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Abstract

Two-Way Migration of a Potamodromous Cyprinid in a Small Hydropower Plant with a Pool Type Fishway †

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Abstract: Most freshwater fish need to move freely through rivers to complete their life cycles. Thus, river barriers that hinder or block their longitudinal movement (e.g., dams, culverts, gauging stations), directly affect their reproductive, feeding, and habitat routes. A holistic solution to these barriers would need to allow directed, undistracted, and bidirectional fish migration between different habitats; that is to say, it would need to allow two-way migration. The most extended solution that would allow upstream fish migration is a fishway. However, for downstream migration fish have alternate routes such as spillways, turbines, or bypasses. Studies and discussions about two-way migration and bidirectional movement through a fishway have been focused on large dams and reservoirs; thus, there is a lack of available data on other environments, less popular species, or smaller dams and weirs. In this sense, it is possible to hypothesize that a fishway, especially in a smaller facility, could enhance two-way migration by allowing bidirectional movement. Therefore, as a first step to analyzing the possibility, we studied longitudinal connectivity (two-way migration and bidirectional movements) through a small run-of-river hydropower plant (HPP) with a step-pool type fishway, a common and representative configuration of several small HPPs around the world. A potamodromous cyprinid—the Iberian barbel (*Luciobarbus bocagei*)—was selected as the target species. In this study, radio and PIT tracking data were collected for four different years and combined to characterize movement in the full system: fishway, turbines/spillways, and the river reach downstream (up to 3 km) and upstream (up to 4 km) from the HPP. The results demonstrated the existence of several types of movement with inter-annual and intra-annual variability. Several fish even returned over the years. This suggests that, in this type of HPP facility, a fishway can provide bidirectional connectivity and two-way migration, thus ensuring that a great proportion of fish complete their life cycles.

Keywords: bidirectional; downstream migration; fish ladder; fish passes; PIT; potamodromous; radio tracking; run-of-river; upstream migration

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