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came educated ambassadors for the crayfish and have introduced more than 80,000 crayfish to the river at more than 30 reintroduction sites. The volunteers have worked more than 8000 hours in total! Hopefully the introduced populations will continue to grow, so that the local tradition with fishing and partying along the riverside will be back within a couple of years. 🦞

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## EXTREME DANGER TO IRISH CRAYFISH

Europe has only five indigenous crayfish species (ICS), four of them widespread, but most species are diminishing rapidly. While water and habitat quality are certainly factors to be improved, the main threat comes from non-indigenous crayfish (NICS) from North America, demonstrated by, among others, David Holdich, Julian Reynolds, Catherine Souty-Grosset and Peter Sibley (2009. A review of the ever-increasing threat to European crayfish from non-indigenous crayfish species. *Knowledge and Management of Aquatic Ecosystems* 394-395: 46p), and Meetings and Symposia such as Leeds ('Crayfish conservation in the British Isles', March 2009), Poitiers ('European crayfish: food, flagships and ecosystem services', October 2010) and Bristol ('Species Survival: securing white-clawed crayfish in a changing environment', November 2010). Their impact is two-fold; competitive exclusion, and transmission of aphanomycosis (crayfish plague) which is fatal to non-American species, and the situation for native crayfish is perilous across Europe.

Ireland stands out on two counts – alone in Europe, there are currently no alien species, and the indigenous White-clawed crayfish is still widespread, in a variety of habitats from lakes to streams and lowland rivers. But for how long? The main threats to Ireland come from the next-door island, and the problem is more than just geographic, it's political, or at least legislative!

England has several species of alien crayfish, and the native White-clawed crayfish has been progressively eliminated from most of its habitat, to the extent that voluntary groups are now seeking sanctuaries or 'ark sites' for them, chiefly in isolated gravel pits and quarries. There is now an excellent 'toolkit' for doing this (see Stephanie Peay, Kindemba V., Attwood F. and Christmas M. (2011). A toolkit for developing catchment-scale conservation strategy for White-clawed crayfish. Buglife – The Invertebrate Conservation Trust, Peterborough). But the legislation controlling crayfish is not uniform in the UK – England, with a widespread NICS problem, has different laws from Scotland, where signal crayfish have recently invaded. And regulations in Northern Ireland, with no alien crayfish, are different again. But not many people know

this. English people going to Northern Ireland may assume that the laws are the same, and may bring in NICS – and if they become established there, because the river systems flow across the frontier, it's curtains for the last big stocks of white-claws.

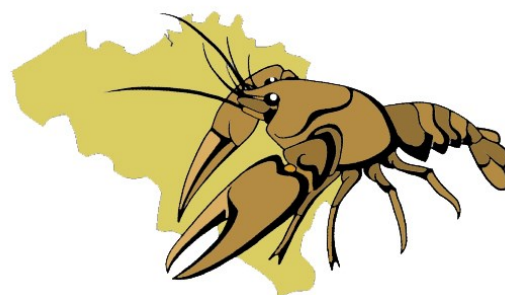
The problem is even more widespread. Crustacean Fanclub can buy over one hundred species of North American crayfish on the internet. While EU Customs are fairly vigilant as regards international trade, controls are much laxer within Europe – and several mid-European countries are exporting a variety of crayfish with little controls. It seems that it may only be a matter of time before the unthinkable happens.

There have already been several 'false alarms' from Irish rivers – large white-claws have been mistaken for signals, and live crayfish (NICS, but fortunately not American) have been discovered for sale in a Dublin market. The two states, Northern Ireland and the Republic of Ireland, cooperate on protecting the indigenous species, despite their different legislation. Its protection is clearly now a matter of two last-ditch approaches to preserve Ireland's largest non-marine invertebrate if it is not to disappear – education and enforcement. Public education has to be much stronger, at all levels from schools to the popular press and electronic media, and officials in customs, conservation and river management need help to distinguish the species. The safest way is to prohibit any importation of live crayfish, but other European countries have tried this, and failed. 🦞

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## "RIVIERKREEFTEN.BE" — A NEW WEBSITE ON CRAYFISH IN BELGIUM

With its only indigenous species, *Astacus astacus*, close to the verge of a local extinction and several exotic species that have been introduced over the course of many decades, Belgium is now facing a great challenge in the field of conservation and nature management for many of its freshwater eco-



**RIVIERKREEFTEN.be**

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systems.

Although four exotic crayfish species thrive in Belgian water bodies and rivers, almost no information is available on their current dispersal and the extent of their invasive behavior. Existing sources are often inaccurate, unreliable or outdated, thus making them inadequate to understand the scope of the exotic crayfish problem in real time.

RIVIERKREEFTEN.be is a new website exclusively devoted to the freshwater crayfish that occur in Belgium. This initiative reaches out to anyone who shows interest in freshwater crayfish, and attempts to fill the information void that currently exists on this particular topic. The website provides basic information on general crayfish biology, the indigenous and non-indigenous species that occur in Belgium, and the harm that invasive crayfish are causing to the indigenous fauna and flora. At this moment, the website is only available in Dutch. Later on, French and English translations will be available.

A new interactive tool will be online starting from September 2012 to add more functionality to the website, enabling visitors to submit observations of wild crayfish with precise information on the encountered species and their locations. This input will hopefully improve the knowledge on the dispersal of all the freshwater crayfish species in Belgium and actively support scientific research on this matter. ¶

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## OPPORTUNITIES FOR NOBLE CRAYFISH PRODUCTION IN BELGIUM

Two University Colleges - KaHo Sint-Lieven (KAHO) and Hogeschool Universiteit Brussel (HUB) - are investigating whether production of noble crayfish could be a viable activity for Belgian farmers. Nowadays, many farmers are trying to diversify their activities, and in this context, crayfish culture

might be an interesting way to provide an additional income.

Unlike in many other European countries, the noble crayfish (*Astacus astacus*) appears to be a relatively unknown delicacy to Belgian people. The production of crayfish in Belgium is rather low, and most crayfish for human consumption are imported.

While the indigenous noble crayfish is known to have a superior taste, mainly American crayfish (*Procambarus clarkii*) are found on the market. Nevertheless, an inquiry by the HUB showed there's a potential market for locally produced indigenous crayfish, especially in the sector of star restaurants.

Years ago, top chefs in Belgium frequently used noble crayfish in their dishes. The low availability of noble crayfish and the inferior taste of their widely available American counterparts, caused crayfish to disappear from several restaurant menus. However, noble crayfish are still regarded as a delicacy by local top chefs, and star restaurants are willing to reintroduce them on their menus if their availability and quality could be guaranteed. This fact makes it interesting to investigate the possibilities for locally produced "Belgian crayfish".

In order to avoid financial failures, the economic feasibility and technical requirements for noble crayfish production should first of all be evaluated. Therefore, KAHO and HUB are now investigating whether noble crayfish culture could become a sustainable aquaculture activity in Belgium or not.

The traditional pond culture doesn't seem to be a suited method to cultivate noble crayfish in Belgium. Due to environmental legislation issues, the lack of suitable agricultural area and the risk of crayfish plague infection, KAHO decided to investigate the possibility of producing noble crayfish in indoor recirculating aquaculture systems (RAS) (Photos 1 – 3). In its Aquaculture Education and Research Facility (Aqua-ERF) researchers are looking for the technical requirements to grow these crayfish to consumption size. An indoor RAS has the advantage that all kinds of culture parameters including temperature, water quality and feeding rate can be regulated and optimized. The production could also be controlled in order to better meet the market demand (e.g., deliver crayfish outside the normal harvest season). Compared to crayfish culture in ponds or flow-through systems, the prevention of pathogen introduction will also be more secured in a closed system.

A financial feasibility study for this type of crayfish production is being carried out by the HUB. Its Trade and Business department will study the market potential of locally

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produced “Belgian crayfish”. They will determine if indoor crayfish culture can be an economically viable activity in Belgium. Therefore, different parameters will be evaluated, including production costs, the probable demand for locally produced crayfish and the potential market prices for this product. Consumer opinion on crayfish as a delicacy will also be an important factor in this study.

The public attention for this project is quite notable and farmers have already shown an interest. If the results of this research turn out to be positive, it seems there will definitely be candidates to start their own crayfish farm. Hopefully this project will lead to the establishment of a viable industry, which can eventually provide Belgian farmers a source of income. ♀

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AQUA-ERF

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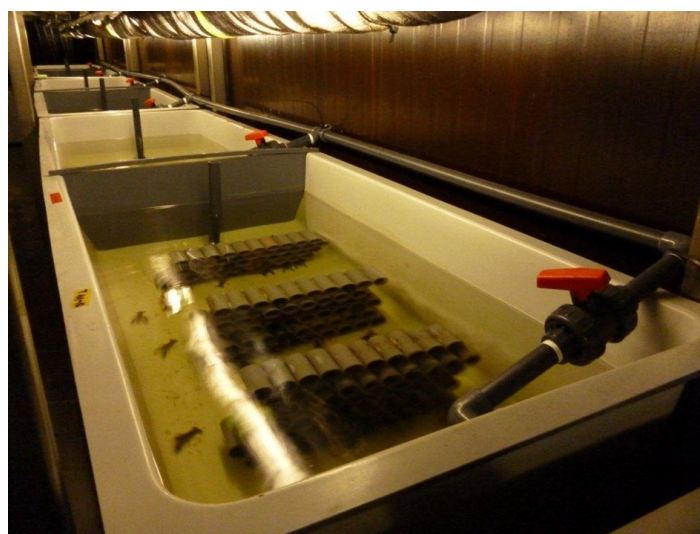
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**Photo 1.** The crayfish tanks at the Aqua-ERF research facility.



**Photo 2.** Noble crayfish (in tank) during an optimal density trial.



**Photo 3.** One summer old noble crayfish in their hiding places  
All photos by Thomas Abeel.

