



Nofence collars grazing analysis

Kingsdale Head
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KINGSDALE HEAD



Bonnie and Calf

Introduction

Grazing animals are part of a natural landscape and we see grazing as an important part of the management of Kingsdale Head. The habitats on Kingsdale Head and the expected behaviour of the Cattle have influenced management decisions such as the amount of grazing pressure and the timing of that grazing to maximise the positive influence of grazing animals whilst minimising any potential negative impacts on habitats more sensitive to disturbance such as blanket bog and deep peats.

We have baseline habitat mapping carried out by the Yorkshire Peat Partnership during their condition assessment of the site as well as broad habitat mapping carried out by South Lakes Ecology. This habitat mapping alongside previous experience of grazing the site was used to develop a grazing plan and appropriate stocking density.

We have used [Nofence collars](#), that enable us to set boundaries for grazing using GPS data, in part to ensure we are able to manage where grazing takes place on sensitive parts of the site and at certain times of year, but also to monitor grazing behaviours and better understand how cattle are making use of the site. This report is an analysis of almost 1 years grazing data (24th of December to the 7th of November) and a summary of the grazing behaviour relative to the habitats on Kingsdale Head. Peatland restoration has taken place towards the end of this grazing period and this information may act as a baseline to investigate if grazing behaviour changes following restoration. The cattle are moved between enclosed areas through the year so rather than just testing the grazing preference of the cattle this analysis test the success of our management plan in achieving the planned grazing density across the site.

Method

We developed our Standard Operating Procedure for the collars in consultation with our farm vet to ensure the welfare of our cattle. The collars collect data at roughly 30-minute intervals but are to some extent affected by varying mobile network signal strength and the location data also has varying accuracy but is usually within 10-20m of actual locations. All adult cattle were fitted with collars. Two to four young cattle followed the herd depending on the time of year.

Habitat data was provided by the Yorkshire Peat Partnership and the peat condition assessment they produced. Habitat data was collected as point data and then interpolated to create Voronoi Polygons representing habitat coverage. This interpolation to create the habitat layer was done using 625 data points and represents the habitat on Kingsdale Head relatively well. Whilst there is a good distribution of survey points there are areas where the interpolation between two survey points may mean smaller blocks of habitat are missed within the resolution of the survey, perhaps misrepresenting which habitat cattle are grazing within. Cattle are obviously able to select grazing at a finer resolution than the survey, for example amongst acid grassland along steep sided gills which may be underrepresented in the peatland condition assessment data. Some additional data was used to look more closely where grazing overlaps with mapped blanket bog habitats. Including broad habitat data collected by South Lakes Ecology as well as mapped areas of drainage and waterbodies.



Cattle sheltering in shade on a warm day

Results

Table 1 - Grazing distribution by Habitat

Broad habitat type	Percentage of grazing time spent across the 10 months	Percentage of habitat type across Kingsdale	Difference between habitat availability and time spend
Dry heath	0.43	1.73	-1.3
Mire/flush/rush pasture	14.32	13.56	0.76
Blanket bog	11.36	54.28	-42.92
Acid grassland	70.01	28.57	41.44
Woodland	3.85	0.99	2.86
Bare ground	0.03	0.87	-0.84
total	100	100	

As can be seen above not surprisingly Kingsdale Head is largely dominated by blanket bog habitat and consists of 67% blanket bog, mire and rush on peat soils. Grazing however was concentrated largely on acid grassland areas with some interaction with blanket bog habitats. Cattle were recorded to be on blanket bog habitat 11.36% of the time, including over two thirds of that time, or 7.33% of overall grazing time, on the poorest quality M20 bog which is largely graminoid dominated.

As the habitat data doesn't always have the resolution to represent steeper acid grassland slopes on gill sides a 10m buffer from ordnance survey river data was applied to investigate more closely the proportion of grazing recorded as being on blanket bog in these areas. In addition, close to the artificial drainage channels, which are extensive across the site, vegetation can be more graminoid dominated and of a drier character. We have applied a 5m buffer to these drainage ditches to investigate where bog grazing overlaps with drainage and to act as a baseline to see if this changes following restoration. The table below shows 18.31% of grazing shown as being on bog vegetation was within 10 meters of a gill or river and 16.09% within 5m meters from a drainage ditch or grip.

Table 2- Analysis of bog grazing related to areas close to rivers and drainage channels

Within bog areas, but influenced by other features	% bog grazing time
10m River buffer	18.31
5m drainage buffer	16.09
combined	34.4

Of the 11.6% of overall grazing on peatland, around a third of that time was close to rivers and drainage ditches.

Looking at the time difference between recorded locations for each animal we were able to calculate travelling speed between each data point. Below represents the average speed in meters per minute split between habitats. This may be a useful way to distinguish between where animals are possibly resting and grazing versus where they may be travelling through a habitat. It may be influenced by other factors such as how easy it is to travel across a habitat because of slope or water level for example, the nutritional quality of the grazing or the availability of shelter.

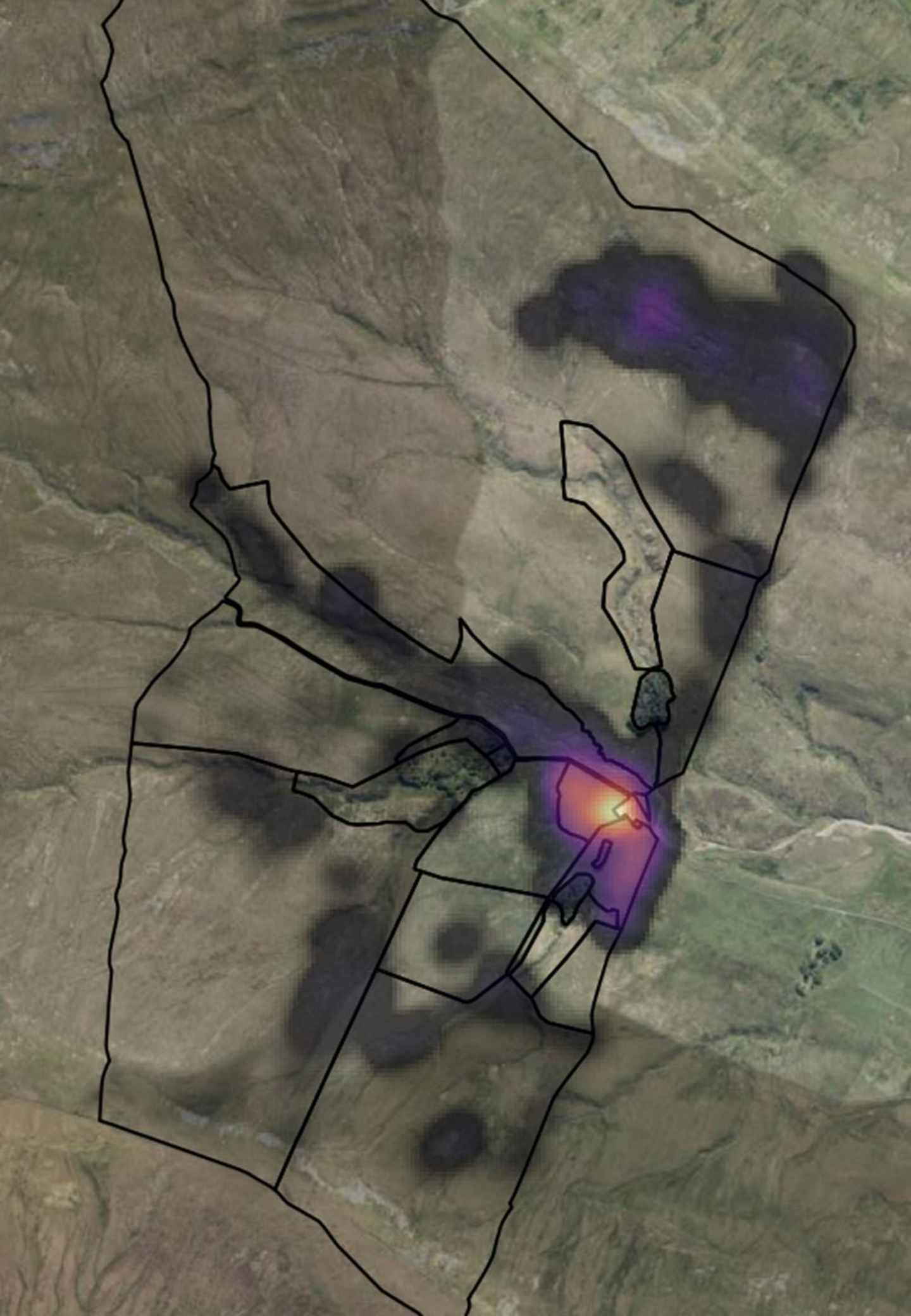
Table 3 - Average travel speeds on different habitat types

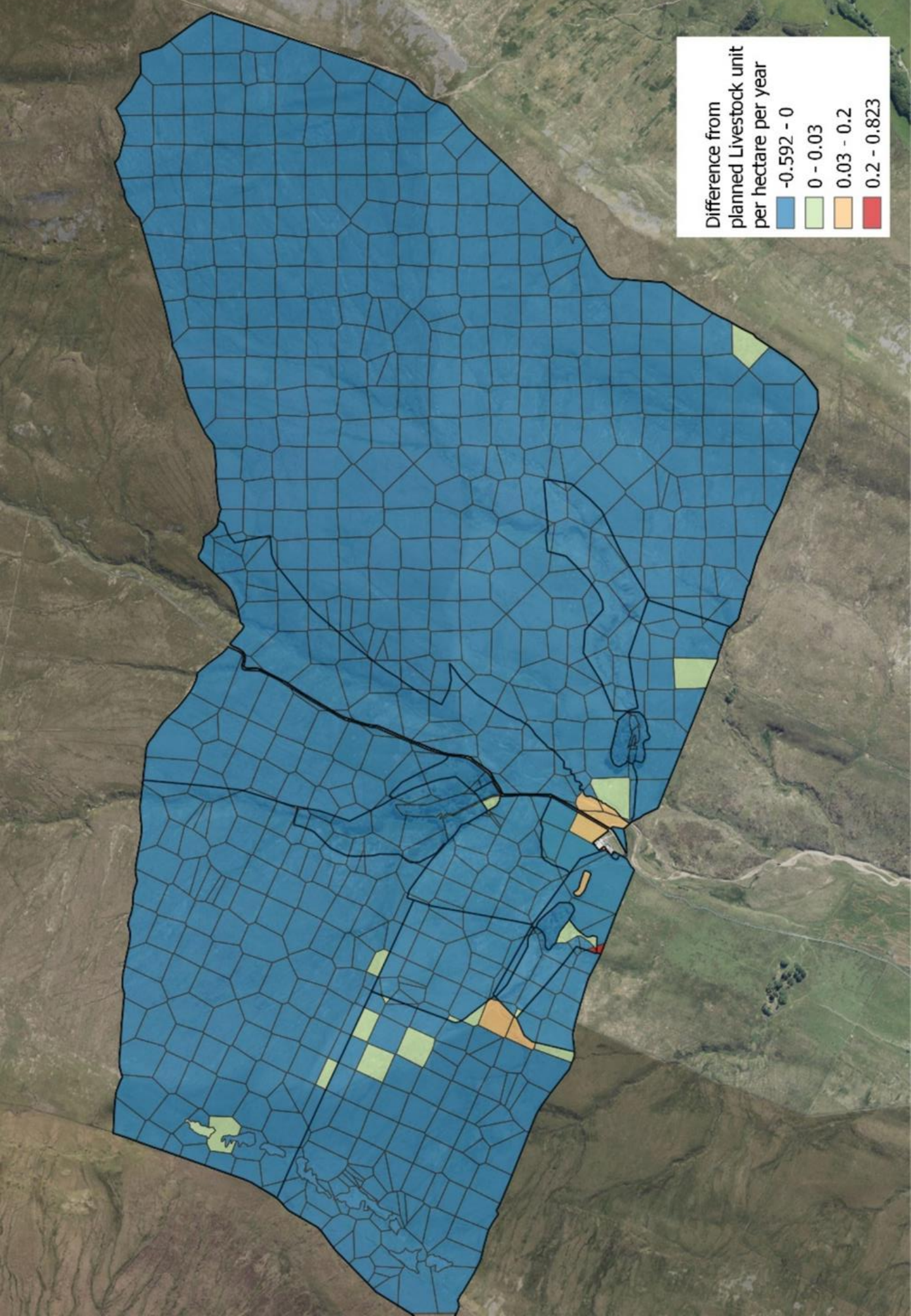
Broad habitats type	Meters per minute
Dry heath	3.87
Mire/flush/rush pasture	3.77
Blanket bog	3.37
Acid grassland	2.46
Woodland	2.16
Bare ground	32.89
Average	2.54

Table 4 - Percentage of time spent in each habitat type per month

Habitat	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov
Dry heath					4.14	1.05					
Mire/flush/rush pasture	3.93	4.02	20.52	11.86	17.56	20.87	0.03	14.81	21.81	23.04	12.22
Blanket bog		0.67	3.90	19.08	29.54	39.65		8.00	14.47	8.83	3.31
Acid grassland	83.12	75.67	71.06	60.00	37.42	34.59	94.41	67.39	61.66	63.83	78.70
Woodland	10.90	7.26	2.00	5.82	3.94	1.59	1.21	6.79		0.14	0.25
Bare ground					0.02	0.37					

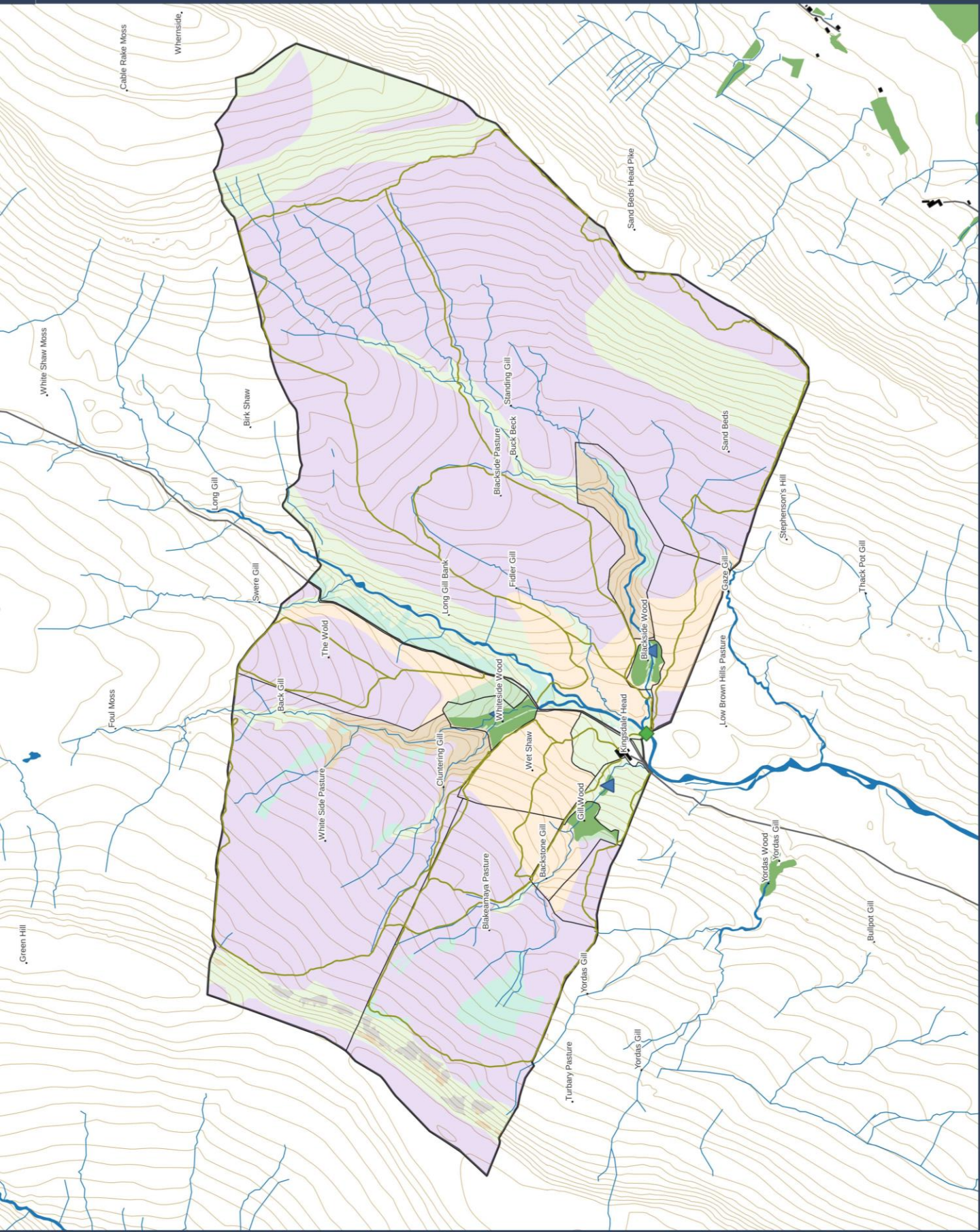
The table above shows the percentage of time spent in each habitat by month. The most significant proportion of time spent on blanket bog was between April and June where time was spent on 4 particular grazing parcels dominated by blanket bog. The high proportion of bog habitat within these parcels is accounted for in the grazing plan and these areas are grazed for a short period only, however, given the extent of the bog the cattle inevitable spend time travelling across blanket bog to reach other habitats. It's worth noting these parcels are significantly drained and grazing took place before restoration work. Particularly parcel SD70801030 is heavily drained and graminoid dominated.





Farm Map

- Waterfalls
- Bridges
- Tracks
- Boundaries
- Rivers and streams
- Farm
- Woodland
- fixed habitats
- Grassland
- Heath
- Blanket Bog
- Purple Moor Grass
- Rush Pasture
- Scree
- Woodland
- Contours
- Road



Map 1 – Heat map of grazing distribution through the year

Showing that most of the grazing is concentrated around the improved pastures around the farmhouse. These pastures are used throughout the winter but also briefly at the end of summer to maintain their floral diversity. Additional grazing can be seen to be mainly focussed along the gills and acid grassland slopes

Map 2 – Differences from planned grazing

Shows a comparison between the planned grazing density in Livestock units per hectare per year and the actual Livestock units per hectare per year. Areas in blue were either grazed less than planned or exactly as planned with a zero difference. Areas shown in green only exceed the expected grazing density by 0.03 Livestock units per hectare, so very close to expected densities, areas in orange are slightly higher and areas in red significantly higher.

Map 3 – Farm Map

Shows the broad habitat types across the site as well as key features such as rivers and field boundaries.



Cattle grazing acid grassland slopes on the edge of Whernside

Discussion

The cattle are free to graze large, enclosed areas and these maps are representative of habitat selection and grazing behaviour within the grazing parcels. However, across the site the grazing is managed, and cattle are moved between field parcels to keep the herd moving and manage a gentle grazing pressure across the site. As such the results above don't necessarily represent how the cattle would have utilised the site given completely free choice of grazing. The information does however let us test whether our planned management has been successful in achieving the planned grazing densities across the site and limiting any potential impact on areas of the site more sensitive to disturbance such as blanket bog and deep peats (peat soils deeper than 40cm).

As seen in table 1, grazing density is largely concentrated on acid grassland areas and relative to the proportion of that habitat on site there seems to be significant preference for that habitat type where available. Whilst there does seem to be grazing on blanket bog there is significantly less time spend on blanket bog habitat relative to the large proportion of this habitat that makes up the grazing parcels suggesting that cattle are actively selecting against grazing these habitats.

Many of the blanket bog habitats on Kingsdale Head are significantly drained 7.33% of the grazing locations were recorded on the poorest M20 bog communities, presumably associated with the proportion of grass and sedge which makes up this habitat type. Grazing with cattle in these cotton grass dominated areas could break up some of the vegetation allowing more moss dominated blanket bog habitat through. Additionally, 34.5% of grazing recorded as being on blanket bog was associated with grazing around rivers and drainage channels. As mentioned the method for habitat data collection and interpolation may under represent the acid grassland slopes associated with gills and rivers as well as the change of vegetation adjacent to peatland drainage to favour more grass and sedge dominated vegetation.



Bonnie selecting out *Agrostis* grass dominated areas within areas mapped as blanket bog.



A mosaic of habitats within the bog areas

The Nofence collars, whilst providing quite accurate location data at regular intervals, don't allow for a measure of whether or not animals are travelling through habitats, resting and ruminating or grazing. The time stamped location data actually produces a measurement of distance travelled and speed. GPS and signal inaccuracies may have skewed some of these measurements, however we have had a look at the average speed travelled across different habitat types. This measurement may be effected by a range of factors, for example, whether or not animals have a preferred habitat for resting, such as woodland, which showed some of the lowest measurement for average speed. Additionally, the nutritional quality of the habitat might effect how far animals are having to travel during grazing for example they seemed to have a slower average speed on improved and acid grassland areas. Blanket bog makes up large proportions of the site by area, so this may mean that animals are travelling through these areas more often. Given the poor nutritional quality of bog habitats we would expect higher speeds of travel through these areas as seems to be the case.

We have also looked at the seasonal variation of the grazing by habitat type. Unsurprisingly there is a wider diversity in habitats grazed at the points in the year where the cattle are grazing the larger, more diverse parcels of the site. These parcels are largely dominated by blanket bog, and are only grazed for a limited period in the summer to minimise the level of disturbance. As a result, the times of year with the largest proportion of grazing on blanket bog correlated with the grazing of these parcels. Accounting for this in the management plan these large areas of the site are grazed for shorter periods of time resulting in very low grazing density across the year and limited disturbance as seen in map 2.

Map 1 shows the distribution of grazing through the year. Large areas of accessible blanket bog have been completely ungrazed and there does seem to be concentration of grazing along the steep acid grassland slopes and gills. Map 2 shows only some areas where grazing has exceeded the proposed grazing density.

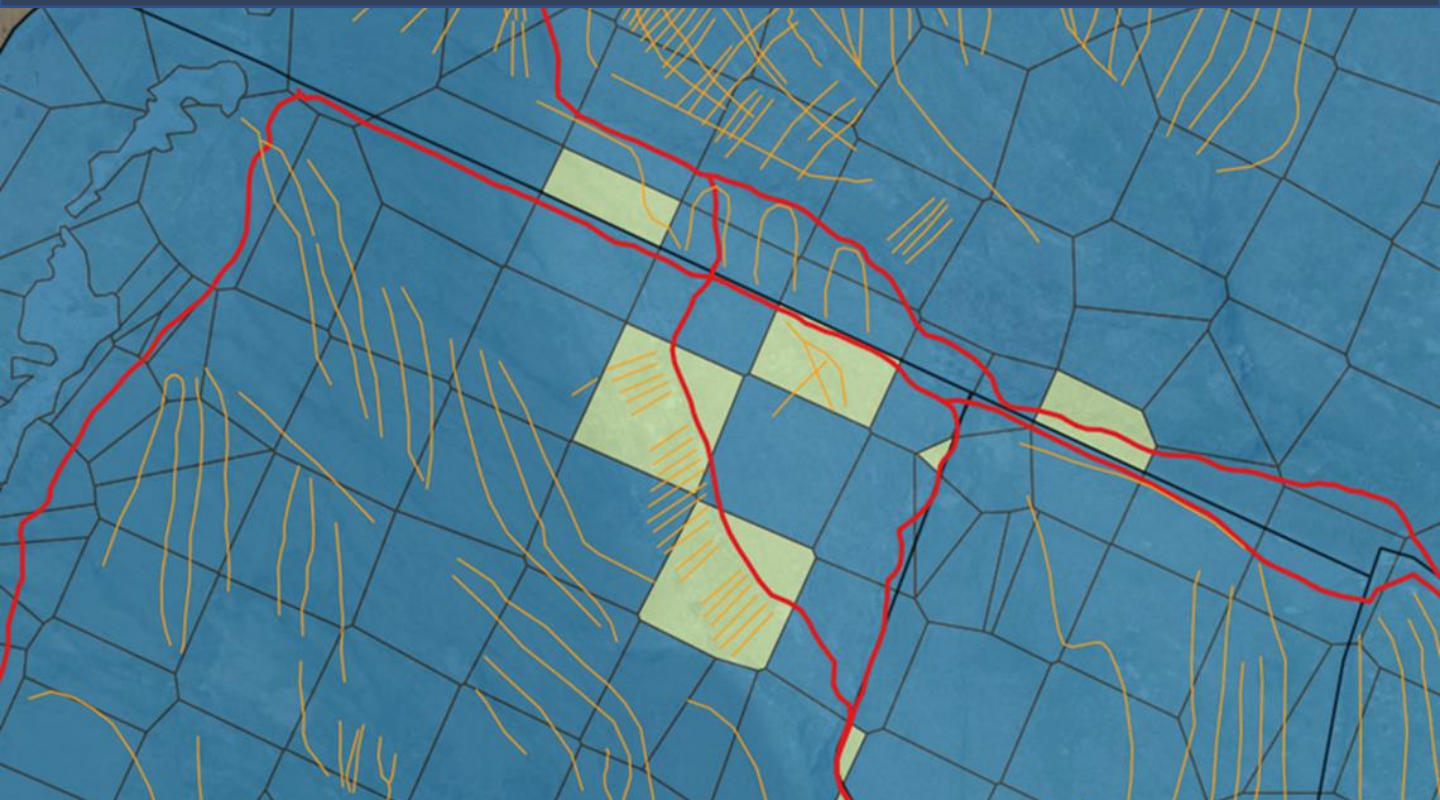


Map 3 : Scree slopes

On the scree slopes, where the grazing density has been planned as zero because of the lack of much vegetation, there has been some registrations from the collars in these locations.



Often preferentially grazing gills and valley bottoms.



Map 4: Areas of blanket bog slightly over grazed from that planned shown in green. These areas are associated with significant drainage as well as some of the ATV access tracks which will have impacted the vegetation. These areas marked in green still have not exceeded a density of 0.05 Livestock units per hectare, below a density at which the IUCN would suggest trampling carries a risk of vegetation damage on blanket bog

<https://www.iucn-uk-peatlandprogramme.org/sites/default/files/2019-05/7%20Grazing%20and%20trampling%20final%20-%205th%20November%202014.pdf>

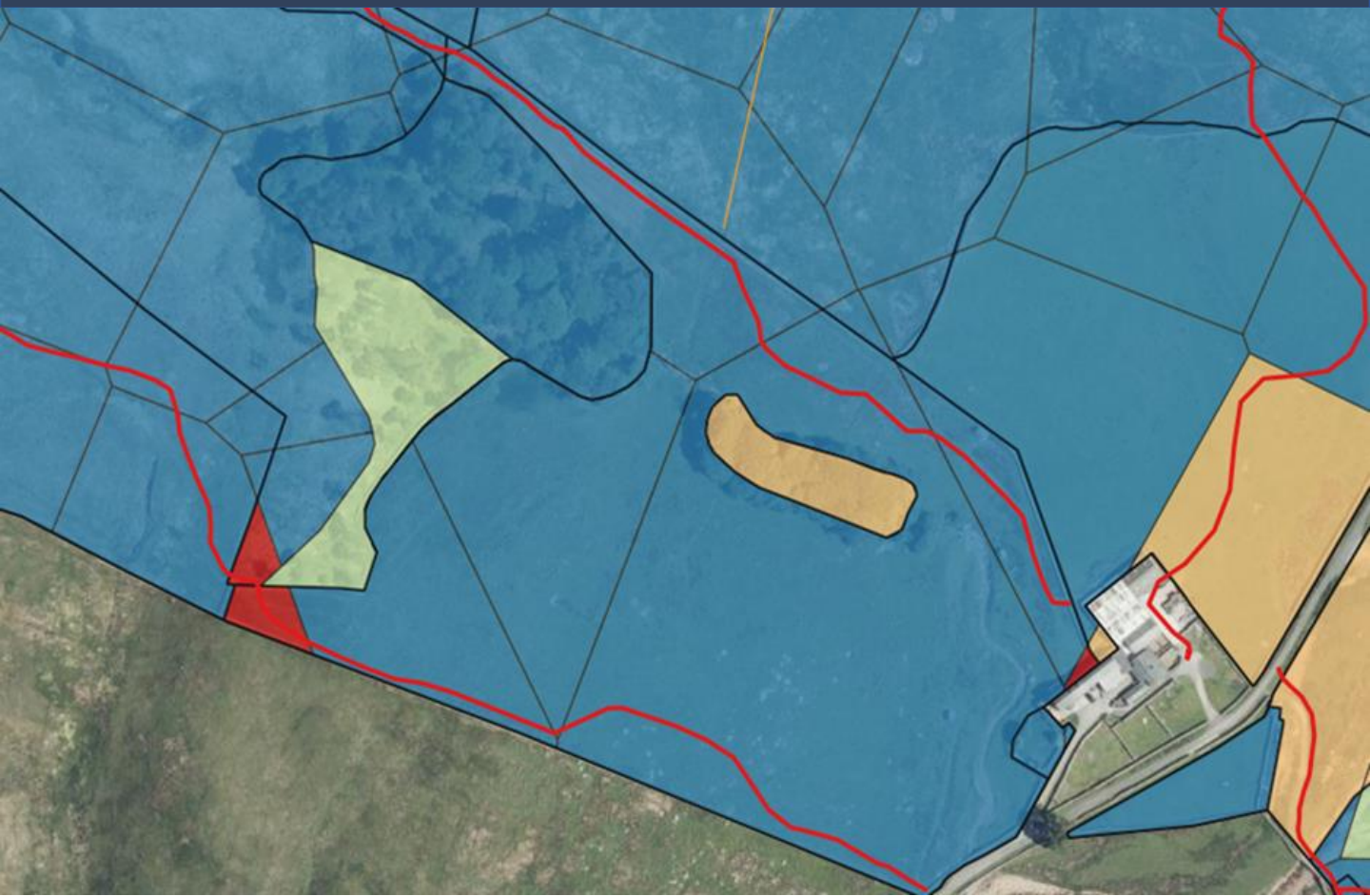


Trampling and grazing has the potential to diversify cotton grass dominated areas of blanket bog.



Map5: Highly grazed areas

Areas shown in orange and green above have been recorded as grazed at densities above those planned by as much as 0.2 LU per hectare, although still a low level of grazing. This area is recorded as blanket bog but is associated with significant steep grassland slopes along the gill side shown in pink and is a good example of where the resolution of the data can sometimes not highlight these grassland areas.



Map 6: Highest areas of grazing

There are some small areas of higher recorded grazing densities shown in red. These are associated with the In-bye winter pastures particularly in areas used preferentially for shelter such as wooded areas and narrow walled areas. Whilst used preferentially at higher densities these areas were not poached significantly or damaged and may over time create some small areas of nutrient enrichment offering a different vegetation type and some variation over the summer period when it is not grazed.



Wooded areas made up a small proportion of the site and stock were often excluded from these areas. Where available they were often used preferentially.

In general, the Nofence collars have been a useful tool in monitoring the behaviour of the cattle, saved time and offered welfare benefits in terms of monitoring stock.

In the future this work can act as a baseline for the way cattle use the site and for considering potential changes to the grazing plan.

This was the first year these cattle grazed the site. It is a large site for a small herd and we may expect that as the cattle get to know the site this might impact how they select grazing within it. Perhaps more quickly finding better grazing amongst less palatable vegetation.

As peat restoration works are completed it will also provide a baseline to show how restoration may change grazing patterns. We may expect the proportion of grazing on blanket bog areas to go down as the water table and vegetation changes towards healthier bog communities. Alternatively as the hydrology changes the risk of poaching or disturbance may increase and this is something we can monitor using no fence collar and adjust appropriately. The data also allows further monitoring of high grazing density areas, which may cause concern, and help inform management decisions as the herd grows slowly over the next few years.

The data collected seems to support the key assumptions used to develop the management plan, showing broadly successful implementation in grazing the site within planned grazing densities. For the small areas where the data would suggest these densities have been exceeded, the densities are still below what would be considered damaging and expected within the variation of a natural system. With changes to hydrology following the peatland restoration work carried out in 2022 and the herd growing slightly, further monitoring of the plan is needed to assess how grazing behaviour might change and if the management plan needs to be updated. This monitoring will sit alongside peatland condition monitoring and a range of biodiversity surveys that will inform how Kingsdale Head is changing.