The UK wildfire research landscape revisited

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Knowledge for Wildfire:

improving management of UK wildfire through knowledge exchange

www.kfwf.org.uk

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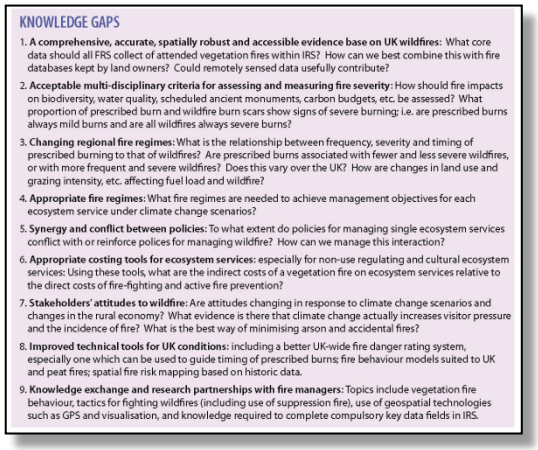
NERC SCIENCE OF THE ENVIRONMENT

Aim and structure

To provide an overview of existing knowledge on the 'research landscape' for UK vegetation fire:

1. **Research topics**; Knowledge for Wildfire (KfWf) 2013 survey and 2015 Researcher Database – Who does what?
2. **Knowledge gaps;** FIRES seminar series policy brief (2010) – are the gaps still current?
3. **Research agenda**; Royal Society Interaction of Fire & Mankind workshop – broadening the consultation

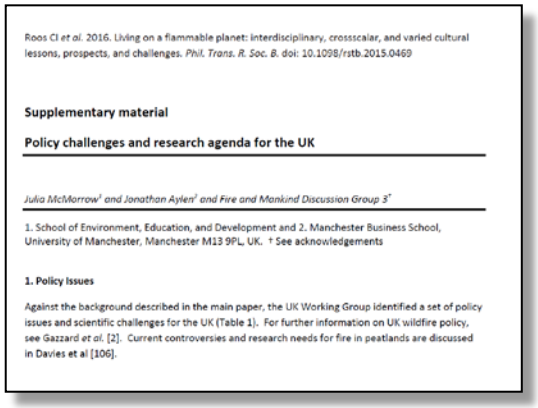
http://www.kfwf.org.uk/researchersdatabase/



KNOWLEDGE GAPS

1. **A comprehensive, accurate, spatially robust and accessible evidence base on UK wildfires:** What core data should all FRS collect of attended vegetation fires within IRS? How can we best combine this with fire databases kept by land owners? Could remotely sensed data usefully contribute?
2. **Acceptable multi-disciplinary criteria for assessing and measuring fire severity:** How should fire impacts on biodiversity, water quality, scheduled ancient monuments, carbon budgets, etc. be assessed? What proportion of prescribed burn and wildfire burn scars show signs of severe burning; i.e. are prescribed burns always mild burns and are all wildfires always severe burns?
3. **Changing regional fire regimes:** What is the relationship between frequency, severity and timing of prescribed burning to that of wildfires? Are prescribed burns associated with fewer and less severe wildfires, or with more frequent and severe wildfires? Does this vary over the UK? How are changes in land use and grazing intensity, etc. affecting fuel load and wildfire?
4. **Appropriate fire regimes:** What fire regimes are needed to achieve management objectives for each ecosystem service under climate change scenarios?
5. **Synergy and conflict between policies:** To what extent do policies for managing single ecosystem services conflict with or reinforce polices for managing wildfire? How can we manage this interaction?
6. **Appropriate costing tools for ecosystem services:** especially for non-use regulating and cultural ecosystem services: Using these tools, what are the indirect costs of a vegetation fire on ecosystem services relative to the direct costs of fire-fighting and active fire prevention?
7. **Stakeholders' attitudes to wildfire:** Are attitudes changing in response to climate change scenarios and changes in the rural economy? What evidence is there that climate change actually increases visitor pressure and the incidence of fire? What is the best way of minimising arson and accidental fires?
8. **Improved technical tools for UK conditions:** including a better UK-wide fire danger rating system, especially one which can be used to guide timing of prescribed burns; fire behaviour models suited to UK and peat fires; spatial fire risk mapping based on historic data.
9. **Knowledge exchange and research partnerships with fire managers:** Topics include vegetation fire behaviour, tactics for fighting wildfires (including use of suppression fire), use of geospatial technologies such as GPS and visualisation, and knowledge required to complete compulsory key data fields in IRS.

http://www.fires-seminars.org.uk/downloads/FIRES_Policy_Brief_final.pdf



Roos CI *et al.* 2016. Living on a flammable planet: interdisciplinary, crossscalar, and varied cultural lessons, prospects, and challenges. *Phil. Trans. R. Soc. B.* doi: 10.1098/rstb.2015.0469

Supplementary material

Policy challenges and research agenda for the UK

Julia McMorrow[1] and Jonathan Aylen[2] and Fire and Mankind Discussion Group 3[*]

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1. Policy Issues

Against the background described in the main paper, the UK Working Group identified a set of policy issues and scientific challenges for the UK (Table 1). For further information on UK wildfire policy, see Gazzard *et al.* [2]. Current controversies and research needs for fire in peatlands are discussed in Davies et al [106].

http://rstb.royalsocietypublishing.org/content/roypb/suppl/2016/05/19/rstb.2015.0469.DC2/rstb20150469supp2.pdf

KfWf
Improving management of UK wildfire through knowledge exchange

Knowledge for Wildfire surveys

- NERC Knowledge Exchange Fellowship, Oct 2012 – 30 Sep 2016 (31 Mar 2017)
- England and Wales Wildfire Forum as primary stakeholder body
- Aimed to facilitate knowledge exchange between NERC vegetation fire researchers, wildfire practitioners and policy-makers
- Two surveys of the vegetation fire research landscape:
  - 22 respondents from 11 universities, NERC and EPSRC focus (McMorrow & Dold, 2013)
  - KfWf database of UK-based researchers, NERC focus (Tantanasi & McMorrow, 2015)
- Both built on FIRES seminar series policy brief

KfWf
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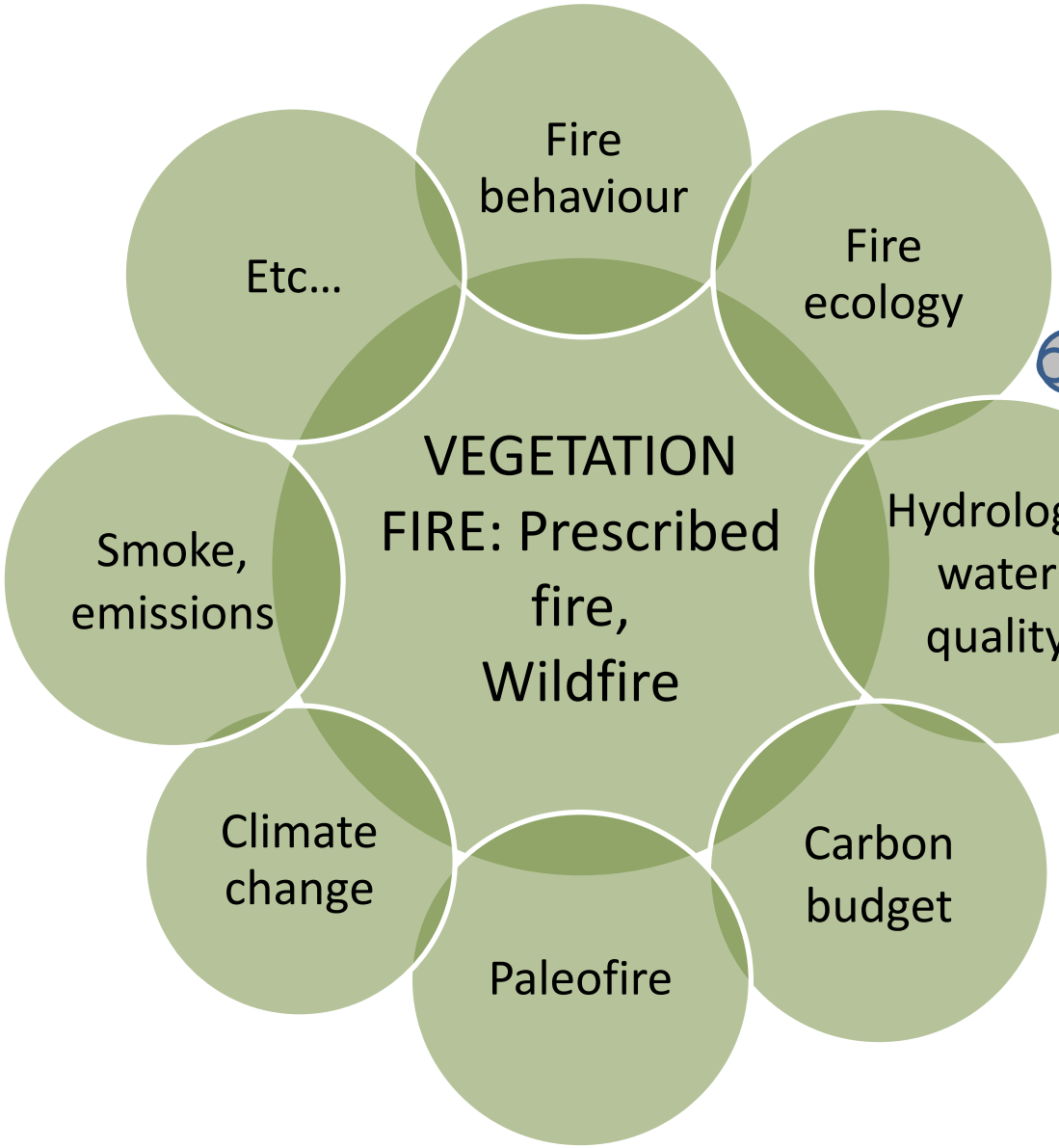
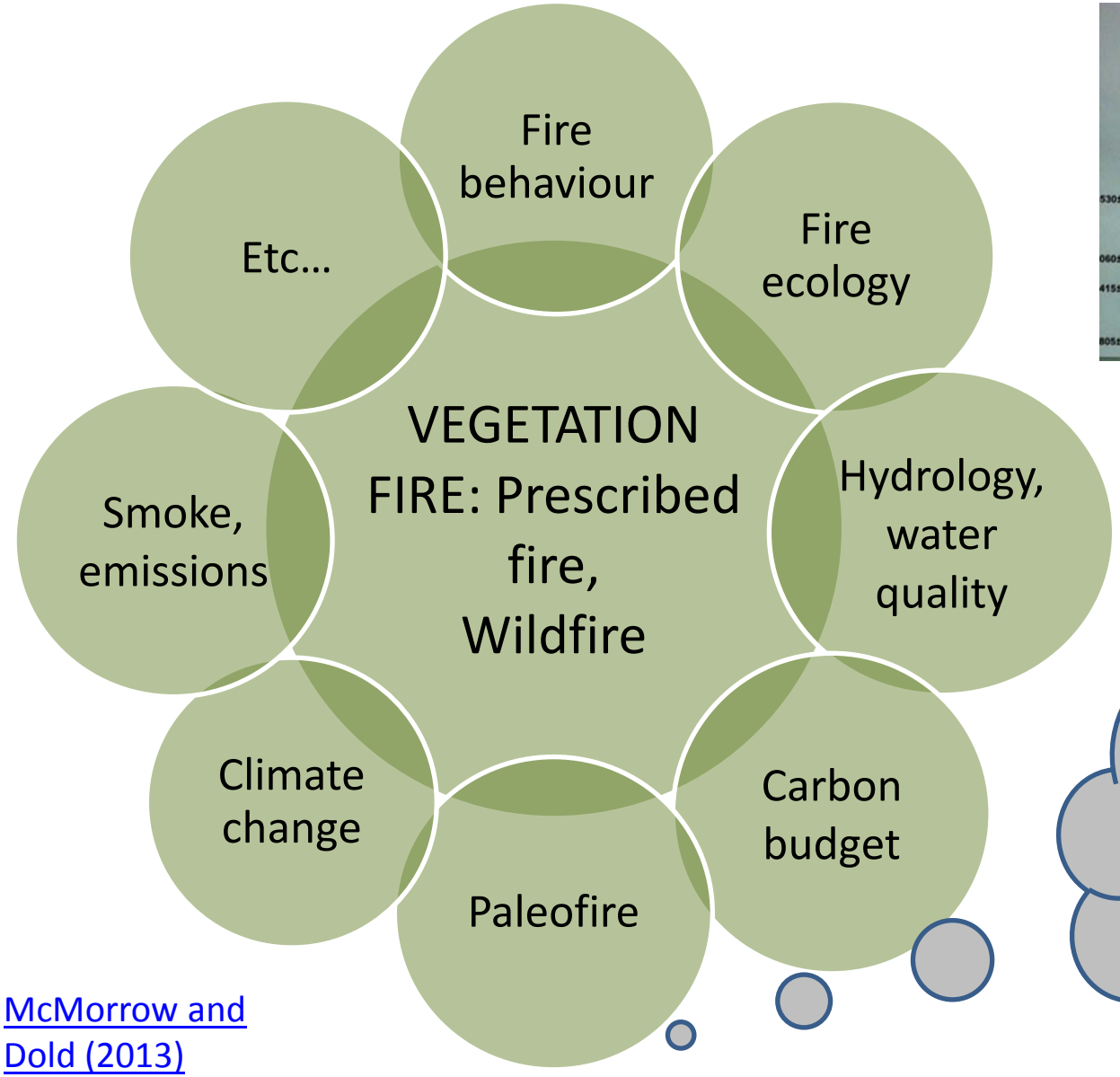
NERC/EPSRC fire researchers topics; 2013 survey

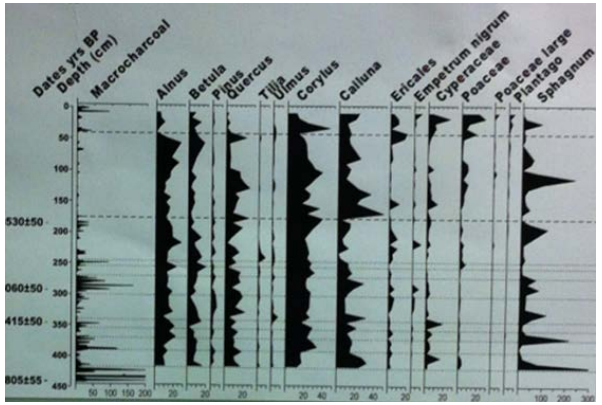


Key theme 1
Environmental impacts of prescribed burning on heather moorland

McMorrow and Dold (2013) The UK wildfire research landscape. IFE Re-13 conference, https://www.escholar.manchester.ac.uk/uk-ac-man-scw:237298

NERC/EPSRC fire researchers topics





Pollen and charcoal in peat cores, sediments & rocks. Burn scars in tree rings

Key theme 2
Past relationships between fire, climate, vegetation and humans

McMorrow and Dold (2013)

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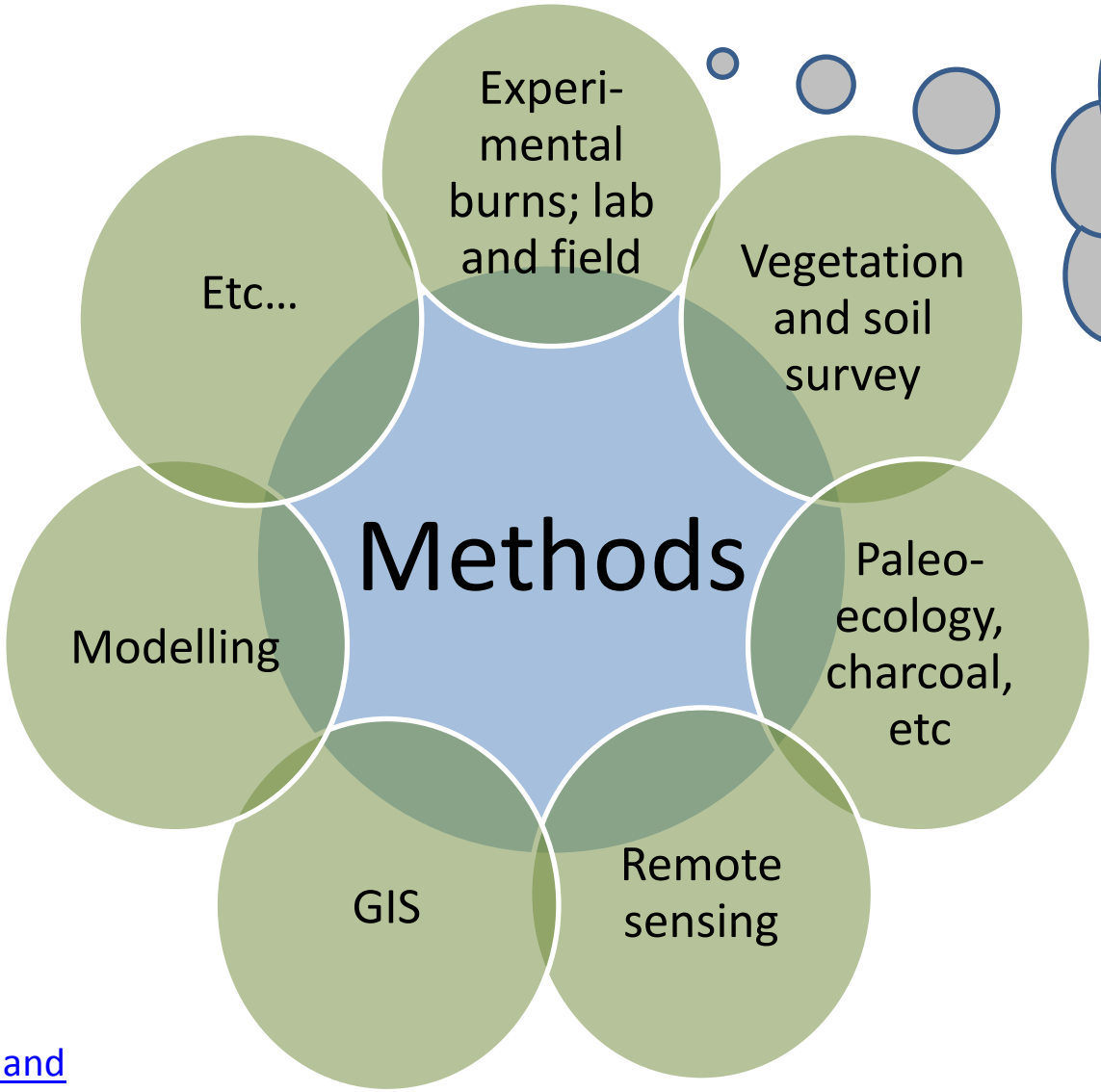
How vegetation fire is studied (2013)



Key theme 3
Combustion of vegetation and peat. Fire behaviour

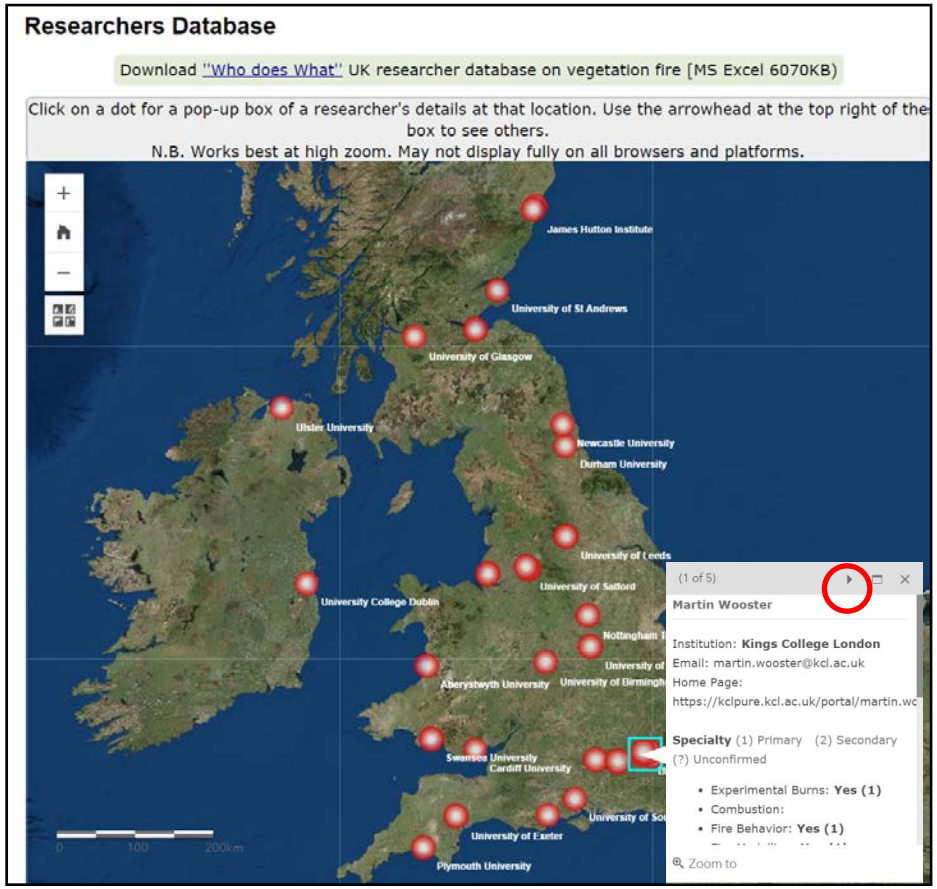
McMorrow and Dold (2013)

KfWf Researcher Database

http://www.kfwf.org.uk/researchersdatabase/

Tantanasi & McMorrow, (2015)

- 'Who does What' online resource of UK-based vegetation fire researchers
- Excel sheet and interactive map
- Developed in summer 2015 with NERC funding
- Data sources: (i) public domain data e.g. *Envirobase Environmental Research Database* developed by Living with Environmental Change (LWEC); (ii) feedback from England and Wales Wildfire Forum; (iii) email consultation with researchers



Interactive map with a pop-up window of researchers topics and contact details. Arrowhead at top of pop-up window lists other researchers at that location

'Who does What' UK researcher database on vegetation fire by Knowledge for V

Note: NERC IAA-funded project. Listings in black indicate the researcher has provided their details. Red questionmark indicates unconf

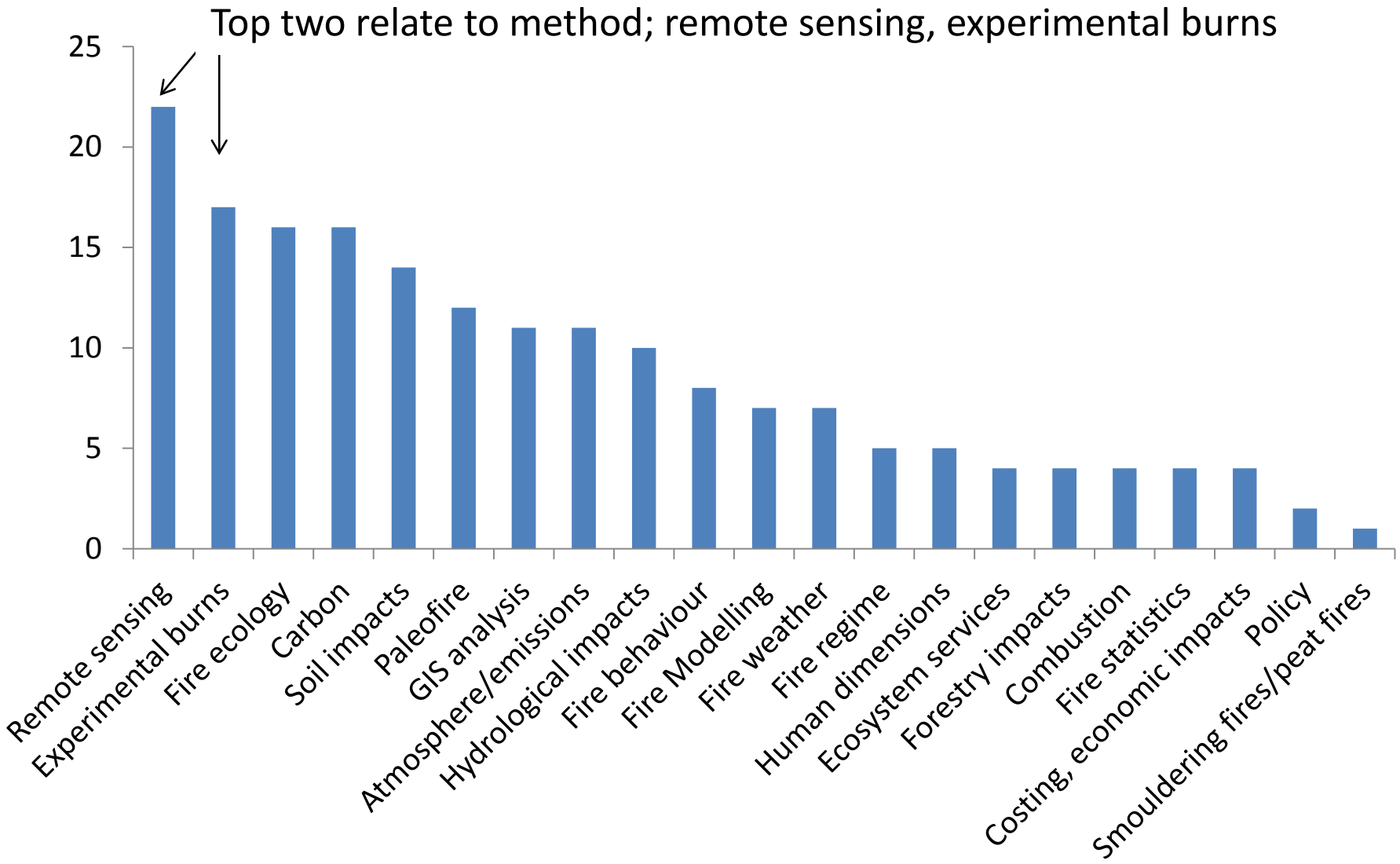
RESEARCHER CONTACT DETAILS				RESEARCH TOPICS: 'Yes [1]' indicates a mai				
Researcher's name	University	University/Institution email	Personal page on Institution's website	Experimental burns	Combustion	Fire behaviour	Fire Modelling	Fire weather
Mark de Jong								Yes (1)
Ronan Paugam				Yes (1)			Yes (1)	
Thomas Smith				Yes (1)		Yes (1)	Yes (1)	Yes (2)
Martin Wooster				Yes (1)		Yes (1)	Yes (1)	Yes (2)

- **Contact details,** 73 researchers
- **Research topics**: primary (1), secondary (2), Unconfirmed (?)
- **Projects:** Envirobase, other

http://www.kfwf.org.uk/_assets/documents/researchers/Researchers_Database_09102015.xls

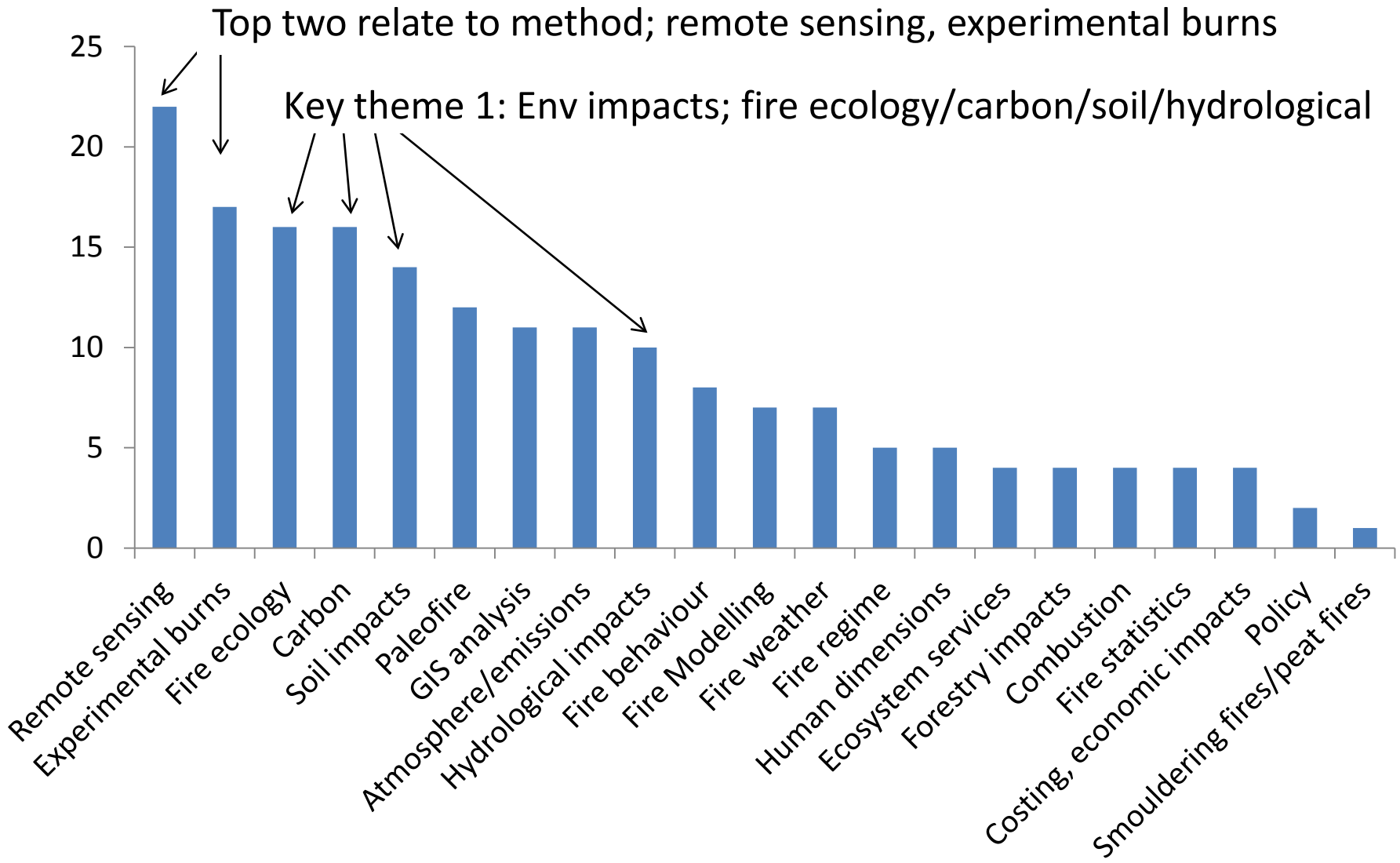
KfWf researcher database 2015

Primary interests, n = 184



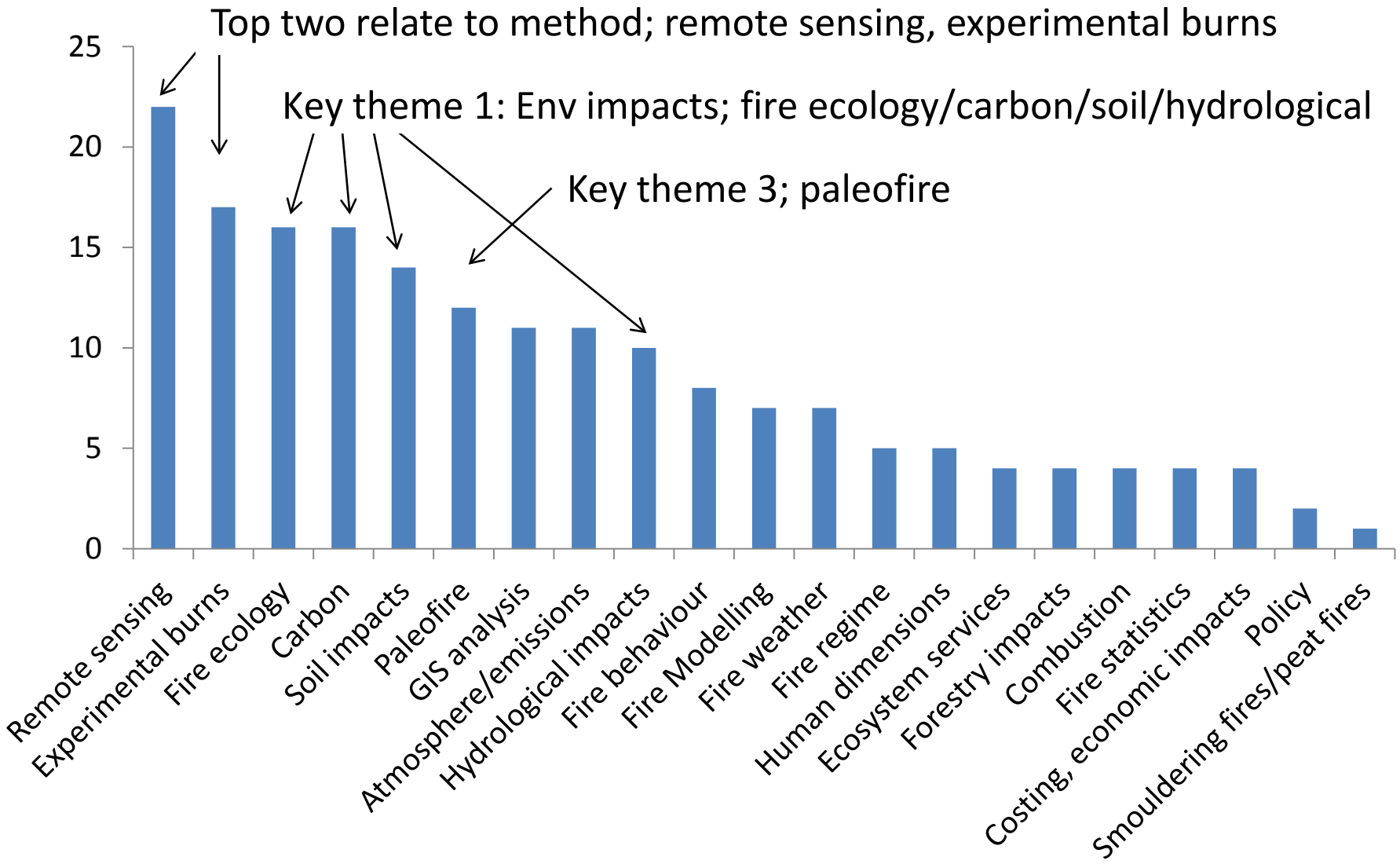
KfWf researcher database 2015

Primary interests, n = 184



KfWf researcher database 2015

Primary interests, n = 184



KfWf researcher database 2015

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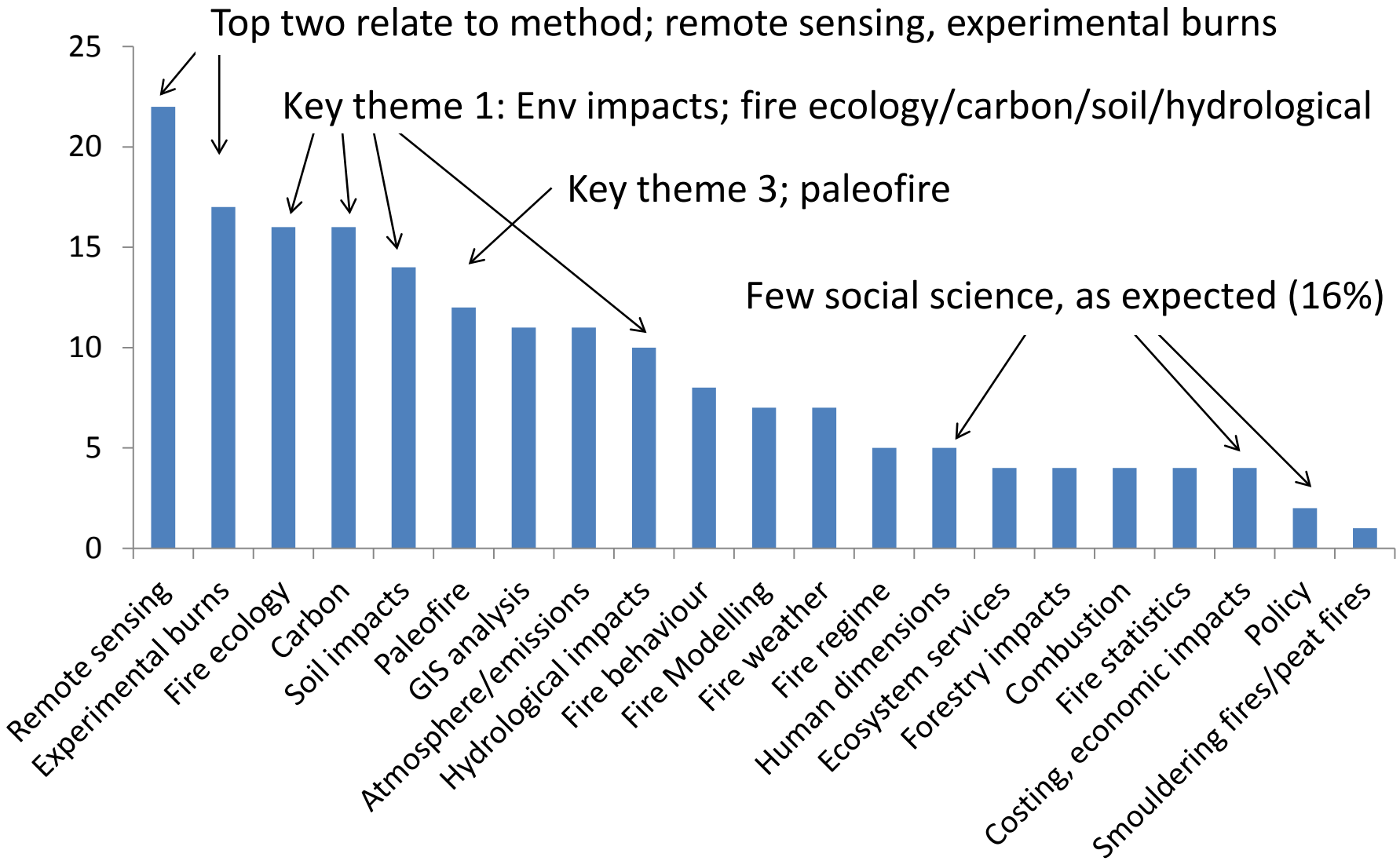
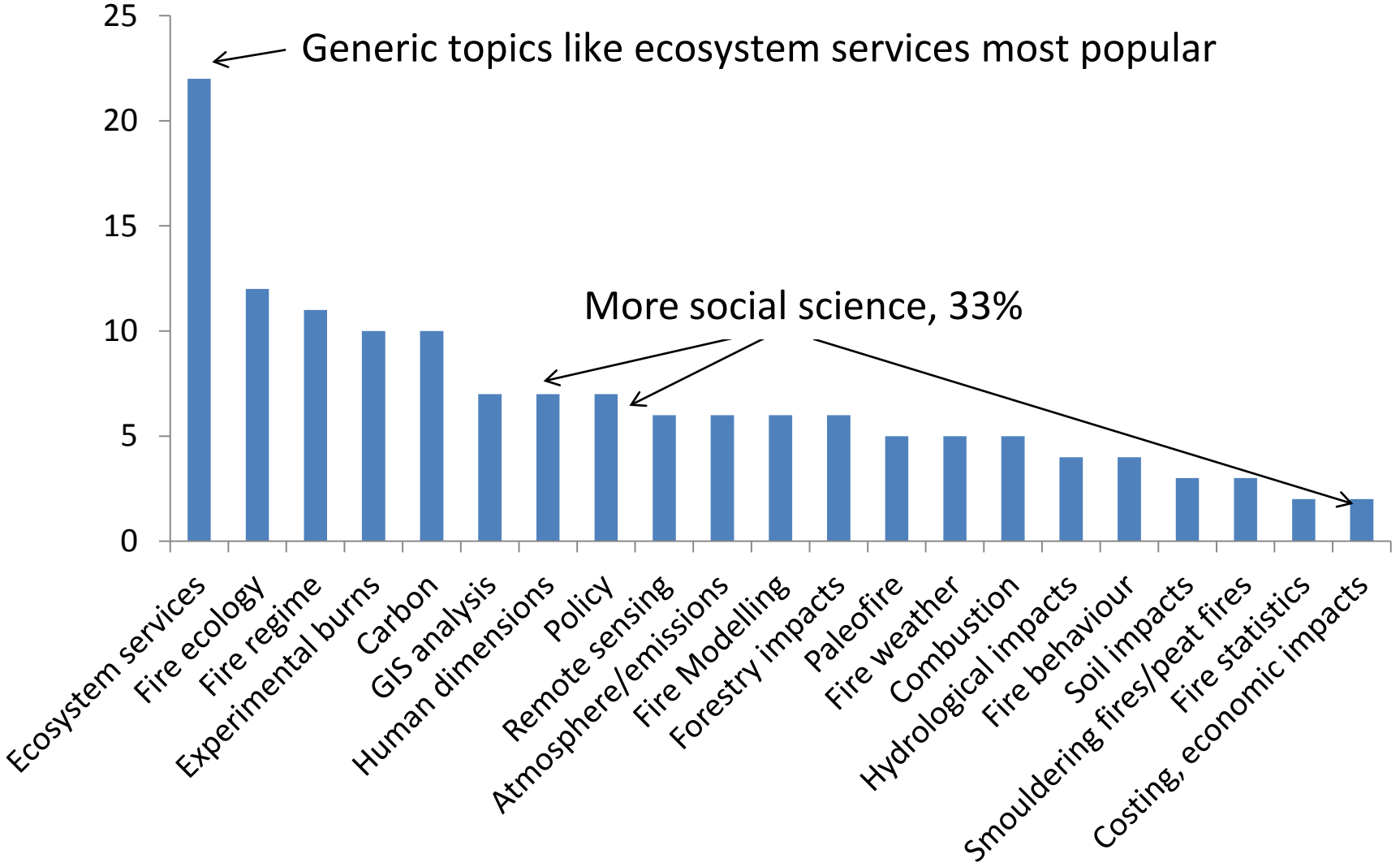


KfWf researcher database 2015

Secondary interests, n = 143



Caveats to KfWf reseacher database

- Snap shot, 9 Oct 2015
- Biased to environmental research to reflect NERC remit; e.g. *Envirobase* of publically funded environmental research
- Topic list influences results:
  - Incorporated feedback from researchers & EWWF
  - Mixture of topics and methods
  - Final list was a comprise between researchers and end-users; generalisations were required but also some overlap
  - Our perceptions of scope and importance differ.

Knowledge gaps: FIRES seminar series policy brief (2010)

1. **A comprehensive, accurate, spatially robust and accessible evidence base on UK wildfires**: What core data should all FRS collect on attended vegetation fires for the Incident Recording System (IRS)? How to combine IRS data with land owners' fire databases? Role for remotely sensed data?
2. **Acceptable multi-disciplinary criteria for assessing and measuring fire severity**: How should fire impacts be assessed? What proportion of prescribed burn and wildfire burn scars have high burn severity?
3. **Changing regional fire regimes**: relationship between frequency, severity and timing of prescribed burning to that of wildfires? Does this vary over the UK? How are changes in land use and grazing intensity, etc. affecting fuel load and wildfire?
4. **Appropriate fire regimes:** What fire regimes are needed to achieve management objectives for each ecosystem service under climate change scenarios?

Knowledge gaps: FIRES seminar series policy brief (2010)

5. **Synergy and conflict between policies:** How do policies for managing single ecosystem services conflict with or reinforce with wildfire management? How can we manage this interaction?
6. **Appropriate costing tools for ecosystem services**: especially regulating and cultural ecosystem services to quantify indirect costs of a vegetation fire on ecosystem services?
7. **Stakeholders' attitudes to wildfire:** changing in response to climate change scenarios and changes in the rural economy? How best to minimise arson and accidental fires?
5. **Improved technical tools for UK conditions:** e.g. a UK-wide fire danger rating system to guide timing of prescribed burns; fire behaviour models suited to UK fires; spatial fire risk mapping.
6. **Knowledge exchange and research partnerships with fire managers:** e.g. vegetation fire behaviour, tactics for fighting wildfires (including use of suppression fire), use of geospatial technologies such as GPS and visualisation, and knowledge required to complete compulsory key data fields in IRS.

Royal Society 'Interaction of Fire & Mankind' workshop outputs

- Discussion meeting, London 14-15 Sep 2015. organised by Andrew Scott, Claire Belcher, Chris Roos and Bill Chaloner. PTRSB special issue
- 16-17 Sep 2015, Chicheley Hall workshop. UK strand one of 3 Roos *et al.* (2015)
- Supplementary material to Roos et al. 2015 'Policy challenges and research agenda for the UK'
  - ***Wildfire policy issues and associated scientific challenges for the UK***
  - ***Proposed scientific research programme for the UK*** at two scales:
    National level:
    - **Improved national risk assessment tools**, e.g. Fire danger rating system; wildfire threat analysis maps (risk of ignition, hazard, national assets at risk)
    - **Rapid scientific response team for wildfire events**: cross-sector, interdisciplinary
    - **Knowledge exchange programme:** 2-way secondments & shadowing; co-produced research; embed findings in operational procedures

Regional & local integrated case studies

- **Relationships between fire characteristics, especially fire severity**, and ecological effects
- **Smoke and emissions**; plume modelling, etc
- **Socio-economic drivers**; understanding local knowledge and use of fire
- **Effects of fire** on health, infrastructure, ecosystem services
- **Spatial risk assessment**; improved recording (fire perimeters); map risk of ignition, fire hazard and values at risk
- **Influencing the policy process**;
  - **Cost-benefit analysis** of key wildfires, e.g. Actual and avoided costs to ecosystem services, social disruption, health, etc.
  - Digestible, high impact **briefing note** evidencing risk and costs, e.g. Parliamentary Office of Science and Technology POST-notes

Conclusion

- Existing key NERC-remit themes: remote sensing, environmental impact (fire ecology, etc.), paleofire
- Growing expertise in technical tools; fire weather, risk mapping
- overlap with EPSRC; fire behaviour, combustion
- A larger range of researchers now engaged, but still too little social science – ERSC engagement required.
- Cross-disciplinary issue, integrated approach required
- Some progress in filling key knowledge gaps but many remain. Today is a good opportunity to jointly agree priorities.

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