



## **Dartmoor Headwaters**

# **Natural Flood Management (NFM) Project**

## **Newsletter- June 2021**

The Dartmoor Headwaters NFM pilot project, a partnership between the Environment Agency (EA) and Dartmoor National Park Authority (DNPA), concluded on 31<sup>st</sup> March 2021 having initially secured funding in 2018. During that time the project has worked with its partners Devon County Council, Natural England, Highways England, West Country Rivers Trust and Woodland Trust, as well as landowners and commoners across Dartmoor.



However, this is not the end of the NFM story on Dartmoor, we are pleased to report that further funding has been secured to continue this work into the next phase of the NFM partnership, to take place between 2021 and 2027.

During the pilot phase we trialed the use of more natural solutions to managing flood risk than have traditionally been used. These techniques involved slowing and storing flows higher up in river catchments, reducing flood peaks downstream. Such measures are less intrusive in the environment and can bring added benefits such as enhanced biodiversity, increased carbon capture and storage and improved water quality. They are normally used higher up in the river catchment to tackle flooding nearer to the source and can be used in addition to engineered defenses further downstream, to further reduce flood risk and provide a higher level of flood resilience for longer, also taking account of climate change increasing river flows over time.

The pilot project focused upon five river catchments- the Mardle, the Dean Burn, the Collybrook, the Black Brook and the Hanger Down area of the River Erme catchment, where the communities downstream in the towns of Buckfastleigh, Peter Tavy, Walkhampton and Ivybridge have all flooded in recent years.

Early in the project detailed surveys of archaeology, habitat and soils were carried out both on the commons and on enclosed farmland to help inform where best to consider flood management measures.

## Soil Surveys



Right: run-off from arable land due to poor soil management and ill-timed cropping operations. This run-off and loss of soil is environmentally damaging for our rivers and streams, makes poor farm business sense and can cause flooding in the towns and villages below. A handful of properties have flooded during the period of the pilot because of the ongoing issues with run-off from agricultural land.

By kind permission of landowners and commoners surveys were conducted across all of the trial catchments. The aim was to assess soil condition and identify issues such as compaction, which can exacerbate run-off.



The project has surveyed soils, offered advice on soil remediation and cropping and has been able to offer the use of a soil aerator for addressing widespread compaction issues.



The combined effects of soil type, climate, erosion and overgrazing on moorland soils can all contribute to poor soil condition and run-off issues. In this situation the capacity of soils to intercept and absorb water is very limited resulting in a high risk of problematic surface run-off and loss of soil.

There is still much work needed to address soil management across the catchments.

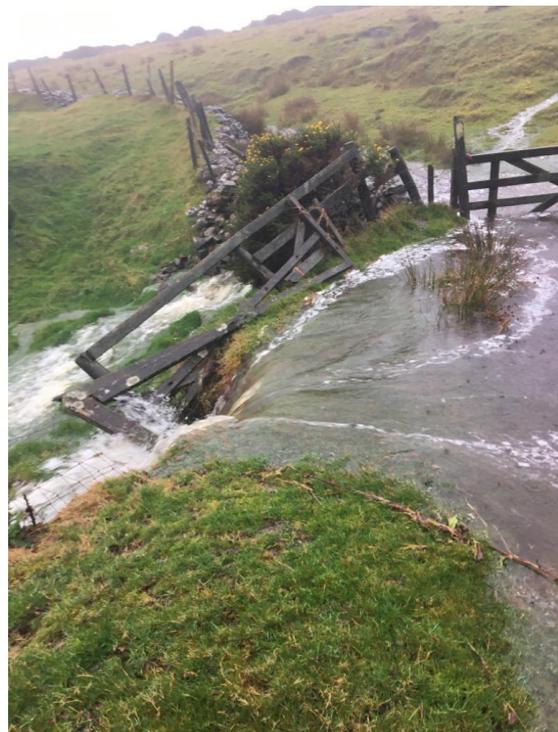
The types of interventions trialed during the pilot include leaky barriers constructed from wood, stone, willow, wool and fallen timber, river restoration and floodplain reconnection, wetland enhancement, tree planting and managing flood water on Public Rights of Way. We also funded a PHD student at Plymouth University to further our understanding of the hydrology of woodlands on Dartmoor and carried out extensive engagement with landowners and community flood groups. We have in addition been working closely with the Southwest Peatland Partnership to fund an extra 75ha of Peatland Restoration on the high moor.

What follows is a snapshot of some of the projects completed during the pilot with the cooperation of landowners, commoners and contractors, to trial these different techniques in different settings on both farmland and common land.

### **Moorland Run-off on Dean Moor**

Flood water damage to a bridleway from moorland run-off in high flows.

We worked in partnership with the Ranger Service to repair the damage and tackle the source and the speed of the flow.





Improvements to the public bridleway were included in the contract. The path was resurfaced and a new gate and signage provided by the Ranger Service.

The source of the problem was a steep gully channelling water down towards the gateway. A series of stone dams were installed along its length to slow the water, allowing it to flow away safely through the new buddle hole below.



Trees were planted downstream of the flow and the area fenced to allow natural regeneration. The new vegetation and trees will in time help to intercept and slow down the flow of water.



Working on the commons can be challenging with limited access to deliver materials, unpredictable weather conditions and the sensitive nature of the moorland environment.

## The Blackbrook Catchment

Work here was delivered by West Country Rivers Trust on behalf of the Dartmoor Headwaters NFM Project. Many thanks go to them for their hard work here and for getting the local farming community onboard to trial some great measures to alleviate flood risk.



Moorland run-off converging on a pinchpoint at the old railway bridge had caused erosion damage and access difficulties. Water was gathering a great speed as it headed down towards the village of Walkhampton, where the community has previously suffered flooding.



A series of trial stone dams were installed on flow pathways to slow down flood water, all with different designs according to their position on the flow route and the volume of water carried.



Normal flows pass through the leaky dams unimpeded; it is peak flows that are slowed and stored to ease the pressure downstream.



Improvements were also made around a yard area lower down, which was affected by the flood water. Water was diverted away from cattle feeding and loafing areas and bunded areas created to intercept the water. Trees suited to the wet conditions were planted to help with water infiltration, screening and biodiversity.

Work in this catchment will continue into the next phase of the NFM project.

## Holne Moor- Slowing the Flow



A group of Holne commoners were first enthused about getting involved with Natural Flood Management work during a very wet visit to Exmoor to see similar work done there in early 2020.



After much consultation over the many archaeological features, the Holne SSSI and SAC, the HLS agreement and with the commoners themselves, work plans finally came to fruition in February this year.



Leaky dams made from both live willow faggots and timber boards were installed into a network of old tin mining gullies, many of which channel significant flows during heavy rainfall.



The commoners worked together to complete the task and emerged enthusiastic to get involved in future NFM work on their common. This was despite the challenges of access and the weather being less than helpful!

These leaky dams will be monitored over the next few years by the project and by the commoners, to see the impact this approach could have over a wider area on Dartmoor commons in the future.

## Trialing Different types of Leaky Dam

Natural Flood management measures are generally smaller in nature than more traditional flood defenses, with the sum of many features across the landscape helping to slow flows, store water and reduce the risk of flooding.

We trialed the widespread use of leaky dams made from different materials in different situations to see what works best and where. We have had some great results captured by time lapse camera and wet weather observation, with some dams already tested throughout two winters. Many lessons for the future have been learnt.



**Woody Debris dams** are made from fallen timber or material found locally on site and pegged securely in place. These dams blend in well with their surroundings, are naturally leaky and should remain in place for many years to come.



**Live willow faggot dams** are naturally leaky and provide a great barrier for slowing water, trapping silt and debris and with the advantage that the willow faggot and stakes will grow (below right). This will further stabilise the structure, the roots will help with water infiltration and absorption and there are habitat and livestock health benefits from willow too.



Willow faggots can be adapted for use in a variety of situations. In this very steep, incised gully faggots were used both to create frequent leaky barriers across the width of the gully and are also pegged down lengthways into deeply eroded channels and erosion holes to prevent further damage.



They are secured in channel with live willow stakes, which when growing will help to stabilise banks and eroded cuttings. The presence of the willow bundles in deeply cut, faster flowing channels will really help to break up and slow down the flow.



Below: in a wide section of gully lower down there is the opportunity to enhance wetter habitat by using a wide faggot dam to help to retain some of the water and allow wetland species to colonise.



To see how a willow faggot dam works to hold back high flows, click on the link to this short video:

 [20200723-DNPA-MW- VIDEO A willow faggot in action.wmv](#)



**Stone dams** vary greatly according to their location and function and are most suited to ditches or gullies with surface water flows where the passage of fish will not be impeded. The stone structure is built to be deliberately leaky to allow the passage of normal flows.



Water permeates slowly through the smaller stone on the downstream side of the structure, preventing erosion from any great force of water. These stone dams stood the test of storm Dennis, overtopping but without the loss of any stone.



Throughout the pilot project we were only able to trial the use of stone dams in two places- where there was relatively easy access to deliver the stone.

Delivering stone to remote moorland locations is not only very expensive but also highly impractical and runs the risk of damaging sensitive moorland habitat.

Building a stone dam- buddle hole first.



Stone dams blend in well with their local environment, especially when the surrounding vegetation has had chance to grow back around them.



**Timber dams** on the left are holding back high flows from a network of tin mining gullies on Dean Common. They are made from untreated oak sleepers and will be resilient against weather and livestock interference. The lower boards have small spaces in between to allow leakage during normal flows.



On the right timber boards are used to slow and channel flows in combination with willow faggots used to hold water and to enhance wetland habitat. Timber is a useful material to use in situations where the gully bed is too dry for live willow faggots or where a more robust structure is needed. These dams do not always initially blend into the landscape as well as other types but will weather in time.

## Wetland Enhancement



Water from an adjacent ditch has been diverted into this meadow and encouraged to spread out, making the habitat permanently wetter.

Helped also by a series of ponds and scrapes, the biodiversity value of this wetland has been greatly enhanced.

Areas of open water are attracting a wide variety of dragonflies, damselflies and other insects.

The meadow is intercepting and storing much more water, reducing the volume running away to eventually enter the river downstream.



Similarly, by encouraging the stream out onto the floodplain with the help of small earth bunds, areas of wetter habitat and open pools can be created to benefit both biodiversity and water storage.

Here a group of neighboring landowners are discussing how this work can be linked up throughout their wet valley, to achieve flood mitigation and biodiversity gain on a larger scale in the future.

## Floodplain Reconnection

In this two-stage project we started upstream using timber dams to slow water, encouraging it to spread out from its defined channel in peak flows. This rewetted the surrounding floodplain and will in time create new areas of important wetland habitat.



The next stage was to address a section of straightened watercourse flowing within a deep cut channel, completely disconnected from the floodplain.

The stream bed was raised using layers of dried silt and brash topped off with coir matting and the original stream bed cobbles. Some of the flow will continue along this raised channel. The majority however will find its natural and original course throughout the wet meadow, which had been showing signs of drying out.

The habitat in the wet meadow will be monitored. It is expected to make a gradual change over the coming years as the species respond to the meadow becoming permanently wetter.



Finally downstream volumes of silt had built up in the sediment pond and lake due to the speed and volume of water heading downstream. Both pond and lake were cleared of silt and the measures put in place should reduce the silt load in future, allowing more water to be stored in the lake. This project will be closely monitored over the coming years to measure the effects on flow, silt deposition and biodiversity.

### Scorrilton Driftway



Houses in Scorrilton have been flooded very recently as a result of flood water running down the driftway into the village. In a joint project between the Ranger Service and the Headwaters Project drainage improvements have been carried out, to include new French drains, renewed cross drains and a series of trial infiltration pits to soak away the water.



This track is well used by vehicles, walkers and horse riders, so any measures had to maintain ease of access for all. Hopefully we have helped to alleviate the flooding issue, caused largely by the topography of surrounding farmland and surface water on the track gathering pace during periods of prolonged and heavy rainfall.

## Tree Planting



Trees are usually protected from grazing livestock by fencing, which means that rough tussocky vegetation and scrub can develop. This is much more effective at intercepting run-off than grazed pasture lacking in sward any structure.

The planting carried out was also planted with biodiversity in mind. We planted nearly 6000 trees, all a mix of native broadleaf trees, trialed various planting densities to measure survival under grazing pressure and trialed different types of biodegradable tree guards and spiral rabbit guards.



protection of gorse and scrub. Trees and scrub are incredibly valuable to livestock in open landscapes for shelter from harsh weather and for shade in summer. Trees also provide perches and song posts for birds and a source of nectar and berries amidst a bleak landscape.

Planting trees and allowing scrub to develop on slopes above watercourses and on riparian strips is a great way of increasing the soils capacity to soak up and slow down water. The tree roots over time will break up compacted layers of soil and help water to infiltrate rather than run off the surface.



The commons are usually a virtually treeless landscape with any young trees soon being grazed off by livestock or burnt. However, in areas of scrub not subject to frequent burning, trees can establish themselves within the

## Peatland Restoration



Holne moor lies within the South Dartmoor Site of Special Scientific Interest (SSSI) and SAC (Special Area of Conservation) and is designated for its European dry heath and Blanket Bog habitats. One of the main objectives of restoring degraded peatlands habitats, once the hydrology has been restored, is to re-establish a Sphagnum moss layer. This provides the long-term stability the peat needs and re-starts the peat-forming and carbon sequestering processes that restoration is trying to achieve.

The NFM pilot has contributed funding to help with 70ha of peatland restoration, 35ha of which was completed on Holne Moor during Spring 2021. We are engaging with the South West Peatland Partnership team and hoping to align NFM and peatland restoration more closely in the future.



Century. This retains water and creates a series of small pools, great for water storage, carbon storage and for enhancing biodiversity.

There are various techniques used, usually involving peat dams or bunds to block the drainage channels surrounding peat-cuttings, dug by hand in the 19th

The Dartmoor Headwaters Project will be funding a further 35ha of restoration work on Buckfastleigh Moor this autumn, to include blanket bog restoration, Molinia cutting and planting thousands of Sphagnum moss plugs.

## What Next?

Covid 19, together with the challenges of working in remote and highly designated landscapes, made a definite impact upon the delivery of trial projects, stopping work completely for a while during the first lockdown and hampering the collaborative approach to delivery we had hoped for.

However, the learning from the pilot project to date has helped to secure further funding to extend this important work into the next phase of the Natural Flood Management partnership, to take place between 2021 and 2027. We will be taking this learning and using these techniques Dartmoor wide to make a difference on a larger scale, as well as building upon the work already done in the trial catchments.

The learning we have gained from the pilot phase extends far beyond the structures we have trialed. We have learned much more than anticipated along the way and are pleased to have achieved one of our goals- getting a group of commoners on board and employing them as contractors to work on the high moor. We have been reminded how much time it takes to get projects off the ground, have received much positive feedback from interested members of the public and it has been satisfying to see how enthusiasm for participating in the project can mushroom amongst a local community of landowners.

A business case must be completed to 'unlock' the new funding for phase 2 of the project, which will likely take the project team into 2022, when we can begin funding physical works again. Prior to this surveys and other work to help develop the project further will be possible to fund, and it is hoped that easing of covid restrictions will allow us to do some engagement about what the future holds with various groups on Dartmoor and the communities at risk of flooding on and around the moor.

We look forward to continuing this work and are keen to work with farmers, landowners and land managers who have NFM project proposals, especially those working in collaboration with neighbours or commoners, where we can influence flood risk on a greater scale. Anyone who thinks their land could benefit from soil survey to help understand any issues and inform future work is encouraged to get in touch. Similarly if you know of a forthcoming event or suitable platform from which to promote the project then please let us know.

For more information please get in touch with the Dartmoor Headwaters Project Officer- **Kerry Smith** on **07849 085339**/ [ksmith@dartmoor.gov.uk](mailto:ksmith@dartmoor.gov.uk) or contact the NFM mailbox on [dartmoornfm@environment-agency.gov.uk](mailto:dartmoornfm@environment-agency.gov.uk)

For an insight into other NFM projects completed around the country- follow this link to a short six-minute film "High Water Common Ground"

[High Water Common Ground - 6 Minutes](#)