

## First record of the Asian clam *Corbicula fluminea* (Müller, 1774) in the Guadiana River Basin (southwestern Iberian Peninsula)

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### Abstract

The paper presents the first record of *Corbicula fluminea* (Müller, 1774) in the Guadiana River Basin (Iberian Peninsula). This exotic bivalve was found in June 2006 on the Lacarón and Guadiana rivers with mean density is between 3.3 and 16.9 individuals per squared meter. Population structure and the dates of the first records suggest that the introductions may have occurred between 2003 and 2004. The potential impact of the invasion on native freshwater bivalves is discussed along with the need for monitoring and prevention of further introductions of non-indigenous bivalves in the Iberian Peninsula.

*Key words:* *Corbicula fluminea*, invasive species, Guadiana River Basin, Iberian Peninsula

Recently two exotic species of freshwater bivalves, both from Southeast Asia, have been introduced into Iberian inland waters. The zebra mussel *Dreissena polymorpha* (Pallas, 1771) was first reported in Spain from the Ebro River basin, in the early 1980's (Altaba, 1992). *Corbicula fluminea* (Müller, 1774) (Figure 1) was found for the first time in Iberian waters in 1980 in the Tagus River estuary (Mouthon, 1981). Later, the species was reported from the Douro River, Oporto, Portugal (Nagel 1989) as well as the Miño and the Douro rivers, Spain (Araujo et al. 1993). Both species are considered potential invasives because, they are characterized by early sexual maturity, high reproductive potential and a remarkable ability to adapt to the environments they colonize (Darrigran 1997). Such characteristics allow exotic bivalves to disperse quickly in great numbers (Darrigran and

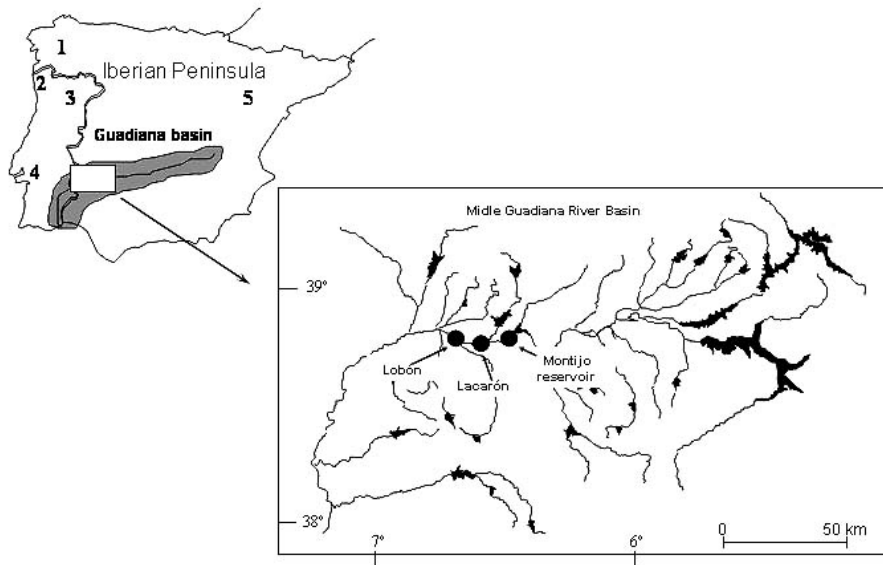


**Figure 1.** *Corbicula fluminea* specimens from the Lacarón site (photo: J.L. Pérez-Bote)

Pastorino 1995). Their entry in the Iberian Peninsula most probably occurred via trading ships from Southeast Asia. In North America, *C. fluminea* has been spreading throughout rivers since 1924, having been imported as a food item by Chinese immigrants (McMahon 1982).

Casual observations of the presence of *C. fluminea* were made in June 2006 at several locations on rivers of the middle Guadiana basin (Extremadura Region, Spain: Lacarón: 6°26'W, 38°52'N; Montijo reservoir: 6°25'W, 38°55'N; Lobón: 6°37'W, 38°51'N, see Figure 2, Annex 1). At the Lacarón River, a quantitative survey of their density was carried out in two 100m x

100m areas. Random coordinates were chosen at which a sample of sediment (n= 10) from the river bottom was collected using an Ekman dredge that samples approximately 0.06 m<sup>2</sup> of sediment. The sediment was sieved by using a 1 mm<sup>2</sup> mesh size and the bivalves that were removed were counted and measured. Mean density (number of Individual's m<sup>-2</sup>) was estimated from the data. Shells were measured for anterior-posterior length using a digital caliper and length frequency distributions were constructed. The age of specimens was evaluated by using the age/length data from Cataldo and Boltovskoy (1998).



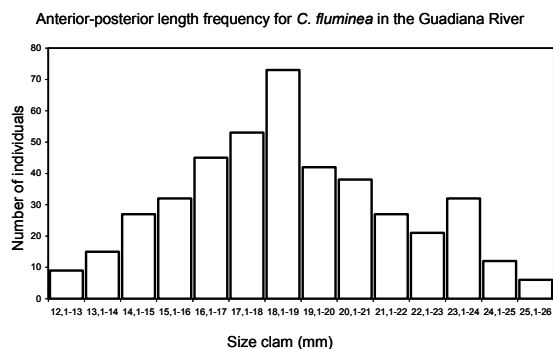
**Figure 2.** Map of the Guadiana River basin with localities where the Asian clam *Corbicula fluminea* was detected. Other localities in the Iberian Peninsula are indicated by numbers: 1, 2, Miño Basin (Araujo et al. 2003); 3, Douro Basin (Nagel 1989); 4, Tagus estuary (Ituarte 1981); Ebro Basin (Zapata et al. 2006) (see also Annex 1)

The Asian clam size frequency distributions at Lacarón site is shown (Figure 3). The population (n= 432) is composed of shells ranging from 12.53 to 25.72 mm in length with a modal size class of 18.1-19 mm. The approximate age distribution of each sample shows that the most of the individuals from the Lacarón sample (85.18%) are less than one year of age whereas the remainder (14.82%) is made up of one-year-old individuals. Based on these age estimates and the dates of first records, the introduction of *C. fluminea* in the Guadiana River Basin may have

taken place as recently as 2003 or 2004. On the Guadiana River, *C. fluminea* was found together with native bivalve species [*Unio pictorum* (Linnaeus, 1758)] at the vicinity of mouth of the Lacarón River in the Guadiana River in June 2005. No density or population structure data are available yet for the latter location, however it appears that, at these locations, native bivalves are very scarce.

The effects of exotic species on mollusks in the Iberian Peninsula freshwater ecosystems may be going unnoticed because of the lack of

information on the distribution and abundance of the native fauna itself. However the decline of some bivalves as *Margaritifera auricularia* (Spengler, 1793) is partially attributed to the presence of zebra mussel, *Dreissena polymorpha* (Araujo and Ramos 2000). *C. fluminea* does not foul native bivalves in the same way that the zebra mussel (Ricciardi et al. 1998) do but it has potential to compete with adult and juvenile bivalves for space and food.



**Figure 3.** Asian clam size frequency distribution at Lacarón site

According to our data, as well as taking into the consideration previous investigations (for example: Altaba 1992; Mouthon 1981), the recent introductions of exotic bivalves to Iberian Peninsula should give rise to concern. There is an urgent need to monitor freshwater bivalves in order to determine the status of native species and possible impact of non-indigenous taxa.

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**Annex 1**Records of *Corbicula fluminea* in the Guadiana River Basin and other localities in the Iberian Peninsula

Location	Record coordinates		Record date	Species abundance, individuals	Collector/Ref.
	Latitude, °N	Longitude, °W			
Lacarón	38°52'	6°26'	June 2006	high	J.L. Pérez-Bote
Montijo reservoir	38°55'	6°25'	June 2006	high	J.L. Pérez-Bote
Lobón	38°51'	6°37'	June 2006	high	J.L. Pérez-Bote
Miño Basin	41°57'	8°44'	June 1990	-	Araujo et al. 1993