



American bullfrog

(*Lithobates catesbeianus*)

2003–2007 multi-year programme for the management of American bullfrogs in the Aquitaine region

Gironde federation for fishing and the protection of aquatic environments

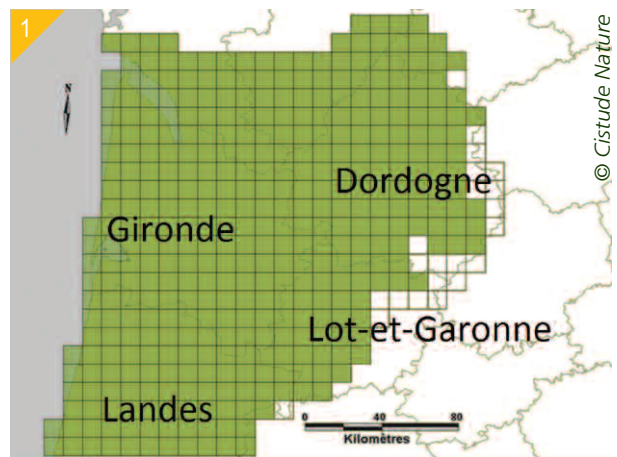
- The federation was recognised as a “public service” organisation by the Water law (30 December 2006) and operates under the stipulations of the 1901 law on non-profit associations.
- It groups 58 certified associations for fishing and protection of aquatic environments (AAPPMA) and a certified departmental association of recreational fishermen using nets and traps (ADAPAEF).
- It oversaw the 2003-2007 multi-year programme for the eradication of American bullfrogs.

Cistude Nature Association

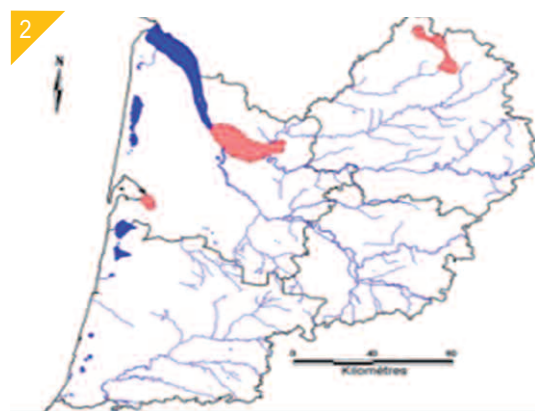
- The association provided technical and scientific management of the 2003-2007 multi-year programme to eradicate American bullfrogs.
- The main missions included:
 - managing all work in the field, including surveys, tests on traps, population monitoring (distribution, ecological characteristics, etc.);
 - training and assistance for the initial interventions in the field and for the checks on the presence of American bullfrogs;
 - work to raise awareness, consisting of distributing brochures in the mailboxes of owners of colonised sites and the drafting of announcements in the letters sent by the towns confronted with the problem.
- Contact: Matthieu Berroneau - matthieu.berroneau@cistude.org

Intervention site

- In the Aquitaine region, American bullfrogs were introduced in 1968 in the town of Arveyres. The main management issue concerning the species is the preservation of native amphibians impacted by its presence:
 - large quantities of other amphibians have been found in the stomachs of bullfrogs;
 - high densities of American bullfrogs result in inter-species competition because the animals fill an important ecological niche that is very similar to that of native species, particularly green frogs (*Pelophylax* spp.);
 - they can be a health carrier of the fungus responsible for chytridiomycosis (*Batrachochytrium dendrobatidis*), a disease that kills native species.



© Cistude Nature



© Cistude Nature

1. Area studied for the eradication programme.
2. The red zones indicate the presence of American bullfrogs in the Aquitaine region.

Disturbances and issues involved

- In the Aquitaine region, American bullfrogs were introduced in 1968 in the town of Arveyres. The main management issue concerning the species is the preservation of native amphibians impacted by its presence:
 - large quantities of other amphibians have been found in the stomachs of bullfrogs;
 - high densities of American bullfrogs result in inter-species competition because the animals fill an important ecological niche that is very similar to that of native species, particularly green frogs (*Pelophylax* spp.);
 - they can be a health carrier of the fungus responsible for chytridiomycosis (*Batrachochytrium dendrobatidis*), a disease that kills native species.

Interventions

■ The multi-year programme to eradicate American bullfrogs

■ Objectives of the programme:

- determine the distribution of American bullfrogs in the Aquitaine region;
- understand the dispersal and colonisation mechanisms of the species;
- determine the most effective capture and eradication techniques;
- raise awareness concerning invasive alien species.

■ Numerous regional stakeholders participated, including ONCFS 40, ONCFS 33, the Landes de Gascogne regional nature park, the Périgord Limousin regional nature park, the Onema local office in Dordogne and Cistude Nature.

■ Study on the American bullfrog population in the Aquitaine region

■ The distribution of the species was determined by listening for the calls of males in two phases. During the first, seven water bodies were randomly selected in each grid sector (10 x 10 km each) and 386 sectors were surveyed. During the second phase, the sectors where the species was previously detected were divided into 5 x 5 km sectors and all water bodies were surveyed.

■ Species dispersal and colonisation mechanisms:

- radio-monitoring of 25 bullfrogs captured randomly to learn more on their vital habitats, habitat use, mortality rates and migratory movements;
- monitoring of the dispersal of juveniles by setting up nets with capture buckets (trap barriers);
- study of bullfrog diets by analysing stomach contents.

■ The results of the study were used to propose recommendations for the trapping and eradication tests:

- concentrate eradication efforts during the summer when bullfrogs gather near permanent water bodies;
- shoot the adults rather than draining and drying the ponds because almost 30% of bullfrogs hibernate outside of the water, under leaves or in burrows;
- limit development during the juvenile stage when the species disperses over short distances.

■ Trapping tests

■ In order to formulate the most effective possible protocol for the elimination of American bullfrogs, Cistude Nature conducted trapping tests on sites in the towns of Ambarès-et-Lagrave and Izon in the Gironde department.

■ 2003 and 2004, tests were run on different types of traps taking into account the biological stages of the bullfrogs.



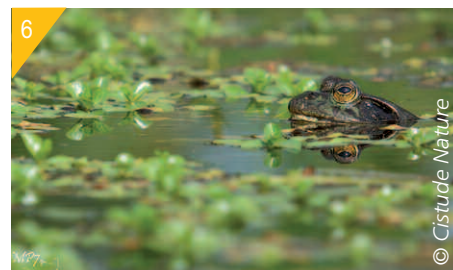
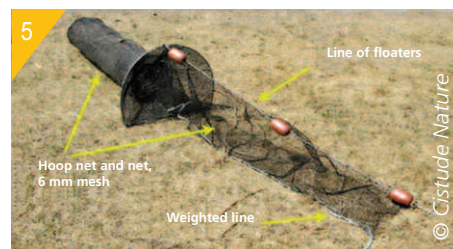
3. Trap barrier used to monitor juveniles.

4. Equipment used to collect spawns.



Trapping tests carried out in 2003 and 2004.

Year	2003	2004
Types of traps	<ul style="list-style-type: none"> ■ Hoop net for minnows ■ Hoop net for catfish ■ Fyke net made of white nylon ■ Large shelter trap ■ Small shelter trap ■ Floating shelter trap 	<ul style="list-style-type: none"> ■ Hoop net for catfish; fyke net with finer mesh, large shelter trap ■ New system with fyke nets (a net positioned near the banks in the water)
Conclusions	<ul style="list-style-type: none"> ■ The most effective traps for American bullfrogs are: ■ hoop nets for catfish to trap tadpoles and to a lesser degree juveniles, fyke nets for tadpoles, adults and subadults ■ Large and floating shelter traps for adults and subadults 	<ul style="list-style-type: none"> ■ Shelter traps are effective for adults and subadults ■ Juveniles are difficult to capture ■ Shooting is advised for adults and juveniles ■ Fyke nets were abandoned because they were too fragile and less effective than hoop nets for catfish



5. Single-entry hoop net with net.
6. American bullfrog.

- 2005 and 2006, tests were run on the best trap layout and densities for catching bullfrog tadpoles:
- single and double-entry hoop nets with attached netting, developed in conjunction with a specialised firm;
- prior to each trapping campaign, capture-mark-recapture (CMR) was carried out to determine the tadpole population and measure the effectiveness of the method.

Summary of the work done in 2005 and 2006.

Year	2005	2006
Study protocol	<ul style="list-style-type: none"> ■ Intervention on the Saint-Denis site (town of Ambarès-et-Lagrange) <ul style="list-style-type: none"> ■ CMR from 12 to 18 May ■ Intervention from 01 July to 10 August, 40 days of effective trapping ■ 30 traps laid in water, along the banks, every 8 metres 	<ul style="list-style-type: none"> ■ Intervention in the town of Ambarès-et-Lagrange <ul style="list-style-type: none"> ■ CMR in April ■ Intervention from 28 April to 08 June, 19 days of effective trapping ■ Two sessions to test the positioning of traps were run in the water body

■ Shooting trials

- Cistude Nature also participated in setting up shooting trials to determine the effectiveness of the technique in eliminating American bullfrog juveniles and adults.
- The trials were conducted in conjunction with the National agency for hunting and wildlife (ONCFS in the Gironde department), following authorisation by the Prefect, in the concerned towns from 2004 to 2006.
- The main site was located in the town of Izon.
- The method involved:
 - interventions in the pools on the Gabauds site (1 200 square metres) and in the nearby ponds (La Naude and the wastewater-treatment plant) in the town of Izon;
 - a total of six sessions from 2004 to 2006;
 - night-time hunting by a two-man team where the first person must identify the animals with a flashlight and the second shoots the identified frogs with an air rifle or a .22 long rifle;
 - retrieval of the animals immediately or during the following shooting trial.

Results

■ Study of animal populations

- Study of isolated groups spread over two departments.

Distribution of isolated populations of American bullfrogs.

Department	Gironde		Dordogne		
Sector	Libourne / St André-de-Cubzac	Arcachon bay	St-Saud-Lacoussière	Piégut-Pluviers	Thiviers
Surface area	250 km ²	12 km ²	9 km ²	6 km ²	7,5 km ²
Number of colonised water bodies	300	18	29	25	24

- American bullfrogs are a versatile species, capable of adapting to very different environments. Individuals differ widely in terms of their home range and their use of the habitat.

- Ideal sites for colonisation are those with abundant aquatic and riparian vegetation.

- Their diet varies, but consists essentially of aquatic prey:

37% amphibians (American bullfrog, green frogs (*Pelophylax* spp.) and the Mediterranean tree frog (*Hyla meridionalis*)), 32% insects and 13% crustaceans (Cistude Nature, 2007 annual report).

■ Trapping tests

- 2005:

- 5 772 tadpoles captured out of an estimated 8 400 ($\pm 2\ 200$);

- the tests were halted after 40 days because the number of catches dropped after the 30th day.

- 2006:

- a total of 9 380 tadpoles were caught (it was not possible to compare this data with the CMR results);

- trapping results were better when the traps were laid in areas with ample vegetation and when single-entry hoop nets were used with the nets running toward the bank.

■ Shooting trials

Results of the shooting trials.

Dates	01 Sept. 2004	07 Sept. 2004	03 May 2004	18 July 2004	19 July 2005	20 July 2005
Length of trial (one team)	160 minutes	190 minutes	360 minutes	220 minutes	110 minutes	105 minutes
Shots fired	26	29	38	16	8	5
Animals retrieved	16	19	20	12	4	3
Animals hit, but not retrieved	4	5	12	1	1	1



- Observations on the site following the trials:
 - no American bullfrogs were observed in September 2005;
 - one American bullfrog and large numbers of green-frog tadpoles were observed in May 2006. A shooting campaign was organised during which 12 frogs were killed and retrieved. The recommended air rifle was used because higher firing rates are possible targeting both adults and juveniles (the ammunition is inexpensive), even though it is much less powerful than a .22 long rifle.

■ Assessment

- Protocols were drafted for shooting adults, trapping tadpoles and collecting spawn.
- A plan to eradicate American bullfrogs from the Périgord Limousin regional nature park is under way using the proposed protocols.
- The project to set up an eradication plan for the Arcachon basin and the area around the town of Libourne was not launched due to a lack of funding.

Information on the project

- A total of 24 000 brochures and 350 posters were produced and distributed to raise awareness concerning the invasion of American bullfrogs and present the management programme.
- An internet site on the topic existed from 2004 to 2010.
- Information on the project was supplied via press articles as well as radio and television programmes.

Author: Sandra Fernandez, Irstea



7. Documents to raise awareness.

For more information

- Cistude Nature:
<http://www.cistude.org/>
- Cistude Nature. 2007. Rapport annuel d'activité. Programme pluriannuel de mise en place d'une éradication de la Grenouille taureau : répartition, colonisation, tests d'éradication, sensibilisation. 38 pp.
- Information on American bullfrogs on the Cistude Nature site:
<http://www.cistude.org/index.php/conservation/especes-exogenes/grenouille-taureau>