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Spawning Bluefin Tuna & the Deepwater Horizon Oil Spill

Why is the Gulf of Mexico (GOM) important to Atlantic bluefin tuna (*Thunnus thynnus*)?

The GOM is the major spawning ground of the western population of Atlantic bluefin tuna. Electronic tagging, genetics and chemical analyses of earbones have confirmed that there are at least two populations of Atlantic bluefin - an eastern population that spawns only in the Mediterranean Sea and a western that spawns only in the Gulf of Mexico.^{1,2,3} These studies indicate there is extensive mixing on North Atlantic feeding grounds along the eastern seaboard of North America; however, bluefin separate to independent spawning areas to breed.

When are bluefin tuna in the GOM, and which areas are most important?

Bluefin are in the GOM from January through June each year, but the peak spawning time is April and May.⁴ Bluefin tuna are distributed throughout the Gulf of Mexico, but there are two spawning hotspots - one in the north-western GOM and one in the north-eastern GOM.⁴ The latter area overlaps the spill area. Bluefin tuna prefer to spawn in cyclonic eddies - circular swirls of current - offshore of the continental shelf in temperatures 75-80°F.⁵

Describe the spawning process.

Electronic tagging data indicate bluefin tuna spawn in surface waters. In captivity we have seen bluefin pairs swim in a tight school and twirl quickly up through the water like a tornado. The females are in front, followed by males, and once the females release their eggs into the water, the males broadcast their gametes into the water to fertilize the eggs. This type of spawning is called broadcast spawning. Individual fish will spawn repeatedly, usually at night or early dawn, for up to a week at a time. Throughout the course of a night of spawning, bluefin dive to depths of 100 feet or more to cool off as these activities are very athletic and the bluefin is a warm bodied fish.⁶ Large adult females can spawn 30-60 million eggs in a single season.⁷

Describe the early life history stages of bluefin tuna.

Once fertilized, bluefin tuna eggs, which contain a droplet of oil, float to the surface where they drift for several days until they hatch into free-swimming larvae. At this stage they are very tiny. The larval stage lasts just 10 days, during which time the larvae feed on zooplankton and grow 0.4 mm per day.⁷ The larvae remain primarily in the top 50 feet of the water column but have been found at depths greater than 500 feet.^{5,8}

What are the specific threats to bluefin tuna from the Deepwater Horizon spill?

It is impossible to predict the effects the oil or dispersants have on individual bluefin tuna, much less the population. However, bluefin tuna need clean open ocean water to spawn so it is possible that the presence of oil could affect adult health and spawning behavior, as well as egg and larval survival. Because adults spawn at the surface, they could become coated with oil, potentially impairing locomotion and causing skin lesions. Adults might also ingest toxic oil particles since their high metabolism necessitates passing large amounts of water across their super thin gills. This possibly would cause respiratory, and potentially if ingested, digestive problems or lesions. Even if individuals do not enter the spill area, they might eat contaminated prey. If oil moves out of the GOM into the Gulf Stream via the Loop Current, this could have a disastrous impact to bluefin since larval, juvenile, adolescent and adult bluefin tuna follow this same ocean current highway on their migrations. Widespread use of dispersants and other mediation measures could also adversely affect bluefin tuna; in some cases environmental clean-ups cause more damage than the original contamination. Dispersants function by breaking up oil into smaller particles; because bluefin eggs contain oil, the dispersant could be particularly toxic to eggs. All this said, because they are a highly adapted mobile species, it is possible that bluefin will be able to detect the spill and give it a wide enough berth so that not even their larvae could drift into the contaminated area, resulting in no adverse impacts, at least in the short-term.

The effects of the 140,000,000-gallon Ixtoc I spill on bluefin in the GOM in 1979 were never assessed. The 1978 larval survey recorded the highest larval abundance on record, and the level has been over 70% lower since that time, but it is impossible to attribute this decline to the spill since overfishing is likely the most significant factor contributing to the decline.⁹

What makes Atlantic bluefin tuna such a remarkable animal?

They are among the largest fish, aptly named giant bluefin. Adults in the GOM weigh up to 1500 pounds and can be as large as a Volkswagen Beetle. Bluefin migrate across the entire Atlantic in as little as a month, and they are warm-blooded like a mammal or bird. They are the target of a billion dollar global fishery, primarily driven by demand for sushi and sashimi - a 513-pound bluefin tuna sold for \$177,000 in January 2010 - and as a result the GOM spawning stock has declined by 80-90% over the last several decades.

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