

# Developing a Fire Danger Rating System for the UK

Michael Bruce - Firebreak Services Ltd

Karl Kitchen – Met Office

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# Aim:

*To give an introduction to the potential development strategy for a Fire Danger Rating System for the UK.*

# Introduction

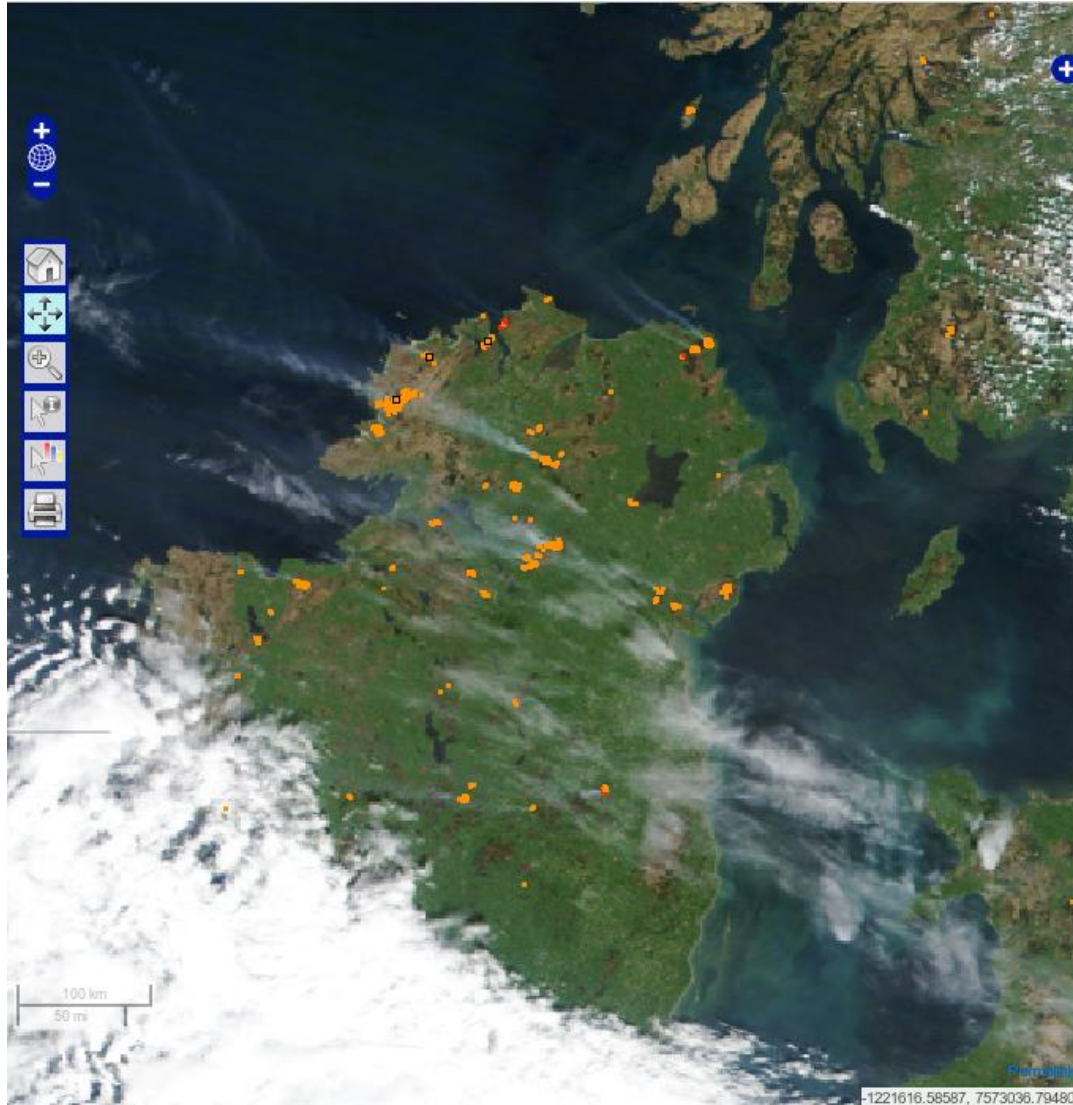
- Context – the need for a Fire Danger Rating System (FDRS)
- Philosophy behind FDR
- Functions
- Developments to date
- Potential uses
- The way forwards

# UK - Easter Sunday 20/4/03

- Multiple large fires



# Northern Ireland/Eire 2011



# Policy Context

- Budget cuts
- Improving the efficiency / productivity of public & private investment.
- The “Big Society” – working with the private sector

# Wildfire Threat Assessment

- Fire Hazard – increasing fuel loads
- Weather events
- Climate change
- Fire risks (ignition sources) – always there

# Fire Danger Rating Systems



- Systematic assessment of fire risk and potential impact.
- The “alarm bell”

# Uses for an FDRS

- Preparedness planning
- Fire prevention planning
- Prescribed Fire planning & execution
- Suppression tactics & strategies on wildfires

# Uses cont.

- Initial attack despatching
- Escaped fire situation analysis
- Detection planning
- Fire behaviour training

# Goal of FDR Research

“Make an index such that any given value will represent the same fire behaviour, no matter what weather history leads to it”- Van Wagner

“A very stiff test”- Marty Alexander:

“The trouble is one very quickly outruns the available practical knowledge” - Van Wagner

# The Caveat.....

“The fact is that it’s difficult to portray all the aspects of fire danger in a single number. One number can’t be expected to cover the full range of fire management needs.”

Marty Alexander 1994

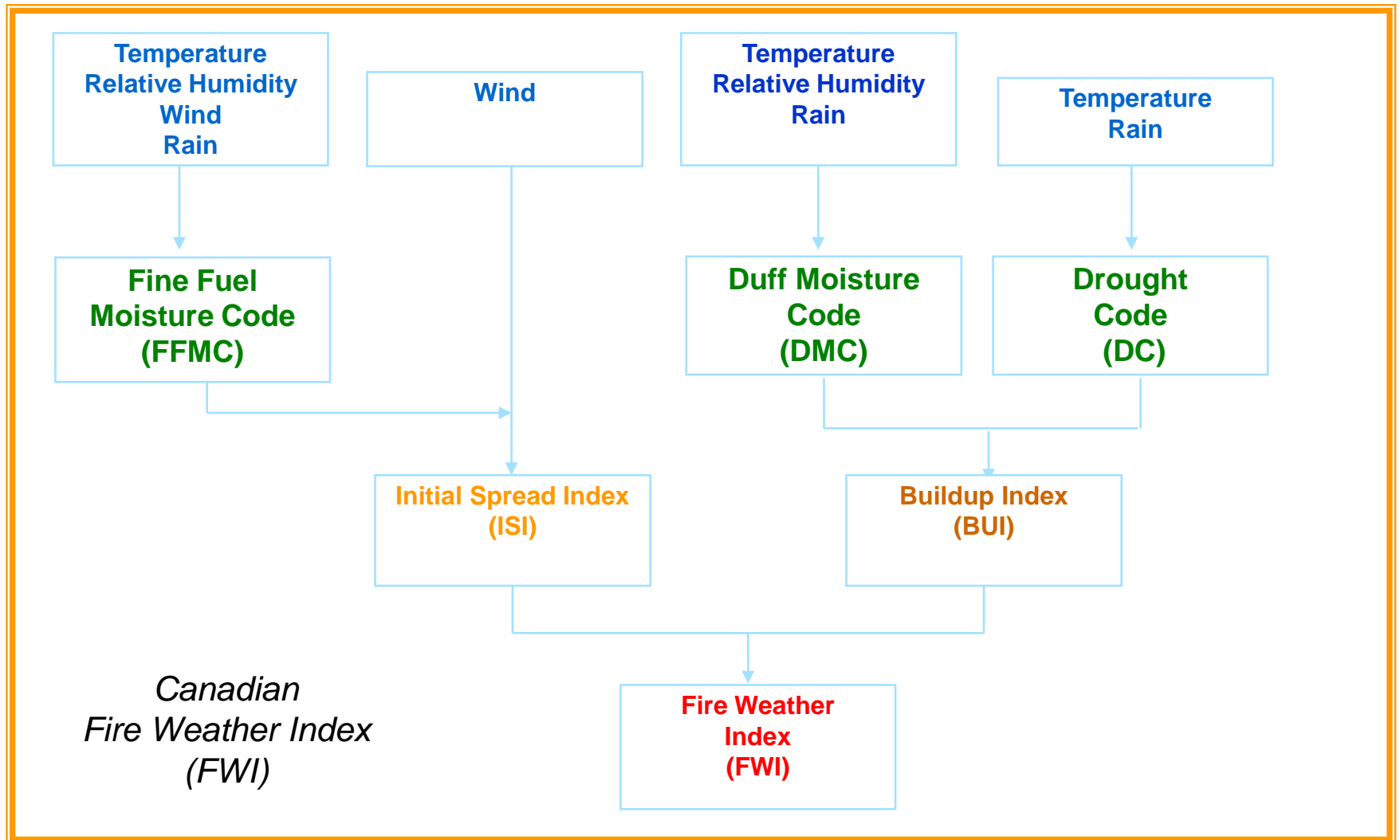
# Met Office Fire Severity Index

- It's a copy of the Canadian Fire Weather Index (FWI), which is part of the CFFDRS.
- MOFSI uses particular threshold FWI value to define "exceptionality"
- MOFSI's not a Fire Danger Rating System
- CRoW Act (Eng & Wales 2000) has provided consistent funding

# Canadian Fire Danger Rating Concept

- Ignition potential (flammability)
- Spread rate
- Control difficulty (fire intensity & mop-up)
- Immediate post burn impact (fire severity)

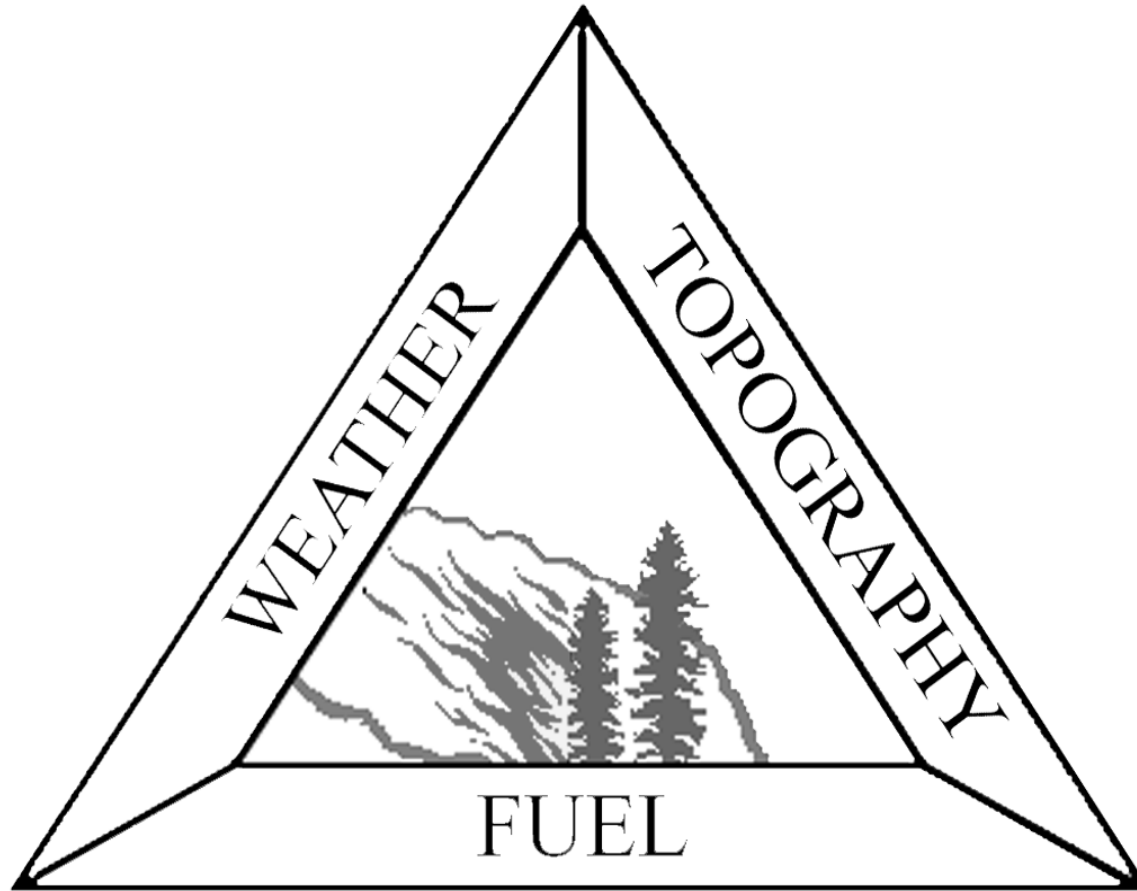
# Fire Weather Index (FWI)



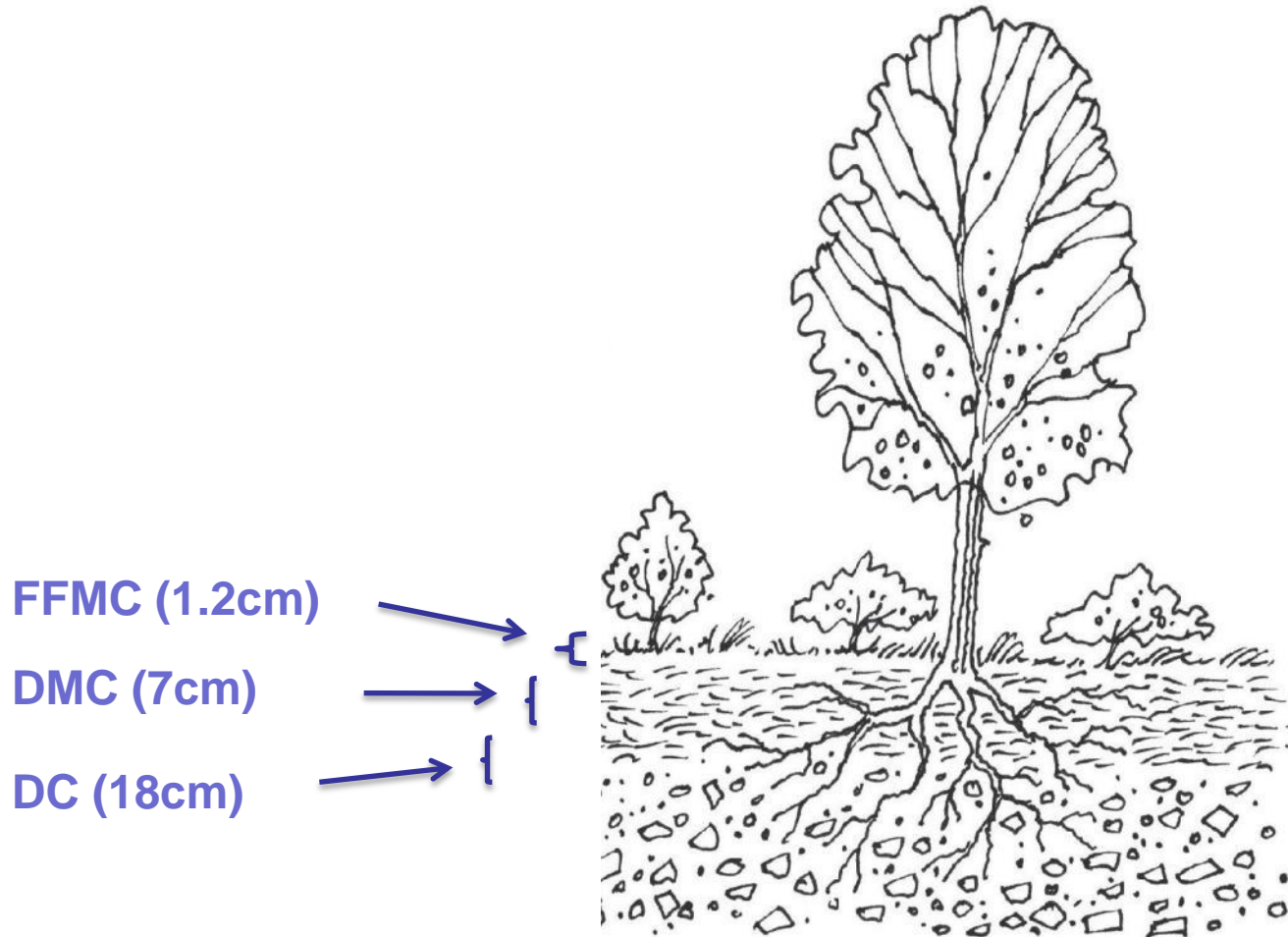
# Basis of FWI – CFFDRS

- Driven by 4 simple weather inputs:
  - Air temperature, relative humidity, wind, & rain
- Works on a wide area basis
- Based on a Jack Pine forest floor fuel type.
- Information base 40,000 fire tests & case studies

# Fire behaviour factors



# Soil Moisture Indices



# Constraints

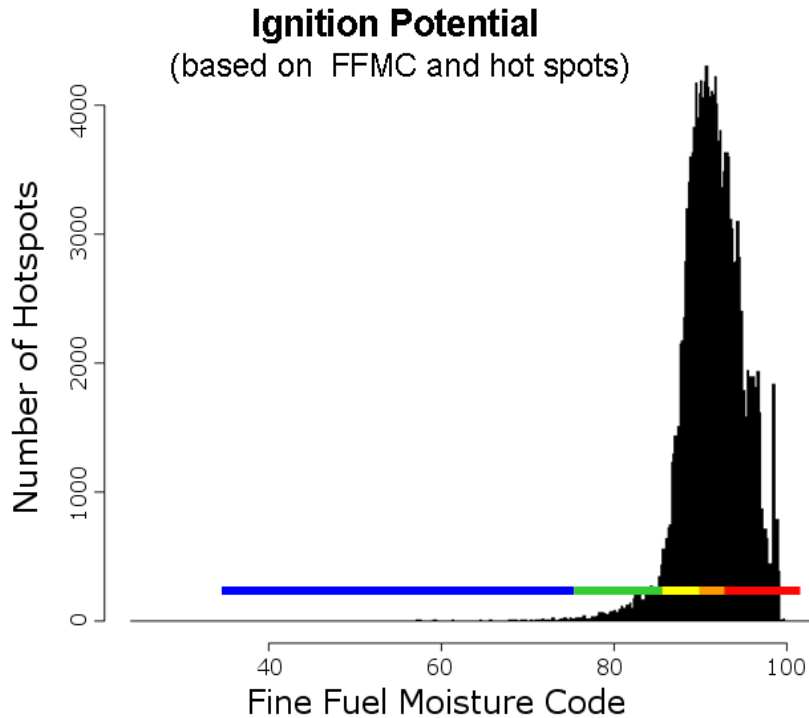
- Uses models to fill in the gaps
- Models = assumptions / averaging
- Based on Canadian forest fuel moisture & fire tests
- Known to work poorly with shrub fuels

# Firebeaters Research Project

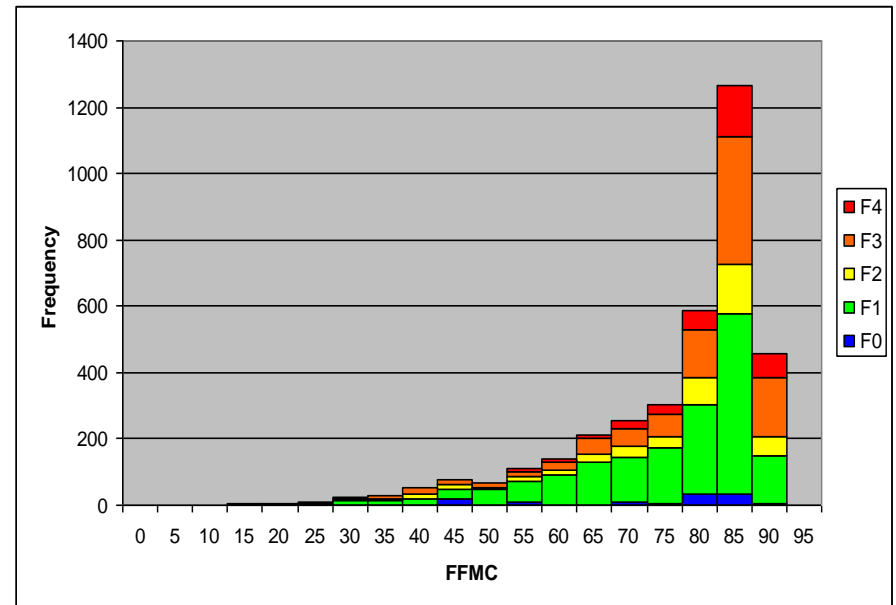
- Project funded 2006 - 2008
- Poor relationship found between FWI and either ignitions or fire intensity in UK (especially heather fires)
- Good relationship found between FFMC and ignitions

# FFMC comparisons

## Global ignitions



## Ignitions Scotland 2003



# FDR Errors / Validation

	Danger Rating	
True State of Nature	Low Danger	High Danger
Low Danger	No error	<i>Type I error— false positive</i>
High Danger	<i>Type II error— false negative</i>	No error

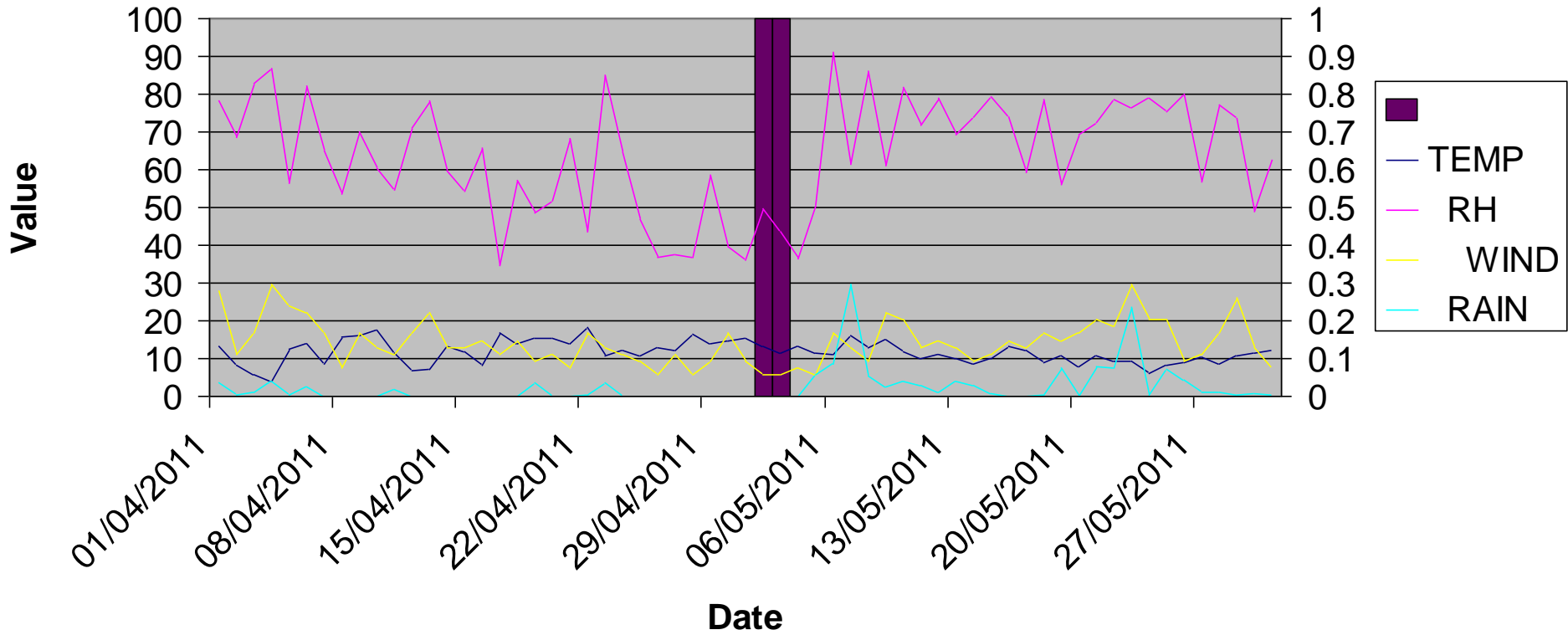
# Balmoral Estate

## - NE Scotland

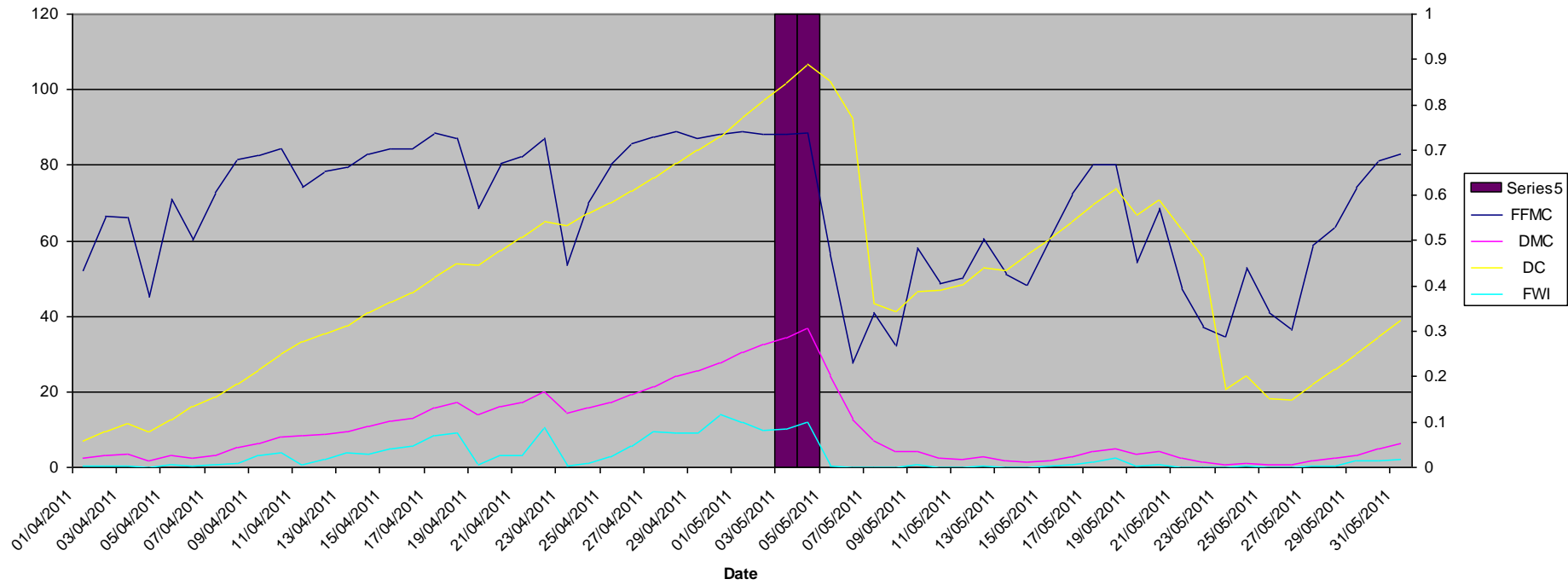


- 2/5/11 – 3/5/11
- 100ha (247 acres)
- Heather fuels
- Surface fire with some re-ignition in duff/peat on steep dry slope
- Potential erosion, vegetation recovering

# Balmoral



### Balmoral



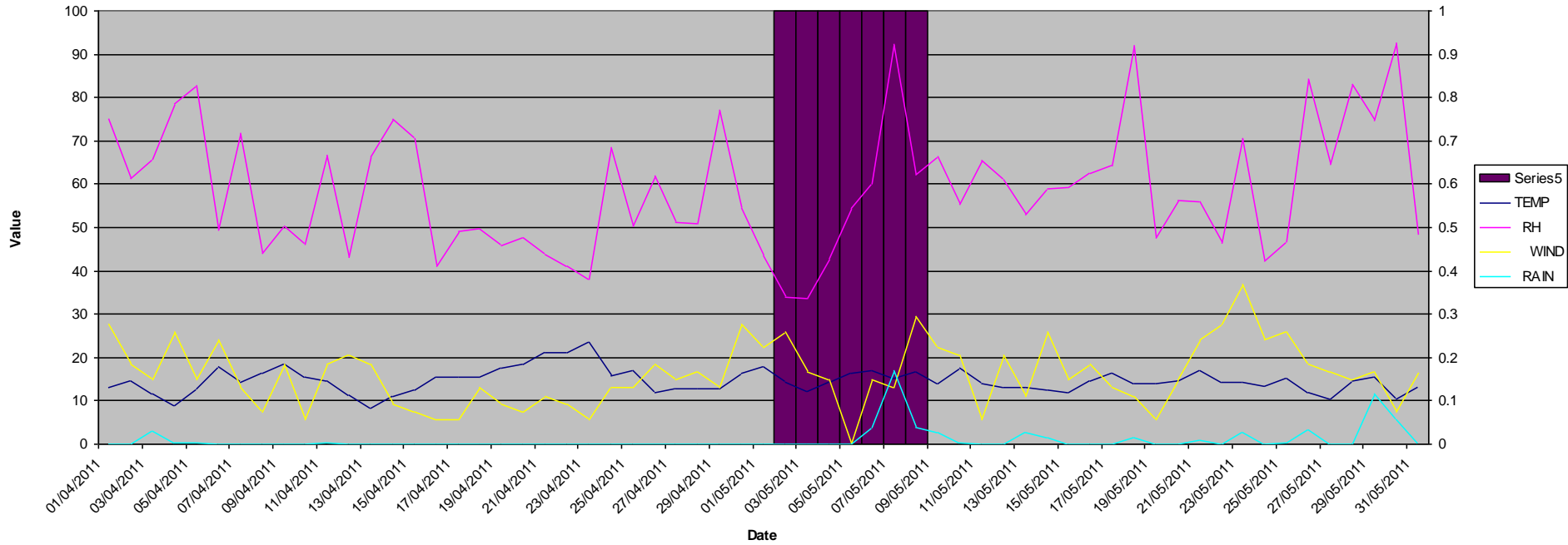
# Million Wood

## – West of Birmingham

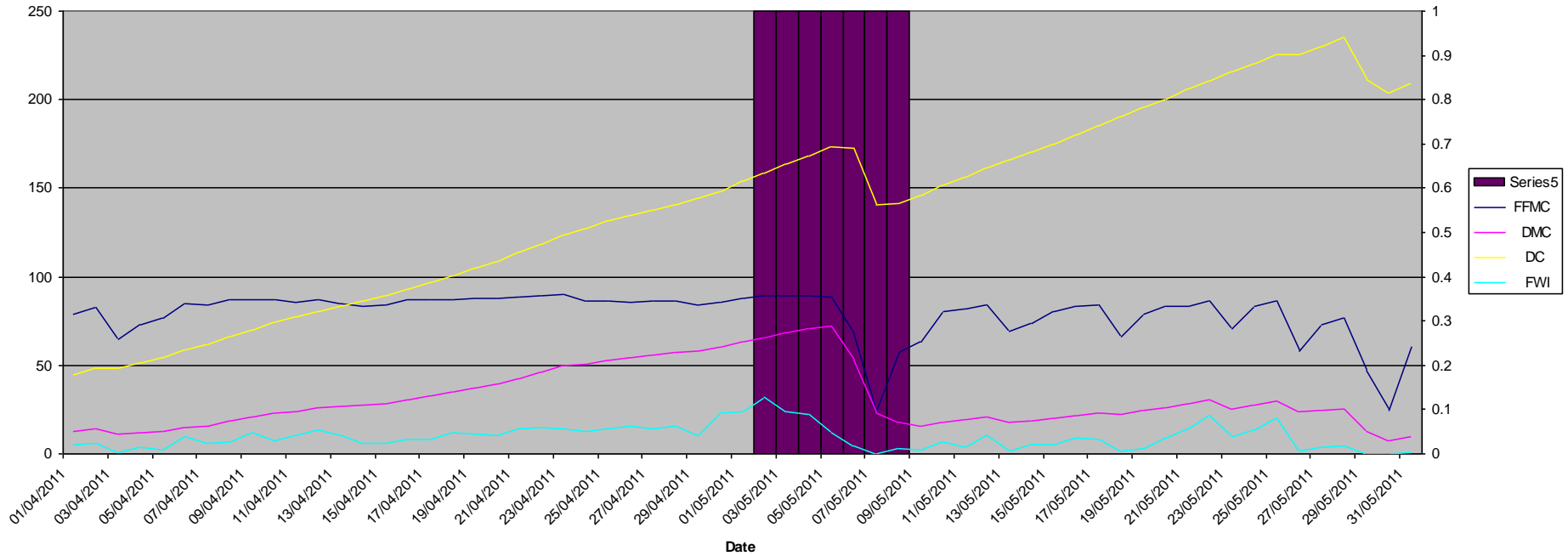


- 2/5/11 – 8/5/11
- 20ha (50 acres)
- Brambles, bracken, grass & needles - surface fuels
- Corsican Pine trees
- High intensity fire, & smouldering 14 days
- Crown scorch 15m - 15%+ trees dead

### Million Wood



### Million Wood

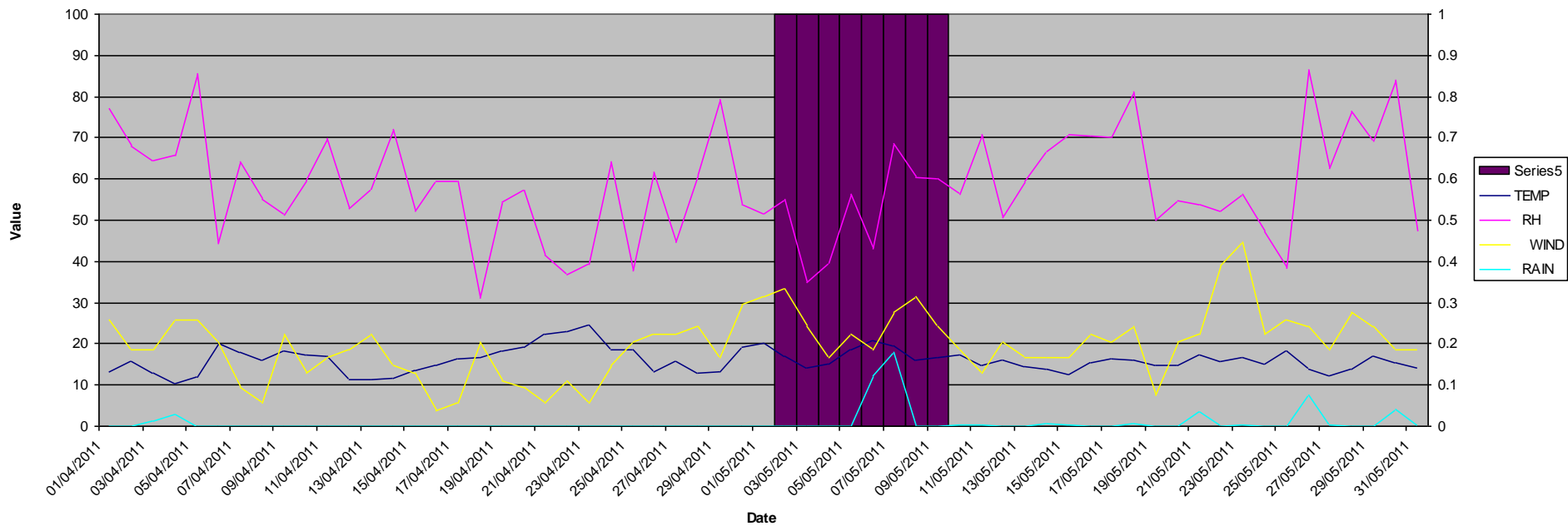


# Crowthorne (Swinley Forest) - Berkshire west of London

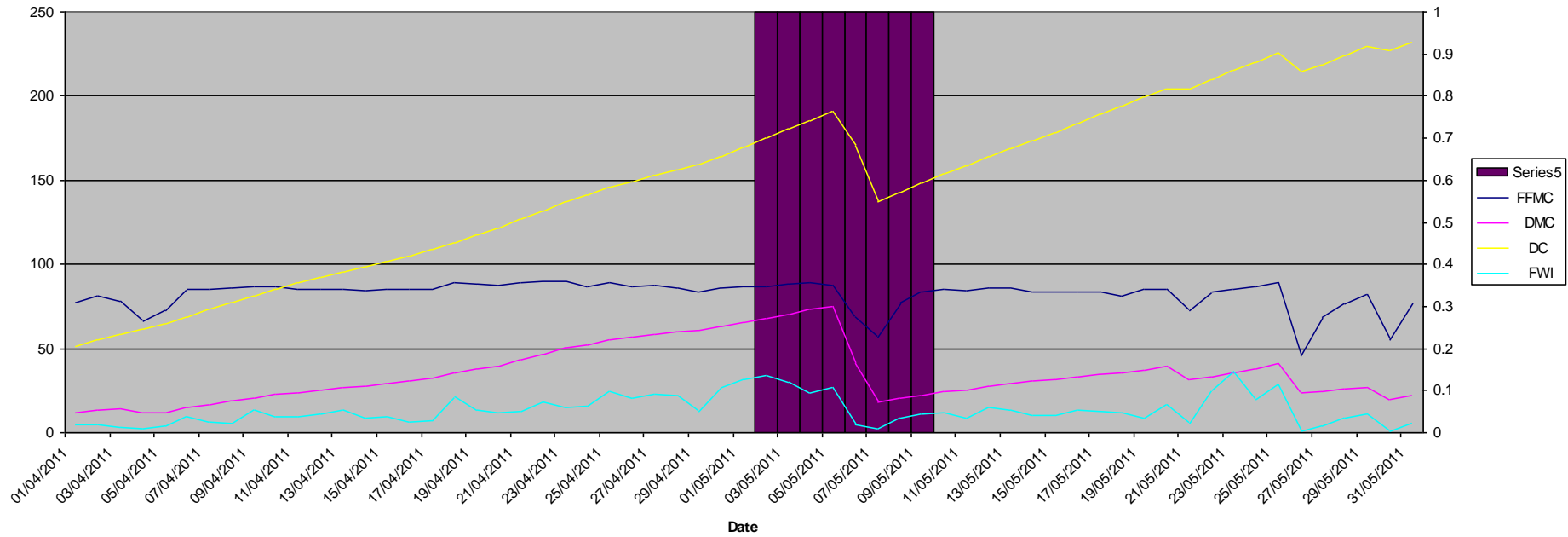


- 2/5/11 – 9/5/11
- 70ha (170 acres)
- Grass, bracken, brambles & needles
- Thicket stage pine trees
- Low-high intensity surface fire, some crowning, smouldering
- 40ha trees killed

### Crowthorne



### Swinley Forest

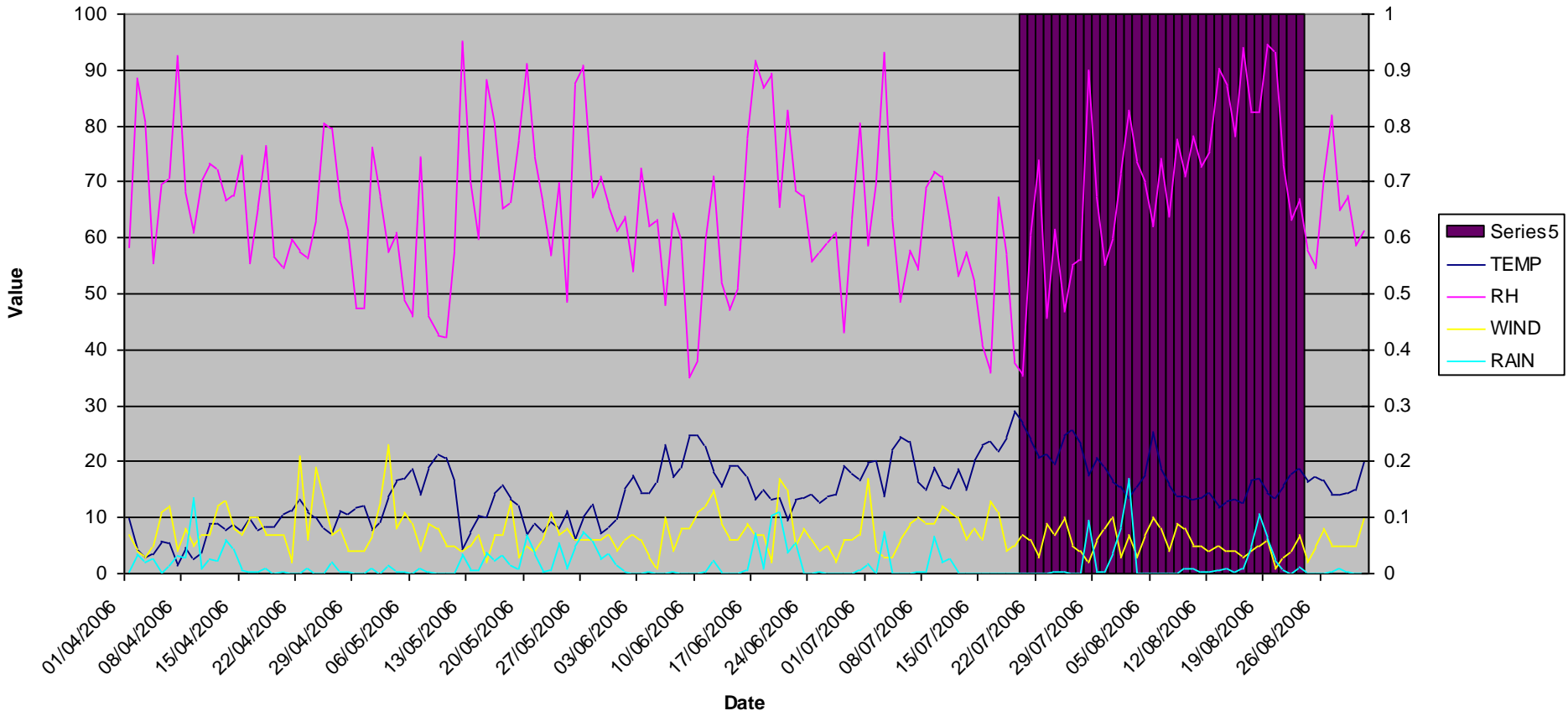


# Rothiemurchus, Aviemore - North Scotland

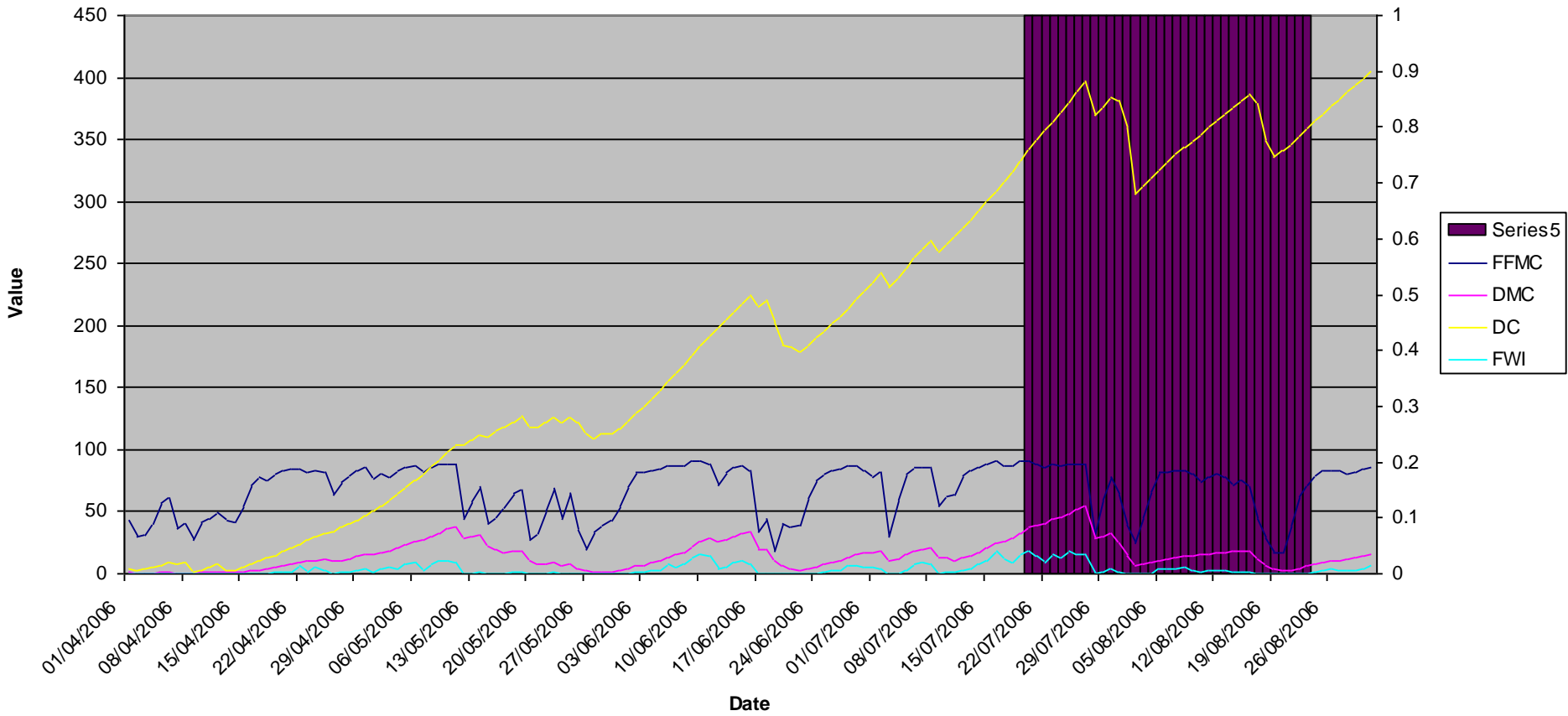


- 19/7/06 – 22/8/06
- 15ha (37 acres)
- Heather & peat
- High intensity surface fire, some crowning, 4 weeks smouldering
- Trees killed by root damage

# Rothiemurchus



# Rothiemurchus

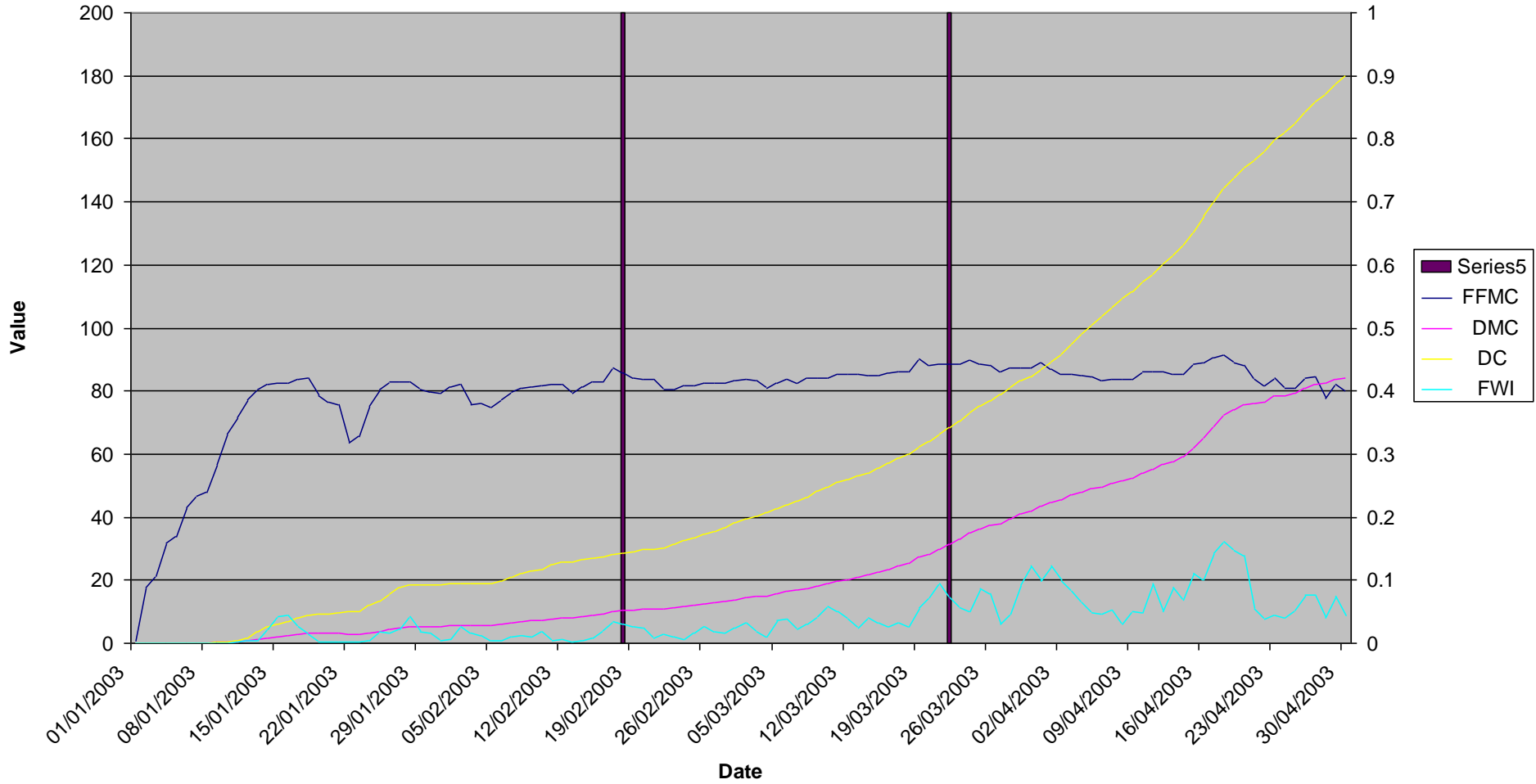


# Glen Tanar NE Scotland– Prescribed burning (history)



- Burned 21/3/03
- Burning heather over peat
- Small hot fire
- 2011 poor recovery & exposed peat

# Glen Tanar



# Preparedness – Private Sector



- 3 key resources
  - Helicopters
  - ATV fire fogging units
  - Staff
- Heli's 3 day schedule
- ATV refuelling/checks
- Staff: weekend rota's

# Way forwards

- Use FFMC & Met Office 5 day forecast to create a UK FDRS for spring fires
- Test FFMC & DMC for summer FDRS
- Available free at the point of use on a website all aspects of FWI system based on Met Office 5 day forecast
- Create preparedness network of fire managers to warn others of “High” or “Extreme” conditions
- Review based on fire managers feedback

# Research needs

- Fire tests in a variety of weather conditions and fuel types
- Fully developed case studies on well documented fires
- Fuel moisture content research with the aim of modelling fuel moisture
- Physiological model of fuel moisture / flammability