



Groundsel bush

(*Baccharis halimifolia*)

Managing groundsel bushes in the Spanish Basque country

LIFE + *Estuarios del País Vasco* project

■ The LIFE + *Estuarios del País Vasco* project (LIFE08NAT/E/000055) (*Restauración de hábitats de interés comunitario en estuarios del País Vasco*) attempted to counter the problems caused by groundsel bushes (*Baccharis halimifolia*) in the main estuaries of the Basque country, by focussing on the most heavily invaded areas.

■ The objectives of the planned activities for the project included:

- conservation and restoration of the EU-listed habitats affected by the progressive advance of invasive alien species and by the detrimental conditions for hydraulic dynamics;
- improvement of environmental conditions for EU-listed species and migratory birds;
- implementation of good practices for environmental restoration, including innovative experiments that can be reproduced in other regions affected by the same problems;
- raising the awareness of experts, managers and the general public concerning the difficulties caused by groundsel bushes in estuaries.

■ The total budget for the project was 1.8 million euros (50% from the EU LIFE-Nature fund and 50% provided by the Environmental department of the Basque government).

■ The project was managed by IHOBE, a public agency overseen by the Environmental department of the Basque government.

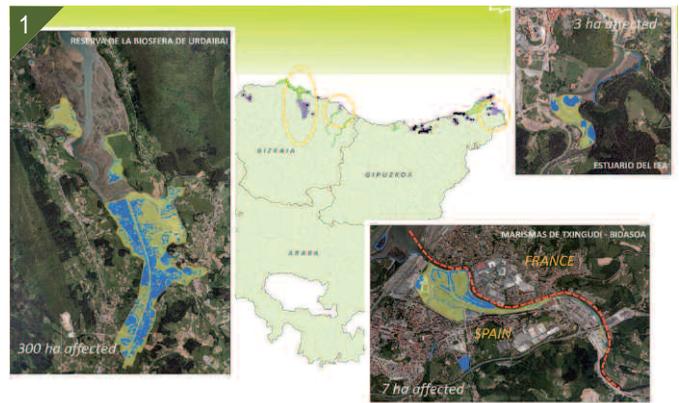
■ Contact: Estela Beteta – estela.beteta@ihobe.net

Context and issues involved

■ Groundsel bushes are considered one of the most troublesome invasive alien species in Spain. In the Basque country, it may be found in each estuary, from Txingudi (Irun) to Barbadun (Muskiz).

■ The most heavily impacted estuary was located in the biosphere reserve of Urdaibai (Bizkaia), where over 300 hectares were colonised. The reserve, a Ramsar site listed by UNESCO as a world natural heritage, comprises an array of habitats (cliffs, swamps, river plains, heathlands) and serves as a winter rest and reproduction site for many species of migratory birds.

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1. Study sites.

■ The colonising groundsel bushes competed with certain native species such as common reed (*Phragmites australis*), sea rush (*Juncus maritimus*) and aquatic warblers (*Acrocephalus paludicola*).

■ The colonisation also raised problems concerning the use of the environment, e.g. damage to banks and infrastructure, reduced access to rivers.

■ In response, an initial programme was set up. It included:

- a status report with maps on the distribution of groundsel bushes in the Urdaibai reserve (2005);
- experiments on how to control the plants using herbicides.

■ The LIFE + *Estuarios del País Vasco* project was prepared and submitted in 2008, then implemented starting in 2010.

Interventions

■ Interventions were conducted on three estuaries confronted with different geographic situations and degrees of invasion:

- the Urdaibai reserve on the estuary of the Oka River, of which 300 hectares were colonised by groundsel bushes;
- the Txingudi area on the estuary of the Bidasoa River, a RAMSAR site with 7 hectares colonised;
- the Lea River (a river basin spanning 82 square kilometres), of which 3 hectares were colonised.

■ The objective of the interventions planned in the framework of the LIFE + project was to prevent the dispersal of seeds and to protect the natural habitats of the estuaries.

■ The management techniques had to be modified during the project to take into account the



- site characteristics, e.g. water levels, tidal effects;
 - accessibility;
 - difficult climatic conditions (wind, rain);
 - appearance of new invasive species on the study sites;
 - presence of groundsel bushes on nearby sites that contributed to the renewed colonisation of the treated sites;
 - very high germination rates for seeds.
- various difficulties encountered in the field:

■ Manual uprooting

- Technique used on young plants, less than 1.5 metres tall.
- Elimination of the entire root system.
- This work was carried out year round.
- Effective technique, but expensive.

■ Cutting targeting the female plants

- Selective cutting to avoid the dispersal of seeds.
- This technique limits the spread of the plants, but does not eliminate them.

■ Herbicide

- Technique used on adult plants and new shoots.
- Active ingredient: glyphosate.
- The herbicide was applied on the trunks using brushes, following cutting.
- This technique is possible only under favourable weather conditions (no wind or rain).
- Requires safety measures (gloves, masks).
- Highly effective and less expensive than manual uprooting.

■ Monitoring of the management work

- On the three study sites, monitoring was set up for 45 plots (3 metres x 3 metres) and 164 transects (10 m x 50 m).
- Monitoring was initiated two months after the work.
- Measured parameters:
 - presence and abundance of native species to measure the degree of habitat restoration;
 - regrowth of groundsel bushes to determine the effectiveness of the work;
 - development of seeds to assess the risk of a new invasion following the work..

Results and costs

■ Results

- A total of 570 000 adult plants were treated on the three sites.
- Over 5 million seedlings were uprooted.

Overall results of the management work (source: IHOBE).

Method	Treated surface area (ha)			TOTAL
	2011	2012	2013	
Herbicide, first treatment	139.69	38.27	14.50	192.46
Herbicide, second treatment	78.08	55.49	138.75	272.32
Manual uprooting	80.31	81.76	72.68	234.75
Selective cutting			79.78	79.78
TOTAL	298.08	175.52	305.71	781.41



2. Urdaibai biosphere reserve.
3. Manual uprooting.
4. Use of a herbicide.
5. Monitoring regrowth of groundsel plants.

■ Regrowth of groundsel plants

■ A reduction was observed on all three sites, particularly on the least colonised site (the estuary of the Lea River where groundsel plants were totally eliminated from the three-hectare colonised area).

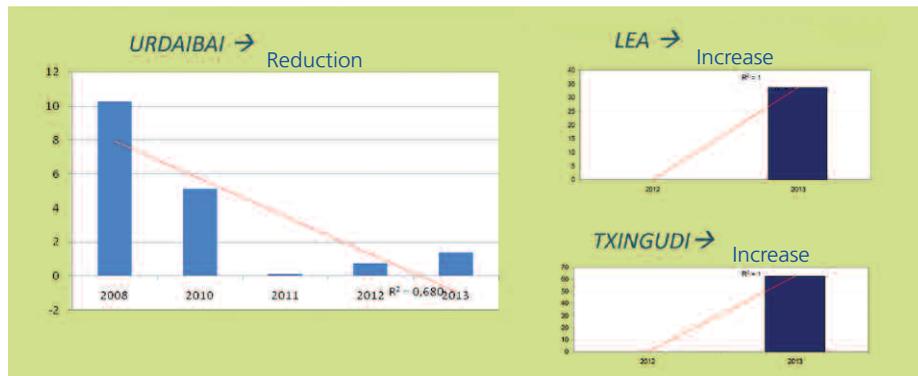
Change in the observed number of groundsel plants starting to grow again.



■ Effects on the density of seedlings

■ A reduction was observed in the Urdubai reserve, but an increase in the estuaries of the Lea and Txingudi Rivers.

Change in the observed number of groundsel seedlings.

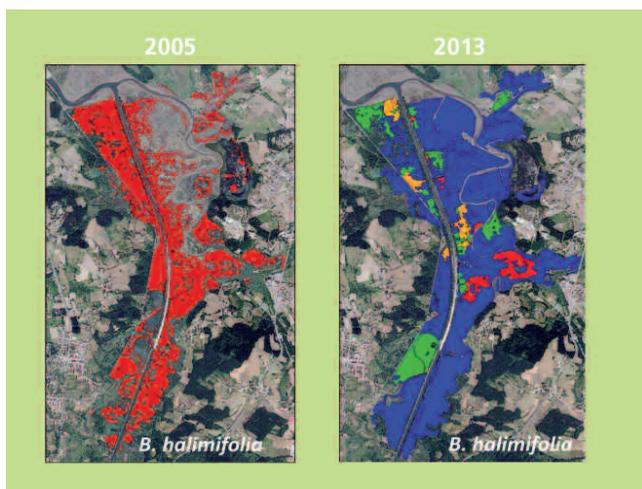


■ Detailed results for the Urdaibai reserve (2012)

- Percentage of new shoots is 26%.
- Estimated germination capacity of the seed bank in the soil:
1 seedling per square metre compared to 10.28 seedlings observed for the status report in 2008.
- In terms of habitat restoration, the native species were more abundant, namely *Atriplex prostrata*, *Phragmites australis* (together 41%), *Juncus maritimus* (18%), *Elymus athericus* (9%).
- Groundsel bushes were still present in 70% of the treated surface areas, with an average abundance of 10% (maximum abundance 50%).
- Between 10 and 35 workers were present on each site.

Assessment of project costs.

Method	Average cost (€ per hectare)
First treatment	2 988
Second treatment	2 277
Uprooting of seedlings	1 081
Manual uprooting	1 789
Selective cutting	486
TOTAL	8 621



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Results of management work in the Urdaibai reserve (groundsel bushes shown in red).

Outlook

- The methods used to manage groundsel bushes have proven their effectiveness, however the results vary depending on the site:
 - on heavily colonised sites, the rate of regrowth is very high. The plants are managed and their extension limited through a combination of techniques (uprooting of plants and seedlings + use of a herbicide);
 - on sites where the presence of groundsel bushes is limited to certain spots, the rate of regrowth is low and total eradication is possible.
- The initial work to eliminate the plants is effective, however the subsequent germination rate of seedlings remains very high.
- Manual uprooting is the most effective technique.
- The techniques employed and the work conditions must adapt to the situation on each site.
- Surveillance and monitoring after the work is indispensable to ensure effective results.
- Coordination and data exchange are indispensable for the management of invasive species spanning several regions.
- Finally, further scientific research is required on the species biology, intervention techniques and the response of groundsel plants to the management work.

Information on the project

- Communication efforts in the framework of the LIFE + programme:
 - awareness raising of the general public through signs and informational documents, videos, an internet site, an educational programme, exhibitions;
 - drafting of a "good-practices guide" for management (a French version will soon be available);
 - presentation of posters during conferences and workshops, e.g. Néobiota 2012 (Turkey), EWRS 2014 (France);
 - creation of an international work group for groundsel bushes (two meetings during the management programme).

Author: Emmanuelle Sarat, IUCN French committee



6. 7. New seedlings in a previously treated area.
8. Results of management work in the estuary of the Bidasoa River.

For more information

- LIFE project + *Estuarios del País Vasco*: www.euskadi.net/life_estuarios
- Beteta E., 2014. LIFE + project, Estuaries of the Basque country. *Baccharis halimifolia* management on the Atlantic coast. 4th International symposium on weeds and invasive plants. Montpellier, 20 May 2014. 37 pp.
- Beteta E., 2012. LIFE + project, Estuaries of the Basque country. Control and elimination of *Baccharis halimifolia* L. in Urdaibai. Poster presented at the Seventh international conference on biological invasions, Neobiota 2012, Halting Biological Invasions in Europe. From Data to Decisions. Pontevedra, Spain, 12-14 September 2012.