

Kinder Scout *Sphagnum* Trials

Introduction

In 2015, as part of the Peatland Restoration project, two trials were set up: the *Sphagnum* propagule trial and the dense plug plant trial. The aim of the *Sphagnum* propagule trial is to compare the establishment, survival and growth of four different *Sphagnum* propagule types, including BeadaGel™ (*Sphagnum* gel), BeadaHumok™ (*Sphagnum* plugs), BeadaMoss™ (*Sphagnum* beads) and translocated *Sphagnum* clumps, on revegetated bare peat. The aim of the dense plug plant trial is to evidence how quickly comprehensive *Sphagnum* cover can be achieved.



Study sites

Both trials are located on the north Edge of Kinder Scout, within the Ashop River catchment, in the Upper Derwent Valley, Derbyshire. Initial bare peat revegetation was completed on the Edge under an Environmentally Sensitive Areas (ESA) Scheme and the Making Space for Water project (Pilkington et al 2015). The Peatland Restoration project continued bare peat revegetation through the application of heather brash, lime and fertiliser; installed additional timber and stone dams in gully systems; and applied *Sphagnum* propagules into the developing sward. This work was completed between February 2011 and July 2013.

Methodology

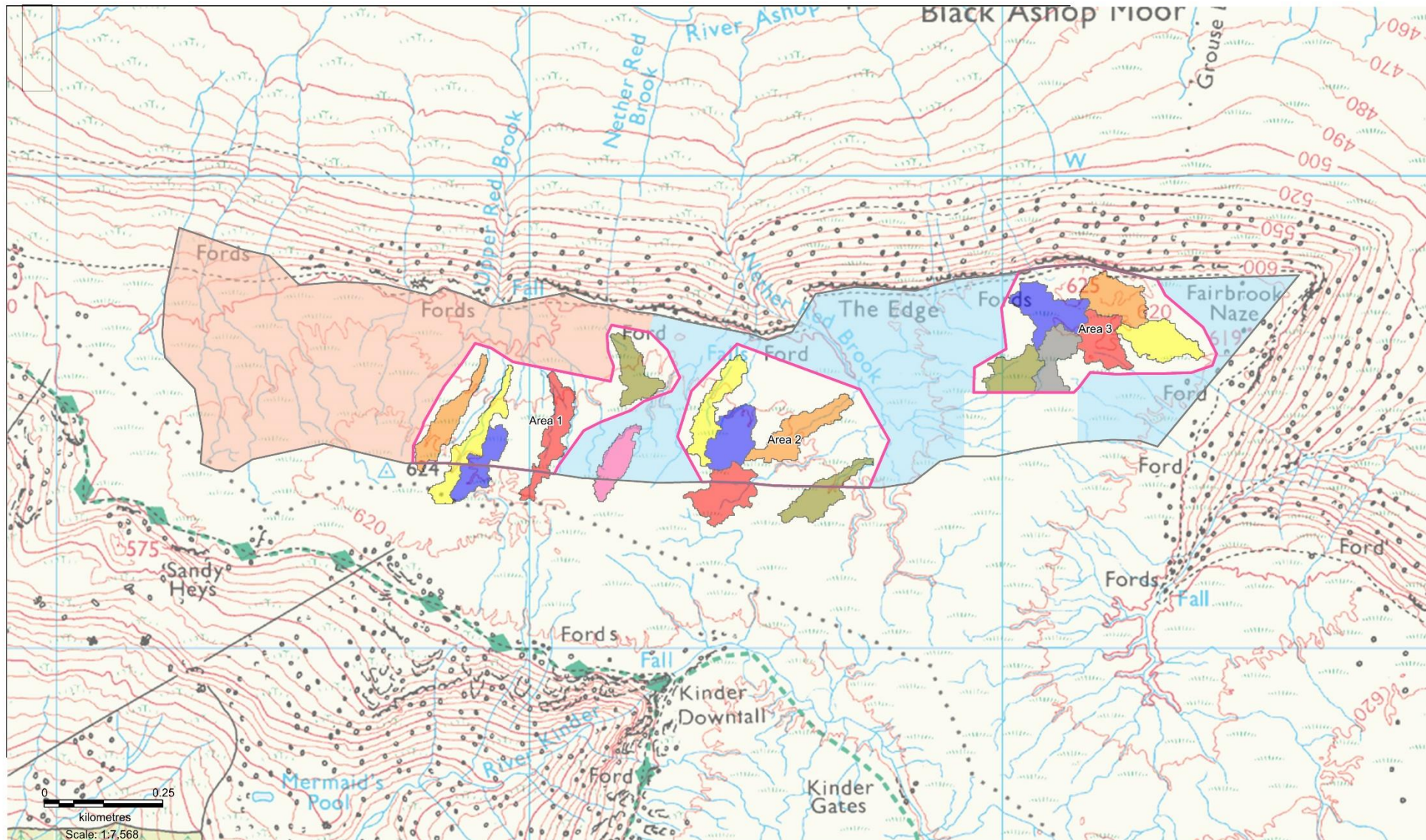
Sphagnum propagule trial

Four headwater micro-catchments were treated with one of four different *Sphagnum* propagule types; beads, gel, clumps and plugs. A fifth micro-catchment received no treatment and provides a control. These applications were replicated three times (area 1, area 2 and area 3). Ten quadrats were located within each of the micro-catchments to monitor the success of *Sphagnum* propagule development.

Dense plug plant trial

In the dense plug plant trial, 36,550 *Sphagnum* plugs were planted to deliver comprehensive *Sphagnum* cover within 3 years. Twenty quadrats were located within two categories of topography, ten on undulating ground and ten on depressions / hollows on hag tops.

Sphagnum treatment for both trials took place between 6th and 20th March 2015.



Legend

- The Edge
- Treatment areas
- Area treated with Sphagnum beads Spring 2015
- Area treated with Sphagnum beads Autumn 2014

Sphagnum propagule & dense plug plant trials

- Beads
- Clumps
- Control
- Gel
- Plugs
- Dense Plug planting

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 <p>LIFE 14 NAT/UK/000070</p>	<p>Moors for the Future Partnership</p> <p>The Moorland Centre Fieldhead Edale Hope Valley S33 7ZA</p> <p>Tel: 01629 816581 Email: moors@peakdistrict.gov.uk</p> <p>www.moorsforthefuture.org.uk</p>	<p>Sphagnum propagule and dense plug plant trial</p>
<p>Drawn by: TKC</p>		<p>Date: 17/12/2018</p>

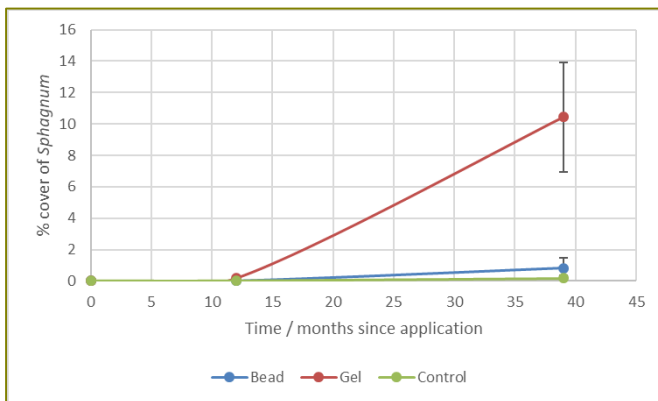
Results

Sphagnum propagule trial

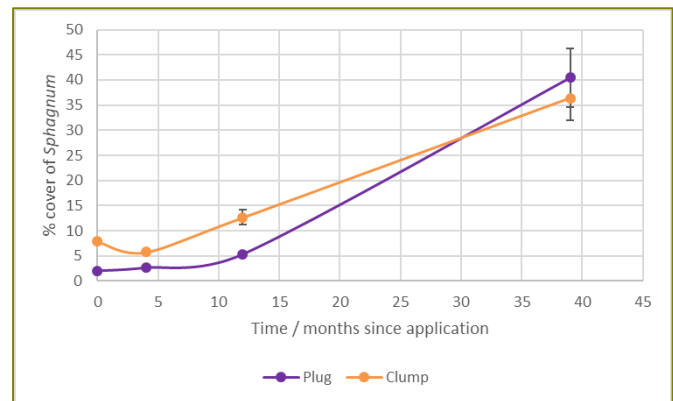
Since the application of *Sphagnum* propagules in 2015, three repeat surveys have been carried out. Changes in the percentage cover of *Sphagnum* within quadrats have been observed for all propagule types. In 2015, the mean percentage cover of *Sphagnum* in quadrats treated with beads and gel was 0%. By 2018, this had increased to 0.8% for beads and 10.4% for gel. Plugs and clumps, which had a higher initial cover of 2% and 7.9% respectively, also increased by 2018 to 40.4% for plugs and 36.3% for clumps.

Cost benefit comparison

Of the four forms of *Sphagnum*, clumps and plugs were the most successful, in terms of mean percentage cover. In terms of cost (production and application) per quadrat, plugs were the most expensive (£10.44 / m²), followed by clumps (£3.15 / m²) and then beads and gel (£1.04 / m²). In order to take both measures of success (i.e. *Sphagnum* cover and cost) into account, the cost per 1% (1 cm²) cover of established *Sphagnum* has been calculated, providing a cost-benefit comparison across all propagule types. When both *Sphagnum* coverage and cost is taken into account, the most successful propagule type is clumps (£0.09 per 1 cm² of established *Sphagnum*), followed by gel (£0.10 per 1 cm² of established *Sphagnum*), plugs (£0.26 per 1 cm² of established *Sphagnum*) and beads (£1.30 per 1 cm² of established *Sphagnum*). It should also be noted that as percentage cover of *Sphagnum* continues to increase over time, the cost per 1% cover will decrease.



Sphagnum growth from gel and beads



Sphagnum growth from plugs and clumps



Gel quadrat in 2018 with 15% cover of *Sphagnum*

Bead quadrat in 2018 with 20% cover of *Sphagnum*

Plug quadrat in 2018 with 70% cover of *Sphagnum*

Clump quadrat in 2018 with 90% cover of *Sphagnum*

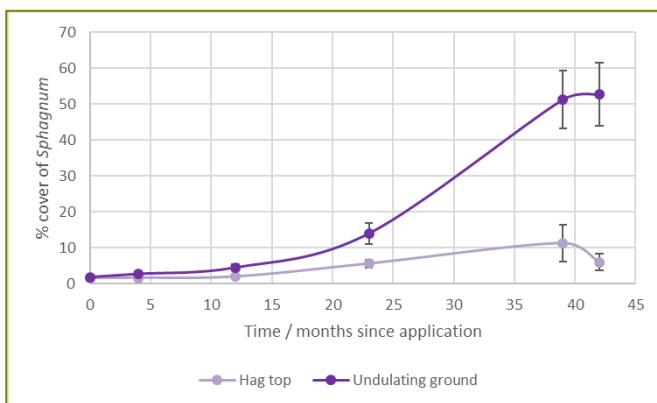
Results

Dense plug plant trial

Since the application of *Sphagnum* propagules in 2015, four repeat surveys have been carried out. Changes in the percentage cover of *Sphagnum* within quadrats located on both hag tops and undulating ground have been observed. In 2015, the mean percentage cover of *Sphagnum* in quadrats located on hag tops was 1.6% and on undulating ground was 1.9%. By summer 2018, this had increased to 11.3% on hag tops and 51.3% on undulating ground.

However, between summer and autumn 2018, a small decrease in the cover of *Sphagnum* on hag tops was observed. This is likely to be a result of the warm, dry and largely sunny summer, which according to the Met Office (2018) was provisionally the equal warmest on record for the UK. *Sphagnum* located on undulating ground did not seem to be affected in the same way.

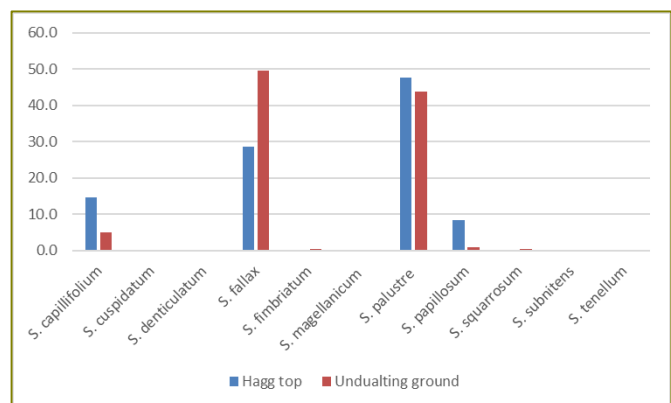
During the autumn 2018 survey, the cover of individual *Sphagnum* species was also assessed. Eleven species of *Sphagnum* were identified. On hag tops, the most dominant species included, *S. palustre* (47.8%), *S. fallax* (28.5%), *S. capillifolium* (14.7%) and *S. papillosum* (8.4%). On undulating ground, the most dominant species included *S. fallax* (49.5%) and *S. palustre* (43.7%).



Sphagnum growth from plugs located on hag tops and undulating ground



Quadrat located on a hag top in 2018 with 15% cover of *Sphagnum*



Sphagnum species present in 2018



Quadrat located on undulating ground in 2018 with 80% cover of *Sphagnum*

Conclusions

A number of conclusions can be drawn from these trials.

- Based on *Sphagnum* growth, over a period of three years and three months, the most successful propagule type is plugs, followed closely by clumps, then gel, and lastly beads, which showed limited success.
- When both *Sphagnum* coverage and cost is taken into account, the most successful propagule type is clumps, followed by gel, plugs and beads.
- As the percentage cover of *Sphagnum* continues to increase over time, the cost per 1% cover will decrease. This may justify the higher initial cost for plugs, which appear to result in a greater extent of *Sphagnum* over time.
- If, based on initial cost, gel is to be used, consideration must be given to the method of application to ensure that it allows the gel to make contact with the peat and is practical over a large area.
- Topography (i.e. hag top versus undulating ground) has a dramatic effect on the growth of *Sphagnum* plugs, suggesting that moisture from precipitation and cloud cover is sufficient for *Sphagnum* to survive and grow slowly but much faster growth is observed when *Sphagnum* is located in areas with a higher water table and better protection from desiccation.
- Topography also affects *Sphagnum* species; the most dominant species on hag tops was *S. palustre* and on undulating ground was *S. fallax* and *S. palustre*.

A detailed discussion is provided in the full report which is available from http://www.moorsforthefuture.org.uk/data/assets/pdf_file/0005/1508576/MFFP-Kinder-Scout-Sphagnum-Trials-Update-Report-2018.pdf



References

- Met Office (2018). Summer 2018 [on-line]. <https://www.metoffice.gov.uk/climate/uk/summaries/2018/summer>. Accessed 25th October 2018.
- Pilkington, M., Walker, J., Maskill, R., Allott, T. and Evans, M. (2015). *Restoration of Blanket bogs; flood risk reduction and other ecosystem benefits*, Final report of the Making Space for Water project: Moors for the Future Partnership, Edale.