

# Monitoring of Burning in Uplands

## A Rapid Assessment Protocol



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### Upland Heather Moorland

- Heather moorlands cover 30-35% of the land surface in Britain. They occur typically at altitudes between 250 to 700m on a variety of soil types and in different topographical situations. These conditions combined with historical and current land management practices, along with other factors such as air pollution and unmanaged fires influence whether the heather moorland vegetation is regarded as dry heath, wet heath or a form of blanket bog on deep peat.
- Heather moorlands are regarded as semi-natural habitats; their soils are typically associated with areas having once been forested. Soils are generally acidic and damp due to the high precipitation and heavy hill fogs they receive.

### Moorland Management

- Moorland management consists of several key actions, including heather burning, cutting and grazing. Burning takes place between October and April, when the soils are more water saturated and the risk of deep peat burns and accidental spreading of fires is reduced.



Heather in bloom showing different burn stages.



Controlled Burn

### Why Does Heather Burning Occur?

- Controlled burns help to remove the accumulation of older woody stands of heather and to rejuvenate the area. This provides good nutrition for grouse and sheep.
- Burning aims to create a mosaic of differing aged stands of heather, providing new shoots for forage and shelter in older stands.

### Heather Moorland Extent

- Over 27% of *Calluna* dominated habitats in the English Uplands show evidence of recent burning (Cranfield University research).
- In the Peak District, especially the grouse moors on the drier Eastern slopes in the Dark Peak and parts of the South West Peak, areas are managed by regular burning. On the map overleaf, polygons indicate areas of recent burns mapped from photos between 1995 - 2002 (approximately 90km<sup>2</sup>, see page 3).

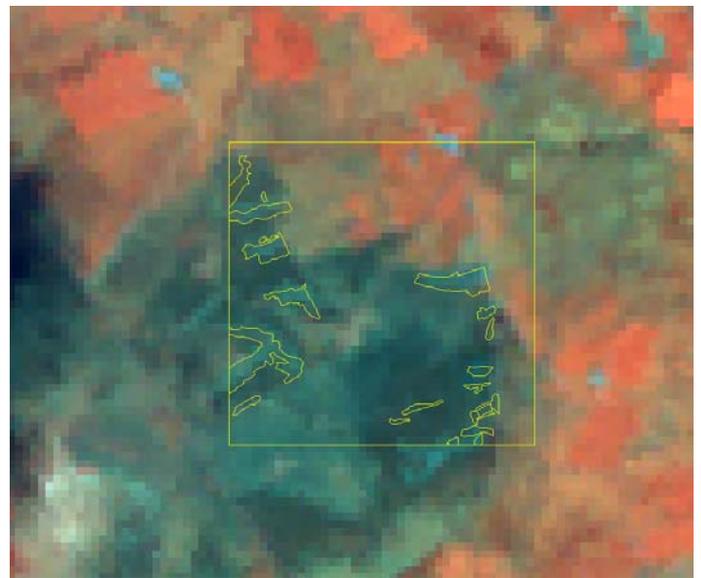


## Monitoring of Burning

- Although heather burning is an important management tool in the uplands, little research has been carried out regarding the exact distribution, area coverage and ages of burns. Monitoring by manual mapping in the field or from aerial photos is expensive and time consuming.
- Supported by Moors for the Future, scientists from Cranfield university developed a method for rapid burn assessment using a geographic information system (GIS).



Digitised heather burns from aerial photo.



Satellite image overlaid with digitised polygons of burnt *Calluna* from aerial photo.

## Rapid Assessment Protocol

- Tool developed using ArcGIS programming to automate generation of point sampling grids that allow rapid allocation of burn classes.
- Protocol tested using random selection of 25 1km<sup>2</sup> images from Peak District National Park.
- Burn extent assessed using both manual digitisation and point sampling method.

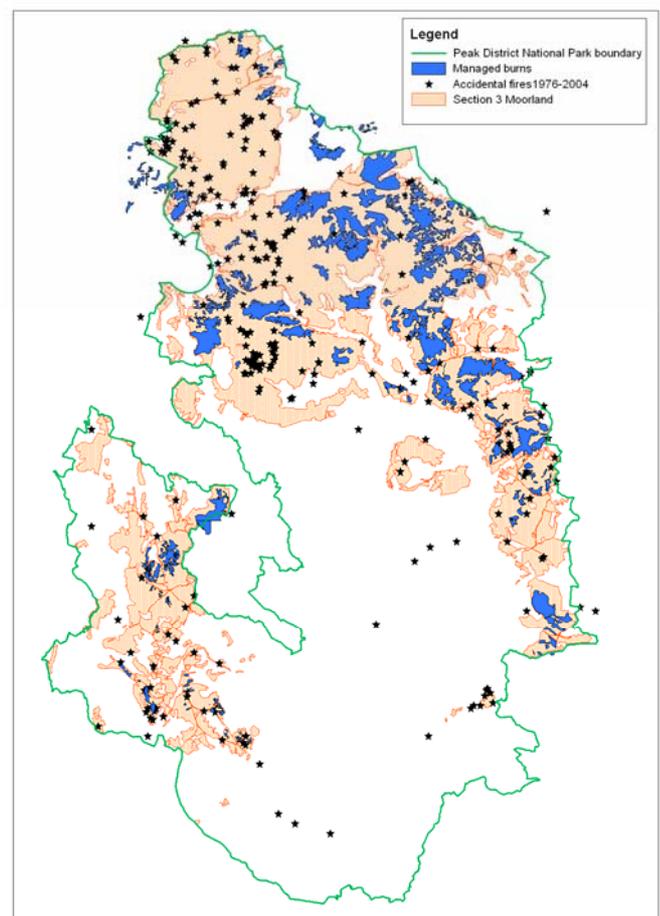
## Current Data Sources

### Satellite Imagery:

- pros:** benefit of repeated coverage, potential for semi-automated digital classification.
- cons:** very expensive at high resolution, low availability of cloud free images, requirement of specialised processing skills and software.

### Aerial Photography:

- pros:** photos usually available for National Parks, fine spatial resolution, but automated methods such as segmentation using raster or object-based classifiers have not yet proven to be consistent and also require specialist skills and software.
- cons:** manual digitisation possible, however, slow and comparatively expensive process.



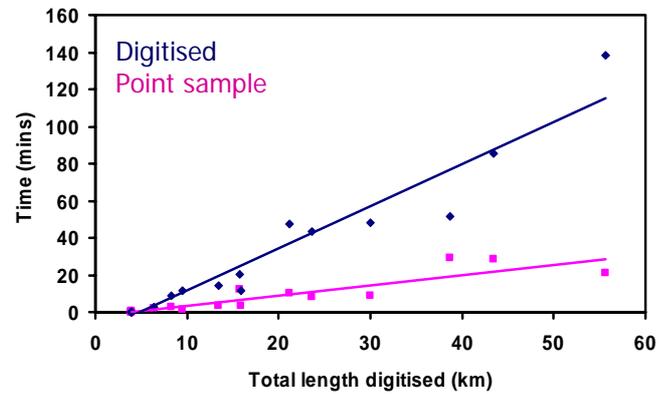
## Development of the GIS Tool

### Aim

- To determine the point sampling density required to achieve, on average, 95% accuracy in area estimates compared with manual digitisation.

### Method

- Area estimates from 97 digitised 1km<sup>2</sup> images compared to results from point sampling at differing densities (5m - 200m resolution).
- Burns were classed into four approximate maturity classes: pioneer, building, mature and a senescent phase. There are significant differences in growth rates of heather in different areas of the Peak District. Ground survey was conducted for 12% of all samples.



### Time Advantages

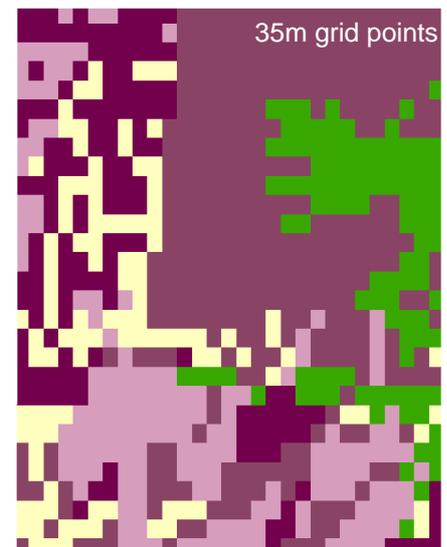
- Significant time advantages were made using the rapid burn assessment (approximately 20-25% time required in comparison to manual digitisation).

### Accuracy & Spatial Resolution

- 95% overall accuracy achieved by using a grid of 35m resolution.

### Outcome

- Provision of area estimates of burns with 95% accuracy. In addition using raster output from the GIS sampling tool may also be adequate for landscape scale mapping with a 35m resolution.



These maps represent the different Stages of heather growth:  
white - pioneer heather  
light purple - building heather  
intermediate purple - mature heather  
dark purple - degenerating heather  
green - bracken



This work was made possible by a Small Research Grant by Moors for the Future.

### Acknowledgements / Data availability

- The research was conducted by Ben Clutterbuck as well as Adrian Yallop and Graham Thomas from the University of Cranfield. Copyright of all data and maps remains with the authors.
- Full copies of the research reports are held in the Moors for the Future library.
- Views expressed in this research note do not necessarily reflect those of all Moors for the Future Partners.

### References / Links

**Clutterbuck, B (2004)** *Assessment Protocol for the Monitoring of Calluna Burning in Upland Environments*. Unpublished MSc Dissertation, University of Cranfield

### Moors for the Future Research notes

- No 1 Breeding Bird Survey of the Peak District Moorlands
- No 2 Gully Blocking in Deep Peat
- No 3 Peak District Moorland Stream Survey
- No 4 Heavy Metal Pollution in Eroding Peak District Moorlands
- No 5 Visitor Responsibility in the Moorlands
- No 6 Rapid Assessment Protocol for Monitoring Burning

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### The Moors for the Future Partners are:

English Nature, National Trust, Peak District National Park Authority, United Utilities, Severn Trent Water, Yorkshire Water, Sheffield City Council, Peak Park Moorland Owners & Tenants Association, Defra, Country Land and Business Association, National Farmers Union

