

Partial riverine barriers delay the spread of invasive signal crayfish.

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Background:

American signal crayfish (*Pacifastacus leniusculus*) are one of the most widespread non-native species in Europe [1], but management techniques are often ineffective, and identifying methods to limit secondary spread is vital [2]. Riverine barriers (e.g. dams, weirs and culverts) have shown promise in restricting spread [3], but more information is needed to determine their effectiveness over large spatio-temporal scales.



Methods:

1. Developed an individual-based model (IBM) that accurately reproduces longitudinal expansion rates of signal crayfish (JRK).
2. Determined how density affects crayfish barrier passage (JAD).
3. Incorporated barrier passage data and experimental results in the IBM to predict the impact of a partial riverine barrier on the longitudinal spread of crayfish (JRK).

Key Results:

1. The IBM accurately reproduced the spread of signal crayfish (Fig. 1).
2. Density did not affect crayfish barrier passage behaviour.
3. A barrier suppressed the upstream invasion rate for **6.5 years** after it was first encountered. Once the invasion rate had recovered, the invasion front was **2.4 km** further downstream compared to the no barrier treatment, representing a **1.73 year** delay (Fig. 2).

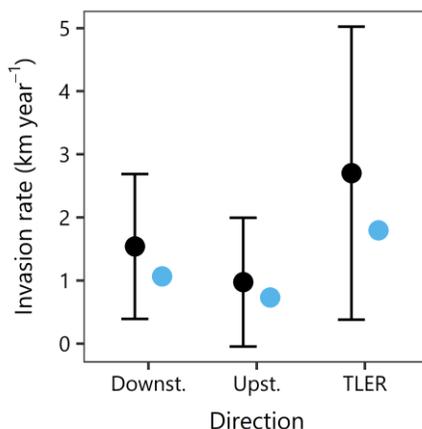


Fig. 1 – Invasion rates reported in the literature (black) and in the IBM (blue).

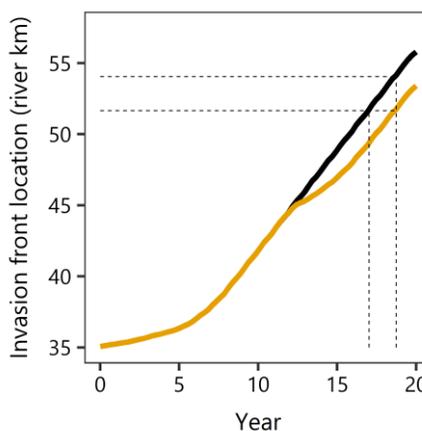
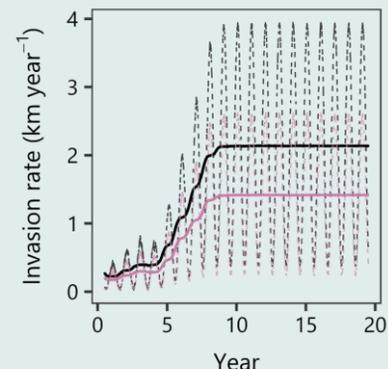
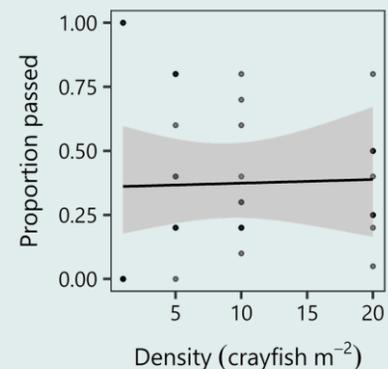


Fig. 2 – Location of the upstream invasion front with (orange) and without (black) a partial riverine barrier.

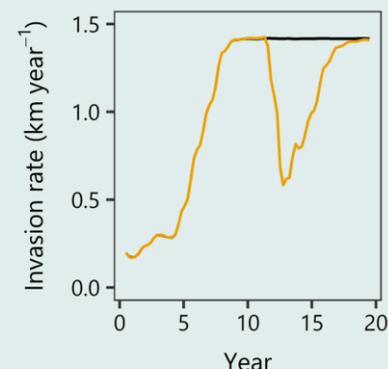
Extra Information:



Upstream (pink) and downstream (black) invasion rates from the IBM.



Density does not relate to passage success.



Upstream invasion rates with (orange) and without (black) the barrier.



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- [1] Kouba, A. *et al.* 2012. *Knowl. Manag. Aquat. Ec.* 413. Article N°: 5.
 [2] Manfrin, C. *et al.* 2019. *Diversity.* 11:1. Article N°: 5.
 [3] Rosewarne, P.J. *et al.* 2013. *Manag. Biol. Invasion.* 4:4. pp. 273-282.

