



REVIEW OF LITERATURE CITED IN THE PETITION AND SUBMISSIONS

...Calling on the Scottish Parliament to urge the Scottish Government to amend the existing licencing regime to allow for the commercial trapping of American Signal Crayfish in Scotland.

Summary

There appears to be consensus in the literature reviewed that allowing commercial trapping of American Signal Crayfish, even as a control measure, is likely to lead to the expansion of its range.

Approach to the literature review

This review reports on the literature that directly addresses two questions:

1. Does the paper support commercial trapping as an effective way of dealing with American Signal Crayfish?
2. Does the academic paper suggest that commercial trapping of American Signal Crayfish is likely to contribute to the expansion of its range?

Not all literature cited in the petition and submissions address these points. Relevant quotes from the papers are provided.

Relevant literature in detail

Alonso, F., Temiño, C. & Diéguez-Uribeondo J. (2000). Status of the white-clawed crayfish, *Austropotamobius pallipes* (Lereboullet, 1858) in Spain: legislation and conservation. *Bull. Fr. Pêche Piscic.* 356: 31–54

1. Does the paper support commercial trapping as an effective way of dealing with American Signal Crayfish? No
2. Does the paper suggest that commercial trapping of American Signal Crayfish is likely to contribute to the expansion of its range? Yes

Useful quotes from the paper:

“The initial loss of habitat range of the native crayfish was accelerated by the rapid attempts of fishermen and others, to restore crayfish populations by restocking with the North American crayfish, *P. clarkii*. The absence of adequate legislation for preventing the introduction of non-native species and the trade of living crayfish were factors that

contributed to the rapid spread of *P. clarkii*. This same process is today being repeated with the signal crayfish, *P. leniusculus*, which is currently being used for restocking purposes.” (p 40)

“The progressive allowance to fishing signal crayfish in some areas since 1994, and the increasing demand for signal crayfish fisheries may allow a rapid spread of this species.” (p 42)

“Control of crayfish dispersal by means of limiting their live commercialization is perhaps the most repeated advice issued by the scientific community for the control of introduced species (IAA, 1988) but has been rarely developed.” (p46)

“On one side, opening the fishery will result frequently in the spread of the species to other undesired areas, while on the other side it is difficult to explain to fishermen and the local public the reasons for not exploiting the populations” (p47)

Arce, J.A. & Alonso F. (2011). Factors related to the presence of the *Austropotamobius pallipes* (Lereboullet, 1858) species complex in calcareous mountain rivers in central Spain. *Knowledge and Management of Aquatic Ecosystems*. 401: 25.

1. Does the paper support commercial trapping as an effective way of dealing with American Signal Crayfish? No
2. Does the paper suggest that commercial trapping of American Signal Crayfish is likely to contribute to the expansion of its range? Yes

A useful quote from the paper:

“One of the first Spanish wild signal crayfish populations developed as early as the 1980s close to this area, but no natural or human-led dispersal was observed for twenty years, while fishing for signal crayfish was forbidden all over Spain. But since it was allowed in neighbouring territories a wave of illegal introductions have started, and more than thirty new populations have being detected in the vicinity during the last decade, highlighting the role that expectation of future fishing can play in the dispersal of invasive crayfish (Alonso et al., 2000), which is still going on.” (p10)

Bohman, P., Degerman, E., Edsman, L. & Sers, B. (2011). Exponential increase of signal crayfish in running waters in Sweden – due to illegal introductions? *Knowledge and Management of Aquatic Ecosystems* 401: 23.

1. Does the paper support commercial trapping as an effective way of dealing with American Signal Crayfish? No
2. Does the paper suggest that commercial trapping of American Signal Crayfish is likely to contribute to the expansion of its range? Yes

A useful quote from the paper:

“Although our results may indicate that signal crayfish from Lake Vättern are used for illegal introductions, not all new populations in running waters are due to illegal stocking with crayfish from this lake. ... Signal crayfish is now caught and transported as live animals in many new regions in Sweden. Although the live crayfish are meant to be cooked and consumed, it is easy to catch live signal crayfish, transport them by car, and release them illegally in a whole new water area. All introductions require a stocking permit from the County Administrations, but the cost for illegal stocking is low (Gren et al., 2006). The ecological cost may however be substantial.” (p23p7).

Diéguez-Uribeondo, J. (2006). The dispersion of the Aphanomyces astaci-carrier Pacifastacus leniusculus by humans represents the main cause of disappearance of the indigenous crayfish Austropotamobius pallipes In Navarra. Bull. Fr. Pêche Piscic. 380-381: 1303-1312.

1. Does the paper support commercial trapping as an effective way of dealing with American Signal Crayfish? No
2. Does the paper suggest that commercial trapping of American Signal Crayfish is likely to contribute to the expansion of its range? Yes

A useful quote from the paper:

“The dramatic decline of indigenous crayfish in Navarra has started soon after changing management regulations on catching areas for signal crayfish within the “indigenous crayfish area” in 1999. This has made signal crayfish accessible for illegal introductions and this is probably the reason why new populations of signal crayfish are being detected. Some local governments in Spain have not restricted the catching of exotic crayfish considering that this will represent a control measure of unwanted exotic crayfish. Previous studies carried out in the region of Burgos have shown, on the contrary, that allowing open-catching areas for exotic species only favor the dispersal of these crayfish plague-carriers (ALONSO et al., 2000). Similar situations have been reported in Sweden, where it was observed that an increase in number of crayfish plague outbreaks followed as legislation become more liberal to signal crayfish introduction and catching (BOHMAN et al., 2006). This study confirms this observation and points out that uncontrolled catching and poor management of catching areas could facilitate availability of crayfish for illegal introductions.” (p1310)

Holdich, D.M., James, J., Jackson, C. and Peay, S., 2014. The North American signal crayfish, with particular reference to its success as an invasive species in Great Britain: *Ethology Ecology & Evolution*.26 (2-3) pp.12.05.2014.

1. Does the paper support commercial trapping as an effective way of dealing with American Signal Crayfish? No

2. Does the paper suggest that commercial trapping of American Signal Crayfish is likely to contribute to the expansion of its range? Yes

Useful quotes from the paper:

“The pros and cons of introducing crayfish into Europe for astaciculture (cultivation of crayfish) have been reviewed by Ackefors (1999), Holdich (1999a) and Westman (2002). As is commonly the case, there are difficulties in comparing the monetary value of crayfish to small businesses with the non-monetary values of biodiversity. There appears to be some consensus among scientists, however, that the cumulative impacts overall are negative.” (p233)

“The rapid human-assisted spread of signal crayfish can also be illustrated by the situation in Scotland, where the species was first discovered in 1995 (Maitland 1996) and in just over 10 years it spread (presumably by illegal introductions) to eight river catchments, totalling at least 58 km of river (Gladman et al. 2009).” (p242)

“The authors know of no examples in Europe where trapping has eradicated a population of signals, although it can reduce the abundance of trappable animals. However, due to compensatory growth, it does not necessarily reduce the total number or the biomass.” (p 251)

Although trapping crayfish does not eradicate crayfish or prevent their expansion of range, the promotion of trapping as a control measure and the promotion of consumption of wild signal crayfish as a food are both creating some confusion among the public and generating interest in wild harvest. (p 252)

Peay S. (2010) Review of the Loch Ken (Kirkcudbrightshire Dee) American Signal Crayfish, Trapping Project, 2009

1. Does the paper support commercial trapping as an effective way of dealing with American Signal Crayfish? No
2. Does the paper suggest that commercial trapping of American Signal Crayfish is likely to contribute to the expansion of its range? Yes

A useful quote from the paper:

“Rather than improving biosecurity, the existence of a trapping programme would increase the likelihood of further introductions, albeit indirectly, by promoting interest in trapping for control and wild harvest generally in Scotland. Permitting any trapping of signal crayfish in Scotland dilutes the effectiveness of the protective legislation in Scotland. Experience in England and in other European countries is that allowing trapping for “control” can be considered to be a step onto a slippery slope that leads to increased demand for wild harvesting and a large increase in the number of illegal introductions.” (p 11)

Stebbing P.D., Longshaw M., Taylor N., Norman R., Lintott R., Pearce F. & Scott A. (2012) Review of methods for the control of invasive crayfish in Great Britain. CEFAS. Contract C5471 final report.

1. Does the paper support commercial trapping as an effective way of dealing with American Signal Crayfish? No
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Useful quotes from the paper:

“While the rate of spread has undoubtedly been reduced as the creation of new crayfish farms in the go areas has all but ceased, it is evident that people in no-go areas continue to buy signal crayfish to introduce to ponds, a practice which will inevitably lead to the spread of the animals into other natural aquatic environments.”

“Removing the controls on signal crayfish in no go areas would certainly increase the rate of spread of the species, as it becomes more readily available and as the risks of being prosecuted for illegal release diminished. This would inevitably increase the risk that the species will be introduced to catchments that currently contain high value un-impacted native crayfish populations.” (p48)

Literature cited in petition and submissions

Alonso, F., Temiño, C. & Diéguez-Urbeondo J. (2000). Status of the white-clawed crayfish, *Austropotamobius pallipes* (Lereboullet, 1858) in Spain: legislation and conservation. Bull. Fr. Pêche Piscic. 356: 31–54.
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