Chemical Analyses of Bluefin Tuna Earbones Reveal Two Discrete But Overlapping Populations in the Atlantic: Findings Reported Today in *Science*

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BABYLON, NY -- Atlantic bluefin tuna are the largest and most sought-after of all tunas, weighing as much as 1,500 pounds and capable of fetching $50,000 or more in Asian markets where their flesh is a prized commodity. The Gold Rush for one bluefin is a big reason why their numbers have declined precipitously since the 1950s. New research findings reported in *Science* have critical implications for how bluefin tuna fisheries are managed on both sides of the Atlantic Ocean.

A team of international researchers led by Dr. Jay Rooker of Texas A&M University at Galveston and Dr. David Secor of the University of Maryland, in collaboration with Tag-A-Giant Foundation and Stanford University researcher Dr. Barbara A. Block, adds a new chapter to this emerging story, providing critical insights into the population structure and mixing of Gulf of Mexico and Mediterranean populations of bluefin tuna. The study comes at an important time as new assessments by international scientists suggest that both western and eastern fisheries are unsustainable at their current levels, and managers will convene in Marrakech, Morocco next month to consider revisions to existing – but failing – rebuilding plans.

In the current study, titled, "Natal Homing and Connectivity in Atlantic Bluefin Tuna Populations," Rooker and fellow researchers examine the chemical composition of the fish's ear bone—the otolith—to identify individuals from western and eastern Atlantic nurseries in the Gulf of Mexico and Mediterranean Sea, respectively. Chemical signatures in the form of stable carbon and oxygen isotope ratios served as a "birth certificate" and were used by the researchers to determine the birthplace of adolescent and adult bluefin tuna (2-20 years of age or more) on spawning and foraging grounds in the Atlantic Ocean.

The study shows that trans-Atlantic movement and mixing of populations was high, with over half of the juveniles collected in North American waters being of Mediterranean origin. "North American fisheries for juvenile bluefin tuna appear to be

supported to a large degree by the Mediterranean population, and thus the condition of this population will directly impact commercial and recreational fisheries for bluefin tuna in U.S. waters," according to Rooker.

"Our data coupled with archival and satellite tagging data clearly show that the migratory patterns of bluefin tuna are more complex than previously assumed, and information on mixing must be included in future assessments to ensure that rebuilding efforts are successful."

Despite the high level of mixing, the team also observed that over 99 percent of adult bluefin tuna returned to their place of origin in the Gulf of Mexico to spawn, and over 95% return was detected in the spawners from the Mediterranean Sea

"Rates of homing reported here are extremely high and comparable to Pacific salmon, which are known to return to the streams in which they were initially spawned, with very high frequency," according to Block. "The new otolith chemistry findings fit perfectly with previous electronic tagging and recent genetic data, which show that distinct bluefin tuna populations mix across the foraging zones of the North Atlantic but separate into distinct spawning areas. This has important implications for the management of bluefin tuna in both the East and West Atlantic. We clearly have eastern origin fish from the Mediterranean Sea in our U.S. fishery, and the Mediterranean fishers must realize their excessive overfishing is negatively impacting our fishery. Furthermore, we must quickly get a handle on the mixing in order to discern the number of bluefin that remain in the Gulf of Mexico stock."

The origin of commercially harvested bluefin tuna (commonly called "giants" and weighing over 300 pounds) in northern New England and Canada were examined and found to be nearly entirely of Gulf of Mexico origin. Results demonstrate that these waters may represent critical foraging habitat of the smaller, more vulnerable population that spawns in the Gulf of Mexico. Similarly, otolith samples isolated from the Gulf of Mexico spawners indicate these fish were spawned in the region, which highlights the importance of recovery and protection efforts for bluefin tuna in this region.

In addition to Rooker and Block, David Secor of the University of Maryland Center for Environmental Science; Gregoria DeMetrio of the University of Bari (Italy); Ryan Schlosser of Texas A&M University at Galveston; and John Neilson of the St.

Andrews Biological Station co-authored the article. The research was supported by the National Oceanic and Atmospheric Administration's Southeast Fisheries Science Center, the University of New Hampshire's Large Pelagic Research Center, the Tag-A-Giant Foundation, and the Monterey Bay Aquarium Foundation.

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