Report for: Project JHI-D2-3 AiMS NBS, WP3 River corridors.

Easter Beltie Restoration Project: Ecological monitoring 2023-24

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Background

River restoration projects have become widespread across Scotland in the last few years, and their number is set to increase greatly benefitting from new funding such as the the new Scottish Government Nature Restoration Fund which enables more projects to be delivered than has ever been seen before. Establishing effective monitoring techniques was identified as vital in the last RESAS programme, which initiated the most powerful long term study in river restoration monitoring to date.

The restoration

The morphology of the Easter Beltie river channel was significantly altered in autumn 2020 to reverse historic channelisation, funded by the Scottish Government Biodiversity Challenge Fund. The new burn is now doubled in length, fully connected to its floodplain, is highly sinuous and includes three extensive on-line ponds, 15 large woody structures installed in 2022 and widespread riparian tree planting. In autumn 2022 a new active travel path was installed alongside the restoration site. The project won the 2021 Nature of Scotland Climate and Nature Award and has been featured on Landward, Out of Doors, Countryfile and in national and local press. A pictorial report and short film showcase the works.

Research

Multiple meta-analyses[1] have highlighted the poor response of macroinvertebrates as an indicator of change in a river restoration context. However, the degree to which this is an issue of study/experimental design has not been explored. The study design employed in the Easter Beltie project is highly robust and the early evidence we are gaining from this project is providing keen insight to the ecological response of the river to habitat rehabilitation.

In order to evaluate the ecological impacts of the restoration we have been sampling macroinvertebrates annually using a full BACI design using this new study design. Samples were collected to assist in the monitoring and assessment of the response of the macroinvertebrate community to changes in channel morphology. The morphology of the Easter Beltie river channel was significantly altered in autumn 2020 to reverse historic channel straightening. The resultant channel is now sinuous and includes three on-line ponds.

Samples collected in April 2023 have been identified and species richness per sample, ranges from 3 species (recorded at Easter Beltie and Negative Control) to 27 species recorded from a sample collected from the Positive Control). This reflects similar ranges to those recorded in the previous sampling period, April 2022.

Compared to the Negative and Positive Control sites, multivariate analysis of the changes in the physical environment at the Easter Beltie shows a larger deviation between the two survey periods (pre restoration, 2018 to 2019 and post restoration, 2021 to 2022; Figure 1).

The physical environment in the river channel post-restoration at the Easter Beltie has a greater degree of overlap with that measured in the Positive Control site. In Figure 1, the blue ellipse with the dashed edge (measurements from the restored Easter Beltie) now overlaps more closely with the green ellipses (measurements from the Positive Control), when compared with the pre-restoration Easter Beltie condition (solid blue ellipse).

The next sample collection will take place in April 2024.

[1] e.g. https://doi.org/10.1016/j.ecohyd.2019.11.001

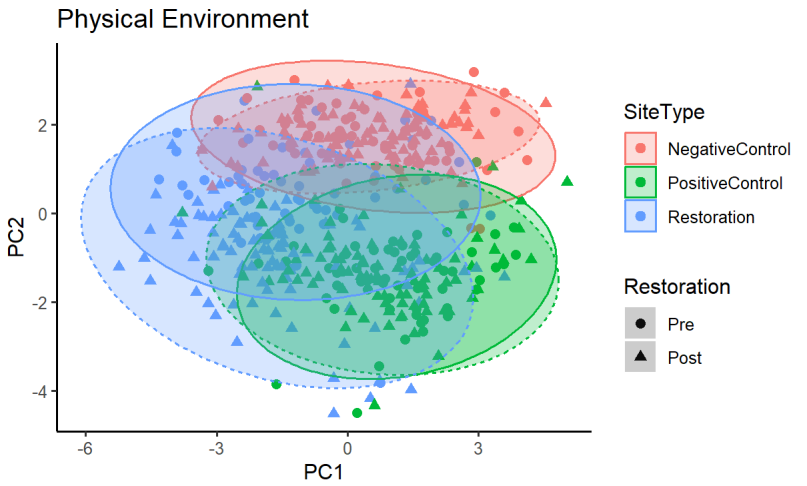

Figure 1: Changes in the physical environment as measured (see previous reports) described in multivariate space using the first two principal components (combined describe 37.7% of the variation). Ellipses include 95% of the data. Solid edges represent pre restoration period and dashed edges represent post restoration.

Communications

- STV feature on river restoration (20 Feb 2024)
- Article produced for The National
- Project report
- Easter Beltie: A River Restored (film produced by the Dee Catchment Partnership working with Scotland the Big Picture)
- The Easter Beltie project featured in two of the Creating Riverwoods films: Creating Riverwoods: Floodplains and Creating Riverwoods: Dynamic Processes
- Media coverage of the new active travel path in the Scotsman and local media
- Follow up feature on Countryfile
- Interpretation boards highlighting this action research project have been produced
- Extensive social media coverage from Dee Catchment Partnership channels
- Easter Beltie: restoration and research (Webinar) (4 March 2024)
- The Riverfly Partnership and Smart Rivers projects set up new citizen science groups at the site

Next steps

The next sample collection period will take place in April 2024 at which point we will have sufficient data to report on the impact of the restoration on early colonisation by macroinvertebrates, and advise on the robustness and efficiency of the new sampling protocol developed in this research.

Contact

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