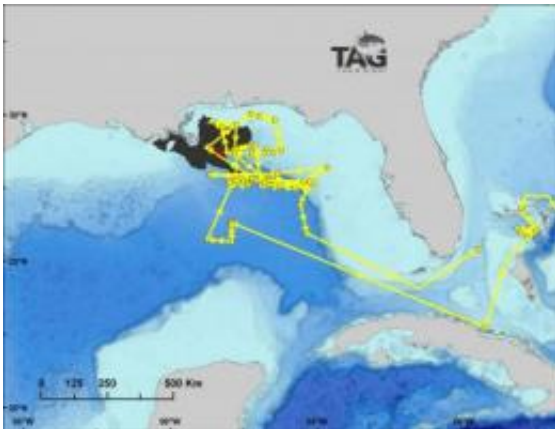


# New study maps spawning habitat of bluefin tuna in the Gulf of Mexico

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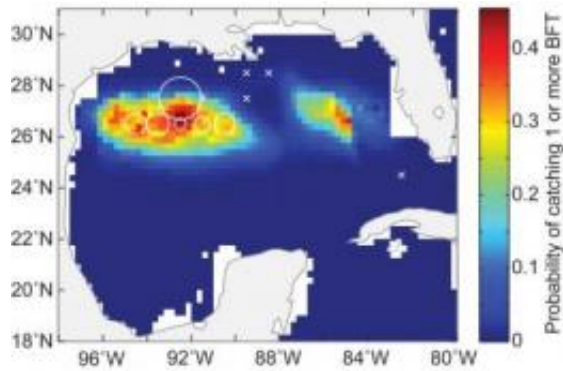
This shows the track (yellow line) and daily positions (dots) of a giant bluefin tuna electronically tagged off Canada on October 25, 2008 -- which spent the period from March 23-May 24, 2009, in the Gulf of Mexico. The track is overlaid on the area of the Deepwater Horizon oil spill as of May 24, 2010 (black). Peak spawning of bluefin tuna occurs in this area during April and May. Credit: Tag-A-Giant Foundation and Stanford University

Electronic tagging and fisheries catch data have revealed pronounced differences in preferred habitat of Atlantic bluefin tuna and yellowfin tuna in the Gulf of Mexico, despite their close ancestry, according to a new study published today in the peer-reviewed journal *PLoS ONE*. Bluefin tuna return to the same regions of the Gulf of Mexico during spring months to spawn. The bluefin are selecting a particular habitat along the slope waters of the Gulf of Mexico, which has unique

oceanographic properties that are predictable and can be seen from satellites. Yellowfin tuna are more widely distributed throughout the warm Gulf waters and occupy the region throughout the year.

"The bluefins' habitat requirements are relatively exact so we can predict with reasonable accuracy where bluefin tuna are likely to be spawning at any given time based on oceanographic data continually being gathered by satellites and weather buoys," said lead author Steven Teo of the University of California at Davis. "This is in stark contrast to yellowfin tuna, which exhibit much more generalized environmental preferences." The fidelity to breeding areas over time detected in this study is reminiscent of salmon returning to their natal stream to spawn.

Bluefin tuna are among the most valuable fish in global markets. The International Commission for the Conservation of Atlantic Tunas (ICCAT, <http://www.iccat.int>) currently manages the Atlantic bluefin tuna as two distinct populations, with western Atlantic spawners of the [Gulf of Mexico](#) forming a distinct population genetically from the eastern spawners of the Mediterranean Sea. The western Atlantic stock has suffered a significant decline in spawning stock biomass since 1950, and a 20-year rebuilding plan has failed to revive the population or the North American fishery. The failure of the Gulf of Mexico spawning population to rebuild, as well as the scope of illegal and under-reported catches - particularly in the [Mediterranean Sea](#) - are of such major concern that the species was recently considered by the United Nations for endangered species listing in March of 2010.



This map shows the probability of encountering a bluefin tuna when fishing with a pelagic longline in the Gulf of Mexico. Probability of encounter is indicated by the colors from high (red) to low (blue). Bluefin tuna are located along the slope waters in the western and eastern Gulf of Mexico. Credit: Habitat Utilization of the Gulf of Mexico by Bluefin and Yellowfin Tuna, Teo and Block, *PLoS ONE*, 2010

Targeted bluefin fishing has been banned in the Gulf for over twenty years, but bluefin continue to be captured accidentally on pelagic longlines, often resulting in mortality. The study shows that bluefin tuna are captured in the Gulf of Mexico from January through June each year, and the highest pelagic longline catch rates are in April and May, during the bluefin spawning season.

The authors compared environmental preferences and spatio-temporal distributions of bluefin and yellowfin tuna as revealed by pelagic longline catch rates and scientific tagging cruise conducted by the Stanford University and Monterey Bay Aquarium team coupled with oceanographic data sets. Drawing on these data, a model was developed to determine the relative probability of catching bluefin and yellowfin tuna at a given place and time. This model showed that there are two major hotspot regions within the Gulf where bycatch occurs - one in the eastern Gulf of Mexico to the north of the Loop Current, and the other

in the western Gulf of Mexico. Both regions are along the slope where the shallow continental shelf depth changes rapidly to the deep sea. It is within these hotspots that bluefin tuna prefer to spawn in circular, swirling water masses called "cyclonic eddies." These eddies are more productive and slightly cooler than surrounding warm Gulf ocean currents. Yellowfin tuna, however, are much more widely dispersed throughout the Gulf of Mexico throughout the year.

These findings indicate that it would be possible to utilize spatial management techniques to protect western [Atlantic bluefin tuna](#) on their breeding grounds in the Gulf of Mexico without compromising the yellowfin tuna fishery, which could be carried out in other areas during the critical bluefin tuna breeding times.

Unfortunately, these findings also give cause for concern in light of the recent Deepwater Horizon oil spill. "Both catch data and electronic tags indicate the Gulf of Mexico along the continental shelf is the preferred habitat of this majestic fish. I think it is amazing how precisely we can predict where the bluefin are. Unfortunately their spawning habitat overlaps the Deepwater Horizon oil accident site, and the timing of the spill coincides with the time when we expect them to be there spawning" said senior author Dr. Barbara Block of Stanford University.

**More information:** [dx.plos.org/10.1371/journal.pone.0010756](https://doi.org/10.1371/journal.pone.0010756)

Provided by Stanford University

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