



Water pennywort

(*Hydrocotyle ranunculoides*)

Managing water pennywort in the village of Beaumont-Pied-de-Bœuf (Sarthe)

Loir-Lucé-Bercé intermunicipal board (CCLLB)

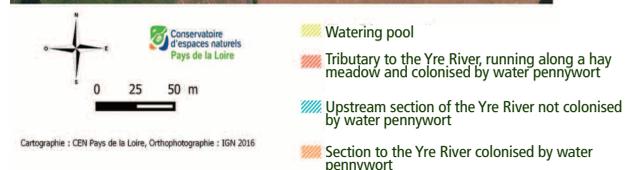
- The CCLLB covers a territory with over 25 000 inhabitants in 24 towns, including Beaumont-Pied-de-Bœuf where the first cluster of water pennywort in the Sarthe department was found.
- The CCLLB has been in charge of managing aquatic environments and flood prevention (GEMAPI) since the first of January 2018 and recently launched an initial diagnostic study of its territory which includes the northern tributaries to the Loir River in the Sarthe department.
- The CCLLB was assisted, in the framework of the "Early detection - Fast reaction" system of the IAS (invasive alien species) network set up by the Pays-de-la-Loire region, by the Pays-de-la-Loire nature conservatory (CEN) and the National Botanical Conservatory in Brest (CBNB) in managing this initial colony.
- Contact : Guillaume Chapin, Gemapi technician - guillaume.chapin@loirluceberce.fr

Pays-de-la-Loire nature conservatory (CEN)

- Since 2016, the Pays-de-la-Loire nature conservatory (CEN) has been the leader of the Pays-de-la-Loire IAS regional network, the first such regional network created in France (2001) to enable the stakeholders involved in IAS issues to discuss how to manage IASs.
- Its main mission is to organise the network and to pool the available expertise in view of managing IAS issues in conjunction with the national IAS strategy and the strategy implemented by the Loire-Bretagne river basin.
- The CEN implements an action programme in close conjunction with an array of partners.
- It is the regional IAS coordinating entity and provides nature managers and local governments with operational solutions by pooling expertise and means on the regional level.
- Contacts : Guillaume D'hier - g.d-hier@cenpaysdelaloire.fr ; Emmanuel Leheureux - e.lheureux@cenpaysdelaloire.fr



© CEN Pays de la Loire



1 - Intervention site.

National botanical conservatory in Brest (CBNB)

- The CBNB provides the Pays-de-la-Loire CEN with technical and scientific assistance in leading the IAS regional network.
- It drafts detailed alert documents intended to facilitate the identification and reporting of emergent IAS plants by people in the field and assists in setting up rapid management procedures.
- It assisted in the current project during the inspections to identify the water pennywort and in setting up the management protocols for the invasive species.
- Contact : Dortel Fabien - f.dortel@cbnbrest.com



Intervention site

- The site is located in the village of Beaumont-Pied-de-Bœuf (Department 72), at the place called Pied-de-Bœuf.
- The cluster of water pennywort was situated in the upper river basin of the Loir River, in the Yre River. It covered a distance of 230 metres, plus another 70 m in a tributary stream that constitutes the most upstream colonised section.
- The species was detected and identified in the beginning of August 2018 by a volunteer agent for the CBNB. The water pennywort was the dominant species over the entire distance of the site and even covered the entire width of the river in some sections. At the site, the Yre River runs along pastures and there is a ford for the cattle to cross. The cattle can also access the river via two watering pools created by the farmer.
- The colony of water pennywort was located near the "Narais, Bercé, Dinan" Natura 2000 zone. The site was the only site colonised by water pennywort upstream of the town of Château du Loir. Some downstream sections of the Yre River to the point of confluence with the Loir River are not conducive to colonisation by water pennywort (fast currents, continuous riparian vegetation).

Disturbances and issues involved

- A colony of *Hydrocotyle ranunculoides* can have highly negative impacts on biodiversity. The river banks are home to a succession of diversified vegetation with a high level of species richness (strings of wet meadows, megaphorbia, sedge wetlands and pioneer reed beds comprising yellow iris). In the water, they are replaced by "floating meadows" of watercress, wideleaf water parsnip and fool's watercress, as well as by beds of horned pondweed. Together, they constitute a favourable habitat for the southern damselfly (*Coenagrion mercuriale*), a species protected on the national level, listed in Annex 2 of the European Habitats directive, but also a decisive ZNIEFF species in the Pays-de-la-Loire region and recently observed on the intervention site. The replacement of the existing communities by a single-species colony of water pennywort would represent a considerable loss of diversity for the environment and could threaten the southern damselfly. * This was the first colony located in the upper section of a river basin in the Pays-de-la-Loire region. The other known colonies are located near the Atlantic coast and in the Loir Valley. It is an emerging species in the region and the clear objective was to avoid colonisation of virgin territories and its permanent installation.
- A development of the species could have significant socio-economic impacts in various sectors:
 - some farmers are already familiar with the negative impacts of certain IASs such as water primrose on yields (Brière marshes). If a new IAS were to colonise the area, the agricultural land could simply be abandoned;
 - dispersal of water pennywort via hydraulic vectors must be taken into consideration because management costs could rise steeply if the species were to spread widely;
 - if the species were to proliferate, it could hinder and even render impossible recreational activities (fishing, water sports and activities, etc.) on the Yre River and further downstream on the Loir River.



2 - Meadow along the Yre River at the intervention site.

Interventions

■ Discussions with the local partners

■ A technical committee (Cotech) was rapidly set up by the CEN in order to assess the risks, communicate on the management objectives and establish an operational plan of action. The committee includes the Sarthe Departmental Council, the Departmental Territorial Directorate (DDT), the French Biodiversity Agency (OFB), the Chamber of Agriculture, the CCLLB, the land owner, the farmer, the mayor of Beaumont-Pied-de-Bœuf, the CEN, the CBNB, the Loir Public River-basin Territorial Agency, the Loire-Bretagne Water Agency and the Fishing Federation (FDPMA 72).

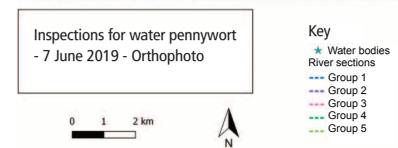
■ Objectives

■ The objective on all the colonised sites was to uproot all detected water pennywort, including the stolons, i.e. eradicate the plant in order to preserve the wet and floating meadows on the site. To attain that objective, it was necessary to:

- gain knowledge on the dispersion zone of water pennywort in order to confirm its effective installation on the site;
- avoid its dispersal downstream in the river and generally in the river basin;
- avoid the growth/dispersal of plant cuttings;
- push back against the forward edge of the colonised zone and if possible totally eradicate the species on the intervention site.

■ History

The river was inspected over a distance of 20 kilometres. It was divided into five sections, each 3 to 6 km long, and inspected by teams of two people.



3 - Removing the nets intended to catch any fragments and cuttings following uprooting of plants.

4 - Map of the area inspected for water pennywort. (Source: PdL CEN)

Table 1. List of events.

2018	August	Species reported by the CBNB. Activation of the "Early detection - Fast reaction" system for inspection and definitive identification of the species by the CBNB and the CEN.
	December	Cotech meeting
2019	May	Drafting of the management protocol subsequently approved by the French Biodiversity Agency (OFB) and the Departmental Territorial Directorate (DDT). Inspections to precisely determine the distribution zone of the water pennywort, starting from the village of Beaumont-Pied-de-Boeuf downstream to the town of Château du Loir, then along the Loir River to the town of Vaas. No other clusters were detected.
	June	Manual uprooting and stripping of the heavily colonised sectors in Beaumont.
	July	Second uprooting operation to remove all visible plants, followed by an inspection to eliminate any new sprouts.
	August	Installation of an electric fence to block access of cattle and wild animals to the river. Inspections and uprooting of sprouts, discovery of a few plants 100 metres downstream of the known cluster.
	September	New inspections downstream over a distance of 10 km. No observations of the species. Inspections on the intervention site and uprooting of sprouts.
	October	Inspections and uprooting.
	November	Inspections and uprooting.
2020	March	Inspection of the intervention site, one sprout observed and uprooted.
	May	Inspections and uprooting, six sprouts uprooted (rhizomes and stalks 20 to 50 cm long). Inspections to precisely determine the distribution zone of the water pennywort along the Yre and Loir Rivers, down to the town of Vaas. No other clusters were detected.
	June	Monitoring and uprooting, 7-8 sprouts uprooted (rhizomes and stalks 20 to 50 cm long).
	July	Monitoring and uprooting. Discovery of a few sprouts over the entire intervention site.
	August	Monitoring and uprooting. Discovery of a few sprouts over the entire intervention site.
	September	Second Cotech meeting on water pennywort in Beaumont. Field trip (no sprouts detected) and discussion of future objectives for the plan of action.
	October	Monitoring. Mowing of banks not grazed and trampled in 2020. No sprouts observed.



■ Intervention techniques

■ Installation of nets downstream of the intervention site to catch any fragments of water pennywort carried off by the current:

- prior to uprooting, a net was installed downstream of the cluster to catch any fragments and cuttings;
- a second net was installed between the two parts of the colonised site, i.e. at the confluence of the Yre and its tributary;
- finally, prior to removing the first two nets, a third was installed downstream and left in place for 24 hours to catch a maximum of green waste and avoid the dispersal of fragments and cuttings.

■ Uprooting the beds of water pennywort:

- careful manual uprooting was done progressively from downstream to upstream by removing the leaves without pulling on the stalks, in order not to break the stolons;
- the stolons were then extracted from the mud as completely as possible, though in some cases they did break. Use of a pull fork was occasionally necessary in heavily colonised sectors to remove clumps of soil and reach deeper stolons;
- unfortunately, uprooting using a pull fork is less precise than manual uprooting and other plant species may be unintentionally removed. However, the end effect was negligible because the indigenous species grew back quickly after the work.

■ Precautions taken to avoid dispersal:

- personnel made efforts to avoid trampling colonised sites in order not to disperse the species via their boots;
- all equipment and tools were cleaned after use;
- a fence was installed to block cattle from trampling the colonised sectors. Trampling of the soil by cattle results in an area becoming muddy and conducive to the establishment of water pennywort. It also makes the spread of indigenous species more difficult.

■ Waste management

■ The uprooted water pennywort was removed from the site and transported in a dump truck covered with a tarp to a composting unit.

Results and costs

■ 2019

■ The work was done on the entire length (almost 300 metres) of the colonised area, however new sprouts reappeared in some places, but were apparently dominated by the indigenous species.

■ No floristic monitoring was undertaken to precisely determine the improvement of the ecological status of the site, however the personnel observed expansion on the treated site of indigenous species similar to those present prior to the colonisation by the water pennywort. This good result was probably due to the rapid launch of the management operations (early detection - fast reaction) and to the resilience of the river banks.



5 - Uprooting using a pull fork.
6 and 7 - Sections of the Yre River in August (6) and September 2019 (7), following the uprooting work.

2020

The seven sessions of inspections, uprooting and monitoring in 2020 resulted in a clear reduction of the species. The banks that were completely covered in 2019 by a single-species colony of water pennywort were virtually free of the species, except for a few sprouts. This would appear to be due not only to the work done over the two years, but also to the fact that the cattle no longer had access to the river banks and bed. The installation of a fence may be considered an effective means to avoid the propagation of water pennywort.

A few sprouts were detected and removed in areas where the river banks were the most severely degraded upstream of the colonised section, as well as in a few sectors that continued to be trampled by the cattle (the ford crossed by the livestock).

Costs

Table 2. Costs incurred by the plan of action in the years 2019 and 2020.

2019		2020	
Item	Cost (€ incl. VAT)	Item	Cost (€ incl. VAT)
Management, meetings, logistics (6 days x 564 €)	2 892	Management, meetings, logistics (4 days, 2 x 450 € and 2 x 564 €)	2 028
Inspection, diagnosis (5 days, 2 x 450 € and 3 x 564 €)	2 592	Inspection, diagnosis (5 days, 2 x 450 € and 3 x 564 €)	1 464
Manual uprooting (17 days, 8 x 450 € and 9 x 564 €)	7 548	Manual uprooting (17 days, 8 x 450 € and 9 x 564 €)	7 548
TOTAL	13 032	TOTAL	11 040
TOTAL OPERATIONS 2019-2020		25 692	

Table 3. Funding provided by each organisation in 2019 and 2020.

Organisation	Funding (€) in 2019	Funding (€) in 2020
LLB intermunicipal board	5 500	4 500
Pays-de-la-Loire CEN	6 524	5 412
CBNB	1 128	1 128
Total funding 2019-2020	13 152	11 040

Information on the project

The work done in 2019 and 2020 has been presented in numerous symposia and meetings of the Pays-de-la-Loire IAS network. There are currently plans to highlight the project as a textbook case of the "Early detection - Fast reaction" system of the regional network. Further efforts to communicate and showcase the project will depend on the results of the upcoming dissemination campaign.



8 - Detection of sprouts in the most upstream section of the cluster in August 2020.

9 - Regrowth of indigenous species along the fence.

Outlook

- The sections of the river banks near the watering pools and the ford continue to be trampled by the cattle. It will be necessary to preserve these areas from this disturbance.
- During the Cotech meeting held in September 2020, it was decided to re-orient the management programme toward a complete renaturalisation of the river, including a return to the original bed and the re-creation of meanders, in the framework of the GEMAPI policy. This proposal was approved by the Water Agency and will include the creation of a suitable watering spot. Made of stone, the watering spot will avoid trampling of the river banks by the cattle and the disturbed soil that is conducive to the installation of water pennywort.
- To make sure that the vegetation on the river banks does not return to scrub and eventually to riparian forest, the banks will be mowed each year at the end of the summer season. In 2020, they were mowed on 16 October.
- Management work targeting the preservation of a diversified hydrophilic strip along the river, a factor favourable to biodiversity, may be undertaken in an effort to go beyond simply eliminating the water pennywort. That work may consist of annual mowing and removal of the waste.

Authors: Guillaume d'Hier, Pays-de-la-Loire CEN, Clara Singh, IUCN French committee, for the Resource Centre on invasive alien species. April 2021.
Editor: French Biodiversity Agency.

This management report fills out the collection already published in the second and third volumes of the book titled "Invasive alien species in aquatic environments, Practical knowledge and management insights", in the Knowledge for action series published by the French Biodiversity Agency.

(<http://especes-exotiques-envahissantes.fr/best-practices-guide/?lang=en>)



10 - *Coenagrion mercuriale* detected on intervention site.

For more information

- CEN PdL, CBNB, 2019. Managing water pennywort in Beaumont-Pied-de-Bœuf (72), IAS network of the Pays-de-la-Loire region, 43p. (In French).

