

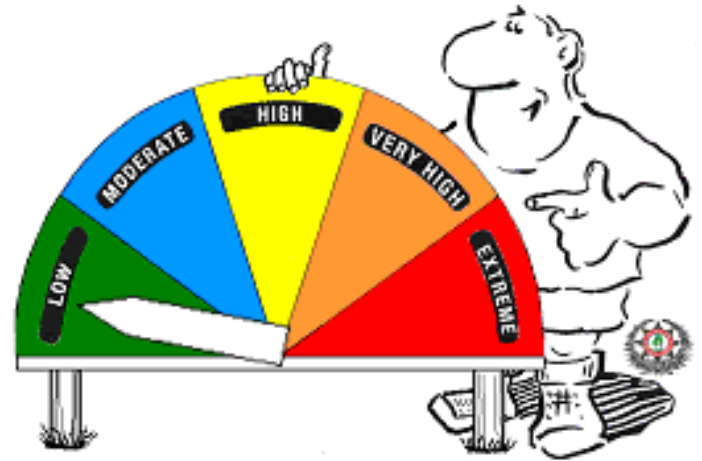
# Effectiveness of rural fire danger warnings to New Zealand communities



Lisa Langer  
Sophie Hide  
Grant Pearce

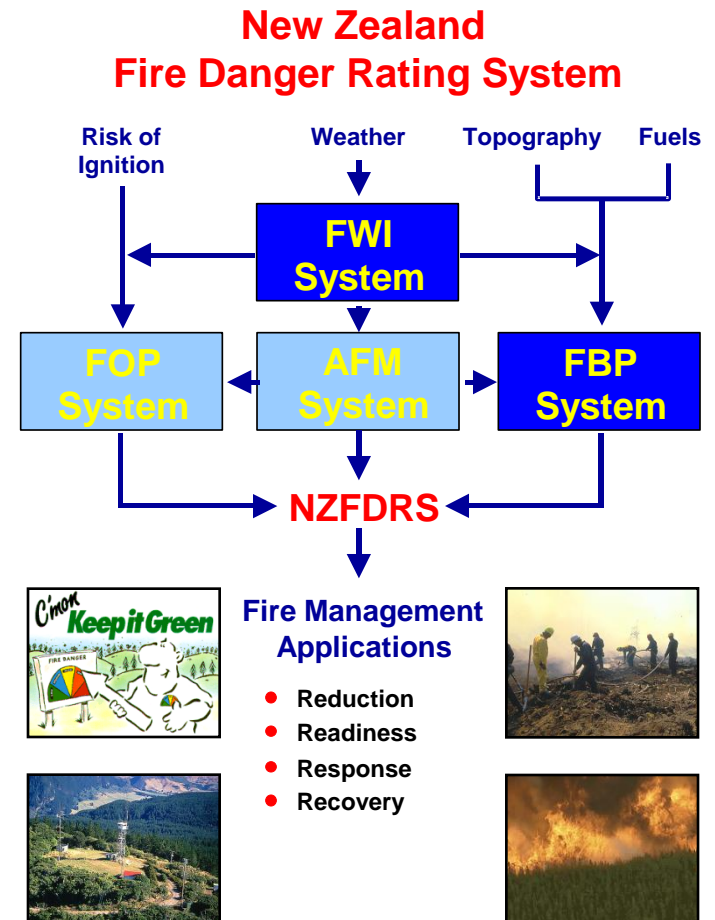
# Overview

- Fire danger rating in NZ
  - fire danger classes
  - fire danger warning signs
- Research methodology
- Findings:
  - lit review
  - interviews with fire managers
  - surveys of general public
- Study recommendations



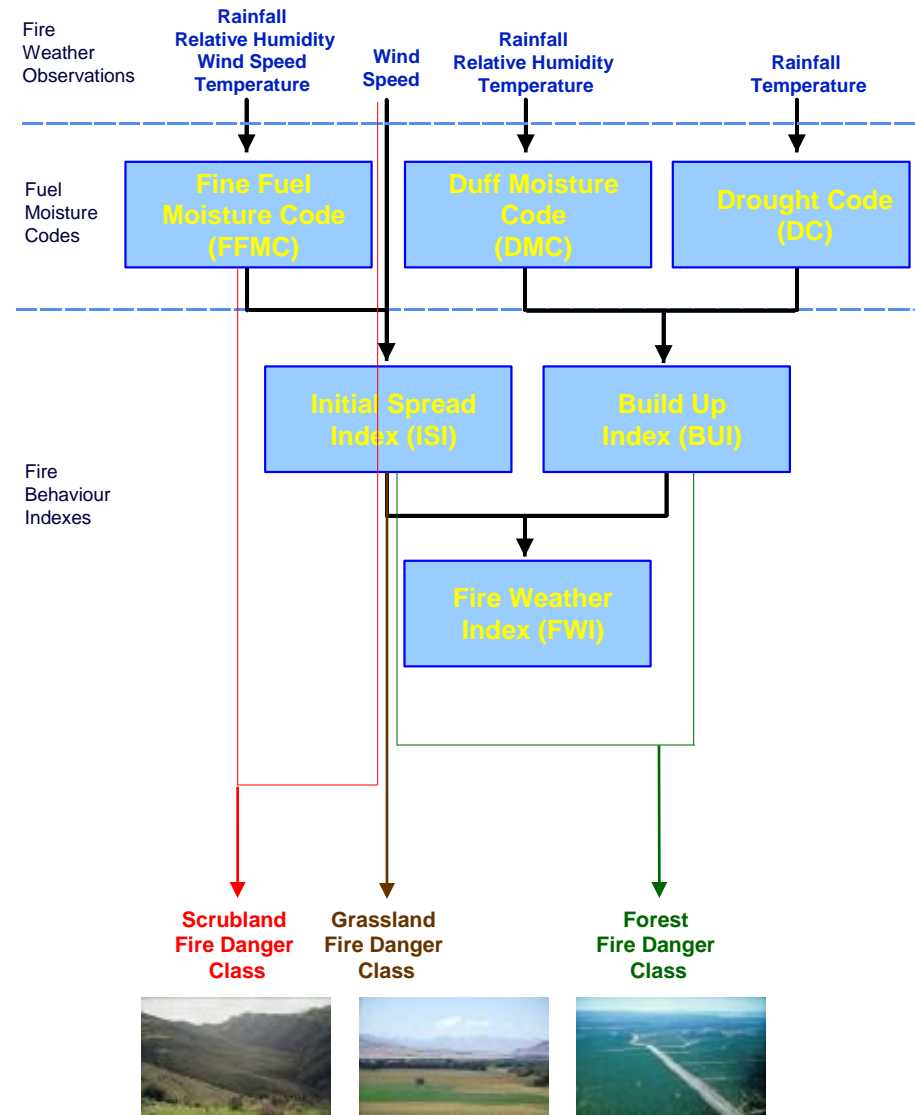
# New Zealand Fire Danger Rating System (NZFDRS)

- derived from Canadian equivalent, the CFFDRS
- fire danger rating:  
*“probability of a fire starting, spreading and doing damage”*
- supports fire management decision-making
- Fire Weather Index (FWI) System the core component – effects of weather
- Fire Behaviour Prediction (FBP) System – effects of terrain and fuels



# Fire danger classes

- combine outputs from FWI System with fuel models from FBP System
- criteria for Forest, Grassland and Scrubland
- provides assessment of fire danger on broad area basis only



# Fire danger classes

- 5 classes: L, M, H, VH and E
- based on head fire intensity
- related to suppression effectiveness
- principal use for notifying the public
- warn of increasing difficulty of controlling fires as fire danger increases



Fire Danger Class	Fire Intensity (kW/m)	Minimum fire suppression resources for direct head fire attack
Low	0 - 10	Ground crew with handtools.
Moderate	10 - 500	Ground crew and back-pack pumps.
High	500 - 2000	Water under pressure and heavy machinery.
Very High	2000 - 4000	Head fire attack using aircraft and long-term retardants may be effective, but it may be too dangerous for ground crews.
Extreme	> 4000	Head fire attack not likely to be effective, and it will be too dangerous for ground crews.

# Fire danger communications

- main method is via roadside fire danger warnings signs
- indicate current (daily) fire danger
- sometimes also includes fire season status or burn permit requirements
- also national fire prevention campaign based on “Bernie” character



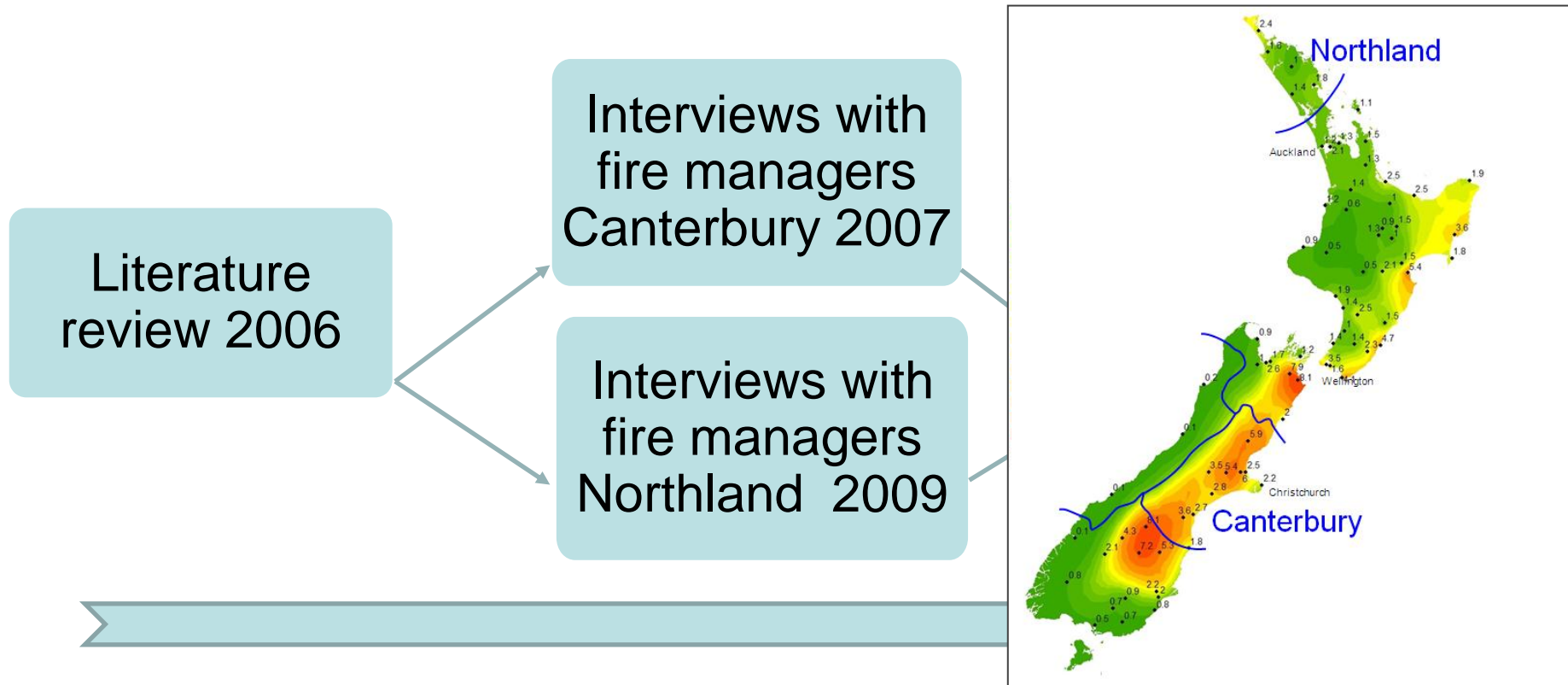
# Methods: research process



- Focus on fire danger communications, not fire risk communication



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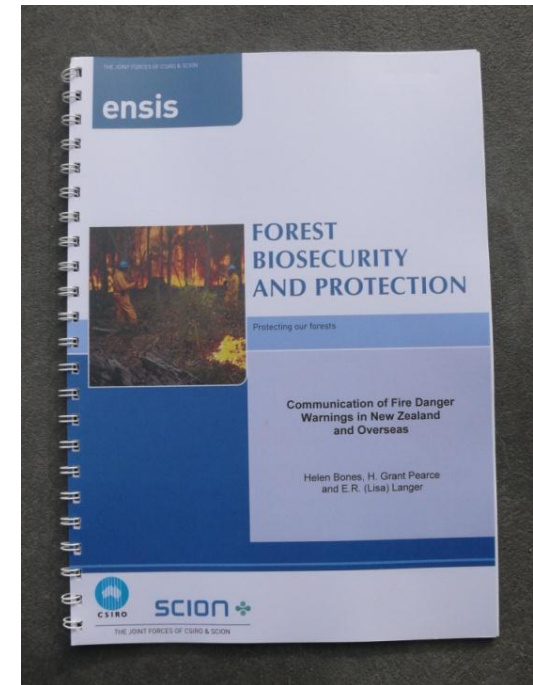
# Methods: research process



- Focus on fire danger communications, not fire risk communication

# Literature review:

- Most Western countries use similar signs and media campaigns
- NZ media campaign focus on dialling 111 if smoke seen
- Not clear what actions are encouraged or discouraged as fire danger increases
- Expected behaviour left largely to the interpretation of sign viewer.
- Fire danger ratings more meaningful to fire managers than public?



# Literature review: suggested initiatives

- Fire danger messages need to be matched to:
  - behaviour changes authorities are trying to encourage (promoting personal responsibility)
  - the different target audiences (local and visiting)
- More attention is needed to evaluate how effective messages are at achieving fire agency aims
- Public's perception and understanding of fire risk should be measured.



# Interviews: fire and land managers

## Aim

- To explore messages that fire managers are seeking to convey through various forms of fire danger communication:
  - fire danger warning signs
  - fire restrictions and requirement for permits
  - national publicity campaign
- To establish how managers want public to behave when confronted with these messages.

*C'mon*  
**Keep it Green**

In emergencies  
*Dial 111*



# Interviews: fire and land managers

## Method

- 7 interviews in Canterbury during 2007, 12 interviews in Northland, 2009
- Included Rural Fire Authorities, District Councils (local govt), NZ Fire Service (urban), Dept. of Conservation, and forest managers
- Face to face
- 29 open questions
- 40-90 mins in length



# Findings: Canterbury fire managers

- Uncertain or confused regarding specific public behaviour(s) expected at different ratings!
- Signs only convey presence of risk and need for caution, rather than providing guidance on behaviour
- Overlap between fire danger signs and fire season controls
- Public confused by 'Open', 'Restricted' and 'Prohibited' fire seasons
- Fire danger signs and 'Bernie' character widely recognised

**BUT** the media campaign message needs to be updated to promote prevention aims, and monitored for effectiveness



# Findings: Northland fire managers

- Sign style/colours recognised internationally, but sign differences between regions can confuse
- No direct links between sign and desired actions/behaviours
- Radio, specialist magazines, newspapers and internet are most effective for rural audience
- Need links between NZFS urban 'Firewise' and rural fire danger campaigns
- 'Bernie' needs to be up-dated
- Need region-wide policies for consistent public information.





# Research questions for public survey

Findings from interviews with fire managers identified the following areas of enquiry:

- Adequacy of fire danger sign - its location; perceived meaning, accuracy and relevance; and ease of understanding
- Consistency of knowledge of fire danger and behaviour expected under different levels of fire danger
- Variability in knowledge and perception of other communication initiatives



# General public: Interviewee profile

- Survey of 118 people in Northland and Canterbury locations
- Mix of rural residents, NZ and overseas visitors
- 16 – 65+ age range
- 54 male, 64 female
- 60 (50%) had no experience of rural fire
- 26 (20%) involved in out of control fires



# General public: fire danger sign

- Poor perception of sign currency  
40% do not know or do not think that information is current/accurate
- Poor perception of relevance  
20% felt that signs were directed at specific groups or 'reckless' people rather than to themselves



# General public: fire danger sign (contd.)

- Lack of behaviour change guidance  
Many (66%) acknowledged that the sign identified the fire danger or risk level

**BUT** only 35% reported that this also alerted them to need to change their behaviour





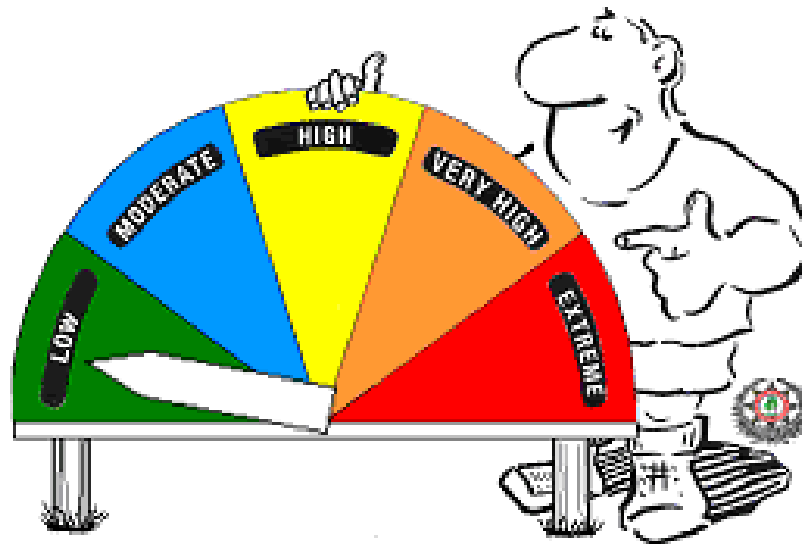
# Knowledge and interpretation

- Varied perception of rating and meaning
  - no clear distinction between classes, except L and E
  - many more conscious of general movement across scale
  - inconsistent knowledge of range of fire risks
- Fire danger sign ratings infrequently perceived as means to guide behaviour change
  - proposed behaviour change varied widely between respondents by rating or by increased fire danger



# Knowledge and interpretation (contd.)

- Limited understanding of fire permit requirements
  - rarely associated with fire danger warning sign communication
  - mixed responses for meaning of 'Restricted' and 'Prohibited' fire seasons



# Other communications

- TV and radio were the most memorable and preferred media
  - no widespread knowledge of alternative modes
  - only ~50% of respondents reported awareness of such publicity
- Message of 'Bernie' campaign was known by only half of participants
  - message = alert to fire danger, risk level or need to 'keep it green'
  - **BUT** fewer reported that the message directed a need to change behaviour





# General public: Recommendations (1)

1. Define and publicise range of risk factors that cause fires.
2. Provide guidance on expected behaviour and link this to relative fire risk conveyed in fire danger signage and communication.
3. Initiate efforts to clarify and simplify information relating to fire danger (and incorporate guidance for recommended behaviour change).

## General public: Recommendations (2)

4. 'Fire danger warning sign' and 'fire season' systems operate in parallel. Explore possibility of developing and integrating the two separate methods.
5. Improve sign technology, accuracy/maintenance and placement locations .
6. Develop media campaign to target specific groups and provide guidance on behaviour change.



# Future research?

- Identification and scoping of further research needs on fire danger communication
- What rural fire messages need to be developed?
- How should rural fire messages be delivered?



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