Protecting large ocean areas doesn't curb fishing catches: Study

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A school of Jacks in Revillagigedo National Park, south of Baja California, Mexico. Revillagigedo National Park is the largest fully-protected marine protected area in North America, and fishing is prohibited. Credit: Octavio Aburto/National Geographic Pristine Seas.

A new study published in *Science Advances* today provides evidence that

large-scale, offshore, and fully-protected marine areas (MPAs) protect biodiversity without negatively impacting fishing and food security.

In the first-ever "before and after" assessment of the impact of establishing Mexico's Revillagigedo National Park on the fishing industry, a team of US and Mexican researchers found that Mexico's industrial fishing sector did not incur economic losses five years after the park's creation despite a full ban on fishing activity within the MPA.

Established in 2017, the "Galápagos of Mexico" is the world's 13th-largest MPA, and one of the few where all damaging human activities, including fishing, are banned to help marine populations recover. Home to one of the world's largest aggregations of sharks and manta rays, as well as tuna, humpback whales and five species of sea turtles, it also shelters more than 300 species of fish, of which 36 are not found anywhere else in the ocean. At the time, the Mexican industrial fishing lobby opposed the creation of the National Park, arguing that it would impact their catches and increase their costs.

"Worldwide, the fishing industry has blocked the establishment of the marine protected areas we urgently need to reverse the human-caused global depletion of sea life. This study uses satellite tracking of fishing vessels and artificial intelligence (AI) to show that the fishing industry's concerns are unfounded," said Enric Sala, Explorer in Residence at National Geographic Society, the founder of Pristine Seas and a study co-author. "Even the largest of MPAs, which safeguard entire ecosystems, home to thousands of species of marine creatures, do not impact the handful of fish species that the fishing industry seeks out. The larger the MPA, the larger the benefits."

Methodology

The study, conducted by a team of researchers from the Mexican Center

for Marine Biodiversity, UC San Diego's Scripps Institution of Oceanography, the Institute of Americas' Gulf of California Marine Program, and the National Geographic Society, analyzes the behavior and productivity of the Mexican industrial fishing sector before and five years after the implementation of the largest fully protected MPA in North America, the Revillagigedo National Park.

Using data from satellite tracking, fish catches from the Mexican Fisheries Commission, and new AI tools from the Allen Institute for AI's Skylight platform, the experts set out to determine whether the creation of the MPA reduced fishing within the protected area, whether fishing catches were affected and if the creation of the MPA displaced fishing onto a larger area, resulting in an overall negative impact on marine biodiversity.

"The use of satellite tracking devices and AI monitoring platforms was critical to show compliance from the fishing industry and for the MPA managers' to monitor the protected area," said Dr. Fabio Favoretto, postdoctoral scholar at Scripps Institution of Oceanography and lead author of the study.

A diver swims in Revillagigedo National Park, south of Baja California, Mexico. Revillagigedo National Park is the largest fully-protected marine protected area in North America. Credit: Octavio Aburto/National Geographic Pristine Seas.

The satellite data analyzed by Favoretto came from government-mandated GPS devices installed on some 2,000 fishing vessels. By reviewing the open source data, they were able to identify movement of fishing vessels to see if fishing behaviors or maneuvers were performed. The team then employed machine-learning enabled techniques to identify patterns associated with vessels.

They found that the Revillagigedo National Park has had no negative effect on the Mexican industrial fleet's catches, nor did it increase the area used for fishing that would drive fishing vessels to venture further

to catch fish. Skylight revealed only a few isolated cases of illegal fishing within the MPA after 2017, highlighting the effectiveness of technology in helping those monitoring and protecting the 147,000 square kilometers of waters included within the park's boundary.

The study results refute the Mexican fishing industry's argument that the park would cause a potential loss of 20% of their tuna and other pelagic catches and provide proof that large, fully-protected MPAs can contribute to a more sustainable and equitable use of the ocean, without major economic repercussions on the fishing industry.

"The findings of this study are consistent with what experts have recorded in other Pacific marine protected areas," said Octavio Aburto, co-author and professor of marine biology at Scripps Institution of Oceanography. "Any argument to the contrary were just assumptions—this study provides the data to show that negative impacts to fishing do not exist. We hope the results can open a discussion to work together with the fishing industry to protect biodiversity and improve fish stocks."

Safeguarding biodiversity

The findings are released at a time when countries debate how to implement the global goal to protect and conserve at least 30% of the ocean by 2030, which is enshrined in a landmark agreement reached at the UN Global Biodiversity Conference (COP15) in December 2022. Just last month, United Nations members agreed on a legally-binding instrument to protect biodiversity in the high seas—the international waters beyond national jurisdictions.

"The clock is ticking until 2030," Sala said. "If the world is serious about protecting the natural world—our life support system—we need to drastically increase ocean protection. Right now, less than 8% of the

ocean is somewhat protected, and only 3% is fully protected from fishing and other damaging activities. Millions of species, including humans, who rely on the ocean for oxygen, food, mitigation of global warming, medicine and more depend on us to act."

Threatened by human activities like overfishing, the ocean's rich stockpile of biodiversity is rapidly declining, posing risks to food security, health and the environment. By rapidly establishing marine protected areas in strategic ocean areas, the world can collectively safeguard more than 80% of the habitats of endangered species, up from a current coverage of less than 2%.

Amid these debates, the study provides empirical evidence that large-scale MPAs in countries' Exclusive Economic Zones can contribute to global conservation goals without compromising fisheries' interests or a nation's ability to ensure food security.

A scientific diver performs a survey transect in Revillagigedo National Park, south of Baja California, Mexico. The orange fish is the endemic Clarion angelfish (Holacanthus clarionensis). Credit: Octavio Aburto/National Geographic Pristine Seas.

Shoring up the fishing industry

The study refutes a long-held view promoted by the industrial fishing lobby that ocean protection harms fisheries, and opens up new opportunities to revive the industry just as it is suffering from a recession due to overfishing and the impacts of global warming.

"Some argue that closing areas to fishing hurts fishing interests. But the worst enemy of fishing is overfishing and bad management—not

protected areas," Dr. Sala said.

The study will enrich ongoing discussions taking place in Mexico and beyond as Catalina López-Sagástegui, co-author and a researcher at the Institute of Americas, said, "Access to data and technology is improving our collective understanding of marine ecosystems health, which allows us to design and implement MPAs that help restore the health and resilience of marine ecosystems, benefiting fisheries in the long term."

Dr. Reniel Cabral, Senior Lecturer at James Cook University in Australia, who wasn't involved in this study, added: "It's simple: When overfishing and other damaging activities cease, marine life bounces back. After protections are put in place, the diversity and abundance of marine life increase over time, with measurable recovery occurring in as little as three years. Target species and large predators come back, and entire ecosystems are restored within MPAs. With time, the ocean can heal itself and again provide services to humankind."

Dr. Sala said, "MPAs are the most effective tool we have for protecting the health and diversity of our oceans. We need to expand and strengthen protected areas to ensure that our oceans can continue to provide food, jobs and other vital benefits for future generations. Our study helps to dispel the myth put forward by the industrial fishing lobby that MPAs harm them."

More information: Fabio Favoretto, The largest fully protected marine area in North America does not harm industrial fishing, *Science Advances* (2023). DOI: 10.1126/sciadv.adg0709. www.science.org/doi/10.1126/sciadv.adg0709

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