

Otolith radiocarbon signatures provide distinct migration history of walleye pollocks around Hokkaido, Japan in the North-Western Pacific

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Abstract

1. Otoliths have been widely studied as natural recorders of the entire life cycle of aquatic teleosts. Trace elements and stable isotope ratios in otoliths are well understood and used as proxies of migration histories, however few elements have shown the potential to reconstruct the migration history of oceanodromous fish. 2. This study reports the first use of radiocarbon in otolith to reconstruct the horizontal migration history of fish. We analyzed three different stocks of walleye pollock *Gadus chalcogrammus* around Hokkaido, Japan. 3. Radiocarbon concentration from the outermost edge of otoliths showed a general consistency with seawater radiocarbon concentration of the sampling region, validating the application of otolith radiocarbon concentration to fish migration studies. Pollocks of all three stocks generally inhabited the nearby sampling area throughout their life cycle, though some pollocks of the Okhotsk and Japan Sea stocks respectively showed a possibility of migration between different sea regions. 4. This study confirmed a novel method using radiocarbon concentrations to reconstruct the migration history of marine teleost. Using the high sensitivity of otolith radiocarbon concentration observed in this study, it may be possible to detect fish migration with higher spatial resolution than previous studies using conventional proxies.

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