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Sea lamprey nests increase the diversity of benthic macroinvertebrate communities

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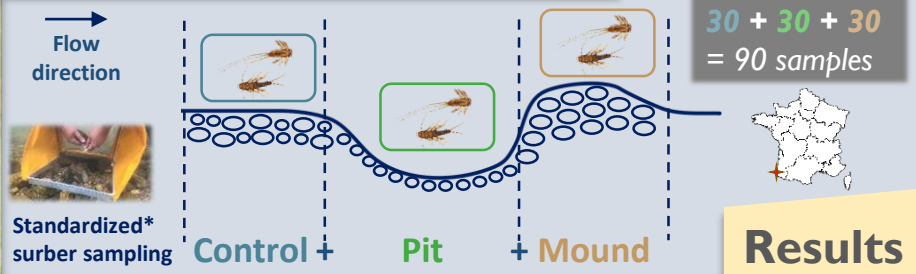
^{1,2,5}Pôle Gestion des Migrateurs Amphihalins dans leur Environnement, OFB, INRAE, Agrocampus Ouest, Univ. Pau & Pays Adour/ E2S UPPA, Pau, France

Introduction

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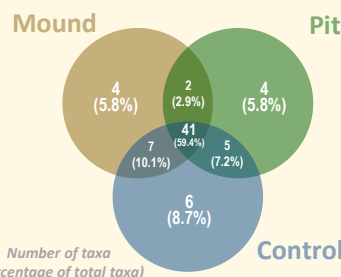
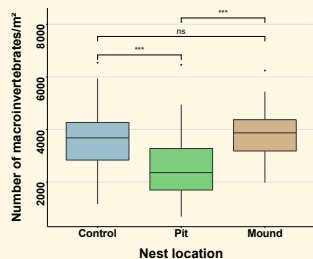
The **habitat heterogeneity hypothesis** states that increased habitat heterogeneity promotes species diversity thanks to a greater number of available **ecological niches**. For stream invertebrates, **substrate** appears to be a key driver of macroinvertebrates community structure followed by **current velocity** and **depth**. **Lamprey nesting**, by removing large volumes of sediment and altering local bed morphology, increases the riverbed physical heterogeneity. **This structural heterogeneity might increase biological and functional diversity**. Here, we investigated the local-scale effects of lamprey spawning on macroinvertebrates communities and discussed the overall effects at the reach-scale.

Materials and methods



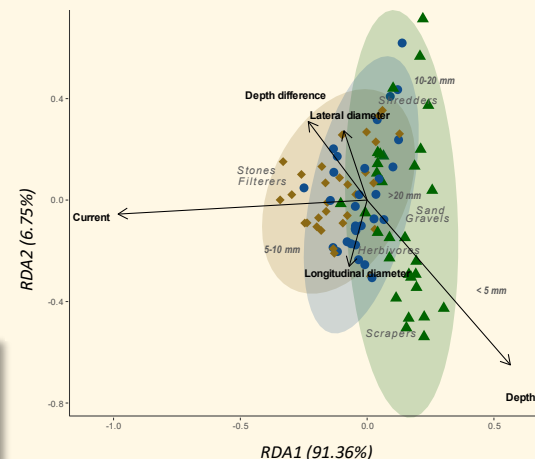
1 Density and richness

- Lower richness /density in **pit** than in **mound**
- Higher richness in **control**



3 Traits and nest characteristics relationship

- Current and depth structuring the communities
- **Pit**: small scrapers preferring sand and gravel
- **Mound**: medium-sized filterers preferring stones



Discussion

2 Diversity indices

- More equitability in **control** than nest (**pit + mound**)
- Replacement explains more variability than nestedness

- **Lamprey nests create structural, biological and functional heterogeneity**
- Traits distributed according to the physical characteristics, reflecting the dynamics of food within the nest locations
- The decreased richness and diversity in the pit (possibly due to lack of biogenic substrate) is not compensated by the mound → **nests are not a biodiversity « hotspot », but modify the structure of the communities.**
- 4 % of the river streambed is modified in our studied zone (this percentage may be higher with high density of spawners)

• Li, H. and Reynolds, J. F. (1995), 'On Definition and Quantification of Heterogeneity', *Oikos* 73(2), 280–284.
 • Hogg, R. S., Coghlan, S.M., Zydlewski, J. and Simon, K. S. (2014), 'Anadromous sea lampreys (*Petromyzon marinus*) are ecosystem engineers in a spawning tributary', *Freshwater Biology* 59(6), 1294–1307.
 • Boyero, L. (2003), 'The quantification of local substrate heterogeneity in streams and its significance for macroinvertebrate assemblages', *Hydrobiologia* 499(1), 161–168.

* According to IBG-DCE index following the Water Framework Directive