CASE STUDY: Swainsmoor Farm 4

Swainsmoor Farm is a mixed livestock farm in the headwaters of the Churnet catchment on the Leek Moors Site of Special Scientific Interest (SSSI). The streams flow through a series of moorland cloughs across the farm. Most are tree-lined with a thicket of willow and alder, whilst one tributary flows through Priority Habitat of Deciduous Semi-Natural Ancient Woodland.

Location: Swainsmoor, Leek Moors
Water course: River Churnet
Sub-catchment: Churnet, Upper Dove

Ownership:

The farm is owned by the Peak District National Park Authority, leased to the Ministry of Defence and managed by a tenant farmer.

Access:

The tributaries on this farm flow through a 'Danger Area' and an area of 'Managed Access' across which there are public and permissive footpaths. Some of the interventions can be seen from footpaths.

About the project:

The aim of the project was to restore natural stream processes within the headwater streams at the source of the River Churnet. By installing a suite of 42 Large Woody Debris (LWD) log jams in 2.2km of the streams at the source of the river this work slows down the rate at which peak flows travel through the system. In low flows, water passes unimpeded past the woody material in the stream. In times of high rainfall, the woody material provides physical resistance to flow so that peak flood flow further down the catchment is reduced. This woody material not only restores natural resistance to flood peaks, but it also enhances the aquatic habitat for native wildlife too such as invertebrates, fish, riparian birds and mammals.

How it was achieved:

The felling work at the source of the Churnet was designed to mimic natural processes as much as possible. Trees were selected based on a number of criteria with both the aquatic and terrestrial habitats in mind. Over the 2.2km of the stream network bankside trees (including birch, spruce, larch, alder and willow) were felled to create log jams, and within the willow thickets live material was pleached to create living structures which improves their long-term resilience. Each jam was made up of 3-4 trees. Suitable bankside trees were selected and felled into the channel. Each tree was felled on top of the previous tree to create a lattice of interlocking branches and woody material. This interlocking mass creates a heavy, dense structure which doesn't mobilise in high flows. Natural geological pinch points were also used in the valley to ensure a double fail-safe was in place mitigating against wash-out. In the unlikely event of the felled trees breaking loose from the jams, the downstream pinch point acts as a debris trap to prevent pieces mobilising further downstream. The pleached material was cut using a technique similar to that used in hedge-laying so that live material remained attached to the stump. This has a two-fold benefit; the material can't mobilise in high flows as it is still attached but also it can re-coppice and sprout fresh growth meaning the structure carries on living and remains within the stream network. This work was carried out using training arborists to fell the trees. The technique used here has been described as the 'Chop n Drop' approach which seeks to mimic windblown trees enabling the aquatic habitat to be restocked with woody material. The natural process of LWD in rivers is called the 'Riparian Wood Cycle'. LWD not only helps to reduces peak flows but it also has a crucial ecological role in freshwater rivers and streams.

Cheshire Wildlife Trust
SOUTH WEST PEAK LANDSCAPE AT A CROSSROADS
HERITAGE FUND
Environment Agency

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www.southwestpeak.co.uk/projects/natural-heritage/slowing-the-flow

John Wain, Tennant Farmer

Why have you allowed this work in your woodland?

"I wanted to see better habitats for fish in the streams and it also doesn't impact the way I farm the land so I couldn't see why not."

What impacts has it had on the environment and habitat in your woodland?

"There is plenty more places for the fish to find shelter and food now. It's had no impacts on the way I farm the land. The log jams are within the channel and the sheep aren't effected and neither are the cattle. It's not made my land wetter at all, you can just see the water backing up in the stream behind the trees but after the rain has passed through it just goes back to how it was."

Consents:

This work required the following consents:

Land Drainage Consent
Under Section 23 of the Land Drainage Act 1991 permitting works that may impede the flow of a water course. Issued by Staffordshire County Council.

Felling licence
Issued by the Forestry Commission under the Forestry Act 1967 permitting the felling of trees for any purpose that falls outside the exemptions listed by the act. In this case, the felling licence was part of an existing woodland management plan agreed with the Forestry Commission.

Section 28 of the Wildlife and Countryside Act
This act is in place to ensure wildlife, species and habitats are protected against disturbance and habitat degradation. As the work was also within the Peak District National Park consultation with the PDNPA was also required along with consulting other statutory organisations such as Natural England for SSSI consent.

Why was the work needed:

The Upper Churnet had very few naturally occurring LWD jams within the stream and had a fast flow regime through the valley. The installation of LWD log jams improved the habitat for wildlife by introducing the pool and riffle effect. This provides shelter for fish and invertebrates and also suitable spawning and foraging places for aquatic species. Additionally the work was needed to provide a physical barrier in the stream to slow down peaks flows. Bank side felling of non-native conifers also allowed more light to penetrate the forest floor benefiting native ground flora.

Benefits:

LWD log jams have multiple benefits. Firstly, and crucially, log jams reduce flow rates meaning peak flow conveyance is much slower. Secondly, LWD has a localised positive impact on immediate downstream gravels and stones as the flow rate in the immediate vicinity is altered enabling the flushing through of fine silts and cleaning of spawning substrate. Silt and sediment eventually accumulate behind the structures with a leaf-pack. This creates the 'pool-riffle' effect above and below jog jams. LWD can also divert water during higher flows and allow it to reconnect with the floodplain. This allows silt and sediment to drop out of the water column onto the floodplain, decreasing the total sediment load in the stream. Woody debris also provides a natural habitat for many invertebrates, lower plants and fungi. It provides important refuge and foraging ground for fish and affords shelter for juveniles from high flows and predation. It engineers habitat diversity and biocomplexity.

Construction data:

- 42 LWD log jams
- 2.2km of watercourse restored with LWD

Costs:

- 3 days FTE labour, 6 days of arboricultural contractor labour at a total costs of £2130 (ex VAT)
- Number of structures: 42?
- Cost per structure: £50.71 (ex VAT)

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