

Case Study #6: Ecological Impacts of Great White Shark Decline in False Bay, South Africa

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Breaching White shark at Seal Island, False Bay, at the southern tip of South Africa. [Image source](#)

Background

False Bay, on South Africa's southwestern coast, was once a stronghold for Great white sharks (*Carcharodon carcharias*), especially near Seal Island, a key habitat for Cape fur seals. As apex predators, great whites played a critical ecological role by regulating populations of mesopredators and influencing the behavior of prey species. The bay's kelp forests, dominated by *Ecklonia maxima* (sea bamboo) provide complex habitats which support diverse marine life, including invertebrates, fish and smaller sharks. These forests also stabilize coastal food webs through nutrient cycling and carbon sequestration.

The cold nutrient rich waters of False Bay, influenced by the Benguela and Agulhas currents, sustain these kelp ecosystems, which have expanded consistently due to ideal environmental conditions. However, between 2015 and 2019, sightings of great white sharks declined dramatically, with their near-total disappearance from the bay by mid-2018. This loss removed a key stabilizing force in the marine food web, raising concerns about the cascading ecological effects, particularly given the interconnected role of kelp forests in supporting predator-prey interactions.

Drivers of Great White Shark Disappearance

The sudden and dramatic decline of great white sharks in False Bay is closely linked to a pair of orcas (*Orcinus orca*) which began preying on great white sharks with great efficiency. These orcas were targeting their nutrient-rich livers, creating intense predation pressure that not only resulted in direct mortality but also prompted the surviving great white sharks to leave False Bay for safer areas.



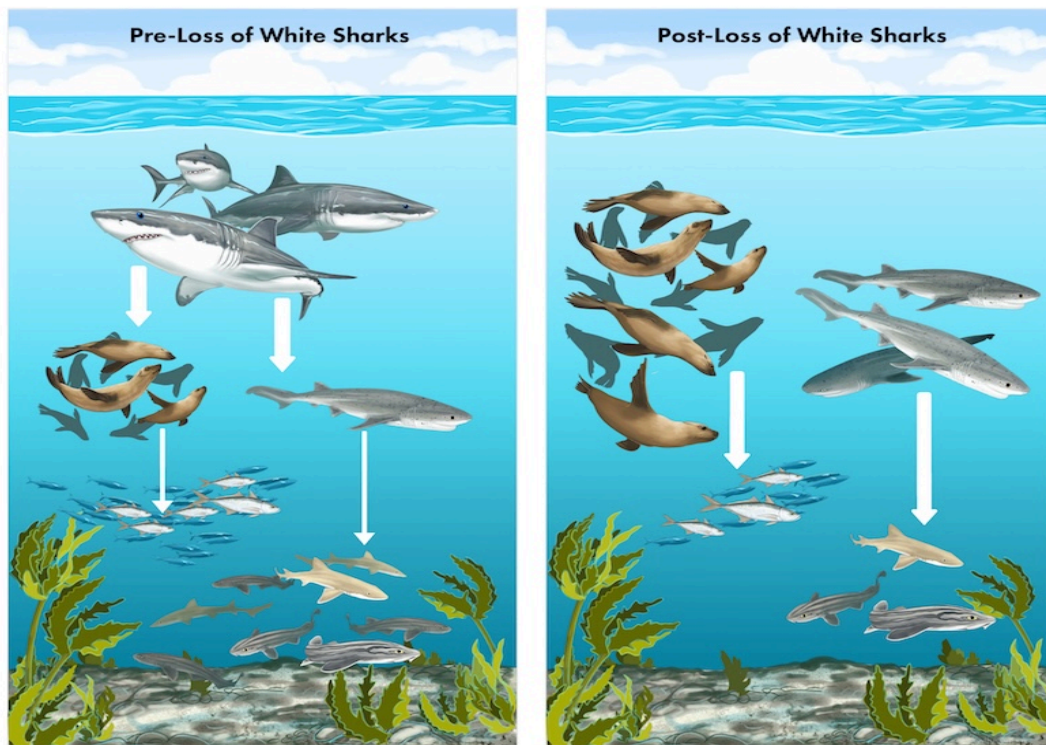
Orca attacks Great white shark in South Africa. [Image source](#)

In addition, human pressures such as incidental capture in shark nets, bycatch from commercial fisheries, and habitat disturbance from coastal development and pollution have further affected the local shark population. While broader environmental changes may influence shark populations elsewhere, the rapid and near-total disappearance of great whites from False Bay is most clearly explained by the combined impact of targeted orca predation and ongoing human pressures. Together, these factors have fundamentally disrupted the role of this apex predator in the ecosystem.

Observed Changes

The absence of great white sharks triggered several immediate changes in False Bay's predator-prey dynamics. Populations of Cape fur seals and broadnose sevengill sharks increased sharply in areas like Seal Island, where their numbers had previously been controlled through predation. Sevengill sharks, once scarce in this region due to their vulnerability to great white predation, began frequenting kelp-dense zones they had long avoided. This led to increased predation pressure on smaller shark species like the pyjama catshark and smooth-hound sharks, as well as declines in forage fish targeted by seals, such as anchovies and horse mackerel.

The rising numbers of mesopredators, particularly fur seals and sevengill sharks, have placed additional strain on fish populations critical to ecosystem balance and local fisheries. Schooling fish species, such as anchovies and horse mackerel, already targeted by human fisheries, are now further depleted due to intensified seal predation. At the same time, benthic fish and smaller shark species are experiencing increased predation from sevengill sharks, which is changing the structure of their communities and triggering cascading effects through the food webs weakening the resilience of key fish populations.



A graphic illustrating the marine food chain with and without great white sharks. As shown in the right panel, the number of Cape fur seals and sevengill sharks increased, but there was a decrease in smaller fish. Image via [Hammerschlag, N., et al. \(CC BY 4.0\)](#).

The Role of Kelp in a Shifting Marine Web

Kelp forests in False Bay are vital to the region's ecosystem, profoundly influencing shark behavior, population dynamics and broader ecological stability. These dense forests serve as shelter, hunting grounds, and nursery areas for a variety of shark species, including the pyjama catshark and sevengill sharks. The kelp provides refuge from larger predators and supports high biodiversity. With the decline of great white sharks, sevengill sharks have increasingly moved into kelp - dominated areas, taking advantage of the protection and abundant food resources that dense kelp offers - habitats they previously avoided due to predation risk.

Kelp forests also influence the movement and hunting strategies of larger sharks; dense kelp can act as a barrier, sometimes restricting great white sharks' access to traditional hunting grounds and altering their behavior. Healthy kelp forests provide crucial shelter and nursery habitats for sharks, supporting their survival and reproduction. When kelp density declines due to factors like urchin overgrazing, warming waters, or human impact, sharks - especially juveniles - become more vulnerable, disrupting food webs and weakening ecosystem resilience.

Ecological Impacts

The disappearance of great white sharks has also altered the landscape of fear in False Bay. Without their top-down control, mid-level predators such as sevengill sharks and fur seals proliferated unchecked, altering the structure and function of the marine ecosystem. These shifts changed species abundances and disrupted established ecological roles and food web dynamics. Kelp forests,

while providing critical habitat, are now experiencing shifts in predator occupancy and prey pressure, potentially reshaping interactions within these habitats. Species like Cape fur seals, which once avoided certain hunting grounds due to shark presence, are now venturing into previously risky areas, altering their foraging strategies and spatial patterns. Researchers warn that this imbalance could reduce the ecosystem's long-term resilience, making it more vulnerable to external stressors and potentially leading to a less biodiverse and less stable marine community.

Impacts on Biodiversity and Fisheries

The rise and redistribution of mesopredators have placed added stress on smaller marine species, contributing to local biodiversity declines. Smaller shark species, already facing fishing pressures, now contend with increased predation from sevengill sharks, while forage fish populations - essential for both seals and local fisheries - may decline under heightened seal predation. The expansion of mesopredators into new areas may also disrupt fisheries targeting affected species. Because many of these species depend on kelp forests for shelter and spawning, increased predation within kelp zones could accelerate declines. In the long term, this restructured food web could reduce the productivity and stability of coastal fisheries as foundational species are consumed at unsustainable rates or displaced from critical habitats.

Supporting Data and Metrics

Between 2000 and 2015, great white shark activity in False Bay remained relatively stable, but sightings dropped sharply between 2015 and 2018. During this period, Cape fur seal presence around Seal Island increased significantly, and sevengill sharks emerged as a dominant predator in areas they historically avoided. Declines were observed in key prey species, including small benthic sharks and schooling fish, highlighting the systemic impact of losing a top predator's loss.

References

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