

Novel investigations into the distribution, growth, and origins of Longfin Smelt throughout the SFE

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The Longfin Smelt is an iconic forage fish that once thrived in the San Francisco Bay Estuary. In the last 30 years, the population has crashed to less than 1% of historic levels, suggesting the ecosystem has become unsuitable for this native species. However, little is known about the ontogenetic niche (physical habitat characteristics required for successful spawning and rearing) within the Estuary. Here we describe results of a 3-year interdisciplinary study of the life-history of Longfin Smelt. By surveying new habitats and conducting microstructural and microchemical analysis of fish otoliths (ear bones), we are transforming our understanding of the habitat requirements of this severely threatened native species. Our expanded surveys show that this species utilizes and spawns within habitats previously omitted by long-term surveys, and our otolith microchemical analyses reveal wide diversity in individual life history strategies that likely facilitates population resilience within a highly dynamic environment. These results may change our fundamental understanding of the population dynamics of this species, and we are working directly with resource managers to integrate these results into current management strategies aimed at conserving and restoring Longfin Smelt populations in San Francisco Bay.