Predicting Sediment Transport Dynamics in Rivers Infested with Invasive Signal Crayfish (*Pacifastacus leniusculus*)

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1. Introduction

Sediment transport models are not suitably accurate (Fig. 1)[1].

Inclusion of biological activity could improve model accuracy, but only a few studies have attempted this in freshwater environments[2,3,4].

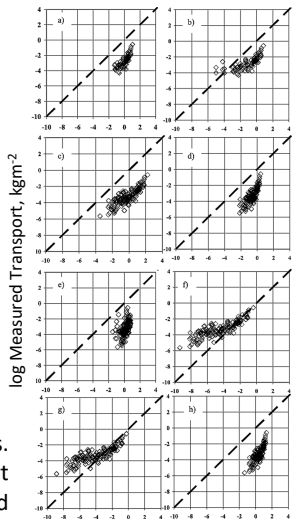
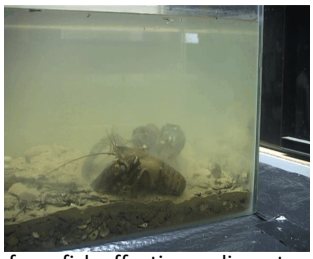


Fig. 1[1]: Measured vs. computed bedload transport rates for 8 different bedload transport formulae.

2. Signal Crayfish

- Widely-distributed invasive species in the UK
- Important due to large body size[5], presence in high densities[5], and burrowing behaviour[6]
- Affect both coarse and fine sediment transport in rivers through walking, foraging, and fighting activity[7,8]



Ctrl+Click here to view videos of crayfish affecting sediment movement in a new tab

3. Research Aim

Incorporate biological activity into sediment transport models to increase prediction accuracy in rivers, using signal crayfish as an example

4. Methods

1 Meta-analysis of past studies

- Compile database of studies addressing the alteration of sediment conditions by invertebrate animal activity
- Determine functional groupings of invertebrate-sediment interactions

2 Predict channel geometry change

- Use HEC-RAS[9] to predict change in response to signal crayfish invasion and future climate change
- Conduct theoretical study of idealised channels
- Calibrate with real data

3 Adapt sediment transport equation(s)

- Adapt calculation of transport parameters to include signal crayfish activity
- Flume experiments to determine crayfish density effects and incorporate them into the model

Examples of Functional Groupings

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Image Credit: Matthew F. Johnson

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