Tiger shark and bed of seagrass, Grand Bahama

Why tiger sharks are good for seagrass and the environment

Scientists have discovered that tiger sharks are aiding in the regrowth of seagrass beds by scaring off grazers such as dugongs.

When factors such as heat waves destroy seagrasses, sharks become critical for ecosystem health. Where tiger sharks rove seagrass beds, dugongs and other shark prey steer clear. That keeps seagrasses—which these grazing prey like to eat—from being completely eaten away.

Seagrass is essential to the fishing industry. Found in salty and brackish waters worldwide (except Antarctica), seagrass generally grow at depths of one to three meters where there is sufficient light. They provide shelter for marine animals. By providing a three-dimensional structure in an otherwise barren sea, seagrasses provide the perfect hiding place for fish and invertebrates such as crabs, shrimp and clams. "In developing countries, this is of major significance for food supply and livelihoods, where everything can be caught, eaten or sold. In developed countries, seagrass fisheries are exploited more for recreational purposes or are highly species specific—for example, clams," said Dr Leanne Cullen-Unsworth, from Cardiff University's Sustainable Places Research Institute.

Carbon sink

Seagrass beds also store vast amounts of carbon—known as blue carbon—and help to offset greenhouse gas emissions and climate change. Although seagrass meadows occupy less than 0.2 percent of the world's oceans, they are responsible for more than 10 percent of all carbon buried annually in the sea. Per unit area, seagrass meadows can store up to twice as much carbon as the world's temperate and tropical forests. Coastal seagrass beds hold up to 83,000 metric tons of carbon per square kilometer, mostly in the soils. beneath them. ■

Form and function: Why are not all sharks streamlined?

After studying the body composition of 32 shark species, a team of researchers has concluded that sharks have managed to evolved different physical attributes based on the ecosystems they live in.

Large livers, bulky bodies

For instance, sharks that live in dark, cold and nutrient-poor oceans (like the bramble sharks or birdbeak dogfish) have big fatty livers that make up more than a quarter of their bodies. As a result, they are bulkier and less hydrodynamic. Nevertheless, they are able to survive because in their part of the world, slow swimming is the order of the day—for both the predator and the prey.

"They are the zeppelins of the shark world, cruising near effortlessly at low speeds to save energy," said biologist Adrian Gleiss, PhD at Murdoch University Centre for Fish and Fisheries Research. He is the lead author of a paper describing the findings of his team's study, which was recently published in the *Proceedings of the Royal Society B* journal.

Small livers, fast swimmers

At the other end of the scale are sharks with smaller livers—they are negatively buoyant and therefore have to swim fast so that their fins can provide sufficient lift. Such species had evolved a more efficient body that could maximise their energy expenditure.

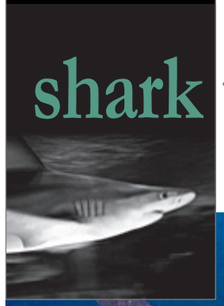
Jean Potvin, PhD, professor of physics at Saint Louis University, elaborated: "As with the sharks inhabiting shallow waters, trying to fly zeppelins at the speeds and accelerations common to fixed wing aircraft of same the weight class would require significantly more energy, unless that is, it is reshaped into a more javelin-like body."

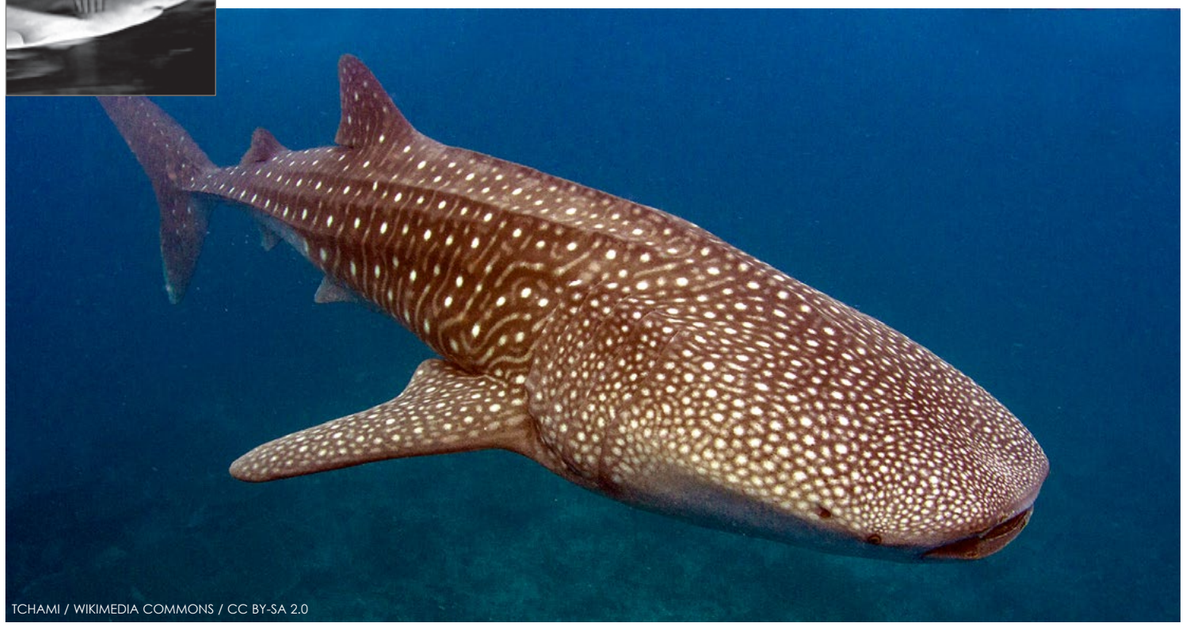
"It would follow that slimmer, and thus more hydrodynamic sharks will require less energy for swimming at the high speeds necessary to catch agile prey, especially in environments where fast swimming is common," she added.

This study has shed light on how the environment has shaped the evolution of marine fish from bottom-dwelling to those capable of swimming at a range of depths. "It is incredible to think that many hundreds of million years ago, the early ancestors of fish only lived near the sea bed, sporting heavy armour that prevented them from swimming in mid-water," said Gleiss.

"Sharks represent a relic of this time and were probably among the first fish to exploit most depths of the ocean. Our study contributes to our understanding of the evolutionary processes that led to them being such a successful group." ■ SOURCE: PROCEEDINGS OF THE ROYAL SOCIETY B

The shortfin mako is on record as the fastest-swimming shark, capable of bursts of speed up to 68 km/h (42 mph).





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Each whale shark has a unique pattern of lines and spots.

Astronomy software used to track whale sharks

Spots on whale sharks are being used to identify and track individual whale sharks worldwide, thanks to an algorithm developed by NASA that was originally used to track star patterns.

An algorithm developed by NASA to study star patterns in the night skies is being used to track whale sharks in the oceans in a bid to learn more about them.

It relies on citizen science: Divers who encounter whale sharks when diving would send in photos of the animals to the Wildbook for Whale Sharks website. The algorithm then tries to match the whale shark in the submitted footage with previously submitted photos in the database, compiled over the years.

Whether or not a match is found, the new image will be added in the database for future reference. This system, called the Wildbook for Whale Sharks, is a visual database of whale shark encounters and individually catalogued whale sharks.

How does the match occur?

Well, according to its website: "The Wildbook uses photographs of the skin patterning behind the gills of each shark, and any scars, to distinguish between individual animals. Cutting-edge software supports rapid identification using pattern recognition and photo management tools."

"That pattern is like a fingerprint, it's unique to each individual, so we're actually tagging the whale sharks without touching them," said Bradley Norman, a marine conservation biologist. He is the lead author of a paper in the 29 November issue of the *BioScience* journal, which focused on how the algorithm has been used to track whale sharks all these years.

To date, almost 30,000 whale shark encounter reports from 1992 to 2014 have been recorded, with more than 6,000 individuals identified from 54 countries. ■

SOURCE: WILDBOOK FOR WHALE SHARKS

Nova Scotia's great white shark mating hot spot

Great white sharks recently tracked in Nova Scotia waters may offer insight into the elusive mating habits of these majestic creatures. Based on the research group Ocearch's findings, shark migration patterns in Nova Scotia's southern waters are consistent with there being a breeding site in the area, according to Ocearch founder Chris Fischer, which could mark an important step towards unravelling the mysterious mating habits of great white sharks.

For scientists like Fred Whoriskey, executive director of Dalhousie University's Ocean Tracking Network, the fact that great whites come to Nova Scotia may be an indication it is a place for males and females to mingle. Fischer said the great whites are the "balance keepers" of a range reaching from Newfoundland to Florida. If the white sharks are not there, the seals can just go out and scavenge the entire region at their leisure and tend to wipe out shellfish populations and a lot of fish we count on as food sources. ■

Western Australia is Australia's great white shark hot spot

According to Australia's Commonwealth Scientific and Industrial Research Organisation (CSIRO), there are no reliable estimates of white shark population sizes or trends in Australian waters, but genetic evidence suggests there are two populations of white sharks in Australia: an eastern population, ranging along the eastern coast from Tasmania to central Queensland; and a western population, ranging from western Victoria to northwestern Western Australia (WA).

The local abundance of white sharks in shelf and coastal waters varies from season to season and year to year due to variations in shark distribution and movement patterns.

Monitoring by CSIRO of acoustically tagged white sharks off Western Australia indicated that white sharks may be present off most of the southern and lower western coasts of WA throughout the year, although they are more likely to be encountered during spring and early summer and are least likely to be present during late summer and autumn.

The study also suggests there may be twice the number of adult great white sharks off WA's coast. ■

SOURCE: MARINE AND FRESHWATER RESEARCH

ANDREY BIZYUKIN

Great white shark