

Seaward migration and successful tactics of allis shad *Alosa alosa* and twaite shad *Alosa fallax* : insights from otolith microstructure and microchemistry

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SUMMARY.

During seaward migration, allis shad and twaite shad juveniles move through the estuary. The question is: do juveniles stay in the estuary? The present study, that focuses on the Gironde-Garonne-Dordogne watershed, examines retrospectively the role of the estuary during seaward migration, by using otolith Sr/Ca ratio analysis. Analysis is carried out on the otoliths of spawners, individuals that successfully complete their life cycle (the “winners”). Otolith daily growth increments and our ability to identify the entrance into brackish (estuarine) water and seaward exit on the otolith are validated. The time spent in freshwater and brackish water, the size at which habitat shift occurs, otolith microstructure, and also the data collected from samplings in the wild reveal a short time spent in the estuary, that has to occur in a particular environmental window. They also reveal that both species use the area in a different way. For allis shad, the time spent in the estuary is 13 days on average and does not differ from one year to another, suggesting an individual internal window constraining the stay in the estuary. For twaite shad, the time spent in the estuary is longer (25 days on average) and more variable from one year to another compared to allis shad. Our results reveal that, for allis shad, estuary is used as a corridor to go to the seawater growth habitats. Twaite shad use coastal area as well as the estuary, implying that this species has estuarine and coastal essential habitats. This different use of the area, associated with other life history traits, explain the more significant mercury contamination in twaite shad than allis shad.

Key-words: Ecology, *Alosa alosa*, *Alosa fallax*, Otolith, Sr/Ca, Estuary, Seaward migration