



## **Effects of dam operation on the endangered Júcar nase, *Parachondrostoma arrigonis*, related to mesohabitats, microhabitat availability and water temperature regime, in the river Cabriel (Spain)**

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The presence of large dams affects habitat availability, often regarded as the primary factor that limits population and community recovery in rivers. Physical habitat is often targeted in restoration, but there is often a paucity of useful information. Habitat degradation has reduced the complexity and connectivity of the Mediterranean streams in Spain. These changes have diminished the historical range of the endangered Júcar nase, *Parachondrostoma arrigonis* (Steindachner, 1866), isolated the populations of this species, and probably contributed to its risk of extinction.

In the Júcar River basin (Spain), where this fish is endemic, the populations are mainly restricted to the river Cabriel, which is fragmented in two segments by the large dam of Contreras. In this river, 3 main lines of research were developed from 2006 to 2008, i.e., microhabitat suitability, mesohabitat suitability, and water temperature, in order to relate such kind of variables with the flow regime. The main goal of the research project, funded by the Spanish Ministry of Environment, was to detect the main reasons of the species decline, and to propose dam operation improvements to contribute to the recovery of the species. The flow and water temperature regimes were also studied in the river Cabriel, upstream and downstream the large dam of Contreras.

During the three years of study, below the dam it was observed a small and not significant variation in the proportions of slow and fast habitats; the regulated flow regime was pointed out as the main reason of such variations. At the microhabitat scale, optimal ranges for average depth and velocity were defined; these data allowed us to develop an estimation of weighted useable area under natural and regulated conditions. The Júcar nase were found majorly at depths no greater than 1,15 meters with slow water velocities. It was possible to observe a clear alteration of the flow and water temperature regime below the dam, due to the cold water release during the summer months (maximum discharge) for irrigation in the Valencian Region. The temperature effect was partially mitigated by the presence of natural springs. The results in these three lines of research supported the proposal of management actions, such as the implementation of an environmental flow regime, with anticipated releases more coincident with the natural flow regime, and previous to the fish migration for spawning, and therefore smaller discharges during the summer.