



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)

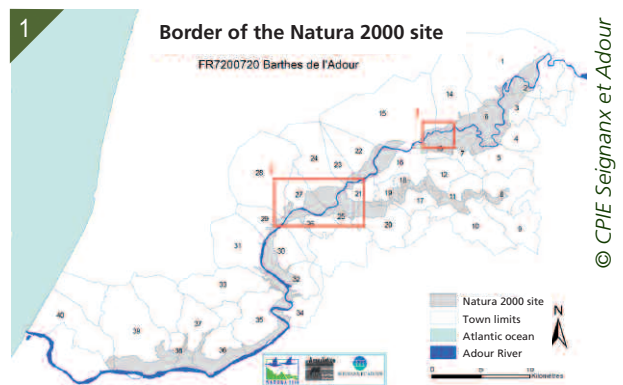
- The non-profit association *Nature et Loisirs* was created in 1990 by the local governments in the Seignanx area and was certified as a CPIE in 1999.
- The centre has set up a management-coordination project for water primrose:
 - assistance in project management for towns owning wetlands (*barthes*);
 - assessment of the management methods used in the municipal *barthes*;
 - management of water-primrose colonisation using transects and aerial inspection;
 - publication of a technical document on best practices for water-primrose management;
 - funding is provided by the Landes departmental council, the Adour-Garonne water agency and the State.
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Intervention site

- Since 2010, in the framework of the management-coordination project for water primrose, the CPIE has provided assistance for project management to the towns located in the Barthes de l'Adour Natura 2000 zone and owning wetlands intended for collective grazing. * The *barthes* are alluvial plains along the Adour and Luy Rivers that are regularly flooded. In 2011, the CPIE assisted four towns, namely Tercis-les-Bains, Rivière, Saint-Vincent-de-Paul and Orist. In 2012 and 2013, the CPIE was also active in the town of Mées.

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, i.e. 21% of the total surface area.



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).

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 land use

- A reduction in the quantity and quality of the meadows for livestock grazing.

Interventions

History of management work

- In the 1990s, large-flower water primrose (*Ludwigia grandiflora*) first appeared in the canals and ditches of the Barthes area.
- In 1996, the initial management efforts were undertaken, consisting of uprooting and burial of the plants, and use of herbicides.
- From 1996 to 1999, the management work in the canals and ditches was halted because *Ludwigia grandiflora* had regressed significantly. However, it appeared in the lakes used by hunters.
- In 1999, several lakes were treated (plants uprooted).
- In 2002, *Ludwigia grandiflora* was present in all the ponds and lakes, and in most of the amphibious grasslands and floodable meadows used for grazing in the Barthes area.

- From 2003 to 2009, herbicides were used to control *Ludwigia grandiflora* on the meadows of several towns (Tercis, Rivière, Saint-Vincent-de-Paul, Orist, Saubusse) and in the canals spanning the entire Barthes area:

- 2006, biological control of *Ludwigia grandiflora* was attempted using African buffaloes in the town of Tercis. The attempt was halted due to the lack of results;
- 2007, manual uprooting was attempted for the first time in a canal in the town of Tercis;
- 2009, the use of herbicides in aquatic environments was forbidden nationwide.

- In 2010, use of herbicides was halted in the meadows and canals of the municipal *barthes*. An experimental programme to study alternative methods for *L. grandiflora* and *L. peploides* (see page 55, the report titled *Experiments in managing water primrose in meadows and amphibious environments of the Barthes de l'Adour area (part 1)*) was launched.

■ Management methods

- Since 2010, the CPIE has tested a number of methods intended to manage *Ludwigia grandiflora* in the towns that requested assistance.

- Thermal weed control:

- the work was done by a local farmer or by municipal personnel in the towns of Tercis-les-Bains and Saint-Vincent-de-Paul;
- the equipment was provided by a private company.

- Mowing and removal:

- the work was done by a local farmer using a mower, a rake and a round baler in the town of Tercis-les-Bains;
- the plants were then transported and stored on concrete slabs (in a quarry and on a farm) by local farmers. Some of the plants were used as bedding in a cow barn.

- Ensiling (chopping) and removal:

- the work was done by a private company using a tracked silage harvester in the towns of Tercis-les-Bains, Rivière and Orist;
- the plants were then transported by local farmers using trailers and stored on a dry, sandy hill or on a concrete slab in a quarry.

- Combined mowing and thermal control:

- the work was done by a local farmer in the town of Tercis-les-Bains;
- the equipment was provided by a private company.

- Fencing off (exclosure) of the meadow:

- the work was done in the town of Rivière;
- local farmers and hunters installed the fences around the colonised *barthes*.

- Reprofilling and exclosure:

- the work was done by a local company specialised in farming work in the town of Rivière;
- the area was ploughed to a depth of 10 to 15 centimetres, then harrowed to break up the clumps of earth.

■ Monitoring protocol for the tests

- Monitoring of the experimental management methods was set up in 2010 and conducted from 2011 to 2013 in the towns of Rivière and Tercis-les-Bains to assess their impacts on large-flower water primrose.



2.3. Meadow invaded by *Ludwigia grandiflora*.
 4. Burner for thermal weed control.
 5. Ensiling (chopping) the water primrose.
 6. Map showing water primrose in a municipal meadow (dark red = high density, light red = low density).

- Six transects, 100 to 300 metres long with sampling points, were created in the treated areas in 2013.

- T1: 100 m in a fenced-off and ensiled area;
- T2: 100 m in a grazed, control area;
- T3: 100 m in a fenced-off and reprofiled area;
- T4: 100 m in a fenced-off area;
- T5: 300 m in a mowed area;
- T6: 200 m in an ensiled area;

- A sampling point was established every 20 or 50 centimetres (500 to 600 points per transect).

- Analysis of aerial photographs:

- aerial photographs were taken annually in July-August starting in 2011;
- analysis was conducted on both raw and processed photographic data;
- photos were georeferenced and a mosaic was created;
- conclusions were drawn and maps produced.

Results and costs

■ Preliminary results of the monitoring in 2013

- The results presented here are the initial conclusions of the monitoring on the management trials conducted in 2013. The results of the aerial-photo analysis are not presented here.

Methods	Results
Thermal weed control	<ul style="list-style-type: none"> ■ This method was not employed in 2013 due to the difficulties in finding a functional solution for the tractor. ■ Its effectiveness is equivalent to mowing and ensiling (chopping), but it is more complex to implement.
Mowing and ensiling (T5 and T6)	<ul style="list-style-type: none"> ■ Exceptional flooding occurred in 2013 in the <i>barthes</i>, particularly in Tercis, where the <i>barthe</i> remained totally submerged for over two months until July, leading to: <ul style="list-style-type: none"> - damage to and disappearance of the plant communities in the meadows; - colonisation by <i>Ludwigia grandiflora</i> and other invasive species (<i>Myriop aquaticum</i> and <i>Paspalum distichum</i>). ■ Management results were difficult to analyse given the exceptional weather conditions.
Grazed, control area (T2)	<ul style="list-style-type: none"> ■ Over 44% of bare ground due to grazing. ■ Relatively high frequency of <i>Ludwigia grandiflora</i> (24%) and <i>Polygonum hydropiper</i> (20%). ■ Very few grasses (16%).
Meadow closed to grazing (T4)	<ul style="list-style-type: none"> ■ Relatively high frequency of grasses and reeds, in particular <i>Agrostis stolonifera</i> (46%), <i>Paspalum distichum</i> (33%), <i>Juncus acutiflorus</i> (20%). ■ Concurrent development of water primrose (42%) but at a low relative frequency (22%) compared to that of the other species (the total relative frequency is greater than 100% due to the presence of several species at a given sampling point).
Reprofiling and enclosure (T3)	<ul style="list-style-type: none"> ■ Relatively high frequency of grasses and reeds, in particular <i>Agrostis stolonifera</i> (38%), <i>Paspalum distichum</i> (17%), <i>Juncus acutiflorus</i> (30%). ■ Virtual disappearance of <i>Polygonum hydropiper</i>. ■ Very low relative frequency of water primrose (8%).

■ Costs

■ The total annual cost for water-primrose management in the four towns was 19 055,19 € (before VAT) in 2011 and 9 902,88 € (before VAT) in 2012.

Method	Cost	Advantages	Disadvantages
Thermal control	565 €/ha	<ul style="list-style-type: none"> ■ No waste management. ■ Effective method after a single treatment. ■ Zones can be selected. ■ No observed impact on grasses from one year to the next. ■ Only one person required. 	<ul style="list-style-type: none"> ■ Method not advised during hot weather with wind. ■ Effective only at low speeds (2 km per hour). ■ Effective on relatively flat land. ■ Not suitable for high, dense vegetation (the burners are blocked).
Ensiling (chopping)	580 to 750 €/ha	<ul style="list-style-type: none"> ■ Grass cover is not affected. ■ Immediate removal (no deposit on site). 	<ul style="list-style-type: none"> ■ Method requires 2 or 3 people and equipment. ■ A nearby storage place is required. ■ Effective on relatively flat land. ■ Small surface area treated per hour.
Mowing	230 €/ha	<ul style="list-style-type: none"> ■ Grass cover is not affected. ■ Large surface area treated per hour. ■ Only one person required. 	<ul style="list-style-type: none"> ■ Many operations required for a given area (mowing, drying, baling, removal). ■ A nearby storage place is required. ■ The plants remain on site during the drying, creating a risk of regrowth.
Mowing and thermal control	557 €/ha	<ul style="list-style-type: none"> ■ Can reach the base of the stalks and the creeping root system when there is a significant amount of litter. ■ Only one person required. 	<ul style="list-style-type: none"> ■ Many operations required for a given area from one year to the next. ■ Grass cover is affected. ■ Encourages the creeping type of water primrose.
Ensiling (chopping) and thermal control	573 to 659 €/ha	<ul style="list-style-type: none"> ■ Can reach the base of the stalks and the creeping root system when there is a significant amount of litter. 	<ul style="list-style-type: none"> ■ Two operations for a single treatment. ■ Method requires 2 or 3 people and equipment. ■ Grass cover is affected.
Exclosure	2.50 to 2.70 € per metre distance	<ul style="list-style-type: none"> ■ No impact on the environment. ■ Rapid implementation. ■ Can be implemented over large areas. 	<ul style="list-style-type: none"> ■ Unpopular method for livestock farmers and the public.
Reprofiling	48 €/ha	<ul style="list-style-type: none"> ■ Easy implementation with local farmers. ■ Make available land abandoned by livestock. 	<ul style="list-style-type: none"> ■ Limited to small areas (a few hectares), compatible with ecological issues. ■ Reprofiling area must be fenced off long enough for the grass to grow back.

● Outlook

- Revitalisation of the meadow plant community (enhanced grazing conditions):
 - adaptation of grazing conditions (rest time for the meadow, grazing management, etc.);
 - control over water levels during the spring and summer (restoration of the hydraulic system, maintenance of canals, ditches and hydraulic installations);
 - exclosure and work on the soil in areas being colonised by water primrose (fences put up and soil turned over (Rotavator) in September).
- Direct management of water primrose by mowing or ensiling (chopping), with removal of the plants outside the wetlands to a storage area or for spreading on fields or used as bedding for livestock in a barn.

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For more information

- Internet site of the Seignanx and Adour CPIE:
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. 2013. Coordination of water-primrose management in the de l'Adour area, 98 pp.

