



# Red swamp crayfish

(*Procambarus clarkii*)

## Experiments on managing red swamp crayfish in ponds in the Vosges department

### Onema, the French national agency for water and aquatic environments, NE regional office

■ Onema is a public agency under the supervision of the Ecology ministry and was created by the Law on water and aquatic environments (30 December 2006) in response to the requirements of the Water framework directive (23 October 2000) which set quality objectives for water and aquatic environments with a deadline in 2015.

Onema is the principle technical organisation in France in charge of developing knowledge on the ecology of aquatic environments and managing aquatic ecosystems. Its mission is to contribute to comprehensive and sustainable management of water resources and aquatic environments.

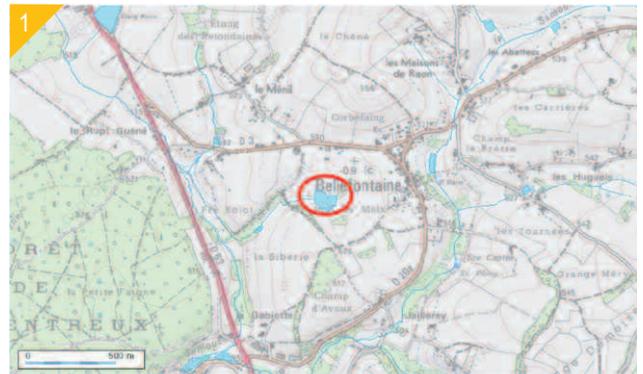
#### ■ Five main missions:

- provide technical support for water polices (local governments, Water agencies, State services, etc.);
- stimulate research on the major challenges facing water and aquatic environments (climate change, new forms of pollution, etc.);
- improve knowledge on the status and uses of water and aquatic environments and make the information available to the public;
- play an essential role in the police for water and aquatic environments, in support of State services;
- fund specific water policies, such as solidarity funding between river basins and the Ecophyto plan.

#### Three organisational levels:

- the general management develops science-advice capabilities in support of public water policies, manages the agency and coordinates the Water information system (WIS-FR);
- the nine regional offices corresponding to one or more administrative regions in France. They represent the agency in its dealings with local authorities and they manage the local offices in their region;
- the local offices are the basic building blocks of Onema. Their mission is to inspect and monitor water uses and to provide technical support to the water police. They also collect data on the status and uses of water and aquatic environments, as well as on species.

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1. Intervention site.

### Intervention site

■ The site is located in the town of Bellefontaine, in the southern section of the Vosges department in the Semouse river basin (Rhône-Méditerranée-Corse basin).

■ The site consists of two ponds/reservoirs on a tributary to the Semouse River. They are also supplied by springs and rainfall. The two ponds are equipped with a draining system and can be drained. The upstream pond has a surface area of 2 500 square metres and the downstream a surface area of approximately 8 000 m<sup>2</sup>.

■ They are privately owned and are intended for recreational fishing. Legally speaking, the ponds were authorised for a period of 30 years. At the time of the intervention, the 30-year period had expired and the owner was obliged to correct the situation by submitting an application to the departmental territorial agency.

### Disturbances and issues involved

■ The announcement concerning the presence of *Procambarus clarkii* was only the second in the Lorraine region. It entails a number of consequences for the local environment, including:

- a risk that certain native species (native crayfish, molluscs, invertebrates, fish, amphibians) may regress or simply disappear;
- the crayfish may be healthy carriers of “crayfish plague” (aphanomycosis), a disease that kills native crayfish;



- the crayfish may be carriers of chytridiomycosis, a pathology affecting amphibians;
- destruction of cyprinid spawning grounds due to the reduction in aquatic plant beds where many fish species spawn;
- the crayfish can damage structures and hydraulic installations by digging into banks (tunnels up to 1 metre deep, even 2 metres in Spain) and completely destabilising them at great economic cost.

\* Disturbances on the local level:

- risks of colonising new sites;
- competition with native species.

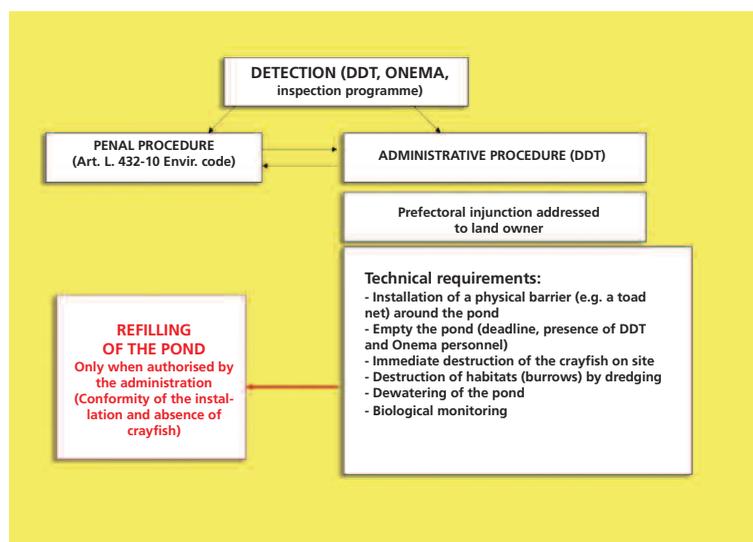


2. Red swamp crayfish (*Procambarus clarkii*).

## Interventions

- September 2009, an exuvia discovered during a check on pond conformity signalled the presence of red swamp crayfish.
- October 2009, the presence of the species was confirmed by trapping using hoop nets with bait. Gravid females were captured and numerous juveniles were observed. All size classes were noted.
- The crayfish had not colonised the tributary, i.e. they were present exclusively in the two ponds.

*Diagram of the administrative and penal system in the Vosges department.*



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### ■ Intervention period and method

■ Fall 2009:

- November 2009, slow emptying of the ponds by the owner in the presence of the State services, DDT and Onema, following the prefectoral injunction;
- installation of a physical barrier (plastic tarp) with pails as traps around the perimeter to avoid any escape of the crayfish;
- netting to collect a maximum number of crayfish, plus manual collection of any visible crayfish and searches in the various habitats;
- use of quicklime in pools remaining in the pond;
- total dewatering with filtration systems in the pond fish trap to avoid the escape of any remaining crayfish to the stream.

■ 2010:

- the pond was dewatered in the winter and summer, with monitoring of the filtering system and collection of the crayfish in pond fish trap;
- regular monitoring of the site to check for the presence of crayfish.

■ 2011:

- the pond was dewatered in the winter and summer, with monitoring of the filtering system;
- regular monitoring of the site to check for the presence of crayfish.

■ 2012:

- the pond was dewatered in the winter and summer, with monitoring of the filtering system;
- regular monitoring of the site to check for the presence of crayfish.

■ 2013, the owner received permission to refill the pond.

## Results and assessment

### ■ Results

■ Following the three years of successive dewaterings and the end of the experiment, the combined techniques resulted in the complete eradication of red swamp crayfish in the two ponds where the species had naturalised (reproduction, growth).

■ This result is the product of several factors:

- early detection;
- rapid intervention on the site in the framework of regulatory constraints weighing on the pond owner;
- and all the measures implemented following the emptying of the ponds.

■ The work must be followed by biological monitoring on the site and the surrounding area. The monitoring showed that in this particular case, the red swamp crayfish had not colonised the downstream environment and the surrounding ponds.

### ■ Costs

■ In this case, the costs were not calculated and fell entirely on the pond owner who had introduced the crayfish.

■ However, the costs incurred by the fishing operations, the quicklime operation and purchase of equipment (physical barrier) may be estimated at around 5 000 euros.

■ Monitoring consisted of two annual visits following the emptying of the ponds.

■ A further element is the loss of use of the ponds for three years and the destruction of the fish in order to avoid transporting crayfish larvae to other ponds.

## Outlook

■ Total emptying of the colonised ponds and control over the water levels were indispensable elements in the success of the management work against the invasive crayfish.

■ This case showed that in efforts against an invasive species, the work must be adapted to each situation and each site. It also showed that an intervention may last a fairly long time (three years in this case).

■ Finally, during the intervention, ample information must be provided in the local press as well as to elected officials and the owners of ponds and lakes.



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3. Detection of the species.
4. The physical barrier around a pond.
5. Use of quicklime in pools remaining in the pond.
6. Draining the pond in the winter.
7. Filtering systems in the pond fish trap.



## Information on the project

■ The first national meeting on invasive alien crayfish, held from 18 to 20 June 2013 in Saint-Lyphard (Loire-Atlantique department), was organised by INRA Rennes, the Brière regional nature park, the Forum of Atlantic marshes, the CNRS Rennes and Onema. The project results were published in an *Onema Meetings* document and in the *Aestuarium* collection of documents.

## Note on applicable regulations

■ The introduction of a “species likely to provoke biological imbalances”, as per articles R432-5 and L432-10 in the Environmental code, is subject to a fine of 9 000 euros.

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8. Dead red swamp crayfish following emptying of the pond.

### For more information

- <http://www.onema.fr/Les-rencontres-de-l-Onema>
- <http://www.onema.fr/collection-les-rencontres-syntheses>
- <http://www.set-revue.fr/la-gestion-des-ecrevisses-exotiques-envahissantes-dans-le-departement-des-vosges/texte>
- Collas M., Julien C. et Monnier D. 2007. Note technique : La situation des écrevisses en France. Résultats des enquêtes nationales réalisées entre 1977 et 2006 par le Conseil Supérieur de la Pêche. Bulletin Français de la Pêche et de la Pisciculture (386) : 1-39. <http://www.kmae-journal.org>
- Collas M. 2014. La gestion des écrevisses en plan d'eau dans le département des Vosges. *In* Premières rencontres françaises sur les écrevisses exotiques invasives. Damien J-P., Gallicé A. Miossec G. et Paillisson J.M. (eds) *Aesturia - Paroles des Marais Atlantiques*.
- Holdich D.M., Reynolds J.D., Souty-Grosset C., Sibley P.J. 2010. A review of the ever increasing threat to European crayfish from non-indigenous crayfish species - Knowledge and Management of Aquatic Ecosystems (2009) 394-395, 11. <http://www.kmae-journal.org>
- Souty-Grosset C., Holdich D.M., Noël P.Y., Reynolds J.D. et Haffner P. (eds) 2006. *Atlas of Crayfish in Europe*. Muséum national d'Histoire naturelle, Paris, Patrimoines naturels, (64), 187 pp.