

# Habitat restoration as a management tool for invasive American bullfrog

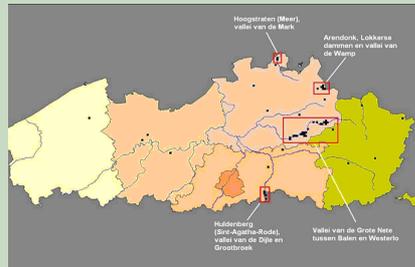
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Management of American bullfrog is extremely challenging due to the species' flexible life history and population biology. For small, isolated populations in shallow ponds, eradication with double fyke nets can be a feasible option. For large meta-populations, mitigating bullfrog impact on native biota can be achieved with an integrated approach of control and habitat restoration.

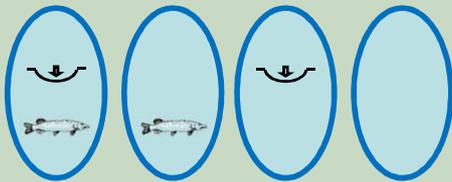
## Introduction

The control of invasive alien species is essential for securing native biodiversity. For American bullfrog, *Lithobates catesbeianus*, suspected to impact on native amphibians around the globe, comprehensive management techniques are currently absent. In Flanders small and isolated populations are actively managed through trapping with double fyke nets. In large and interconnected meta-populations, such active control is not an option because of practical problems and budget constraints. Here, we explored possibilities of passive management through habitat restoration.



## Approach

- Full-factorial, multi-year **experiment** in 12 small, shallow replicate ponds on an abandoned fish farm.
- Four **treatments**: drawdown with fish removal and stocking of pike fingerlings (D/P), stocking of pike (ND/P), drawdown and entire fish removal (D/NP), control (ND/NP).



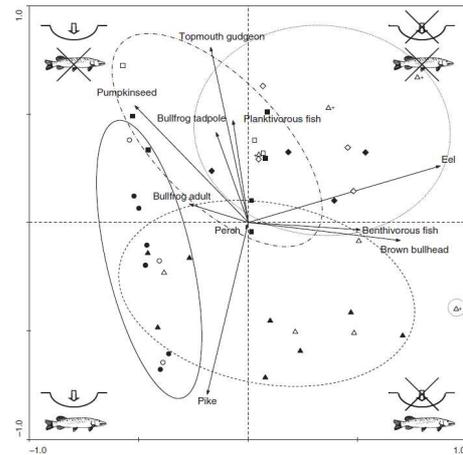
- Sampling of bullfrog tadpoles with double fyke nets, measure environmental variables linked to a good ecological quality (water transparency, macrophyte abundance)

## Conclusions

- Restoration of reproduction ponds to a clear water state, characterized by numerous macro-invertebrate predators, abundant water plants and low fish biomass is recommended.
- Biomaniipulation using a native predatory fish species can effectively lead to a change in food web interactions to the detriment of bullfrog.
- This method may thus be regarded as a candidate for effective and sustainable control of invasive bullfrog meta-populations.

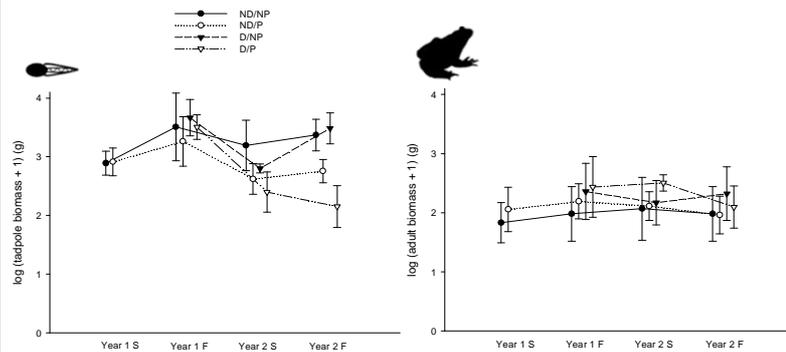
## Objectives

- Explore possibilities of **passive management through habitat restoration** via biomanipulation.
- Investigate effect of complete drawdown with amphibian and fish removal versus predation on bullfrogs by **introduced native northern pike, *Esox Lucius***.



## Results

- Presence of pike led to a **tenfold decline of bullfrog tadpole biomass**.
- Communities receiving pike harboured **substantially less small and mostly planktivorous fish species** (e.g. pumpkinseed, *Lepomis gibbosus*, and topmouth gudgeon, *Pseudorasbora parva*).



- **direct pike predation on tadpoles** was observed.
- as the occurrence of macroinvertebrate-feeding pumpkinseed was low in the presence of pike, the **indirect effect of predation by macroinvertebrates on tadpoles** may significantly increase, leading to tadpole decline.

### Further reading

Louette G. 2012. Use of a native predator for the control of an invasive amphibian. *Wildlife Research* 39: 271-278.

Louette G., Devisscher, S. & Adriaens, T. (2012). Control of invasive American bullfrog *Lithobates catesbeianus* in small shallow water bodies. *Eur J Wildl Res* DOI 10.1007/s10344-012-0655-x.

Sharifian-Fard, M., Pasmans, F., Adriaens, C., Devisscher, S., Adriaens, T., Louette, G., Martel, A. (2011). Ranaviriosis in invasive bullfrogs, Belgium. *Emerging Infectious Diseases* 17(12): 2371-2372.

### Acknowledgements

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