

Paper presented at:

# Creating a New Prosperity: Fresh Approaches to Ecosystem Services and Human Well-being

Royal Geographical Society, London,  
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# FIRES

## Fire Interdisciplinary Research on Ecosystem Services

*Fire and climate change in  
UK moorlands and heathlands*

**Julia McMorrow, Coordinator,  
University of Manchester**

**A series of four transdisciplinary  
seminars on the effects of moorland  
and heathland wildfires and managed  
fires on ecosystem services.**



**SCOTTISH  
NATURAL  
HERITAGE**





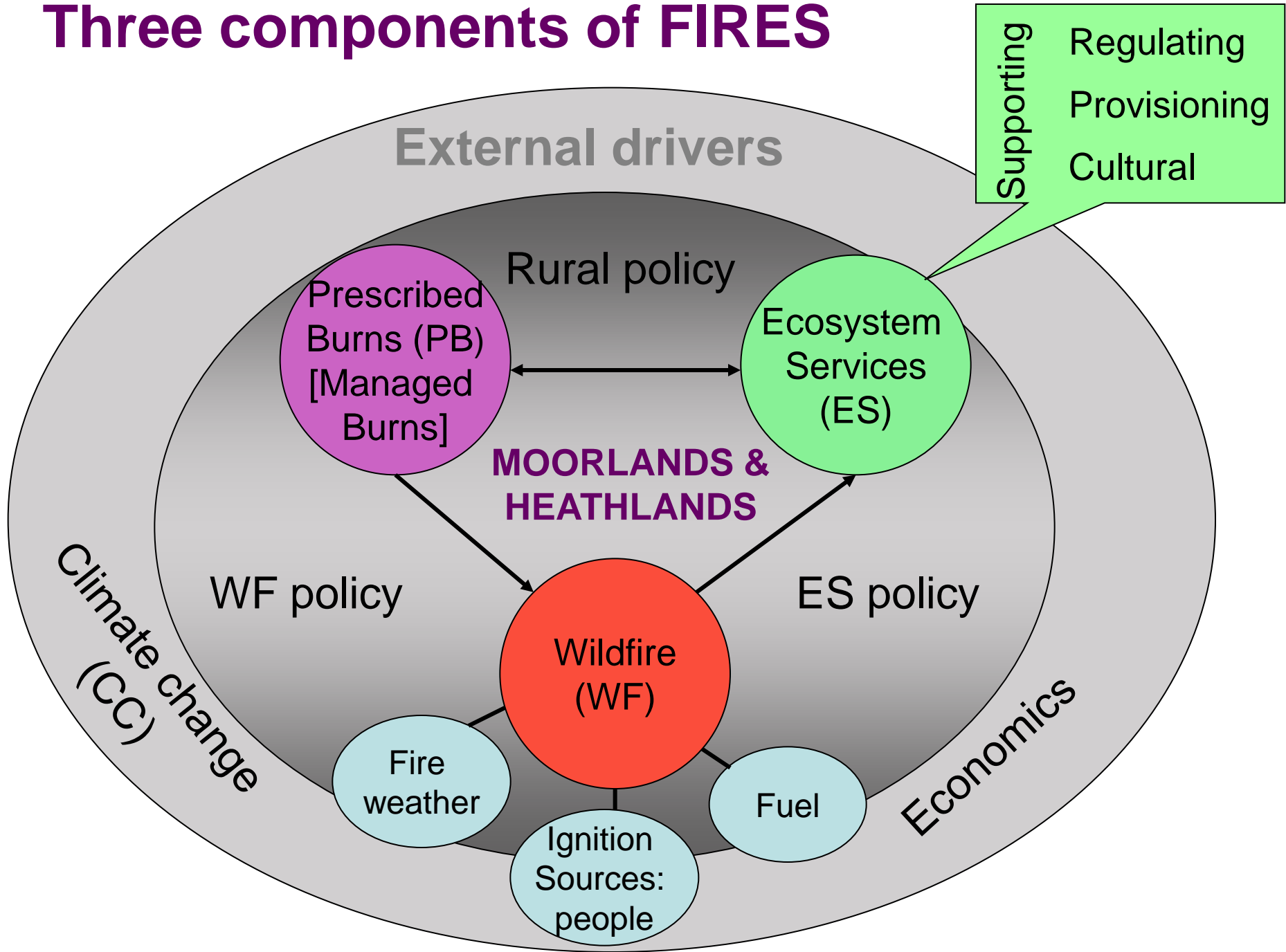
# FIRES programme

1. The role of managed fire in ecosystem services of UK moorlands and heathlands  
*Edinburgh, 31 March – 1 April 2008*
2. The impact of wildfire on ecosystem services: relationships between wildfire, climate and people.  
Manchester, 24 June 2008
3. Forecasting and modelling wildfire risk in UK moorlands and heathlands  
*Manchester, 31 March – 1 April 2009*
4. Economic impacts of wildfires and adaptive land management to reduce wildfire risk and impact  
*Peak District National Park, 13-14 May 2009*

# Participants

- **Strong stakeholder participation** >60% of the 132 participants were stakeholders. Funding from SNH, GWCT & PDNP enabled 190 places and 6 international speakers
- **Cross-sector** Fire & Rescue Services, land managers, conservation, water companies, National Parks, forestry, etc
- **Capacity building** 20 early career participants
- **60% env science**, but discipline and sector balance in steering group:
  - 2 env scientists: Julia McMorrow (Manchester, Coordinator);  
Colin Legg (Edinburgh, Co-I)
  - 3 social scientists: Jonathan Ayles (Manchester, Co-I);  
Claire Quinn & Klaus Hubacek, Leeds RELU)
  - 3 non-academic stakeholders
    - Jon Walker, Moors for the Future Partnership (Co-I);
    - Simon Thorp /Marion Thomson, Heather Trust.
    - Mark Jones, Chief Fire Officers' Assoc, Chair of English Wildfire Forum

# Three components of FIRES



# Wildfires

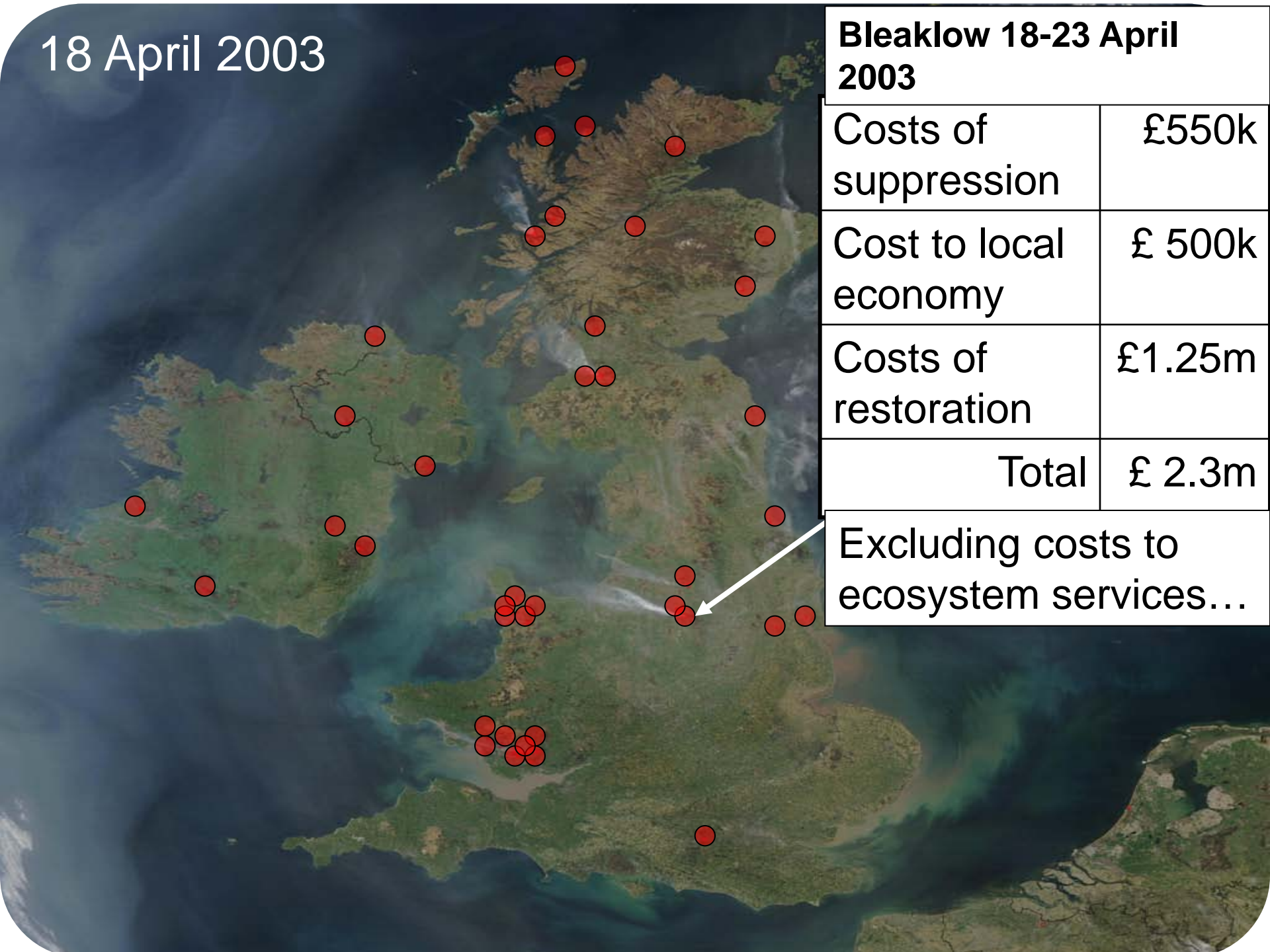
- The UK has a wildfire problem; ~1600 grassland fires in a normal year in England & Wales (1996-2004), and over 4000 in droughts years 1995, 2003.
- Poorly recorded. Improved UK-wide standard of recording needed, especially location and cause.
- WF on regional risk registers, but not NERC's natural hazards list, nor Defra's ES impact grid under 'protection against natural hazard'.
- Yet large, long-lived and potentially damaging to all ES and human well-being, especially peat fires

18 April 2003

**Bleaklow 18-23 April 2003**

Costs of suppression	£550k
Cost to local economy	£ 500k
Costs of restoration	£1.25m
Total	£ 2.3m

Excluding costs to ecosystem services...



- Vegetation fires difficult to tackle, especially on remote moorlands. Gorse fires very intense.
- Challenge resilience of FRS to deal with other incidents
- FRS need to be better equipped & trained for vegetation fires.
- Bias to structural fires because poor evidence base for vegetation fires and relatively low priority of environment:  
1 Life, 2 'Property', 3 Environment  
→ **Need for costing ES.**



# Prescribed burning

- **Controversies** surrounding burning heather for grouse and grass for grazing, highlighted in FIRES, eg,
  - conflicts with biodiversity, clean water & carbon → Legal burn season and Heather and Grass Burning Code.
  - Properly managed ‘cool burns’ maintain the character of moors and heaths. Should target ecosystem be heather & *Molinia*?

## Relationship to WF

- PB and wildfire are intrinsically linked. Prescribed burning can reduce wildfire risk by managing fuel loads.
- But PB can become WF. Escaped PB are thought to be major cause of WF in Scotland, but recreation and arson in England and Wales ∴ Need to appreciate *spatial variation* of fire management and WF.

# Impacts on ES depend on fire regime

- Research has focussed on single fires. Need to study fire regime (frequency, timing, intensity, size)
- Not all fires are the same – ‘cool’/’mildfires’ less damaging than ‘hot’/intense fires, which can burn into peat, usually in summer.
- Poor understanding of the effects of intense fires on biodiversity, including reptiles and invertebrates
- Need better understanding of:
  - Optimum fire regimes to manage different ES, and how to prioritise between them.
  - Drivers of change in fire regime

**Changing rural economy creates a bigger risk of severe WF than climate change. Critical need to manage fuel load in a publically acceptable way which minimises risks to other ES.**

# WF as a semi-natural hazard: the role of people

WF would not occur in UK without people to provide ignition sources, accidentally or by arson.

∴ Risk of WF occurrence is a function of biophysical hazard of **fuel**, primed by **weather** + human-induced hazard of **ignition**.

Expanding settlements and more visitors → ↑ density of ignition sources , ↑ frequency of WF ∴ Access land closures.

Research needed on **public attitudes to fire** (to improve WF awareness campaigns and arson reduction), and **socially acceptable strategies** to manage WF risk



# 'WF natural hazard regulation' as an ES

## Impact pathway / adaptive management exercise

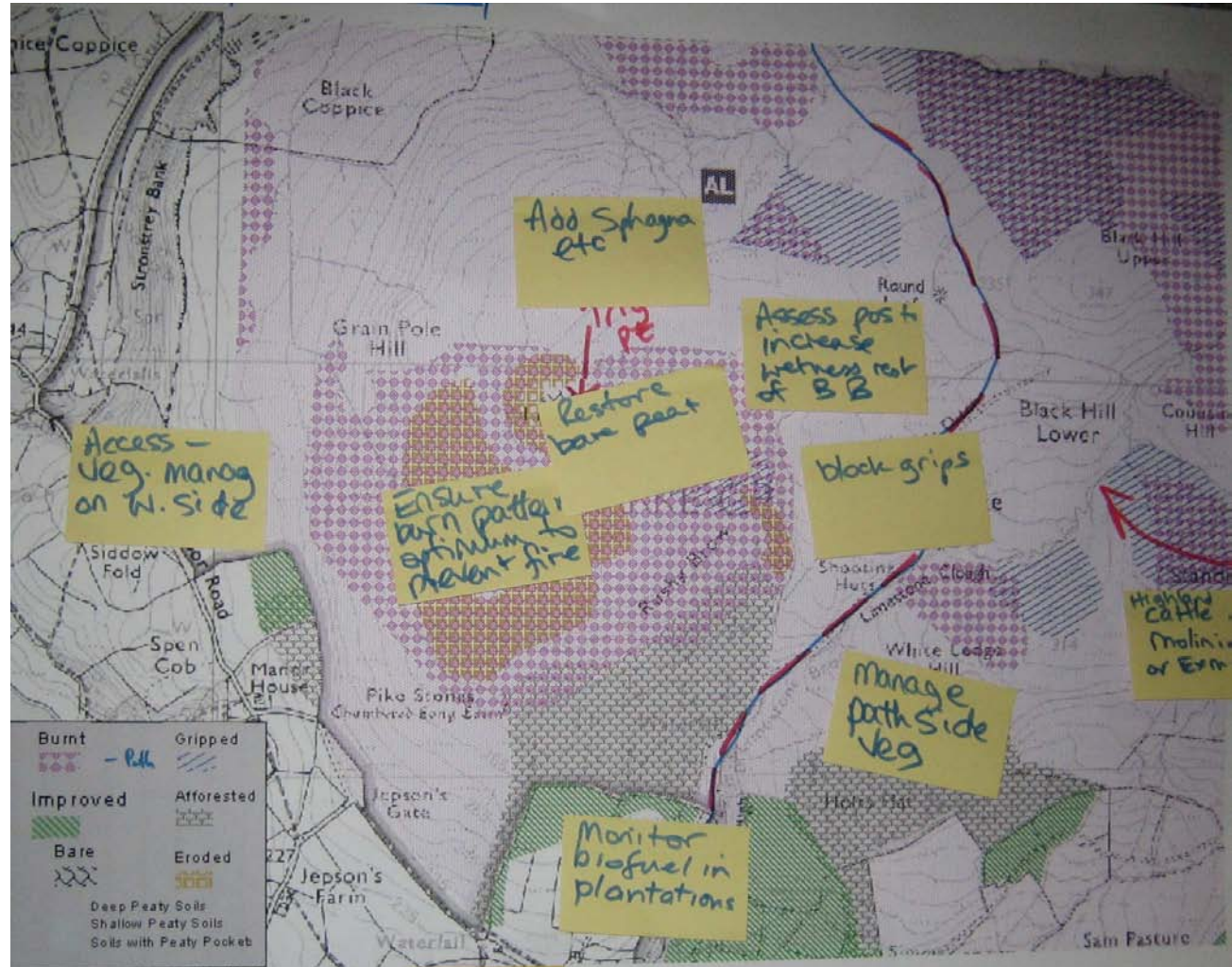
### Stage 1

Policy change =  
mitigate WF risk  
by fuel reduction  
e.g.

Prescribed  
burns, grazing,  
cutting

### Stage 2

Impacts on  
biodiversity,  
timber  
production,  
recreation and  
other ES



Information derived from:  
ATMAPP Vector Soil Association (NSRI)  
AP Habitat Inventory for blanket bog (NEI)  
Geological Survey (GOS)

ENGLAND

NATURAL  
ENGLAND

# Stage 3

- Include 'WF hazard regulation' as an ES on Defra grid:
  - WF frequency
  - WF intensity ('severity')
- Business as usual
- Changes to other ES (+/-/=/?)  
if policy of managing fuel load:
  - +ve for ↓ risk of severe WF
  - +ve for grazing,
  - ve/? for carbon sequestration,
  - ve for biodiversity (if PB)
  - +ve for access
- Need a mix of strategies

VITAL →

Prob of SEVERE FIRE ?

SEVERE FIRE AREA

BUSINESS AS USUAL

↑ SUMMER PRACT  
+ ↓ AIR QUALITY

Checklist of ecosystem services for consideration under different wildfire management scenarios

Category	Fuel Management	Risk reduction	Increase resilience	Business as Usual	
<b>Provisioning services</b>					
Food (livestock)	+			0	--
Fibre (woodland)	+			0	--
Renewable energy provision				0	--
Fresh water	+			0	-
<b>Regulating services</b>					
Air-quality regulation	+			-	-
Climate regulation-Carbon storage	-/0	?		-	--
Climate regulation-GHG sequestration	-/0	?		0	-
Erosion regulation	+			0	--
Water purification	+			0	--
Pest/ disease regulation	+			1	+
Pollination	+			0	-
Natural hazard regulation:					
- wild fires risk	++			++	++
- wild fires intensity	++			1	--
- flood mitigation/ water runoff	+			+	--
<b>Cultural services</b>					
Cultural heritage	+			1	(-)
Recreation & tourism	++			1	(-)
Field sports	++			1	--
Aesthetic value	+			0	--
Biodiversity conservation	++			?	--
<b>Supporting Services</b>					
Nutrient / water cycling, soil formation	+/0			0	-
<b>Economics</b>					
Local economy	++			1	0
National economy	0			0	0
Wildfire mgmt costs	+			0	0
Public Health/ Wellbeing	+			0	0
<b>NGT FIRE COSTS</b>	-			0	0

**Score and assessment of effect**

++ Potential significant positive effect      + Potential positive effect      0 Negligible effect  
 - Potential negative effect                      - Potential significant negative effect      ? Gaps in evidence

Source: adapted after Defra (2007) An introductory guide to valuing ecosystem services, Table 3.1, p24.

# Key policy messages 1

- UK has a growing & costly WF problem: episodic, spatially variable fire regime and causes.
- Not recognised as a (semi-)natural hazard in UK because so far life and ‘property’ rarely damaged and poor recording
- Need good **UK-wide evidence base**
- Need **costing** of moorland and heath ES as property assets so suppression costs can be balanced against avoided costs to ES
- WF affects all ES so requires managing, ∴ include WF reduction as an ES on Defra grid and do **full impact path analysis**.
- Impacts of PB & WF on ES depend on baseline, timescale and fire regime. Need research optimum PB and WF **fire regime** for each ES under changing climate and rural economy.

# Key policy messages 2

- Fuel loads thought to be dangerously high. Monitoring required. Changes in rural economy are as important as climate change. The 2 interact.
- People cause WF; need better understanding of attitudes to fire
- Balanced prevention strategy addressing the 3 conditions for fire -- *fuel* (reduce fuel load and continuity); *weather* (↑ ecosystem resilience to droughts; fire weather index); *ignition source* (restrict access, weather-dependent PB).
- Improve fire-fighting efficiency but avoid over-suppression which increases fire severity.
- Better training and technical tools; improved MOFSI, risk mapping.
- Promote partnership working – Local Fire Groups, EWF & SWF
- Continued KE, especially on fire behaviour and fire regime.

# What next?

- Response on Muirburn to Scottish Government's WANE Bill consultation
- Research and KE grant applications:
  - ☹ NERC KE;
  - ☹ NERC small grant;
  - ? RELU 4 Adapting to rural fire risk;
  - ? LWEC
- Journal articles
- Articles for stakeholder magazines
- **Policy brief**



## Contact

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