



Abstract

Assessment of Fish Passage and Behaviour through a Tidal Weir Using an Underwater Sonar [†]

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- † Presented at the IX Iberian Congress of Ichthyology, Porto, Portugal, 20–23 June 2022.
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Abstract: The “Rio Novo do Principe” temporary tidal weir is built annually in the brackish section of the Vouga river to prevent saline intrusion during the low-flow summer period, thus securing freshwater abstraction for agricultural and industrial uses. Compatibilization between these objectives and successful fish migration, coupled with adequate biological monitoring of this infrastructure, is essential, since it is located on a Nature 2000 site (Ria de Aveiro: PTZPE0004), an area considered important as a migratory corridor for diadromous fish species. In 2019, an experimental fishway was added to the weir, and a monitoring program has been ongoing since then, using an underwater acoustic camera (ARIS 1800 Sonar) to study fish behaviour upon facing and passing this obstacle. This monitoring was carried out between July and November of 2019 and 2020, on a weekly or fortnightly basis, for a complete 24-h cycle, spanning 12-h intervals, downstream and upstream of the weir. The number of fish (e.g., grey mullets and sand smelts) that successfully used the fishway in each monitoring session, varied between 1.02 fishes/min in 2019, and 0.86 fishes/min in 2020, depending on environmental conditions. An extrapolation of the number of fish recorded in the function of the lunar phase for the complete operation period of the structure (142 days in 2019 and 126 days in 2020) resulted in 158,207 individuals in 2019 and 154,961 individuals in 2020. GLM analysis with the fish counts as response variable showed that the environmental predictors that significantly influence the experimental fishway use were salinity, tidal phase, and the moon phase, for both years. Compatibilization between the prevention of saltwater intrusion and successful fish migration may be hard to achieve, but results from this study provide insights into fish behaviour when facing such obstacles and can help promote the optimization of fishways solutions in tidal areas.

Keywords: fishway; tidal weir; ARIS sonar monitoring



Citation: Oliveira, R.; Alexandre, C.M.; Quintella, B.R.; Rato, A.S.; Pedro, S.; Almeida, P.R. Assessment of Fish Passage and Behaviour through a Tidal Weir Using an Underwater Sonar. *Biol. Life Sci. Forum* **2022**, *13*, 123. <https://doi.org/10.3390/blsf2022013123>

Academic Editor: Alberto Teodorico Correia

Published: 17 June 2022

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Author Contributions: Conceptualization, P.R.A., B.R.Q., C.M.A., S.P.; methodology, P.R.A., B.R.Q., C.M.A., S.P., R.O.; writing—original draft preparation, R.O.; writing—review and editing—R.O., S.P., C.M.A., B.R.Q., A.S.R., P.R.A.; supervision, P.R.A.; project administration, P.R.A. and C.M.A.; funding acquisition, P.R.A., B.R.Q., C.M.A., S.P. All authors have read and agreed to the published version of the manuscript.

Funding: This research was co-funded by EU's LIFE Programme for the Environment and Climate action (LIFE16 ENV/PT/000411) and The Navigator Company. This study was also supported by the Portuguese Science Foundation (FCT) through the strategy plan for MARE (Marine and Environmental Sciences Centre), via project UIDB/04292/2020, and under the project LA/P0069/2020 granted to the Associate Laboratory ARNET FCT also supports this study through individual contracts attributed to Carlos M. Alexandre (CEECIND/02265/2018) and to Bernardo R. Quintella (2020.02413.CEECIND), and the PhD scholarship attributed to Ana S. Rato (2021.05339.BD).

Institutional Review Board Statement: Not applicable.

Informed Consent Statement: Not applicable.

Data Availability Statement: Data is available from correspondence author, upon reasonable request.

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