Upstream Thinking - Sphagnum plug planting at Morridge and the Roaches

Report by Jasmin Bishop, Countryside Worker Apprentice and Karen Shelley-Jones, Scheme Manager, April 2022

The Upstream Thinking project, with funding from a Water Environment Grant, aimed to improve water quality and natural flood management by supporting sustainable upstream land management. Part of this project was to plant 10,000 sphagnum plugs at Morridge and 50,000 sphagnum plugs on the Roaches, both part of the Leek Moors SSSI.

Around 70% of UK drinking water comes from upland areas. When bare peat is exposed (not covered in blanket bog) it is easily eroded. Weather conditions dry out the peat and wash it into watercourses. Up to 2.5cm in depth can be lost a year. The bare peat allows water to flow over it carrying peat (50% carbon) and other heavy metals off the moor and into drinking water systems. Peat particles are expensive to remove from water.

Sphagnum is able to hold up to 10 times its weight in water. So when connected in a blanket bog this is a lot of water retained in the uplands. Sphagnum binds the peat and protects it from drying out. It is able to slow the flow of water off the moors and filter out impurities.

Peatlands are the largest natural carbon sink on earth. Sphagnum moss is the peat-maker. Sphagnum grows peat as it dies off into the water-logged low-oxygen environment, these conditions limit decomposition, creating layers of peat. In this way carbon is locked into the peat making it important as a carbon sink. Peat grows at 0.5-1mm a year, so it can take 1000 years to grow 1m of peat.

The Roaches

In the summer of 2018, a devastating accidental fire destroyed vegetation across 60 hectares of blanket bog and heathland on the Roaches, leaving vast expanses of bare peat.

Initial restoration plans were to allow for natural regeneration of moorland grasses and dwarf shrub heath to take place where possible, to provide a nurse crop (pictured below).





Exposed gullies were blocked with stone dams (pictured left). This helps to stabilize the site and bring back vegetation, but without the reintroduction of sphagnum mosses, it would be impossible for the peat to rebuild.

The main sites for planting stretched from Doxey Pool down to the derelict cottage, across an area of approximately 20ha. Within these

areas a grid was laid out dividing the site into manageable and visible sections. These were areas that were badly affected by the fire, large areas were completely bare with no vegetation at all, other areas had begun to repair with key indicator species like cotton grass tussocks, purple moor grass tussocks and common hair-cap moss growing. These species indicated the right conditions for sphagnum to grow and also provided excellent cover for the sphagnum plugs. It was in these areas and the blocked gullies that the planting was concentrated.

Teams of volunteers were sourced from the South West Peak Landscape Partnership, Staffordshire Wildlife Trust, Churnet Valley volunteers, and the Leek and Dane Valley Climate Action Group. The numbers varied from small groups of 5 to groups as large as 20. The aim was to plant 200 sphagnum plants per person each day and saturate the grid with as many plants as it could sustain. The technique that was found to be most effective was working in pairs, one using a



dibber (metre-long pointed stick) and the other planting. The instruction was to put 3 or 4 in a metresquare as long as the conditions were appropriate. The sphagnum needed to be planted beside cover in areas that were wet but not flowing.

Once this strategy was developed and the volunteers and leaders improved their technique, planting sped up, from taking 3 people 4 hours to plant 800 to 2 people taking 6 hours to plant 2000. The average planted in a day was 2000 with 6 being the average number of planters. Overall around 168 person hours were required to plant the sphagnum



It was a popular activity with many volunteers returning on multiple occasions.

The planting was due to run from 24/02/2020 – 29/03/2020 ending before the ground birdnesting season. Unfortunately the amount of time we had to plant was cut short. Initially we were delayed by a week due to snow and then the Coronavirus outbreak abruptly halted operations. Despite this over 43,000 plugs were still planted, the remainder were temporarily stored by the site manager to be planted by staff.



It was intended that the combination of gully blocking, natural regeneration and sphagnum planting would stabilize this site, reduce the run-off of water and peat particles and thus improve downstream water quality. Using sphagnum plugs rather than beads should see the plants double in size in a year, as opposed to the 4 or 5 years it takes for the pellets to become viable. This should see the restoration of this peat land to a functioning blanket bog in a relatively shorter time scale. A functioning blanket bog means less peat degradation, therefore, it will capture and store CO2 rather than emitting it. It also will return the hydrological functionality of the peat bog allowing it to act like a sponge and hold water in the uplands. The sphagnum itself creates a rough filtration system slowing water flow and improving water quality further along the watercourse.

In periods of high rainfall, sphagnum's ability to retain water in the upper layers of peat limits the speed at which the water can enter watercourses, thereby helping to reduce peak flood levels.

The Results

In February 2022, staff from the South West Peak Landscape Partnership revisited the site to check on progress, recognizing that it would be impossible to locate many of the sphagnum plants over such a large area. Nevertheless, a number of sphagnum plants were located growing in amongst the recovering vegetation (pictured right).



The plants had grown significantly in size, which can be seen when a quadrat is placed over them.



Morridge

This site was a very different proposition. This SSSI unit is described as remnant blanket bog on thin peat and had been assessed as being in unfavourable recovering condition. In order to move the site towards favourable condition we organized 9 blocks of the tall dwarf shrub heath to be cut in October 2019, this was then followed by planting of 10,000 sphagnum plugs at a planting density of between 0.25 and 1 plant per square metre. The species mix was called the 'Yorkshire mix' comprising approximately 30% *Sphagnum capillifolium*, 30% *Sphagnum papillosum*, 30% *Sphagnum palustre*, 5% *Sphagnum magellanicum*, 5% *Sphagnum subnitens*. Each 'plug' contained a combination of one or more of these species.

Planting was not evenly spaced, focusing instead in locations which were flatter and wetter with some shelter from wind. The planting was carried out by hand with small teams of volunteers using short wooden dibbers to make appropriate diameter holes into the peat to a depth no greater than 10cm. The sphagnum plugs were planted by hand and firmed into the peat.



The plug plants started off pretty tiny, they are just visible in this quadrat (50cmx50cm quadrat, each division 10cmx10cm)



Although the vegetation had been cut, there was still a noticeable litter layer, thus small depressions had to be created in order to plant the plugs in contact with the peat and firm them in.



In addition, as a trial approach, sphagnum was also planted within areas of uncut vegetation. This zone was not heather dominant and there were species and a sward composition more indicative of something beginning to approach state 6 blanket bog, but with less sphagnum diversity and abundance than was desirable. Here the approach was to plant selectively amongst degenerate heather where the sward was opening up, using the natural litter layer and feather mosses as a mulch. As above it was necessary to create a pocket within which to secure the plug (pictured below).



The Results

The site was revisited in January 2022 by staff from the South West Peak Landscape Partnership, Peak District National Park Authority, Natural England, Environment Agency and Ministry of Defense. The dwarf shrub heath vegetation within the cut areas was re-growing nicely and it was possible to relocate a number of sphagnum clumps. Picture below is one of the clumps of sphagnum we located, approximately 10cm in diameter.



It was even possible to find some amongst the uncut vegetation.



Here is a rough growth comparison in two years





