

# Stable carbon and oxygen isotope ratios of otoliths from juvenile and adult winter flounder

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This study was designed to determine if stable carbon ( $\delta^{13}\text{C}$ ) and oxygen ( $\delta^{18}\text{O}$ ) isotope ratios in otoliths could be used to differentiate the locations that serve as important nursery areas for winter flounder along the Rhode Island, USA coastline. In recent years the populations of winter flounder (*Pseudopleuronectes americanus*) have significantly declined. Fishing restrictions have been implemented; however, the stocks continue to decline, and habitat limitations may be a factor. Therefore, knowledge of connectivity between juvenile nearshore habitats and the adult offshore populations may be important for improved management of this fishery.

Winter flounder spawn during late winter in nearshore areas, and juvenile fish reside in shallow-water habitats along the coastline during their first summer. Once young-of-the-year flounder undergo metamorphosis and settle, they remain in close proximity to that site until fall. Mature fish move offshore during the late winter and spring, and then return to their natal estuaries during the fall and winter to spawn. Juvenile flounder were collected yearly over a three-year period from 18 natal habitats along the coast. After several years, adult flounder of the same cohorts were obtained from similar inshore locations and also from the offshore fishery. Whole sagittal otoliths from the juvenile flounder and juvenile otolith cores from adult fish were analyzed for  $\delta^{13}\text{C}$  and  $\delta^{18}\text{O}$  using continuous flow isotope ratio mass spectrometry.

Results from these analyses show significant differences in  $\delta^{13}\text{C}$  and  $\delta^{18}\text{O}$  signatures among water bodies (bay, coastal ponds and an estuarine river). Also, significant positive correlations were found between  $\delta^{18}\text{O}$  and the salinity of the natal habitats. Preliminary analysis indicates that the isotope ratios of the juvenile cores from adult flounder and whole otoliths from juvenile fish collected at the same locations were similar. Isotope data for juvenile cores from adult flounder obtained from the offshore fishery are now being compiled and compared. These results may provide valuable information on the relative importance of various juvenile habitats to the Southern New England winter flounder fishery.