Fire Danger Rating System for Scotland Testing and Development

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Firebreak Services Ltd

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Main uses FDRS

- Fire prevention work
- Preparedness activities

Key Outputs FDRS

- Ignition potential (flammability)
- Probable fire behaviour
- “Fire intelligence”

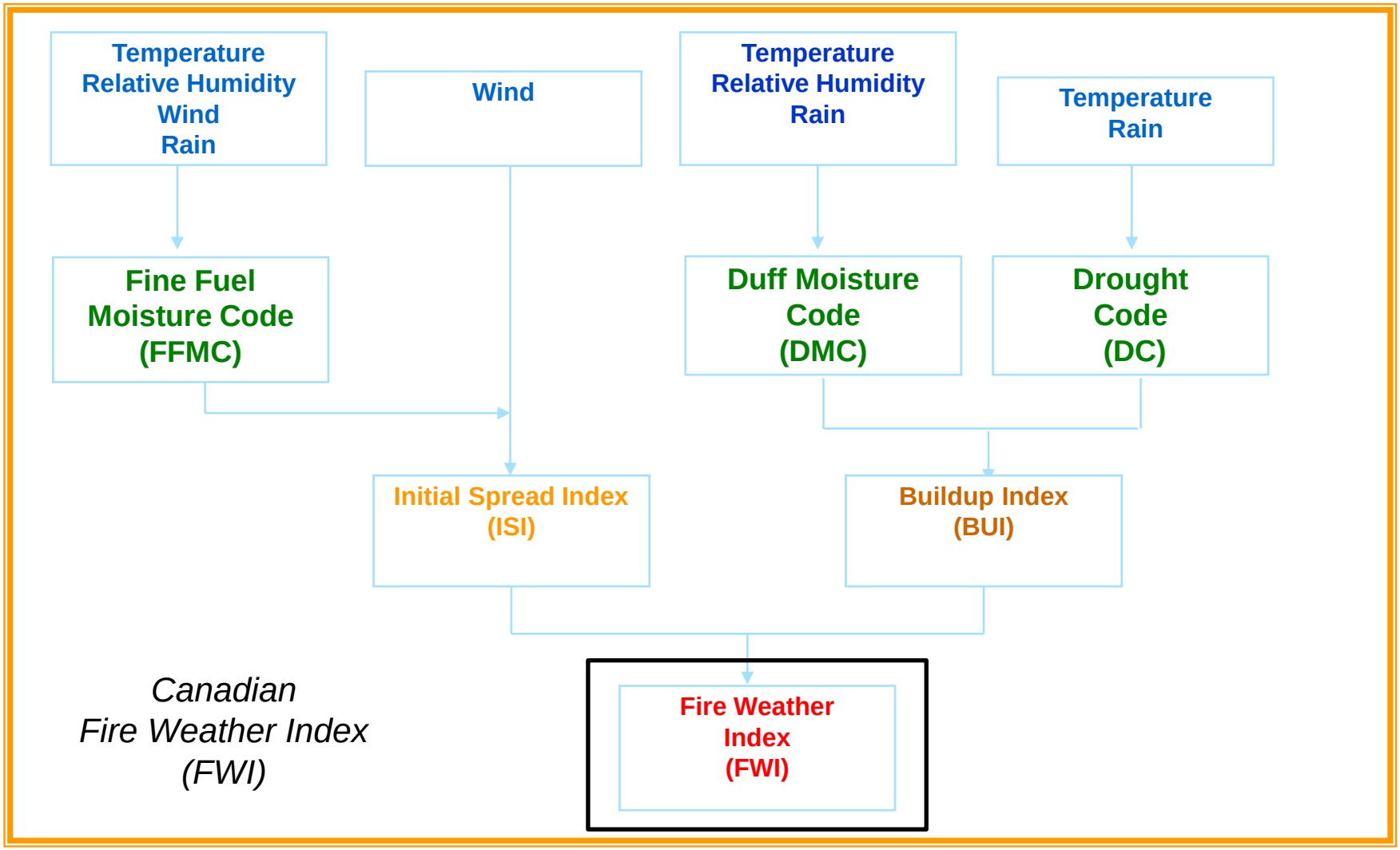
FDRS Inputs & Outputs

- Should be based on weather data that is easy to obtain
- Models that give consistent measures of fire danger over time & space, with similar environmental variables
- Should cover large areas on a broad scale
- That is interpreted by people who understand vegetation fires, before fire danger information is distributed.

Systems active in UK

- 3 active systems that cover some / all UK:
  - Met Office Fire Severity Index (MOFSI)
  - European Forest Fire Information System (EFFIS)
  - Experimental email daily local area feed
- All use Canadian Fire Weather Index (FWI) software….but give different readings

Fire Weather Index (FWI)



Upper limit of resources, FWI / FDRS “extreme” banding

- Priority for our Fire & Rescue Services
  - life, not forest/scrub
- Series of large fires & extended attack
- Lots of smouldering - mopping-up existing fires
- Resources already committed / available:

  …..no reserves left!

Technology transfer & validation

- Understand the Canadian system.
- Understand your own fuel complexes
- Compare index values with your own local knowledge and experience
- Benchmarking with fuel moisture, fire tests, and case studies of wildfires
- Compare fire records with index values

FDR Errors / Validation

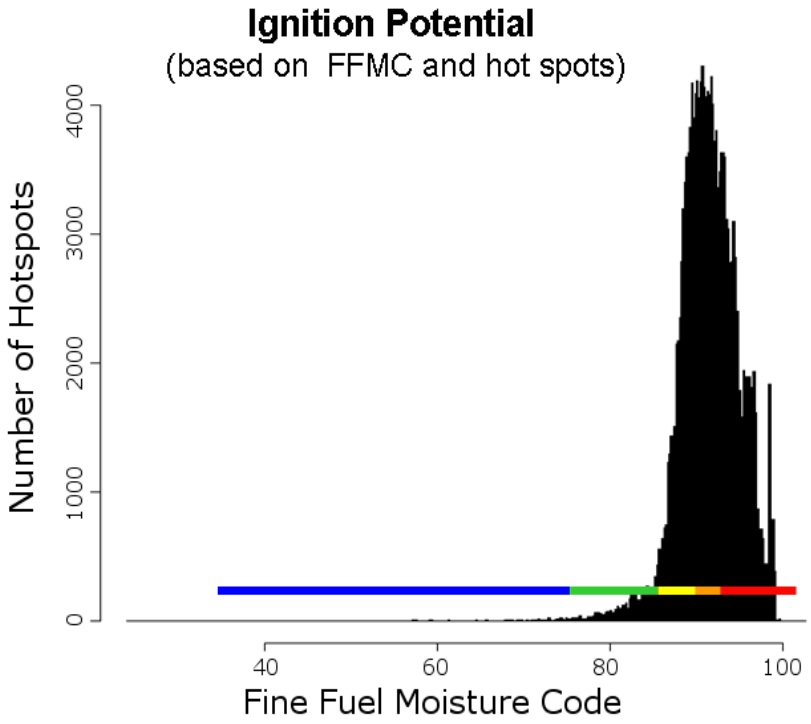
	Danger Rating	
True State of Nature	**Low Danger**	**High Danger**
Low Danger	**No error**	***Type I error— false positive***
High Danger	***Type II error— false negative***	**No error**

Scottish Fire Danger Rating System?

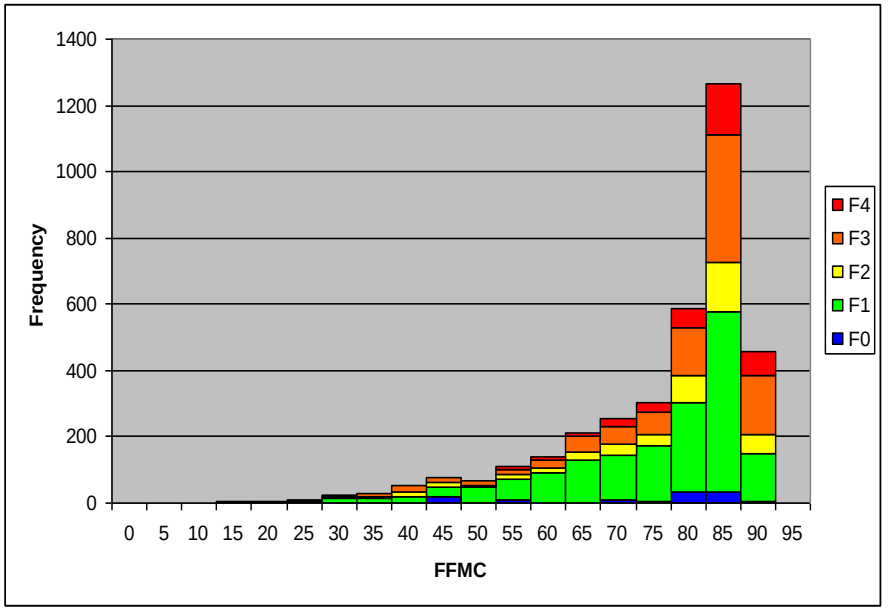
- Met Office Fire Severity Index (currently)
  - Fire index bandings developed to suit Countryside Rights of Way Act 2000 (England & Wales) “exceptional conditions”
  - Not available in Scotland
- Firebeaters research (Edinburgh Uni)
  - MOFSI outputs had limited correlation with fire occurrence or intensity
  - Some correlation with sub-index FFMC

Fine Fuel Moisture Code international comparisons

Global ignitions



Ignitions Scotland (Firebeaters research)



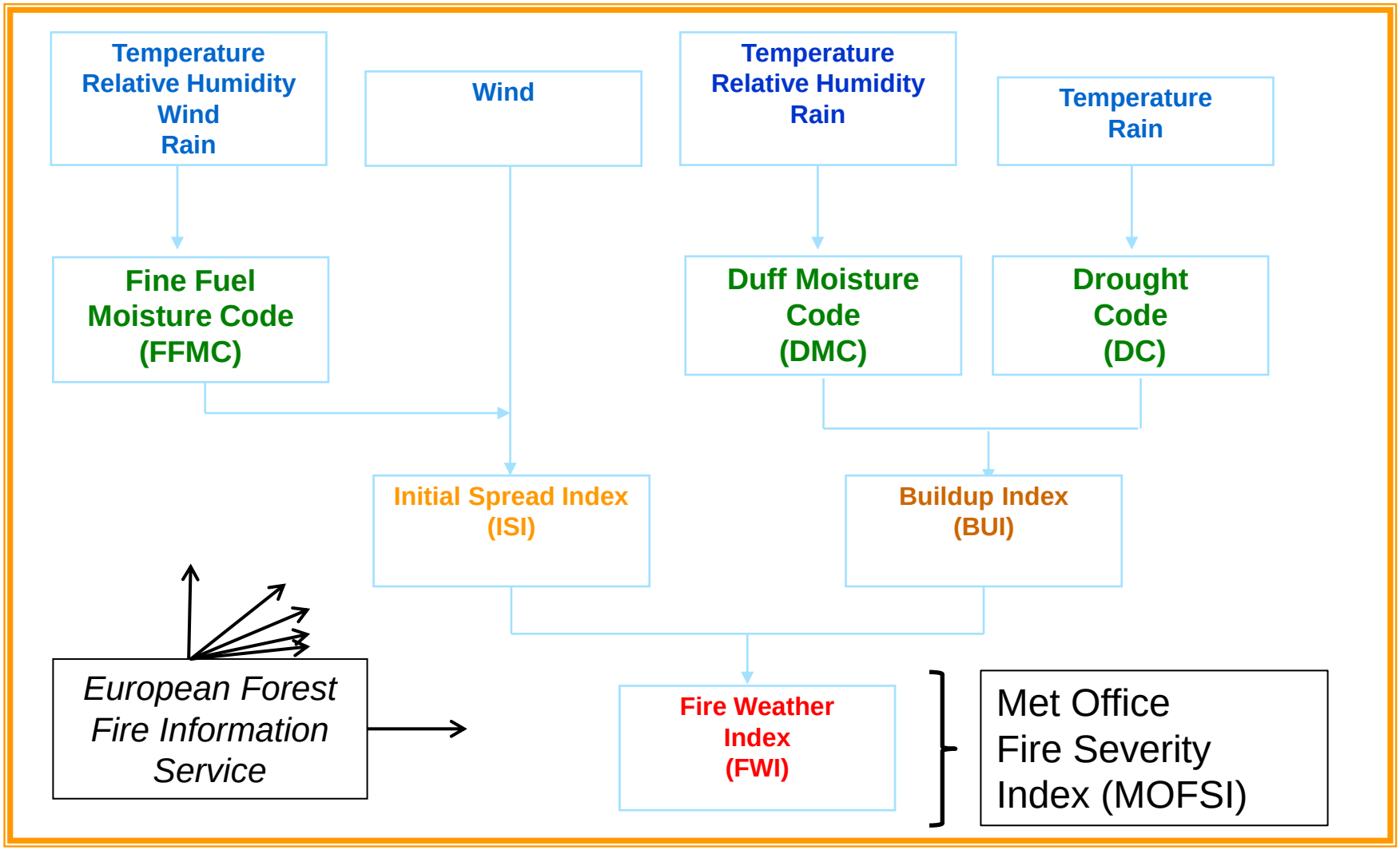
Scottish System? (cont)

- European Forest Fire Information Service (EFFIS)
- Stengths:
  - It’s free
  - 4 day forecast
  - Fire danger rating – mapped
  - All sub-indexes available

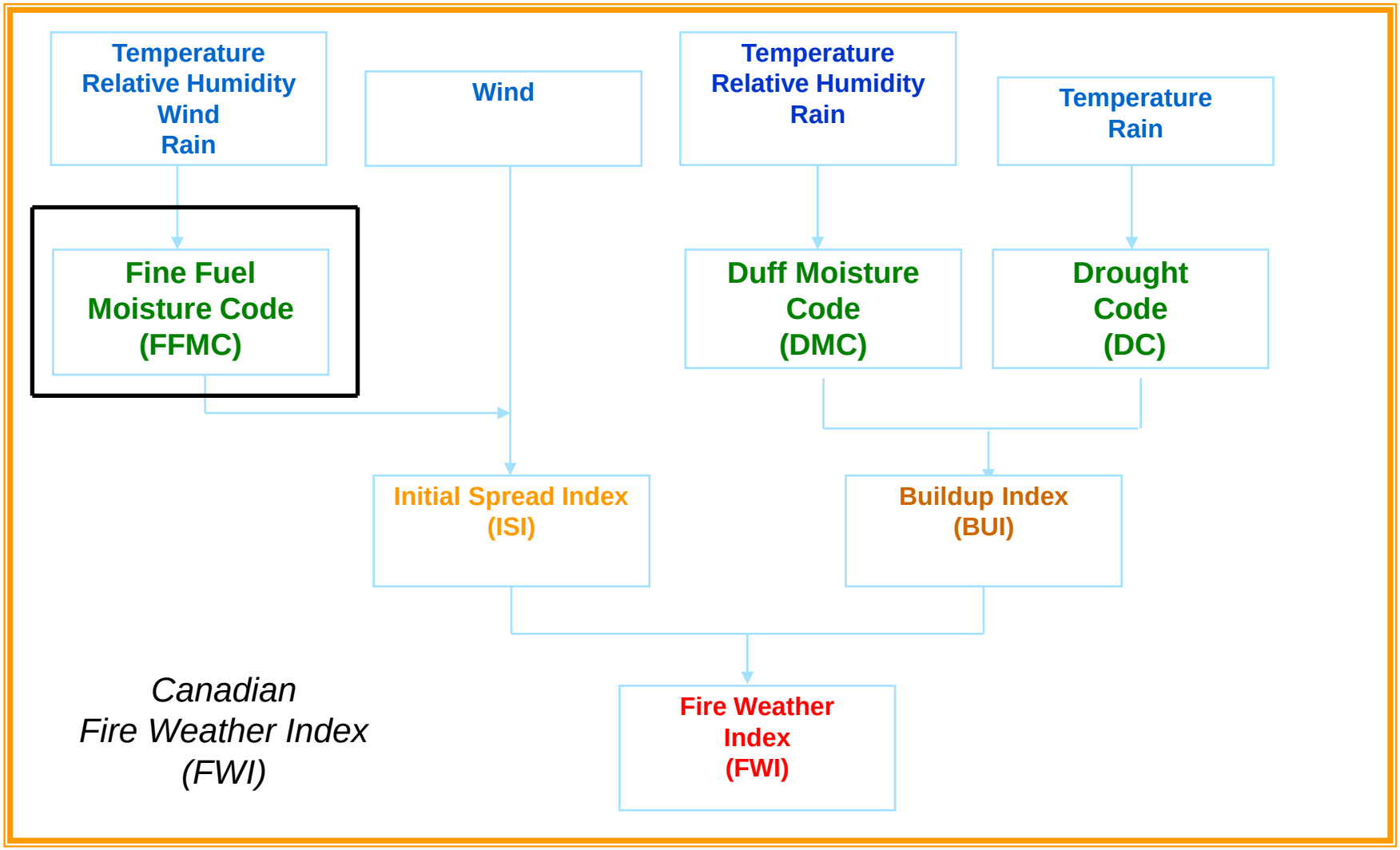
Scottish System ? (cont)

- EFFIS weaknesses:
  - based on weaker weather data set / forecast than MOFSI
  - Each “cell” covers a very large area
  - Fire danger bands set quite high for our fuels

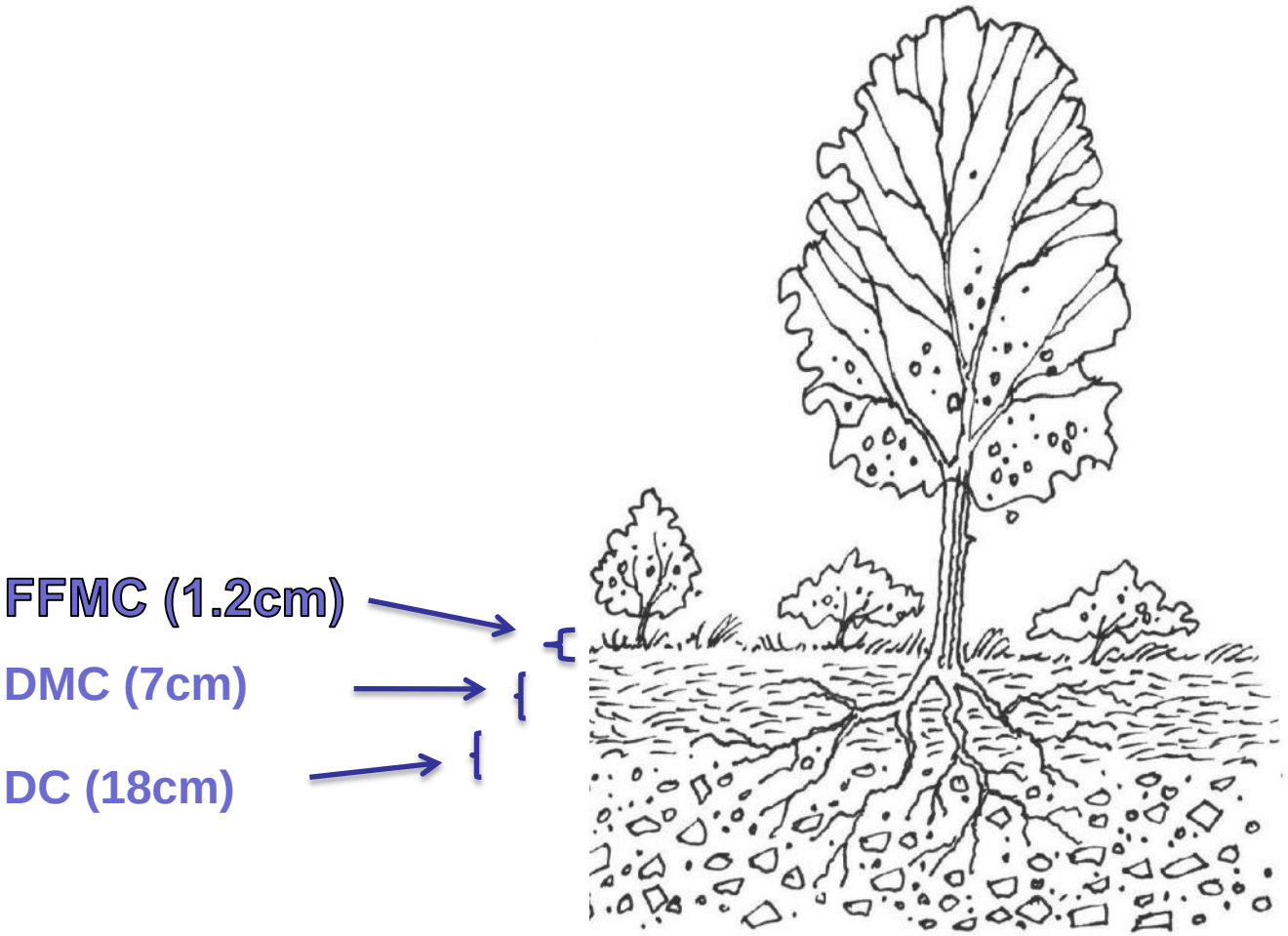
Fire Weather Index (FWI)



Fire Weather Sub-indexes



Soil Moisture Indices



FFMC fire danger bands

EFFIS FDR bands

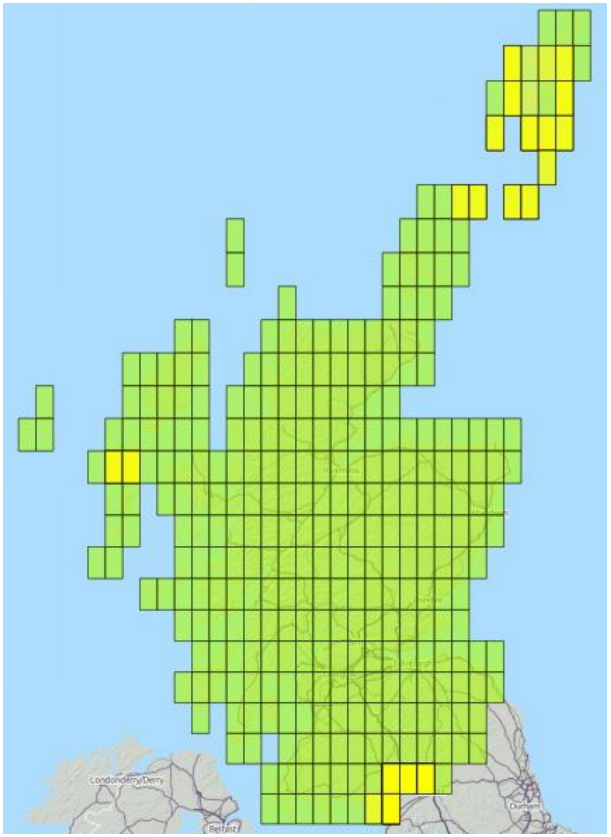
- Low <82.7
- Moderate 82.7 – 86.1
- High 86.1 – 89.2
- Very high 89.2 – 93
- Extreme >93

EFFIS adjusted FDR bands

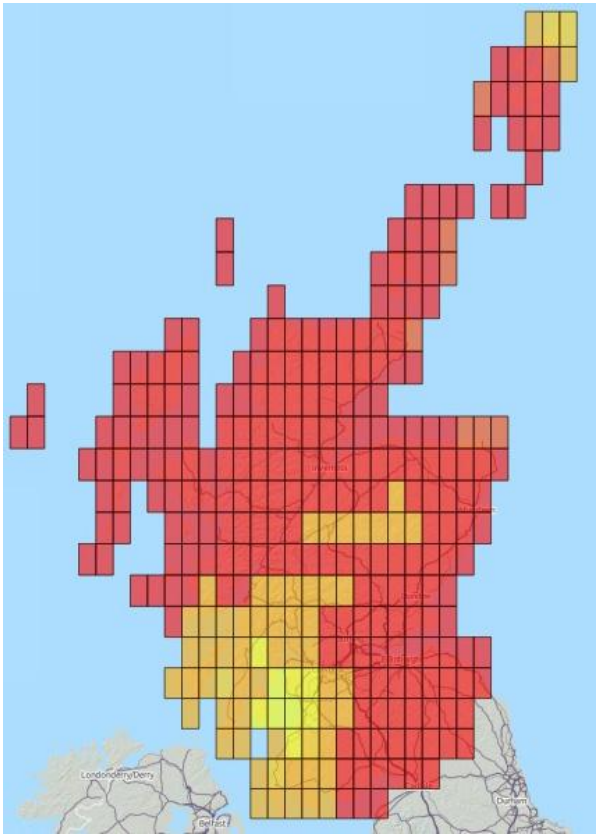
- Low <72
- Moderate 73 - 77
- High 78 - 82
-
- Extreme >82

2nd April – FDR bands

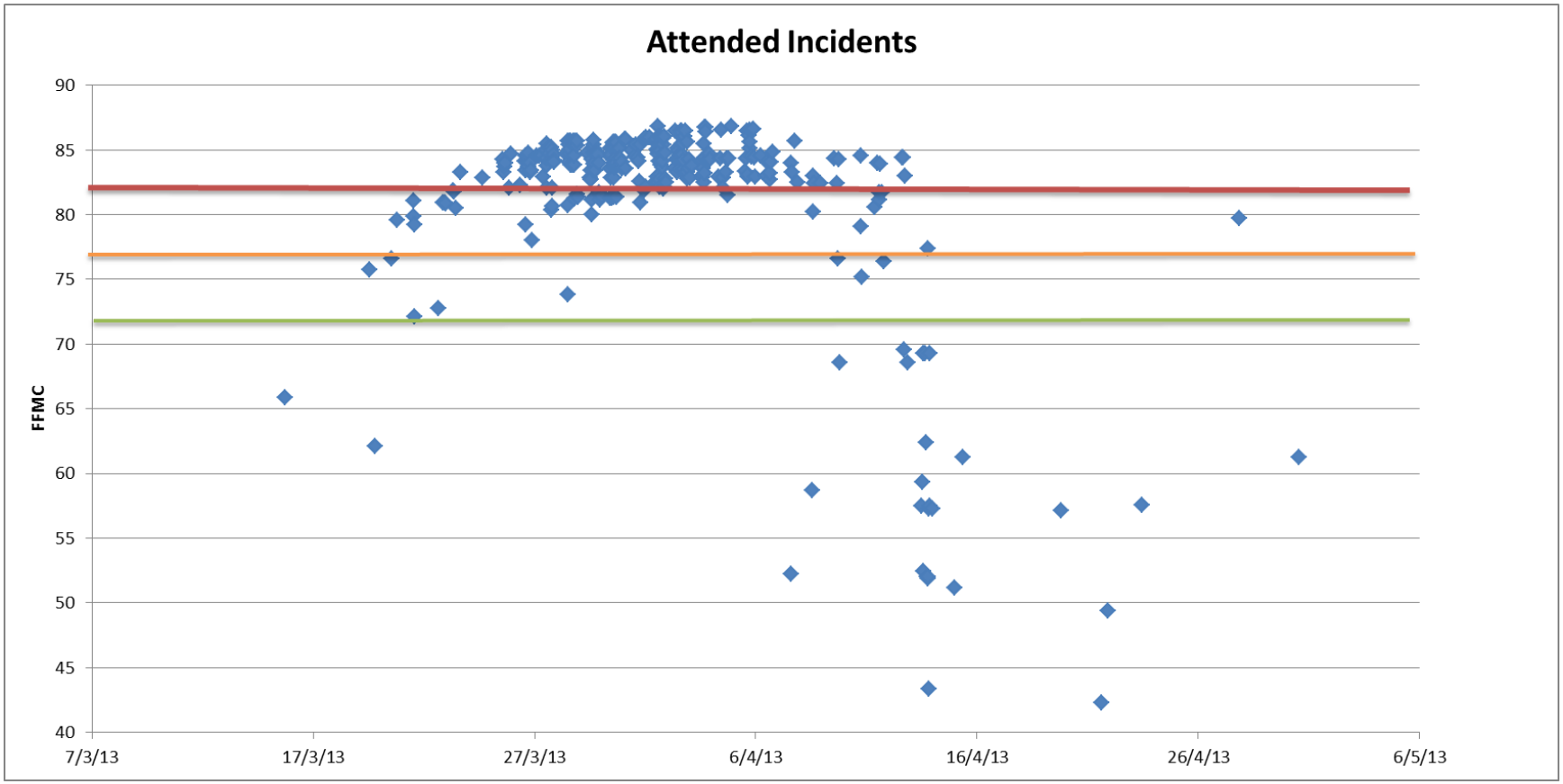
EFFIS



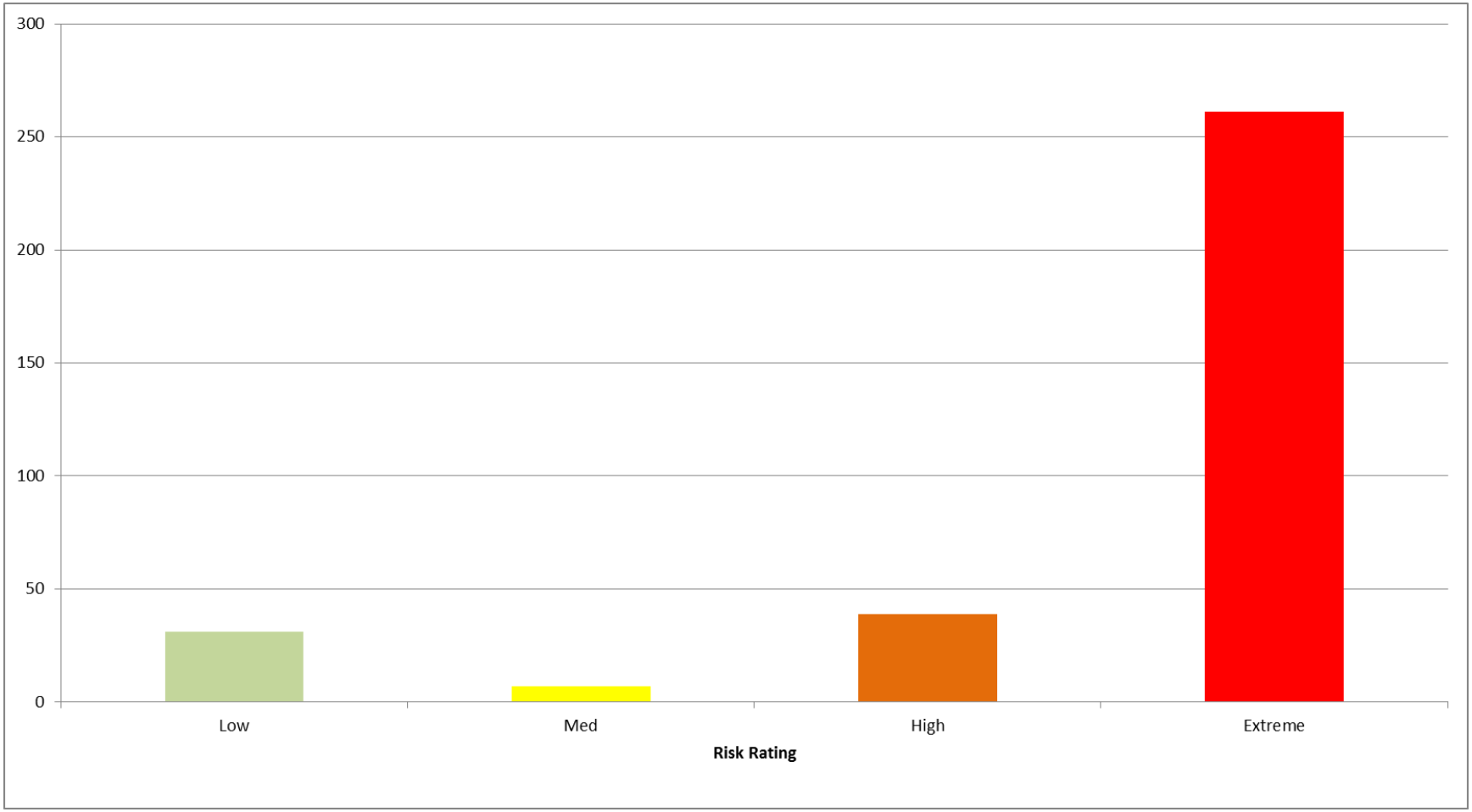
EFFIS - adjusted



NW Highlands spring 2013 fires & FFMC fire danger bands

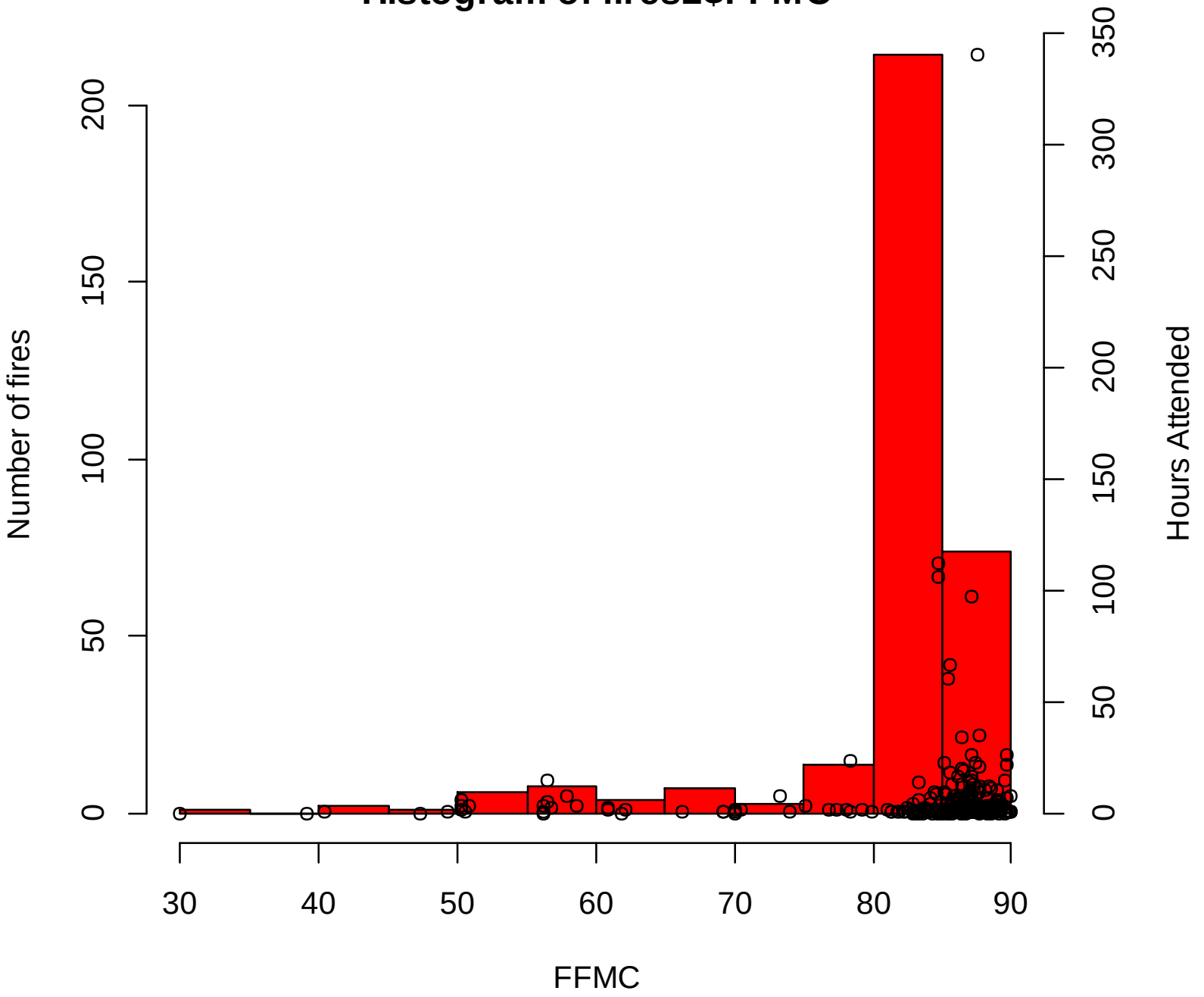


Fires & FFMC fire danger bands



Dates of large fires

No.	Location	Area (Ha)	Date
6	Stromeferry / Achmore	1,212	16/03/2013
1	North (Lewis)	752	27/03/2013
3	Cam Loch (A837)	182	27/03/2013
14	Loch Etive	353	27/03/2013
11	Eileen Shona / Loch Moidart	155	29/03/2013
12	Loch Sunart (east)	323	29/03/2013
13	Loch Sunart (east)	95	29/03/2013
4	Aultbea (East)	196	01/04/2013
5	Gairloch	680	02/04/2013
7	Eilan a'Cheo (Skye)	110	02/04/2013
10	Upper Banavie, Fort William	532	02/04/2013
9	Loch Eilt (east)	213	03/04/2013
2	Loch na Toll Bhaid	73	05/04/2013
8	Glenelg	310 ?	
	Total	5,186	
	Plus 25% uplift for EFFIS estimate for smaller fires	6,482	


Histogram of fires2$FFMC
Number of fires
Hours Attended
FFMC
0
50
100
150
200
0
50
100
150
200
250
300
350
30
40
50
60
70
80
90

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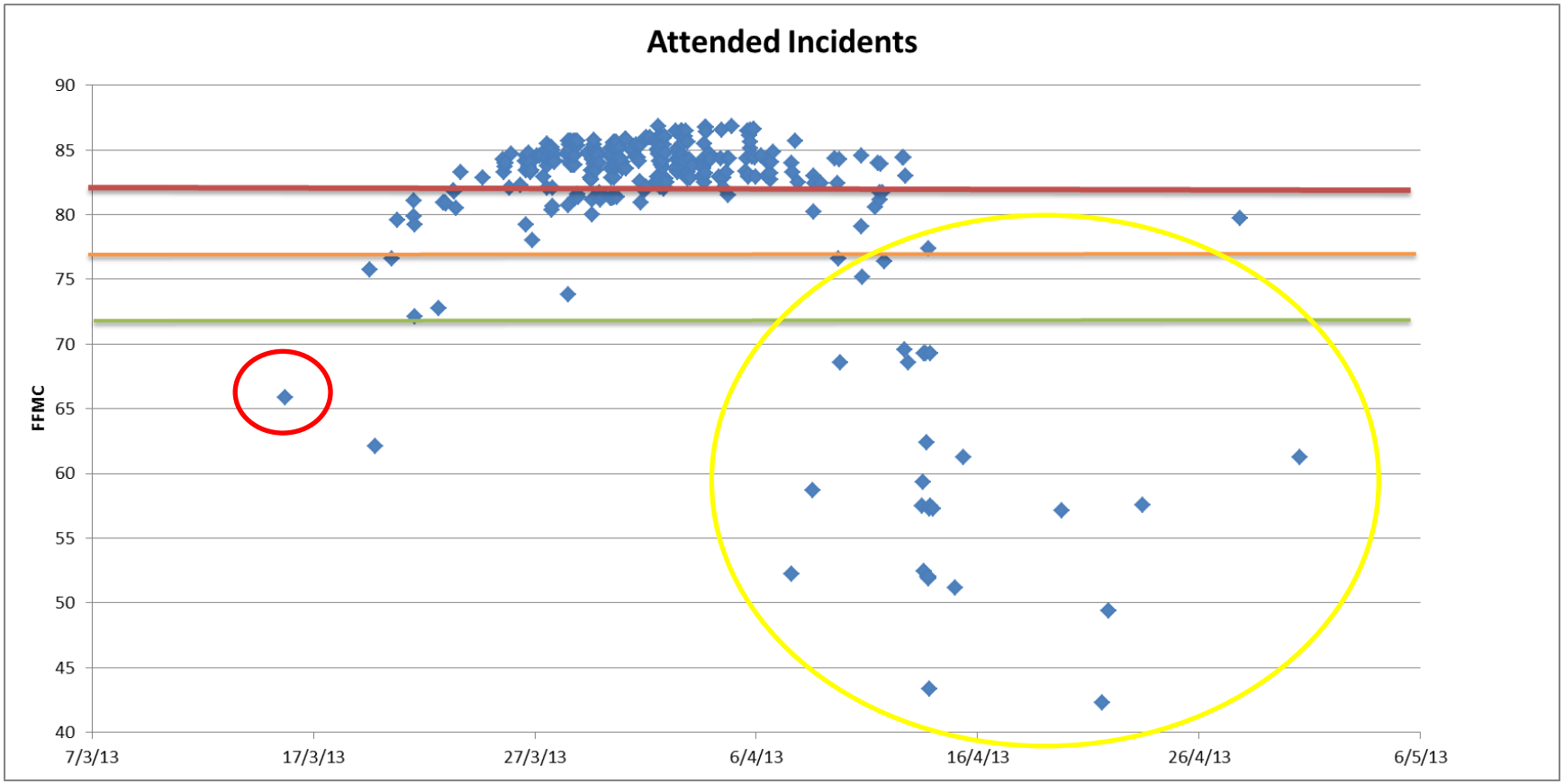

Fire prevention & preparedness activity

- Establishment Scottish Fire & Rescue Service 1 April 2013
- Route for fire danger information established immediately
- Fire danger warnings issued:
  - 4 April 2013
  - 18 July 2013

Outcomes

- Scotland has a “work around” FDRS
- Significant responsible media coverage
- Reduction in wildfire occurrence
- Volunteering of private sector resources

Conclusions

- We need to invest in a Fire Danger Rating System – grounded in UK fire research
- Research needs to focus on fuel moisture
- Appropriate messages about high fire danger periods, to both land management and fire service networks work
- Trust supporting the partnership is needed
- We need to create appropriate links with the “media” to get public messages out.

Thank you

Video training on the Canadian FWI system can be found at:

http://www.youtube.com/watch?v=mdeM-cBCQJA

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