



Sveriges lantbruksuniversitet
Swedish University of Agricultural Sciences

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Department of Aquatic Resources

Institute of Freshwater Research

To the Scottish Parliament

It has come to our attention that the Scottish Parliament is going to consider a request to open up commercial fishery on signal crayfish in Scotland.

I have been asked to summarise our experiences with signal crayfish in Sweden, Finland and Norway, by people concerned about the consequences if you decide to grant this request.

Sweden and our institute have 55 years of experience with this species. The Institute of Freshwater Research was earlier part of the Swedish Board of Fisheries and when the board was closed down 4 years ago we became part of the Department of Aquatic Resources, Swedish University of Agricultural Sciences. I myself have more than 25 years' experience in research, management, conservation and fisheries of freshwater crayfish.

We think that the Scandinavian experiences may be useful information for you, since Scotland and Scandinavia have similar climatic and geographical conditions with lakes and rivers in interconnected catchments. In addition commercial, sustenance and recreational fishery in freshwater is locally, socially and economically important in both countries.

To summarise, our advice to you is **not** to open up a commercial fishery as a control measure of signal crayfish. A commercial fishery has proved **not** to be a useful method to control an invasive crayfish species. It is rather a way to further the spread of signal crayfish to new catchments and to further the spread of crayfish plague, since signals are chronic carriers of the disease. The result will be strongly negative effects on bottom fauna, on the salmonid fishery and not least the losses of most of your native white claw crayfish populations, through crayfish plague outbreaks.

Points to support our advice

- The introduction of signal crayfish into Sweden resulted in a fivefold increase in the extinction rate of our native noble crayfish through crayfish plague outbreaks
 - Signal crayfish does not give better catches even in southern Swedish climates and does worse further north due to failed reproduction, caused by the longer winters
 - Signal crayfish is **not** immune to crayfish plague but rather a chronic carrier that may succumb to the disease if stressed
 - Many signal crayfish populations in Sweden and Finland are currently experiencing collapses, resulting in lost fishery, but always still with some individuals left, maintaining the crayfish plague
 - Crayfish plague free populations of signal crayfish have not yet been found in Sweden. The frequency of infected animals within a population varies between 20% and 80%.
 - Opening up the fishery for the first time to the general public in one lake in middle Sweden resulted in massive illegal introductions in neighbouring lakes and rivers
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- Crayfish as food are generally transported alive and escapes are commonplace
- Fishing during the population build-up phase, in our experience, actually may relax competition and rather promote than slow down the development of a crayfish population
- There are no documented examples of a hard fishing pressure being able to eradicate a freshwater crayfish population
- The people that should control the crayfish by fishing have no interest in the population going extinct. Their goal is the opposite a stable and productive population
- Crayfish as food are traditionally transported live. There are many many examples of deliberate and accidental releases of crayfish for consumption. The crayfish themselves, unaware of the legislation are very good climbers and escape.
- Once there was a belief in Sweden that signal crayfish farming could be controlled. There was also a belief that the introductions could be controlled and only take place in parts of the country where the native species was gone. Both these beliefs have proved futile.
- When crayfish is found in new places today they have been exterminated with insect poison in both Sweden and Norway. This is however only possible in the rare cases (usually small ponds) where the side effect on other fauna is minor and reversible.

Some illustrative examples

Thus the crayfish plague arrived to Sweden!

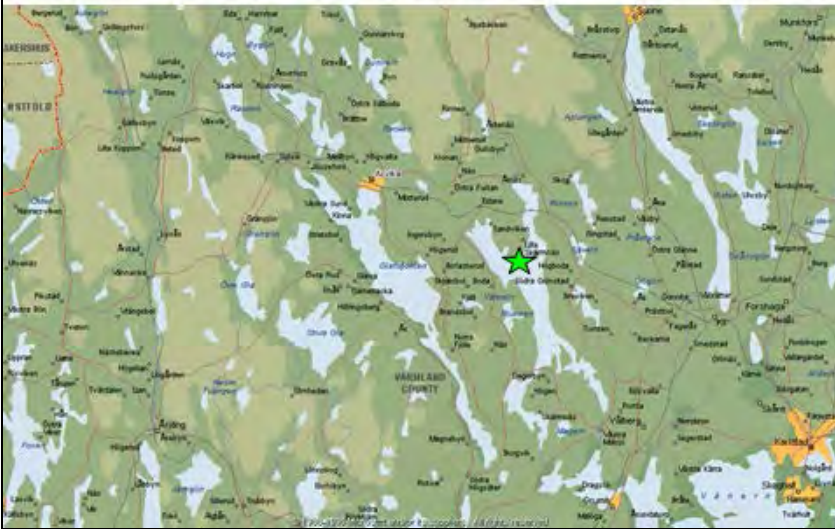
The fish market Kornhamnstorg, Stockholm August 1907.

A shipment of noble crayfish from Finland were in bad condition and were tipped into Lake Mälaren They had crayfish plague!



Lake Värmeln

Permission to introduce signal crayfish in new area 1994



This is what happened when a permit for introduction was granted (just before the new legislation forbid new introductions), in a part of Sweden where no signal crayfish was present before, but where there were plenty of native noble crayfish in the lakes and rivers close by.

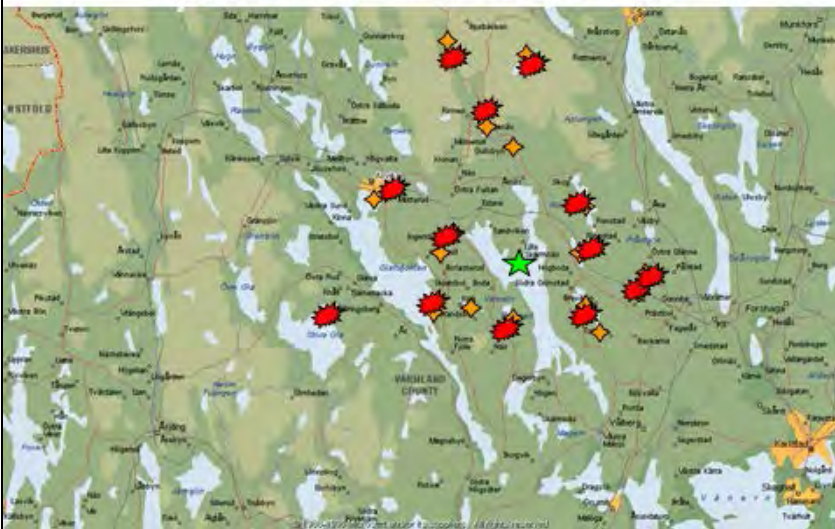
Lake Värmeln

Crayfish plague outbreaks in the neighbourhood next 10 years

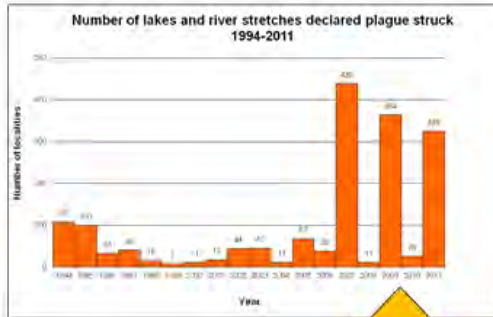


Lake Värmeln

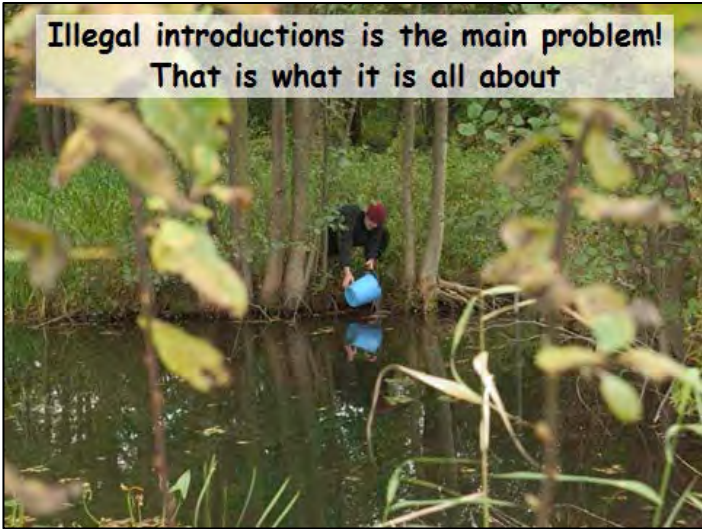
Illegal introductions discovered 10 years later



**Illegal introductions is the main problem!
That is what it is all about**



So what is this all about ?



Is this a serious problem?

•YES!

94 cases of illegal introductions of signal crayfish discovered in the counties Värmland Dalmland bordering Norway in 2000-2006.

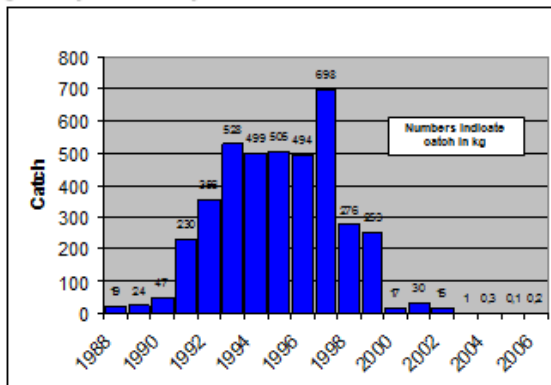
117 cases of illegal introductions of signal crayfish discovered in Sweden 2007-2009.

Many times in lakes or rivers with restoration programs for noble crayfish



Useful information 1. There are many examples of strong declines

Signal crayfish catch by one commercial fisherman in Lake Mälaren



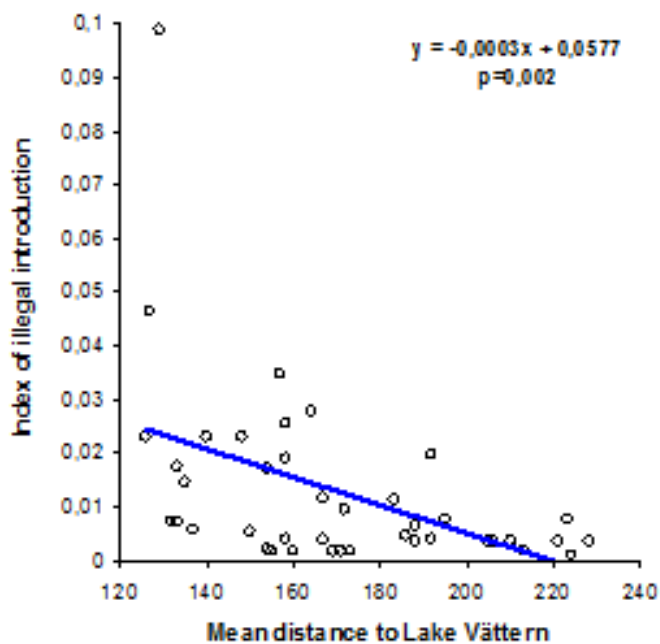
The fishermen are becoming a bit worried for the future!

Case 1

Supply of illegal stocking material
Lake Vättern is the only lake in Sweden with
an open fishery to anyone



The distance from Lake Vättern (in red) to sites of signal crayfish introductions (red dots) in the counties of Värmland and Dalmland.



Relationship between the distance from Lake Vättern to the places of
signal crayfish introduction in the counties of Värmland and Dalmland

Case 2

Drastic increase in crayfish plague



*Localities declared plague struck by the regional authorities during 2007 (439 yellow dots) and illegal introductions of signal crayfish discovered during summer and autumn 2007 (24 red dots). In all cases of crayfish plague, apart from the northernmost one, the outbreaks of plague were connected to an illegal introduction of signal crayfish ($p < 0.05$; binominal test)

*98 % of the plague incidents were north of River Dalälven, the northern border for the earlier legal introductions.



*Signal crayfish with visible crayfish plague spot on the tail. The crayfish comes from an illegal introduction into lake Stora Le in western Sweden bordering Norway. The lake extends into Norway. Norway never introduced signal crayfish!

Final words

There is no known example so far where fisheries have succeeded in totally eradicating a crayfish population. In Sweden we have the well documented example of lake Halmsjön. This quite small lake < 30 hectares was fished with up to 4000 trap nights yearly for a period of 15 years. Finally the fishery collapsed in 1990, and it has not recovered since, but there is still some signal crayfish, carrying crayfish plague in the lake. This makes restoration with the native noble crayfish in this lake, today 25 years later, impossible.

We have run a 6 year EU-funded project on how to achieve a sustainable fishery on signal crayfish by following fishermen in 19 different localities in Sweden. A subproject was to understand the underlying causes for the collapses in the signal crayfish fisheries in several hundred lakes and rivers, which have occurred in the last 20 years. We have not found any case where fishing was the cause of the collapse and in the only case where the fishing mortality was really high there are still plenty of signal crayfish with crayfish plague around.

In general our experience is that if fishing starts with handling of live signals the opportunities for illegal introductions in the neighbourhood opens up. It creates a new interest in the species in areas (in our case northern Sweden) where there was no interest before. An added commercial interest also adds to the interest. The very old but partially unproven myths about the superiority of signals from a fisheries point of view start to spread also. We have substantial scientifically based evidence today, that signals do not give a better fishery, in the long run, in natural waters even in the climate of southern Sweden. And they do worse further north compared to nobles. Going back in time, there were restrictions on in which areas permits were given. When fishing right owners then asked for a permit they got NO. However it was quite often they returned a year after and said they now had signals. The also claimed being innocent of the introduction and then they got a permit retrospectively. That way the restrictions in new areas were lifted and the distribution of “legal” signal

crayfish expanded in Sweden. With the lesson learnt no more permits for signal crayfish introductions in Sweden have been given after 1994.

In July this year Professor Japo Jussila, from Kuopio University in Finland, and I took part in a EIFAAC (European Fisheries and Aquaculture Advisory Commission) meeting in Lillehammer, Norway. Norway never introduced signal crayfish for farming but signal crayfish have been discovered in 5 places during the last 12 years. Similar to in Scotland, the Norwegian authorities were processing a request to open up a fishery in a lake with a quite numerous population of once illegally introduced signal crayfish. The argument was both that it would control the population, and that the locals felt it was a waste of a resource not to utilise the signal crayfish. Both I and Prof. Jussila gave talks on our experiences and there was an intense discussion afterwards in this session on the pros and cons of a fishery. Our advice was similar to the one given to you now and the authorities then decided to turn the request down.

Unless Scots are much more law-abiding than Swedes Finns and Norwegians you will not control the signal crayfish populations by opening up the fishery. You may for a short while have an income for the local community. But one of the verified factors behind signal crayfish collapses in Sweden and Finland is that lakes that collapses are slightly warmer compared to lakes that do not. So it is most likely a quickly passing benefit. Heavy on the negative side you will instead have a further spread of signal crayfish, and the spread of crayfish plague, to new Scottish catchments, with negative effects on native fauna, and again without any guaranteed beneficial fishery in the future. And there is no way back.

We urge you to seriously consider the consequences of your decision to the request. And please do it before you decide. Remember that your decision may be irreversible.

If you have further questions or need more facts and the scientific references to back up our statement I am happy to be of service.

Yours sincerely

Dr Lennart Edsman

Senior Scientist, SLU Aqua, Institute of Freshwater Research, Drottningholm, Sweden

President Elect International Association of Astacology

National coordinator “Action plan for conservation of the native noble crayfish”

Project leader EU-funded project “Sustainable signal crayfish fisheries”