

## Study Finds White Sharks Flee Feeding Areas When Orcas Present

### Electronic tag data reveals white sharks do not return until following season; elephant seals benefit

New research from Monterey Bay Aquarium and partner institutions published today in Nature Scientific Reports challenges the notion that great white sharks are the most formidable predators in the ocean. The study "Killer Whales Redistribute White Shark Foraging Pressure On Seals" shows how the great white hunter becomes the hunted, and the elephant seal, the common prey of sharks and orcas, emerges as the winner.

"When confronted by orcas, white sharks will immediately vacate their preferred hunting ground and will not return for up to a year, even though the orcas are only passing through," said Dr. Salvador Jorgensen, senior research scientist at Monterey Bay Aquarium and lead author of the study.

The research team - which included Jorgensen and Monterey Bay Aquarium scientist Scot Anderson, and research partners from Stanford University, Point Blue Conservation Science and Montana State University - documented four encounters between the top predators at Southeast Farallon Island in the Greater Farallones National Marine Sanctuary, off San Francisco, California. The scientists analyzed the interactions using data from 165 white sharks tagged between 2006 and 2013, and compiled 27 years of seal, orca and shark surveys at the Farallones.

"The research in this paper combines two really robust data sources," said Jim Tietz, co-author of the study and Farallon Program Biologist at Point Blue Conservation Science. "By supplementing the Aquarium's new shark tagging data with Point Blue's [long-term monitoring](#) of wildlife at the Farallon Islands National Wildlife Refuge, we were able to conclusively show how white sharks clear out of the area when the orcas show up."

In every case examined by the researchers, white sharks fled the island when orcas arrived and didn't return there until the following season.

Elephant seal colonies in the Farallones also indirectly benefited from the interactions. The data revealed four to seven times fewer predation events on elephant seals in the years white sharks left.

"On average we document around 40 elephant seal predation events by white sharks at Southeast Farallon Island each season," Anderson said. "After orcas show up, we don't see a single shark and there are no more kills."

Each fall between September and December white sharks gather at the Farallones to hunt for young elephant seals, typically spending more than a month circling Southeast Farallon Island. Transient orcas also feed on elephant seals, but only show up occasionally at the island.

To determine when orcas and sharks co-occurred in the area, researchers compared data from the electronic shark tags with field observations of orca sightings. This made it possible to demonstrate the outcome on the rare instances when the predators encountered each other.

Electronic tags showed all white sharks began vacating the area within minutes following brief visits from orcas. Sometimes the orcas were only present for less than an hour. The tags then found the white sharks either crowded together at other elephant seal colonies farther along the coast or [headed offshore](#).

"These are huge white sharks. Some are over 18 feet long (5.5 meters), and they usually rule the roost here," Anderson said. "We've been observing some of these sharks for the past 15 to 20 years -- and a few of them even longer than that."

The study's findings highlight the importance of interactions between top predators, which aren't well-documented in the ocean.

"We don't typically think about how fear and risk aversion might play a role in shaping where large predators hunt and how that influences ocean ecosystems," Jorgensen said. "It turns out these risk effects are very strong even for large predators like white sharks -- strong enough to redirect their hunting activity to less preferred but safer areas."

The researchers drew no conclusions about whether orcas are targeting white sharks as prey or are bullying the competition for the calorie-rich elephant seals.

"I think this demonstrates how food chains are not always linear," Jorgensen said. "So-called lateral interactions between top predators are fairly well known on land but are much harder to document in the ocean. And because this one happens so infrequently, it may take us a while longer to fully understand the dynamics."

#### About the Monterey Bay Aquarium

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