Broadleaf watermilfoil

(Myriophyllum heterophyllum)

Managing broadleaf watermilfoil on the Somme River and its canals

Somme departmental council

- The departmental council has been the owner and manager of the Somme River public domain since 2006. It is consequently responsible for the maintenance of canals and the management of structures and facilities (locks, dams) on the river and canals.
- In this overall framework, it also manages the invasive alien species, both animal and plant, that are detected.
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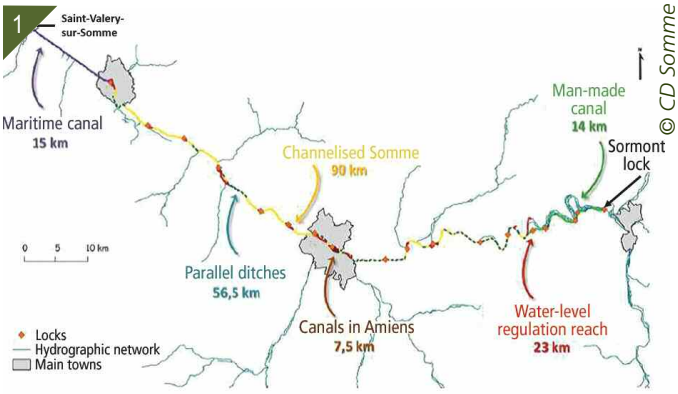
Intervention site

- The work was done on the public river domain of the Somme department. This area comprises the Somme canal, the channelised section of the Somme, plus several natural river reaches and parallel ditches. This river domain covers 720 hectares in 58 towns and includes a total of 120 km of navigable waterways.
- Since 2011, the Somme and its canals have been the site of particularly strong development of broadleaf watermilfoil (*Myriophyllum heterophyllum*).
- The management work took place on the Somme canal from just upstream of Lock no. 7 (Sormont) to a point downstream of Lock no. 25 in Saint-Valery-sur-Somme.

Disturbances and issues involved

- Broadleaf watermilfoil, due to its density and the formation of the thick mat on the water surface, is a major hindrance for fishing, water sports and boating.
- In that it blocks the growth of native submergent plants, the species represents a considerable threat for biodiversity and the ecological balance. It can reduce the reproductive success of fish by limiting access to spawning grounds.
- Finally, large quantities of broadleaf watermilfoil can alter the chemical parameters of the water by increasing the pH and reducing the quantity of dissolved oxygen.



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1. Map of the section of the Somme River public domain where the interventions took place.
2, 3. Zones colonised by broadleaf watermilfoil.

Interventions

Mowing (2011 to 2014)

From 2011 to 2014, mowing operations (cutting the stalks at a depth of approximately one metre) were regularly carried out in the spring and summer. They took place in the Breilloire reach (see the map on the next page), the first area where strong development of broadleaf watermilfoil was observed.

This work temporarily cleared the waterways, but did not produce a long-term solution to the development of the species due to the dispersal of plant fragments that subsequently resulted in rapid recolonisation.

Harrowing (2014 to 2016)

Experiments using a harrow were carried out in the Breilloire reach in 2014 and 2015 in view of improving the effectiveness of the management work.

Harrowing consists of scraping the river bed in order to uproot the plant, using a harrow mounted on an excavator. The work was done from the bank using a 22-ton excavator equipped with a 15-metre boom.

This technique has the advantage of removing the root system of the plant and avoiding the risk of trapping alevins when pulling the plants onto the bank, however the great weight of the machine may damage the banks, dikes and trails.

In 2014, 145 tons of plants were harvested from 600 square metres of river. In 2015, 710 tons of plants were harvested from 5.7 hectares.

The work was repeated in 2016 on the seven sites most affected by the broadleaf watermilfoil, representing a total of 14 hectares. In order to avoid damaging the dikes and the vegetation along the water courses, the excavator equipped with the harrow was installed on a barge that was positioned by a pusher-boat.

The plants were placed on a second barge and then stored temporarily near the point where they were harvested.

As a precautionary measure, nets were placed downstream of the work zone to collect any watermilfoil fragments and avoid the dissemination of the plants.

Meeting of the technical committee

Given the troublesome development of the plant, a technical committee was set up and met several times in 2015 and 2016.

The committee members included representatives from the following organisations:

- Somme Federation for fishing and the protection of aquatic environments;
- Picardie Conservatory for natural areas (CSNP);
- Bailleul National botanical conservatory (CBNB);
- Regional environmental directorate (DREAL), French biodiversity agency (AFB), Departmental territorial and maritime directorate and the Somme Public river-basin territorial agency (AMEVA);
- Artois-Picardie Water agency;
- Departmental council (Environmental directorate and River and maritime agency (AFM));
- Hauts-de-France Regional council.

Following an assessment of the work done in 2016, it was decided to continue

4. Harrowing from the bank.
5. Harrowing from a barge.
6. Nets in the canal to avoid dispersal.

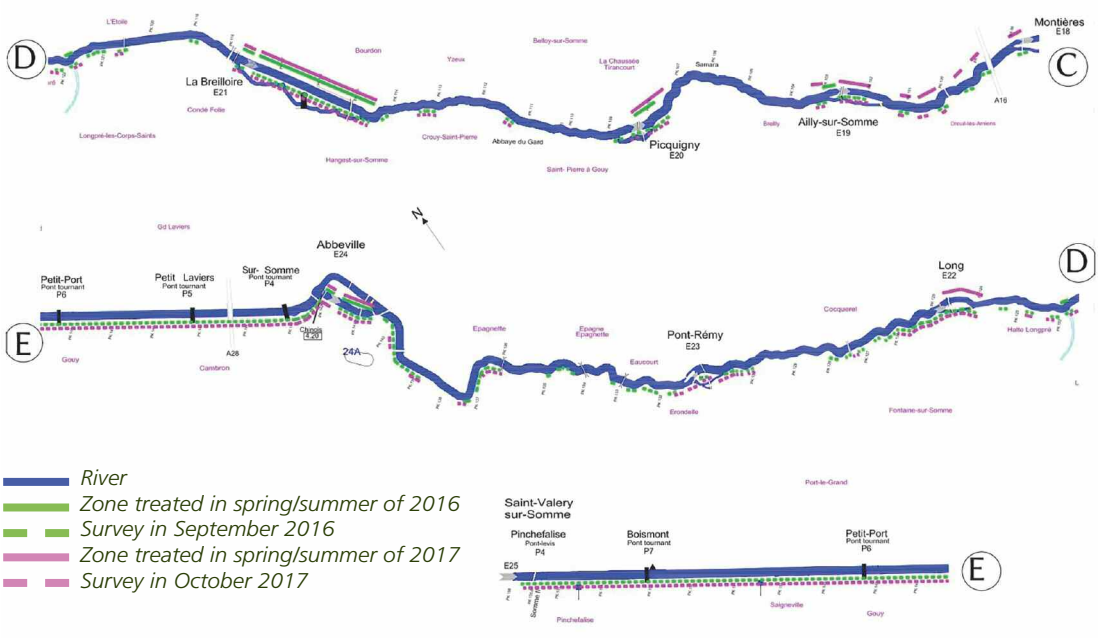
with mechanised harrowing in 2017 and to complete the work with manual uprooting on the berms of the canals in order to reduce any renewed colonisation and clear the waterways for a longer period.

- The committee was of the opinion that all the sites should be treated at some point.
- An application for this project was submitted in compliance with the applicable Water law regulations.

Inventories

- In September and October 2016, the CBNB ran a scientific assessment to determine the distribution of broadleaf watermilfoil over the entire sector.
- Given that it was not always easy to distinguish the species from the native whorl-leaf watermilfoil (*Myriophyllum verticillatum*) using the available morphological criteria, a genetic analysis was undertaken by the Centre for molecular ecology at the University of Rennes.
- Out of a total of 98 samples, 13 corresponded to whorl-leaf watermilfoil and the rest to broadleaf watermilfoil. The two species were identified in the upstream section of the river, but only broadleaf watermilfoil was found in the downstream section. It was particularly prevalent in the immediate vicinity (upstream and downstream) of locks, where it formed large beds.
- In March 2017, prior to the start of the work, the sector was surveyed with the assistance of the CBNB to map the presence of whorl-leaf watermilfoil and ensure that it was not affected by the work, given that the species is protected.
- Nine priority sites were identified for mechanical uprooting in 2017 and eleven sites for manual uprooting.

7. Drawing a sample of watermilfoil.
8. Manual uprooting of broadleaf watermilfoil.



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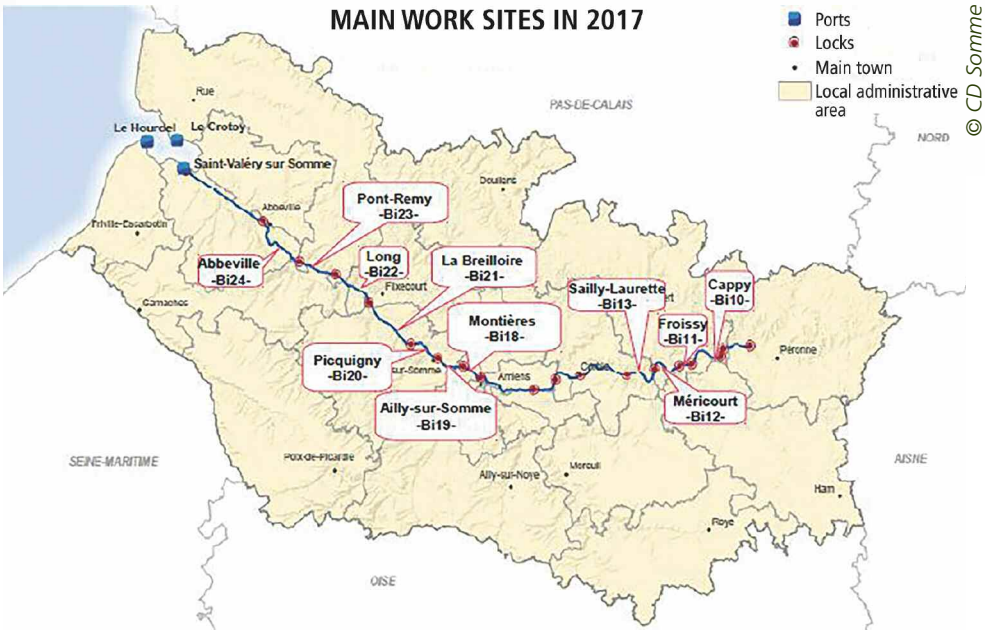
Example of maps showing the sites of broadleaf watermilfoil in downstream sections of the Somme River.



Main work sites in 2017.

■ Harrowing and manual uprooting in 2017

■ The mechanical uprooting took place from the beginning of April to mid July and manual uprooting on the berms from the beginning of April to the end of September. Navigation was prohibited during the work.

■ The system for mechanical uprooting was the same as in 2016, i.e. the harrow was mounted on an excavator that worked from a barge. Particular care was taken in the channelised section to ensure that the excavator did not dig into the canal bottom and impact its watertightness. After harrowing, the plants were transported on a barge to a temporary site, before being sent to the storage sites.

■ During the manual work, the plants were carefully uprooted with their roots by hand or using suitable tools (hoe, spade, rake, etc.). The work progressed from upstream to downstream.

■ Nets were set downstream of the work site and any floating fragments were collected using dip nets during the uprooting work to avoid their dispersal.

■ Storage and composting

■ The harvested plants were transported to nearby storage sites where, following draining, drying and decomposition, they will be mixed with soil and used for landscaping. The planned mixture is 20% of decomposed plants and 80% soil, on the basis of a study by the SATEGE research unit (Somme department) that confirmed the percentages.

■ The remaining volume of plants will be transferred to a composting unit in the department.

■ Additional measures

■ Further measures included the installation of an anti-return flap on the interconnections with the canal and nets to prevent the dispersal of the invasive alien species downstream, as well as lowering the water level in the interconnecting water bodies.

Results and costs

■ Results

■ Since the start of the interventions, a total of 860 000 square metres were cleared.

■ However, the watermilfoil has returned to all the cleared areas, with variable recolonisation rates (see the table below).

Monitoring data on the harrowing work in 2016 and 2017 in the most heavily infested reaches.

Reach	Surface areas colonised by broadleaf watermilfoil (square metres)				Comments
	Work in spring/ summer of 2016	Survey in October 2016	Work in spring/ summer of 2017	Survey in October 2017	
Abbeville	22 400	21 400	21 500	2 500	10 to 15% of area cleared in 2017 later recolonised
La Breilloire	39 500	57 300	60 600	6 500	10 to 15% of area cleared in 2017 later recolonised
Montières	37 400	2 900	43 000	8 800	20% of area cleared in 2017 later recolonised
Froissy	19 600	6 300	37 000	34 920	95% of area cleared in 2017 later recolonised
Cappy	11 000	25 000	71 900	118 150	100% of area cleared in 2017 later recolonised

■ Costs

Year	Method	Surface area cleared (sq. metres)	Quantity harvested (metric tons)	Cost (€)
2011	Mowing	40 000	60	No data
2012	Mowing	105 000	195	
2013	Mowing	135 000	265	
2014	Mowing	50 000	85	
	Harrowing	600	145	
2015	Harrowing	57 120	710	78 825
2016	Harrowing	139 574	No data	211 975
	Genetic study	-	-	7 302
2017	Harrowing	312 000	No data	408 000
	Manual uprooting	20 000	No data	124 800
	Scientific monitoring	-	-	10 000
TOTAL	-	**859 294**	No data	**840 902 (2015-2017)**

■ The work was done by private companies. The cost of harrowing was estimated at 1.30 euros per square metre and that of manual uprooting at 5.20 euros per square metre (before VAT in both cases).

■ The work in 2016 was funded by the Artois-Picardie Water agency (80%) and by the Departmental council (20%).

■ The work in 2017 was funded by the Departmental council (20%), the Artois-Picardie Water agency (47%) and by the European ERDF fund (33%).

■ The genetic study in 2016 cost 7 302 euros and the scientific monitoring programme in 2017 cost 10 000 euros.

Information on the project

- Signs were installed on the work sites to inform the public and raise awareness.
- Articles appeared in the local press (Courrier Picard) and a sequence was shown on the regional television station France 3 Hauts-de-France, etc.

Outlook

- A study is now under way on planting riparian vegetation along the banks, where possible, in order to create shaded zones and limit the development of the watermilfoil.
- In that the problem exists well beyond the geographic limits of the department, coordinated efforts are required by all stakeholder in the river basin to ensure effective management of the broadleaf watermilfoil.
- For 2018, the estimated surface area to be cleared is 363 000 square metres. Plans are now being made for the future work.

Author: Doriane Blottière, IUCN French committee. January 2018.

For more information

- Canal de la Somme et Somme canalisée : Opération de traitement du Myriophylle hétérophylle par les techniques de l'arrachage mécanique et de l'arrachage manuel. Programme 2017. Dossier de déclaration Loi sur l'eau. Direction générale adjointe Equipement du Département, Direction de l'entretien des Infrastructures, Agence Fluviale Maritime. 125 pp.
- Caractérisation génétique des populations de myriophylles dans le canal de la Somme. Conservatoire botanique national de Bailleul, Conseil départemental de la Somme. 34 pp.
- Travaux d'arrachage mécanique et manuel de Myriophylle sur le domaine fluvial départemental, mémoire technique. Département de la Somme, Curages Dragages et Systèmes SAS. 69 pp.
- Lévy, V. 2017. Premier bilan des actions menées par le Conservatoire botanique national de Bailleul dans le cadre de l'assistance scientifique à la lutte contre le Myriophylle hétérophylle engagée par l'Agence départementale fluviale et maritime de la Somme. Conservatoire botanique national de Bailleul. 8 pp.

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