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ENVIRONMENT

Fish evolve to reap the rewards of protected waters

Nick Lavars | March 21st, 2017



The team studied tuna, such as the yellowfin, as part of their study (Credit: tomwang/Depositphotos)

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The very idea of a marine reserve is to provide sanctuary for ocean life to thrive, but what sort of long-term impact does that have on the evolution of a species? Scientists in Canada have carried out a study looking at how marine reserves can increase the numbers of less mobile fish, finding that fishing pressures in the surrounding areas also seemed to influence how quickly that evolution occurred.

In the new research paper, the scientists from the University of British Columbia (UBC) note that there has been plenty of work conducted on how marine reserves affect the size of mature fish and preserve biodiversity. But not so much attention has been given to how they promote the evolution of low-movement rates among fish.

Some species roam far and wide, while others prefer to stay closer to home. For the more adventurous, this means a greater chance of being caught, while the less mobile that stick closer to protected areas are more likely to procreate and pass that trait to their offspring.

The team's thinking was that this would, over time, increase the numbers of less-mobile fish and result in more individuals staying within marine reserves. It used existing literature and mathematical modeling to put a timeframe on this hypothesized evolutionary process to see how swift an impact a new

marine reserve would have on individual species. Study co-author Jonathan Mee explained how this works.

"In mathematical modeling, we use our knowledge about how the world works to create equations," he told New Atlas. "For example, the number of tuna in year two equals the number of tuna in year one times the proportion that survive from year one, plus the number of female tuna in year one times the number of babies produced by each female. We then use computers to iterate those equations over and over, for example, through to year 500."

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These kinds of equations were adapted to take into account how far different fish species – including yellowfin tuna, skipjack tuna, Atlantic sailfish and great white sharks – typically move over their lifetimes. They also looked at what happens when marine reserves are established, along with the threat of increased fishing.

The team's modeling indicated that new marine reserves lead to increases in population and decreased movement rates, and that the higher the fishing pressure the faster these features evolve. It also says that the movement patterns of skipjack tuna could change within just 10 years of a new marine reserve, while those of great white sharks would take up to 50 years. Which is all to say that the effectiveness of marine reserves may have previously been understated.

"The reserves are likely more effective than previously thought in preventing extinction for some species, protecting biodiversity and even acting as an insurance policy," said Sarah Otto of UBC's Biodiversity Research Centre in a statement.

The team's research was published in the journal *Evolutionary Applications*.

Source: University of British Columbia

Link: <http://newatlas.com/fish-evolve-protected-waters/48510/>