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Abstract

Use of Otolith Shape and Elemental Signatures to Infer the Population Structure of the Thicklip Grey Mullet *Chelon labrosus* in the Southern Bay of Biscay †

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Abstract: Xenoestrogenic effects have been reported in thicklip grey mullet, *Chelon labrosus*, used as pollution sentinel organisms in estuaries in the Southeast Bay of Biscay with intersex gonads described in populations from some contaminated estuaries. Despite evidence of reproductive stress in this catadromous fish species, knowledge of mullet reproductive movements and connectivity between estuaries is lacking. This study investigates the population structure of *C. labrosus* using otolith shape and elemental signatures of 60 adult individuals collected from two estuaries found in the Southeast Bay of Biscay (Gernika and Plentzia). All samples were collected in June–July 2020. Otolith shape analysis was determined using elliptical Fourier descriptors, while elemental signatures (Sr:Ca, Li:Ca, Mg:Ca, Mn:Ca, Co:Ca, Ni:Ca, Cu:Ca and Ba:Ca) of whole sagittae were determined by inductively coupled plasma mass spectrophotometry. Both natural tags were analyzed with univariate and multivariate statistics to determine whether these signatures are geographically distinct and can be used to assess the degree of separation between individuals. The data showed significant differences in the otolith shape and elemental analyses, with canonical analysis of principal coordinates plots identifying two different groups, each one belonging to each estuary of origin. Differences in whole otolith elemental signatures between locations were driven by Sr:Ca, Li:Ca, and Ba:Ca. Sr:Ca and Li:Ca ratios were higher in Plentzia than in Gernika, while Ba:Ca was higher in Gernika. The high re-classification success rate using both tools obtained from stepwise linear discriminant function analysis supports these findings and suggests that Gernika and Plentzia individuals passed enough time in separated water compartments and should be regarded as two different population units. This could suggest that the intersex condition in mullets from Gernika is due to life-long exposure to xenoestrogens after homing during early larval development in that estuary, without migrations to other estuaries. Acknowledgements: Project funded by Basque Gov. (IT1302-19), Spanish MCIN and EU-FEDER/ERDF (PGC2018-101442-B-100) and EU H2020 (Assemble+ 730984).

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