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The Potential for Great White Sharks to Frequent the Long Island Sound

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Abstract

There are a few species of sharks that regularly inhabit the coastal waters of Long Island, New York. Rising water temperatures and increasing human/seal populations in the New England/Long Island region have the potential to cause alterations in local species composition, especially as white shark populations continue to grow in the northwest Atlantic Ocean. Increased competition may drive species such as sand tiger sharks and white sharks into areas previously thought to house low shark concentrations, such as the Long Island Sound. This work was written so that tourists and the people of New England become informed as to the ever-changing ecology of our aquatic ecosystems. Spotting a shark in the Long Island Sound is now a “once in a blue moon” event, but this may change with alterations in our local ecology.

Keywords: sharks, Long Island, New England, Ocean

A Drive through New England

The North Fork (NOFO) of Long Island is best described by rocky shorelines, coastal breezes, and rural agriculture. From crab traps to sprawling vineyards, the NOFO truly is the best of both worlds. I spent every fall, winter, spring and summer strolling the pebbled beaches, skipping stones and gazing across the Long Island Sound toward the not-so-distant Connecticut landscape. I was 18, had just graduated high school during the summer of 2017, and was feeling a bit suffocated. I was working close to 40 hours a week at a retail job, and I felt my final summer of freedom slipping through my fingers. College was just a few short weeks away, and I wasn't ready for the massive change that lay before me. On a whim, I was inspired to take a week-long road trip up the New England coast to explore the other side of the Sound. I departed from Orient Point at 7 A.M. on a humid July morning and found myself in New London, CT, a mere 90 minutes later. The choppy whitecaps and powerful gusts of salty air reaffirmed my sense of adventure, as well as the desire to experience something unique and empowering.

Cloudless blue skies and warm sea breezes lead the way as I cruised down Cape Cod's Route 6, making stops in Chatham, Eastham, and Wellfleet. Beaches and sparkling surf on my left and right, I eventually made my way to the tip of the Cape, just outside of Provincetown, MA. It was here that I came across a bouldered breakwater that jugged out into the coastal marsh of Provincetown Harbor. I parked my car and approached the outcrop, already populated with dozens of tourists (just like me). A large and colorful sign to my right caught my eye. It was a beach warning sign, indicating that great white sharks lived in those waters, and one should avoid swimming near seal colonies. I was taken aback; the landscape of Provincetown Harbor looked *just* like the bays and creeks back home where I spent most of my time. Was it really possible for great whites to be there, in that sheltered harbor? Maybe 100 feet to my left by the buoy, or 10 feet to my right in the reeds? I'd heard about sharks in Massachusetts, but I never really thought about sharks living less than 200 miles north of home. I had always thought of Long Island as separated from the Cape, so this New England experience was truly an eye-opener for me. If great white sharks could make their way into Provincetown Harbor, who is to say they are unable to make their way into the Long Island Sound?

The Sharks of Long Island

According to award-winning author Patrick Lynch in his 2017 book titled, *A Field Guide to Long Island Sound*, Long Island began taking shape between 15-25,000 years ago and is dotted with remnants of Wisconsin glacial activity, including the infamous flooding of Lake Connecticut into what is now the Long Island Sound (LIS). Lynch indicates that the LIS is a relatively shallow body of water with an average depth of only 64 feet, and a length of about 110 miles, though it seems a lot longer to anyone who has traversed the Island on a busy summer

weekend. The easternmost entrance to the LIS, known as the Race, is also the deepest (around 320 feet). In his 2010 book *Fishing Long Island Sound: A Guide for Beach and Boat Anglers*, master fisherman and author Tom Migdalski proposes that the Race is the most productive area of the LIS due to abundant populations of striped bass, bluefish, false albacore, squid, sand eels, and anchovies, among others. He mentions that these species provide an important source of commerce and recreation for anglers, as well as entice predators such as tuna (not to mention larger, hungrier mammals like dolphins and seals) to enter the LIS. Lynch also writes that a few species of seals regularly visit the eastern LIS, most notably harbor seals and gray seals.

Although seals are a relatively uncommon sight, even in the eastern region of the LIS, they have the potential to invite predatory white sharks to the isolated waters of the LIS. The Sound is no stranger to sharks, though, evidenced by four permanent residents that actively live in the estuary waters. Shark expert Dave Sigworth, who is also the Associate Director of Communications at the Maritime Aquarium at Norwalk, identifies them as the brown/sandbar shark (*Carcharhinus plumbeus*), the sand tiger shark (*Carcharias taurus*), the spiny dogfish (*Squalus acanthias*), and the smooth dogfish (*Mustelus canis*) in his 2011 *Wrack Lines* article, “Sharks in the Long Island Sound”.

Dr. Gregory Skomal is a marine biologist at the Massachusetts Division of Marine Fisheries, and he has published many studies and articles on sharks (most notably the great white). He is among the first to successfully tag and track white sharks off Massachusetts, and he has spent more than five years on a project to quantify and qualify shark populations along the east coast, specifically the northwest Atlantic. In his 2016 book *The Shark Handbook*, he compiles information on the four species one may chance upon in the LIS. He indicates that the sandbar shark can grow up to 7.5 feet (but usually only grow to 4-5 feet), living alongside and

feeding on benthic fish and invertebrates. The fact that sandbar sharks live in deeper waters is an indication as to why run-ins with humans are so infrequent in the LIS. The sand *tiger* shark, on the other hand, is the largest permanent resident of the Long Island Sound, measuring between 5 to 10 feet. Despite the needle-like teeth protruding from their gaping mouths, sand tigers are some of the most docile, timid sharks in the ocean. Humans have little to fear from these shy sharks, notwithstanding the attacks attributed to them by the Florida Museum of Natural History this past summer on the Fire Island National Seashore.

There happen to be two types of dogfish in Long Island waters: the spiny dogfish and the smooth dogfish. “Spiny” refers to the sharp spines anterior to the dorsal fin, and “smooth” refers to a dogfish sans these particular spines. According to Sigworth, spiny dogfish are the most abundant sharks on the planet, reaching around 4 feet each and travelling in massive packs—much like wild dogs. The Smithsonian Institute published a book titled *Animal* in 2005, in which the smooth dogfish is described as a species that grows up to 5 feet and frequents the shore come sunset. It also mentions that both dogfish sharks are benthic and prefer temperatures on the cooler side (below 15°C). Unfortunately, it is more common than one might think for bottom-fishing anglers to accidentally hook a dogfish as a result of their plentiful populations.

I remember slowly drifting through the waves atop my father’s boat on a clear blue day, with my small orange life jacket strapped tightly across my chest and a hat covering my eyes. My father, an avid fisherman, had a line in the water, slowly and gently rolling his weighted lure along the bottom of the Shelter Island Sound by Paradise Point. I was young and anticipating a bustling day full of sea robins, fluke, and maybe the occasional skate. Suddenly, I saw a strong tug at the end of my father’s line, initiating a brief yet powerful struggle between man and fish. Excitedly, I peered over the port side to see a 2-foot-long smooth dogfish slowly circling in front

of where I stood. My father reached over the rail and with a nimble, experienced hand smoothly dislodged the hook from the shark's mouth. Like a flash of lightning, the dogfish zipped back to the depths from whence it came.

The Legend of the Great White Shark

There *is* one species of shark that forever lives in infamy (and no, it's not a dogfish). The portrait of jagged, serrated teeth and a foreboding frame is ingrained in minds of every man, woman, and child. The thought of finding oneself in the water with a great white shark may make even the bravest quiver in fear as they anticipate the excruciating bite that is sure to ensue. Sounds familiar, right? Well, this is the perception of white sharks that has been in the public forefront since the 1970s. Peter Benchley published a book titled *Jaws* in 1974, with a movie of the same name hitting the theatres in a massive way the following year. The novel/film combo depicts a blood-thirsty 25-foot killer great white shark terrorizing a quiet New England town. *New York Times* writer Samantha Schmidt authored a 2016 piece on the 1916 "Twelve Days of Terror," in which she argues that *Jaws* and Discovery Channel's "Shark Week" are to blame for the mischaracterization of white sharks. In reality, great white sharks are somewhat mysterious apex predators with a fascinating morphology. Unlike most other sharks, white sharks are endothermic poikilotherms, meaning their internal temperature is not constant but they can self-regulate to reduce the effects of external temperature fluctuations. This suggests that they can tolerate a wide temperature range. Although this is the case, white sharks are known to prefer more temperate waters. Not too hot, not too cold. You can think of a white shark as a modern-day Goldilocks, if it helps.

Temperature is Key

In 2014, fisheries manager at NOAA Tobey Curtis, renowned shark expert at the Florida Museum of Natural History George Burgess, and Dr. Gregory Skomal (among others) published a paper titled, “Seasonal Distribution and Historic Trends in Abundance of White Sharks, *Carcharodon carcharias*, in the Western North Atlantic Ocean” (*PLOS ONE*, vol. 9.6). In this article, tagging data shows that white sharks along the U.S. east coast follow the general trend of avoiding water that is both too hot and too cold. In winter, the sharks migrate south to Florida and the Gulf of Mexico region to avoid the frigid northern waters. In summer, the sharks flee the hostile heat of the south and congregate from the Jersey Shore up into northeastern Canada. White sharks have been observed in water with temperatures ranging from 1.6°C to 30.4°C, according to a 2017 study by Skomal, Braun, Chisholm, and Thorrold. This, of course, is not completely representative, but it agrees with the assertion made by John Casey and Harold L. Pratt, Jr. in their 1985 article published in the *Memoirs of the Southern California Academy of Sciences* symposium on the “Biology of The White Shark.” Casey and Pratt write that white sharks are shown to prefer water between 11°C and 24°C, though still shown to inhabit a much wider range. Of the sharks documented within these specifications, Casey and Pratt assert that 75% of those are also found to reside in the narrower confines of 15°C to 22°C. Curtis and his colleagues also identified a similar range in their 2014 study, between 14°C and 23°C.

This is invaluable information for the discussion of the potential for white sharks to make their way into the eastern Long Island Sound. The Long Island Sound Study, an organization whose goal is to safeguard and monitor the health of the LIS, reports that the average summer (the season in which white sharks are shown to inhabit the New England region) temperature of the LIS is around 20°C, right smack in the range that most white sharks are observed to prefer.

Temperature appears to be a necessary abiotic factor to consider when determining the environment in which a species can survive and thrive. This is the case not just for aquatic biota, but for terrestrial biota as well. Could a palm tree flourish while rooted in the soils of the Arctic tundra? Could a clownfish persevere under a frigid Antarctic ice cap? Well, anything is possible, but the probabilities of such successes are extremely low. Salinity is also an abiotic factor that may limit the distribution of certain species. A white shark is accustomed to oceanic salt levels, and the high rates of freshwater inflow from Connecticut rivers may prove to be unacceptable for white sharks. Lynch states that oceanic salinities are usually measured at 33-35 ppt, with the eastern LIS considered brackish with 32-33 ppt. However, this does not appear to be outside the realm of possibility of supporting a white shark. The Western Basin of the LIS, however, drops to salinities that range between 20-22 ppt, much less than the salinity of the open ocean.

So we've established that white sharks can regulate their temperatures and they prefer to live in a moderate temperature range. This is much like a person preferring the mild climate of coastal Maryland to the snowy, frigid winters of Vermont or the unbearable humidity of summertime Florida. While on my road trip, I was fortunate enough to stop by the Woods Hole Oceanographic Institution in Massachusetts. Although it was a rather humid and overcast day, the buildings were packed with tourists and the streets were almost unmaneuverable. Seeing as I could not find a parking spot, I cut my losses and drove on. The following year, the Woods Hole Oceanographic Institution and the University of Washington demonstrated that white sharks follow the path of warm, gyrating water (called "eddies") way out into the ocean in an effort to follow food sources while allocating less energy to stay warm. Laura Castañón, writing for *Oceanus Magazine*, describes the eddies as mobile heating stations that allow the sharks to keep warm before diving to the colder depths in search of food. This is proven by the powerful and

impressive Lydia, the first white shark to be tracked across the Atlantic Ocean. She was fitted with a SPOT (Smart Positioning or Temperature Transmitting) and a PSAT (Pop-up Satellite Archival Transmitting) tag, the former of which proves that her movements coincide with the flow of a warm water eddy across the Atlantic, and the latter of which proves the use of these eddies as a sort of home base as she dives to find food in deeper water. This goes to show that temperature is crucial to a white shark's hunting and energy conservation habits.

Baby Sharks in the Hamptons

Now, when most non-natives think of Long Island, what do they think of? It has been my experience that the first thing that comes to people's minds is either Fire Island or the luxurious Hamptons. I'm going to talk about both, for the sake of satisfying the masses. The Hamptons have served as my backyard for years. I spend countless summer afternoons snapping photos with friends, driving west down Dune Road in Westhampton Beach towards Cupsogue Beach, only to turn around and drive back east to Shinnecock Inlet. I am a constant critic of the ridiculous summertime traffic in the Hamptons, but it is safe to say I understand the hype. Although, I think there are plenty of people who miss out on the hype surrounding another nearby spectacle. Once you get through the Hamptons by way of Sunrise Highway, it's just a short stretch until you reach the end of the South Fork and Montauk Point ("The End of the World", as some like to call it). Right off Montauk Point is where you can find a great white shark nursery, discovered only within the last few years.

In 2018, Curtis and his colleagues Metzger, Fischer, McBride, McCallister, Winn, Quinlan, and Ajemian published a paper (*Scientific Reports*, vol. 8.10794) describing the movements of ten infant great white sharks after being tagged between Montauk Point and

Shinnecock Inlet in 2015/2016. The researchers obtained multiple measurements from the newborns, but more importantly, the sharks were fitted with tags to track their migratory activity. According to the article, three criteria must be met in order to consider a habitat a true white shark nursery. They are: (1) infants must be found there more often than in other areas, (2) the sharks frequently utilize the area over a span of years, and (3) the sharks are found to live in the area over a span of years. The study concludes that the first two requirements have been satisfied, while the third is strongly positive but temporally limited, and the results should become clearer in the coming years. It is observed that the infant sharks hug close to Montauk Point, the Hamptons, and Fire Island. According to a 2018 article published by Florida Atlantic University, the shallow water and abundant food sources of the south shore allow the baby sharks to eat comfortably and avoid predation by larger offshore sharks. Lisa Finn, a prolific and detailed author on great white activity for the *Patch* on Long Island, wrote a 2016 article in which she describes the early stages of the discovery. In an interview with Finn, the COO of the research group Ocearch, Fernanda Ubatuba, explains that it is of utmost importance to identify and study all breeding sites as soon as possible so that resources can be allocated properly to protect white sharks, since it takes two decades for great white sharks to reach full sexual maturity.

Fire Island and the Twelve Days of Terror

Fire Island National Seashore is a barrier island on Long Island's southern shore and protects the Great South Bay and mainland Long Island from the mighty Atlantic Ocean. It is a popular tourist destination due to its fine sand beaches and seaside atmosphere. Not surprisingly, though, it has had its fair share of shark activity. Remember the sand tiger shark, one of the

permanent residents of the LIS? Well, here is an interesting story. Sand tigers live on the south shore, too, and July 18, 2018 saw two shark attacks at the hands (or, mouth, rather) of a sand tiger shark. Now, you're probably thinking, "I thought you said sand tiger sharks were shy!", and yes, that is still true. In an article by Natalie van Hoose, director of the Florida Program for Shark Research Gavin Naylor says of sand tigers, "They have the potential to do real damage to humans but don't, which underscores the fact that these bites are accidental. Sharks are not hunting humans." A 13-year-old boy and a 12-year-old girl were, unfortunately, on the receiving end of these attacks, with the injuries being relatively minor. One question remains, though: how can we confidently attribute these incidents to a sand tiger? Where is the evidence?

As a result of the attack on the young boy, a fragment of tooth left in the boy's leg was found and sent to Dr. Naylor and program manager Lindsay French in Florida, where he and his research team attempted to identify the species responsible. After removing viable tissue from the tooth remnant, the researchers were able to isolate DNA and compare it to the DNA standards they had on file. Dr. Naylor concluded, with almost 100% certainty, that the tooth fragment belonged to a sand tiger shark. However, all there is to go on for the female victim is her description of a 4-foot orange-brown shark, which matches the description of a juvenile sand tiger shark most likely following a school of bait fish close to shore. In his report to *Nature Correspondence*, Dr. Naylor explains that this is a common practice for sand tiger sharks, albeit *incredibly* rare for multiple attacks to happen on the same day just miles apart.

Or is it?

Look back at July 1-12, 1916, also known as the "Twelve Days of Terror." On July 1, in Beach Haven, N.J., 25-year-old Charles Vansant was attacked by a shark and bleeds out waiting

for medical services. On July 6, in Spring Lake, N.J., just 45 miles north of Beach Haven, Charles Bruder suffered a double-leg amputation as a result of a shark attack and died shortly after. On July 12, in Matawan Creek, N.J., 11-year-old Lester Stilwell was attacked and killed shortly after jumping into a creek. While attempting to retrieve Stilwell's body, 24-year-old tailor Stanley Fisher was attacked and killed by the same shark. 30 minutes later and a half-mile away, 14-year-old Joseph Dunn was bitten by a shark. He, however, survived.

Does this paint a picture of the classic “man-eating, human-flesh craving monster” we all know and love? Many of the residents of 1916 New Jersey certainly believed sharks to be blood-thirsty man-eaters. Maybe you do, too. I mean, 4 deaths, 5 attacks in 12 days—is there really another explanation? Well, of course, there is, but back in 1916 people did not know all that much about sharks. Certainly less than we do today. This unfortunate piece of history served the same purpose of shark misrepresentation in the early 20th century as did the *Jaws* fiasco of the late 20th century. While what happened to those 5 people over a hundred years ago is tremendously tragic, that 12 day period is not representative of sharks as a whole. In a 2016 article by Elizabeth Brown for the Florida Museum of Natural History, director of the Florida Program for Shark Research George Burgess indicated that he believes a sole great white shark to be responsible for the attacks, as they occurred at high tide (thus maximum salinity) and in a south to north sequential pattern (thus showing a lateral progression indicative of one individual). It likely made a wrong turn and was doing the best it could to stay alive as it moved further inland. In a 2016 article for *The New York Times*, Samantha Schmidt writes about the impact the media sensation has caused for the communities in which the attacks occurred. According to Schmidt, the town has embraced the tourism activity that still provides revenue to this day, but it also attempts to maintain a level of dignity and respect for the tragic events that took place 100

years previous. Matawan librarian and resident Jeanette Walker made it clear in an interview with Schmidt that, while tourism creates an exciting atmosphere, she doesn't want her town “to be an extension of a TV station’s ‘Shark Week’.” Can we blame her?

National Geographic writer Erik Vance wrote in Brian Skerry’s 2017 book, *Shark*, that the two questions plaguing the scientific community are “how many sharks are there, and where do they go?” According to the Florida Museum of Natural History, as human populations increase and more people enter the water, it only makes sense that the probability of a shark attack increases as well, especially if shark populations are on the rise, too. According to Curtis and his team’s 2014 article, great white shark numbers are only down 31% from 1961 estimates, which is much better than the previous value of 73%. In a 2017 interview with *Associated Press*, Greg Skomal mentioned to *AP News* writer Mark Pratt, “last summer [2016] we saw greater numbers of smaller sharks, including juveniles, and that tells us that the population is rebuilding.” Another *National Geographic* writer, Sarah Gibbens, wrote two intriguing articles in 2017 that discussed the increasing white shark populations around Cape Cod. Gibbens cites data from the Massachusetts Division of Marine Fisheries stating that observed white shark populations nearly doubled between the summer of 2014 (80 sharks), when the study began, and the summer of 2015 (147 sharks). She also mentions that, as of 2009, great whites were almost nonexistent in the waters around Cape Cod, with only five documented individuals. She attributes their growth to the explosive seal populations in the area, offering a reliable food source for white sharks to return to. However, Gibbens also makes note that Cape Cod is not the only area that should expect growing white shark populations. White sharks have been tracked into the Gulf of Maine in both 2016 and 2017. White sharks usually don’t spend too much time that far north, even though they have been tracked all the way to northeastern Canada in the

summer. This is an indication that the northwest Atlantic is becoming more hospitable to temperate species.

Will Great White Sharks Come to the Long Island Sound?

So what is the potential for great white sharks to come into the Long Island Sound? Well, it should first be noted that a great white shark *has* been documented and tracked off Guilford, CT, in the Long Island Sound. The ping belonged to Montauk, a young white shark who was originally tagged in August 2016 by Ocearch. Staff writer for *Zip06.com*, Zoe Roos wrote a 2016 article citing Dave Sigworth of the Maritime Aquarium at Norwalk, who suspects that there are more great whites in the Long Island Sound than just the one that happened to have a tag. If not for Montauk, the scientific community might never have had any concrete evidence that great whites were willing to enter the LIS. Therefore, the answer to the basic question is this: it is well within the realm of possibility to observe a white shark in the Long Island Sound. However, there are numerous factors to consider as to whether the likelihood of a run-in will increase.

As Tom Migdalski wrote in his 2010 book, there are copious fish species that could sustain a white shark in the LIS, ranging from bluefish, striped bass, and bunker to the occasional tuna. The most likely entry point should a great white enter the LIS would be in the vicinity of the Race, with its deep, swift moving water and bountiful food supply. Furthermore, the Long Island Sound is a protected estuary environment and has the potential to serve as a shark nursery. Extensive research is required on the environment of established nurseries before making any conclusions. As previously stated, water temperature would favor the presence of white sharks in the late spring, summer, and early fall, evidenced by the temperature range established by Curtis and his team, Casey, and Pratt. The Long Island Sound Study has also established a warming

trend in the Long Island Sound, which means that the region is becoming more favorable for warm-water tolerant fish and less favorable for cold-water tolerant fish, thus altering prey species composition for predators. The south shore, Montauk, and the Eastern Basin of the LIS contain seal populations that draw white sharks around the island in search of more food. One result of growing white shark populations in New England, Cape Cod, and Montauk may be increased intraspecific and interspecific competition, ultimately forcing less competitive white sharks and other smaller species of fish into niches they did not previously inhabit. This supports the theory that even if white sharks do not become more populous in the Long Island Sound, the region as a whole could expect some alterations in species distribution. Therefore, run-ins in the Long Island Sound with other species of sharks, such as sand tigers, may increase in the coming years. The good news is, though, there has only ever been one documented shark attack in the Long Island Sound, in 1961 Oyster Bay (not to mention that it was a provoked incident).

All in all, residents of Long Island and Connecticut should not be overly concerned about meeting a white shark in the Long Island Sound. They surely visit the Long Island Sound once in a while, evidenced by the movements of Baby Montauk, but for the most part they know well enough to stay away. Worldwide, an increase in the amount of shark attacks may increase, but the probability of being attacked in the Long Island Sound should remain low. Nevertheless, if you haven't heard it before, here is a list of things provided by the Florida Museum of Natural History that are more likely to kill you than a shark: alligators, lightning, tornadoes, heart disease, suicide, drowning, train crashes, fireworks, car accidents, bears, and yes, even dogs. Not convinced? The odds of dying by a shark attack in your lifetime are 1 in 3,748,067. Even so, to avoid being that one person, it is best to never swim alone, stay close to shore, remove flashy jewelry, avoid excessive splashing, and of course, never antagonize a shark. On the *very* off

chance that you do find yourself in the grips of a shark, though, it would be best not to assume the “play dead” survival tactic will hold. A firsthand example is shown through the story of neurologist Dr. William Lytton, who was attacked off Cape Cod’s town of Truro on August 15, 2018. He recounted the experience from a rehabilitation center to writer Philip Marcelo of the Associated Press, saying that the shark released its hold after he punched its gills, giving him the opportunity to swim back to shore. It pays off to *always* fight back against a shark by punching it in the nose, eyes, and gills, all the while calling for help. Most people, though, will never need to use this advice.

The Boat Trip Back Home

I frequently ask myself what the takeaway was from my impromptu road trip a year and a half ago. It gave me a taste of independence before being dropped into university life to become educated on topics like biology and ecology. It gave me the opportunity to explore an unfamiliar place, even if the destination was just a short ferry ride away. Most importantly, though, it gave me time to think, reflect, and be alone with an abundance of natural beauty. I learned to appreciate what lay before me, for I had become accustomed to the nonchalant atmosphere of the East End, thus taking it for granted. I now understand that the ponds, beaches, highways and oceans all have something to offer, whether it is apparent or not. I no longer felt suffocated or weary. Rather, I was refreshed and, by the end of my trip, I was itching to get back to Long Island so that I could explore my home with a new perspective. Atop the New London ferry, I remember gazing down at the waves of the Sound, wondering what lay beneath. White sharks? Maybe, maybe not. There seems to be no clear reason for them to stay out, and with rising ocean temperatures, a visit from a white shark is not outside the realm of possibility. This is not a

worst-case scenario. Far from it, really. Perhaps living peacefully alongside these giant fish will allow us to gain a new perspective on the creatures that we have so desperately tried to distance ourselves from.

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