



Abstract

# Guadiana Nase (*Pseudochondrostoma willkommii*) Reproduction in Still Water <sup>†</sup>

Paloma Moreno <sup>1,\*</sup>, Juan Carlos Ramírez <sup>1</sup>, Guadalupe de la Cruz <sup>1</sup> and José Martín-Gallardo <sup>2</sup>

<sup>1</sup> Vegas del Guadiana Aquaculture Centre, Gestión Pública de Extremadura, 06011 Badajoz, Spain; juancarlos.ramirez@gpex.es (J.C.R.); guadalupe.delacruz@gpex.es (G.d.l.C.)

<sup>2</sup> Plant Biology, Ecology and Earth Science Department, Science Faculty, University of Extremadura, 06006 Badajoz, Spain; jomarga@unex.es

\* Correspondence: paloma.moreno@gpex.es; Tel.: +34-924012950

<sup>†</sup> Presented at the IX Iberian Congress of Ichthyology, Porto, Portugal, 20–23 June 2022.

<sup>‡</sup> Presenting author (oral communication).

**Abstract:** *Pseudochondrostoma willkommii*, called Guadiana nase in the Iberian Peninsula, is an endemic cyprinid that lives in the middle stretches of rivers and is also common in still water. According to the literature, spawning occurs in April, after upstream migration while looking for shallow waters with a current and coarse substratum. There are no previous studies about captive breeding of this species, even though it has been a common species in the Guadiana River basin for years. Now, Guadiana nase populations are declining due to allochthonous fish introductions, river fragmentation, and pollution. The main objective of this study was the natural reproduction of *Pseudochondrostoma willkommii* in captivity. Guadiana nase captive breeding was started in 2017 at the Vegas del Guadiana fish farm; fish were captured in the wild by electrofishing and kept in spawning ponds with a natural photoperiod and temperature regime, with spawning substrates and without previous hormonal treatment. Guadiana nase spawned in captivity beginning in the first year. Spawning took place in still water, using the coarse substratum areas; no current was provided in the pond. It started in March and continued in April; at least two batches of larvae were recorded. The number of fingerlings was quite variable in different years; final juvenile fish densities ranged from 1.78 to 90.39 fish/m<sup>3</sup> and were not correlated with the initial number of spawners. Better results were obtained the sooner we introduced spawners to the pond, which enabled proper acclimatization and more complex habitat conditions. Spawners gathered in groups, except in the ponds with the lowest densities, where they were never in groups and showed agonistic behavior. This agonistic behavior did not affect reproduction success.

**Keywords:** cyprinid; reproduction; nase; captive breeding



**Citation:** Moreno, P.; Ramírez, J.C.; de la Cruz, G.; Martín-Gallardo, J. Guadiana Nase (*Pseudochondrostoma willkommii*) Reproduction in Still Water. *Biol. Life Sci. Forum* **2022**, *13*, 97. <https://doi.org/10.3390/blsf2022013097>

Academic Editor: Alberto Teodorico Correia

Published: 15 June 2022

**Publisher's Note:** MDPI stays neutral with regard to jurisdictional claims in published maps and institutional affiliations.



**Copyright:** © 2022 by the authors. Licensee MDPI, Basel, Switzerland. This article is an open access article distributed under the terms and conditions of the Creative Commons Attribution (CC BY) license (<https://creativecommons.org/licenses/by/4.0/>).

**Author Contributions:** Conceptualization, P.M.; methodology, P.M. and J.C.R.; formal analysis, P.M.; investigation, P.M.; resources, P.M., J.C.R. and G.d.l.C.; data curation, P.M. and G.d.l.C.; writing—original draft preparation, P.M.; writing—review and editing, P.M. and J.M.-G.; supervision, J.M.-G. All authors have read and agreed to the published version of the manuscript.

**Funding:** This research was funded by FEADER grant number 202012AGE035.

**Institutional Review Board Statement:** Ethical review and approval were waived for this study, due to no manipulation of normal reproductive behaviour, natural breeding and routine fish farms practices have been carried out.

**Informed Consent Statement:** Not applicable.

**Data Availability Statement:** Ichthyological database. Junta de Extremadura (Regional Government of Extremadura).

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