Land-use and carbon management for heather moorland in the UK

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Introduction

- Introduction – the history of muirburn
- Carbon stores
- Values, assets and sustainability
- Muirburn and fire characteristics
- Prevention and mitigation
- Regulation, codes of practise and training

UK peat area & carbon storage

Country	Area (km^2)	—— Soil Depth——		Total
		0 – 100 cm (Mt C)	> 100 cm (Mt C)	(Mt C)
Scotland	17,789	1,104	516	1,620
England	4,246	296	123	419
Wales	732	67	52	119
Northern Ireland	1,873	90	54	144
UK (total)	26,640	1,557	745	2,302

UK Forest Carbon 2010 (Mt C)

- **UK forest area** **28,000 km^2**
- **Living biomass** **136**
- **Dead** **27**

  Forest total **163**

- **Forest soil carbon** **730**

Values to protect

- Sensitive plants, often wetland plants

- Severe / smouldering fire on organic soils
  - Sterilises soil
  - Very slow recovery

Grouse shooting (hunting) -economic value

Muirburn

- Regulated first in 1424
- Usually with the wind
- Damp fuels & damp soils
- In autumn or spring
- Only allowed in summer with a licence, for special purposes.

Fuel & fire characteristics – young heather

Less moss, more flammable

Low fuel load, low fire intensity

Fuel & fire characteristics – old heather

Mosses, need very low MC to ignite
Peat, smouldering, high MC ignition

High fuel load,
high fire intensity, low fire severity

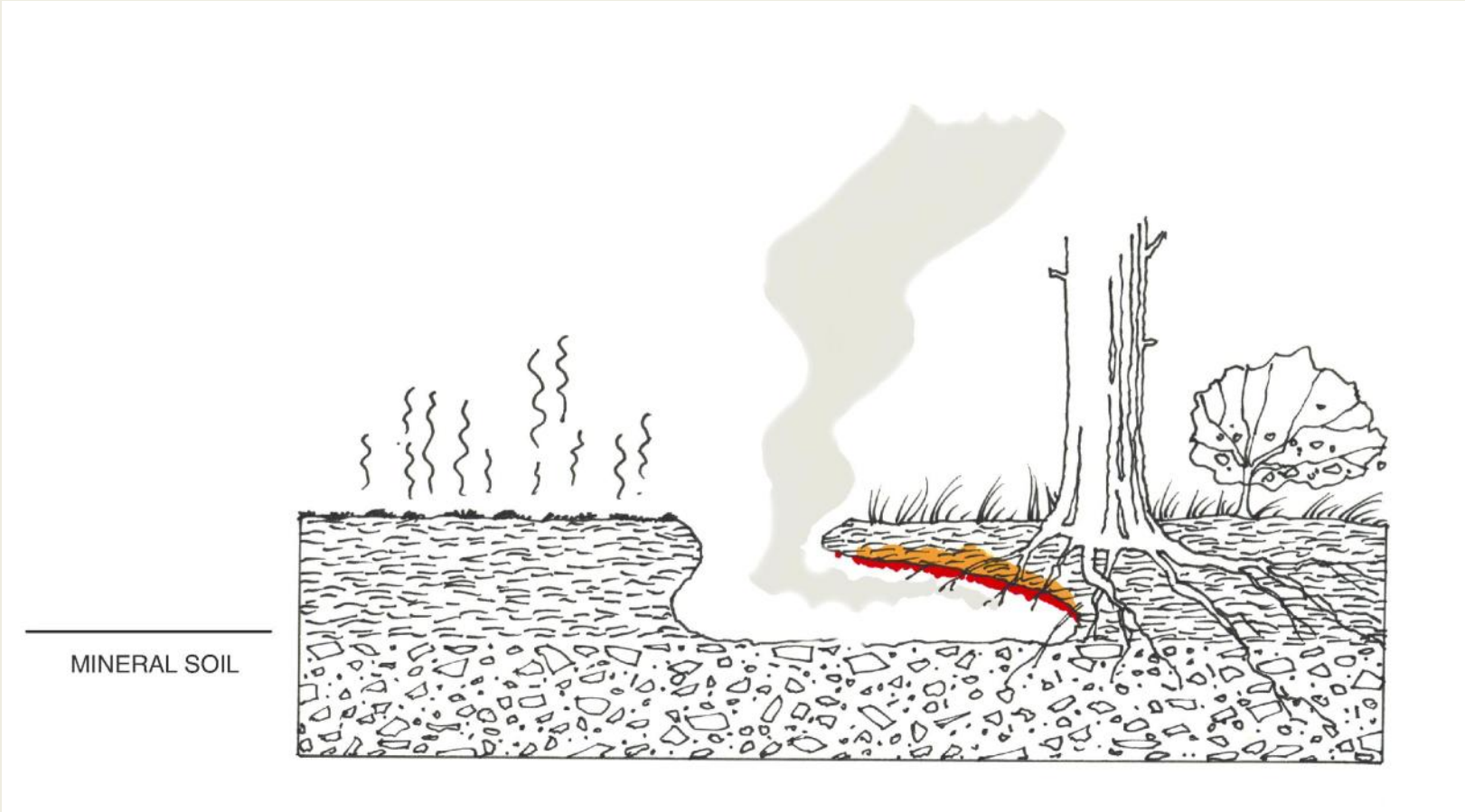
Blanket bog

Bog carbon accumulation rates

Country	Bog type	Treatment	Kg/ m^2/year	Tonne m^2/year
UK	Blanket	Unburned	0.14	1.44
	Blanket	Burned* & grazed	0.10	0.97
Canada	Raised	Fire regime	0.023	0.23

* 10 year fire return interval

Smouldering fire – its different



Carbon losses – wildfires, with smouldering

Country	Bog type	Depth of burn (m)	Kg/m^2	Tonne/hectare
Canada	Raised	0.05 – 0.1	3.2	32
	Raised	0 – 0.1	2.2	22
	Raised	0 – 0.1	2.1	21
UK	Blanket	0.3		156
	Blanket	1.2 – 1.8		768 - 1152

Balance of risks-

To burn or not to burn that is the question?

Burn option

- Reduced carbon accumulation
- Potential for low level degradation

No burn option

- Increased fuel load hazard
- Potential increase in the scale of any fire – fuel continuity
- Higher fire intensities – more difficult and dangerous to extinguish
- Much higher fire severity & potential for massive loss of carbon

Firebreaks in heather - 20m wide, < 20cm tall

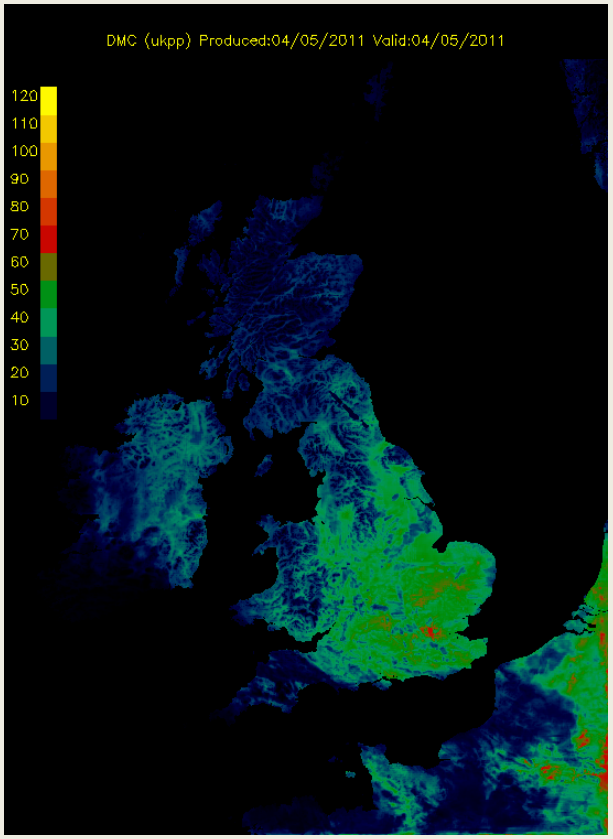
Good quality site (25 year fire return interval)	Poor quality site (50 year fire return interval)
Year 0 & 25	Year 0 & 50
Year 5	Year 10
Year 10	Year 20
Year 15	Year 30
Year 20	Year 40

New fire prescriptions - written burn plans

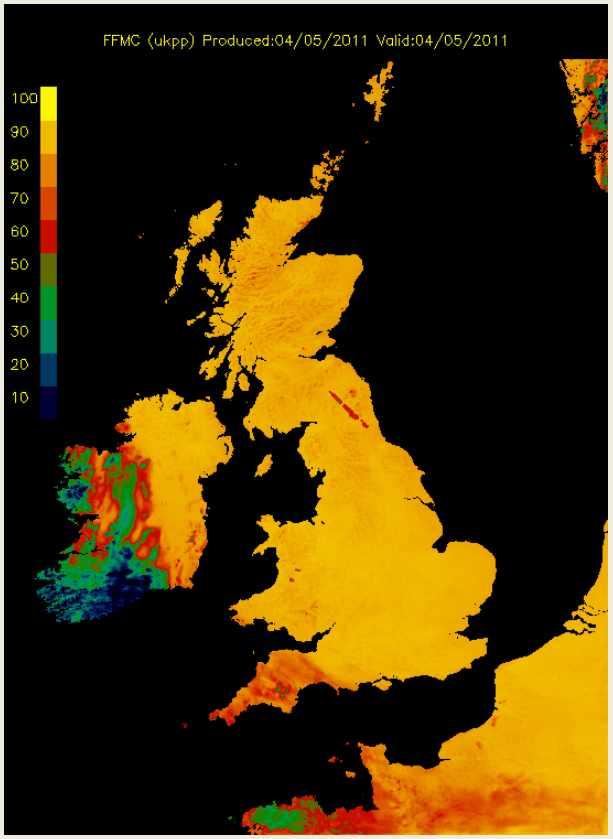
- Increasing trend to need to have everything written down – appropriate?
- Might be doing 20 - 30 fires in a day
- Prescriptions - potentially stifling bureaucracy!
- Codes of practice can be more flexible and allow for dynamic decision making

Prevention & preparedness
- Fire Danger (CFFDRS) 4th May 2011

Duff Moisture Code (DMC)



Fine Fuel Moisture Code (FFMC)



Education & training

- Need an understanding of the ecology and fuels of the area to be burned
- Need an understanding of fire behaviour of the relevant fuel types
- Need an understanding of the other factors that affect fire bahaviour

Training system

- Difficulty of training and certificating existing workforce
- Value of revised good practice guides, education and demonstration days
- Employers must set competency standards
- Voluntary systems work best

Conclusions

- Smouldering wildfires could release massive stocks of carbon held in blanket bogs in the UK
- Systematic preventative burning by land managers could protect existing carbon stocks, especially in high fire risk areas
- As burning can be done for an economic reason a policy change rather than loads of money is required
- Good practise guides preferred over licences / fire prescriptions
- Voluntary education and training rather than compulsory certification more likely to generate change. This is where the money should be spent!
- Research needed to calibrate Fire Danger Rating system

Thank you