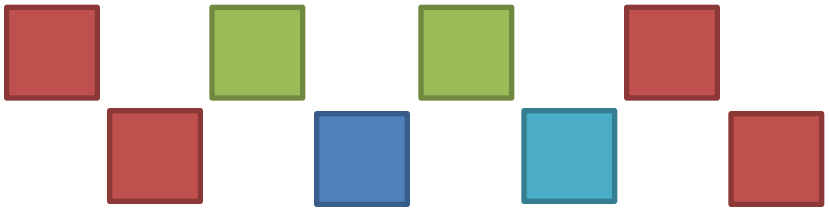
Fire in Australia: Color-coding and measuring intuition.

Justin Perry and Jeremy VanDerWal



JAMES COOK UNIVERSITY AUSTRALIA

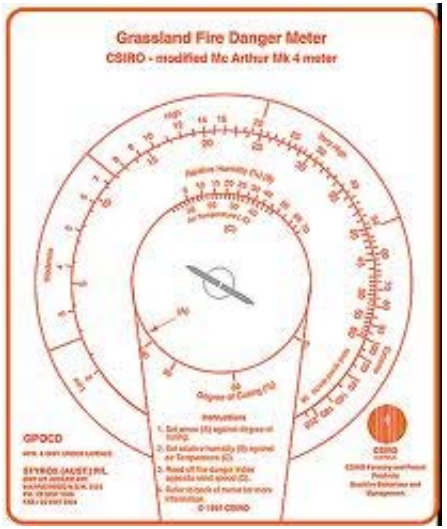
CSIRO

Firescape Science

Managing fire is tricky

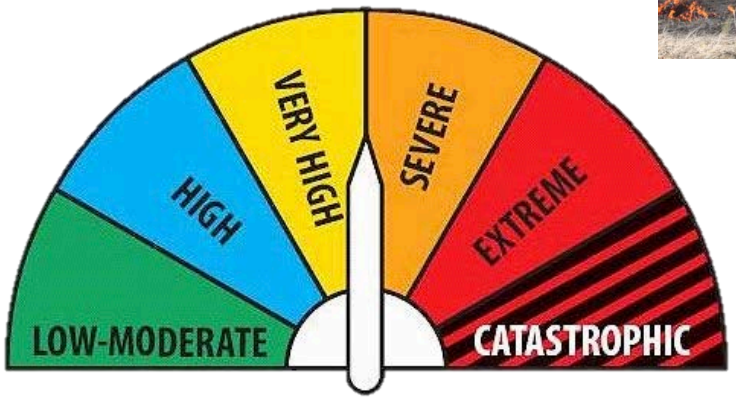
- Current method of fire risk management…

Conditions, outlooks



Experience – good and bad

Try it out… hope for the best!



Measure of risk

Consequences of getting it wrong..

Western Australia: Heartbroken families 'allowed to see burnt homes'

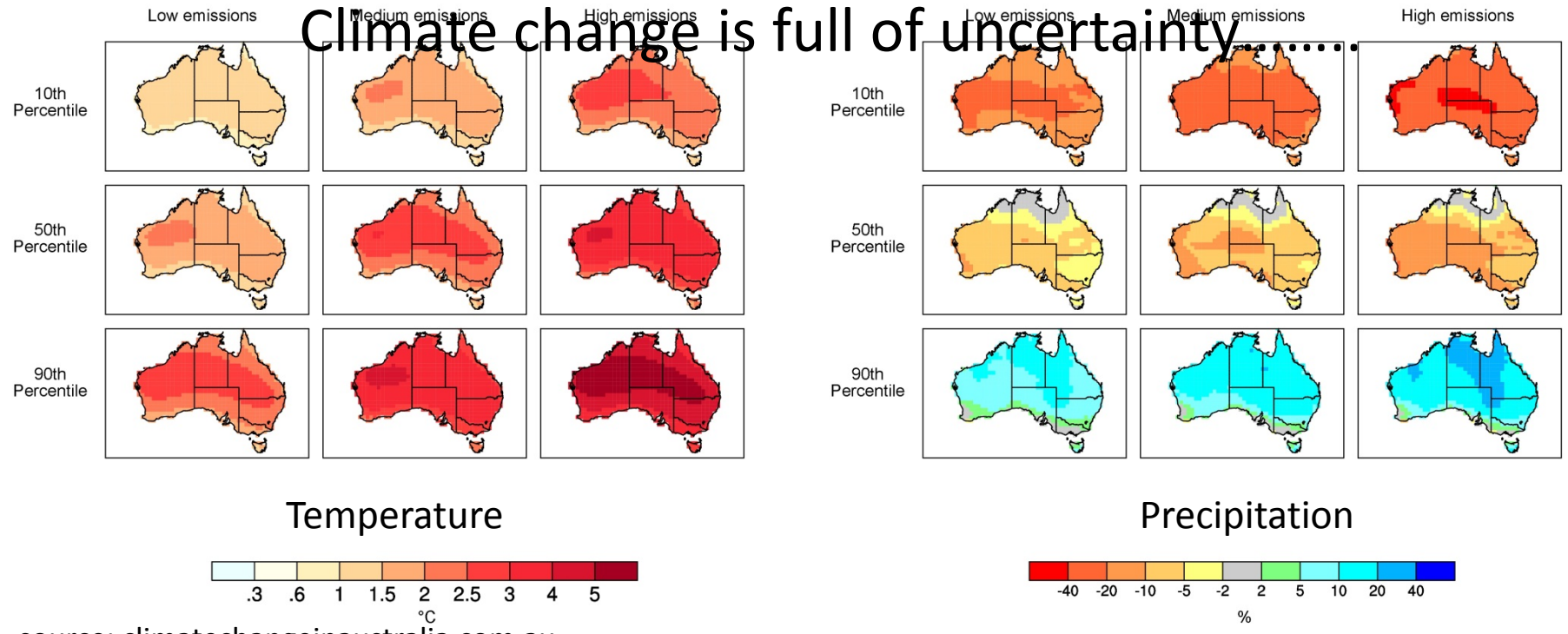
PerthNow

November 25, 2011 5:13PM

Intuition and experience is only based on the experiences of individuals:

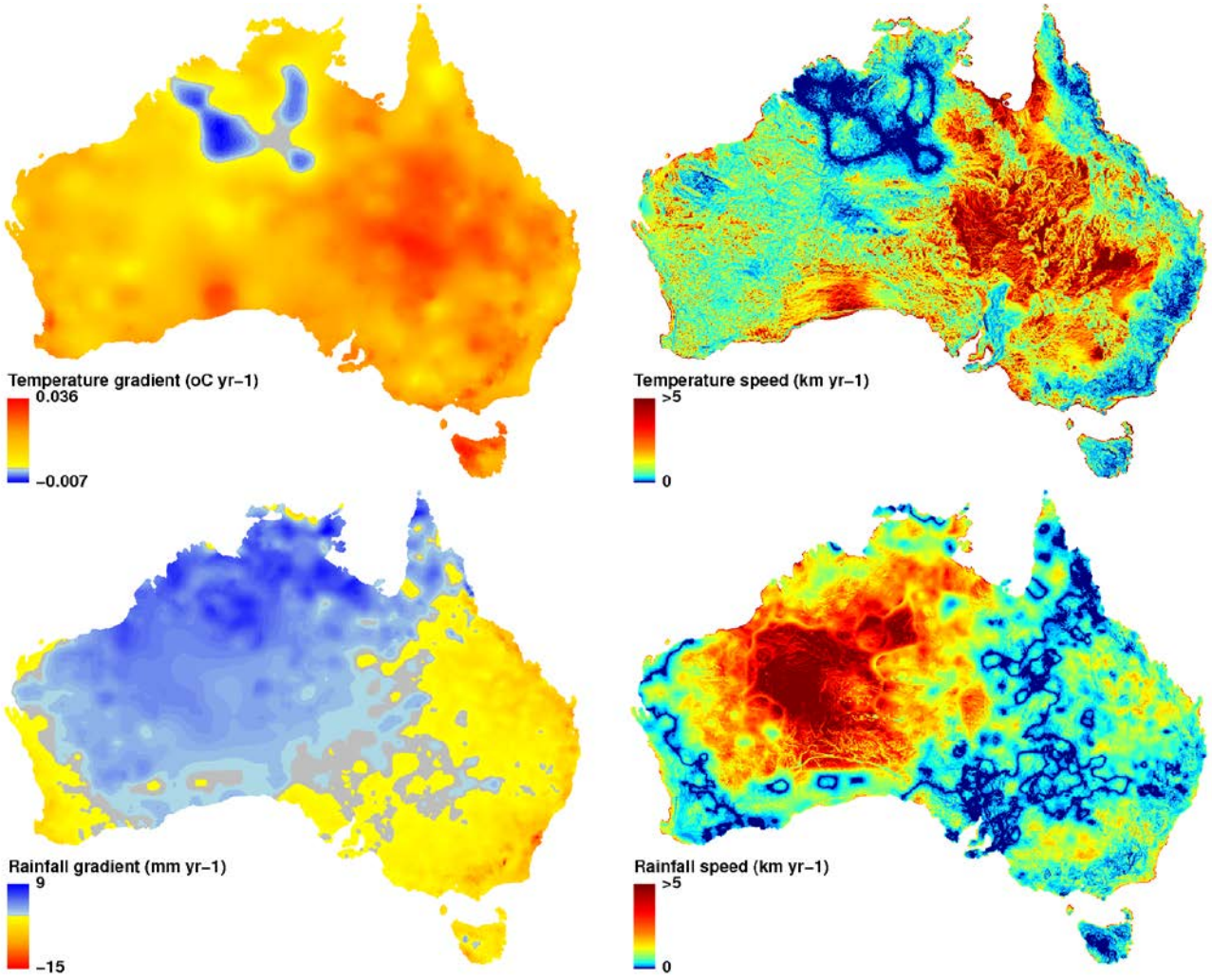
How do we learn from others and adapt to conditions outside of our own limited experience? How do we deal with uncertainty?

Climate change is full of uncertainty……



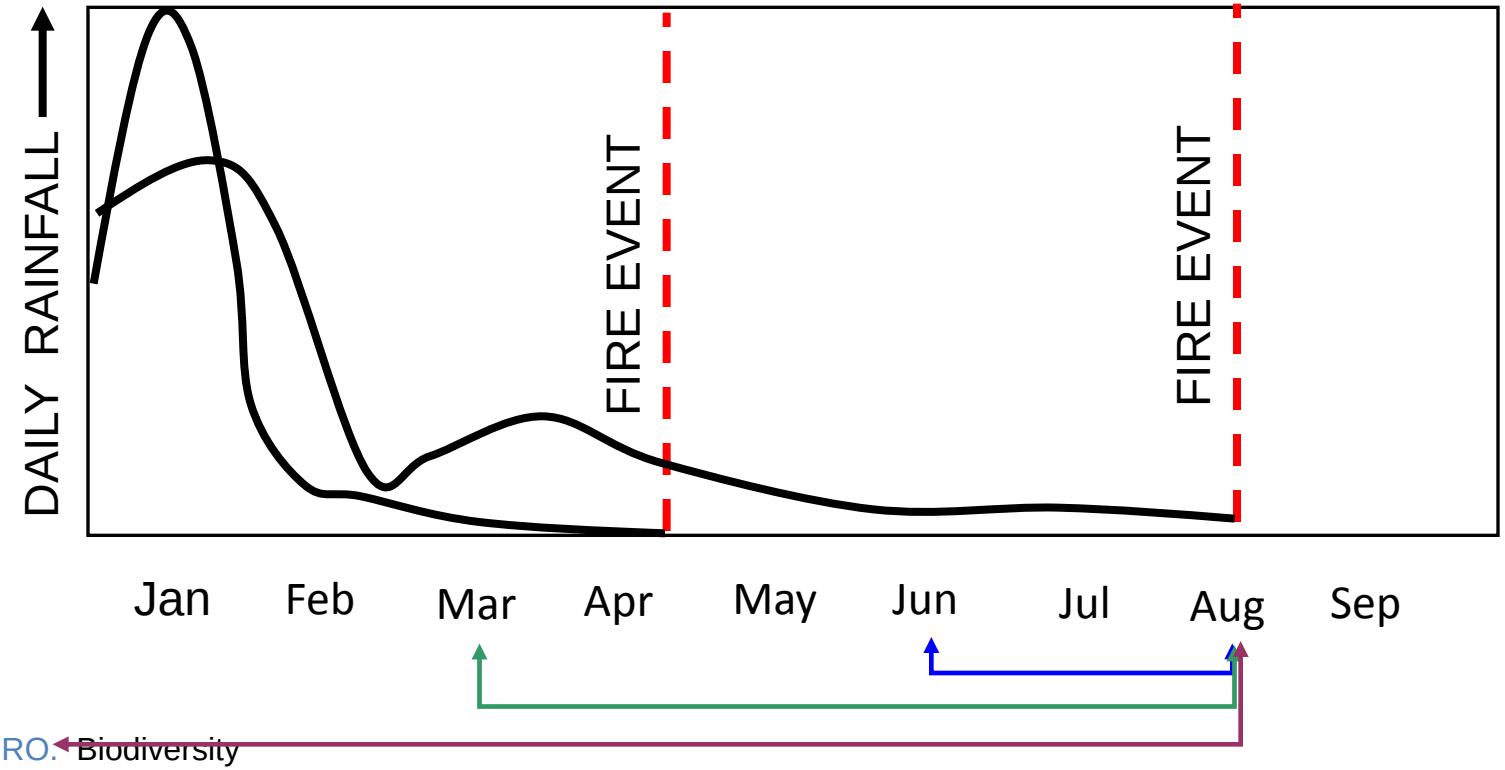
source: climatechangeinaustralia.com.au

1950 – 2010 Climate change

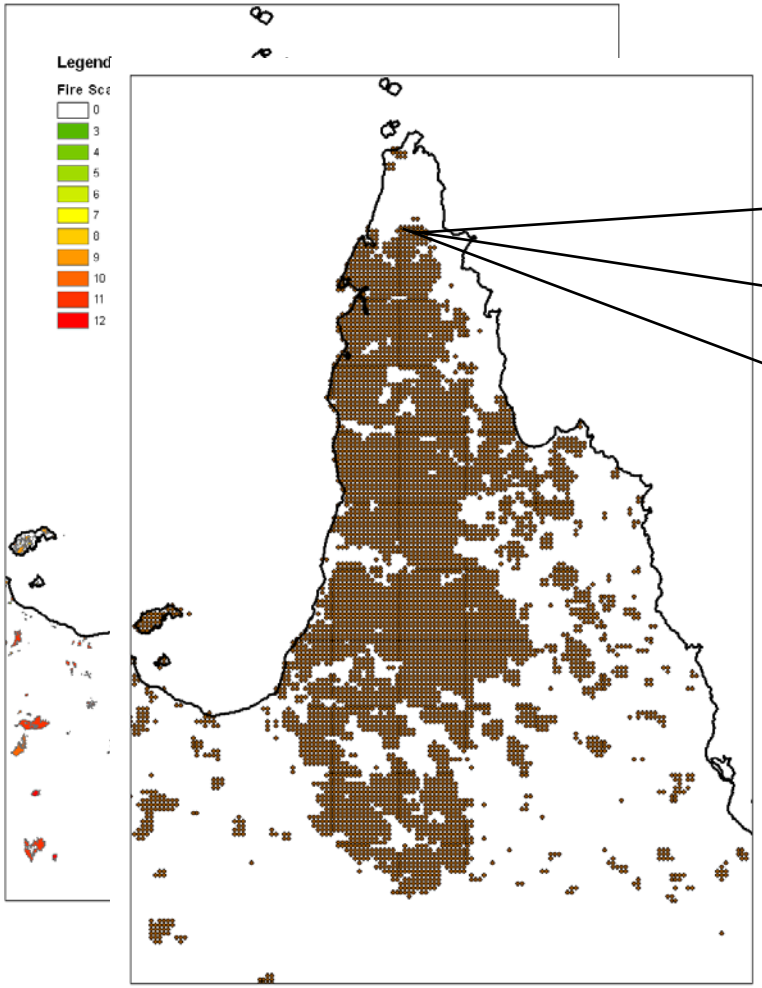


How might a model look?

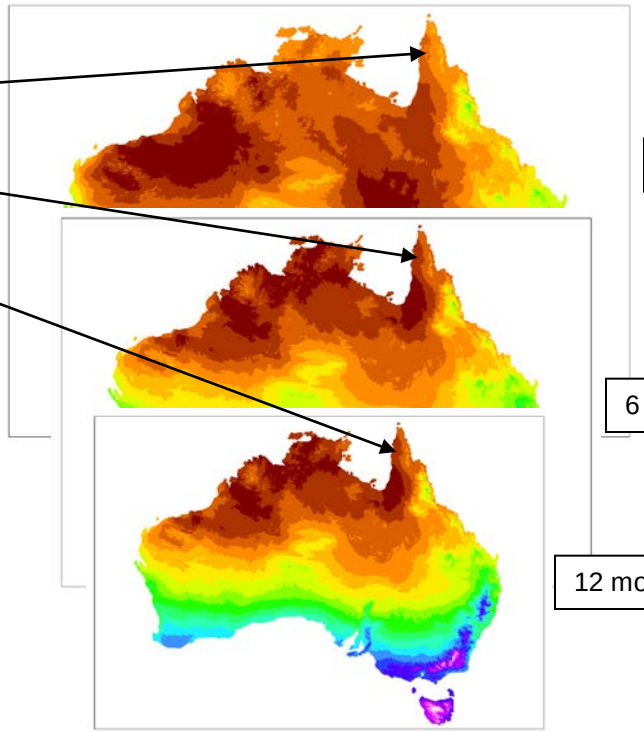
Annual weather patterns are highly variable in the tropics.



Using satellite derived fire scars, weather and vegetation.



Intersect with climate grids to get value at same location and time



3 months

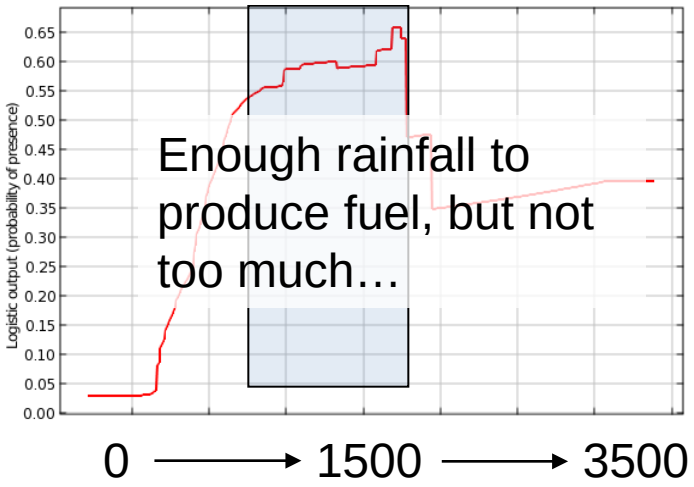
6 months

12 months

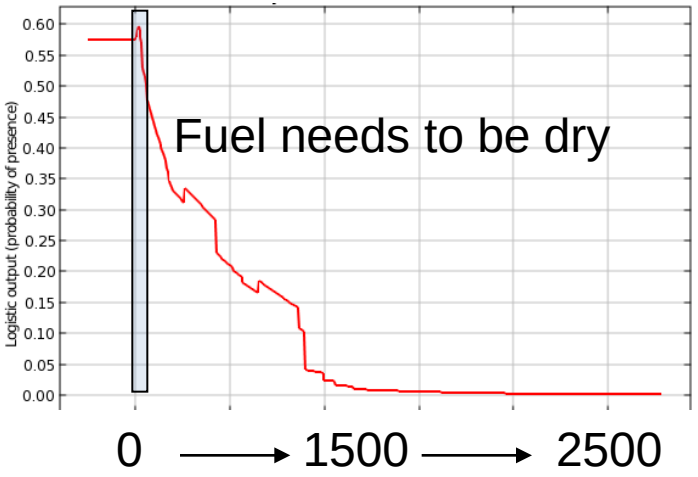
Turning knowledge and experience into a tool: Modelling fire

Broad vegetation type Northern Australia

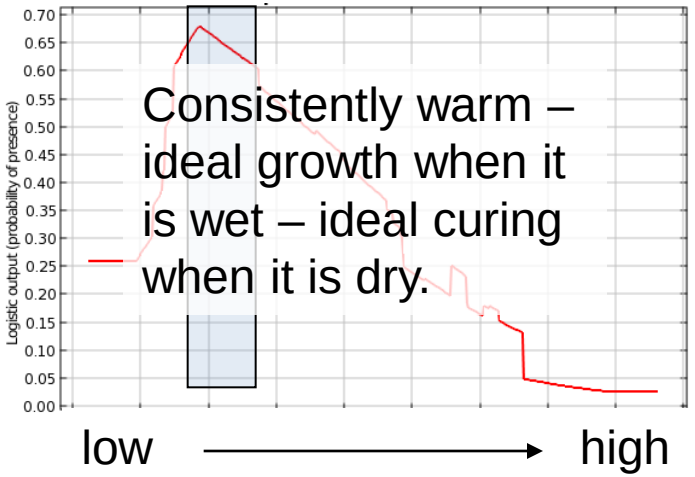
Rainfall in the wettest quarter – 12 months



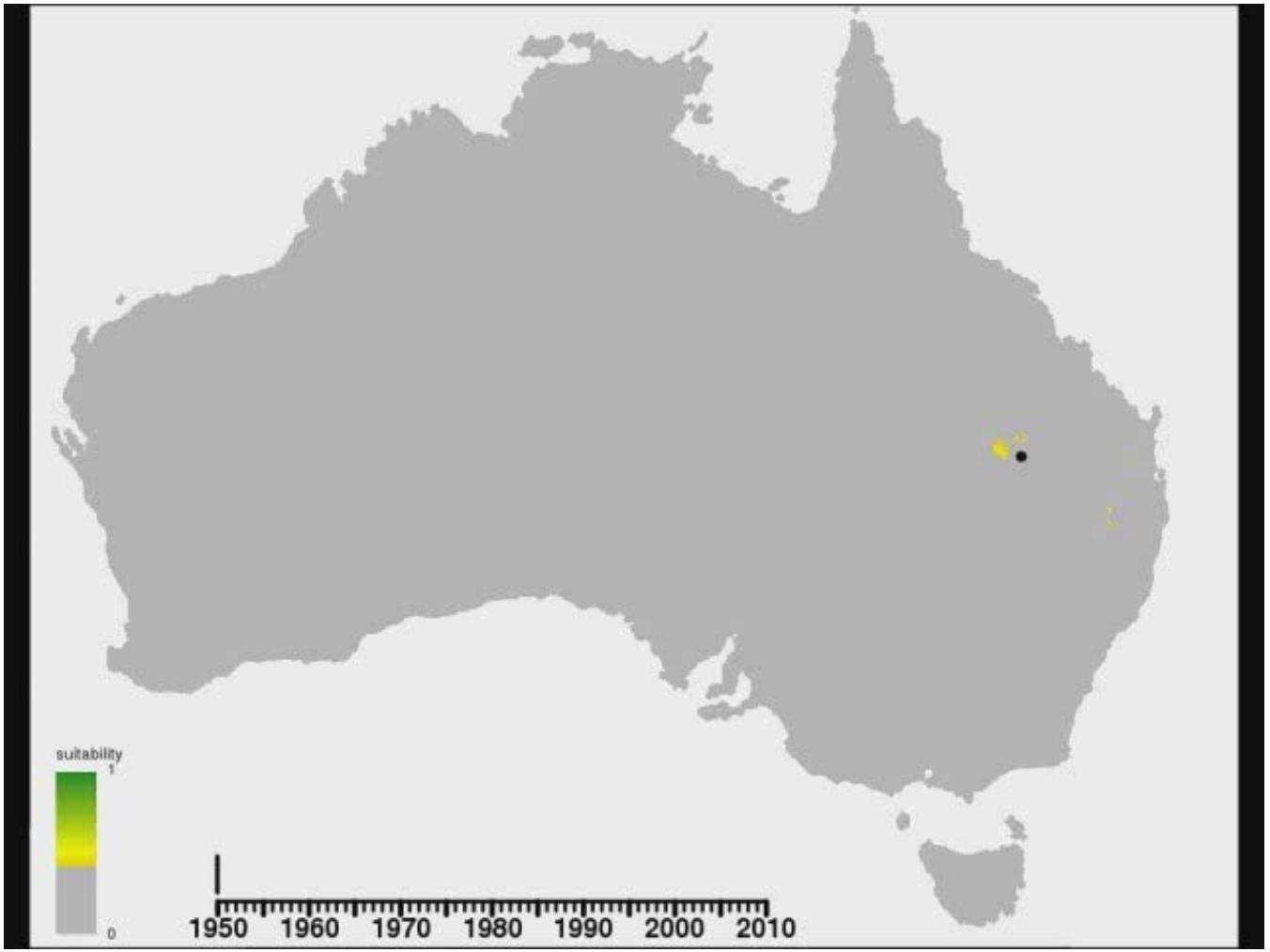
Rainfall – 3 months



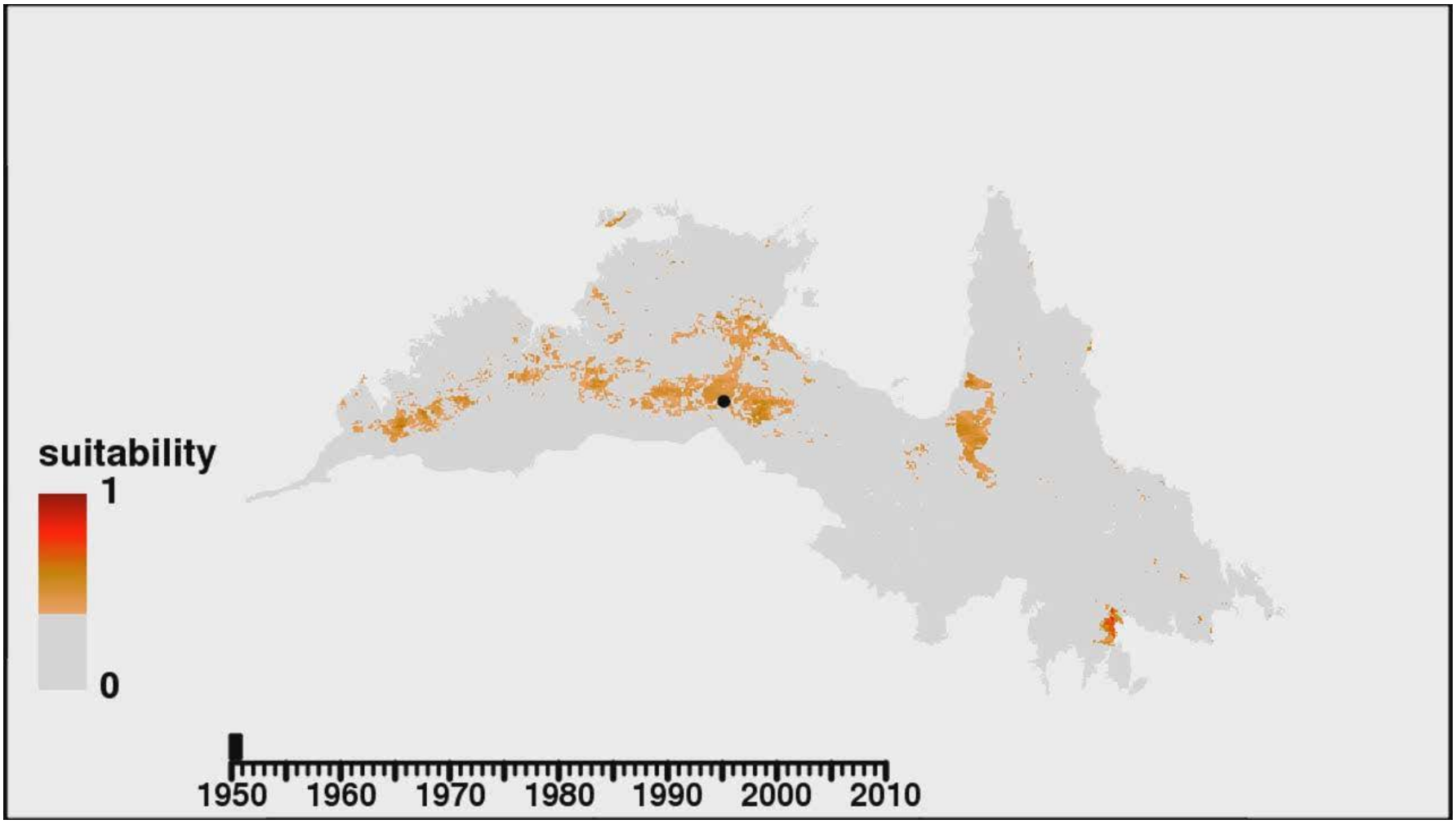
Temperature seasonality – 12 months



Fire suitability 1950 - 2010



Fire suitability November



Current paradigms

1. *Climate change may already be altering fire regimes and will continue to do so in the future.*

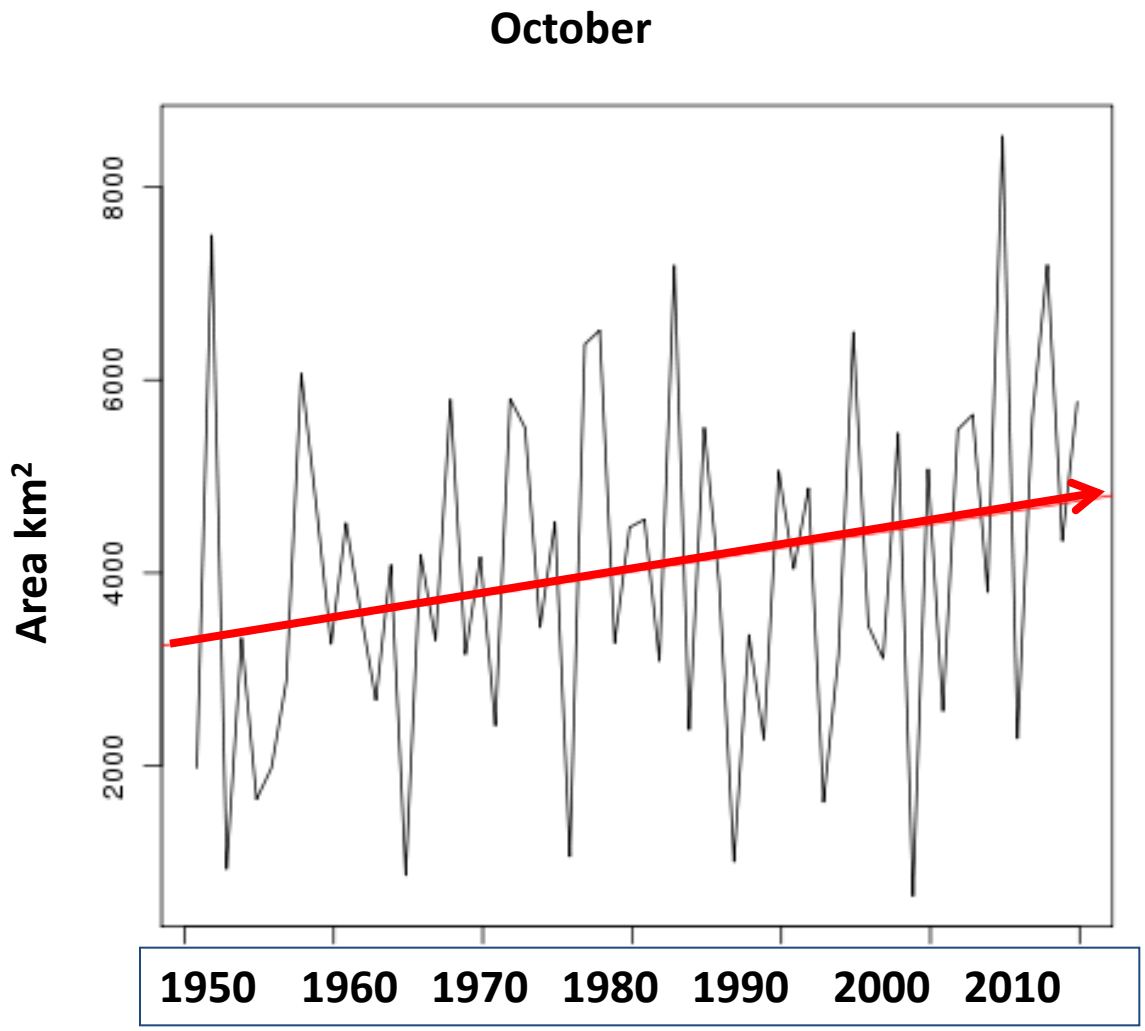
   Biodiversity and Climate Change Expert Advisory Group: 2009

2. *Climate change is unlikely to have a major impact on fire regimes in this biome.*

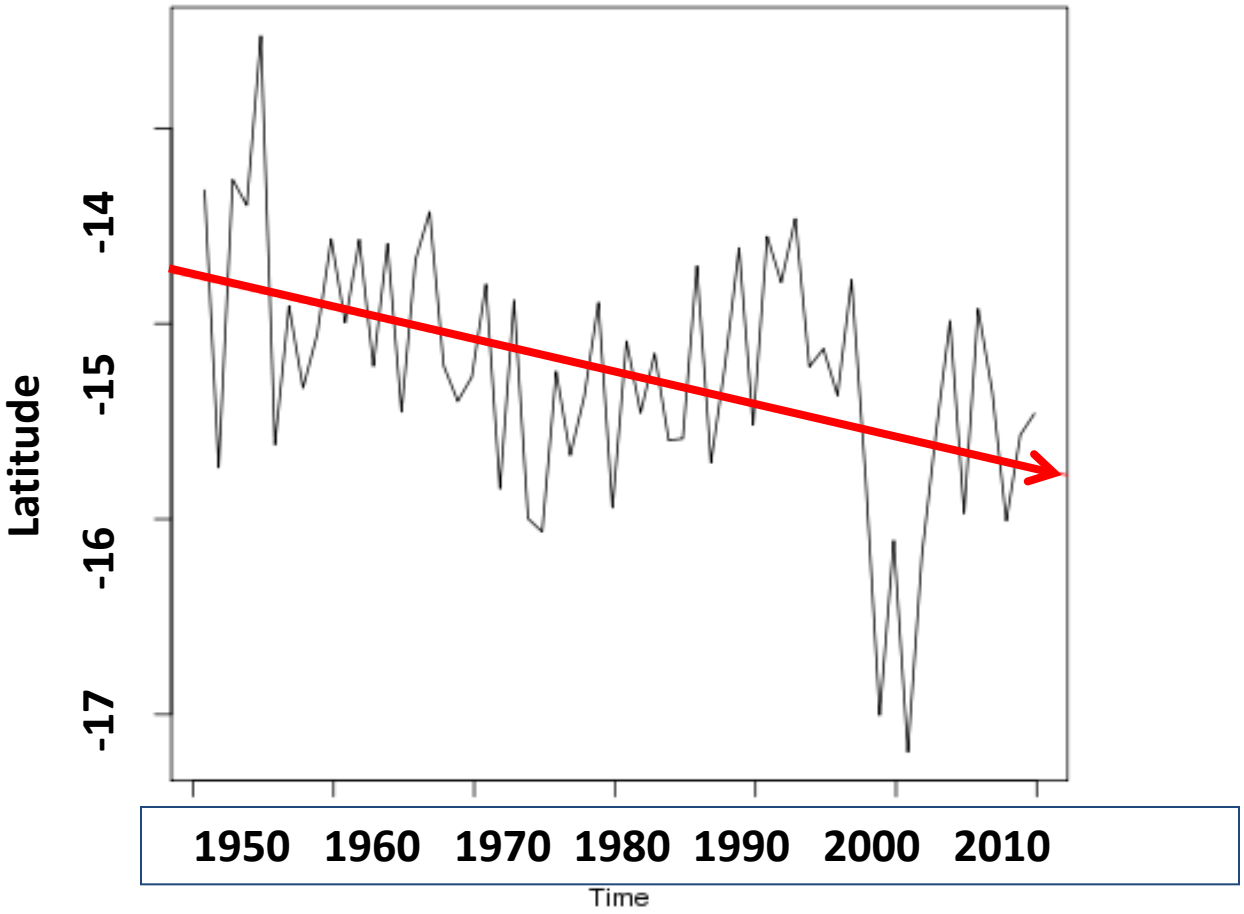
   FIRE MAXIMUM.

   Williams et al 2009; Bradstock 2010, Global Ecology and Biogeography

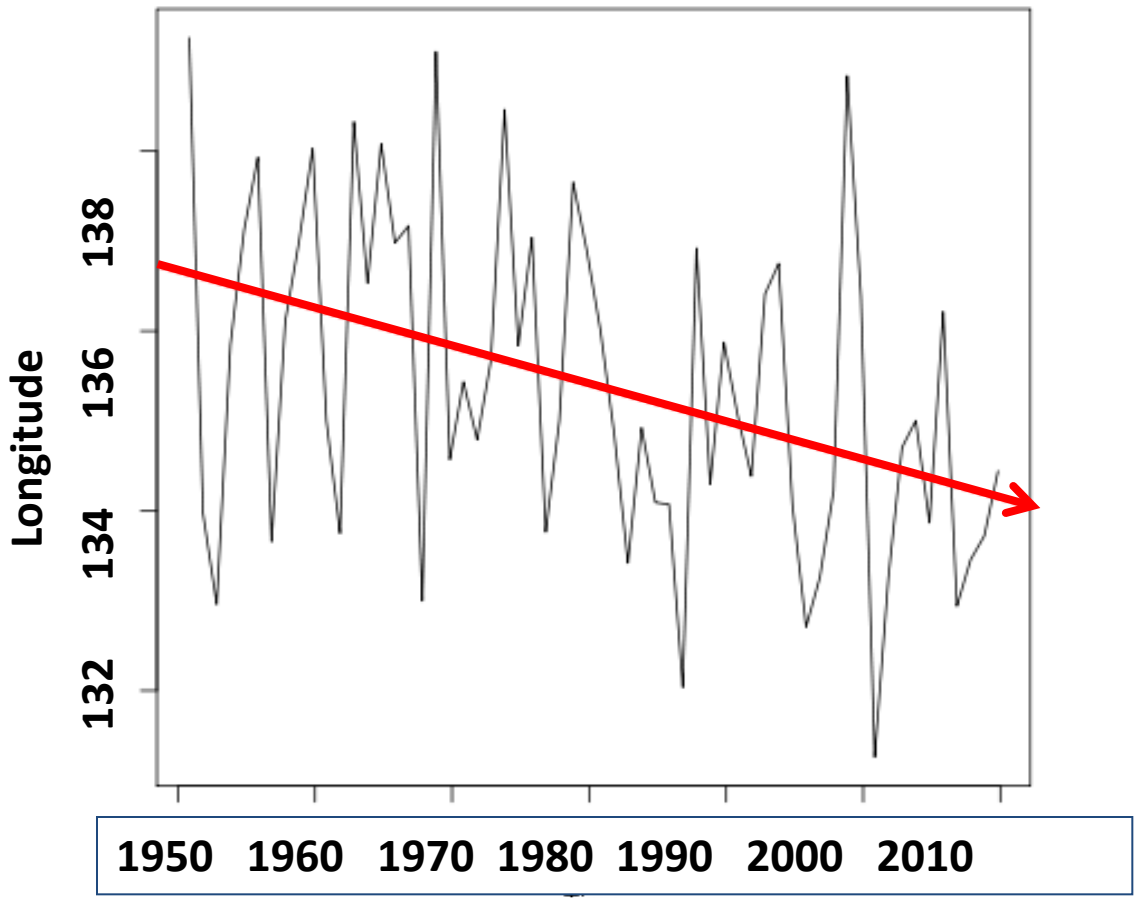
Both are, in part, true


October
Area km²
8000
6000
4000
2000
1950
1960
1970
1980
1990
2000
2010

Predicted distribution trending south

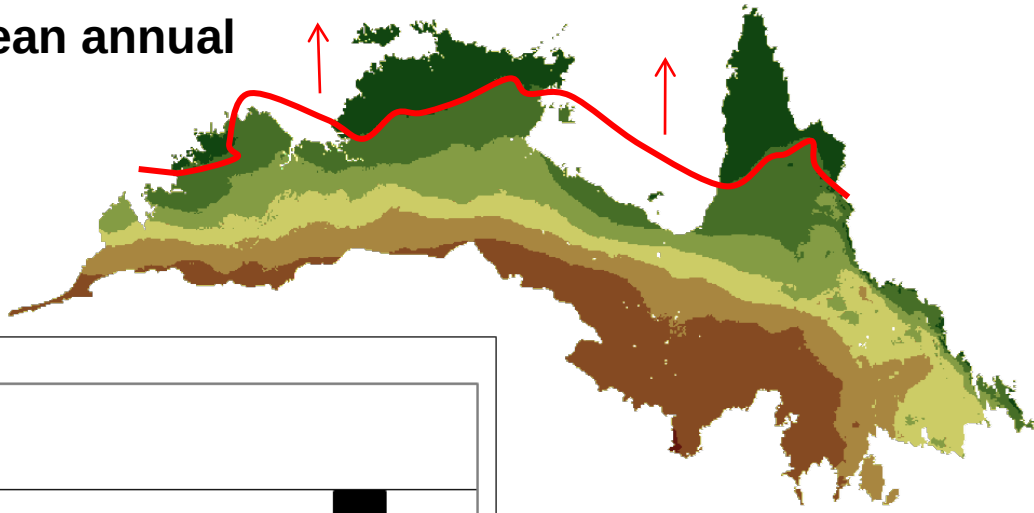


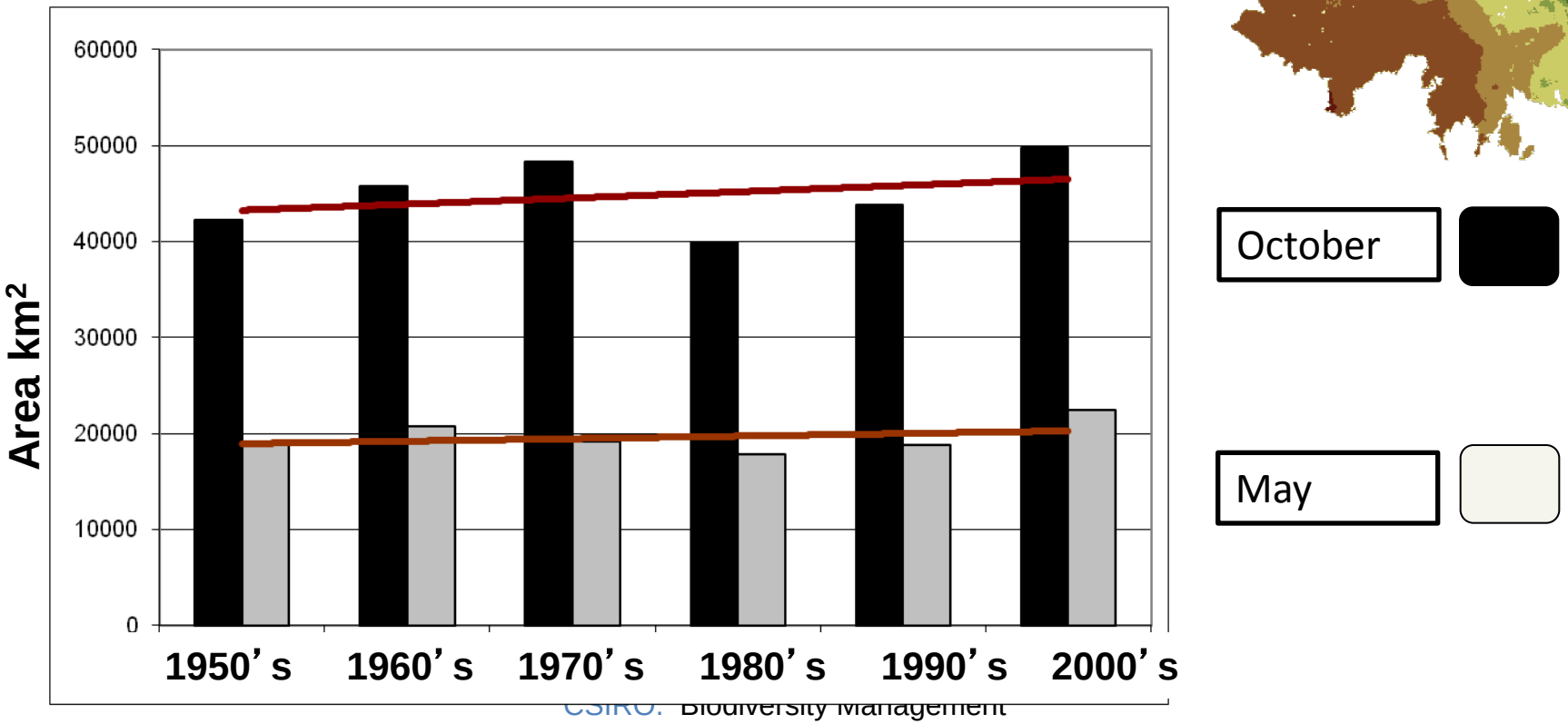
Predicted distribution trending west



Fire suitability in high rainfall areas.

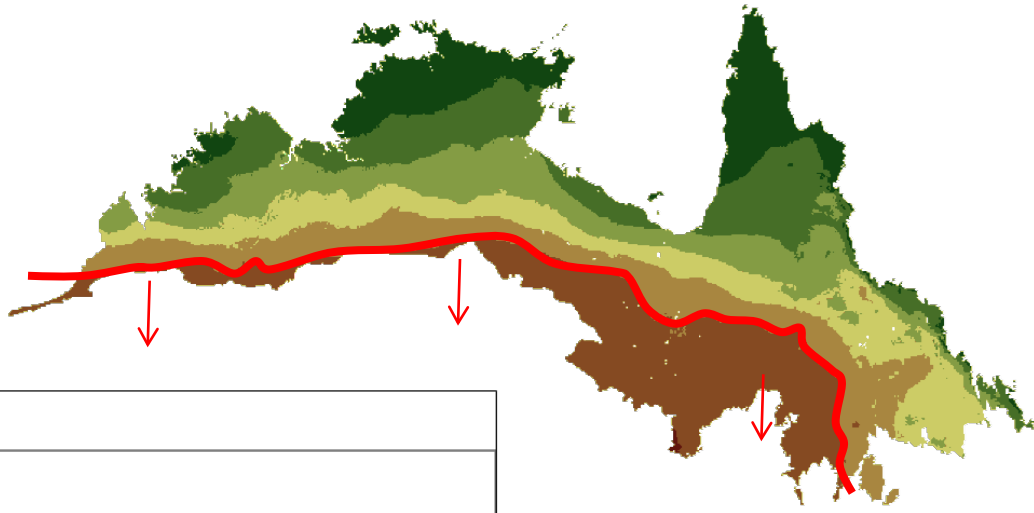
> 1100mm mean annual rainfall

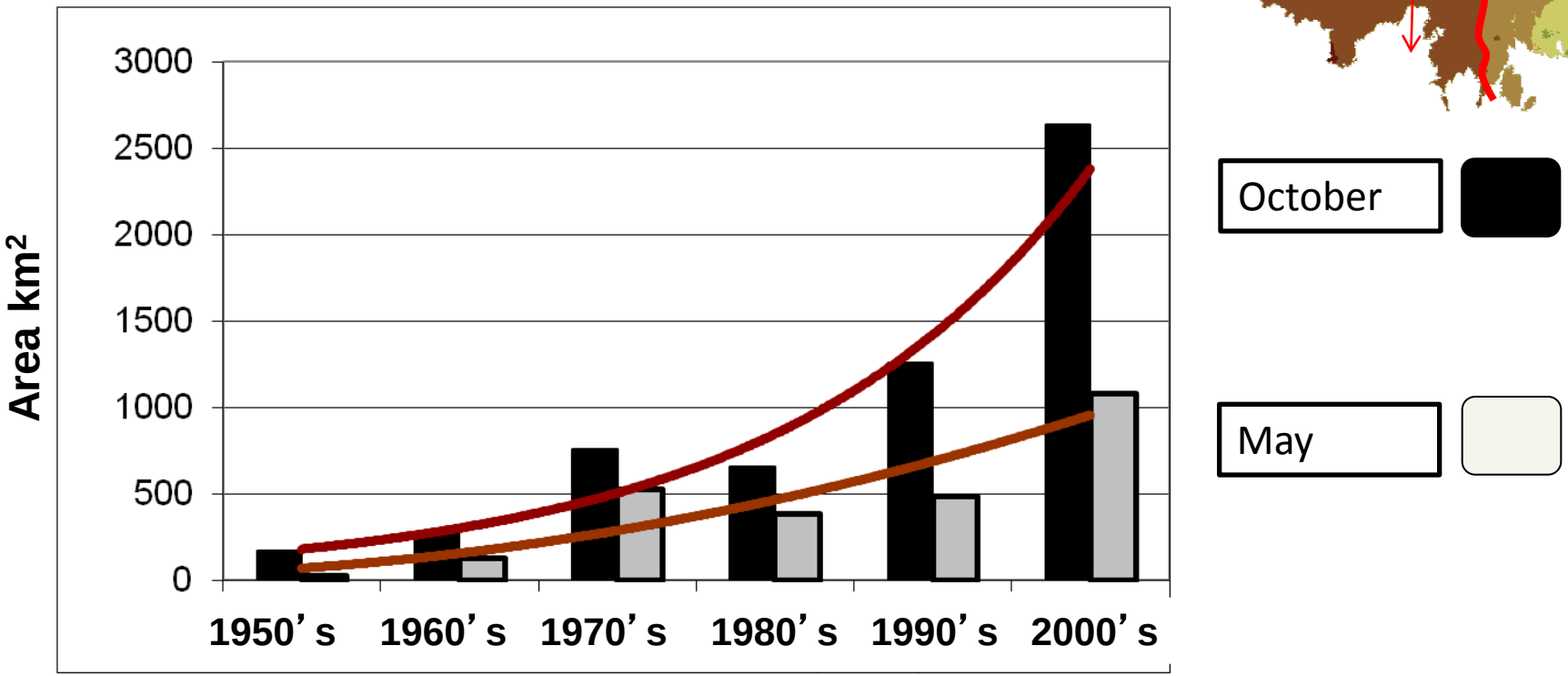


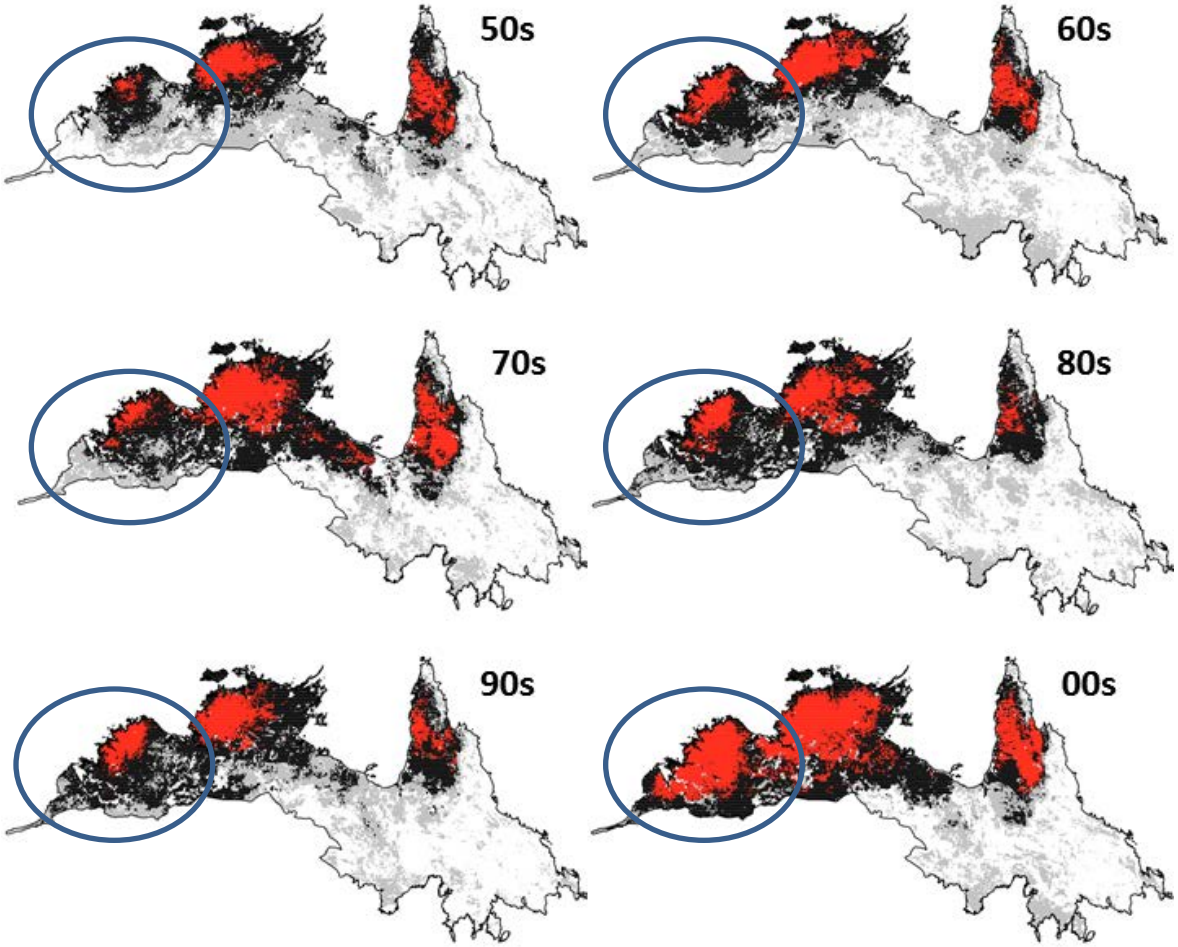


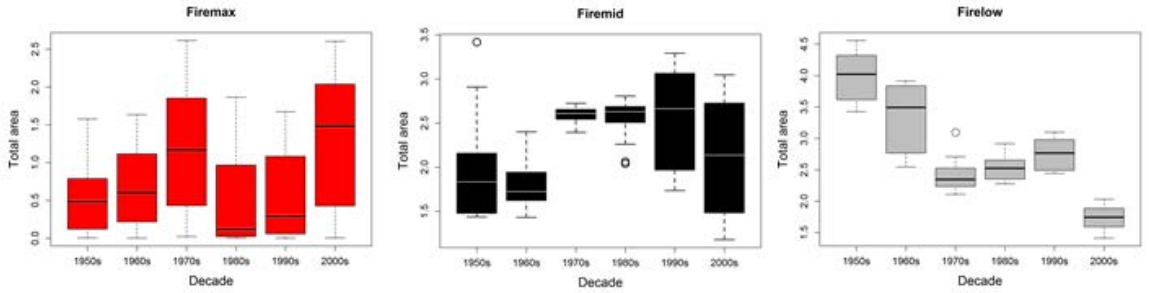
Fire suitability in low rainfall areas.

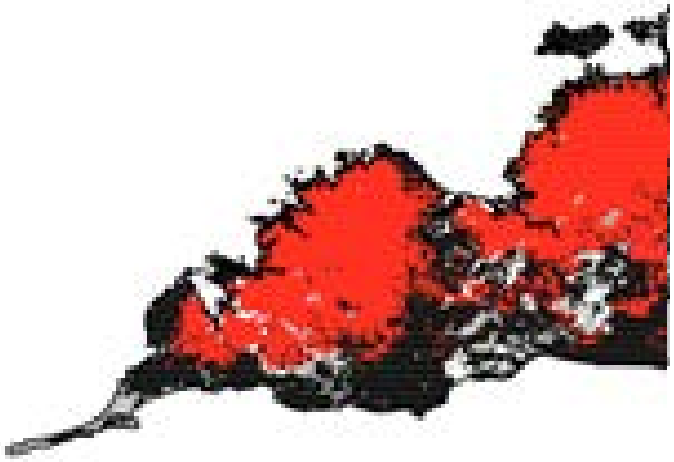
< 450 mm mean annual rainfall






50s
60s
70s
80s
90s
00s


Firemax
Firemid
Firelow
Total area
Decade
1950s
1960s
1970s
1980s
1990s
2000s



2000’s

Interpretation, uptake and end-user involvement

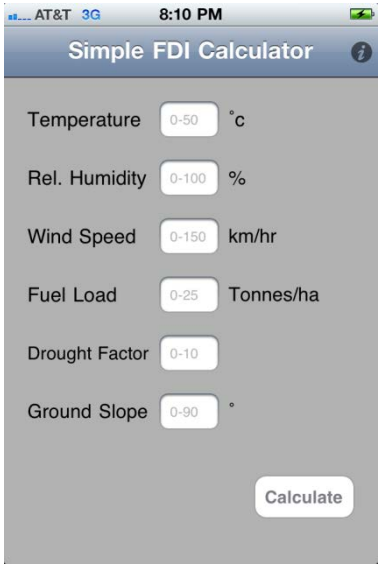
- Develop website & mobile apps that provide information and best estimates of fire risk.

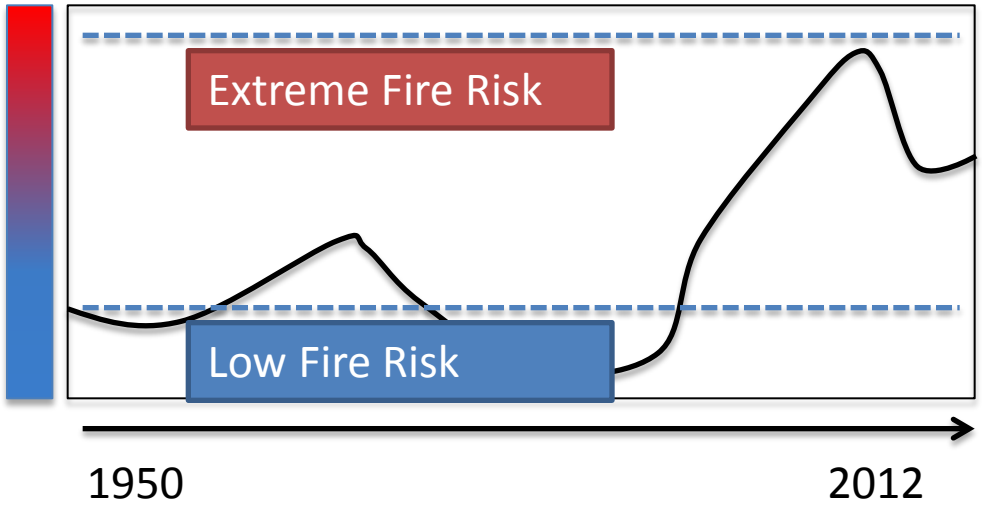
For the end-user...

- We see this as a decision support tool, visualized as a map-based browser of fire-specific information. Selecting a location would provide information on:
- · Probability of fire and potential impacts
- · Current and recent weather
- · Fire history (e.g., time since last burn)
- · Vegetation and topographic characteristics
- · Land tenure and infrastructure
- · Permits and local legislation
- · Etc.
- Included will be a mechanism for feedback that allows end-users to provide invaluable knowledge and experience for further improvements.

For a scientist...

- We see an intuitive online resource that represents a continuous, continental fire history for Australia. It would act as a repository of both knowledge (personal experience) and data. Data can be shared via web link or exported in multiple formats for local storage, manipulation and analysis.

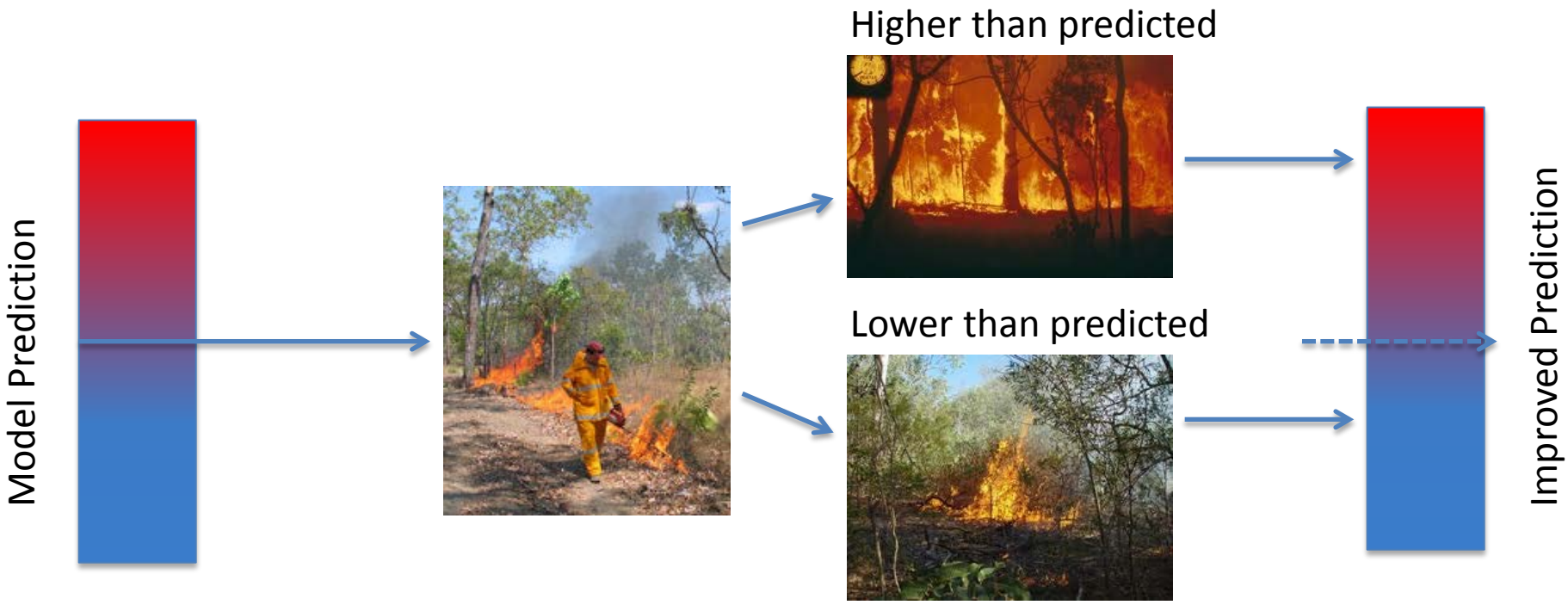

AT&T 3G
8:10 PM
Simple FDI Calculator
Temperature
0-50
°c
Rel. Humidity
0-100
%
Wind Speed
0-150
km/hr
Fuel Load
0-25
Tonnes/ha
Drought Factor
0-10
Ground Slope
0-90
°
Calculate

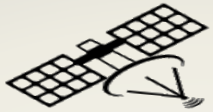

Extreme Fire Risk
Low Fire Risk
1950
2012

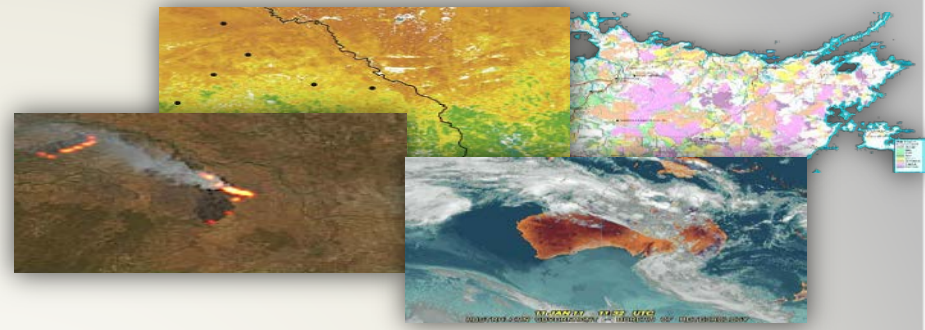

suitability
1
0
1950 1960 1970 1980 1990 2000 2010

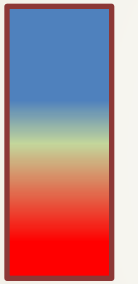
Machine learning

- Model learns as more information is fed into it……. A receptacle for experience.

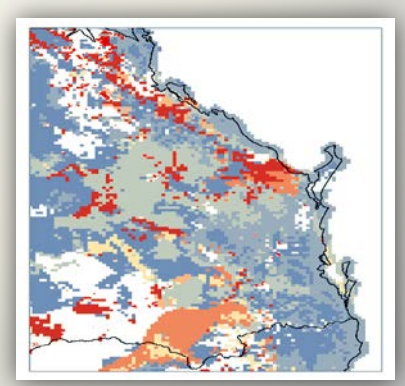









Mission Control Center



Benefits

Human environment

- Assists with prescribed burns to protect human lives and well-being, infrastructure and service




Natural Environment

- Avoid frequent catastrophic high intensity fires that impact flora and fauna.


Thankyou