

# Reef shark populations in steep decline: study

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Curious gray reef sharks (*Carcharhinus amlyrhynchos*) at Kure Atoll in the Papahānaumokuākea Marine National Monument, Hawaii were studied as part of a study published April 25 in the journal *Conservation Biology*. An international team of marine scientists provide the first estimates of reef shark losses in the Pacific Ocean using underwater surveys conducted over the past decade across 46 US Pacific islands and atolls, as part of NOAA's extensive Pacific Reef Assessment and Monitoring Program. The team compared reef shark numbers at reefs spanning from heavily impacted ones to those among the world's most pristine. The results are sobering. Credit: P. Ayotte

Many shark populations have plummeted in the past three decades as a result of excessive harvesting – for their fins, as an incidental catch of fisheries targeting other species, and in recreational fisheries. This is particularly true for oceanic species. However, until now, a lack of data prevented scientists from properly quantifying the status of Pacific reef

sharks at a large geographic scale.

In a study published online April 27 in the journal *Conservation Biology*, an international team of marine scientists provide the first estimates of reef shark losses in the Pacific Ocean. Using underwater surveys conducted over the past decade across 46 U.S. Pacific islands and atolls, as part of NOAA's extensive Pacific Reef Assessment and Monitoring Program ([www.pifsc.noaa.gov/cred/](http://www.pifsc.noaa.gov/cred/)) the team compared reef shark numbers at reefs spanning from heavily impacted ones to those among the world's most pristine.

## **The numbers are sobering**

"We estimate that reef shark numbers have dropped substantially around populated islands, generally by more than 90 percent compared to those at the most untouched reefs", said Marc Nadon, lead author of the study and a scientist at the Joint Institute for Marine and Atmospheric Research (JIMAR) located at the University of Hawaii, as well as a PhD candidate with Dr. Jerry Ault at the University of Miami's Rosenstiel School of Marine & Atmospheric Science. "In short, people and sharks don't mix."

To obtain these estimates, Nadon and his colleagues used an innovative survey method, called 'towed-diver surveys,' which were designed specifically for the census of large, highly mobile reef fishes like sharks. The surveys involve paired SCUBA divers recording shark sightings while towed behind a small boat.

"Towed-diver surveys are key to our effort to quantify reef shark abundance," said Ivor Williams, head of the team responsible for these surveys. "Unlike other underwater census methods, which are typically at an insufficient spatial scale to properly count large, mobile species, these surveys allowed our scientists to quickly record shark numbers over large

areas of reef."

The team crunched the numbers from over 1,600 towed-diver surveys, combining them with information on human population, habitat complexity, reef area, and satellite-derived data on sea surface temperature and oceanographic productivity.

The models showed the enormous detrimental effect that humans have on reef sharks.

"Around each of the heavily populated areas we surveyed – in the main Hawaiian Islands, the Mariana Archipelago, and American Samoa - reef shark numbers were greatly depressed compared to reefs in the same regions that were simply further away from humans." Nadon said. "We estimate that less than 10% of the baseline numbers remain in these areas."

Like all fishes, reef sharks are influenced by their environment. "They like it warm, and they like it productive," said Julia Baum, Assistant Professor at the University of Victoria, Canada, referring to the increase in reef sharks the team found in areas with higher water temperatures and productivity. "Yet our study clearly shows that human influences now greatly outweigh natural ones."

"The pattern – of very low reef shark numbers near inhabited islands – was remarkably consistent, irrespective of ocean conditions or region," added Williams.

"Our findings underscore the importance of long-term monitoring across gradients of human impacts, biogeographic, and oceanic conditions, for understanding how humans are altering our oceans," concluded Rusty Brainard, head of the Coral Reef Ecosystem Division at NOAA's Pacific Islands Fisheries Science Center, which conducted the surveys.

Provided by University of Miami Rosenstiel School of Marine &  
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