

# Preliminary results from seven years of hydro-geomorphic monitoring of a reach scale river restoration project

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## Introduction

There is a lack of evidence on the geomorphic responses to restoring low energy, straightened rivers. Improving knowledge of benefits and pitfalls over longer timescales (i.e. 5-10 years) would help to anticipate responses in other projects and plan accordingly.

The Logie Burn in Aberdeenshire, NE Scotland (Fig. 1), drains a  $\sim$ 25 km<sup>2</sup> catchment with mixed land use. A 236 m reach was restored in October 2011 by reconnecting its old meandering planform. (Fig. 2).

A before and after monitoring program sought to determine the morphological and sedimentary responses. So far, 7 years of data have been collected as summarised here. An earlier study covered the first 3 years (Addy & Wilkinson, 2019).

# **Methods**

- Geomorphic surveys (annual or biennial)
  - > Topographical surveys (total station & dGPS)
  - > Bed sediment sampling (top 5 cm layer)
  - > Visual classification of substrate type
- Discharge monitoring
- ➢ 15 min discharge record over 2011-18 (Fig. 3) 6
- Morphological change analysis
- > 0.25 DEMs produced and analysed in ArcGIS
- > DEMs of difference produced in GCD 7
- Pool volume change analysed in RBT 4
- Laboratory methods
- > Sieving and weighing of sediment > Bed total phosphorous concentration









#### Figure 2 Baseline topography of the restored and control reaches.

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### Reference

Addy, S., & Wilkinson, M. E. (2019). Geomorphic and retention responses following the restoration of a sandgravel bed stream. Ecological Engineering, 130, 131-146. https://doi.org/10.1016/j.ecoleng.2019.01.013



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boxplots (Mann-Whitney U-test, p < 0.05).

### Conclusions

- Restored reach showed a net sediment gain of 137 ±20 m<sup>3</sup> over 7 years (Fig. 4) reflecting wood input (Fig. 4(C)) and a channel gradient decrease (Fig. 5(A)). Control reach had a smaller net sediment gain.
- Pool volume varied (Fig. 5(B)) but was greater in 2018 than prior to and immediately after restoration. Substrate diversity declined following restoration but was higher in 2018 than pre-restoration (Fig. 5(C)).
- Total phosphorous storage evolved to a higher level than pre-restoration (Fig. 6) reflecting the net sediment gain. Grainsize distributions were similar between years and treatments (Fig. 7).