Fire Masterclass

Fire futures for a flammable continent:
Imagining types of change in fire regimes

Dick Williams
Commonwealth Employment Service
What and Why I model…

Types of change and implications for climate adaptation pathways

• **Motivation**
  • Climate adaptation.
  • *Why, what model? What are you trying to better understand?*
  • Trajectories of change. Novel fire regimes and ecosystems.
  • *Include geographic scale and time resolution.*
  • Plant community; 10s to 100s km². Years-decades

• **Balancing climatology and ecology**
  • Explicitly interested in the warming-biological interactions. Direct AND indirect effects.
Case study of your modelling

2003 Alpine Fires, SE Australian mainland

• Foothill open forests
• Montane tall open forests
• Subalpine snowgum woodlands
• Alpine grasslands, herbfields, heathlands and wetlands
Typology of change template
(Thanks to Russ Wise, CSIRO)

**Inevitable:**
- Regime shift
- Range shift
- Irreversible

**Novel shocks:**
- Thresholds
- Regime shifts
- Irreversible

**Magnitude of change**
- Large, coincident, widespread
- Incremental within historical variability
- Known shocks within historical ranges
- Small, isolated, local

**Rate of change**
- Gradual
- Rapid

*Fire Masterclass 11 October 2013*
Typology of change template

**Inevitable:**
- Regime shift
- Range shift
- Irreversible

**Novel shocks:**
- Thresholds
- Regime shifts
- Irreversible

**Incremental within historical variability**

**Known shocks within historical ranges**

---

**Magnitude of change**
- Large, coincident, widespread
- Small, isolated, local

**Rate of change**
- Gradual
- Rapid

*The forest estate*
Typology of change template

Inevitable:
- Regime shift
- Range shift
- Irreversible

Novel shocks:
- Thresholds
- Regime shifts
- Irreversible

Known shocks within RHV

Incremental within historical variability

Rate of change
- Gradual
- Rapid

Magnitude of change
- Large, coincident, widespread
- Small, isolated, local
Typology of change template

**Inevitable:**
- Regime shift
- Range shift
- Irreversible

**Known shocks within historical ranges**

**Incremental within historical variability**

**Novel ecosystems and shocks**
- Burn obligate seeders again before reproductive maturity
- Interval Squeeze

**Large, coincident, widespread**

**Small, isolated, local**

**Gradual**

**Rapid**

**Rate of change**

**Magnitude of change**
Typology of change

- Inevitable:
  - Regime shift
  - Range shift
  - Irreversible

- Novel shocks:
  - Thresholds
  - Regime shifts
  - Irreversible

- Incremental within historical variability
- Known shocks within historical ranges

Magnitude of change:
- Large, coincident, widespread
- Small, isolated, local

Rate of change:
- Gradual
- Rapid

Fire in Alpine heathlands, grasslands
Typology of change template

Inevitable:
- Regime shift
- Range shift
- Irreversible

Novel shocks:
- Thresholds
- Regime shifts
- Irreversible

Incremental within historical variability

Known shocks within RHV

Magnitude of change
- Large, coincident, widespread
- Small, isolated, local

Rate of change
- Gradual
- Rapid
Typology of change template

**Inevitable:**
- Regime shift
- Range shift

**Novel shocks:**
- Thresholds
- Regime shifts
- Irreversible

**Warming PLUS Fire in Alpine heathlands, grasslands**

**Rate of change**
- Gradual
- Rapid

**Magnitude of change**
- Large, coincident, widespread
- Small, isolated, local

**Rate of change**
- Large, coincident, widespread
- Small, isolated, local
Typology of change template
(Thanks to Russ Wise, CSIRO)

**Inevitable:**
- Regime shift
- Range shift
- Irreversible

**Novel shocks:**
- Thresholds
- Regime shifts
- Irreversible

**Known shocks within historical ranges**
- Incremental w’in RHV

**Rate of change**
- Gradual
- Rapid

**Magnitude of change**
- Large, coincident, widespread
- Small, isolated, local
What does my modelling mean?

**Anticipating change and decision making**

- *Meaning, practical and scientific utility of approach?*
  - Adaptation options for biodiversity conservation
  - Putting adaptation pathways in ecological context - ecology matters!
    - Feral fires vs Range of Historical variability
    - 5% solution for prescribed burning
    - Reseeding Ash forests burnt a second or third time since 2003
    - Grazing to reduce fire risk
Typology of change

Inevitable:
- Regime shift
- Range shift
- Irreversible

Novel shocks:
- Thresholds
- Regime shifts
- Irreversible

Magnitude of change:
- Small, isolated, local
- Gradual
- Rapid

Rate of change:
- Large, coincident, widespread
- Small, isolated, local
Modelling caveats and challenges

Values, preferences, rules
My 3 biggest modelling challenges are?

1. Trajectories in general
2. The next 5-10 years in particular
3. Projection signposts