



Biodiversity in the South Pennines

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1913

'The cotton grass moors are extensive, dreary and monotonous. Hare's-tail cottongrass is frequently the only vascular plant which occurs'.

Moss, Vegetation of the Peak District

'The Hare's-tail cottongrass community presents a depressing spectacle over the summits between the great industrial conurbations of Lancashire and Yorkshire: fringed by numerous reservoirs and cut through by arterial roads, vegetation and peat are often coated in grime and even the sheep look grey'

Rodwell NVC M20

A Healthy Peatland



Lost or reduced – cranberry, bog asphodel, club mosses, sundews, deer-sedge, *Sphagnum* and other mosses, royal fern, bog rosemary- described as abundant 1835, common on heaths and moors 1859 (Grindon) and gone from many localities within last 30 years in 1888 (Lees)



Change over time

Farey 1815 – upland mosses – *‘formed of great accumulations of the grey bog-mosses, (Sphagnum palustre), common cottongrass, marsh horsetail (is this hare’s tail?), heaths, rushy bents and other small aquatic plants growing on the edges and wetter parts of the most black and rotten of these elevated peat mosses’.*



History of South Pennines

- Until 1300AD, *Sphagnum* abundant/dominant in blanket peats and hummock-hollow and ridge-pool surface patterning present from c. 2000BP
- Then hare's-tail cottongrass more abundant, *Sphagnum* declined
- Co-incident with charcoal in profiles – regular burning from 14th century, possibly also climatic fluctuations
- Little Ice Age 1500-1850, wetter, colder – possibly more erosion
- First main gullies 400-500yrs old
- Human interference?



The factors involved: Grazing

- Problem more since sheep became dominant grazer + all year grazing – c.1550 S Pennines
- 3x increase sheep stocking levels 1930s to 1980s and first ESA
- Overall effects – >0.5 sheep/ha – reduction in heather & increased cottongrasses
- 0.75 sheep/ha increased heath rush, reduced cottongrasses
- Trampling/
pulling out?



Overgrazing/Stock Type



Air Pollution



**Loss of *Sphagnum* for
c.200yrs**



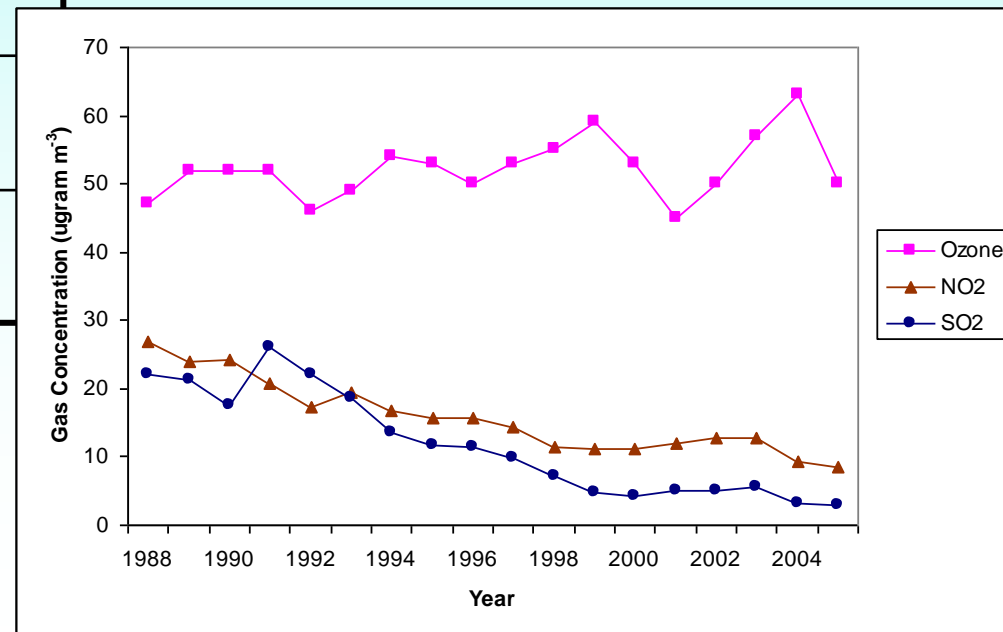
Total Deposition of Oxidised Sulphur to Blanket Bogs 1880 – 1991

Location	Deposition of oxidised S – kgS/ha
Southern Pennines	6400
Northern Pennines	1580
Central Scottish Highlands	1000
NW Scotland/Ireland	400

Acidification of peat <math><3.5</math>

many *Sphagnum* and other species intolerant

Changes in gaseous or ionic concentrations of major air pollutants in wet deposition at Wardlow



Managed Burning

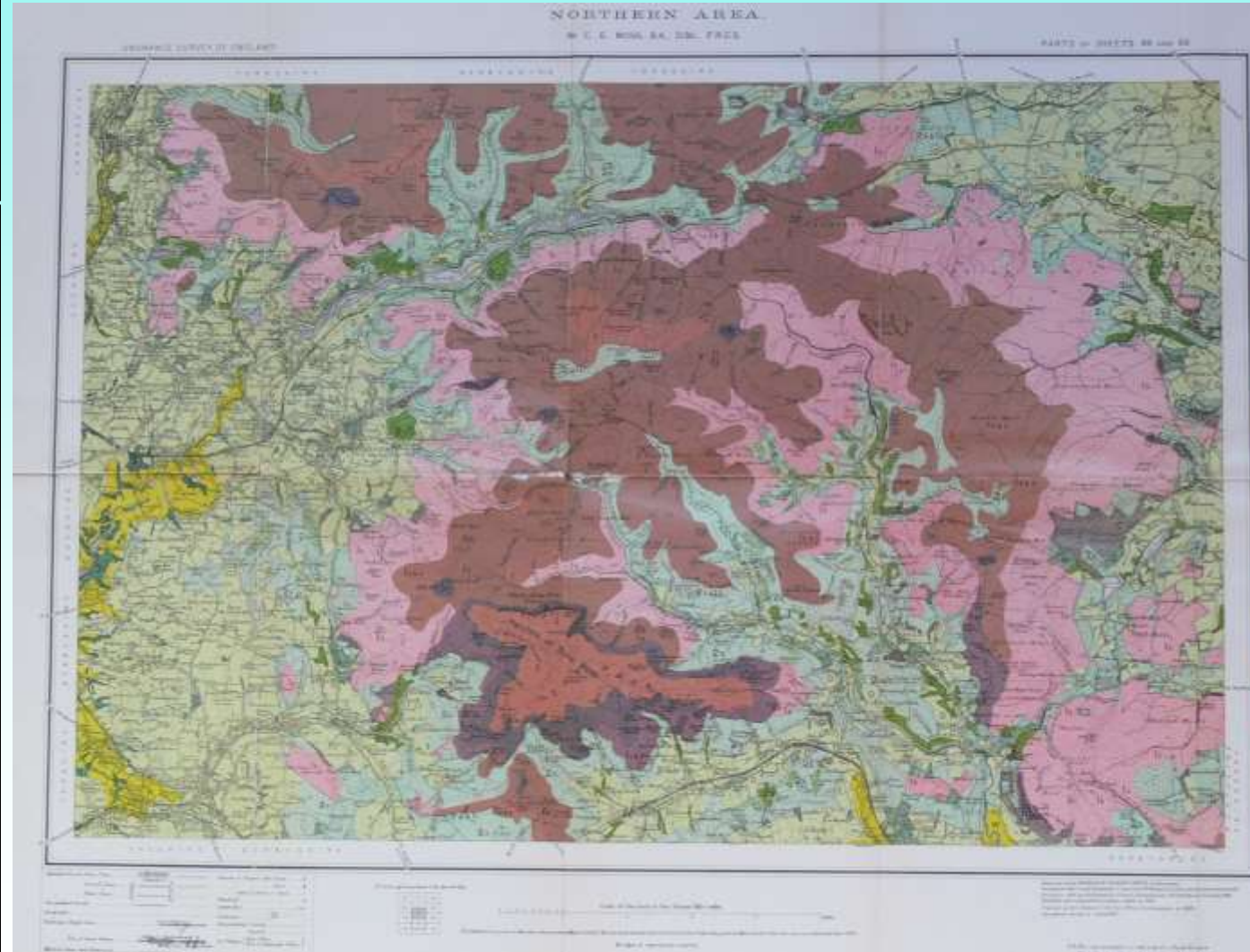
- Controlled burning – regular 1800 onwards (but charcoal back to 14th century)
- Farey 1815 – *firing of the heath in dry weather has set fire to the peat, into which it continued to penetrate and make large and irregular holes. This source of unevenness and of the groughs and gullies, and of local dead black places on the surface of these mosses is perhaps more common than has been supposed.*
- Farey reported fires could be every four years

Managed burning cont.

- Burning season, cooler, less damaging? Increases dominance of hare's-tail cottongrass & heather, some *Sphagnum* spp sensitive to burning
- Regular burning dries out surface, increased nutrients temporarily, warmer surface, water-repellent bitumens and tars form skin
- Possibly more peat pipes?
- *Molinia* burning annually?
- Water runs off faster, less infiltration + water holding capacity, more susceptible to erosion, lower water table



Changes to dwarf shrubs



Wildfire

- **South Pennines driest area for peat in GB**
- **Wildfires significant - Peak District – 324 fires 1970-1995, most on moors, 20% close to paths, 13% by roads, 27% in access land**
- **1976, 79 fires, covered >2.7sq km**
- **1995, 34 fires, covered >46,064sq m**
- **If fire hot, slow, back burns, destroys vegetation +/- peat**
- **If high grazing +/- high rainfall, erosion starts**

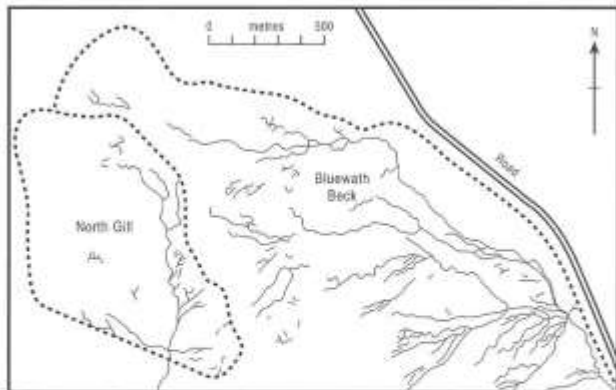
The Effects of Wildfire



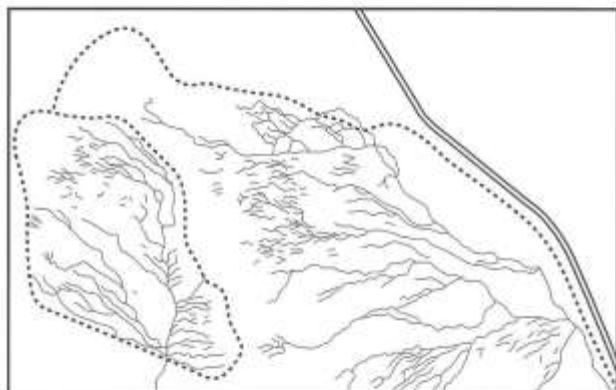
Wildfire cont.



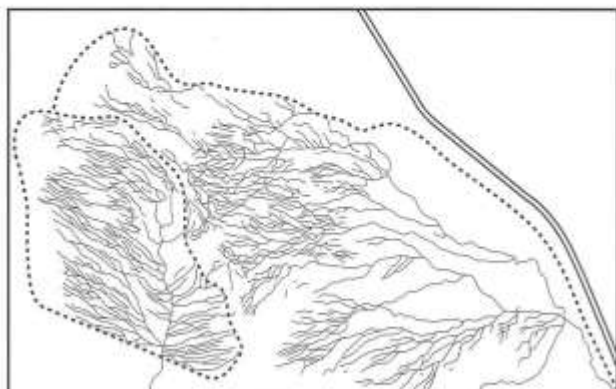
Erosion starts, gullies extend, peat pipes form



Glaisdale Moor 1973



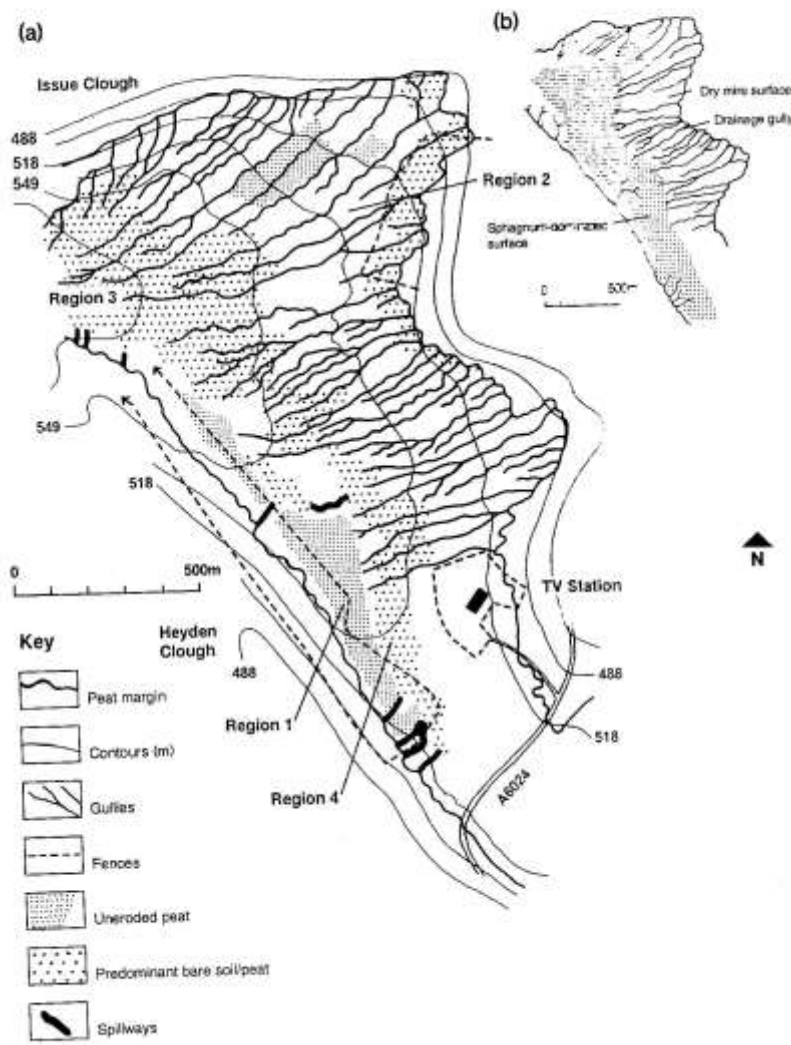
Glaisdale Moor 1978



Glaisdale Moor 1983

Gully development after wildfire

FIGURE 3.8. Map of the blanket mire north of the main A6024 road at Holme Moss, showing the main topographic features mentioned in the text. The grid reference of the Television Station is SE 095 040. The inset, top right, is a reconstruction of the bog surface in the Eighteenth Century, showing the probable extent of Sphagnum-dominated vegetation (shaded) and of drainage gullies.



Holme Moss gullying 1995 on left, reconstruction of 18th century top right (MMP 1997)

Extent of Gullying



Loss of peat

Degraded bog, drying out



- Changes in gully density, length and extent
- Multiple gullies dissecting peat – reduced water table
- Not wet enough for bog plants, dry peat spp increase



Grips

Gripping in 1960s-70s (grant aided!)



Other Drainage

- Clay pipes create gentle ridge and furrow
- Is this old ploughing 'lazy beds'?

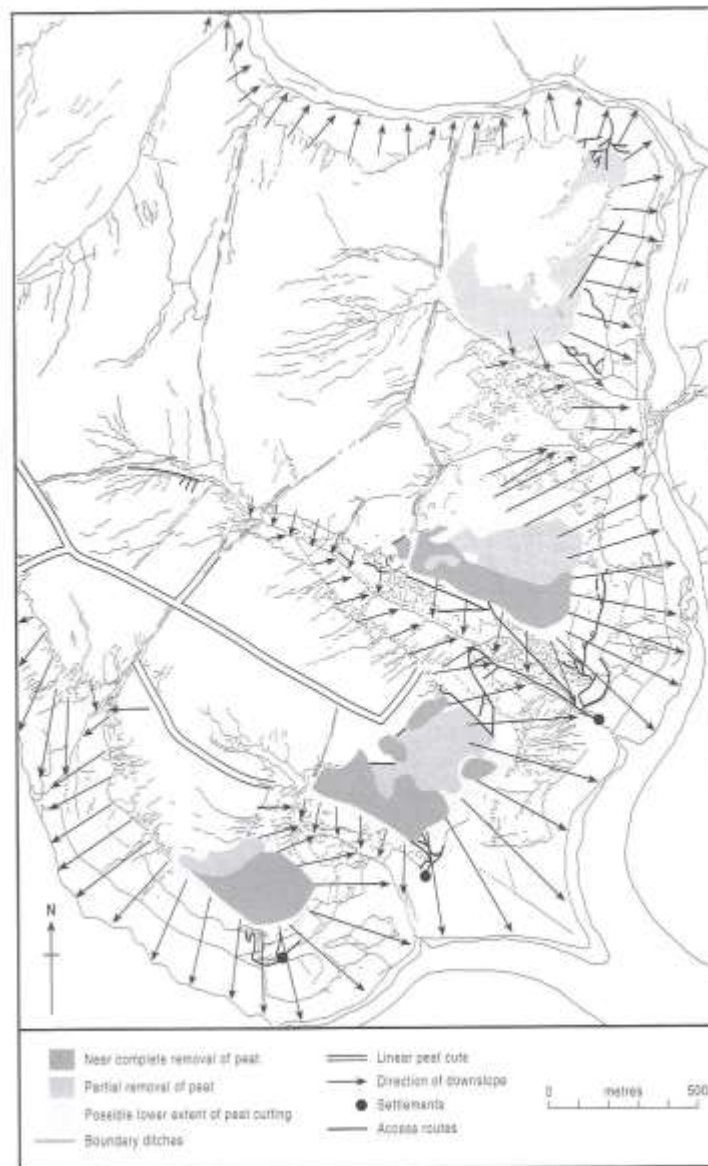


Peat Extraction



236

THE MOORLANDS OF ENGLAND AND WALES



Other aspects of biodiversity

- SPA qualifying spp:

- Merlin
- Golden plover
- Lapwing
- Dunlin
- Snipe
- Short-eared owl
- Whinchat
- Wheatear
- Ring ouzel
- Twite



- Also important-most southerly breeding assemblage of these some of these + grouse

Restoration

- North York Moors 1976
- Peak District NPA– Moorland Management Project 1980-1997
 - 6.5km² totally bare peat/mineral soil, more in west & at high altitude
 - 24.8km² partly bare
 - Loss of peat up to 40-60mm/yr where bare

MMP Focused on re-vegetation not hydrology



1989



1991



1995



1999

Wide range of projects in S. Pennines/Yorkshire

- Moors for the Future
- Yorkshire Peat Partnership
- Water companies (SCaMP, Yorkshire Water)
- Natural England agri-environment schemes
- National Trust
- Much focus now on re-wetting – to assist *Sphagnum* recovery, increase C sequestration, reduce DOC



The future - hopeful?

- Reduced SO²
- Nitrogen??
- Rewetting
- Reduced stock grazing
- Reduced DOC/POC
- Future of burning on bog?
- Increases of species occurring:

