There were differences discovered in sharks in different locations, Pogoreutz continued, noting it could be from any number of factors.

"The differences in shark skin microbial communities may reflect differences in the ambient environment, such as temperature, population density, nutrient availability or pollution, but we cannot rule out the possibility that the changes could provide an adaptive benefit to the sharks," Pogoreutz said. "There's still so much to learn with respect to shark skin-associated bacteria." ■

SOURCE: ANIMAL MICROBIOME

Shark-proof wetsuit in the making

Scientists have developed a wetsuit that could protect swimmers from fatal shark attacks. The suit, is designed to reduce blood loss—the main cause of death in shark attacks.

Researchers at Flinders University in Adelaide have been developing and testing a new type of neoprene—the synthetic rubber commonly used in wetsuits—against the force of a bite from several species, including the great white shark. The new material aims to reduce cuts and punctures from a shark attack, thus lessening blood loss for victims. The suits are also made from fabric that is thicker than a typical wetsuit.

"We are cognisant that it will not prevent all injuries as it will not prevent fractures or crushing injuries," associate professor Charlie Huvneers told AFP.

"When a shark bite occurs, it can have severe physical, mental, social and economic consequences. It is therefore important to keep developing new means of reducing shark bite risks and ensure the efficacy of such new products."

The suit's efficiency was studied in shark-infested waters off the coast of South Australia. "We tested the fabric on white sharks because it is the species responsible for the most fatalities from shark bites."

The tests included 10 variants of two different fabrics using two laboratory tests, puncture

and laceration tests, along with field-based trials involving white sharks measuring 3 to 4m. The results showed that both fabrics tested may provide some protection against shark bite and could be used as part of a shark bite mitigation strategy.

The new neoprene was tested against standard materials commonly used by surfers and divers, with findings to be released later this year. "More force was required to puncture the new fabrics compared to control fabrics (laboratory-based tests), and cuts made to the new fabrics were smaller and shallower than those on standard neoprene from both types of test, i.e. laboratory and field tests.

The study is now being independently reviewed. ■
SOURCE: PHYS.ORG

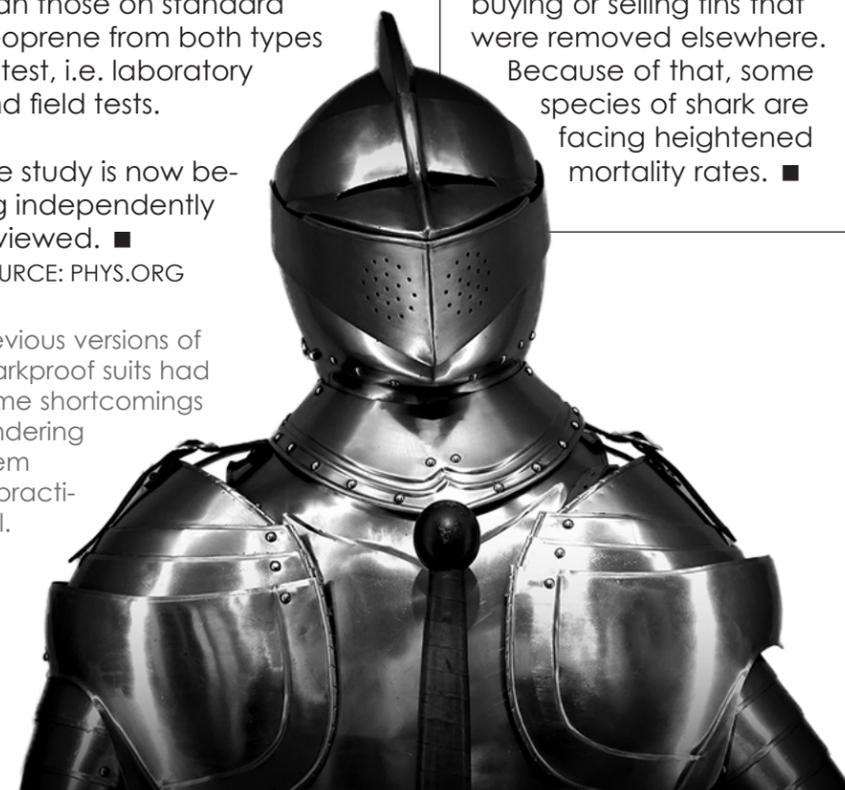
Previous versions of sharkproof suits had some shortcomings rendering them impractical.

US Congress passes bill banning sale of shark fin

The Shark Fin Sales Elimination Act was passed by the United States House of Representatives by a vote of 310 to 107. The bill prohibits the import, export, possession, trade and distribution of shark fin and products containing shark fins in the country.

The act of shark finning and possession of shark fin aboard a vessel is currently prohibited in US waters under the 2010 Shark Conservation Act, but this law does not stop domestic trade. While it prevents removing a shark's fins on ships in US waters, it does not prevent people from buying or selling fins that were removed elsewhere.

Because of that, some species of shark are facing heightened mortality rates. ■



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