MOORS FOR THE FUTURE PARTNERSHIP

MONITORING THE BIODIVERSITY AND ECOSYSTEM SERVICE IMPACTS OF RESTORATION OF DEGRADED BLANKET BOG SITES

CHAPTER 7: SEDIMENT GENERATION AND TRANSPORT

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Monitoring the biodiversity and ecosystem service impacts of restoration of degraded blanket bog sites

Chapter 7: Sediment Generation and Transport

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1. Summary

The generation and fluvial transport of sediment and particulate organic carbon (POC) was monitored in 2020 at sites dominated (pre-treatment) by bare peat and *Calluna vulgaris*. At the bare peat sites, ten years after treatment, a 98% reduction in generation/transport of sediment and POC was observed as a result of revegetation alone, and a 99.9% reduction as a result of revegetation, gully blocking and *Sphagnum* planting. This confirmed the findings of Pilkington & Crouch (2015), who reported a 97% reduction in sediment generation/transport at the same sites two years after treatment.

Monitoring at the *Calluna*-dominated sites was carried out one year after treatment (*Sphagnum*-planting; *Sphagnum*-planting and gully-blocking). Given that the planted *Sphagnum* mosses have not yet established a significant coverage within the catchment, it is unlikely that they would have an observable impact on sediment or POC generation/transport within the catchment. Any differences in results between the catchments are therefore more likely due to differences in sediment/POC source availability, connectivity of the drainage network and vegetation conditions within the flow pathways. These results should therefore be considered as a baseline against which to monitor any future changes as *Sphagnum* mosses establish across the catchments.

2. Introduction

Peatlands are the world's largest terrestrial store of carbon, holding more than twice the carbon stored in all the planet's forests (Crouch and Chandler, 2021; Gregg *et al* (2021). During storms, peat (of which approximately 52% is carbon) eroding from the surface of bare peat patches on damaged peatlands is transported in suspension in fluvial pathways and erosion gullies through headwater catchments and into streams, rivers and reservoirs, compromising both ecosystem sustainability and the quality of drinking water through sedimentation and the release of atmospherically deposited pollutants (especially toxic heavy metals) (Pilkington & Crouch, 2015).

Pressures of climate change may promote increased generation of eroded sediments in damaged peatlands. Hotter temperatures would increase desiccation and subsequent exposure of bare peat; increased frequencies of severe storms would increase rates of erosion from exposed bare peat. Conversely, Pilkington & Crouch (2015) reported that restoration of degraded peatland catchments with extensive bare peat areas reduced erosion by almost 100% after two years following revegetation work.

In the current study, the same methods (and locations) were used as those in Pilkington & Crouch (2015), seven years later, to assess any further changes as a result of the restoration work. Additionally, the same methods were used to monitor erosion and transport of sediment and carbon at a site dominated by *Calluna vulgaris*, where treatments of *Sphagnum*-planting and gully-blocking were applied. The objectives of the monitoring at the *Calluna*-dominated site were to a) provide a snapshot of the comparative rates of sediment and carbon erosion/transport at the different treatments and b) provide a baseline from which to assess the effects on sediment and carbon erosion/transport of establishing a potentially comprehensive *Sphagnum*–canopy over the coming years.

3. Methodology

3.1. Monitoring design

Sediment and Particulate Organic Carbon generation/transport was monitored by collecting fluvial sediment in simple 'TIMS' units (Time-Integrated Mass Flux Sampler), using the same equipment and monitoring design as used in the Making Space for Water Project (Pilkington & Crouch, 2015). These traps are installed in fluvial pathways such that streamflow passes through them during baseflow and stormflow conditions. Sets of 10 traps were installed in each of the bare peat starting-state mini-catchments (N, O and F), and in each of the *Calluna*-dominated mini-catchments (Cal.spha, Cal.sphaGB and Cal.con).

3.1.1. Bare peat sites

3.1.1.1. Comparison of bare peat control and treated mini-catchments

Field data were collected in 2020 from mini-catchments N (revegetated, gully-blocked and *Sphagnum*-planted), O (revegetated only) and F (bare peat control) in order to assess any change in sediment generation/transport due to maturation of vegetation cover at the treated sites. The exact same locations were used in mini-catchments F and O as in a previous study in 2013 (Pilkington *et al.* 2015). At mini-catchment N, five out of ten locations from 2013 were used again in 2020; five were replaced by new locations in 2020 as the original locations were not within the *Sphagnum*-planting area. As the effect of *Sphagnum* cover on sediment/POC generation and transport was of interest, it was decided that it would be appropriate to use new locations for this study. The new locations were selected to be as similar as possible to the original locations in terms of distance from the top of the catchment, gully gradient and steepness of gully walls upstream of the locations. These units were deployed in Autumn 2020 for 50 days, at which point they were retrieved to avoid the units at the bare peat control (F) becoming overwhelmed by sediment.

3.1.1.2. Effects of gully blocking and *Sphagnum* planting

Results from the 2013 survey showed that the quantities of sediment trapped by the TIMS units at the revegetated sites were sufficiently small that, by the time the F (bare peat control) units were approaching full, there would likely be insufficient material in the N and O units to observe any significant difference between them. Therefore, additional sets of ten TIMS units were installed at mini-catchments N and O directly adjacent to those used for the 50-day survey. These were deployed for 172 days, increasing the likelihood of a possible assessment of the impacts on sediment/POC generation/transport of revegetation, gully blocking and *Sphagnum* planting (N) as compared to revegetation alone (O).

3.1.2. *Calluna vulgaris*-dominated site

Locations were selected within the *Calluna*-dominated mini-catchments using the same methodology as for the bare peat mini-catchments. Ten units were installed in each mini-catchment such that the locations were as similar as possible across the three mini-catchments. However due to the unique topography and flow pathways of each mini-catchment, the placement of each TIMS unit should not be considered an exact equivalent.

The purpose of the installation on the *Calluna*-dominated site was to provide a baseline measurement of sediment and POC generation/transport within each mini-catchment during the early stages of the site diversification. This is intended to allow for future repeat sampling, to gauge the longer-term effects – if any – of the treatments applied to the site.

3.1.3. Dates/durations of surveys

Table 1. Deployment dates of TIMS units

Experiment	Start date	End date	Duration (days)
Bare peat: F/N/O	10/09/2020	30/10/2020	50
Bare peat N/O (long deployment)	10/09/2020	01/03/2021	172
Calluna	18/09/2020	26/11/2020	69

3.2. TIMS units

3.2.1. Construction

As detailed in Pilkington & Crouch (2015), TIMS units are sediment traps of simple construction, consisting of a 50 cm length of 50 mm diameter plastic tubing filled with polystyrene packing chips and sealed at each end with mesh.

3.2.2. Field deployment

The TIMS units are deployed by securing them with wooden stakes and cable ties onto the gully floor in the centre of the stream flow line, with the unit in line with the direction of stream flow. As stream water flows through the trap, fluvial sediment is trapped and deposited within the trap.

Within each experiment (bare peat and *Calluna*), locations to deploy the units were selected in each mini-catchment to be as similar as possible to each other in terms of distance from the top of the catchment, gully gradient and steepness of gully walls upstream of the locations. All units used in the bare peat experiment were installed on the same day; all units used in the *Calluna* experiment were installed on another day. Those units installed at the *Calluna* site were placed in pairs – two units side-by-side in five locations – due to a limited number of suitable locations within the main flow pathways being sampled.

Each location was photographed and marked with a GPS, enabling a return to the same location for future surveys.

3.2.3. Field collection

The TIMS units were collected from the field by cutting the cable ties and carefully lifting each tube out from the gully floor, taking care not to disturb any sediment around each end of the unit. Any sediment/material on the outside of each tube was removed with a cloth. The unit was then tilted gently in the direction of the stream flow to allow any water inside to flow out of the tube. The unit was then sealed into a heavy-duty plastic bag for transport from the site to the laboratory. All units were collected on one day per experiment. On return from the field, the units were stored in their sealed bags in a cool place until transported to cold storage at the University of Manchester, where they were processed in the laboratory.

3.3. Processing samples in the laboratory

Following the same methodology as in Pilkington & Crouch (2015) the contents of each TIMS unit were washed and sieved into a bucket, with particles of peat being removed from the polystyrene chips by swirling/squirting with deionised water. The contents of the bucket were then filtered through a pre-weighed filter paper using a Buchner Funnel filter system. The remaining sediment sludge and the filter paper were oven-dried at 105C for 24 hours and then weighed to an accuracy of 0.01 g. This process gave a sediment mass (g) for each TIMS unit.

For samples where sufficient material had been collected, Loss On Ignition (LOI) was then performed, to calculate the organic content of the sediment. For this, the dried samples were re-weighed, heated in an oven at 550C for 24 hours and then weighed again. It was assumed that all organic content (and nothing else) was burnt off during this process, so any loss in mass was equal to the mass of organic content (Particulate Organic Matter, POM). Due to the extremely small quantities of sediment collected in some of the TIMS units, there was not sufficient material to perform this analysis for all units. In some cases, sediment from all units from one mini-catchment was combined into one LOI run; in the case of mini-catchment N there was still insufficient material to run the analysis even when sediment from all units was combined.

Due to the importance of carbon in a climate change context, and the potential for avoided carbon losses from peatland ecosystem due to restoration, Particulate Organic Carbon (POC) generation/transport is of particular interest. Lindsay (2010) reported that the typical contents of (dried) peat are as follows:

- 52% organic carbon
- 45% non-carbon elements which form various side-chains and linkages within the long-chain organic compounds
- 3% mineral matter

POM therefore typically constitutes 97% of dried peat, of which 54% is carbon. Laboratory analyses to measure carbon content of peat samples are complex, expensive and beyond the scope of this study. Therefore, it was assumed that 54% of POM from all LOI analyses was POC. In practice, POM and POC values are only presented in this study relative to control (as percentages of the mean of all values from the control mini-catchment), so POM and POC relative data are assumed to be the same as each other.

3.4. Data processing

3.4.1. Bare peat sites

3.4.1.1. Loss on ignition and dried sediment mass

Due to the small quantities of material collected by the TIMS units installed in mini-catchments N and O in 2020, LOI analyses were limited. LOI data were available for all individual units from mini-catchment F but there was insufficient material to perform the LOI process on the material collected individual units from O and N – including those deployed for 172 days. There was sufficient material to run the LOI process when the material from all O units were combined per deployment (all 10 units deployed for 50 days combined into one sample; all 10 units deployed for 172 days combined into a second sample). There was insufficient material to run the LOI process on the material from the N units from either deployment, even when all material was combined.

It was therefore not possible to perform a direct quantifiable comparison of POC transport at F, O and N, although the fact that LOI could not be performed on samples from O or N was evidence in itself of a large, significant difference between the untreated and treated mini-catchments. A comparison of dried sediment mass was possible for the 50-day experiment.

Due to the limited material collected in the 172-day units deployed at N and O it was not possible to perform a direct comparison of POC generation/transport between the two treatments. LOI data were available for O as a combined total only, and not at all for N. Again, the lack of material at N is a result in and of itself.

Due to the lack of POC data from both the 50 and 172-day units deployed at N and O, comparisons of sediment mass were made between the two treatments for each deployment. Dried sediment is generally not considered a robust proxy for POC as small amounts of mineral sediment may skew results disproportionately, so these results should be treated with caution. However, from the LOI analyses which were possible to conduct, it was clear that mineral content was negligible in all samples; sediment mass were therefore considered to be an appropriate measure of comparative fluvial erosion and transport between the mini-catchments.

3.4.1.2. Statistics
Due to the lack of material available for LOI analyses, it was not possible to test for significant differences in actual POC data between the 3 treatments. Due to the possible/likely presence of mineral sediment in the samples collected at F, and the clear difference in amounts of peat collected at F compared to O or N, it was not considered appropriate or necessary to compare sediment mass between the three treatments. However, in order to assess for difference between treatment sites O and N, the Mann-Whitney U test was used to test for significant difference between sediment mass at O and N for the 172-day deployment.

3.4.2. *Calluna vulgaris*-dominated site

3.4.2.1. Loss on ignition
Sufficient sediment was collected to perform LOI analysis on material from all three mini-catchments (Con; Spha; ShpaGB), but an insufficient amount was available to do this for samples from each individual TIMS unit. Therefore, a combined LOI analysis was carried out on the total material collected from each mini-catchment. All units on all three catchments were deployed for 69 days.

3.4.2.2. Statistics
Due to the LOI analysis being carried out on the combined material collected from each catchment, it was not possible to directly test for significant differences in Particulate Organic Material (POM) between the three sampled mini-catchments. However, Mann-Whitney U tests were used to test for significant differences between sediment collected. As the LOI values for each mini-catchment were very similar, the sediment mass could be used as a proxy for POM with a certain degree of confidence; however, the results should be treated with caution.

4. Results

4.1. Bare peat sites

4.1.1. Effects of treatment compared to bare peat control
In 2020, near-total reductions in sediment generation/transport were observed as a result of both treatments. Relative to the untreated control (F), reductions of 97.9% and 99.9% were observed at mini-catchments O (revegetation) and N (revegetation, gully blocking and *Sphagnum* planting) respectively. The magnitude and consistency of these reductions were sufficiently clear that statistical tests were not necessary, but Mann-Whitney tests for difference confirmed the reductions as significant ($p>0.001$ in both cases). These findings were consistent with those of Pilkington and Crouch (2015), where reductions of 96.7% and 96.15% were observed at sites O and N respectively in 2013 (see Figure 1, Table 2).

Loss On Ignition results showed that proportional organic content of material from mini-catchments F and O were similar, meaning that relative reductions in POC were similar to reductions in sediment: 98.3% at mini-catchment O (insufficient material was collected at N to perform LOI analysis even when all samples were combined, so a reduction of ~99.9% was assumed).

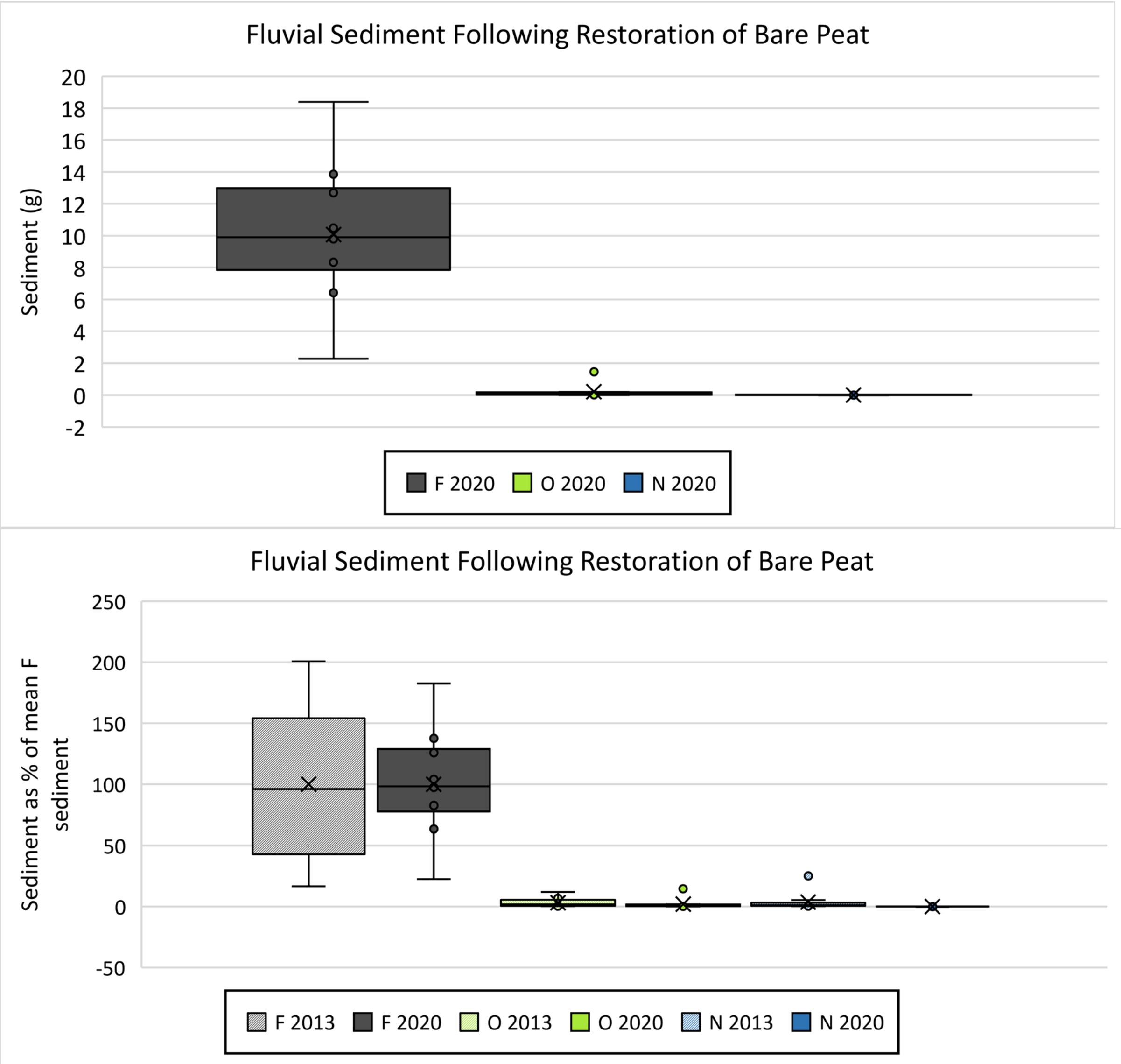

Figure 1: Fluvial sediment collected in TIMS units (short deployment) at F (bare peat), O (revegetation) and N (revegetation, gully-blocks, *Sphagnum*). Raw data from 2020 are presented at the top; relative (as % of mean bare peat control sediment mass) from 2013 and 2020 are presented at the bottom.

Table 2: Sediment and POC data from bare peat sites on Kinder Scout, short deployment of TIMS units. Note: POC data are derived from measured POM data, assuming that POC = 54% of POM. * = not recorded, ** = insufficient material to perform LOI

Results from TIMS units at F, O and N, short deployment	Site	2013 (28 days)	2020 (50 days)
Mean sediment (g)	F	16.69	10.07
	O	0.55	0.21
	N	0.64	0.01
Mean sediment as % of F Sediment	F	100.00	100.00
	O	3.30	2.10
	N	3.85	0.06
% reduction in sediment due to treatment	F	n/a	n/a
	O	96.70	97.90
	N	96.15	99.94
Mean POC (g)	F	*	7.72
	O	*	0.13
	N	*	**
Mean POC as % of F POC	F	*	100.00
	O	*	1.74
	N	*	**
% reduction in POC due to treatment	F	*	n/a
	O	*	98.26
	N	*	**

4.1.2. Effects of revegetation, gully-blocking & *Sphagnum*-planting compared to revegetation alone

Comparison of sediment mass data from the 172-day units deployed at N and O show that only small amounts of material were trapped at each site, despite the long deployment. 2.36g were collected in total at O; 0.12g at N. This represents a 95% reduction in sediment mass at N compared to O (Mann-Whitney U = 16, $n_1 = n_2 = 10$, $p<0.01$). While this could be attributed to gully-blocking and/or *Sphagnum* planting at N in addition to the revegetation at both sites, the absolute values are small and sediment mass may be skewed by small amounts of mineral sediment, so these findings should be treated with caution (see Figure 2, Table 3).

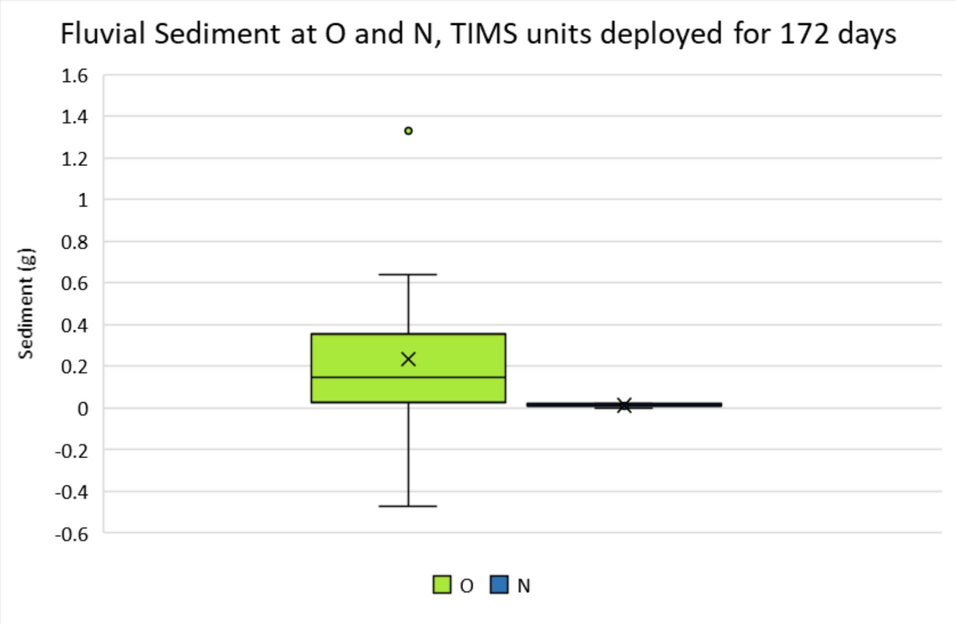

Figure 2: Fluvial sediment collected in TIMS units (long deployment) at O (revegetation) and N (revegetation, gully-blocks, *Sphagnum*)

Table 3: Sediment data from restored bare peat sites on Kinder Scout, long deployment of TIMS units

Results from TIMS units at O and N, long deployment	**Site**	**2020 (172 days)**
Mean sediment (g)	O	0.24
	N	0.01
Difference in mean sediment (g)	O-N	0.22
% reduction in sediment due to additional treatment at N	O-N as % of O	94.92%

4.2. *Calluna vulgaris*-dominated site

4.2.1. Baseline findings from the site

Figure 3 shows the spread of sediment mass (g) collected over 69 days in each mini-catchment on the *Calluna* site. It is clear that the *Sphagnum* (Spha) treated catchment produced a much wider range of values, with a greater mean and overall sediment mass than the control (Con) or *Sphagnum* and gully blocked (SphaGB) catchments.

However, it should be noted that the median value for the Spha catchment was relatively low, indicating that a number of outliers have skewed the results. Indeed this is the case: TIMS unit pairs placed at locations 1 and 2 collected a larger amount of sediment than locations 3, 4 and 5, which were similar to the results from the Con and SphaGB catchments. This is displayed in Figure 4 below.

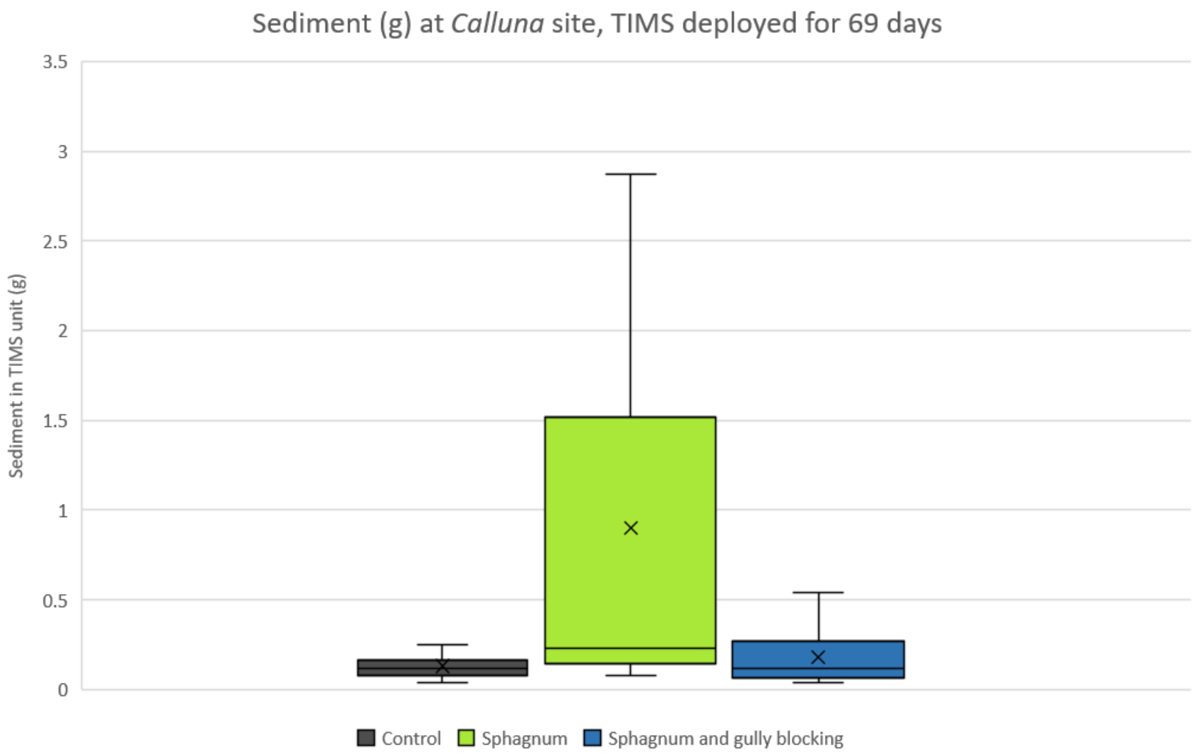

Figure 3. Boxplots displaying distribution of sediment mass (g) collected from the ten TIMS units deployed in each *Calluna* mini-catchment.

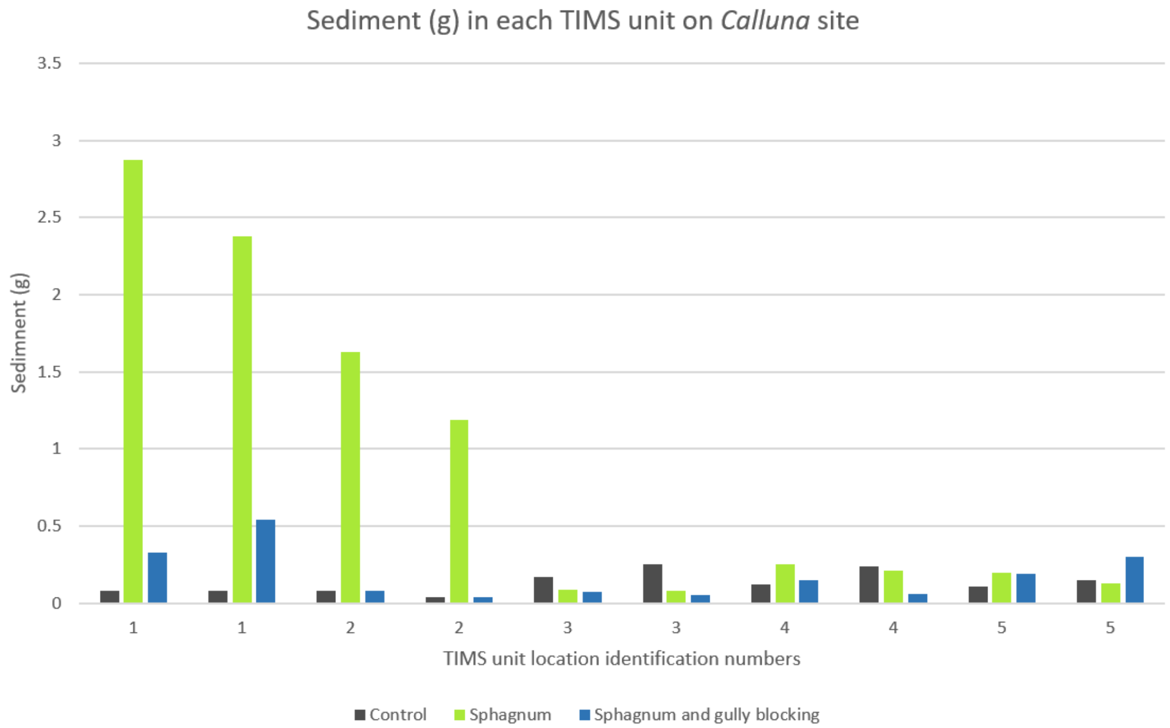

Figure 4. Bar chart showing the sediment mass (g) collected from each TIMS unit in each *Calluna* mini-catchment.
Locations numbers appear twice as the units were installed in pairs. It should be noted that location numbers were allocated as TIMS were installed (usually from lower end of catchment working upstream) and there is not intended to be any relationship between these numbers across mini-catchments.

Figure 5 shows the spread of sediment mass collected from each mini-catchment, as a percentage of the mean sediment mass at the control catchment. Future sampling results, if also displayed as a proportion of mean sediment at control catchment, can be compared to this boxplot regardless of sampling duration.

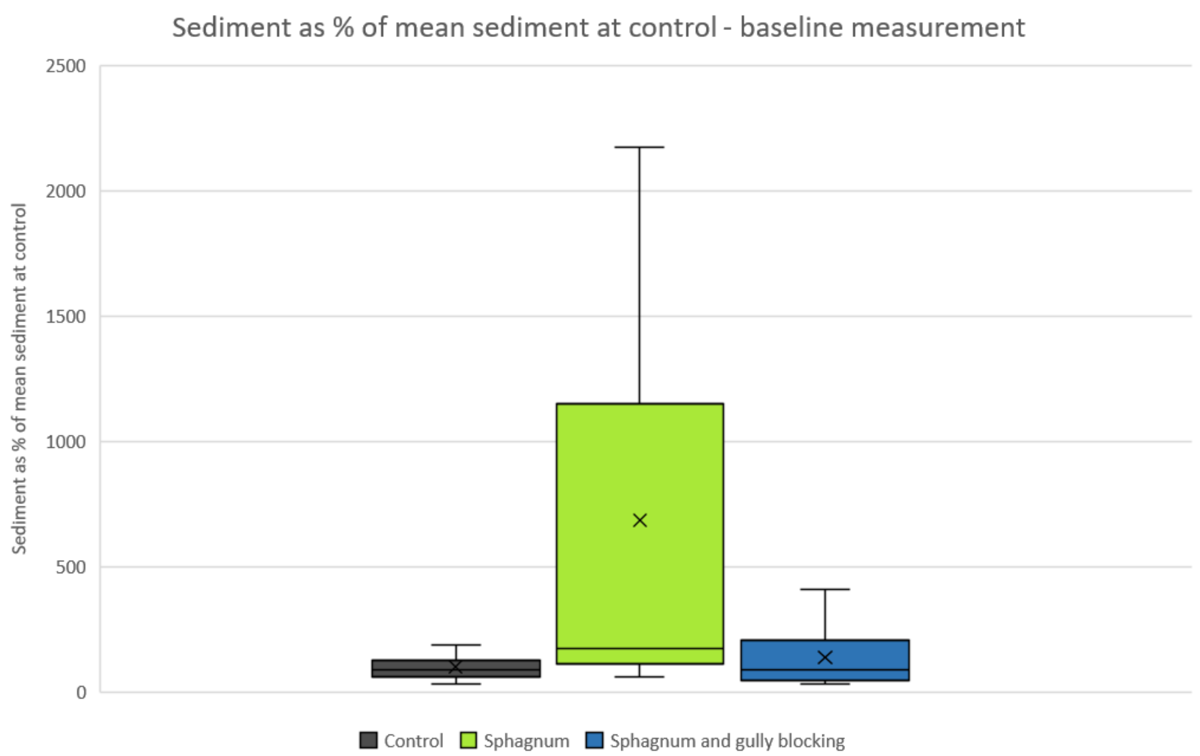

Figure 5. Boxplots displaying distribution of sediment mass collected from the ten TIMS units deployed in each *Calluna* mini-catchment, as a percentage of the mean sediment mass collected in the control mini-catchment.

A statistical comparison of sediment collected in each mini-catchment was carried out using Mann-Whitney U tests for non-paired independent samples. No difference was found between the Con and SphaGB catchments (p = 0.971), a significant difference found between the Con and Spha catchments (p= 0.035) and a borderline significant value was found for the Spha and SphaGB catchments (p = 0.052). These results are summarised in Table 4.

Table 4. Results of Mann-Whitney U test employed to look for differences in sediment mass collected in each Calluna mini-catchment. Significant differences at p <0.05 are highlighted.

	Con & Spha	Con & SphaGB	Spha & SphaGB
Mann-Whitney U	22.00	49.50	24.50
P – value	0.035	0.971	0.052

In order to understand the differences in sediment mass collected at different locations, the area of bare peat upstream of each TIMS location was estimated using a combination of field survey and aerial imagery. The results can be seen in Table 5.

Table 5. Comparison of sediment collected at each TIMS location with estimated bare peat present in the Calluna mini-catchment main flow pathways, and other features noted during survey.

TIMS location	Sediment collected (g)	Bare peat immediately upstream (m^2)	Total bare peat upstream in survey area (m^2)	Observations on area immediately upstream
Con 1	0.16	1.4	81.8	98% vegetated pathway
Con 2	0.12	1.0	80.4	97% vegetated pathway
Con 3	0.42	1.9	79.4	10% vegetation, concentrated immediately upstream of TIMS
Con 4	0.36	56.8	77.5	95% vegetated pathway, but includes outflow from intensive plot pipe
Con 5	0.26	20.7	20.7	75% vegetated pathway
Spha 1	5.25	13.4	64.0	50% bare peat in pathway
Spha 2	2.82	6.9	50.6	20% bare peat in pathway
Spha 3	0.17	2.7	43.7	95% vegetated pathway
Spha 4	0.46	5.3	41.0	85% vegetated pathway
Spha 5	0.33	21.2	35.7	70% vegetated pathway
SphaGB 1	0.87	8.4	72.2	In pool, 70% vegetated pathway
SphaGB 2	0.12	1.0	4.6	90% vegetated pathway
SphaGB 3	0.12	2.1	2.1	90% vegetated pathway
SphaGB 4	0.21	3.2	3.2	80% vegetated pathway
SphaGB 5	0.49	1.5	3.6	90% vegetated pathway

5. Discussion

5.1. Bare peat sites

The 2020 short-deployment (50 days) study confirmed the findings of Pilkington and Crouch (2015): revegetation of bare peat drastically reduces generation/transport of sediment and Particulate Organic Carbon. Results suggest that sediment generation/transport *may* have decreased further since 2013. This could be a result of maturing vegetation creating more protection of the peat surface (reducing sediment generation); vegetation increasing in cover on gully walls (reducing sediment generation); and thickening vegetation in the flow pathways (reducing sediment transport). However, given that reductions due to restoration were already ~97% in 2013, this additional effect size can only be small and so cannot be seen as significant.

Results from the long-deployment study indicate that gully blocking and *Sphagnum* planting may lead to additional reductions in generation and transport of sediment and/or POC as compared to revegetation work alone. This could be a result of an increasing coverage of *Sphagnum* mosses within the catchment (and in particular in the flow pathways) creating a more effective barrier to fluvial sediment transport. However, such a small amount of material was collected at both sites that a robust analysis of POC was not possible. 95% less sediment was collected at N than O ($p<0.01$) but the effect size was small (0.22g per sample) and so this finding should be treated with caution.

5.2. *Calluna vulgaris*-dominated site

The 2020 deployment (69 days) was carried out to find a baseline level of POM transport in each of the three experimental mini-catchments on the *Calluna* dominated site. It should be reiterated that this was a baseline study, and the results reflect the physical characteristics of each gully, rather than the treatment which was recently applied to it. In effect, this represents the 'before treatment' sample for all three gullies. In future, a repeat of the experiment would allow for the effects of treatment to be determined.

A significant difference was found between the amount of sediment collected from the Spha and Con mini-catchments ($n = 10$; $U = 22$, $p = 0.035$) and a borderline significant difference was found between the Spha and SphaGB mini-catchments ($n = 10$, $U = 24.50$, $p = 0.052$). No difference was found between sediment collected in the Con and SphaGB mini-catchments.

It is unlikely that the *Sphagnum* plug treatment introduced to the Spha and SphaGB mini-catchments in March 2019 had grown sufficiently by the time of the TIMs deployment to have any significant impact on the sediment collected. However, is feasible that the dams installed in the SphaGB treatment area would have a more immediate impact in reducing the transport of sediment along that flow pathway, so this should be considered when interpreting the differences between the mini-catchments.

Loss On Ignition testing was carried out for the combined samples for each mini-catchment, and the results were consistent at 95.1–96.1% loss after 550 degrees C. This small range of 1*pp* difference suggest that there can be some degree of confidence that a similar result would be found if all samples were tested individually.

If the study is repeated in the future, POM could be converted to POC using the standard for peatlands of 54% carbon (Lindsay, 2010).

The relationship between bare peat found in each gully and the sediment collected is difficult to quantify. This is in part due to the limited accuracy of the survey methods used, and the high variability in micro-topographical features and precise vegetation distribution within each flow path. Generally, TIMS units with more bare peat immediately upstream were found to have collected more sediment during the survey period. However, exceptions were noted such as survey location 'Con 4' (see Table 5) which was highly vegetated overall, but included a large area of bare peat and an outflow pipe from an intensive plot tipping-bucket, a likely source of eroded peat. In general, however, the more vegetated the area was, the less sediment was collected. It should also be noted that the slope angles of the gully sides were not measured, and these would be likely to have a further impact on the results where bare peat was present.

The effects of bare peat erosion in the '*Sphagnum*' gully sides can be seen in the fixed-point photography (Figure 6) taken in August 2019 and repeated in November 2021. It is clear that many of the *Sphagnum* plugs have not survived on the unstable bare peat surface, and are likely to have died and/or been dislodged by rain or freeze-thaw action.

Figure 6. Gully side planted with Sphagnum (Cal.Spha catchment) August 2019 – November 2021.

Further limitations should be noted. Loss On Ignition, was not carried out for each TIMS unit but for a combined sample, so it is only possible to estimate the POM within each sediment sample, using the overall % found. In additional, in future it may be worthwhile to record the individual species present in each flow pathway. Even though each of the three mini-catchments was found to have approximately the same proportion of bare peat, it does not seem likely that the large and steep bare peat areas present in the *Sphagnum* treated catchment will become vegetated to the same extent as the gully sides in the *Sphagnum* and gully blocked catchment in the coming years.

6. Conclusions

Revegetation of bare peat areas leads to significant reductions in the generation and fluvial transport of eroded sediment. Results from this study showed a 97.9% reduction as a result of revegetation alone and a 99.9% reduction as a result of revegetation, gully blocking and *Sphagnum* planting combined. These reductions were sufficiently great that it was not possible to collect enough material at the two treated catchments to evidence a statistically significant difference between them as a result of the different treatments. Results suggest that there may be a small additional reduction as a result gully-blocking and/or *Sphagnum* planting but the key finding is that revegetation alone is enough to almost ‘switch off’ sediment (and therefore particulate organic carbon) generation and transport.

Baseline data were collected regarding sediment and POC generation and transport at the *Calluna*-dominated site. Results showed significant variability between mini-catchments, likely due to availability of source material from bare peat areas and steep gully walls, connectivity of the drainage network and vegetation conditions within the flow pathways. *Sphagnum* has been planted at two treatment mini-catchments but has yet to establish comprehensive cover across the catchments; future monitoring is required to assess whether the establishment of *Sphagnum* mosses has an effect on sediment and POC generation/transport.

7. References

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