



Large-flowered waterweed (*Egeria densa*)

Managing large-flowered waterweed in the Loiret department

Loiret river board (ASRL)

- The river board was created on 11 November 1858 to manage the upstream section of the Loiret river (from the source to the Chaussée de Saint-Santin), as well as the Montées, Couason, Reine-Blanche and Fontaine tributaries.
- ASRL is active primarily in managing and cleaning the hydraulic installations, in maintaining the river, trapping pests and working on the river banks on behalf of local land owners.
- Contact:
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 - inventory: Carine Biot, policy officer at the Val Dhuy Loiret SBMP (sub-basin management plan), carine.biot@eptb-loire.fr

Intervention site

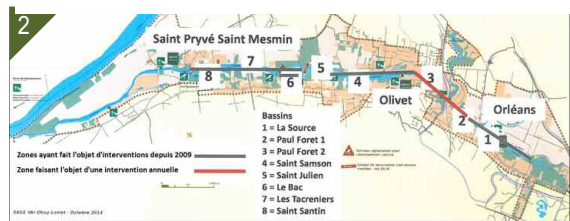
- The Loiret River is an outflow of an underground branch of the Loire (80% of total discharge), which means it is a large river (20 metres wide) right from its source. The Loiret is 13 kilometres long and up to 100 metres wide.
- It is crossed by five roads dividing it into reaches comprising 13 mills and 44 hydraulic installations.
- The existence of the hydraulic installations makes for a rather special river where the first ten kilometres are a succession of very wide reaches with very little current.
- The invasive macrophytes are located primarily in these reaches, in the towns of Orléans, Olivet and Saint-Pryvé-Saint-Mesmin, and cover a surface area of 70 hectares.
- The many houses along the river have led to it being named the “Little Venice of the Loiret”.

Disturbances and issues involved

- Following the improvement in water quality and its transparency, plants began to reappear in the river starting in 2005.
- Their development accelerated over the following years.
- Large-flowered waterweed was identified in 2008.
- By 2014, it had been observed along nine kilometres of river with significant quantities along seven kilometres.
- In addition to large-flowered waterweed, Nuttall's pondweed and filamentous algae were also observed in large quantities.



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1. Homes along the first reach of the Loiret River.
2. Map of the intervention areas along the Loiret.

Impacts on the ecosystem

- The plants slow the flow of water.
- Contribution to the development of filamentous algae on the surface.
- Contribution to sediment build-up.
- Formation of dense beds limiting the development of native plant species.
- Disturbances for the movement of fish species.

Impacts on various uses

- Clogging of hydraulic installations.
- Difficulties for boating (crew, canoeing, excursions, travel by local people).
- Major hindrance for fishing.
- High visual impact (deemed unsightly by local residents and walkers).

Interventions

Mechanical uprooting

- In December 2008, ASRL decided to convert one of its barges into a motorised, hydraulic rake (the Ratodo) capable of uprooting and collecting aquatic plants.



■ Since 2009, the purpose of the annual interventions has been to maintain an open channel in the middle of the river to enable the flow of water and boating.

■ The results of the year 2009, when 300 cubic metres of plants were removed, made clear the need to organise the transport of the plants in conjunction with the town of Olivet. The town provided containers and assumed the costs of transporting and composting the plants. The plants and mud from the Loiret were first analysed as a precautionary measure, prior to transporting the material. It was necessary to design and construct in-house a small crane (called the Plukeur) to load the plants in the containers. The procedure consists of the following steps:

- uproot and collect the plants using the Ratodo;
- load the plants onto pontoons (until 2012, since then an oyster-fishing barge has been used);
- transport the plants to a quay;
- use the Plukeur to transfer the plants to a 15 cubic metre container for transportation to a composting unit.

■ Since 2010, this work has been done by two employees for approximately 50 days per year, between March and October:

- in the morning, the plants are collected;
- in the afternoon, the plants are unloaded from the barge and transported to the composting unit.

■ The work is done in the framework of a partnership with the crew club and the fishing association, who express their needs and provide volunteers, and the town of Olivet, that pays for the transport and composting of the plants.

■ A test on a different management technique was conducted in July 2014 when a company using a harvester boat was brought in (the Lyonnaise des eaux company sponsored the harvesting work and the town of Olivet handled the plants).

■ This project lasted two weeks and 270 tonnes of plants were collected. The work involved three employees, a backhoe, three containers and a truck.

■ The harvested area measured 1 200 metres long and 20 metres wide. This work will be repeated for eight years in the framework of the sponsoring programme.

■ Inventory

■ The Val Dhuy Loiret SBMP is a partner in the continuous effort to find information on invasive plants, on how to identify species and on the inventory set up since 2013.

■ The inventory could be established by the entity managing the SBMP, the Loire board, by calling on the services of an intern.

■ Characterisation report in 2013:

- samples were drawn from 45 transects using the contact-point method (4 to 6-metre intervals);
- parameters were measured (temperature, depth, type of substrate, etc.) to assess the relationships between development processes of the plants, but no clear links were revealed;
- a total of 17 species, both alien and native, were identified, including two that are rare in the Centre region (*Zannichellia palustris* and *Potamogeton obtusifolius*);
- the most abundant species were, in decreasing order, filamentous green algae (pervasive), large-flowered waterweed (invasive) and Nuttall's pondweed (invasive).

■ In 2014, the inventory was carried out again, but in a reduced format with only one contact point per transect (the managers did not have enough time to run a complete inventory each year). Following discussions with experts, the protocol for the reduced format will be modified to concentrate on certain transects rather than studying a single contact point on each transect.



3. 4. The motorised, hydraulic rake (Ratodo).

5. Plants loaded onto an oyster-fishing barge.

6. The Plukeur, a small crane used to transfer the plants to the containers.

- It is still too early to draw any conclusions from the work done, several years of observations are first required.
- More in-depth scientific assistance will also certainly be needed.
- A complete inventory will again be conducted in 2015. Subsequently, complete inventories will be conducted every two to five years, as required. In the meantime, partial inventories comprising two profiles per transect will be carried out.



7. Harvester boat.

Results and assessment

■ Results (estimated volumes and location of the harvested plants)

Year	2009	2010	2011	2012	2013	2014
Harvested volumes (m ³)	300	700	1 000	1 000	1 500	1 000
Work periods and zones (see map on page 1)	April: Saint-Santin June to September: Paul-Foret 1 and 2	June: La Source July: Saint-Santin July to September: Paul-Foret 1 and 2	May: Tacreniers June: Le Bac July to October: La Source, Paul-Foret 1 and 2	April: Tacreniers June to October: Paul-Foret 1, 2 and upstream Saint-Samson	July: Le Bac July to October: Paul-Foret 1, 2 and Saint-Samson	February to March: Le Bac June to July: Paul-Foret 1, 2 and Saint-Samson
Basins	Estimated density of plants from 1 (low density) to 5 (high density)					
La Source	0	2	4	2	1	1
Paul Foret 1	3	3	4	4	4	3
Paul Foret 2	2	2	4	4	5	5
Saint Samson	0	0	0	2	3	5
Saint Julien	0	0	0	0	2	4
Le Bac	1	4	1	2	4	5
Tacreniers	3	4	3	2	4	2
Saint Santin	3	1	4	2	1	1

■ Costs (in euros)

	2009	2010	2011	2012	2013	2014	TOTAL
Ratodo	10 127	1 766	1 741	2 200	900	8 188	24 923
Plukeur		4 278					4 278
Pontoons			3 185				3 185
Quays		448		591			1 039
Barge + engine				12 535			12 535
Fuel	100	200	700	1 500	1 300	1 000	4 800
Additional employees (in summer for uprooting)				3 281	6 053	4 828	14 163
TOTAL	10 227	6 693	5 626	20 108	8 253	14 016	64 924

- The town of Olivet contributed 4 500 euros in addition to the transport of the plants and composting.
- The Brochet Olivetaïn (an independent fishing association) contributed 1 840 euros.
- The cost of the ASRL employees for approximately 60 days of work per year amounted to approximately 20 000 euros in payroll costs, which does not include the temporary personnel hired in the summer, the volunteers or the inventories conducted in 2013 and 2014.
- With the exception of the contributions by the town of Olivet and the Brochet Olivetaïn, all costs were borne by ASRL.
- The plants are transported to a landfill site. Transportation is ensured by municipal employees and the estimated cost of treatment is 17 euros (before VAT) per tonne.

Information on the project

- ASRL started to inform elected officials and residents of the presence of the plants during its general meeting in 2007. Since that time, the development of the plants has been discussed during each board meeting (4 to 5 per year), at the general meetings of ASRL, the Brochet Olivetaïn and the Crew club (once each per year), during four meetings of the Val Dhuy Loiret SBMP, during the sustainable-development days organised by the city of Orléans in 2014 and in information bulletins distributed to residents and fishers.
- For the general public, information has been made available via the media (France 3 television, the *République du Centre* and *Nouvelle République* newspapers), notably in a dozen articles published since 2007.
- The RBMP internet site may be consulted at:
<http://www.sage-val-dhuy-loiret.fr/>
- The Val Dhuy Loiret SBMP has made efforts to communicate via:
 - the publication of a guide for residents containing two pages on invasive plants and animals;
 - preparation (in progress) of a brochure on the topic;
 - three field trips with the members of the local water commission (CLE) and during the national conference on invasive alien species in September 2014;
 - publication of reports on the inventories posted on the RBMP internet site;
 - participation in the Centre region work group and in the Hydrocharitaceae work group launched by the Pays-de-la-Loire committee for the management of invasive species.

Outlook

- During the summer of 2014, the theft of the Ratodo motor initiated discussions within the organisation on future management of invasive species. Unfortunately, the Ratodo is no longer capable of effectively handling the situation.
- For 2015, the objective at ASRL is to double the surface area treated by the harvester boat, i.e. extend it to almost 2 500 metres (with funding from ASRL, the Crew club in Orléans/Olivet and the Brochet Olivetaïn).
- The inventory launched in 2013 and 2014 will be pursued to observe the development of the plants and to better understand the important factors in the colonisation.

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This management report was drafted in May 2015 by the work group for biological invasions in aquatic environments, set up by Onema and IUCN France, in addition to those already presented in the second volume of the book titled "Invasive alien species in aquatic environments, Practical knowledge and management insights", in the Knowledge for action series published by Onema.

<http://www.onema.fr/sites/default/files/EN/EN/cat7a-thematic-issues.html>



8. 9. Efforts to raise awareness in the field.

For more information

- Internet sites: http://www.asrl.fr/les-herbes/lesherbes_index.php
<http://www.sage-val-dhuy-loiret.fr/>
<http://www.sage-val-dhuy-loiret.fr/wp-content/uploads/2013/04/Rapport-destage.pdf>
- Association syndicale de la rivière du Loiret - 336 allée Sainte Croix - 45160 OLIVET
- SAGE Val Dhuy Loiret - Établissement public Loire - 2 quai du Fort Alleaume - CS 55708 - 45057 ORLEANS CEDEX



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