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Otolith shape analysis of Atlantic Bluefin tuna (*Thunnus thynnus*) to support sustainable management

Otoliths are calcium carbonate structures found in the inner ear of fish. Due to properties of their growth, otoliths provide a permanent record of a fish's environmental history. Otolith shape is influenced by the combined effects of genetics and the environment, such that fish from different geographic areas often display differences in otolith morphometrics. Otolith shape analysis can be used to discriminate between fish stocks and to estimate the contribution of different populations to mixed fisheries. This helps to ensure that stocks are appropriately assessed and managed.

Two stocks of Atlantic Bluefin tuna are recognized; the western stock spawns in the Gulf of Mexico and the eastern stock spawns in the Mediterranean Sea. Evidence suggests additional stock complexity in the Mediterranean. Otolith shape analysis can discriminate between adult Bluefin from the west and east Atlantic with an accuracy of 83%.

This study investigated sources of variation in otolith shape of Bluefin tuna. Paired comparisons showed no consistent differences in shape between left and right otoliths, justifying the inclusion of either otolith in the analysis. Otolith shape measurements were obtained from 296 fish that were collected at the same location (Canada) but originated from both the western and eastern spawning grounds (as indicated by a previous otolith chemistry analysis). The ongoing analysis of this data will establish the extent to which otolith shape is included by natal origin. Otolith shape measurements were obtained from 231 fish from four different Mediterranean locations. Ongoing analysis is investigating geographic variation in otolith shape within the Mediterranean. The data will be combined with otolith stable isotope and genetic data as part of a larger study that aims to improve the accuracy of stock discrimination.