

New study finds ecosystem changes following loss of great white sharks

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The waters surrounding Seal Island in False Bay, South Africa, are known for great white sharks breaching out the water in pursuit of seals (left image), but the recent disappearance of great whites from here has led to the emergence of another apex predator, sevengill sharks (right image) that now dominate the area. Credit: White shark image by Chris Fallows; Sevengill shark image by Neil Hammerschlag.

A new study has documented unexpected consequences following the

decline of great white sharks from an area off South Africa. The study found that the disappearance of great whites has led to the emergence of sevengill sharks, a top predator from a different habitat. A living fossil, sevengill sharks closely resemble relatives from the Jurassic period, unique for having seven gills instead of the typical five in most other sharks.

These findings are part of a long-term collaborative study between shark researcher Neil Hammerschlag from the University of Miami (UM) Rosenstiel School of Marine and Atmospheric Science, and wildlife naturalist Chris Fallows from Apex Shark Expeditions.

The research focused on the waters surrounding Seal Island in False Bay, South Africa, a site well known for its "flying" [great white sharks](#) that breach out of the water when attacking Cape fur seals. Since the year 2000, the research team has spent over 8,000 hours observing great whites from boats, during which they recorded 6,333 shark sightings, and 8,076 attacks on seals. These data revealed that for more than a decade, great white numbers were relatively stable, but in 2015 sightings began to drop off steeply.

"In 2017 and 2018, their numbers reached an all-time low, with great whites completely disappearing from our surveys for weeks and months at a time," said study lead author Neil Hammerschlag, a research associate professor at the UM Rosenstiel School and Abess Center for Ecosystem Science & Policy. "While the reasons for their decline and disappearance remains unknown, it provided a truly unique opportunity for us to see what happens to an ocean ecosystem following the loss of an apex predator."

"In 18+ years of working at Seal Island, we had never seen sevengill sharks in our surveys," said co-author Chris Fallows. "Following the disappearance of white sharks in 2017, sevengill began to show up for

the first time and have been increasing in number ever since."

During periods of great white absence in 2017 and 2018, the researchers documented 120 sevengill shark sightings and even witnessed an individual attacking a live seal. In South African waters, sevengill sharks have no equal in the food web with the exception of the great white and orca whale. Historically, the only well-known aggregation site for sevengills in False Bay was located 18 km away from Seal Island within inshore kelp beds. The study suggested that the appearance of sevengill sharks at Seal Island was due to the disappearance of great whites, thereby allowing sevengills to exploit the area without risk of predation from great white sharks or competition with them for shared prey.

This 18-year study provided new insights into the diverse ways that a marine ecosystem can be altered following the loss of an apex predator.

The study, titled "Disappearance of white sharks leads to the novel emergence of an allopatric apex predator, the sevengill shark," was published in the online journal *Scientific Reports* on February 13, 2019.

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