



## Water primrose

(*Ludwigia* spp.)

# Experiments in managing water primrose in meadows and amphibious environments of the Barthes de l'Adour area

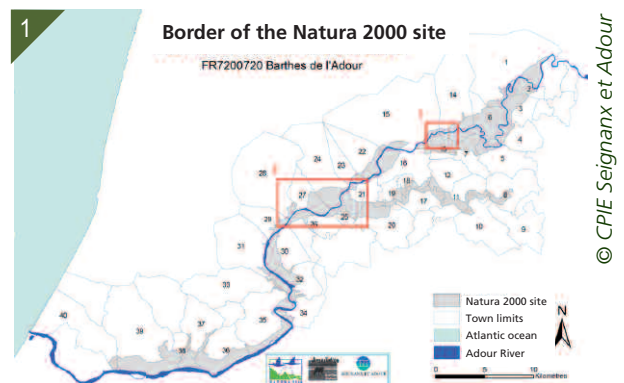
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### Seignanx and Adour centre for environmental initiatives (CPIE)

- The non-profit association *Nature et Loisirs* was created in 1990 by the local governments in the Seignanx area and was certified as a CPIE in 1999.
- The centre has set up a management-coordination project for water primrose based on three main activities:
  - experiments in test zones on control methods not employing herbicides, including an assessment of the impacts on vegetation and a visual assessment of recolonisation rates for water primrose and native species following implementation of the methods;
  - assistance in project management for towns owning wetlands (*barthes*) along the Adour River, including the drafting of management objectives for water primrose depending on the needs of the towns, proposing alternative methods not employing herbicides and checking the suitability of those methods, coordinating subcontractors (including planning and monitoring of the work) and drafting an annual report on water-primrose management for the towns;
  - drafting of a precise annual characterisation and monitoring report on water primrose in the municipal wetlands based on aerial photographs.
- Funding is provided by the Landes departmental council, the Adour-Garonne water agency and the State.
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### Intervention site

- In the framework of the management-coordination project for water primrose, the CPIE is active in certain towns located in the Barthes de l'Adour Natura 2000 zone and owning wetlands intended for collective grazing. The zone comprises 520 hectares of floodable meadows spread over seven towns in the Landes department.
- The *barthes* are alluvial plains along the Adour and Luy Rivers that are regularly flooded. The hygrophilic meadows found in this type of environment are now partially invaded by water primrose.
- Since 2010, the CPIE has conducted experiments on management methods for water primrose in the towns of Tercis-les-Bains and Orist. The experiments are carried out



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1. Barthes de l'Adour Natura 2000 site and location of the municipal lands.  
(1. Saint-Vincent-de-Paul, 2. Rivières, Mées, Tercis-les-Bains and Orist).

on two types of environment and on three study sites:

- wet meadows in the Barthe de Castetbieilh (town of Tercis-les-Bains);
- amphibious environments in riparian zones along the edges of the Barthe de Castetbieilh Pond used for hunting and in grassy areas subject to tidal variations in the New Barthe in the town of Orist.

### Disturbances and issues involved

- The main problem in the Barthes area is the spread of water primrose from the aquatic environments to the meadow environments. In 2012, the CPIE assessment of water-primrose progression using aerial photographs revealed that 111 hectares of the 520 hectares of municipal wetlands were invaded by water primrose, i.e. 21% of the total surface area.
- **Impacts on ecosystems**
  - A reduction in the number of native species making up the plant communities in the meadows and amphibious areas.
  - Disappearance of protected and/or emblematic species (*Marsilea quadrifolia*, *Luronium natans*, *Damasonium alisma*).
- **Impacts on agricultural use**
  - The quantity and quality of the meadows for livestock grazing is reduced.

## Interventions

■ Since 2010, the CPIE has conducted experiments on managing water primrose without herbicides (mowing and thermal weed control) in the towns of Tercis-les-Bains and Orist. From 2010 to 2012, some of the experiments were run on ponds used for hunting. An agreement was signed between the owners of the ponds and the CPIE on 6 April 2011 stipulating the obligations of each party.

### ■ Experimental organisation on each study site

- Two types of plots, 1 square metre each, were marked out with stakes:
  - E-type (experimental) plots that each received a single type of treatment;
  - T-type (control) plots were not treated and served to observe the natural development of water primrose;
  - the 1.5-metre area around E-type plots was treated like the plots to avoid the border effect.

### ■ Study protocol

- Start of work:
  - in 2010 and 2011, April for amphibious environments and June for meadows;
  - in 2012, June for amphibious environments and July for meadows (due to flooding of the plots in April).
- Prior to any treatment, the following work was carried out on each plot:
  - a georeferenced aerial photograph was taken to calculate the exact percentage of cover by each plant species using GIS software;
  - a number of parameters were noted in an observation report. For water primrose, the parameters were the average height of stalks, the percentage of stalks and rosettes, water depth, the percentage of surface area covered and the number of flowers. For the other species, the parameters were the name, percentage of surface area covered, number of plants and their average height.
- Treatments and observations were carried out once per month.

### ■ Types of treatment

- Thermal weed control using a burner.
- Mowing (only on the Barthe de Castetbieilh wet meadow):
  - using a brushcutter on 6 E-type plots;
  - during the period from June to August;
  - the cut water primrose (three 100-litre bags) was stored and dried in a glass-house outside the wetlands (on the CPIE site 34 kilometres from the study site).
- Mowing and thermal weed control (only on the Barthe de Castetbieilh wet meadow):
  - the first test was conducted in 2011;
  - the protocol was the same as for simple mowing, but with thermal weed control.



2. Meadow invaded by *Ludwigia grandiflora*.  
3. Tractor equipped with a burner.

Table indicating the work done on the different sites.

Experimental sites	Barthe de Castetbieilh (Tercis-les-Bains)		New Barthe (Orist)
	Amphibious	Meadow	Amphibious
Type of environment	Amphibious	Meadow	Amphibious
Duration of work	4 months	3 months	4 months
Number of E-type plots	5	6	6
Number of T-type plots	5	6	6

## Results and assessment

### ■ Results

- The experiments were conducted to assess the effectiveness of the tested treatments and their effects over the 3-year period.
- Over the years 2010 to 2012, during the growth period for water primrose (March to September), temperatures and solar irradiance were higher than normal and trended higher. Precipitation also increased over the 2010 to 2012 period.
- The observation data were tested statistically (Mann-Whitney test) to compare the results between the T-type plots and the E-type plots for each year of monitoring. The trends in the parameters were also assessed over the three years.
- Thermal weed control.

*Summary of results in the amphibious and meadow environments.*

Treatment	Results in amphibious environments	Results in meadow environments
<b>Surface area covered by water primrose</b>	<ul style="list-style-type: none"> <li>■ Cover on E-type plots was lower than on T-type plots, but regrowth was rapid.</li> <li>■ In Tercis, a significant reduction was noted after the third year.</li> </ul>	<ul style="list-style-type: none"> <li>■ No significant effect of the treatment was noted during monitoring over 3 years.</li> <li>■ Residual effect of treatment at the start of 2012, but the effect faded during growth season.</li> </ul>
<b>Height of water primrose</b>	<ul style="list-style-type: none"> <li>■ Significant effect at the end of the monitoring periods in each of the 3 years on the two sites with increasing differences between the E-type and T-type plots.</li> </ul>	<ul style="list-style-type: none"> <li>■ Significant effect at the end of monitoring in 2010 and 2011.</li> <li>■ No significant effect in 2012 (results altered by grazing of the T-type plots).</li> </ul>
<b>Flowering of water primrose</b>	<ul style="list-style-type: none"> <li>■ Significant effect at the end of the monitoring periods in each of the 3 years on the two sites, except in Orist in 2012.</li> <li>■ Persistent effect on flowering that was increasingly delayed and limited from one year to the next.</li> </ul>	<ul style="list-style-type: none"> <li>■ Significant effect at the end of monitoring in 2010 and 2011.£</li> <li>■ No significant effect in 2012 (results altered by grazing of the T-type plots).</li> </ul>
<b>Growth dynamics of water primrose</b>	<ul style="list-style-type: none"> <li>■ In Tercis, the percent of colonisation dropped in 2010 and 2012.</li> <li>■ In Orist, the treatment was ineffective on plants in aquatic environments (long flooded period).</li> </ul>	<ul style="list-style-type: none"> <li>■ Significant difference in the growth rate in 2010.</li> <li>■ No significant effect the following two years.</li> </ul>
<b>Surface area covered by other plant species</b>	<ul style="list-style-type: none"> <li>■ Significant effect in 2011 on the two sites with increased cover by other species.</li> </ul>	<ul style="list-style-type: none"> <li>■ No significant effect during the 3 years of monitoring.</li> </ul>

- Mowing (only in the meadow environments):
  - no significant effect on the surface area covered by water primrose during the 3 years;
  - significant effect on height in 2010 and 2011. No significant effect in 2012 (grazing of the T-type plots);
  - no significant effect of the treatment on flowering;
  - significant effect on growth (height) in 2010 and 2011. No significant effect in 2012;
  - significant effect (increase) on the surface area covered by other species.
- Mowing + thermal control (only in the meadow environments starting in 2011):
  - no significant effect on the surface area covered by water primrose;
  - significant effect on height of water primrose in 2011. No significant effect in 2012 (grazing of the T-type plots);
  - no significant effect on the flowering of water primrose;
  - no significant effect on the surface area covered by other species.

## ■ Assessment

- The results in the meadows are difficult to interpret, particularly in 2011 and 2012. Following the end of herbicide use, the livestock began to consume the water primrose. This phenomenon spread and increased in 2011 and 2012, to the point of significantly altering the parameters of the T-type plots.
- The thermal control produced very limited results over the 3 years of monitoring. However, the treatment would seem to be more effective in amphibious environments than in the meadows.
- Mowing had a significant effect (increase) on the surface area covered by other species.

## ● Outlook

- Work during August on the zone being colonised by mowing and ensiling to avoid the creation of water-primrose litter that blocks the development of all other vegetation. This work was undertaken in 2012 and amplified in 2013.
- Thermal control was temporarily interrupted due to the lack of suitable equipment.
- A project to manage water primrose over the entire Barthes area is being developed. This project is the follow-up to a feasibility study conducted in 2011 and 2012 to assess the costs, resources required, advantages and disadvantages of various management methods (thermal weed control, mowing, ensiling, enclosure and reprofiling of the meadows). The study is presented in the following pages, in the report titled *Experiments in managing water primrose in meadows of the Barthes de l'Adour area (part 2)*.

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4. Plot prior to thermal weed control (June 2012).

5. Plot after thermal weed control (August 2012).

### For more information

- Internet site of the Seignanx and Adour CPIE:  
[www.cpie-seignanx.com](http://www.cpie-seignanx.com)
- Internet site of the Barthes de l'Adour Natura 2000 site:  
<http://barthesmidouzemarensin.n2000.fr/>
- Action programme of the Seignanx and Adour CPIE. 2012. Coordination of water-primrose management in the Barthes de l'Adour area, 98 pp.