Title: Use of Discrete Wavelet Transformations to identify groups in otolith chemistry profiles.

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Cluster analysis can be an extremely useful tool in data exploration and categorization, but its application to complex time series data can present several challenges. Firstly, time series analysis of large datasets is computationally intensive. Secondly, any clustering technique needs to maintain the order/time resolution of the data when computing distance values. For these two reasons, traditional distance measures used in clustering can either take a large amount of time to compute on common hardware or fail to produce sensible clusters. We analyzed Strontium isotope ratio (87Sr/86Sr) profiles from over 2000 Delta Smelt (*Hypomesus transpacificus*) otoliths (fish ear bones) collected over 12 years from the San Francisco Bay-Delta in order to identify and categorize their life history strategies. These isotope profiles represent the salinity environment individual fish were exposed to. We used Discrete Wavelet Transformation (DWT) as a method of reducing dimensionality of the data for more computationally efficient categorization and clustering. From our data, we categorized several distinct life history strategies in the Delta Smelt population: Freshwater Residents, Brackish Water Residents, and several Migratory groups that differed in natal region chemistry and timing of movement. We were able to quickly compute well defined clusters in orders of magnitude less time than other techniques. We are continuing to explore methods to cluster large time series datasets in a computationally efficient manner.

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