

Science for Environment Policy

Is Britain's biosecurity being threatened by the risk of an 'invasional meltdown'?

Britain's freshwater ecosystems are on the brink of an invasional meltdown, a new study concludes. Examining 23 freshwater species from south-east Europe, researchers investigated whether individual species in the group would 'pave the way' for others, resulting in a rapid increase in establishment of invasive species. The results showed that 76% of the interactions between the species were positive or neutral, highlighting the possibility of severe consequences for Britain's freshwater ecosystems.

Invasive alien species (IAS) are one of the greatest threats to [biodiversity](#) today, putting many native species at risk of extinction. The importance of this issue is recognised in the new [EU Regulation on Invasive Alien Species](#), which entered into force on the 1st January of this year, and focuses on the key factors to prevent further environmental damage: prevention, early warning and rapid response, and management. Although the Regulation focuses on IAS of Union concern that are alien to the whole EU territory, it also provides for regional co-operation between the Member States on species that are invasive in one part of the EU territory, but native to another.

This study investigates a worrying phenomenon: the 'invasional meltdown'. For a meltdown to occur, the invading species would enable others to establish more easily, increasing the rate of invasions and causing escalating ecological damage. The researchers focused on the threat posed to British freshwater ecosystems by 23 species, including shrimps, worms and fish from south-east Europe, all thought to be high risk for invasion. Five of these species are already found in Britain; however these were included because their potential to spread across the island is high.

The fact that these species are all from the same area (the Ponto-Caspian region) may increase the risk of invasional meltdown. The researchers hypothesise that this is because they have evolved together and therefore rather than wiping each other out they are more likely to coexist or even benefit each other, to the detriment of native species.

To investigate whether this was the case, the researchers used results from 42 publications on their interactions. In line with the invasional meltdown hypothesis, this showed that of the 157 interactions documented, 71 (45%) were 'positive' or supportive (e.g. provision of food or aiding colonisation by providing habitat structure) and 48 (31%) were neutral (i.e. they had no effect on each other). Fourteen species had overall positive impacts on the group (i.e. they affected more species positively than negatively), showing that they may indeed pave the way for further invasions.

Examining likely routes of invasion, the researchers found that 14 of the 23 species were already established in Rhine estuary and ports in the Netherlands, major channels for freshwater invasive species to reach Britain. The researchers also created a map of areas most vulnerable to invasion by these species. To do this they located areas that had the most similar environmental conditions to the established ranges of the invasive species, and therefore areas where they are likely to thrive. They also incorporated human-related factors which may influence the likelihood of invasion such as distance to the nearest ports or roads. The map showed that the south-east of England is at highest risk of invasion, with risk declining further north and west.

The authors conclude that together these results show that Britain's freshwater ecosystems are at high risk of an invasional meltdown. They recommend that the methods in this study be used to help to set priorities and aid decision making in this case, but note that they can also be used for other countries. Biosecurity can be improved, they say, by focusing on pathways of invasion rather than individual species, to intercept a number of invaders at the same time. Furthermore, good international communication regarding the status and impacts of invasive species is fundamental to ensure effective prevention, detection and response.



8 January 2015
Issue 399

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Source: Gallardo, B. & AldridgeIs, D. C. (2014). Great Britain heading for a Ponto-Caspian invasional meltdown? *Journal of Applied Ecology*. Early online. DOI: 10.1111/1365-2664.12348.

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To cite this article/service: "Science for Environment Policy": European Commission DG Environment News Alert Service, edited by SCU, The University of the West of England, Bristol.