Accumulation of Mn, Co, Zn, Rb, Cd, Sn, Ba, Sr, and Pb in the otoliths and tissues of eel (Anguilla anguilla) following long-term exposure in an estuarine environment

Aiming at increasing the resolution of otolith tracers, we investigated the possibility to use Mn, Co, Zn, Rb, Cd, Sn, Ba, Sr, and Pb otolith composition to retrieve the movements of eels (Anguilla anguilla) in the lower Gironde watershed. Caging experiments were designed to validate the site specific otolith signatures. Individually identified eels were reared in cages in three locations along the estuarine and river gradient. Three trials were set up for successive periods of 3 months and 6 months. Water Mn, Co, Zn, Rb, Cd, Sn, Ba, Sr, and Pb concentrations were monitored. The eel otolith composition corresponding to the experimental period was measured with an ICPMS coupled with a femtosecond laser. Liver Cd, Zn and Pb concentrations were measured. For each caging experiments, we tested the influence of individual weight gain, caging site and trial on elemental otolith concentrations. Mn, Co, Zn, Rb, Cd, Sn, Ba, Sr, and Pb were detected in eel otolith above the detection limits. Otolith Sr and Ba concentrations significantly discriminated the caging sites for one trial. Individual weight gain did not have a significant influence on otolith elemental concentrations. Co, Rb, Cd, Sn, Zn, Sr and Ba otolith concentrations were significantly influenced by the trials. Water elemental composition was only partly reflected by otolith elemental composition. The results showed that otolith composition had a more integrative value than water composition. Complex elemental seasonal variations and individual eel incorporation potential complicated the interpretation of otolith composition. Liver and otolith Cd and Zn concentrations did not show a statistically significant correlation.

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Mots clés : OTOLITHE, ANGUILLA ANGUILLA, METAUX LOURDS, ESTUAIRE, STATOLITHS, ESTUARIES, HEAVY METALS
Date : 2012
Format : text/xml
Source : 29767
Langue : Inconnu

Télécharger les documents : https://irsteadoc.irstea.fr/cemoa/PUB00035983

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