

HORIZONTAL AND VERTICAL HABITAT SUITABILITY FOR MIGRATING PACIFIC BLUEFIN TUNA

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Abstract:

Young of the year Pacific bluefin tuna (*Thunnus orientalis*; PBFT) are spawned in the warm waters of the western Pacific Ocean or in the Sea of Japan. Each year, some proportion of young fish undergoes a long distance eastward migration to the California Current System (CCS) where they may reside for several years. Since 2002, the Tagging of Pacific Pelagics (TOPP) program has implanted Lotek LTD series archival tags in the peritoneal cavities of 519 PBFT in the CCS (408 from 2002-2007). To date, 215 of these tags have been recovered.

This archival tagging effort has captured the details (depth, light, and internal and external temperature at intervals from 1-2') of a total of 11 westward trans-Pacific migrations made by 10 PBFT from 2003-2008; two fish made eastward "return migrations". Geolocations derived from ambient light and temperature data show that migrations are a seasonal event that peaks near the vernal equinox and occurs over a narrow range of latitudes (34.2° N +/- 1.84 SD). Extrapolations of the total length and age of each fish over the duration of the time series indicate that fish engaged in westward migrations as early as 2 years old, and as late as 5 years old.

Analysis of tag data in combination with satellite oceanographic products has allowed for the delineation of seasonally dynamic migration corridors, aggregation hot spots and suitable versus unfavourable habitats. While suitable habitats may act as attractants for initiating migration events when the CCS is least productive, unfavourable habitats can act as barriers between suitable zones and contribute to the seasonality of migrations. Vertical data also show that behavioural changes reflect changes in the availability of thermally suitable habitats, as the westward deepening of the 10° isotherm opens more vertical habitats for PBFT to exploit as they migrate.

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