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Rewilding and Species Reintroductions

In this issue

Rewilding in a Managed Landscape – The Swindale Beck Restoration Project

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Figure 1. Swindale Beck before restoration. Photo credit RSPB Images.

This article describes the work carried out to restore a meandering profile and natural processes in a section of the Swindale Beck, a tributary of the River Eden in Cumbria. It outlines the need for the project, the restoration methods employed and the anticipated benefits, and discusses some of the challenges of delivering a rewilding project within a managed landscape.

The Setting

Swindale Beck is a tributary of the River Eden in the Eastern Lake District that runs through Swindale Farm, where the RSPB is working in partnership with landowner United Utilities to demonstrate sustainable land management. Like a great many watercourses in the UK, Swindale Beck has been heavily modified. It was straightened at least 160 years ago, as evidenced by the 1859 Ordnance Survey map, in order to create useable meadows that would allow the valley's people to farm more effectively. Evidence of the fact that the river had not always occupied its straightened route can be seen in the land either side of the river in the form of paleochannels. These are visible on the ground as lower lying, wetter areas.

Figure 1 shows the state of the river in 2015. Rock armoured on both sides, a straight route with almost no variation in width, depth or flow, the beck had little of the in-channel habitat features that a river of this type should support, with no gravel bars or deep pools and very few riffles. Historic management of the channel had resulted in the creation of levees running along a 2 km length through the middle of the valley. Grazing had prevented tree regeneration so that this section had only a handful of bankside trees.

Decades of natural deposition of gravel from upstream meant that most of the straightened length was perched above the surrounding land. Had the river not been constrained, it would most probably have moved into a different, lower lying part of the valley. At times of moderately high flow, water would be carried through the leveed, armoured channel at high velocity, typically carrying with it a bedload of gravel. Much of this would be deposited downstream at the United Utilities drinking water intake, necessitating regular maintenance. The lack of slower flowing areas within the channel meant that smaller sized gravel had little opportunity for deposition, resulting in the channel bed being made up of fairly uniform larger sized gravel. The lack of smaller substrate meant there was little suitable habitat for Atlantic salmon *Salmo salar* or brown trout *Salmo trutta* to spawn.

The upper catchment of Swindale is enormous, meaning that flooding of the valley bottom will always be a regular occurrence. Before restoration, the levees prevented water flowing back into the river once flooding had subsided, creating stagnant pools on the meadow to either side, reducing both the botanical interest of the meadows and their agricultural value.

Some of the hay meadows and rush pastures on the valley bottom are

Figure 2. Swindale Hay Meadows. Photo credit RSPB Images.

designated Sites of Special Scientific Importance (SSSI) and Special Areas of Conservation (SAC) (Figure 2). Under RSPB management, with zero fertiliser inputs and carefully timed grazing, their botanical interest has been improving. They are also an important part of the RSPB farming operation, providing winter fodder for sheep.

Swindale Beck Restoration

As part of the RSPB management planning process for Swindale, consultation with the Eden Rivers Trust helped to identify the potential to restore sinuosity and enhance the biodiversity value of the beck. In 2015, the project began in earnest, with geomorphologists from the Environment Agency (EA) using a digital elevation model and the locations of paleochannels to design a new sinuous channel.

The Cumbria River Restoration Strategy (CRRS) was originally developed to help deliver the government's obligation to improve the quality and function of Cumbria's SAC/SSSI rivers but has since expanded to support all river restoration across the county. The resulting projects have helped the CRRS partnership to gain recognition as national leaders in the field of river restoration. The CRRS contributed significantly to the work in Swindale and lessons learned from previous projects helped to inform the design and delivery of the scheme. The value of this expertise and the partnership between RSPB, United Utilities, Environment Agency and Natural England on this project cannot be underestimated.

Previous river restoration schemes had shown that there is little need to do much detailed design work and that once a river is connected into a restored channel, natural processes rapidly take over and the desired in-river features (gravel bars, riffles, pools) all form spontaneously. This approach was taken with the design for Swindale, and contractors were asked to create a simple channel profile based on a basic two-dimensional design.

Figure 3. Swindale Beck restoration work in progress. Photo credit RSPB Images.

A large part of the new channel needed to be dug through the SSSI/SAC hay meadow and rush pasture. Following an Appropriate Assessment under the Habitats Regulations, Natural England concluded that the overall impacts on the ecology of the SSSI/SAC meadows and pastures would be positive and it was able to support the project. The new channel to be dug ran mostly through an area that was almost permanently wet, with less botanical and agricultural value than other areas of the meadow. Some small areas of reasonably species-rich grassland would be lost in the short term but by reinstating hay meadow on the straightened channel after it had been in-filled, the project aimed to increase the extent of species-rich and agriculturally utilisable hay meadow. The increase in dynamism in the system was also felt to be a positive factor, with a more natural flooding regime and new niches being continually created for plants to colonise. The fact that the RSPB are managing hay meadows across the whole of the valley bottom in a way that is increasing the extent and quality of species-rich habitat, means that there will be a good source of suitable seed for recolonisation.

A specialist environmental contractor, OpenSpace, won the tendering process and started work on site in March 2016 (Figure 3). Weather proved challenging at times, as did the presence of a large number of land drains, which in combination regularly inundated the work area. Insufficient gravel found in some parts of the new route added extra complications and raised concerns that the restored river may be more dynamic than was desirable, which could have negative consequences for surrounding land. To help provide some stability, a number of embryo gravel bars were constructed in locations where these would be most likely to form naturally.

After electro-fishing to remove fish from the straightened route, connection into the new sinuous channel took place in August 2016 (Figure 4). A very heavy rainfall event occurred two days later, flooding the whole valley bottom. Concerns about what this might have done to the unconsolidated banks of the new river proved to be unfounded once the flood water subsided. The high flow had brought down large amounts of gravel and in-filled areas that were lacking in suitable bed material, reshaped and increased the size of the embryo bars, and formed new bars, riffles and pools, resulting in a new channel that was instantly more diverse than the old straightened route.

The restored channel at 891 m is 140 m longer and around 2 m wider than the old route and, without the levees, is much better connected to the flood plain. In-channel deposition is visibly occurring in several places, which should reduce the quantity of material ending up at the United Utilities intake, saving on maintenance costs. Gravels are naturally sorted within the channel resulting in areas of fine sediment distinct from larger substrate. As the new river beds in, and aquatic organisms recolonise, this enhanced morphological diversity will almost certainly result in the beck having much more wildlife than it has supported for decades. We will be carrying out a range of different monitoring activities

Figure 4. Aerial photo showing the straightened route and the restored route before connection. Photo credit RSPB Images.

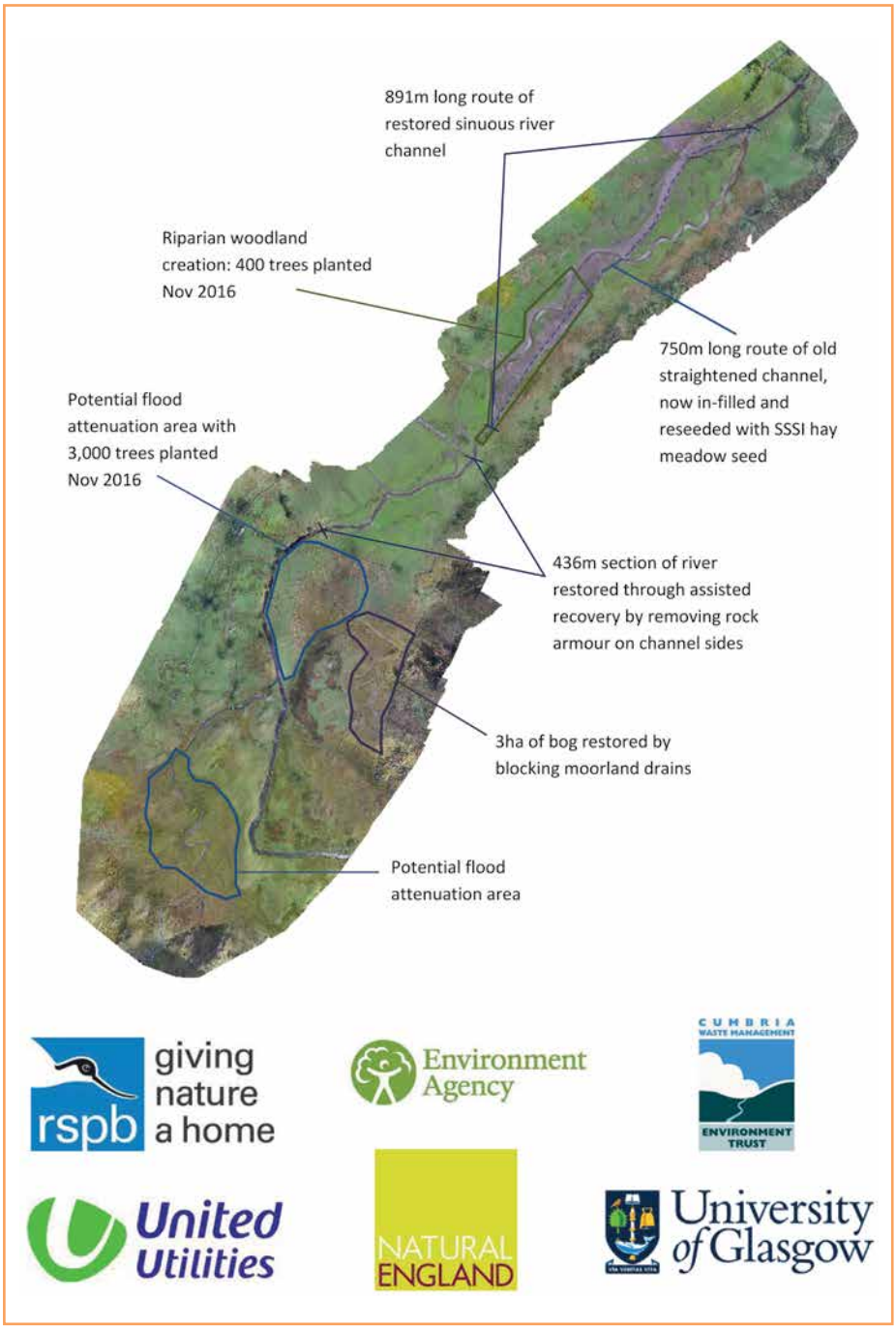

Figure 5. Annotated aerial photo showing river restoration and other Swindale projects. Photo credit Glasgow University.

to document these changes. These will include periodic fish, invertebrate and bird surveys and drone flights to capture morphological change. Water flow and water quality data will be recorded at the drinking water intake just downstream of the project area. Additional research into the impacts of vegetation cover on water flows in the surrounding valley will be carried out through a postgraduate research project in a partnership between the RSPB and the University of Leeds, commencing in 2017.

Around 4,000 trees were planted along the river corridor during winter 2016/17 as part of the project. As these mature, they will add shade and woody debris to the river as well as enhanced habitat alongside. Part of the restored channel will be fenced out to result in a wooded section, while the section running through the SSSI will be left open.

Swindale Beck restoration is nested within a programme of complementary projects to improve ecosystem services in the Swindale catchment, including 40,000 trees being planted around the valley over the last four years, large-scale moorland restoration, a renewed drinking water intake and fish pass, and plans for two flood attenuation areas. (Figure 5).

Rewilding?

While we haven't generally referred to Swindale Beck restoration as 'rewilding' it can clearly be considered in these terms. The aim of the project was to restore natural dynamic river processes in order to enhance the biodiversity, water quality, flood alleviation and aesthetic benefits that have been shown to result from similar projects.

The RSPB/United Utilities partnership responsible for the management of Swindale Farm could have opted for a fuller rewilding scenario. All livestock could have been removed, or naturalistic grazing by large herbivores introduced. Land drains could have been blocked to reinstate more natural hydrology and create areas of wet woodland and fen alongside the restored river. A more intensive programme of tree planting, or natural regeneration of trees, could have been planned. We could have been less prescriptive about the route of the restored channel and allowed the new river to have found its own way. We took the conscious decision not to follow this 'wilder' route for the following reasons.

Protection and enhancement of hay meadows

Hay meadows are a diminishing resource in the British countryside, having declined by an estimated 97% over the last century (Burns *et al*. 2013). While supporting significant species richness, hay meadows are essentially artificial habitats, managed through low-intensity agricultural practices. While a rewilded Swindale valley bottom would still have retained a high degree of botanical richness, natural succession would probably result in a transition from hay meadow communities toward wetter, richer, taller fen habitat and later into wet woodland. To say that hay meadows are worth more than a fen or wet woodland would be completely subjective, but hay meadows do have a particular place in

our cultural consciousness, and their diminishing national presence seemed significant enough to attempt to retain them in Swindale.

Maintenance of culturally valuable traditional farming practices

The Lake District has a long history of pastoral hill farming. While it could be argued that in the main this has not been good for the region's ecology (Ratcliffe 2002), this is at least in part due to government policies following the Second World War which encouraged farmers to graze with unsustainably large numbers of livestock. The aim of our work at Haweswater is to assess if it is possible to deliver environmental benefits within an extensive hill farming operation (RSPB 2015). The restoration of Swindale Beck is an important project within this landscape-scale programme of trial management. If this type of rewilding project and the benefits that accrue from it can be delivered within a farmed environment, then there is a stronger case for continued support for hill farming which at present is heavily dependent on government subsidy.

Demonstration value

Showing that river restoration can be delivered within a farm without negative impact on production may help to inspire other farmers and land managers to carry out similar projects elsewhere. The CRRS has been very successful at delivering a range of river restoration projects in Cumbria in recent years, but to have a really meaningful flood alleviation impact to protect communities at risk from flooding, a great many more need to be carried out. The IUCN has recently published 'River Restoration and Biodiversity' calling for a national programme of river restoration (Addy *et al*. 2016), which highlights the value of rivers and their potential to help mitigate some of the effects of a changing climate.

There is understandable concern from farmers that river restoration may result in land in the flood plain becoming unusable. We hope that Swindale will contribute to the growing body of evidence showing that this doesn't have to be the case. Many hill farms in the Lake District will be similar to Swindale in that, following hay cutting and aftermath grazing, there is little to keep livestock in the valley bottom. In current hill farming practice, it is not uncommon to send livestock to other farms for the winter, or keep them inside. So why not allow these fields to flood? As long as the land in the valley bottom is able to dry out again, producing a hay crop and/or useable pasture in the summer months should be perfectly feasible. Swindale has probably flooded every winter since time immemorial, but this has not impacted on the production of hay and summer grazing.

What if?

Now the Swindale Beck is flowing through its restored, sinuous channel, we don't expect it to stay where it is. There has already been bank erosion and the possibility that the river may decide to create a new channel for itself is one that we were fully aware of from the outset of the project. The river could become wandering, it could cut off access to the meadow or the farm track that runs along the valley bottom. It could affect soil hydrology so that hay meadows become wetter and dominated with rush. While there are steps that we could take to lessen the likelihood of these impacts (land drainage, bunding, bank reinforcement), we are keen to avoid taking them if we can. While our aim is to try to integrate rewilding with management, if nature tells us that this isn't possible, then that will be a valuable lesson learned.

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