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0001 – Dalradian Gold - Curraghinalt Mine Project

Channel Naturalisation Case Studies

Introduction

.1. This note sets out example of channel naturalisation schemes, describing the details of each case study and highlighting relevant details such as timeframes and outcomes.

Case Studies

River Tweed and Eddleston Water

.1. The River Restoration Centre publishes a number of 'demonstration projects' which provide examples of successful watercourse enhancement projects. One of these has involved the re-naturalisation of Eddleston Water.

.2. Eddleston Water is a small tributary of the River Tweed which was extensively altered and straightened, largely in the early 19th Century. These changes led to increased flood risk to Eddleston and Peebles, and damaged the river environment leading to a loss of important habitats and therefore biodiversity.

.3. The Eddleston Water Project was formed in order to address this, and is considered to provide a good case study of catchment scale restoration. The three main aims were to:

- Reduce the risk of flooding to the communities of Eddleston and Peebles by restoring some of the natural catchment features.
- Improve the river habitat for wildlife and fisheries.
- Work with landowners and communities in the Eddleston valley to maximise the benefits gained from such work, while maintaining the profitability of local farms.

.4. These goals were achieved by introducing small changes to land management practices, for example by fencing off the river banks and planting native trees, creating floodwater storage areas (ponds and wetlands), reconnecting the river to its floodplain and re-meandering 1.8km of the river's length.

.5. These measures – whilst small-scale – successfully achieved re-naturalisation of the channel, with images below illustrating examples of small channel naturalisation.

.6. The project commenced in 2009 and subsequent monitoring has demonstrated biodiversity benefits, including:

- Re-meandering increased river length and the amount of riparian habitat available for salmon, otters and other species. Different re-meander sections added 8-46 % length of new river habitat and increases in-stream channel habitat diversity by creating more pools and riffles. Re-meandering has led to the gradual re-establishment of macroinvertebrate communities with initial rapid increases in numbers and diversity post restoration, reflecting increases in habitat variety and extent in the channel.
- Creating flood storage ponds increased dragonfly abundance and frequency of occurrence by increasing habitat availability across the catchment. Designed to always hold some water whilst having > 50% capacity available to temporarily store floodwater, they provide new habitats for aquatic invertebrates mayfly, stoneflies and caddisflies.
- Riparian tree planting increases biodiversity and provides climate change adaptation through the creation of 'thermal refugia' from shading provided by bankside trees.

River Tweed and Eddleston Water

.7. A similar scheme was the Irfon Special Area of Conservation (ISAC) project. This was a partnership between the Wye and Usk Foundation, Environment Agency Wales, the National Museum of Wales and the Rivers Trust, supported by the European Union LIFE+ Nature fund.

.8. A number of issues threatened the River Irfon, including climate change, acidification, land use intensification, invasive species and the inappropriate management of the riparian zone. These concerns were addressed in a number of ways:

- Coniferous forestry in the upper catchment was responsible for exacerbating the acidification problem. After an agreement with the Forestry Commission, forest drains were blocked and trees removed to restore ten bogs to their natural hydrological function, mitigating against acidic flashy flows and reducing flood peaks.
- Whilst this upland restoration came into effect, sand liming - the annual addition of ungraded limestone sand into the channel - was used as a temporary solution to buffer against acidification.
- In the middle and lower reaches the aim was to enhance 30km of the riparian corridor to improve river habitat for a number of key species (including white clawed crayfish and freshwater pearl mussels). This was addressed via stock exclusion, tree planting, coppicing, barrier removal and buffer strips.

.9. As with the example above, these measures proved effective at enhancing the ecological value of the watercourse. The image below was published as part of the end of project report[1] and illustrates work undertaken at Garth Dulas (one of the Irfon's main tributaries). Following this work juvenile Salmon density showed an

[1] http://webcam.wyeuskfoundation.org/isac/content/downloads/ISAC%20End%20of%20Project%20Report%20EV.pdf

immediate increase, doubling between 2010 (pre-enhancement) and 2011 (post-enhancement).

.10. It should be noted that this project was short and targeted, commencing in 2010 and reporting conclusions by 2014.

Realignment project in East Lothian (2022)

.11. This case study provides an example of a step-pool channel of the type that will be provided along the eastern edge of the mine at closure.

.12. The image below demonstrates the vegetation establishment achieved in three years, from construction (June 2022) to September 2025. The successful naturalisation of the channel is clearly visible.

Similarly, the image below illustrates the change in channel characteristics within a six-month period

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