



American bullfrog

(*Lithobates catesbeianus*)

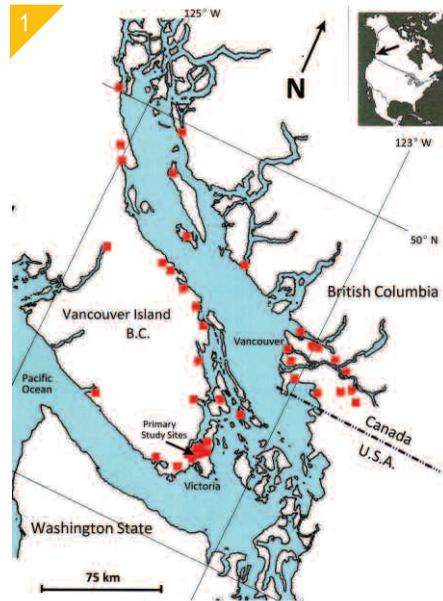
Managing the American bullfrog on Vancouver Island, BC, Canada

Context and issues involved

- Vancouver Island is the largest island on the western coast of North America (32 134 square kilometres). The species was introduced to the island after the Second World War, in the framework of a project for war veterans in view of breeding the animals for human consumption. The commercial endeavour was a failure and the American bullfrogs were released to the natural environment.
- The species dispersed via small populations along the entire south-eastern coast of the island and to a number of nearby, smaller islands. It has also spread to the city of Vancouver and the nearby coastline.
- American bullfrogs compete with several species of native frogs, including the northern red-legged frog (*Rana aurora*), the foothill yellow-legged frog (*Rana boylei*) and the Pacific tree frog (*Pseudacris regilla*). They are also a healthy carrier of *chytridiomycosis*, a disease causing death in native amphibian species.
- In 2006, a programme was launched by the Water department (Vancouver regional authorities) to design, field test and improve new equipment and techniques to capture the American bullfrogs.

Interventions

- Modified electrofishing equipment was used. A prototype of an electrofrogger shock wand was developed and subsequently patented in 2012. The wand is supplied with power from a 24 V battery.
- The manual capture technique targeting adult and juvenile American bullfrogs was tested three years, from 2007 to 2009, on two sites colonised by the species since 2006, namely Amy Pond and Glen Lake.
- Capture operations:
 - adults and juveniles are caught at night, from April to October, using a boat;
 - the team consists of 2 people;
 - each operation lasts 4 hours;
 - operations are conducted 3 to 5 nights per week, depending on the weather conditions;
 - bullfrogs are located using a searchlight and listening for calls;
 - one person manoeuvres the boat, the second locates and catches the adults and juveniles;
 - blinded by the searchlight, the bullfrogs tend to freeze;



1. Study site and distribution of American bullfrog populations on Vancouver Island.

- the electrofrogger shock wand generates an electric field on the water surface approximately 50 centimetres in diameter around the targeted bullfrog. The electric field temporarily paralyses the bullfrogs for 30 seconds, enough time to catch them;
- the captured bullfrogs are placed in a modified freezer that reduces their body temperature to 2°C. After 12 hours, the bullfrogs are transferred to a standard freezer where they die.

Results and assessment

■ Results from 2007 to 2011

At the end of the season in 2009, the two age groups (adults and juveniles) of American bullfrogs had been eliminated from the two sites:

- Amy Pond, spawning was blocked starting in 2007 by eliminating the adults prior to the reproductive period. In 2009, there were no longer any tadpoles on the site, however a few juveniles arrived from nearby ponds.
- Glen Lake:
 - in 2007, a single spawn was observed in the lake, as well as a few tadpoles first observed in 2006;
 - during the summer of 2007, management operations focussed on areas with high densities of juveniles. The presence of many thickets and willows made the work difficult;

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- in 2009, a few adults and juveniles from nearby ponds were observed.

■ Financial aspects

- The average cost of a night of work was 400 Canadian dollars (276 euros). A total of 3 361 bullfrogs were caught, for an overall cost of 25 600 CAD (17 100 €) over 3 years on the two sites.
- From 2006 to 2014, over 30 000 American bullfrogs were caught in approximately 20 colonised lakes on the Saanich peninsula.



2. Capturing American bullfrogs.

Table showing the operational results and costs (2007 to 2011).

Site	Perimeter	Nights			Bullfrogs captured			Annual cost (€)			Bullfrogs captured over 3 years	Total cost (€)
		2007	2008	2009	2007	2008	2009	2007	2008	2009		
AMY POND	0.4 km	8	10	5	871	661	55	2 200	2 700	1 400	1587	6 300
GLEN LAKE	2 km	16	16	9	1376	366	32	4 400	4 400	2 000	1774	10 800
TOTAL		24	26	14	2247	1027	87	6 600	7 100	3 400	3361	17 100

Information on the project

- The electrofrogger shock wand was patented and the equipment will be marketed in conjunction with the Smith-Root company.
- An article was published in the IUCN document titled *Island Invasives, eradication and management*.
- The bullfrog control group works with CABI on invasive alien species (*Invasive species compendium*).
- An article was published in *Neobiota* on the stomach contents of American bullfrogs.

Outlook

- In the two study areas, where a single case of successful reproduction was observed, eradication should be possible after three more years of work.
- Sites that have been colonised for longer periods will require operations spanning more time. Early detection is of the utmost importance.
- The electrofrogger shock wand has no effect on tadpoles. Additional management measures (draining, seine netting) are required to control this development stage.
- The degree of effort required varies from one site to another, depending on the local situation (accessibility, layout, proximity to a colonised site and migratory habits of American bullfrogs).
- The management work has been done since 2006 in the Victoria basin on Vancouver Island.
- From 2007 to 2011, the work was conducted on 16 sites and 445 passage ways. A total of 15 508 bullfrogs were removed. However, the species continues to progress.
- Local authorities are considering additional measures (habitat restoration, informing and raising the awareness of the public).
- The management work will be pursued and reinforced with the creation of a second team in 2014. The work will be carried out on over 20 lakes along a corridor on the isthmus of the largest peninsula and focussing on areas recently colonised by American bullfrogs.

For more information

- www.smith-root.com
- www.bullfrogcontrol.com
- www.crd.bc.ca
- Shock wand for aquatic creatures. U.S. patent number 8 091 269. United States Patent and Trademark Office.
- Orchard, S. A. 2011. Removal of the American bullfrog, *Rana (Lithobates) catesbeiana*, from a pond and a lake on Vancouver Island, British Columbia, Canada. *Island invasives: eradication and management*. IUCN (Gland, Switzerland) 1–542.
- Jancowski, K. et Orchard, S. 2013. Stomach contents from invasive American bullfrogs *Rana catesbeiana (Lithobates catesbeianus)* on southern Vancouver Island, British Columbia, Canada. *Neobiota* 16, 17–37.
- City of Langford. 2012. Park, recreation, culture and beautification committee. Bullfrog eradication program results, 2011. 5 pp.
- Errico C. 2013. American bullfrog management on Vancouver Island. 20 pp.