

Assessing soil compaction and micro-topography impacts of alternative heather cutting as compared to burning as part of grouse moor management on blanket bog

Reviewer comments on revision 1

The revised manuscript addresses the majority of the concerns raised in the previous review and for the most part relate to omission of information that by inclusion now enables clearer understanding of the data and how they can be interpreted.

For peat depth and bulk density it is clear now where samples were collected and therefore do enable a comparison of before and after. I still think that one sample per plot is a bit low (not a deal breaker), but could perhaps be highlighted somewhere in discussion. I understand the problems/limitations with externally funded projects.

I am still a bit concerned about the microtopography assessment and interpretation without any pre-management assessment, though I appreciate the relevance of using the control plots. The inclusion of NVC assessment now also provides some level of information about the vegetation, but in line 387-388 the authors state "...topography was made less variable, as seen in a lower offsets, through the cutting chopping off the tops of the hummocks...". Apologies if I have missed something but there is no mention of hummocks in the site descriptions and it is not clear how change in topography can be interpreted as chopping of hummocks at this point. This can be resolved by including hummocks in the site descriptions and mentioning that this was evident during field survey (or a statement that it 'could' be chopping of hummocks). The sentence itself may need tweaking for grammar.

In the abstract (background) it would be good to amend the description of 'hummocks (e.g. protruding clumps of sedges)' to include tussocks as per the amendment made in the main body of the manuscript.

Method detail

It is a bit unclear to me whether just the plots were mown/burned or how far outside this was done. Could you add a brief sentence describing the exact area the burning and mowing covered – if possible it would be great to show this footprint on the new supplemental Figure.

In the site descriptions water table depth is reported but I can't see any mention of number or location of dipwells in the method. Can a statement detailing the number of dipwells per plot/catchment and their location be added?

Line 275 – peat depth measured to nearest 0.5 cm – is there a reason why it is 0.5 cm? We measure to 0.1 cm, though I realise there is an associated error of perhaps 0.5 cm (is this what you mean?)

Line 301 – "...trays on a 0.0001 g balance." – is this the sensitivity/precision of the balance? If so, I think re-wording as 'trays on a balance with a precision of 0.0001 g' or something would be clearer. I think it would also be worth noting the make/model of balance used.

Figures

Figure 1 – much improved. I wonder if the catchment boundaries and weather station locations ought to be presented in a legend on the map rather than the Figure caption?

Figure 2 – I still don't find this particularly informative. The new Figure in the supplemental information is much clearer and I think would be better in place of Figure 2.

Figure 6A - y axis 'Absolute' is missing the 'o'

Tables

Table 1 – as the project spans several years it might be useful to summarise the temperature, rainfall and water table by each year as well as presenting an overall mean. In addition to note above could you add mention of hummocks if present?

References

Line 60 – O'Brien et al., 2007 is a review. I'm not disputing the quality or content of the review, but think it would be better to refer to original sources here such as Ivanov (1981) or Lindsay et al., (1988) that describe mires and bogs.

- *Ivanov, K.E. (1981) Water Movement in Mirelands. Academic Press, London, 276 pp.*
- *Lindsay, R., Charman, D., Everingham, F., O'Reilly, R., Palmer, M., Rowell, T. & Stroud, D. (1988) The Flow Country: The Peatlands of Caithness and Sutherland. Nature Conservancy Council, Peterborough, 32 pp.*

Line 61 – similarly Evans et al. (2006) do not provide estimates of the % blanket bog in the UK – I know it is not easy to find a study that actually quantifies this but would be better if you can use one.

Line 70-71 – can you support this with a reference? (bogs being used for agriculture/sport)

Line 76-78 – Yallop et al (2009) provide a detailed history of burning in the UK, would be good to add this reference

- *Yallop A, Clutterbuck B & Thacker J (2009) Burning issues. The history and ecology of managed fires in the uplands. In: Bonn A, Allott T, Hubacek K, Stewart J. Drivers of Environmental Change in Uplands. Abingdon: Routledge. p171-185.*

Spelling/grammar/typos

Line 102 "and is often present at an abundance cover of..." – doesn't sound right can you reword this?

Line 141 – Northern is missing the last 'n'

Line 157 – 'average climate' might read better as 'climatic conditions across...'

Line 157 missing the degree symbol 7.3 C

Line 160 – I think the rainfall is the mean annual total rainfall, can you add this detail

Line 170-175 is a very long sentence – can you split into two? Perhaps climate in sentence one and soil/water/slope in sentence two

Line 280 – I think 'ran' not 'run'

Line 281 – front is missing the 'r'

Line 305 and 306 – 1-2 days and three days (should this be 3 days for consistency?)

Line 318 – $\log_{10}$ I think should be $\log_{10}$

Line 330 – ‘higher offset’ – I think this is the ‘variability in offset’, can you check and update as required

Line 332-333 mentions more gullies in the burn catchment – this ought to be highlighted in the site description section

Line 357 – I think indicated not indicate

Line 375 – should it be ‘to increase’ not ‘increasing’?

Line 377 – ‘avoid cutting hummocks’ – see above comment, you must mention hummocks in site descriptions

Line 388-406 can you check Figure numbers on this page. Line 388 ‘tops of hummocks (Figure 7)’ I think is referring to Figure 6.