

Langholm Moor Heather Beetle Experiment Report 2015

1 Purpose

We aimed to measure the vegetation composition at three different heather (*Calluna vulgaris*) moorland sites at Langholm Moor, southwest Scotland, damaged by heather beetle (*Lochmaea suturalis*) infestation in 2009/10. These plots were subjected to various treatment combinations in order to encourage heather regeneration.

In particular, the monitoring regime recorded the amounts of heather, litter and estimates of heather recovery after treatments on each site from 2009 through to 2013.

A return visit in 2015 was scheduled with the aim of looking at the longer term impacts of the treatments on the vegetation composition at each site, and the amounts and general condition of heather.

Langholm Moor suffered another heather beetle outbreak in summer 2015 with evidence of the browning up of heather seen across all three sites.

2 Background to location and treatments applied

Three sites were chosen for comparison around Langholm Moor. All had been damaged by heather beetle infestation during 2009. During 2009-2011, after dieback of the heather, experimental plots were established at each of the three sites where the moorland was: i) untreated, ii) sprayed with herbicide then burnt, iii) cut or iv) burnt. Due to the different age stands and difficult weather conditions the burning treatment was applied at different times at the three sites, making stricter scientific comparisons between sites invalid. The treatments and their timings are summarised below¹.

Charlie's Moss – old rank heather on dry ground 100% damaged in 2009/10.

Year	2010	2011	2012	2013
Treatment	cut			no treatment
	burnt			
		sprayed		burnt in spring- treatment was delayed because of fire risk
	untreated			

Breckeny Knowe – mature heather on dry ground with 40% heather damage in 2009/10.

Year	2010	2011	2012	2013
Treatment	cut			no treatment
	burnt			
		sprayed	burnt in spring	
	untreated			

Middlemoss – young heather on wetter, deeper peat with 100% damage in 2009/10.

Year	2010	2011	2012	2013
Treatment	cut			no treatment
	burnt			
		sprayed	burnt in spring fire damage less because of wetter site conditions	
	untreated			

¹ Agreed by Anna Griffin and Simon Lester October 2013

Monitoring in summer 2013² reported that good recovery of heather had occurred across all the sites for all treatments; and some limited regrowth as also measured in the control plots, where heather had regrown with a distinctive lollipop growth form.

Treatments like burning, cutting and herbicide application had led to the uniform generation of small heather plants. No combination of treatments was judged to be the best overall; although management techniques had initially different results, 2013 had good heather cover of young plants across all three sites. We concluded that in areas with no grazing stock, the heather dieback caused by heather beetle infestation could be seen as an opportunity to introduce regenerating stands of heather, either from applied seed or from seedbank stocks and recommended that treatments could be applied more generally depending on the resources, ground conditions, expertise and machinery available.

As heather is a slow growing species and vegetation composition can change, it was agreed that monitoring of the sites would be carried out again in summer 2015 to see if any longer terms differences could be detected, or if heather regeneration continued to proceed well across the sites.

3 Survey technique

As in previous years the monitoring regime consisted of photographic records and vegetation monitoring of sites using five randomly placed 2x2m quadrats per plot. Bryophytes were grouped into one record of percentage cover per quadrat. Any heather regeneration from damaged material was noted.

As in 2013, seedlings were no longer counted in the majority of plots as live *Calluna* cover could be estimated within the assessment of plant cover. Heather plant heights (cm) were recorded at all sites. This report details results collected in July 2015.

4 Results

Across all sites, the tops of the heather was found to be discoloured reddish but with some green material. As in the past, assessments of dead heather were made but it was extremely difficult to distinguish old remnants of heather from the 2009 attack from the presumed more recent dying heather suffering from the 2015 infestation. It was also impossible to accurately assess the degree of severity of the infestation of 2015 heather beetle per plot as heather condition was still deteriorating.

Observationally, it looked as though the heather flowering had been arrested at each site and beetle larvae were also seen at almost every heather stand and on most heather plants examined; no plot or site appeared to have escaped beetle attack.

² *Langholm Moor Heather Beetle Experiment Report 2013*. Anna Griffin (submitted to The Heather Trust November 2013).

4.1 Breckeney Knowe

Red Grouse were flushed on the walk up to the site and evidence of heather beetle larvae found across the site. The heather at this site was discolouring and it was not possible to give an estimation of % dead heather as in all cases plants were alive in parts, dead or dying at the tips (Photos 1 to 4).

The site burnt in 2010 had dense closed canopy heather patches which were discoloured, but still had healthy patches of fruiting blueberry, *Vaccinium myrtillus* (Figure 1). The cut plots still contain patches of heather twig and good dense heather growth unfortunately being compromised by heather beetle; it had the highest coverage of *V. myrtillus* (as in 2013). In the untreated plots, the “lollipop” heather had continued to grow, but heather dieback is occurring again. Grasses are more prevalent in the sprayed then burnt plots. Any litter fractions as a result of any treatments has fallen away to approximately untreated levels.

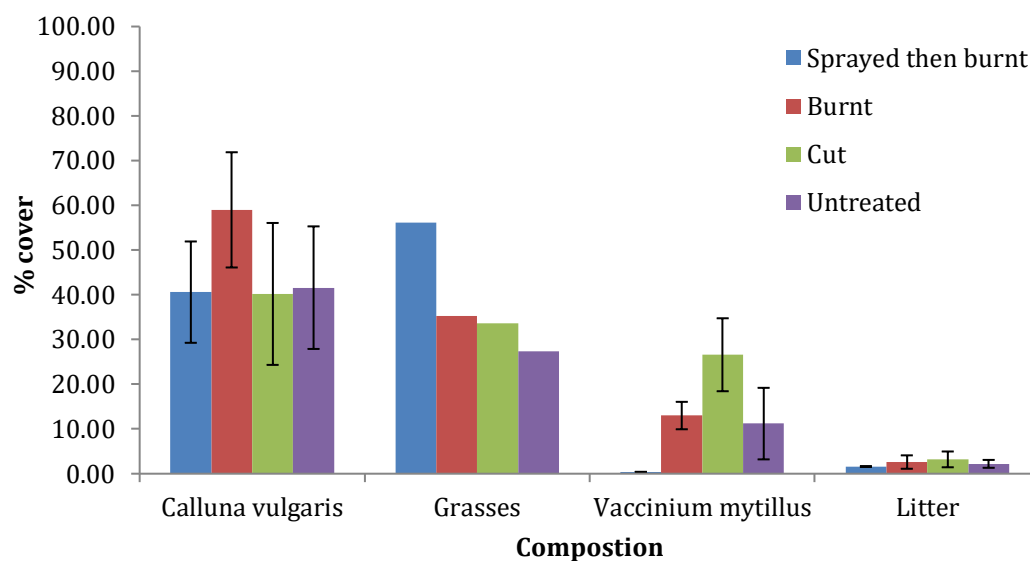


Figure 1. Composition of sites at Breckeney Knowe 2015.

By 2015 heather plants across the range of Breckeney Knowe treatments have continued to increase in height since 2013 but have yet to reach those recorded in the untreated plots (Figure 2).

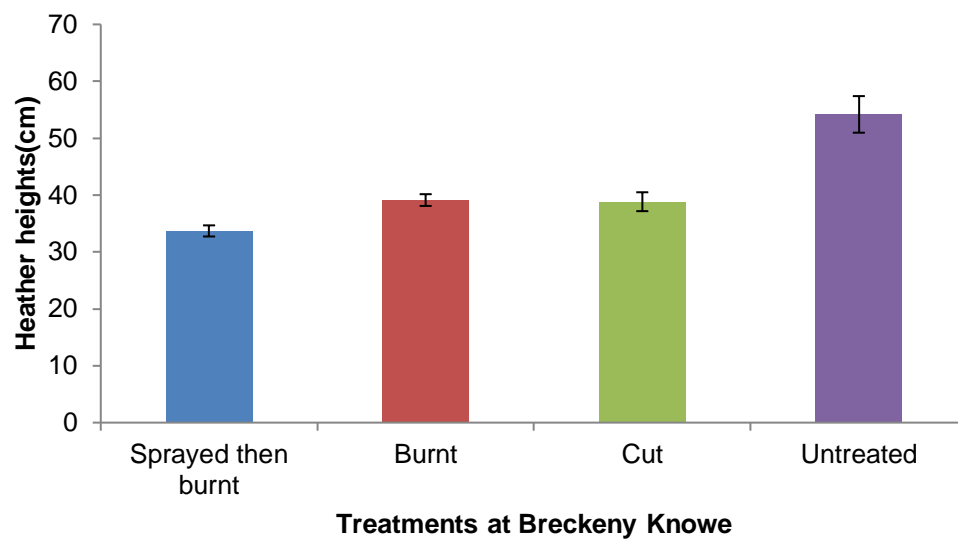


Figure 2. Heather height at Breckeny Knowe 2015.



Photo 1. Discoloured heather at Breckeny Knowe; sprayed then burnt plots.



Photo 2. Dying tip of heather as seen at Breckeney Knowe.



Photo 3. Burnt in 2010 – had the highest cover of heather at Breckeney Knowe in 2015 but it was discoloured and dying due to a heather beetle outbreak.



Photo 4. Lollipop heather at the untreated plots at Breckeney Knowe.

4.2 Middlemoss

This site is a wetter site of the three with boggier ground and a slightly different plant assemblage from the other two sites; *Drosera* species and bog asphodel (*Narthecium ossifragum*), cross leaved heath (*Erica tetralix*) are commoner and bryophytes are dominant.

In 2013 this site looked uniform with no significant differences in composition. On return in 2015 the site burnt in 2010 and the cut sites all had higher heather coverages than either the untreated or sprayed then burnt sites; but all were again being affected by heather beetle. *E. tetralix* varied across the site too; with higher quantities in the control plots (Figure 3, Photos 5 to 7). The sprayed then burnt site still contains dead heather twigs from the low intensity fires in 2011.

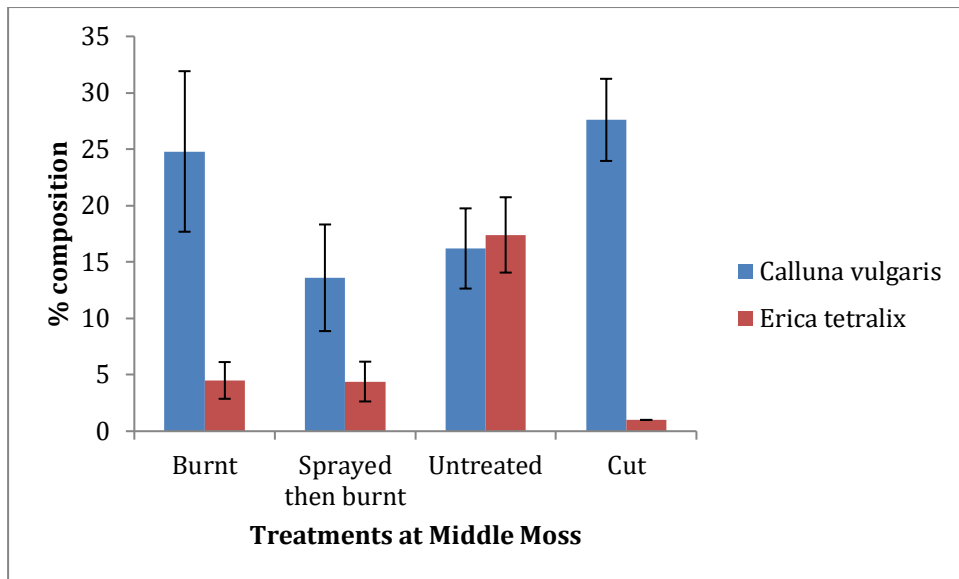


Figure 3. Heather and cross leaved heath percentage cover at Middlemoss (SE values for *Calluna* are 7.1, 4.2, 3.5, 3.6 and SE values for *Erica* are 1.6, 1.8, 3.3 and 0.1).



Photo 5. Burn site at Middlemoss five years after treatment.



Photo 6. Heather plant from Middlemoss sprayed then burnt site showing discolouration from heather beetle damage.

4.3 Charlie's Moss

On return in 2015 this site has good heather cover; ranging from 33% on average in the site burnt in 2010 to 75% in the untreated site which had recovered well from the 2009 outbreak. All this heather growth has been compromised with the recent heather beetle infestation. The burn 2010 treatment contained a high percentage of bell heather, *Erica cinerea* (mean 32% SE10.1) and leggy burnt twigs were still present; perhaps why the amounts of heather are lower on this treatment (Figure 4). The sprayed then burnt site has made good progress and had good heather cover with young heather plants establishing.

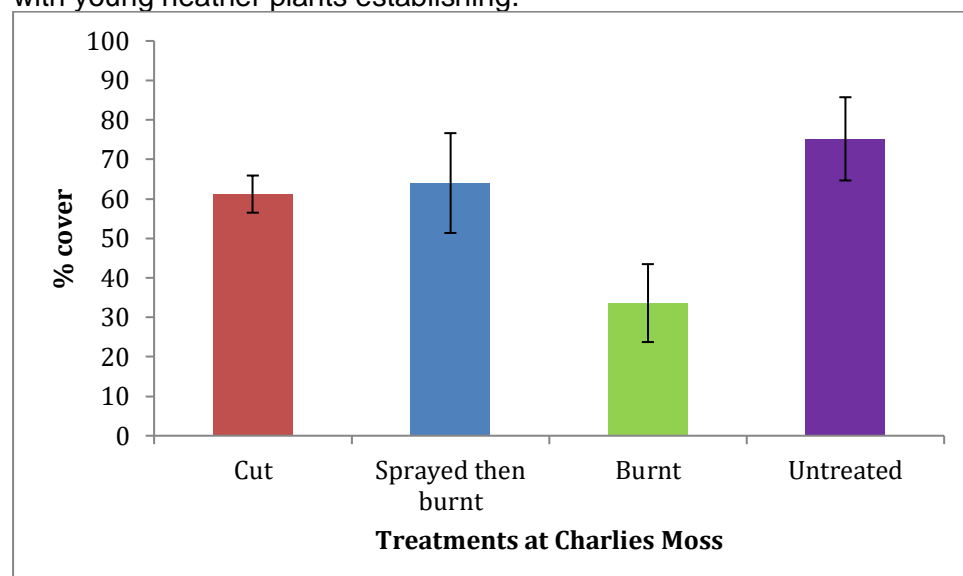


Figure 4. Percentage heather cover at Charlie's Moss.



Photo 7. The cut site at Charlie's Moss



Photo 8. The sprayed then burnt site at Charlie's Moss.

5 Discussion and conclusions

The application of different treatments after heather beetle attacks had resulted in good heather regeneration at Langholm Moor. Good results from either burning, cutting or spraying then burning have all been shown to establish good heather cover over the course of this project (2009 to 2015). At Breckeny Knowe, burning resulted in maximum heather, Middlemoss responded best to cutting and Charlie's Moss recovered better after application of herbicide then burning. Indeed, these results show that untreated plots can recover to good coverages too given time and the absence of grazing animals.

All these treatments do not appear to offer any sort of protection to further outbreaks of heather beetle and this latest outbreak may well compromise both the establishing heather and the regenerating older stands. Young stands and old plants have been damaged. It would be interesting to determine if the untreated, older stands of heather will continue to be able to recover after several, sequential infestations.

The absence of grazers in Langholm gives this project a unique perspective; the presence of grazers may change recovery rates in both old and establishing stands across different moorland settings.