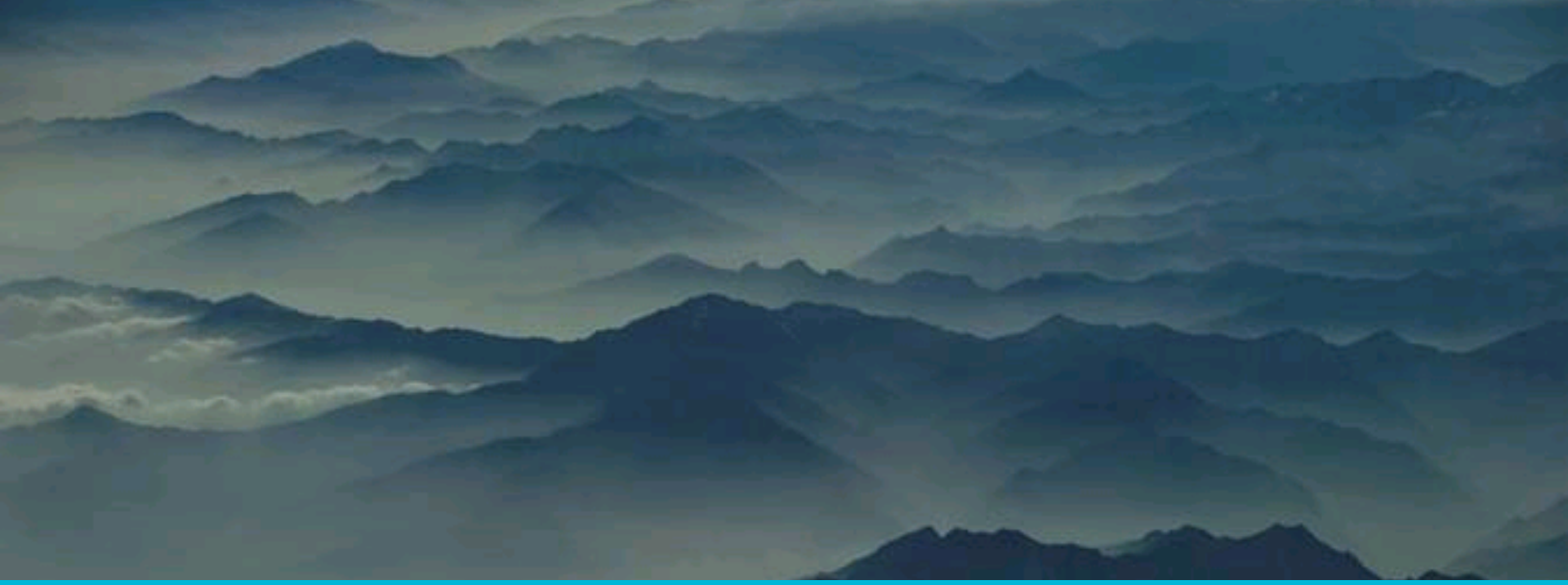


Assessment in Australia: towards adaptation

Mark Stafford Smith | Science Director

Dialogue on National Climate Change Assessment , London, 6th February 2013

CLIMATE ADAPTATION FLAGSHIP
www.csiro.au

CSIRO

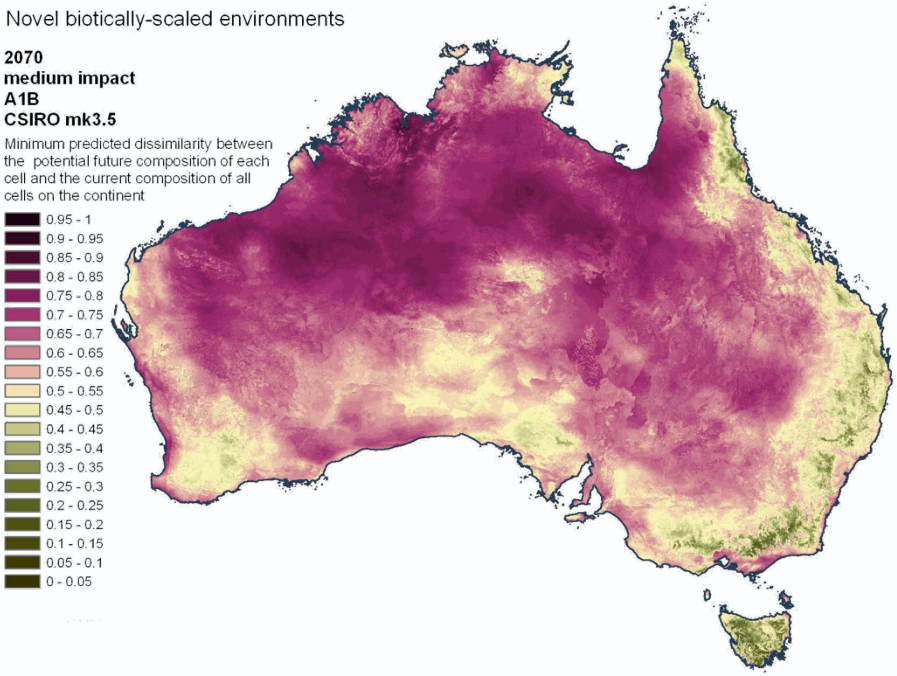
Context, policy and history

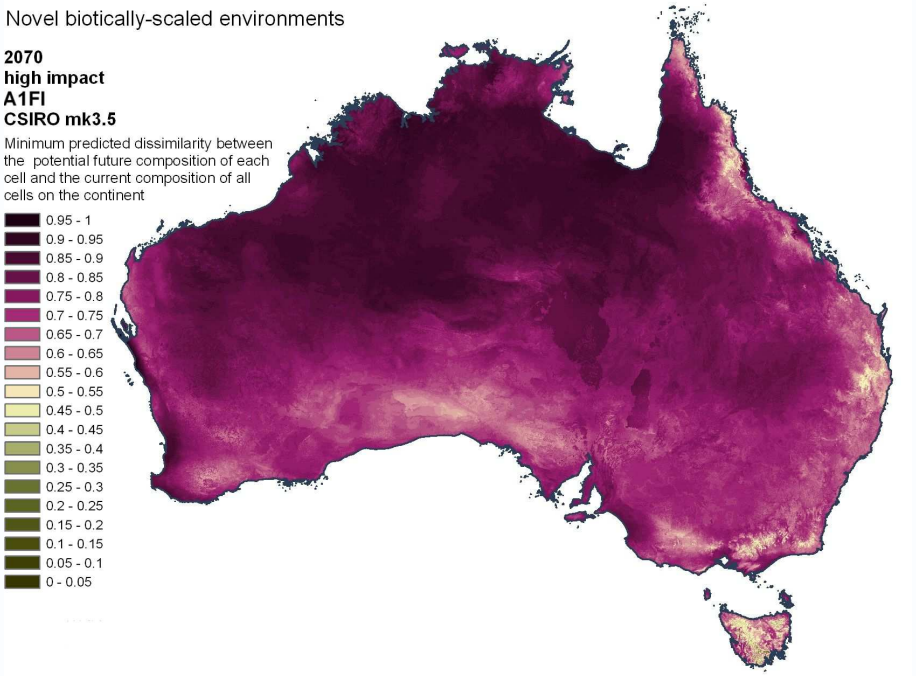
- **Roles**
  - **Australian Government – position paper, *Adapting to Climate Change in Australia* (2010); Department of Climate Change and Energy Efficiency**
  - **Bureau of Meteorology (State governments, Unis)**
  - **CSIRO (climate science with BoM, projections, mitigation, adaptation)**
- **Climate change in policy**
  - **Climate change science, formal programs – domestic and Pacific**
  - **Mitigation – carbon price and domestic politics, etc**
  - **Adaptation...**
- **Past priorities for adaptation**
  - **Vulnerability qualitatively assessed (though Garnaut Review 2008 + AR4)**
    - natural ecosystems, infrastructure, agriculture, water supply and coastal management; + extreme events and indigenous communities
  - **Productivity Commission report 2012, but did not quantify at all**
  - **Regular Intergenerational Report from Treasury on social/fiscal issues**

Recent and current activities

- **Various sectoral analyses**
  - **Projections for Australia 2007 – ClimateChange Online (CMIP derived)**
  - **Agriculture (ABARE)**
  - **National Coastal Vulnerability Assessment**
  - **Many local or sub-sectoral impacts and vulnerability assessments**
    - Climate Futures for Tasmania, NSW
    - NSW/ACT Regional Climate Modelling NARCliM
- **Specific ~national impacts +/- adaptation analyses**
  - **Concrete, heat, SLR, extreme winds analysis, environmental change, South-East Queensland integrated regional study (others coming)**
  - **Not much systematic on impacts or adaptation for whole economy**

National environmental change datasets
(e.g. GDMs of novel environment projections for 2070)

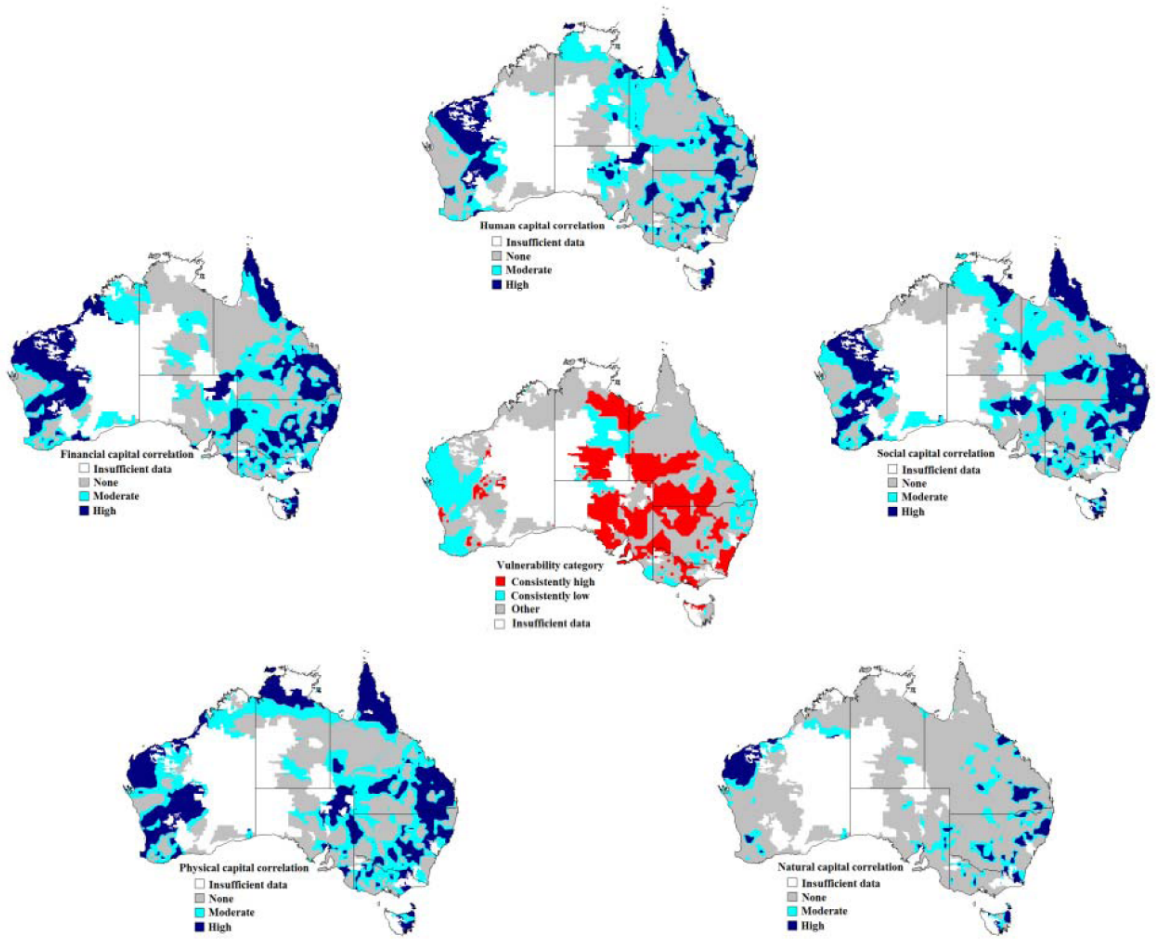




See http://www.csiro.au/nationalreservesystem
and http://www.csiro.au/en/Organisation-Structure/Flagships/Climate-Adaptation-Flagship/CAF-working-papers/CAF-working-paper-12.aspx

Ferrier *et al.* 2012

Vulnerability projected to 2030 – broadacre communities



Integrates measures from Human, Social, Physical, Financial and Physical capital

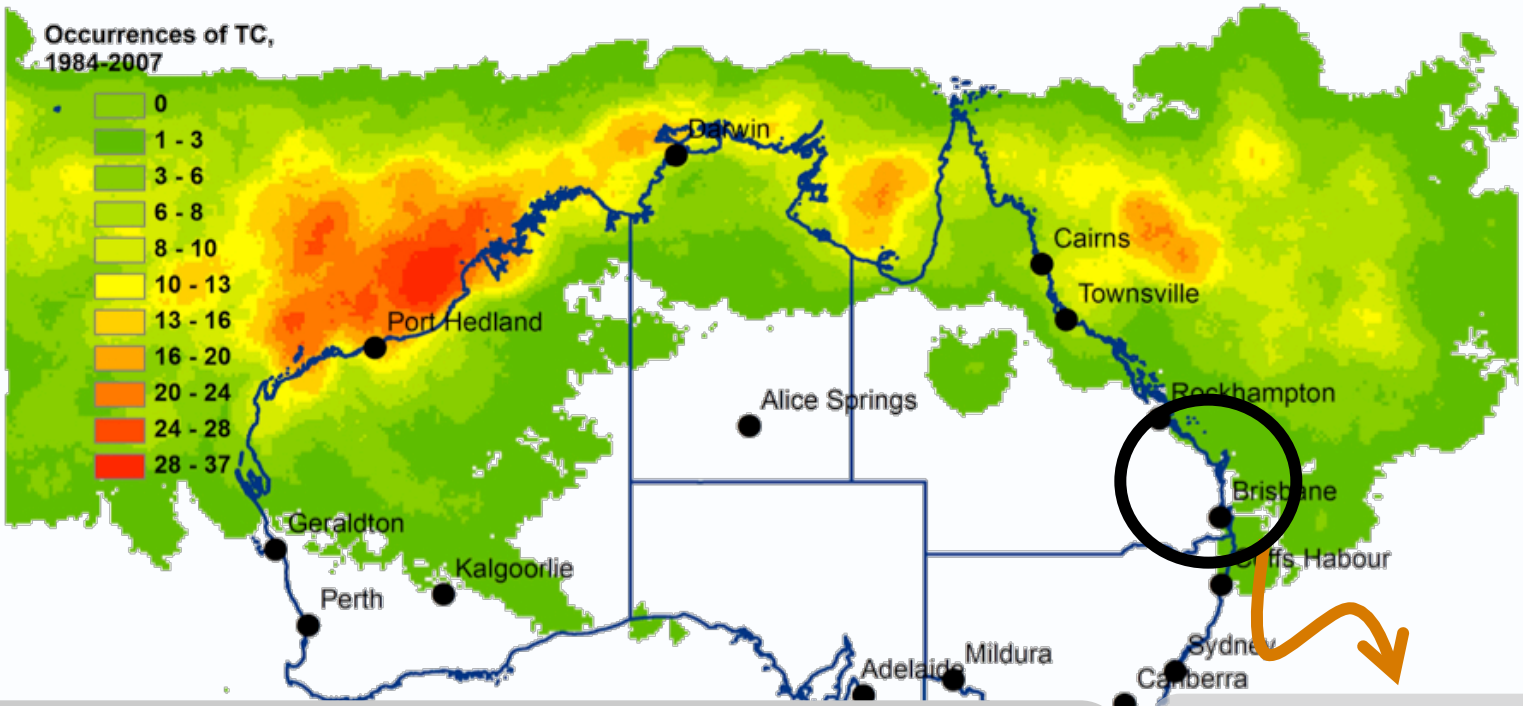
Red region is projected to be consistently vulnerable across several climate change models/ scenarios

Outer maps show correlations with 5 capitals (blue is high)

Web delivery:

http://apsrunet.apsim.info/VulnerabilityAssessmentAustralia/

Areas Prone to Extreme Wind Events in Queensland



Change Brisbane's wind loading standards today?

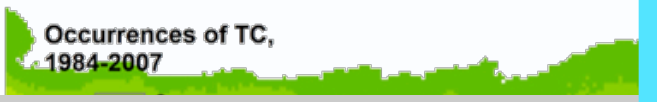
- **NPV = $0.7 bn (if no changes in wind extremes eventuate) up to $8.3 bn (if cyclones shift southwards by 2100).**
- **Delaying change in standards rapidly reduces NPV**

Vulnerable to extreme wind hazard, especially if cyclones move south

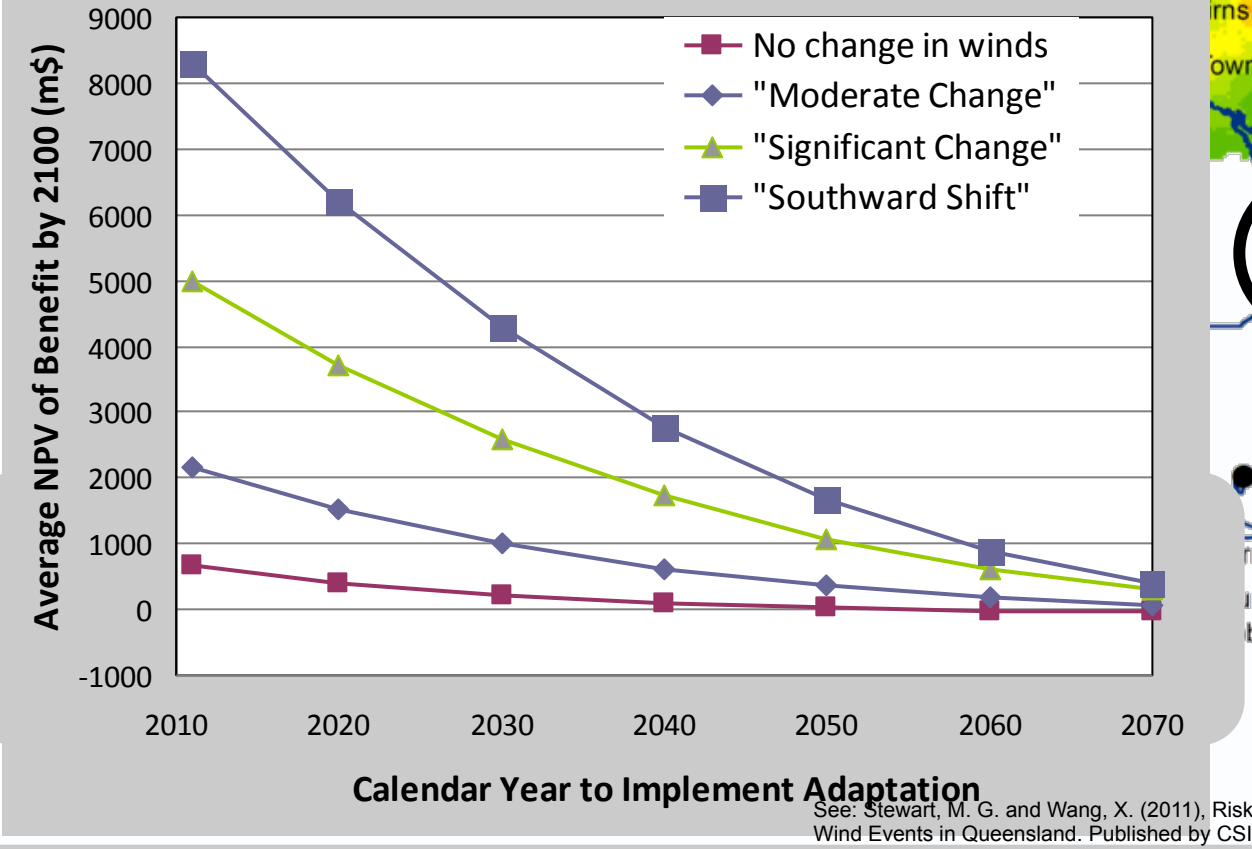
Areas Prone to Extre

Key attributes

- No regrets (value even if no climate change)
- Robust (value for all scenarios)
- Act early (rapid decline in value over time)
- Proactive collective action (else delay)



Adaptation Timing and Be



Vulnerable to extreme wind hazard, especially if cyclones move south

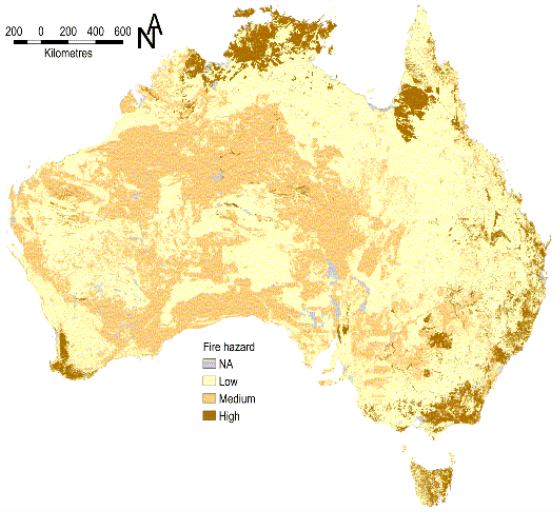
See: Stewart, M. G. and Wang, X. (2011), Risk Assessment of Climate Adaptation Strategies for Extreme Wind Events in Queensland. Published by CSIRO, Canberra, May 2011. ISBN 978 0 643 10431 0
And Stewart, M. G., Wang, X. and Willgoose, G.R. (2012), Indirect Cost and Benefit Assessment of Climate Adaptation Strategies for Extreme Wind Events in Queensland. Published by CSIRO, Canberra, May 2012. ISBN 978 0 643 10854 7

National infrastructure exposure and impacts

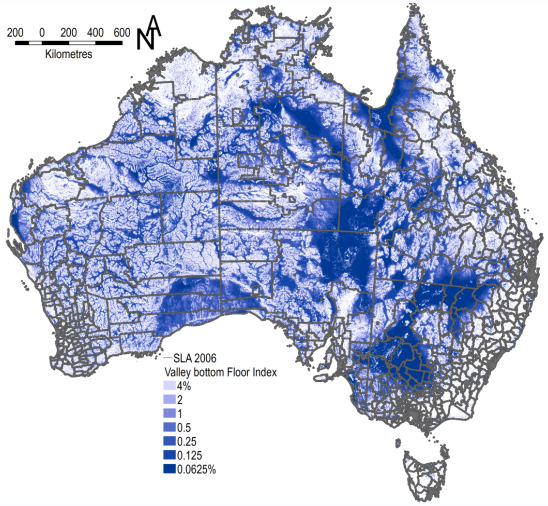
Exposure maps

Coastal Inundation

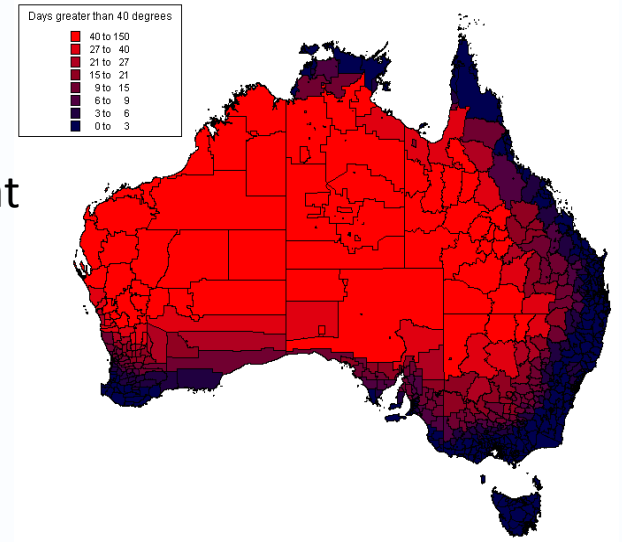
Fire



Inland Flood

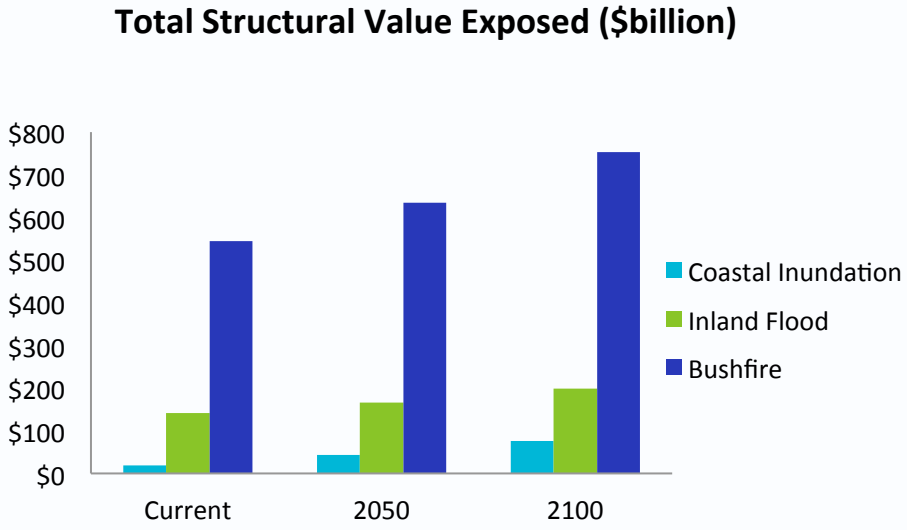


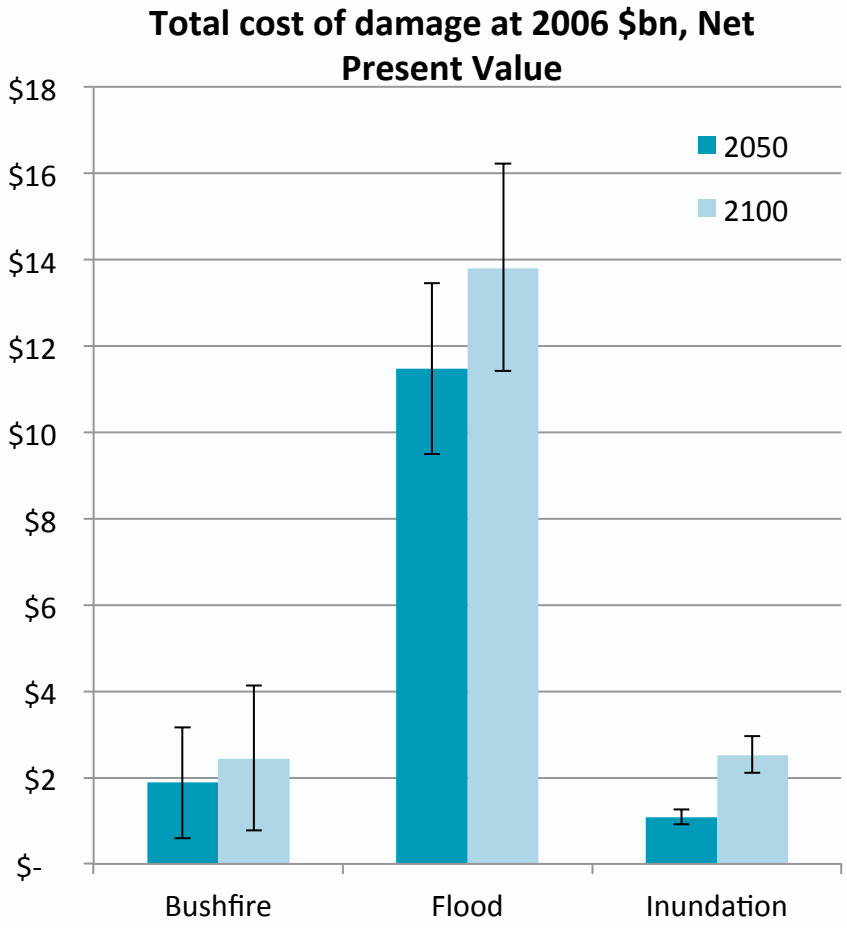
Heat



- *Report not public as at Jan 2013 – expect release shortly*

Total infrastructure value exposed and damage costs for inundation, flooding and bushfires, base case





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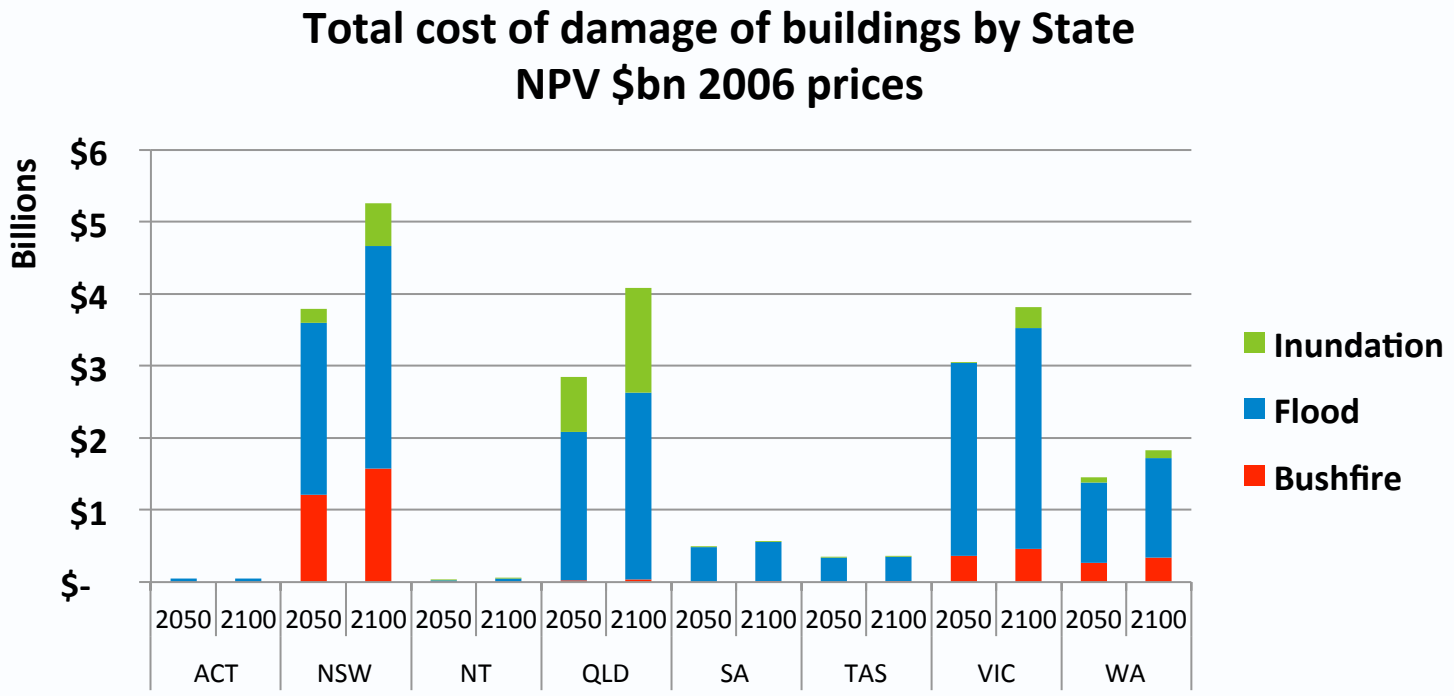
Total damage costs for inundation, flooding and bushfires by State, base case (NPVs)



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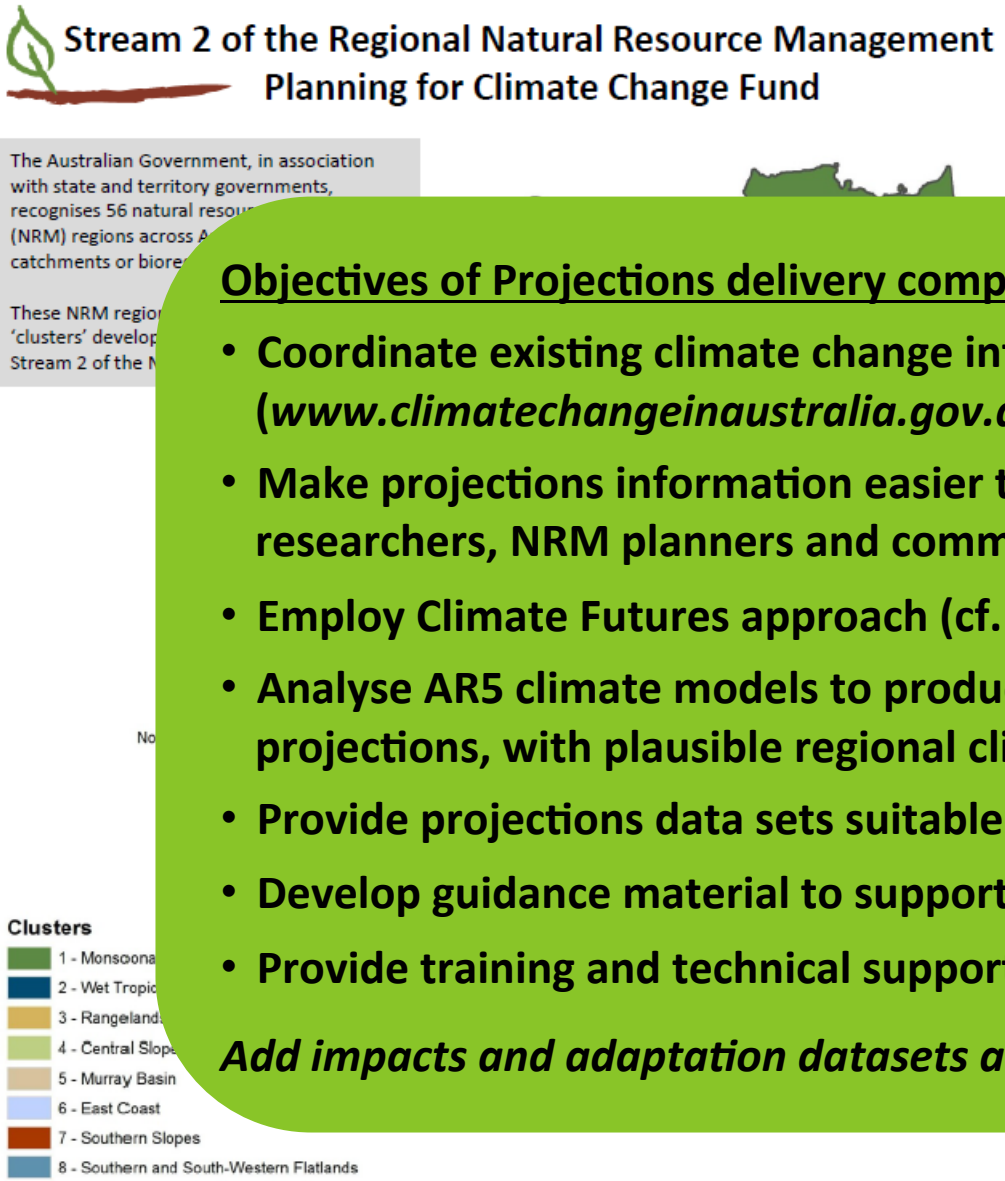
- **Specific ~national impacts +/- adaptation analyses**
  - Concrete, heat, SLR, extreme winds analysis, environmental change, South-East Queensland integrated regional study (others coming)
  - Not much systematic on impacts or adaptation for whole economy
- **In train**
  - Updated projections: Climate Futures web site (CSIRO, BoM)
  - Climate Futures Report (*cf*. UK reports) (DCCEE with support)
  - National Adaptation Assessment (CSIRO CAF led)

Integration: NRM Planning



Objectives of Projections delivery component:

- **Coordinate existing climate change information via a new web portal (*www.climatechangeinaustralia.gov.au*)**
- **Make projections information easier to access and interpret for impacts researchers, NRM planners and communities**
- **Employ Climate Futures approach (cf. *www.pacificclimatefutures.net*)**
- **Analyse AR5 climate models to produce updated national and regional projections, with plausible regional climate change**
- **Provide projections data sets suitable for use in research applications**
- **Develop guidance material to support users of projections**
- **Provide training and technical support**

Add impacts and adaptation datasets and interpretation?

Climate Futures Report

- **Policy commitment by Cabinet for DCCEE, but not legislated**
  - **Establish through 2 reports then repeat ~5yly. First report Jun 2013**
- **Aim: to monitor progress in managing risks – *i.e. adaptation***
  - ***Outcomes*: is Australia achieving good adaptation outcomes?**
  - ***Activities*: what is being done to manage the potential impacts of climate change (strategic planning, capacity building, on-ground works etc)?**
  - ***Drivers and enablers*: do policy settings, institutional arrangements and governance practices support effective climate change adaptation?**
- **Some characteristics**
  - **Explicitly normative set of proposed desirable outcomes for Australia**
    - *Australians able to enjoy opportunities within societally-acceptable levels of risk*
    - *Inter-generational and intra-generational equity considered*
  - **Various scales of analysis (selectively national, regional, sectoral)**
- **Thinking about indicators**

National Adaptation Assessment

1. **A systematic shallow look across all sectors of the economy**
   - **Assessing adaptations needed for 2C warming, and for 4C+**
   - **How drastic is each? How prepared are we for them?**

   Q: how to segment the economy given a decision focus?
2. **A deep dive into a few key subsectors**
   - **Infrastructure, NRM, primary industries, water?**
3. **Case studies of emergent economy-wide effects**
   - **Scheduling, inter-sectoral effects, etc. Poorly understood.**

What adaptation should be happening by 2030 if we are on a trajectory to 2°C? (Mainly incremental/transitional adaptation and risk management)	**What adaptation should be happening by 2030 if we are on a trajectory to 4°C? (**Mainly transformational adaptation and robust decision making under uncertainty)
Few impacts on human health likely by 2030, except possible increase in heat-related illnesses and mental health issues associated with drought. • Develop heat wave warning systems. • Better management of heat stress and related logistics e.g. involvement of emergency management staff rather than just relying on ambulance and hospital staff.	• Improved monitoring of mosquito-borne diseases. • New healthcare capacity and medical skills to deal with previously unforeseen diseases and climate related health problems. • Comprehensive assessment of all the pathways by which climate change will adversely affect public health, including mental health, and indirectly via environmental and dietary changes. • Fundamental changes to urban design to reduce urban heat island effects and equity implications for heat stress

Framing policy stances for adaptation responses: built infrastructure

Anticipate: act on best estimate of future risks, or "what might happen" (more-or-less precautionary).

React: act on demonstrated present risks, or "what has happened".

Business-as-usual: follows today's trends and practices, only fixing when actually damaged.

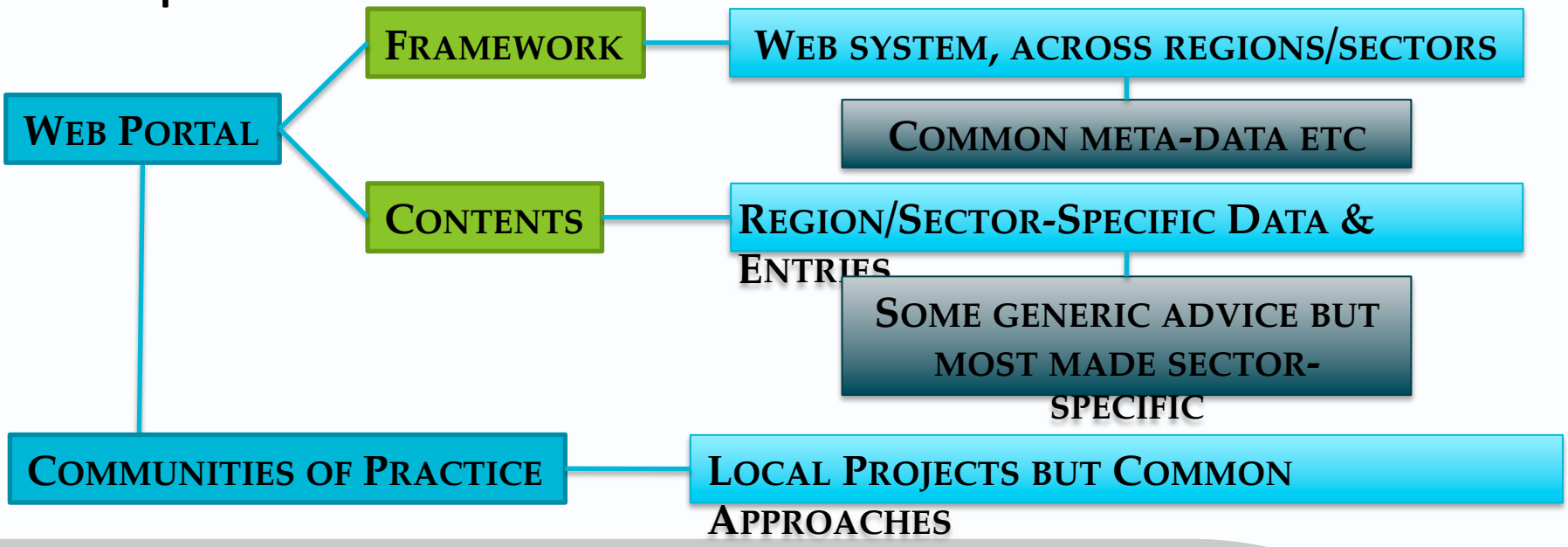
Project in progress:
- How proactive should policy be?
- When should action start?
(for different impacts and regions)

Protect if ...	**Protect existing assets against climate hazard X if:** ▪ **Exposure to future hazard exceeds the *defined exposure trigger* [ET], based on the high climate outlook for the relevant asset life; and** ▪ **Protection expenditures for the most cost effective option are less than C% of the current replacement cost of the assets at risk;-**
otherwise accommodate if ...	Accommodate through upgrade of existing assets if: ▪ Exposure to future hazard exceeds the *defined exposure trigger* [ET] as above; and ▪ Upgrading asset design standard reduces expected damage to *acceptable levels* and is generally expected to be cost effective over asset life, based on high climate outlook;
and only retreat if ...	Retreat existing assets if: ▪ Exposure to future hazard exceeds the *defined exposure trigger* [ET] as above; and ▪ Location of asset does not meet cost effectiveness criteria for protection above; or ▪ No cost effective protection option has been identified; and ▪ No cost effective accommodate option or upgrade has been identified.

Synthesis towards 2015

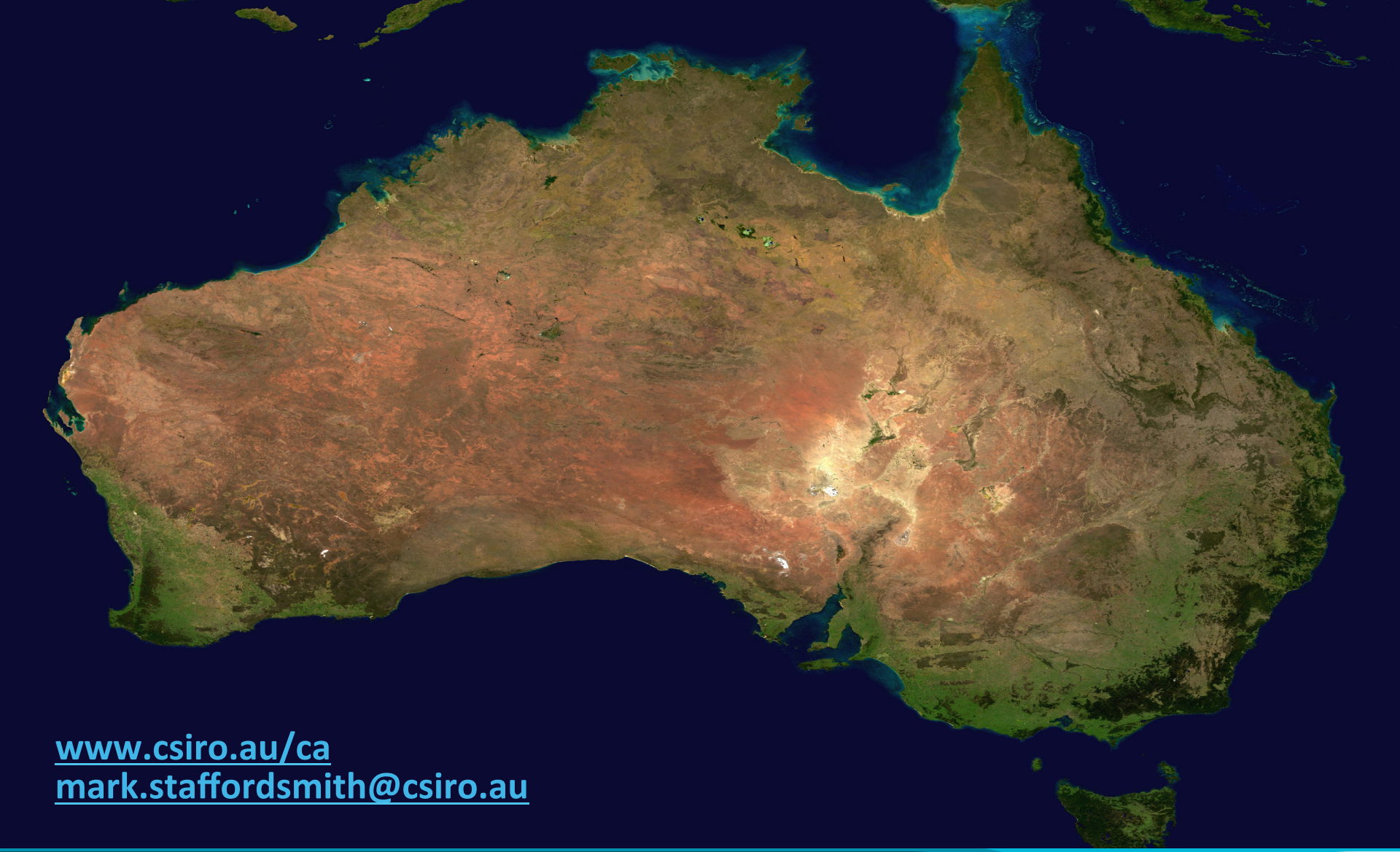
CAF in collaboration…

- **National Adaptation Assessment**
  - A systematic shallow look across all sectors of the economy, with
  - A deep dive into a few key subsectors
- **Climate Adaptation Futures – supporting long-term adaptability**
  - Contribute via National Adaptation Forum. Climate, impacts and adaptation



Challenges and reflections

- **No strong desire to do more impacts and vulnerability assessment at national level**
  - **Despite the political case not being fully made**
    - Anti-mitigation case mainly '*pointless without US, China and India*', not potential effects on Australia
    - Need for adaptation ~accepted, but not for strong government action nor beyond incremental change
  - **Need to make the case to governments that investment in adaptation is cost effective**
    - Especially in disaster preparedness
    - Not just that it can work (e.g. we know cyclone standards do!)
  - **And determine whether the nation is acting**



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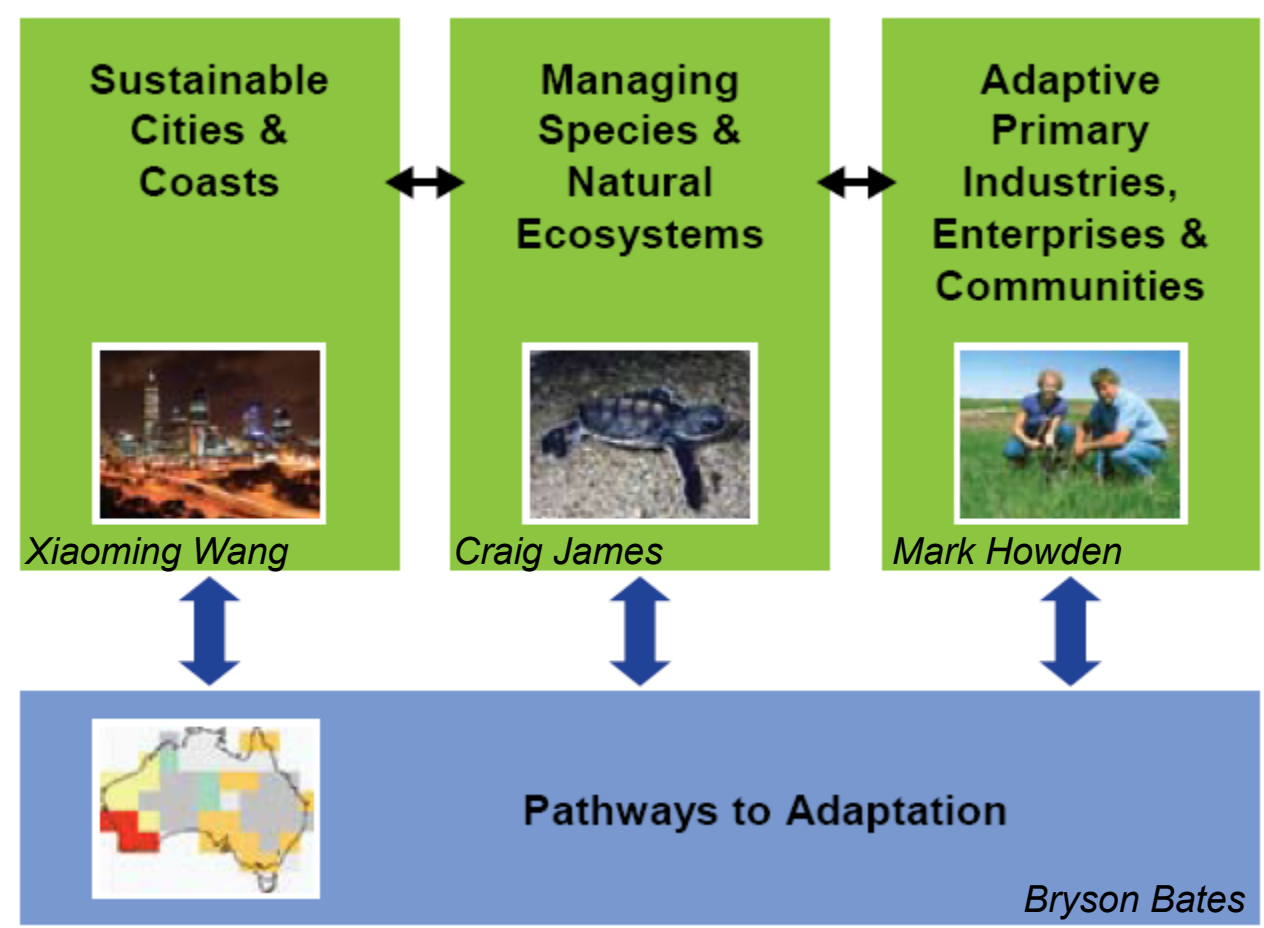
Research strategy delivers to sectoral clients

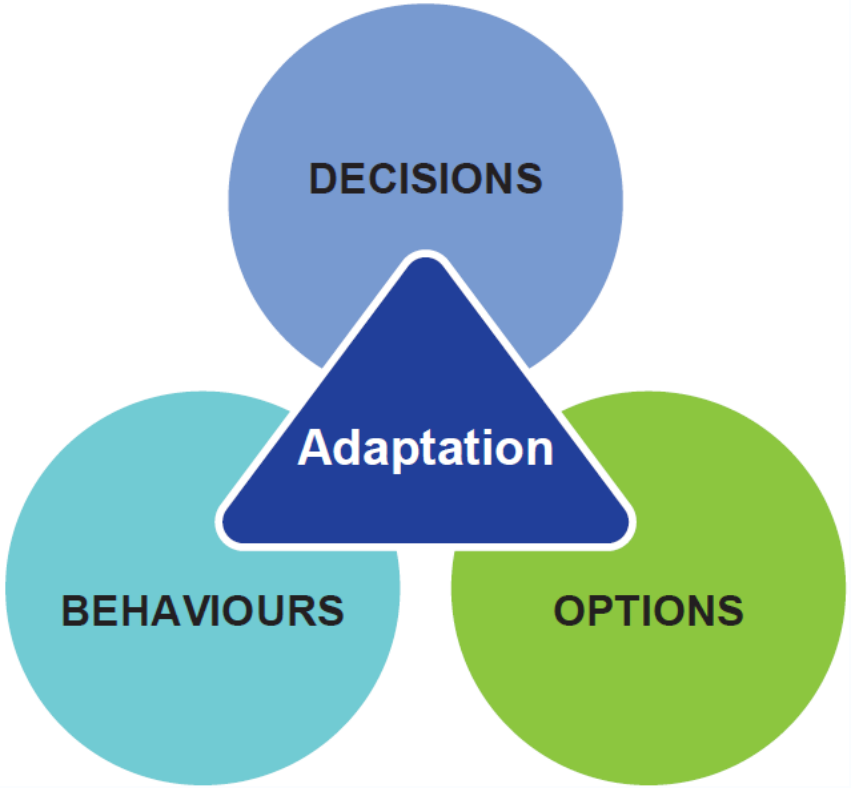


~150 full time equivalents across ~300 staff members
Operating since 2008, now ~$40m/y budget, ~35% external
(Water issues in *Water for Healthy Country Flagship*)

Adaptation science: three perspectives, all needed

Adaptation information and decision-making

Evaluation, adaptation pathways, future scenarios, risk management modes, etc



Adaptive behaviours and institutions

Behaviours, incentives, barriers, adaptive capacity, vulnerabilities, etc

Adaptation options and technologies

Cultivars, materials, farming systems, urban planning, etc