**Utilization distribution: A baseline approach using bluefin tuna (Thunnus thynnus) sonic tracks in the Gulf of Maine**

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Electronic tags yield precious insight into the distribution, depth behavior and habitat use of marine pelagic fish. In particular, utilization distribution surfaces can be derived when large numbers of tags are deployed. In the case of small sample sizes (e.g. pop-up tags in small numbers, or short deployments as in acoustic tags), a simulation approach can help define the null hypothesis of movement, which separates baseline movement from any environmental or external influences. This is useful to further test whether observed residency/departure times are linked to local habitat changes or the natural foraging and exploration behavior of the fish.

In this study, we analyze the spatial and temporal distribution of bluefin tuna using a correlated random walk. Average movement parameters are derived from in situ observations (ultrasonic tracking of bluefin tuna for up to 48 hrs in the Gulf of Maine). Two sets of turn angles and speeds are each used to construct 1000 bluefin tuna tracks, simulated once per minute. Distributions are analyzed at fixed time intervals up to six months. Complete tracks are also constructed, using each set of parameters, to examine small scale movements.

Differences in the two sets of movement parameters demonstrate the need for a switching behavior model when analyzing movements of fish on the continental shelf. This study serves as a baseline for utilization distribution studies of bluefin tuna dispersing from the Gulf of Maine, while the general approach may be useful for tagging studies in any area.

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