Abstract

Smart Fishways: A Sensor Network for the Assessment of Fishway Performance [†]

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Abstract: River barriers cause the fragmentation of riverine habitats as well as changes in the ecology of freshwater systems, fish being one of the most affected organisms by these impacts. The most common solution to allow fish to move freely through river barriers and, thus, to complete their life cycles, are stepped fishways. However, they are currently far from an optimal solution as the natural variability of rivers (e.g., discharge, floating debris, etc.) modifies the hydraulic conditions within these structures, directly affecting the fish passage, i.e., their efficiency, and, thus, the continuous assessment and management of fishways becomes vital for guaranteeing fish migration. Smart Fishways is an EU-funded project which aims to assess the effect of hydrological variability on fishways and to develop a low-cost technological and methodological framework to monitor fishway performance in real-time. The main objective of this project is to combine fish biology, hydraulics, and sensor networks to create a new generation of smart fishways, capable of self-deciding their optimal management and configuration. The present work describes the first steps followed to develop the sensor network and the online platform for the Smart Fishways project, together with the results of an ongoing study in a field test in the Iberian Peninsula. The network follows a star architecture (one gateway controls all the nodes) with independent custom-made ultrasonic water level nodes and environmental sensors distributed through the fishway together with a fish detection system for a fish movement assessment, both managed remotely and autonomously by a central gateway. This work demonstrates how the network is able to optimize the timing of maintenance on a fishway in real time, as well as how it helps to detect those hydraulic configurations and environmental variables that maximize the fish passage.

Keywords: fishways; remote monitoring; smart management; environmental sensor network

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