Large-flowered waterweed and Curly waterweed

(*Egeria densa* and *Lagarosiphon major*)

Managing large-flowered waterweed and curly waterweed by installing screens on the water bottom

Grands Lacs intermunicipal association

- Since 2003, the public board has managed over 9 000 hectares (90 square kilometres) of freshwater ponds and lakes (out of a total area of 1 500 sq. kilometres).
- The board includes an environmental department whose main missions are the management of the FR7200714 Natura 2000 site (Born and Buch wetlands), management of the hydraulic installations, the water levels in the ponds and lakes, and plant invasive alien species (IAS).
- The Born and Buch SBMP (sub-basin management plan) also contains a number of measures concerning IAS management.
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Intervention site

- The water bodies in the *Grands Lacs* intermunicipal association include two ponds and two lakes (see Table 1) listed as part of the Born and Buch wetlands Natura 2000 site.

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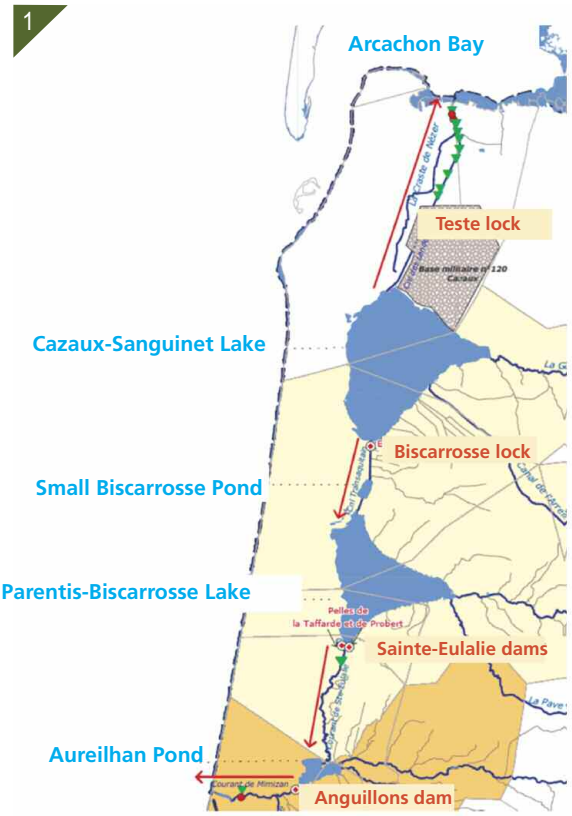


1. Functioning and hydraulic management of the water bodies (Born and Buch SBMP).

Table 1. Main characteristics of the water bodies.

	Northern lake (Cazaux-Sanguinet)	Small Biscarrosse Pond	Southern lake (Parentis-Biscarrosse)	Aureilhan Pond
Surface area (hectares)	5 800	92	3 600	340
Maximum depth (metres)	23	2	20	5.6
Average depth (metres)	8.6	0.66	6.7	1.9
Water volume (million cubic metres)	500	0.6	250	6.4
Annual renewal rate	0.23	62.5	1.02	52.5
Uses, activities, issues	Fishing, hunting, boating, swimming, military zone, drinking water	Nature reserve for hunting and fishing	Fishing, hunting, boating	Fishing, hunting, boating

Disturbances and issues involved

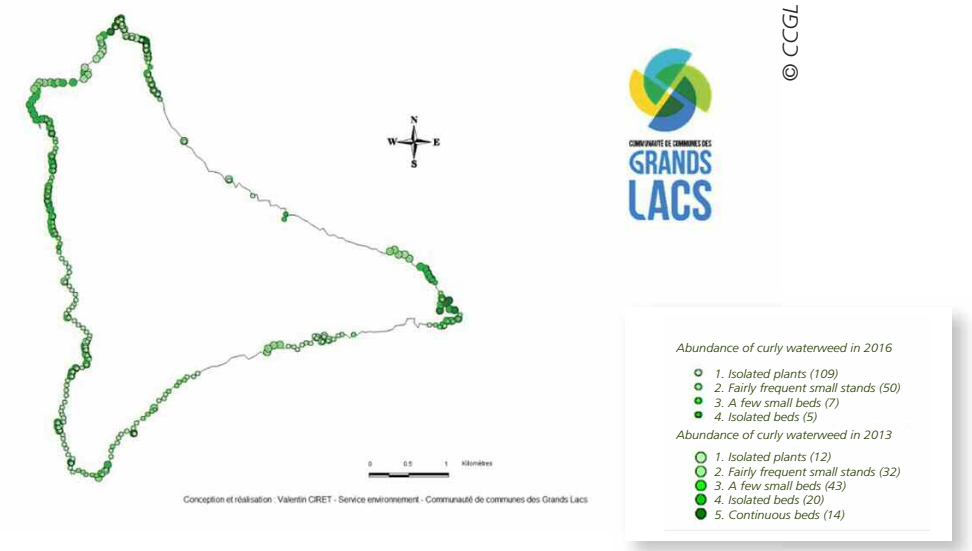
- Curly waterweed, first observed in the area in 1976, was present in the four water bodies.
- The species would appear to be progressively replaced by large-flowered waterweed that was first observed in 2005 in the Parentis-Biscarrosse Lake and subsequently spread, via the hydraulic network, to the Aureilhan Pond. It has not yet been seen in the Cazaux-Sanguinet Lake.
- The two species create serious problems for a number of uses and particularly for motor boating in and near the port zones, but also for sailing due to the development of thick beds over surface areas that can reach several hectares. The plants can foul propellers and block the progression of non-motorised craft.
- The plants, with other amphibious alien species (water primrose and parrot-feather watermilfoil) can also cause decreases in plant biodiversity, notably for swards comprising shoreweeds and lobelias.

Interventions

- The work was carried out to enable the continued use of the water bodies (fishing, boating, etc.) and to preserve the emblematic, native species of plants. It entailed two parts:
- monitoring of plant dynamics via regular mapping of several invasive plants present in the water bodies, namely curly waterweed (*Lagarosiphon major*), large-flowered waterweed (*Egeria densa*), large-flower water primrose *(Ludwigia grandiflora*) and parrot-feather watermilfoil (*Myriophyllum aquaticum*);
- experiments in a boating centre using screens laid underwater to block the light and eliminate the problems caused by the submergent plants for boating, and to reduce the risks of fragmenting the plants (propellers) and creating cuttings that could spread the plants throughout the lake.

Assessment using maps

- Since 2009, the environmental department has mapped the spread of the four invasive alien species mentioned above.



Abundance of curly waterweed in Parentis-Biscarrosse Lake from 2013 to 2016

■ The purpose of this assessment is to identify the important sectors requiring an intervention, the conditions of which depend on the physical situation and the management objectives. The assessment is carried out once every two years and covers a total of 75 kilometres of banks along the water bodies.

■ The method is based on the experimental work done by Irstea (formerly Cemagref) for the Géolandes board (Dutartre *et al.*, 1989). The complete 2016 assessment results may be downloaded at:
http://www.cdc-grands-lacs.fr/Environnement-et-Patrimoine/Lacs-et-especesvegetales-envahissantes/Especes-exotiques-envahissantes-vegetales

■ An example of the assessment results concerning curly waterweed is shown on the previous page.

■ Experiments with screens to block the light

■ Large-flowered waterweed occupied the entire basin of the port in the town of Sainte-Eulalie en Born, creating major problems for motorised boating and for recreational fishing as well.

■ The technique used was similar to that employed recently in Ireland (Lough Corrib, see the management report at http://www.gt-ibma.eu/wp-content/uploads/2016/10/La-garosiphon-major3.pdf), that is the laying of screens underwater to block the light in order to limit photosynthesis and the development of the aquatic vegetation.

■ The main difference lies in the fact that the screens used here were synthetic (polypropylene sheets with fibreglass reinforcing) and will remain definitively on the water bottom, whereas in Ireland, they were made of burlap and should decompose in a few years.

■ A technical and scientific committee was brought together (Irstea, departmental fishing federation and the *Grands Lacs* association) prior to the start of the experiment to set up a monitoring programme, notably by taking samples of plant biomass and analysing the physical-chemical parameters on the site.

■ The operational technique was validated and subsequently refined over time in conjunction with the company doing the job in order to ensure the best possible work conditions.

■ The screens were installed over three consecutive years (2013 to 2015) and cover a total surface area of 9 700 square metres.

■ Information on the experiments is provided in Table 2 below.

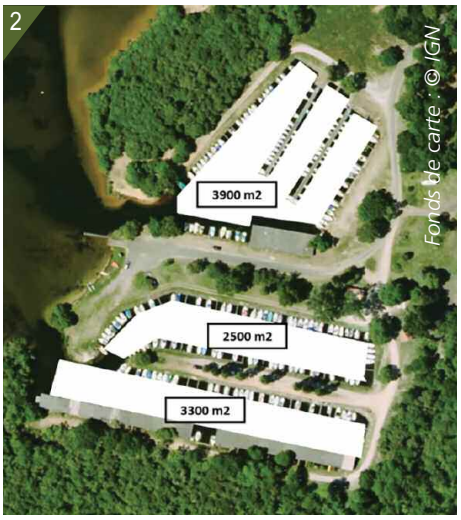
■ Before laying the screens, the plants were mowed at a depth of two metres and harvested.

■ The device used the first year (a harvester boat that cut the plants at a depth of two metres) could scrape the bottom and remove a significant part of the root system of the plants, leaving the bottom fairly smooth. The unwieldy operation of the boat near obstacles (docks, banks) led to the decision to use a more versatile, amphibious device called the Mobitrac (see Figure 4) in 2014 and 2015. The latter was also capable of scraping the bottom thanks to a specially made tool similar to cutting bars dragged along the bottom.

■ Any objects found on the bottom were also removed.

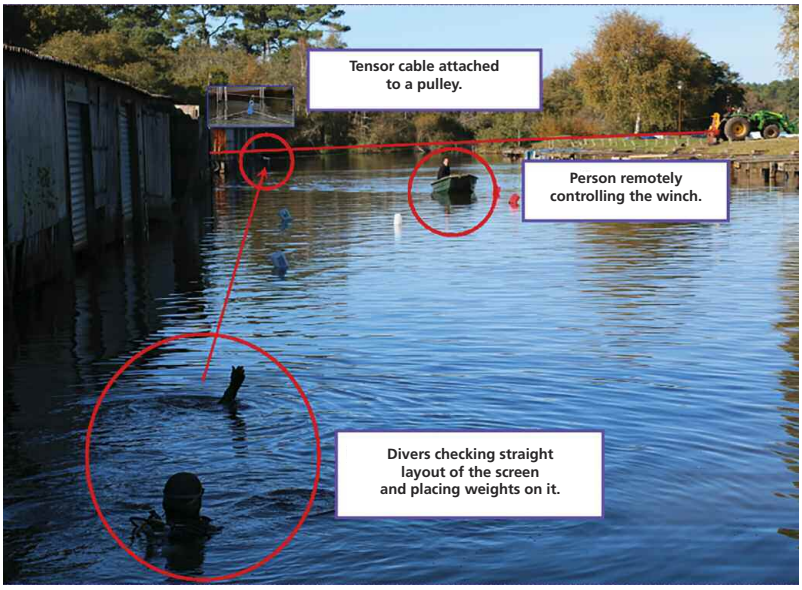
■ The screens (Soltis part number Serge Ferrari 86-2053) are micro-perforated to enable the passage of gasses produced in the water column by fermentation in the sediment (http://www.sergeferrari.com/protectionsolaire/gamme-protection-solaire/).

■ A number of selection criteria determined the final choice of the product. During the bidding procedure, tests were run on the resistance to tearing, opacity and above all immersion in water. The latter criterion was decisive given the size of the screens and the technical difficulties of laying them under water.



2. The white areas are the basins of the port in the town of Sainte-Eulalie, where the screens were placed.
3. The Mobitrac amphibious device.
4. A screen to block light and photosynthesis.
Basic map: © IGN

■ Screens were put together (thermal joining) to create large strips 4 to 5 metres wide and 50 metres long.
■ A company specialised in underwater work positioned the screens, securing them to the sandy bottom using metal connectors and solid concrete blocks.
■ Approximately 90% of the total surface area of the port basins was covered by the screens.
■ The areas under the fishing huts and the docks (floating or on pilings) were not covered for technical reasons (difficulties in unrolling and positioning the screens).



Installation of the screens.

Results and costs

■ Results

■ For technical and financial reasons, the areas under the docks and fishing huts along the banks were not covered with the screens. Aquatic plants (exclusively large-flowered waterweed) continue to grow in these areas, thus providing a habitat for fish, a positive factor for the fishing population. However, these areas must be maintained to avoid any risk of the plants spreading (via cuttings) from the beds to the nearby screens.
■ During the months following the installation of the screens, the aquatic plants disappeared from the covered areas (it should be noted that in dense beds, the biomass of large-flowered waterweed can reach 1 to 1.2 kg of dry matter per square metre).
■ Monitoring of the initial phase of work revealed little or no apparent impact on the environment, i.e. the physical-chemical parameters (dissolved oxygen, conductivity, turbidity, pH) were similar in treated and non-treated basins and fish remained present.
■ Annual maintenance on the screens is indispensable. Due to the absence of prior information on the need for maintenance, this work was not scheduled from the start. It consists of using divers to manually uproot:
- cuttings of large-flowered waterweed growing on thin layers of sediment at some points on the screens;
- a small number of plants growing up through the screens following the second

year after their installation.

■ Financial aspects

Table 2. Intervention activities, dates and costs.

Surface area (sq. metres)	Surface area (sq. metres)	Work done	Period, duration and number of people	Cost not incl. VAT
Bassin des Brochets	3 300	Harvesting	October 2013 3 days	5 000
		Laying screens	November 2013 8 days, 4 people	38 124
		Maintenance	June 2014 3 days, 4 people	6 000
Bassin des Perches	2 500	Harvesting	November 2014 2 days	7 900
		Laying screens	November 2014 4 days, 5 people	28 514
		Maintenance	May 2015 2 days, 4 people	5 250
Bassin des Sandres	3 900	Harvesting	October 2015 4 days	6 937
		Laying screens	October 2015 6 days, 5 people	54 506
		Maintenance	June 2016 3 days, 4 people	7 000
TOTAL	9 700			148 231

■ The entire cost (148 231 euros) was borne by the intermunicipal association.

Information on the project

■ This work was done in conjunction with the local certified association for fishing and protection of aquatic environments (AAPPMA) and with the support of the port users.

■ An information panel detailing the issues, objectives and work conditions was set up on site to encourage people not to disturb the screens.

■ New port regulations are planned to ensure the sustainability of the work (limited speeds, no anchors, protection of the local environment, etc.).

Outlook

■ Regular monitoring of the three basins using a bathyscope is funded by the intermunicipal association. It was also decided to sign an annual maintenance contract for the indispensable, underwater, manual uprooting of the large-flowered waterweed.

■ Before and after each maintenance operation, the contracting company must film the underwater conditions to determine degree of colonisation by the plants.

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This management report was drafted in September 2016 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/EV/cat7a-thematic-issues.html

5. Information panel for site users.

For more information

■ Internet sites: http://www.cdc-grands-lacs.fr/Environnement-et-Patrimoine/Lacs-et-plantes-invasives ; http://www.sage-born-et-buch.fr/

■ Analysis by the Washington State Ecology department: http://www.ecy.wa.gov/programs/wq/plants/management/aqua023.html

■ Guide d'analyse des projets d'intervention dans les écosystèmes aquatiques, humides et riverains assujettis à l'article 22 de la Loi sur la qualité de l'environnement. Annexe 2 : Méthodes de contrôle des plantes aquatiques et des algues. Ministère du Développement Durable, de l'Environnement et des Parcs, Québec. Updated August 2007.

■ Dutartre, A., Delarche, A., Dulong, J., 1989. Plan de gestion de la végétation aquatique des lacs et des étangs landais. Cemagref, GEREA, Etude N° 38, rapport Géolandes, 121 p.

■ Dutartre,A., Jan, G., 2012. Expérimentation de contrôle des herbiers d'*Egeria densa* dans le port de Sainte-Eulalie-en-Born (Landes) à l'aide d'écrans occultant la lumière. Irstea, rapport, 13 p.

■ Perkins M. A. et col., 1980.The use of fiberglass screens for control of Eurasian watermilfoil. J. Aquat. Plant Manag., 18. 13 – 19.

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