Using the Incident Recording System (IRS) to define wildfire in GB

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Context

- Good reporting is needed to evidence wildfire risk.
- Fire Service Incident Recording System (IRS) data is georeferenced so vegetation fires can be mapped (Fig 1) (McMorrow et al., 2011).
- But an agreed method is needed to sub-divide vegetation fires and distinguish wildfire events, which also allows for differences in response strategy between FRS.
- A vegetation fire is a wildfire event if it meets any one of 5 criteria; area, flame length, resources used, duration and threat (Scottish Government, 2013).
- Chief Fire Officers Association (CFOA) Wildfire Group's two proposals use the 3 IRS-based criteria to refine the classification (Table 1).

Aim

To encourage debate on these proposals and mapping methods.

CFOA Wildfire Group proposal 1

Category	Response Vehicles		Duration (hours)	Area (hectares)	Significance
1	≤ 2	OR	≤ 1	n/a	Minor
2	≤ 2	OR	≤ 2	n/a	Low
3	2 or 3	OR	> 2 - < 6	n/a	Moderate
4i	≥ 4	OR	≥ 6 OR ≥ 1		High
5	2 or more category 4 criteria				Very High

CFOA Wildfire Group proposal 2

Category	Response Vehicles		Duration (hours)	Area (hectares)	Significance
1	≤ 2	OR	≤ 2	n/a	Minor
2	≤ 2	OR	≥ 2	n/a	Low
3	3-4	OR	≤ 2	n/a	Moderate
4	3-4	OR	≥ 2	n/a	High
5	> 5		n/a	n/a	Very High

Table 1 Proposed wildfire categorisations
In proposal 1, categories 4 and 5 qualify as 'wildfire events' defined in the Scottish Wildfire Operational Guidance Manual
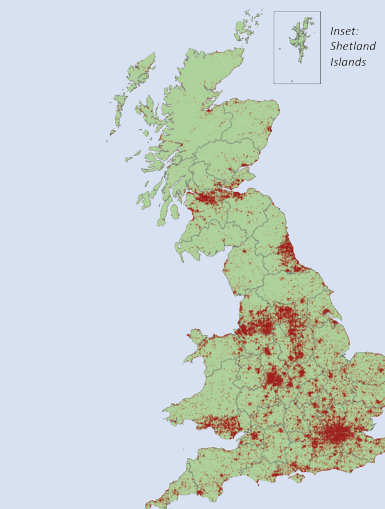

Figure 1: Point map of all GB IRS vegetation fires, FY 2009/10 -2012/13

but vary with how fire incidence is measured; e.g. average number, density per km² or per 10,000 people (Romero-Calcerrada et al., 2008)

- Point mapping by category highlights hotspots to help siting of specialist wildfire resources
- Mapping encourages discussion about reasons for the spatial patterns and how categories could be improved.
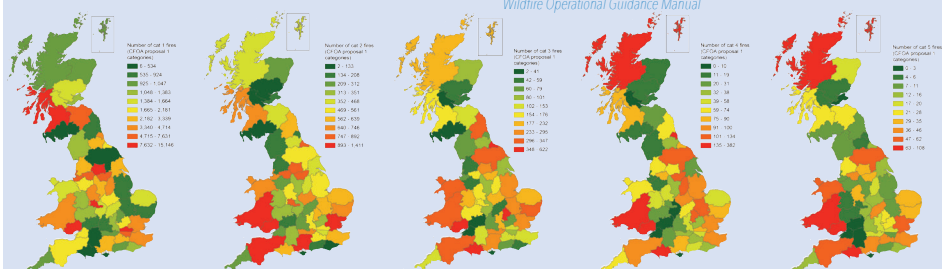

Figure 2 a-e: Chloropleth maps for average number of IRS vegetation fires per Fire Authority in FY 2009/10-2012/13 for each category of CFOA proposal 1
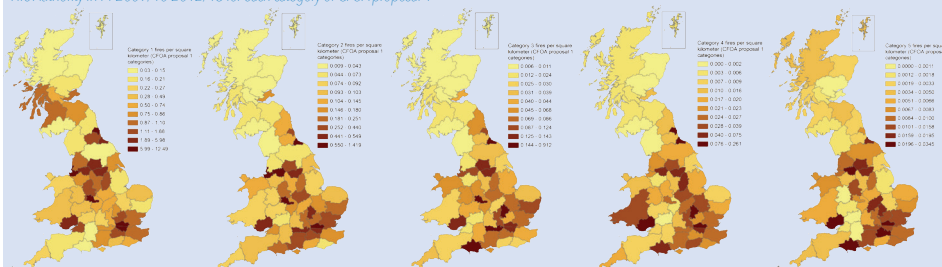

Figure 3 a-e: Chloropleth maps for average number of IRS vegetation fires per Fire Authority in FY 2009/10-2012/13 for each category of CFOA proposal 1

Figure 5: South Wales Police Area; point mapping of IRS vegetation fires FY 2009/10 - 2012/13 using CFOA proposal 1 categories from Table 1.

Method

- CFOA proposed categories (table 1) were applied to 4 financial years of IRS data, 2009/10 – 2012/13.
- Proposal 1 sub-divides the data better so was used to produce point maps and Fire Authority (FA) choropleth maps in ArcGIS.

Results

- Vegetation fires are concentrated in and around urban areas (Figure 1)
- Choropleth maps for average number of fires per FA show how the geography changes with the category (Fig 2a-e), and so the importance of nationally agreed criteria
- Urban areas have more low category and fewer high category fires (Fig 2a, 2e and Fig 4a).
- But the size of a FA area biases the result. Density maps allow for these differences in area (Figs 3a-e, 4b).
- Highlands and Islands FA was in the top 10% for average number of category 4 and 5 fires (Fig 4a) but in the lower 20% for density per km² (Fig 4b)
- Point mapping within a FA shows more local scale shifts in hotspots with category (Fig 5).
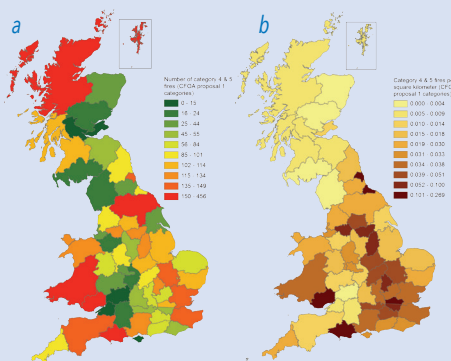

Figure 4: Choropleth maps of (a) the number, and (b) density of IRS category 4 and 5 (Scottish manual wildfires) per Fire Authority, FY 2009/10-2012/13.

Relevance

- IRS data can be used to map the geography of vegetation fire and wildfire at a range of scales, which adds value to the IRS dataset
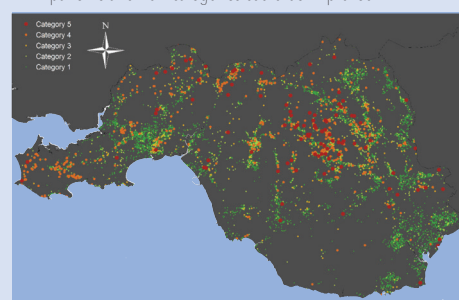- Choropleth maps highlight FAs at greatest risk from wildfire,

Future work using IRS

- Use feedback to improve categories and mapping methods for national reporting
- Map seasonal patterns and inter-annual variability
- Use with other datasets – land cover, industry type, distance from roads, etc. – to explore reasons for patterns and model fire risk at a national scale.

References

McMorrow, J., Walker, J., Karunasaagarar, A., 2011. What the databases say: opportunities and limitations for spatial analysis of UK wildfire. escholar ID: 130106

Scottish Government, 2013. Fire and Rescue Service Wildfire Operational Guidance http://www.scotland.gov.uk/Publications/2013/10/6118 (accessed 5.10.15).

Romero-Calcerrada, R., Novillo, C.J., Millington, J.D.A., Gomez-Jimenez, I., 2008. GIS analysis of spatial patterns of human-caused wildfire ignition risk in the SW of Madrid (Central Spain). Landscape Ecology, 23: 341–354.

Acknowledgements

KfWf
Improving management of UK wildfire through knowledge exchange