Scottish Natural Heritage
Dualchas Nàdair na h-Alba
All of nature for all of Scotland
Nàdar air fad airson Alba air fad

SEPA
Scottish Environment Protection Agency

By email:

Ms Sigrid Robinson
Assistant Clerk
Public Petitions Committee

20 October 2015

Dear Ms Robinson

CONSIDERATION OF PETITION PE1558

Thank you for your letter of 23 September 2015 referring to the clarification sought by the Committee as part of its consideration of the above petition.

During the meeting on 22 September 2015, the Committee asked SNH and SEPA to provide further joint written evidence on the issues below:

- Current Research - What research is currently underway at the moment and how much is being spent to fund it?
- Examples from Abroad – In the Swedish example given, were licences granted for the additional water bodies where populations were extended to?
- Not-for-Profit Model - What evidence suggests that a not-for-profit scheme is not an alternative that is worth considering?
- Impact of Management Models:
    - What evidence suggests that trapping in the Loch Ken has had no effect on managing the overall population?
    - What have been the long-term effects of the alternative methods (such as biocide) that have been trialled to manage crayfish populations?
    - Where such trials have taken place, what money has been invested to determine the long term-consequences of the methods employed?

SNH and SEPA's joint response to these issues are addressed in Annex 1.

If there are any questions about this response, please do not hesitate to get in touch with us via SNH's Government Relations team (SNHGovernment_Relations@snh.gov.uk).

Yours sincerely

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ANNEX 1

SNH and SEPA response to issues raised by the Committee on 22 September 2015

During the meeting, the Committee asked SNH and SEPA to provide further joint written evidence on the following issues:

Contents

1. Current Research

The table below clarifies the amount spent over the last ten years, and that being spent on research that is currently underway.

Table 1. Amount spent on research on Signal Crayfish in Scotland

Amount spent (£1,000s)	**2005 - 2015**	**2015-16**
4.1 Initial research		
Long-term manual removal of crayfish from the River Clyde	135	
Biocide trials at North Esk ponds	104	
Biocide trials at Ballintuim	70	
Biocide trial at Ballachullish	71	2
4.2 Species Action Framework		
Training fisheries biologists to trap and monitor crayfish	3	
Fine scale mapping of the signal crayfish in Scotland	50	
Prospects for the biological control of crayfish in Scotland	25	
Review of crayfish control and cost implications	10	
Two crayfish awareness courses for key staff	10	
Crayfish awareness posters and leaflets	6	
Crayfish barrier installation in the Upper Clyde	95	
Zara Gladman's PhD on Crayfish in Scotland	82	
4.3 Relevant additional work		
Assessing the potential of intensive trapping in Loch Ken	100	
Reducing the risks of spread during transportation of live fish	56	
4.4 PhD and Masters projects		
Other PhDs (Harper, Houghton) and Masters (O'Reilly)	100	70
4.5 Other ongoing work		
Environmental DNA Workshop		2
Fisheries monitoring in Loch Ken project		5
Total	**917**	**79**

Research is currently being carried out through PhD and Masters studies; the level of funding is on a par with the average spent on crayfish research over the last 10 years.

2. Examples from Elsewhere

In Sweden and Spain, the establishment of legal fisheries for Signal Crayfish has been associated with the detection of an increased number of illegal introductions within each country. This has been fully documented and published (e.g. Alonso *et al*., 2000; Diéguez-Uribeondo, 2006; Arce & Alonso, 2011; Bohman *et al.,* 2011). Regulatory authorities in Sweden and Spain have decided that no licences will be granted to exploit any new, unauthorised, populations. In his letter to the Committee of 4 September 2015, and in a subsequent response to the petitioner (sent to the Committee clerk on 20 September 2015), Dr Edsman, a senior researcher in the Swedish University of Agriculture and President-elect of the International Association of Astacology, set out the their rationale for the Swedish approach. Further, in his letter to the Committee of 4 September 2015, Dr Edsman stated that Norwegian authorities have also refused to allow the development of any Signal Crayfish fisheries, citing the same concerns that have been expressed in Scotland.

Licensing does not, therefore, prevent people from illegally introducing and exploiting crayfish populations. In England, when cases of keeping and release into ponds have been investigated, the owners have been unaware of the restrictions on keeping crayfish. In some instances the sellers of the crayfish had specifically advised them that there were no restrictions on keeping crayfish in ponds. These are rarely biosecure, meaning that there is a high risk of Signal Crayfish escaping into the wild.

3. Not-for-Profit Model

When considering whether non-native species should be exploited, Nunez *et al.* (2012) concluded that creating any market engenders pressure to maintain that problematic species. They also concluded that if the target species becomes an economic resource, then there is a higher likelihood that people may try to recreate that market in previously uninvaded regions. This research also suggested that the removal of the harvested individuals could have biological consequences, and any reduction in the number of animals could result in the compensatory growth of uncaptured individuals which may offset any advantages gained. Our knowledge of Signal Crayfish suggests that the same is true for this species. Holdich *et al.* (2014) states that harvesting pressure has the potential to reduce the number of eggs and hence the number of juvenile Signal Crayfish produced. With a reduced density, however, surviving juveniles may show compensatory growth and sexual maturity may occur at a younger age. Non-market size Signal Crayfish continue to have a significant environmental impact and Dr Edsman's letter to the Committee of 4 September 2015 states that the establishment of a fishery will *"worsen the damage done",* by Signal Crayfish rather than resolve the issue.

It is for these reasons, and the evidence provided for Sweden, Spain and elsewhere, that we suggest that the establishment of a fishery is not the correct approach for dealing with the Signal Crayfish problem in Scotland. Any proposal or model which involves the sale of crayfish in order to fund further trapping or, in the case of the model suggested by the petitioner, where surplus income would help fund research, still requires a market demand for crayfish. Creation of a market is highly likely to encourage further spread of signal crayfish elsewhere, whether the motivation is profit, jobs or personal consumption. We refer the Committee to Dr Lenart Edsman's letter to the petitioner of 20 September 2015, in which he describes the potential export market for Signal Crayfish to Sweden.

4. Impacts of Management

- What evidence suggests that trapping in the Loch Ken has had no effect on managing the overall population?

In 2009, the Scottish Government agreed to support a large-scale trapping programme for signal crayfish on Loch Ken, on the grounds that such a scale of operation had not been tried in Scotland. More than 700,000 crayfish weighing over 18 tonnes in total were caught and killed during the five-month study at a cost of approximately £90,000. However, the vast majority of crayfish in the population were below the minimum size that can be caught in traps. The project was reviewed by recognised UK crayfish expert, Stephanie Peay, who concluded that it was unlikely that the project reduced the ecological impact caused by signal crayfish, or reduced their spread. This conclusion is also supported by the results of long-term trapping work from other parts of Europe (See letters from Dr Lennart Edsman of 4 September 2015 and 20 September 2015).

There are no examples in Great Britain or elsewhere in Europe where control measures have been shown to have significantly reduced the ecological impacts of signal crayfish. Trapping can, in some circumstances, reduce the abundance of crayfish locally. However, the smaller crayfish left behind tend to grow more quickly and start to breed at a smaller size, meaning that the total numbers or biomass of crayfish are not necessarily reduced (Holdich et al., 2014). It is highly unlikely that trapping would significantly reduce the ecological impact caused by signal crayfish in Loch Ken and would have to be maintained indefinitely to have any lasting effect on the abundance of larger crayfish.

- What have been the long-term effects of the alternative methods (such as biocide) that have been trialled to manage crayfish populations?

Only the natural pyrethrum, Pyblast, has been used in the biocide treatments in Britain. Follow-up monitoring carried out at Ballachuilish Quarry showed that invertebrates and amphibians had recolonised the pond in less than a year. Follow-up monitoring of the biocide trials at North Esk ponds and Ballintuim showed similar results.

Synthetic pyrethroids, which are commonly used in agriculture, are more stable and more toxic to invertebrates than natural pyrethrum. Case studies where sheep-dip (a synthetic pyrethroid called cypermethrin) was accidentally introduced into river systems, have shown that there can be a severe impact on the invertebrate community over timescales of 1–2 years, negatively impacting the food supply of higher animals such as fish.

There are been several studies which have examined the toxicity of biocides for aquatic invertebrates and their use to kill Signal Crayfish. Currently, only natural pyrethrum is deemed to be suitable for Signal Crayfish control, and then only in enclosed waterbodies small enough to allow effective treatment (that is, relatively small ponds), and where destruction of non-target species can be tolerated.

- Where such trials have taken place, what money has been invested to determine the long term-consequences of the methods employed?

Follow-up monitoring carried out at Ballachuilish Quarry is costing £3,000 over 5 years.

5. References

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