**PEATLAND-ES-UK LONG-TERM EXPERIMENT**

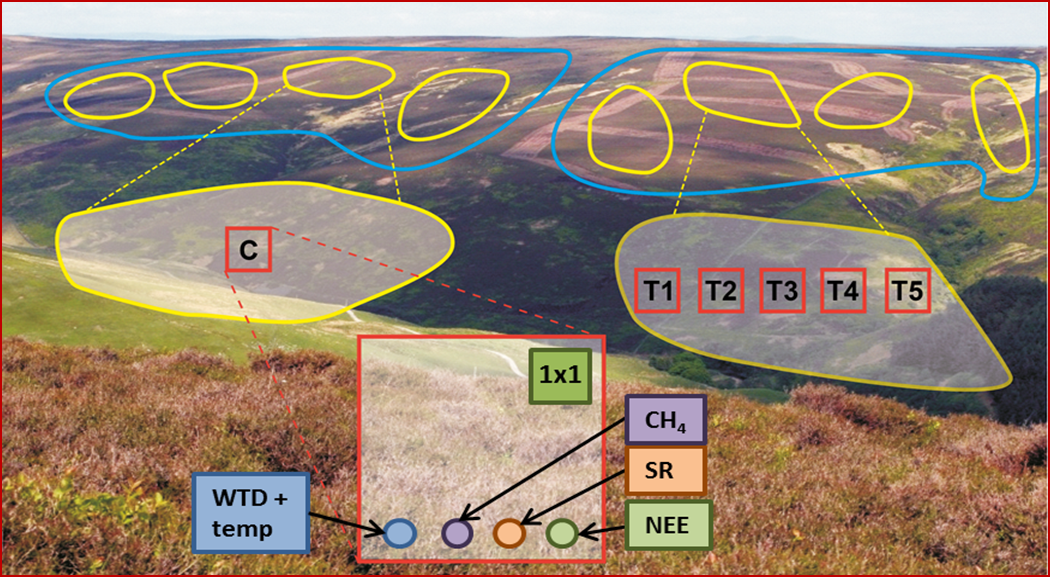
**EXPERIMENTAL DESIGN**

The three sites, Nidderdale, Mossdale and Whitendale are all located in north-west England and were chosen based on a set of key criteria: all are classed as heather-dominated blanket bog (see **Figure 2**) with a mean peat depth of over 1m and were managed as grouse moors. Typically, the sites were managed with a 10-15-year burn rotation and all had a long history of burning (more than 100 years). All sites have more than 50% *Calluna* cover, with at least some existing bog vegetation in the form of *Eriophorum* and *Sphagnum* species, and show a low stocking density of <0.5 ewes ha-1. The sites allowed for a pair of similar sized (~10 ha) sub-catchments, each with a main stream, and their proximity allowed reaching all within a day when necessary.



**Figure 2:** Site conditions as observed by ground-level pictures (credit A. Heinemeyer) taken in winter 2012 at each site (Nidderdale, Mossdale and Whitendale). Note the heather and sedge cover (mostly cotton-grass (*Eriophorum* spp.)) dominated blanket bog vegetation.

Management for each site consisted of two similar adjacent sub-catchments being allocated either a burning or mowing management at the catchment scale, with various plot-level managements: uncut, brash removal or *Sphagnum* pellet addition. Within each sub-catchment, four experimental blocks each with one 5 x 5 m plot-level (with a 5m gap between each plot) replicate per management treatment, were defined with at least 50m between blocks (see **Figure 3**).



**Figure 3:** Schematic site layout of the two sub-catchments (blue outlines) with four blocks (yellow outlines) each. Each plot (red outlines) is 5x5 m. Control (C) plots were burnt (FI) and the additional C1 plots were burnt with *Sphagnum* propagules subsequently added (FI+Sp). Treatment (T1-T5; randomly allocated) plots in the mown sub-catchment were either mown with brash left (LB) or brash removed (BR), were mown with *Sphagnum* propagules added (LB+Sp; BR+Sp) or were left uncut as ‘do nothing’ comparisons (DN). Each plot contained a corner 1x1 m area (green square) for detailed vegetation monitoring, a circle for CH4 and total soil respiration (purple circle), periodically cut and therefore root-free soil respiration (SRc) areas for decomposition (brown circle), and NEE flux (green circle) measurements and a mesh cage with a dipwell and temperature logger (blue circle).

Diverging management of either burning or mowing (see **Figure 4**) started with the first management phase in 2013 (after one year of background monitoring pre-management change), on all blocks and on three additional areas per sub-catchment (~0.24 ha each). In the second management phase in 2015, five new areas (~0.25 ha each) within the sub-catchments were burnt or mown.



**Figure 4:** The six sub-catchments (from left to right: Nidderdale, Mossdale, Whitendale) shown during burning (top row) and after mowing (bottom row) in March/April 2013. Also note the air pollution (visible as smoke) impact during the burning (photo credit A. Heinemeyer).

Each site has a V-notch flow weir at the outflow of each sub-catchment to measure flow rates and, by considering rainfall data from a weather station, calculate water budgets. In one corner of each plot, a logger measures the soil temperature, another logger records daily water tables and a peat rod allows capturing long-term peat accumulation. Additionally, each plot contains a Rhizon sampler for periodical sampling of pore water. Circular flux areas for repeated methane (CH4) and total CO2 soil respiration (SR), root-free SR (SRc) and net ecosystem exchange (NEE) measurements are seasonally monitored along one side. A 1 x 1m sub-plot and the entire 5 x 5 m plots are undergoing annual detailed vegetation monitoring. Refer to **Figure 3** for the overall context.