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Abstract

Effects of River Salinization on Freshwater Fish Behavior—Cerebral Lateralization, Activity, Boldness, and Schooling †

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Abstract: Rivers are experiencing increasing salinization due to anthropogenic disturbances, and salinity has been shown to negatively affect freshwater fish behavioral expression, potentially disrupting ecological processes. In this study, the aim was to determine the sublethal effects of secondary salinization (anthropic in origin) on freshwater fish behavior, using a widespread native cyprinid species, the Iberian barbel (*Luciobarbus bocagei*), as the model species. Behavioral trials were performed in a mesocosm setting, focusing on fish cerebral lateralization, routine activity, boldness, and schooling behavior. The impact of salinity stress was assessed by exposing the barbels to three levels of a salinity gradient—Control (no salt added to the water, 0.8–0.9 mS/cm), Low (9 mS/cm), and High concentration (18–19 mS/cm). Behavioral parameters were recorded every three minutes by visual observation. Our results show that, with increased salinity in the flume channels, fish were less active, and formed less cohesive shoals. Moreover, individuals became bolder, since a higher number of attempts to escape their environment was recorded in greater salinity levels. Laterality of the population appeared to become more evident, as fish revealed a tendency in their decision making to turn left more frequently. Behavioral changes in fish caused by salinization stress should be further researched regarding other freshwater species with different tolerances, in addition to their interaction with other environmental stressors. This broader approach would allow us to recognize salinity thresholds, and also understand the true scope of the consequences of salinization for fish species.

Keywords: secondary salinization; behavior; boldness; cerebral lateralization; activity; shoaling cohesion; cyprinids

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