

Abstract

Application of Machine Learning Methodologies for Unravelling the Philopatry and Dispersal Range of *Alosa* Species in the Eastern European Atlantic [†]

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[†] Presented at the IX Iberian Congress of Ichthyology, Porto, Portugal, 20–23 June 2022.

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Abstract: Allis shad, *Alosa alosa* (Linnaeus, 1758), and twaite shad, *Alosa fallax* (Lacépède, 1803), are two anadromous fish species belonging to the family Clupeidae. Like all other diadromous species, their populations in European rivers are in decline and their scarcity has become an emerging problem. Anthropogenic activities, mainly large dams and other river obstacles have restricted their range in the eastern Atlantic and western Mediterranean. The studies carried out in Europe in the last 20 years provide a good overview of the conservation status of the shads, however, data on many biological characteristics of their life cycle, especially those corresponding to their development in the marine and coastal environment, are still very scarce. In the Iberian Peninsula, scientific data on their populations are scarcely available. In Galicia, there are studies on the populations of these species in the Ulla and Miño rivers; nevertheless, it is not known whether these species can reside in other Galician rivers suitable for their development. The microchemistry of the otoliths of diadromous fish is strongly correlated with the microchemistry of the water of their river of birth. In the present study, the microchemical composition of the otoliths of 95 adults, distributed between both species, caught at sea and in the Ulla and Miño rivers was analyzed and compared with that of the otoliths of 135 juveniles, distributed between both species, from seven Galician and French rivers. In this way, through this correlation it was possible to quantify the degree of philopatry of the specimens, specify their river of birth and establish their dispersal range during the marine phase. Thus, through the application of Machine Learning methodologies, we provide new information on the dispersal range of these species and the interactions between populations.

Keywords: machine learning; philopatry; shads; dispersal range; otoliths; anadromous species; European Atlantic



Citation: Pico, A.; Nachón, D.J.; Vieira-Lanero, R.; Barca, S.; Cobo, M.d.C.; Crujeiras, R.; Cobo, F. Application of Machine Learning Methodologies for Unravelling the Philopatry and Dispersal Range of *Alosa* Species in the Eastern European Atlantic. *Biol. Life Sci. Forum* **2022**, *13*, 45. <https://doi.org/10.3390/blsf2022013045>

Academic Editor: Alberto Teodorico Correia

Published: 7 June 2022

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Author Contributions: Conceptualization, F.C., R.V.-L. and D.J.N.; methodology, A.P. and D.J.N.; software, A.P. and D.J.N.; validation, A.P., D.J.N., R.V.-L. and F.C.; formal analysis, A.P., D.J.N. and R.C.; investigation, A.P., D.J.N., R.V.-L., R.C. and F.C.; resources, A.P. and D.J.N.; data curation, A.P., D.J.N. and R.C.; writing—original draft preparation, A.P.; writing—review and editing, A.P., D.J.N., R.V.-L., S.B., M.d.C.C., R.C. and F.C.; visualization, A.P., D.J.N. and R.V.-L.; supervision, F.C., R.V.-L., R.C. and D.J.N.; project administration, F.C., R.V.-L. and D.J.N.; funding acquisition, F.C., R.V.-L. and D.J.N. All authors have read and agreed to the published version of the manuscript.

Funding: This project has been developed in the framework of the projects “Evaluación de las ‘capturas incidentales’ de *Alosa alosa* y *Alosa fallax* por la flota costera de Galicia: análisis del problema, sensibilización y proposición de medidas de gestión y protección (IMARDEALOSAS)”, which has the collaboration of the Biodiversity Foundation of the Ministry for Ecological Transition and the Demographic Challenge, through the Pleamar Programme, co-financed by the FEMP and “Assessing and enhancing ecosystem services provided by diadromous fish in a climate change context (EAPA_18/2018-DiadES)”, of the Interreg Atlantic Arc Programme.

Institutional Review Board Statement: Protocols used in this study conform to the ethical laws of the country and have been reviewed by the ethics committee of the University of Santiago de Compostela and the regional government (Xunta de Galicia).

Informed Consent Statement: Not applicable.

Data Availability Statement: Data from this research are available from the corresponding authors upon reasonable request.

Conflicts of Interest: The authors declare no conflict of interest.