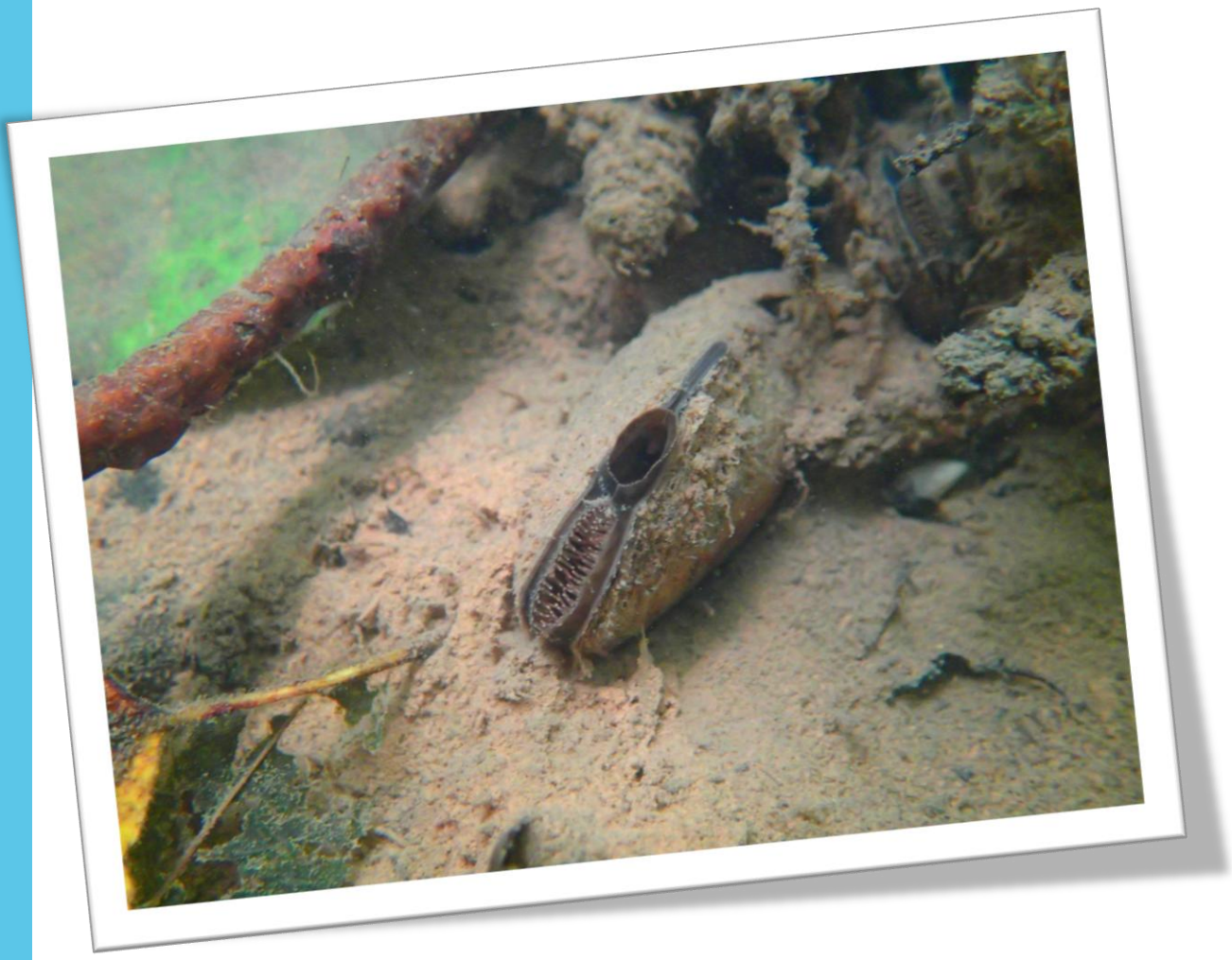
LIFE
Potamo
Fauna

LIFE12 NAT/ES/001091

"Conservation of river fauna of Community interest in the Natura 2000 network sites of Ter, Fluvià and Muga river basins"



THE NAIAD (*Unio elongatulus / U.mancus & U.ravoisieri*)

December 2017

CHARACTERISTICS

It has the typical aspect of a river mussel with an elongated and oval shape of up to 115 mm in length and slightly trapezoidal.

It has a brownish color with yellowish tints and some green areas, and the inner part is black

In the area of the hinge, it externally presents rows of small tubers and internally there are some characteristic teeth that are also helpful for its identification

Unio elongatulus

The forward part of the body is more rounded, while the back end shows a kind of beak

It is difficult to differentiate the two species

It is a bivalve mollusk, with two cloves, and has a lot of variability in shapes, some more elongated, more rounded, and also the clove can be thinner or thicker depending on the habitat where it lives

Externally, concentric rings of different thicknesses can be observed, which indicate the growth rings of the naiad clove

They usually live partially buried in the sediment, where they are closed thanks to a very powerful muscular foot. When they fed the slightly open themselves, allowing two siphons to be seen with some papillae where they aspire and expel the filtered water

Feeding and reproduction

Naiads are specially filtering animals that capture particles of organic matter, bacteria and phytoplankton of water. This filtration mechanism becomes a natural system for the purification of our rivers and ponds, but also makes them very sensitive to episodes of serious contamination.

They have a vital function for the nutrient dynamics of ecosystems and help to oxygenate the sediment. Its life cycle is very unique, presenting a parasitic phase of a fish. The females release microscopic larvae, called *gloquids*, and they need to stick to the gills of a fish host to be able to develop and mature until the form of juvenile. Fish do not suffer from the presence of larvae. Not all fish can be parasite with success. In the case of *Unio* genus naiads, local autochthonous fishes from the Ter and Fluvià basin are known as the *Barbus meridionalis*, the *Squalius laietanus* and the *Salaria fluviatilis*. After 10-30 days, the larvae come out of the fish and falls into the sediment where the juvenile grows up to its adult form, being reproductive individuals at 4 years. The naiads have high longevities of up to 30 years when the conditions are appropriate.

Unio elongatulus

Unio elongatulus

HABITAT

Naiads live buried or half buried in muddy, sandy or gravel beds, of rivers, ponds and other bodies of water. Although they can make remarkable movements in a short time, they tend to diminish very close to the habitats where young individuals have recruited, if they are suitable.

The naiads of the *Unio* genus show the best populations in well-preserved rivers of medium-sized mountains or floodplains. They can still be very abundant in sections with a good configuration of the riverside forest, where they tend to occupy the shores of the riverbed, preferably living among the roots permanently flooded with riverside trees, especially alder trees (*Alnus glutinosa*). The best population of *Unio mancus* that is currently known in Catalonia occupies a well preserved section of the middle course of the Llémena river, with an excellent alder forest. In turn, the best population of *Unio ravoisieri* is located in an ecologically similar stretch of the lower course of the Ser river.

However, some naiads populations of the *Unio* genus are located in irrigated landfills, drainage channels or bypass channels, provided that the riverbed is natural, and that they are managed so that there are no serious impacts, such as recurrent droughts, dredged from the bottom or persistent dump. In fact, in Catalonia, more populations of these naiads are found located in crevices than in river sections. Even more, in some basins or sectors, there are only populations in this type of artificial water mass, where a stable shelter has been found. This is the case of the Fluvià and Brugent rivers, where currently the few remaining populations are located mainly in derivation channels from locks.

A unique habitat occupied by naiads is the Banyoles Lake, where specimens are present throughout their lean bottoms, although *Unio ravoisieri* is currently only present. In addition, some of the outbound streams of the lake also constitute a good shelter for them, mainly in this case of the *Unio mancus* species.

Naiads half buried

Llémena River

Ser River

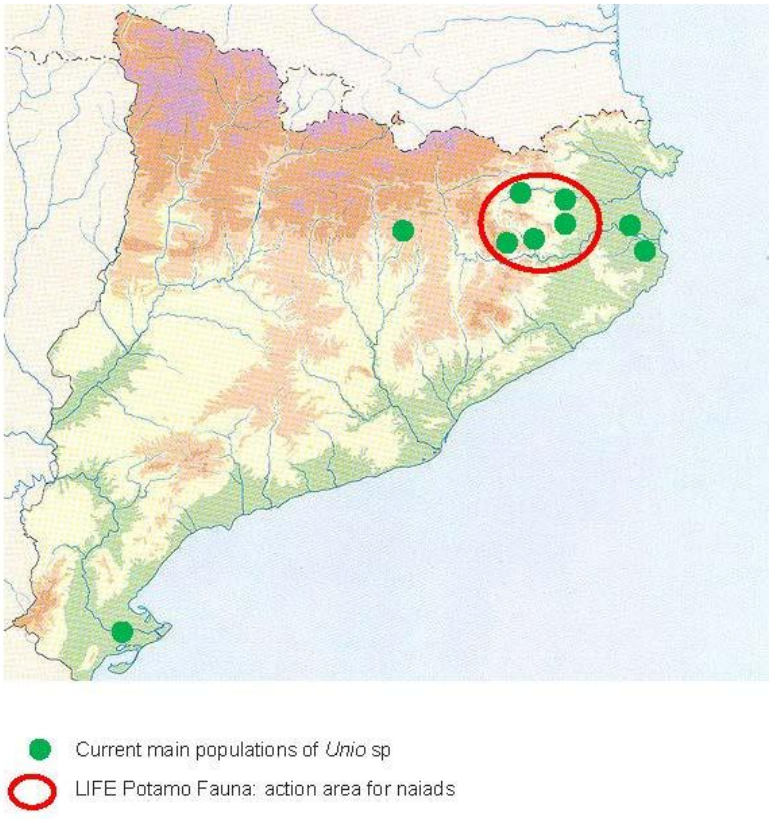
Brugent River

Banyoles Lake

DISTRIBUTION TO NORTH-EAST OF CATALONIA

Did you know that...

Unio mancus and *Unio ravoisieri* are two species of autochthonous naiads in the Iberian Peninsula that appear in Annex II of Council Directive 92/43/EEC of 21 May 1992 on the conservation of natural habitats and of wildlife and the wild flora, better known as the "Habitats Directive", under the name *Unio elongatulus*. Species are also included in the List of Special Species of Special Protection Regimes (LESPRE) of Spain (RD 139/2011), and are also protected by Catalan legislation, specifically by Law 22/2003, of July 4, about the protection of animals.



The naiads of the *Unio* genus had been widely distributed through the rivers of the demarcation of Girona, below 500 meters. In fact, they were present everywhere in all types of water bodies, although probably with a very variable density depending on the characteristics of aquatic habitats. At the moment, however, dispersed and isolated populations are only known in fluvial sections or small masses of water. In addition, most of these populations are very small or are aging because of lack of recruitment, so that their viability is very uncertain.

Unio mancus has a very restricted distribution to the southwest of Europe. In the Iberian Peninsula, it occupies several Mediterranean basins in the North of the Xúquer River.

Unio ravoisieri is well distributed in several Mediterranean basins of North Africa, while in the European continent there is only a small sector in the region of Pla de l'Estany.

THE THREATS

Disappearance of fish guests

Due to its peculiar reproduction system, native populations of the *Unio* genus depend entirely on the status of the populations of the three native fish that are hosts of their parasitic larvae, Catalan Chub *(Squalius laietanus)* Mediterranean Barbel *(Barbus meridionalis*) and River Bassy (*Salaria fluviatilis)*. If these fish disappear or simply they become rare, the naiads cannot reproduce, what brings a situation that if it persists may end up leading to its extinction in a not long period.

Introduction of invasive species

The introduction of invasive species that invades aquatic fauna, especially fish and other mollusks, is currently one of the main threats to the conservation of naiads in the rivers of our country. Exotic invasive fish replaces native species and are not viable hosts for native naiads. In turn, other exotic mollusks such as zebra mussel (*Dreissena polymorpha)*, Asian shell (*Corbicula fluminea*) or Asian naiad (*Sinanodonta woodiana*), can proliferate massively where they are established, competing with autochthonous naiads, or even hanging on death cloves.

Contamination of water

Although they are species that are quite sensitive to water contamination, population of these naiads have been detected in moderately rich-nutrient Rivers. However, it is obvious that one of the main historical causes of regression of these species has been the situations of high or extreme pollution that have been flooded many of the rivers of Catalonia. Although water quality has generally improved in much of the hydrological network, this has not been accompanied by the recovery of populations of naiads, which are still absent from large sectors formerly occupied.

Alteration of river morphology

Due to the habitats they occupy, the naiads are very sensitive to transformative actions of the natural morphology of river channels and channels, and especially to the most aggressive actions with the river environment, such as dredging, flooding, or any other part of the riverside forest.

Water regime and climate change

Naiads are strictly aquatic animals. When rivers dry up they die, just like fish or other fluvial fauna. Unfortunately, as a result of climate change, currently the summer droughts that are observed in many river still occupied by naiads are becoming more severe and prolonged, even drying up sectors that have never dried up to this day.

The Catalan Chub (*Squalius laietanus*), a native host of the larvae of the naiads, is currently in strong regression everywhere

Example of a dumping point, which drastically compromises the quality of water in a river with naiads, the Brugent River

THE PROJECT LIFE POTAMO FAUNA

Within the framework of the European project LIFE Potamo Fauna "Conservation of river fauna of Community interest in the Natura 2000 network sites of the Ter, Fluvià and Muga river basins" one of the objectives of the project has been the recovery and consolidation of two species of naiads (*Unio mancus* and *Unio ravoisieri*) (= *Unio elongatulus*) through different conservation strategies: reproduction in captivity and release of the young specimens produced, population reinforcements by means of translocations of adult specimens and direct infestation of wild fish with *gloquid* larvae.

REPRODUCTION IN CAPTIVITY

This has been carried out at the breeding ground for the Consorci de l'Estany laboratory, which has been expanded to have different production lines for juveniles for the different basins (Ter and Fluvià), to ensure an increase of global productivity. Between 2016 and 2017 4,505 juveniles raised in captivity have been released in 42 different locations. Of these, 27 were created again, in places where there were no naiads. In 15 locations, the existing population was strengthened, which was very small. In 2016, also, a pioneering trial of obtaining juveniles from fishless naiads (Production *in vitro*) was successfully carried out.

STRENGTHS AND POPULATION MONITORING

Another of the works is the translocation of adult specimens and also juveniles of wild naiads to new locations. This technique has been used between 2016 and 2017 in 747 individuals. 90,675 juveniles born in 2017 were also sown. In addition, populations are monitored to know precisely the starting status of the populations within the area of action of the project, as well as to know their evolution over the duration of the project. For example, around 4,500 individuals have been captured or recaptured in the Banyoles area.

FISH INFESTATION

During the project, up to 3,950 fish have been infested with *gloquid* larvae, and then 1,141 of them have been released in the Natural Park of the Volcanic Zone of the Garrotxa. The infested fish have been a Mediterranean Barbel Barb (*Barbus meridionalis*), River Bassy (*Salaria fluvialitis*) and Catalan Chub (*Squalius laietanus*).

More information about the Naiads:

- Naiads in Catalunya
- Mapama *Unio elongatulus*
- Naiads of the Península Ibèrica
- Mapama vulnerable Molluscs
- Sociedad española de Malacología
- Associació catalana de malacologia
- ADEFA Camadoca
- Naiads of the Parc Natural Zona Volcànica de la Garrotxa

LIFE Potamo Fauna (LIFE12 NAT/ES/001091)
Project duration:
1 January 2014 – 31 December 2017
Total cost and EU contribution:
TOTAL – 1.900.262,00 euros / UE – 949.981,00 euros

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