

Most dangerous areas for whale shark-shipping vessel collisions revealed

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Most dangerous areas for whale shark-shipping vessel collisions revealed. Credit: University of Southampton

Researchers have found that heavily used shipping lanes pass through crucial whale shark feeding grounds, posing a threat to this endangered

species.

[Research published](#)

[15 May in *Science of the Total Environment* has revealed areas where the sharks are at the highest risk of colliding with large shipping vessels by mapping the locations of whale shark aggregations and overlaying them with information on shipping traffic. The paper is titled "Identifying priority sites for whale shark ship collision management globally."](#)

["The almost ubiquitous overlap of at least some large shipping vessel traffic with whale shark aggregations underlines the magnitude of the threat the](#)

[shipping industry](#) poses," says lead author Dr. Freya Womersley, a researcher at the Marine Research and Conservation Foundation (MARECO), the University of Southampton and the Marine Biological Association (MBA).

"Our findings highlight the need for targeted measures within these areas to reduce the risk of collision and improve the conservation status of endangered whale sharks."

A growing concern

The world's merchant fleet has doubled in size in the last 16 years. There are now more than 100,000 ships transporting goods worldwide and this number is expected to grow by as much as [1,200% over the next ~27 years](#).

Collisions with wildlife—also known as ship strikes, are a growing concern and can be a leading cause of death for large marine animals, with more than [75 species at risk](#) of population-level consequences.

Whale sharks have a declining population and spend almost half their time in surface waters, often in coastal areas that are [heavily used by shipping vessels](#).

Dr. Gonzalo Araujo, Director at MARECO, said, "Collisions with large ships are likely to be fatal for whale sharks, but evidence is scarce. That's because whale sharks are slightly negatively buoyant, so their bodies sink. To inform conservation efforts, it's important to quantify collision-related threats even when direct evidence is lacking."

Identifying high-risk areas

Although they are mainly solitary creatures, whale sharks regularly come together in search of prey at special sites around the world called [constellations](#). It is especially important to reduce threats to whale sharks inside constellations because the sharks are concentrated in high densities.

Researchers from MARECO, the University of Southampton, the MBA and Marine Megafauna Foundation (MMF) drew on the experience of specialists who study whale sharks around the world to map and gather insights on these constellations.

More than 75 experts responded to a series of survey questions and identified areas where they have encountered the most whale sharks (core habitats), as well as other places whale sharks have been spotted (buffer zones). In total 107 areas were identified in 26 countries. The experts reported observations from over 13 thousand individuals, representing over half of all identified whale sharks.

The team then used information on large ship positions—provided by Global Fishing Watch (www.globalfishingwatch.org)—to understand the density of shipping in each of the constellations.

Whale sharks were most in danger of coming into contact with large vessels off the coast of mainland Ecuador, Isla Mujeres and La Paz in Mexico, Ewing Bank in the northern Gulf of Mexico, Kota Kinabalu and Redang Island in Malaysia, Pintuyan in the Philippines, Musandam in Oman and around the Seychelles and Taiwan.

The researchers identified 39 of these sites where peaks in shipping activity coincided with peak seasonal occurrences of whale sharks, sometimes across several months.

Dr. Chris Rohner, Principal Scientist at MMF said, "Many of these sites had more than one vessel per square kilometer in core habitats. For example, the constellation in Isla Mujeres in Mexico has an average of 56 ships passing through the core habitat monthly. These sites require urgent action to reduce the threats posed by shipping."

Results showed that some experts involved in the study underestimated the threat posed by large ship collisions within constellation sites due to a lack of direct evidence, such as injuries or witness accounts, which are available for other, sub-lethal threat categories like tourism interactions and small vessel collisions.

Reducing the risk

The research team also looked at how this threat could be mitigated. They simulated vessel movements within the whale shark constellation at Ewing Bank, in the northern Gulf of Mexico.

They found that reducing the speed of vessels passing through the constellation by 75% resulted in a small cost to shipping, with an approximate increase in total transit time of 5%, on average, but a potentially high gain for whale sharks as slower ships can better see, and avoid collisions with, the sharks.

Dr. Womersley said, "One of the benefits of speed reductions is that they can be temporarily introduced during whale shark peak seasons. These speed limits can also be applied to smaller vessels which are less deadly but can still damage the sharks."

Rerouting the ships around core habits had even less of an impact—an approximate 0.5% increase in total transit time (just 2.4 hours per vessel) and a 1.1% increase in total distance traveled, on average.

Dr. Araujo added, "Rerouting is the most direct way to reduce the risk of collision and our results suggest that this will often be more cost-effective than speed reduction, mainly because whale shark core sites are small. Movements of as little as 12 nm (22.2 km) away from of a core whale shark habitat could mean fast transiting ships avoid the site entirely."

Amy Fraenkel, Executive Secretary of the Convention on the Conservation of Migratory Species of Wild Animals (CMS), noted, "CMS plays a pivotal role in securing the long-term survival of the whale shark—a globally [endangered species](#). Ensuring the safety of this highly migratory species from vessel collisions within its migratory range particularly at aggregation sites, is a key goal under CMS."

The researchers say support for these measures requires increased awareness and education of the issue as well as improved data but suggest effective management strategies could pave the way for coexistence between this important species and the shipping industry.

More information: Freya C. Womersley et al, Identifying priority sites for whale shark ship collision management globally, *Science of The Total Environment* (2024). [DOI: 10.1016/j.scitotenv.2024.172776](https://doi.org/10.1016/j.scitotenv.2024.172776)

Provided by University of Southampton

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