

OCEANOGRAPHIC PREFERENCES OF ATLANTIC BLUEFIN TUNA, *THUNNUS THYNNUS*, ON THEIR GULF OF MEXICO BREEDING GROUNDS

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Abstract:

Electronic tagging and remotely sensed oceanographic data were used to determine the oceanographic habitat use and preferences of Atlantic bluefin tuna (*Thunnus thynnus* L.) exhibiting behaviors associated with breeding in the Gulf of Mexico (GOM). Oceanographic habitat used by 28 Atlantic bluefin tuna exhibiting breeding behavior (259 d) was compared with available habitat in the GOM, using Monte Carlo tests and discrete choice models. Habitat use and preference patterns for ten environmental parameters were quantified: bathymetry, bathymetric gradient, SST, SST gradient, surface chlorophyll concentration, surface chlorophyll gradient, sea surface height anomaly, eddy kinetic energy, surface wind speed, and surface current speed. Atlantic bluefin tuna exhibited breeding behavior in the western GOM and the frontal zone of the Loop Current. Breeding areas used by the bluefin tuna were significantly associated with bathymetry, SST, eddy kinetic energy, surface chlorophyll concentration, and surface wind speed, with SST being the most important parameter. The bluefin tuna exhibited significant preference for areas with continental slope waters (2800–3400 m), moderate SSTs (24-25 and 26-27 °C), moderate eddy kinetic energy (251-355 cm² s⁻²), low surface chlorophyll concentrations (0.10-0.16 mg m⁻³), and moderate wind speeds (6-7 and 9-9.5 m s⁻¹). A resource selection function of the bluefin tuna in the GOM was estimated using a discrete choice model and was found to be highly sensitive to SST. These habitat use and preference patterns exhibited by breeding bluefin tuna can be used to develop habitat models and estimate the likely breeding areas of bluefin tuna in a dynamic environment.

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