



American bullfrog

(*Lithobates catesbeianus*)

Managing the American bullfrog in Sologne (Loir-et-Cher department)

Beuvron basin management board (SEBB)

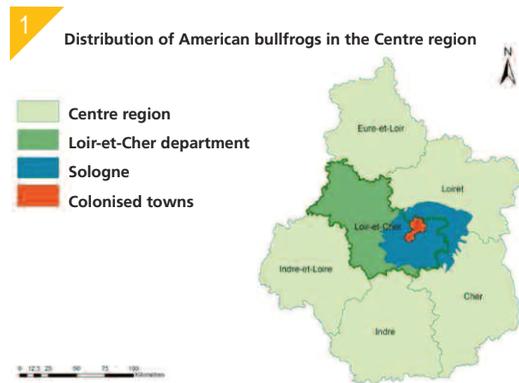
- SEBB is the project supervisor.
- SEBB is a local government created in 1996.
- Its main missions are to manage the rivers in the Beuvron basin, including restoration and maintenance of the rivers, conducting the necessary studies on river management and projects against invasive alien species (both plant and animal).
- Workforce and territory. One policy officer for the basin contract, a river technician, four operators for river maintenance and a part-time secretary make up the SEBB personnel. The board represents 70 towns in the river basin, covering a total of 2 191 square kilometres.
- Contact: Dominique Béguin - beguin.sebb@orange.fr

Loir-et-Cher departmental committee for the protection of nature and the environment (CDPNE)

- CDPNE is the project manager.
- It is a non-profit association.
- The main missions include managing nature reserves (Grand Pierre et Vitain national nature reserve, Pontlevoy regional geological nature reserve, Vallées aux Fleurs - Fossé archeological reserve, Grouais de Chichery - Pezou archeological and geological reserve), providing environmental training to school children and adults, consulting and environmental studies (fauna, flora, habitats, waste, water, carbon footprint).
- Workforce of 13 in the Loir-et-Cher department.
- Contact: Gabriel Michelin - gabrielmichelin.cdpne@orange.fr

Intervention site

- Sologne is a "territory", covering approximately 5 000 square kilometres spread over three departments (Cher, Loir-et-Cher and Loiret). * It is divided into two main parts:
 - Grande Sologne, including the ponds (between the Sauldre and Beuvron Rivers), the section near the city of Orléans (between the Beuvron and Cosson Rivers) and the section along the Cher River;



1. Distribution of American bullfrogs in the Centre region.

- the wine-growing section in the western part of the river basin.

- This area is home to a very large number of wetland species and is an important ecological site in Europe.
- The 10 000 hectares of stagnant waters constitute a good habitat for amphibians and the two large rivers, the Beuvron and the Tharonne, flowing through the area are open channels for movement.
- The dense network of ditches between ponds, supplying pools and along roads also facilitate the movement of aquatic species.
- American bullfrogs were first observed in Sologne in 2002.
- Since then, three towns in the middle of the ponds section of Sologne have been colonised.

Disturbances and issues involved

■ Impacts on native species

- There is a significant loss of biodiversity on colonised sites due to competition and predation. In Sologne, analysis of stomach contents revealed that the bullfrogs consume amphibians, invertebrates, reptiles, fish and even small mammals and birds. American bullfrogs represent a direct threat to 13 protected species of amphibians.
- The species is also a healthy carrier of chytridiomycosis, a pathology transmitted to native amphibians. In Sologne, the Chytridiomycota phylum was analysed and found to be non-lethal.



■ Impacts on land use

- Competition with and predation on fish communities, i.e. impact on fishing. It is necessary to check any caught fish to avoid transporting American bullfrog tadpoles outside the colonised areas.
- Direct predation of alevins.

Interventions

In Sologne, a management programme was established for the period 2003 to 2008. During that time, a number of elimination methods were tested. On the basis of the results obtained over the five-year period, an eradication programme was established for the period from 2009 to 2013 using the most effective techniques.

■ Environmental monitoring

- Monitoring was conducted prior to the eradication operations on colonised and nearby sites to pinpoint the range of the species and the invasion front.
- The work was initiated at the end of the month of May when American bullfrogs exit hibernation.
- A large-scale survey was run in 2009 on 9 areas, each comprising 10 sectors (2 x 2 km) in the colonised territory, covering a total of 36 000 hectares (219 ponds in 11 towns).
- A team of 2 people inspected each area twice.
- Night-time listening:
 - the team went to 2 sites in each sector and listened for 15 minutes. If calls were heard in a sector, all sites in the sector were then inspected during the day;
 - in addition to listening, searchlights and binoculars were used, as were dip nets to find tadpoles.
- Daytime inspections:
 - observations using binoculars for adults, juveniles and spawn, dip nets for tadpoles and spawn;
 - using binoculars, between 1 and 10 observations were made on each site (10 minutes per observation, every 100 metres);
 - using a dip net, 3 samples were taken on each site in vegetation-rich areas in order to catch tadpoles;
 - since 2010, standard monitoring techniques have been used during the daytime on small sites and environmental-DNA monitoring has been used on larger sites.
- Environmental DNA:
 - this technique has been used since 2011. It consists of detecting in water samples DNA fragments left by organisms in the environment (see Figure 4);
 - the technique enhances species detectability when small numbers of the species inhabit the site, provides information on the invasion front and can be used to check that a species has been effectively eradicated from certain ponds;
 - it takes much less time in that more precise detection can be achieved in 2.5 times less time than a standard survey at night using searchlights;
 - in 2013, water samples (one every 20 metres along the banks on each site) were taken on two different days during the last half of July and sent to a lab (Spygen in the Savoie department) for analysis.



2. Adult female frog, 550 grams, with a 77 cm grass snake in its stomach.
3. Sorting American-bullfrog tadpoles following their capture in a pond.
4. Drawing water samples for analysis using environmental DNA to detect the presence of American bullfrogs.

■ Work to control the population of American bullfrogs

- A number of methods are used in parallel.
- Search and remove spawn:
 - spawn is destroyed as soon as it is discovered to prohibit the reproduction of the population;
 - this work has been carried out since 2006 on priority sites;
 - every 4 days, a team inspects the sites.
- Shooting campaigns:
 - the work is done at night (22.00 to 05.00) in teams of two people, two nights per week;
 - following authorisation by the Prefect;
 - males are located by their calls, females and juveniles are located using a searchlight;
 - the targets are first checked prior to shooting to avoid confusion with green frogs;
 - assistance has been provided by ONCFS since 2002 and by volunteers since 2010.
- Trap barriers, fishing and draining of ponds:
 - barriers are a means to catch all the amphibians entering or leaving a site;
 - the traps are checked daily to free the native species;
 - seine fishing is used to catch the fish prior to draining ponds.
- Screens are placed in outlets to block the passage of tadpoles:
 - once the water level has dropped, the tadpoles can be removed.

Results and assessment for the period 2003 to 2013

■ Environmental monitoring

Since 2002, American bullfrogs have been detected on a total of 90 sites. In 2013, 37 sites were colonised in the beginning of the year and 22 were still colonised after the management work.

The species had been completely eradicated from 20 sites by 2013.

■ Work to control the population of American bullfrogs

- Removal of 11 spawns from 7 sites, compared to 57 on 20 sites in 2012. Tadpoles were found on 10 sites in 2012, but on only 3 sites in 2013.
- Shooting, organised in 68 sessions on 32 sites, eliminated 96 bullfrogs weighing over 100 grams and 891 weighing less than 100 grams. Since the start of the shooting campaigns, the average weight of adult bullfrogs has dropped from 461 to 200 grams, i.e. a drop of over half the average weight of the eliminated bullfrogs compared to the initial measures launched in 2003.
- The species continues to reproduce on only 10 sites and the number of reproducers per site has dropped from 9 to 3.
- Only one site was fished and drained in 2013 and no bullfrogs were caught

■ Human resources in 2013

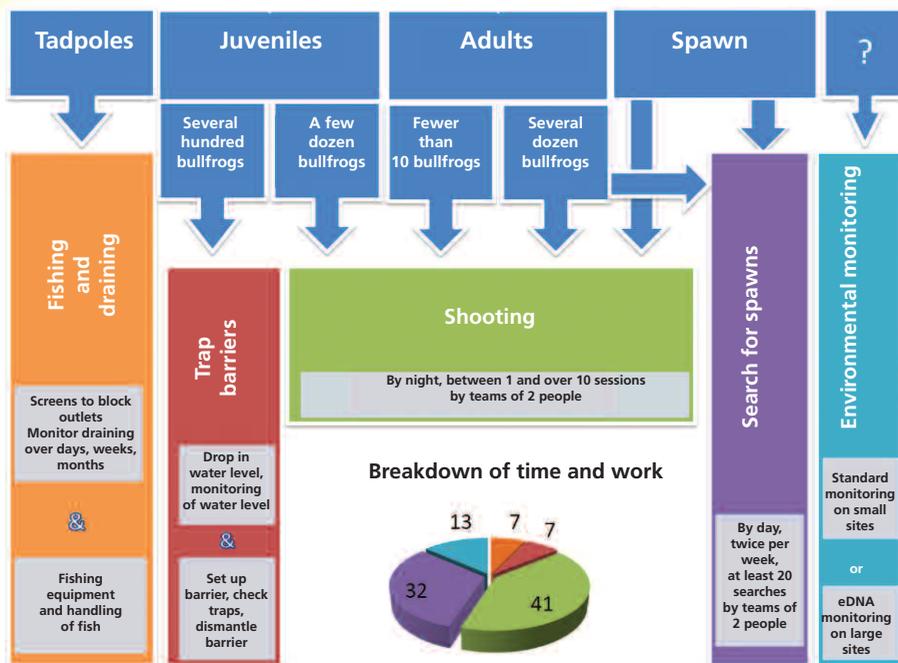
- 52 man-nights by volunteers.
- 69 man-nights with funding.
- 32 volunteers.

■ Coût du programme 2009-2012 : 342 645 €

- Of which, 15 850 euros (85 kits) for environmental-DNA analysis.



5. A team for night-time shooting.
6. Barrier and traps set up for American bullfrogs around a pond.
7. Document to raise awareness.



Source: Departmental committee for the protection of nature and the environment 2014

Decision aid for the work required on sites depending on the biological stage of the species.

■ Funding

- Pays-de-Grande-Sologne (LEADER programme) (32%);
- Centre region (25%);
- Centre regional environmental directorate (14%);
- SEBB (17%);
- Beauval Nature association (12%).

Information on the project

- Annual reports were produced on the preliminary and operational phases.
- Efforts were made to raise the awareness of the general public (brochure, public meetings).
- A documentary film was made by Philippe Henri, titled "La Grenouille taureau, une intruse en Sologne".
- Articles appeared in the press.
- Scientific articles were published in "Science Eaux et Territoires" and in a collective document on the Loire Grandeur Nature plan.
- Presentations of the work have been made in symposia and in professional training courses.

Outlook

- The results of the management plan are positive, but the work must be pursued on approximately 30 sites.
- The 2009-2013 programme ended and the search has begun for funding partners in 2014. Plans are being made for a national programme on invasive amphibians.
- Future work:
 - continued monitoring using the environmental-DNA technique;
 - inspections for spawns and shooting campaigns primarily on sites where reproduction of juveniles has been observed (36 priority sites).

Author: Emmanuelle Sarat, Comité français de l'UICN

For more information

- www.bassin-du-beuvron.com
- www.cdpne.org
- The initial version of this document was first published in:
 - Sarat E. (coord.) 2012. Vertébrés exotiques envahissants du bassin de la Loire (hors poissons) connaissances et expériences de gestion. Office national de la chasse et de la faune sauvage, Plan Loire Grandeur Nature, 128 pp.
 - CDPNE et SEBB. 2012. Grenouille taureau *Rana catesbeiana* (Shaw, 1802) : Bilan des prospections et de la phase opérationnelle 2013. CDPNE et SEBB. 52 pp.
 - Michelin G. 2012. La Grenouille taureau en Sologne, de la lutte à l'éradication. Sciences Eaux et Territoires, 6: 50-56.
 - Michelin G. et Béguin D. 2013. Grenouille taureau : menaces et mise en place d'un programme d'éradication en Sologne du Loir-et-Cher. Journées d'échange sur les espèces exotiques envahissantes du bassin de la Loire, Tours, 29-30 octobre 2013. 43 pp.