

# **ELECTRONIC TAGGING AND MOLECULAR GENETICS: TWO TECHNOLOGIES, ONE POWERFUL VOICE FOR CONSERVATION**

Reeb, C.<sup>1</sup>, Boustany, A.<sup>2</sup>, Jorgensen, S.<sup>1</sup>, Dewar, H.<sup>3</sup>, Polovina, J.<sup>4</sup>, and Block, B.A.<sup>1</sup>

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## *Abstract:*

Highly migratory, cosmopolitan marine fish species present a challenge for conservation and management. Although traditional catch analysis clearly shows seasonal or annual shifts in abundance across large geographic scales, early genetic data concluded that gene flow in most taxa had crisscrossed the world over recent evolutionary time making it unlikely populations were subdivided; thus management seemed unnecessary. Without a marker to identify stocks, without a map of migratory patterns, without specific coordinates of areas crucial to spawning, growth, and maturation, implementing a conservation strategy would be ineffective. Today, highly migratory fisheries are in serious decline. Fortunately, a boom of electronic tag data is filling the void of knowledge concerning spatial occupancy and habitat use. The growing power of genetics to discern differences among closely related populations challenges the dogma that these species are characterized by high gene flow and panmixia. Electronic tagging has identified discrete migratory patterns for Atlantic bluefin showing an overlap on feeding grounds while genetics shows spawning grounds contain divergent stocks. For white sharks, tagging shows high site fidelity in the eastern Pacific while mtDNA shows recent co-ancestry, but strong isolation of the California population from Australia/New Zealand. Finally, genetics has outlined a pattern of swordfish structure and migration that could serve as a baseline for tagging studies; and recent tag data shows an avoidance of swordfish to regions where dissolved oxygen depth is shallow. This might explain a divergence in the central Pacific that genetics can detect. Presented here are glimpses of how combining two technologies can provide a powerful voice to enact and enforce policy for swordfish (*Xiphia gladius*), Atlantic bluefin tuna (*Thunnus thynnus*), and an eastern Pacific population of the CITIES-listed white shark (*Carcharodon carcharias*).

*Contact : Carol Reeb, creeb@stanford.edu*

*(1) Hopkins Marine Station, Stanford University*

*(2) Duke University, Durham, NC*

*(3) Southwest Fisheries Science Center, NOAA, La Jolla, CA*

*(4) National Marine Fisheries Service, Honolulu Laboratory, Honolulu, HI*