

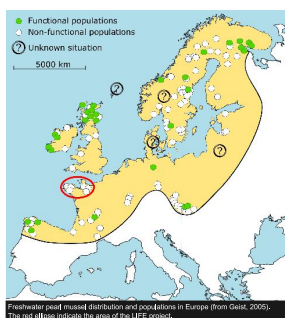
Which practical measures for Freshwater Pearl Mussel populations conservation in Brittany (France) ?

Programme LIFE+ NAT FR 000583 / 1st September 2010 - 31st August 2016



Six rivers located in the north-west of France are known to still shelter the main population of Freshwater pearl mussel (*Margaritifera margaritifera*). All these six populations are still reproducing but are only potentially functional and will, without assistance, disappear in the near future.

Therefore within a LIFE+ Nature project established by the European Commission and government agencies, a rearing station was built in order to save these populations. To achieve this goal, actions are undertaken to unite and educate river stakeholders and environmental restoration managers, to improve our knowledge of the species and finally, to be able to ensure the continuity of the actions performed during the project.



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Meeting : Practical measures aimed at Freshwater Pearl Mussel conservation

Letterkenny, Ireland
15 February 2013

1. Recover a favourable environment for freshwater pearl mussels

Quality of freshwater pearl mussel habitats is improved by encouraging river managers to help with the implementation of measures on short-term (set up fences, riverbank stabilization, control of farms, etc.), but also on medium-term (e.g. land acquisition). Increased public awareness with habitat issues is also very important : river's managers, fishermen and farmers from watershed, as well as general public.

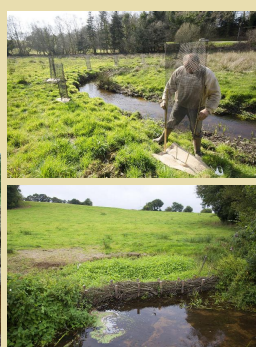
The context of the six rivers is very different and threats for freshwater pearl mussel populations are not the same on each catchment. Then, out of the LIFE programme, the means to recover a favourable environment for the mussels are also different (Tabl. 1).

Tabl. 1. Restoration actions to recover a favourable habitat for freshwater pearl mussel populations

River	Restoration actions
Bonne-Chère	Restoration controlled by the Syndicate of the Bonne-Chère valley. Nature 2000 contracts (Natura 2000 Reserve). Fishing Federation of Finistère department.
Elze	Nature 2000 contracts (Natura 2000 Reserve). Fishing Federation of Finistère department.
Loch	Nature 2000 contracts (Natura 2000 Reserve). Fishing Federation of Finistère department.
Airois	Nature 2000 contracts (Natura 2000 Reserve). Fishing Federation of Finistère department.
Rouvre	Restoration controlled by the Syndicate of the Rouvre river. Nature 2000 contracts (Natura 2000 Reserve). Fishing Federation of Finistère department.
Sarthon	Restoration controlled by the Normandie-Normandie National Nature Reserve - Natura 2000 contracts (Normandie-Normandie National Nature Reserve).



From top to bottom and left to right : Concrete bridge construction for trout's migration • Tree plantation for shade and bank protection • Willow weaving for river bank protection (problems of cattle trough)



From top to bottom and left to right : Concrete bridge construction for trout's migration • Tree plantation for shade and bank protection • Willow weaving for river bank protection (problems of cattle trough)

2. Assess and monitor the environment

The physico-chemical quality of the water, quality of the habitat, substrate, the status of host-fish are monitored. All these parameters are contributing 1) to characterise mussel environment and 2) to look for reinforcement area of young reared mussels.

Water parameters

Manual measures are done every month in water near freshwater mussel populations. The multiparameter Hanna HI 9828 (Hanna instrument) records 3 different parameters (among others) : pH, conductivity and dissolved oxygen. A sensor, HOB0167, records temperature each hour. Nitrate N-NO3 and Orthophosphate P-PO4 samples are analysed by a laboratory. In 2011 and 2015, 20 pesticides molecules are searched by a laboratory (sample after more than 10 mm of rain in 24 h).

Substrate parameters (Geist & Auerwald, 2007)

A multiparameter WTW 3110 with a Pt probe and an Ag/Cl reference probe is used to measure the red-ox potential (Eh) at different depth (0, 5, 10 cm) in order to record the substrate oxygenation (Fig. 1). A pocket penetrometer (0-500 kN/m²) is also used with adapted discs to measure substrate resistance.

Environment

Biological quality is measured twice during the project, in 2011 and 2014, using 2 indicators : the "Normalized Global Biologic Index" (IBGN in French) and the "Biogenic Aptitude Ratio" (Cbt in French). Both of these indicators use the invertebrate population composition to assess the environment quality.

Host-fish population

Electrofishing is done each 2 years (2011, 2013 and 2015) to monitor host-fish populations (*Salmo trutta labrax*) on freshwater mussel populations.

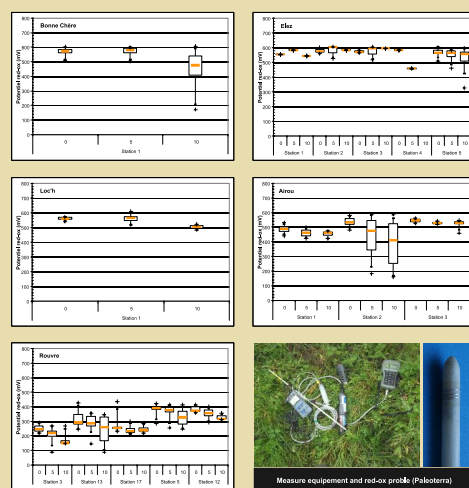


Fig. 1. Box-whisker plots (Whisker: 0.05 and 0.95 percentiles; Box: 0.25 and 0.75 quartiles) of depth profiles for red-ox potential in the free flowing water and at 5 and 10 cm depth in 2011 and 2012.

3. Maintain and support existing populations

1. Harvesting glochidia

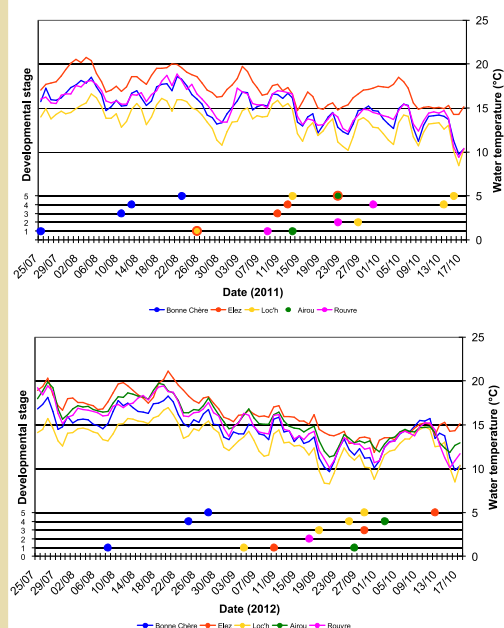


Fig. 2. Developmental course of glochidia of 5 freshwater pearl mussel populations (Bonne-Chère, Elze, Loch, Airois and Rouvre) in 2011 and 2012. Date: occurrence of respective larval stage. Solid line: average water temperature in the respective year (adapted from Schoder et al. 2011).

2. Rearing young mussels

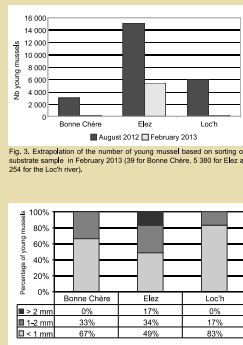


Fig. 3. Extrapolation of the number of young mussel based on sorting of a substrate sample. In February 2013 (39 for Bonne-Chère, 5 380 for Elze and 254 for the Loch river).

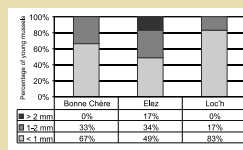
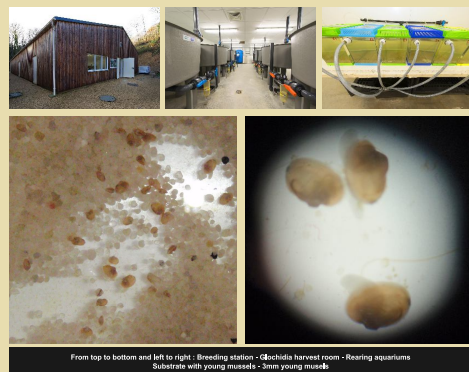


Fig. 4. Average size of the young mussels in February 2013.



From top to bottom and left to right : Breeding station • Glochidia harvest room • Rearing aquariums Substrate with young mussels - 3mm young mussels

3. Reinforcing populations

At the end of summer 2012, young mussels of 3-4 months old were released directly on adequate river substrate : around 5 millions for Elze and 2 000 for Loch. Some of them were kept in sheet cages (Buddensiek, 1995) with a 150µm mesh : 48 holes per cage and one mussel per hole. Results are not available at the moment.

In 2013, we would like to test a capsule successfully used for salmon eggs (Dumas & Marty, 2006).



From left to right : Home made sheet cage • 1mm reinforced young mussel • Capsule

Bibliography

- Dumas J. & Marty S. 2006. A new method to evaluate egg-to-ry survival in salmonids, trials with atlantic salmon. *Journal of Fish Biology*, 68: 284-304.
- Geist J. 2005. Conservation Genetics and Ecology of European Freshwater Pearl Mussels (*Margaritifera margaritifera* L.). Dissertation PhD. Technische Universität München, Germany. 121 p.
- Geist J. & Auerwald K. 2007. Physicochemical stream bed characteristics and recruitment of the freshwater pearl mussel (*Margaritifera margaritifera*). *Freshwater Biology*, 52: 2209-2216.
- Schoder C., Gumpinger C. & Csar D. 2011. Application of a five-stage field key for the larval development of the freshwater pearl mussel (*Margaritifera margaritifera* Linné, 1758) under different temperature conditions - A tool for the approximation of the optimum time for host fish infection in captive breeding. *Ferraria*, 64: 13-22.

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