

New record of translocated *Phoxinus bigerri* Kottelat, 2007 from a river basin in the North-West Atlantic coast of the Iberian Peninsula

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Abstract

This paper provides the first report of the Pyrenean minnow *Phoxinus bigerri* in a small coastal river, which flows into the Atlantic coast of Galicia (NW Spain), as well as basic biometric and population data. The high density found in this survey, in addition to the presence of both young-of-the-year and the six brightly coloured males showing clear spawning characteristics, all indicate that this fish species is naturalized in the area.

Key words: Pyrenean minnow, Galicia, translocated species, density, biomass

Introduction

Minnow populations from the Iberian Peninsula were considered as *Phoxinus phoxinus* (Linnaeus, 1758) (e.g. Doadrio 2001) until the recent systematic revision conducted by Kottelat (2007), that renamed these populations as *P. bigerri*. Kottelat and Freyhof (2007) warn that the identification of the Iberian minnow populations as *P. bigerri* is tentative, as Kottelat (2007) did not analyze samples from Iberia. However, in a recent international standardization of common names of Iberian endemic freshwater fishes, Iberian minnow populations have been renamed as Pyrenean minnow *Phoxinus bigerri* Kottelat, 2007 (Leunda et al. 2009). The species is considered to be endemic to the Adour (SW France) and Ebro (NE Spain) basins, as well as some small watersheds in North Spain (Kottelat 2007; Kottelat and Freyhof 2007). Available data on its present distribution in Spain show that this species has been translocated to the Duero River and some Northern basins, probably as a consequence of its use as live bait or even to provide forage fish

for brown trout (Doadrio 2001; Elvira and Almodóvar 2001). Indeed, recent work on non-indigenous freshwater species (NIFS) in the Iberian Peninsula consider this species as invasive (Leunda 2010).

Galicia is the region located in the NW part of the Iberian Peninsula (Figure 1). Introduction of NIFS in the area is recent when compared to the rest of the peninsula, although Cobo et al. (2010) have shown a steep increase in introductions in the last decades. Until now *P. bigerri* was known to be present in Galicia only in the Navia river draining to the Bay of Biscay (northern Galicia) (Hervella and Caballero 1999), forming a *continuum* in its Northern distribution (Doadrio 2001).

During a recent survey of freshwater fish in water bodies of the region, we found an established population of *P. bigerri* in a small coastal river draining to the Atlantic in the west coast of Galicia (A Chanca River). Thus, the aim of this work is to provide data on the present status of the species in this new location, offering both biometric and population data.

Figure 1. Distribution of *Phoxinus bigerri* in the Iberian Peninsula after Doadrio (2001) (Reproduced with permission of the author). Asterisk indicates new location described in this study.

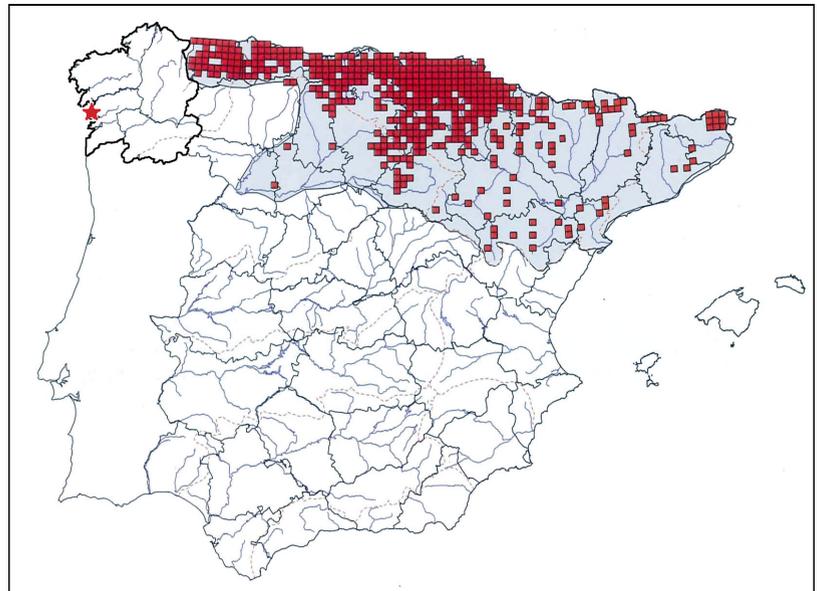


Figure 2. Adult male of *Phoxinus bigerri* captured at the A Chanca River (Photograph by Dr. Rufino Vieira-Lanero).



Figure 3. Head tubercles of an adult male of *Phoxinus bigerri* (Photograph by Dr. Rufino Vieira-Lanero).

Materials and methods

The A Chanca River (Figure 1, A Chanca, Pontevedra, UTM: 29T 515141 4699269 (Datum ETRS89)) is a small stream that flows into the Ramsar site Umia-O Grove intertidal complex, an important wintering area for shorebirds. Sampling was undertaken on a 12 m long and 3.4 m wide section located about 1 km upstream from the river mouth. Multiple-pass or depletion electrofishing, with three electrofishing passes, was conducted. Individuals ($n = 704$) were collected using pulsed D.C. backpack electrofishing equipment (Hans Grassl GmbH, ELT60II) on the 28th of July 2011. After the

capture, individuals were measured to the nearest 1 mm and weighed to the nearest 0.01 g. Six brightly coloured males (Figure 2) were captured showing clear spawning characteristics such as reddish pectoral and pelvic fins and head tubercles (Figure 3).

Condition factor (CF) for each fish was calculated using the formula $CF=100W/L^3$, where W is the wet weight (g) and L is the fork length (cm) of each individual. Length-weight relationship was calculated using the equation $W = aL^b$, where W is the total weight in g, L the total length in cm, a the coefficient related to body form and b an exponent indicating isometric growth when equal to 3. The

parameters a and b were estimated by linear regression of the transformed equation: $\log W = a + b \times \log L$. The statistical significance level of r^2 was estimated, and the b -value for *P. bigerri* was checked to verify if growth was different from the isometric ($b = 3$). When the value of b is other than 3, weight increase is allometric (positive allometry if $b > 3$, negative allometry if $b < 3$) (Ricker 1975). We used the Moran-Zippin's method (Zippin 1958; Seber and Le Cren 1967) for estimating density and followed Leslie and Davis (1939) for estimating biomass, according to depletion estimation techniques.

Results

Length of the individuals varied between 1.6 and 9.2 cm, with a mean \pm SE value of 4.89 ± 0.064 cm, while weight varied between 0.02 and 10.18 g, with a mean value of 2.09 ± 0.062 g.

Condition factor varied between 0.33 and 3.38, with a mean value of 1.29 ± 0.010 . Length-weight relationship was significant ($\log W = 1.9795 + 3.1262 \log L$; $r^2 = 0.973$, $p < 0.001$), showing positive allometric growth ($b > 3$). Density and biomass was 16.27 ind./m^2 and 34.01 g/m^2 respectively.

Discussion

This is the first record of *Phoxinus bigerri* in rivers of the Atlantic Coast of the Iberian Peninsula, and our data on length-weight relationship are in accordance with previous results by Oscoz et al. (2005), Leunda et al. (2006) and Miranda et al. (2006) for populations of Northern Spain.

Although translocation of native fishes is an unusual practice in Spain (Elvira and Almodóvar 2001), recent studies on freshwater fishes in the region revealed the spread of other translocated species from the Iberian Peninsula (Cobo et al 2010 and references therein). In the present work we did not study the effects of *P. bigerri* on other sympatric fish populations, however the high density found, the presence of young-of-the-year in the sample and the finding of six brightly coloured males showing clear spawning characteristics provide evidence that this fish species can be considered as naturalized in the area. Future surveys in nearby river sections will be needed to demonstrate that *P. bigerri* is spreading and considered to be invasive.

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