DEC Office of Climate Change

Climate Change Adaptation & Mitigation Strategy

James Duggie
Principal Policy Officer - Adaptation
Office of Climate Change

(with slides from Colin Yates, Biodiversity & Climate Change Unit, Science Division)

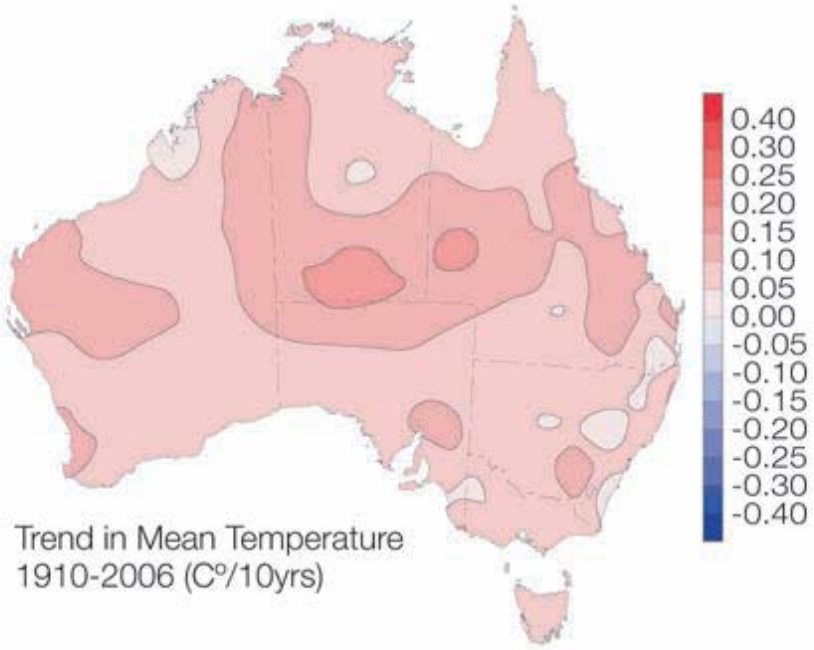
10 December 2009

9th Annual Nature Conservation Conference, DEC

OVERVIEW OF PRESENTATION

- The Office of Climate Change
- Commonwealth policy
- State policy
  - Current State policies
  - Climate Change Adaptation and Mitigation Strategy

How has the climate changed in WA - Temp



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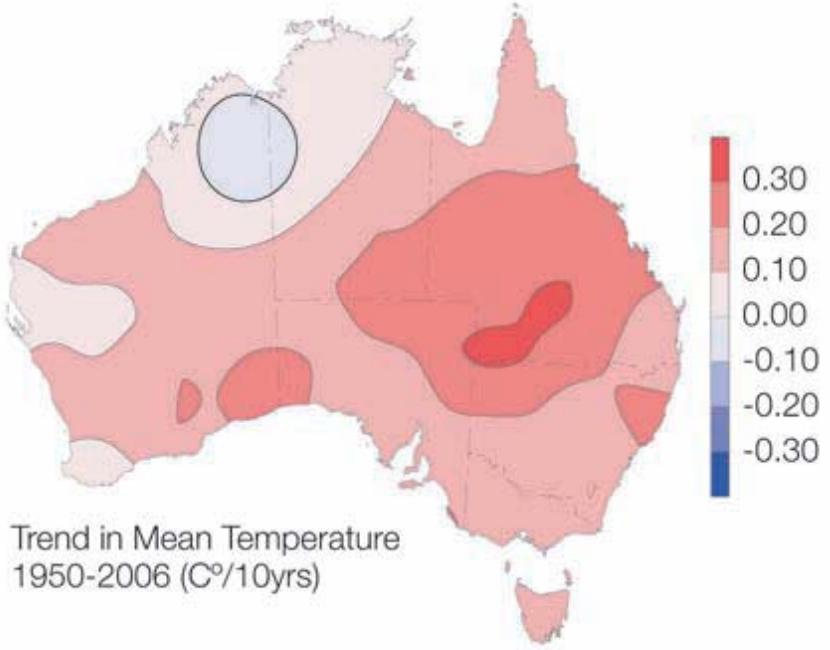

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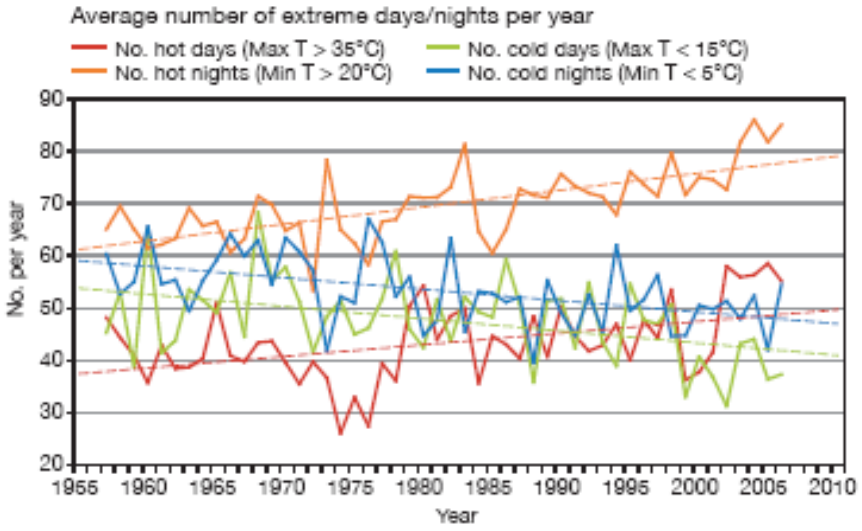
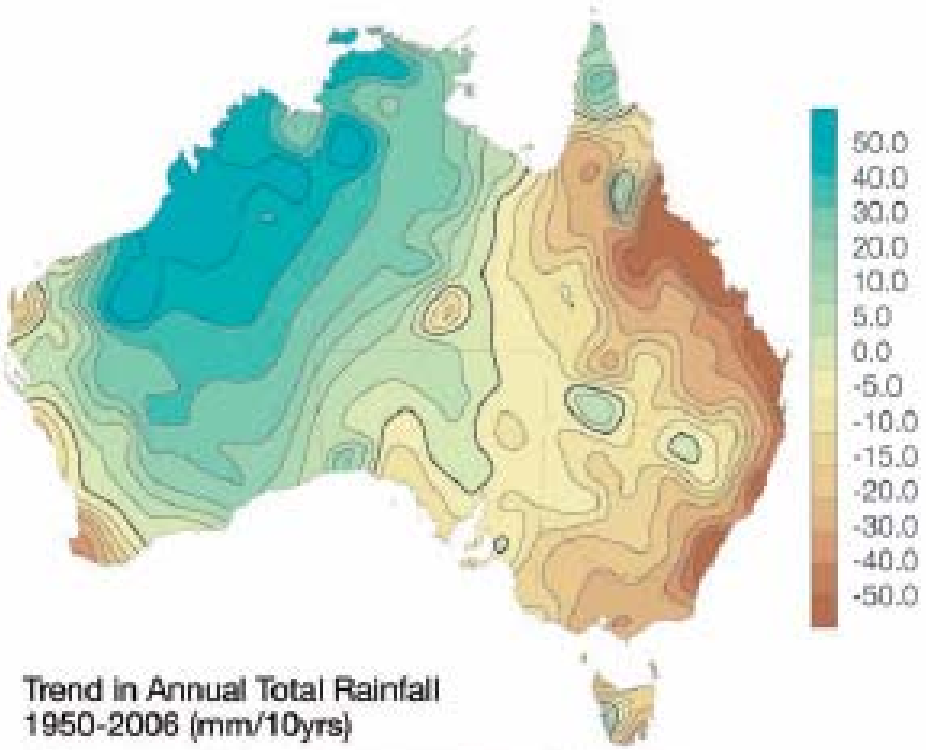
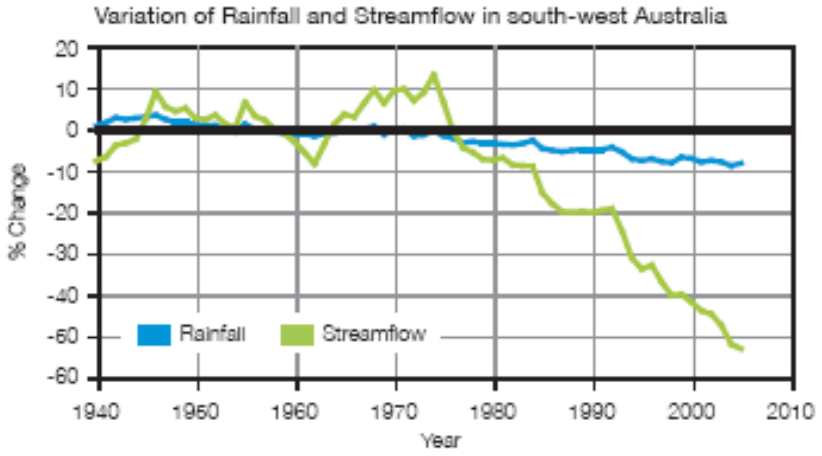


Source: CSIRO (2007) Climate Change in Australia, Technical Report 2007. CSIRO, BoM.

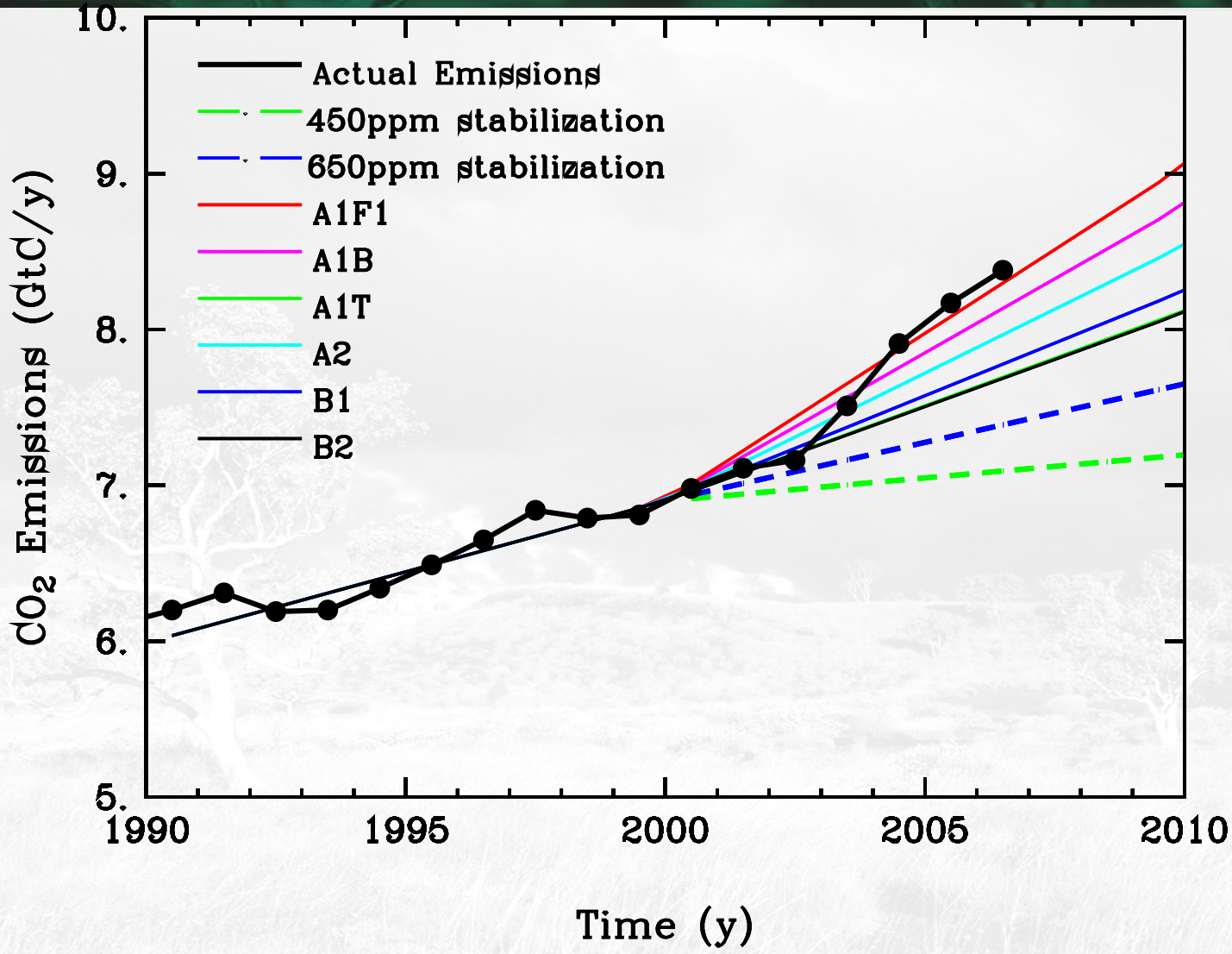
Annual total rainfall





Source: CSIRO (2007) Climate Change in Australia, Technical Report 2007. CSIRO, BoM.

Trajectory of Global Fossil Fuel Emissions



SRES (2000) growth rates in % y^{-1} for 2000-2010:

A1B: 2.42
A1FI: 2.71
A1T: 1.63
A2: 2.13
B1: 1.79
B2: 1.61

Observed 2000-2006 3.3%

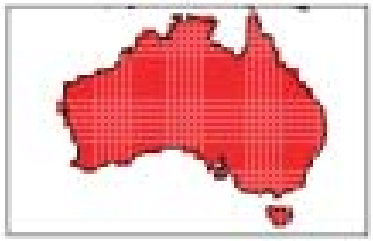
Slide courtesy of Dr Mark Howden, CSIRO

Raupach et al. 2007, PNAS

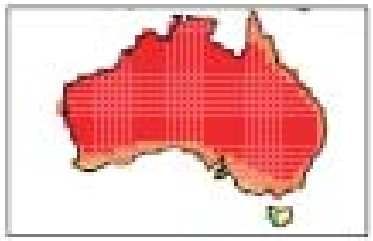
Chance of at least a 1°, 2°, 3° or 4° warming by 2070 for WA

High emission A1F1

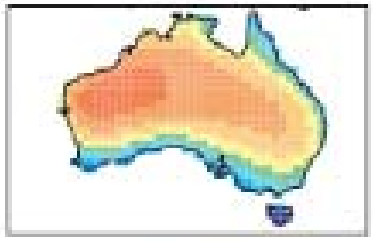
100% chance it will get 1° warmer



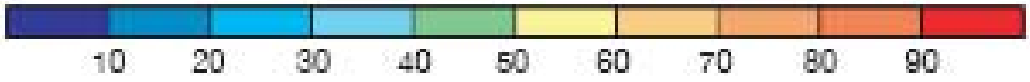
80-100% chance it will get 2° warmer



10-80 % chance it will get "dangerously hot" 3° warmer



1-60 % chance it will get "dangerously hot" 4° warmer



CSIRO (2007) Climate Change in Australia, Technical Report 2007. CSIRO, BoM.

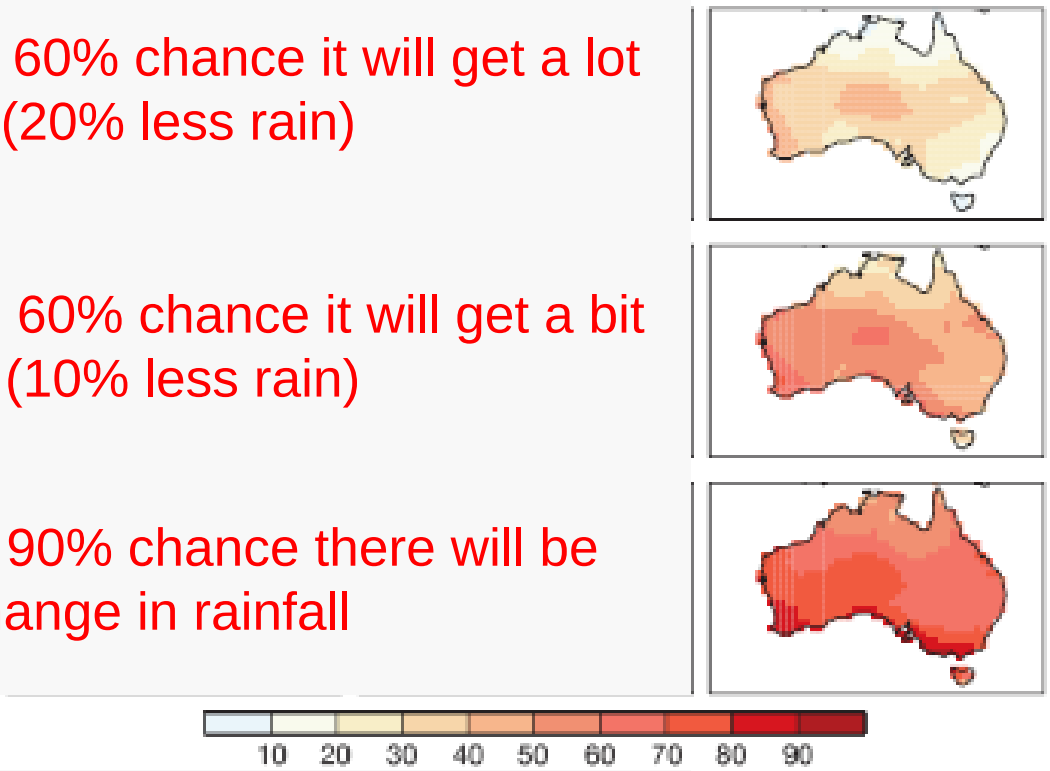
Chance of 20%, 10% decline in rainfall, no change or 10% increase in rainfall by 2070

High emission A1F1

10 to 60% chance it will get a lot drier (20% less rain)

30 to 60% chance it will get a bit drier (10% less rain)

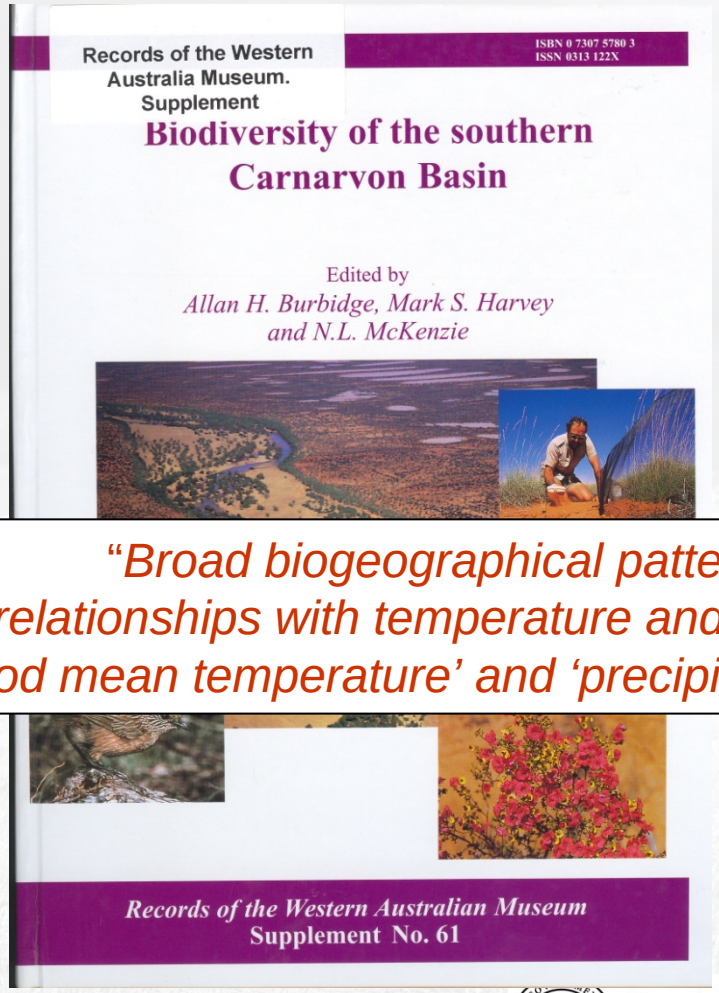
40 to 90% chance there will be no change in rainfall



1 to 30% chance it will get a bit wetter (10% increase)

CSIRO (2007) Climate Change in Australia, Technical Report 2007. CSIRO, BoM.

Biodiversity surveys in WA reveal that climate is a fundamental influence on where particular plant and animal species occur, what communities and ecosystems develop in a location and what habitat is available



"*Broad biogeographical patterns in biodiversity showed strong relationships with temperature and rainfall gradients, especially 'warmest period mean temperature' and 'precipitation seasonality*" (McKenzie *et al*. 2004).

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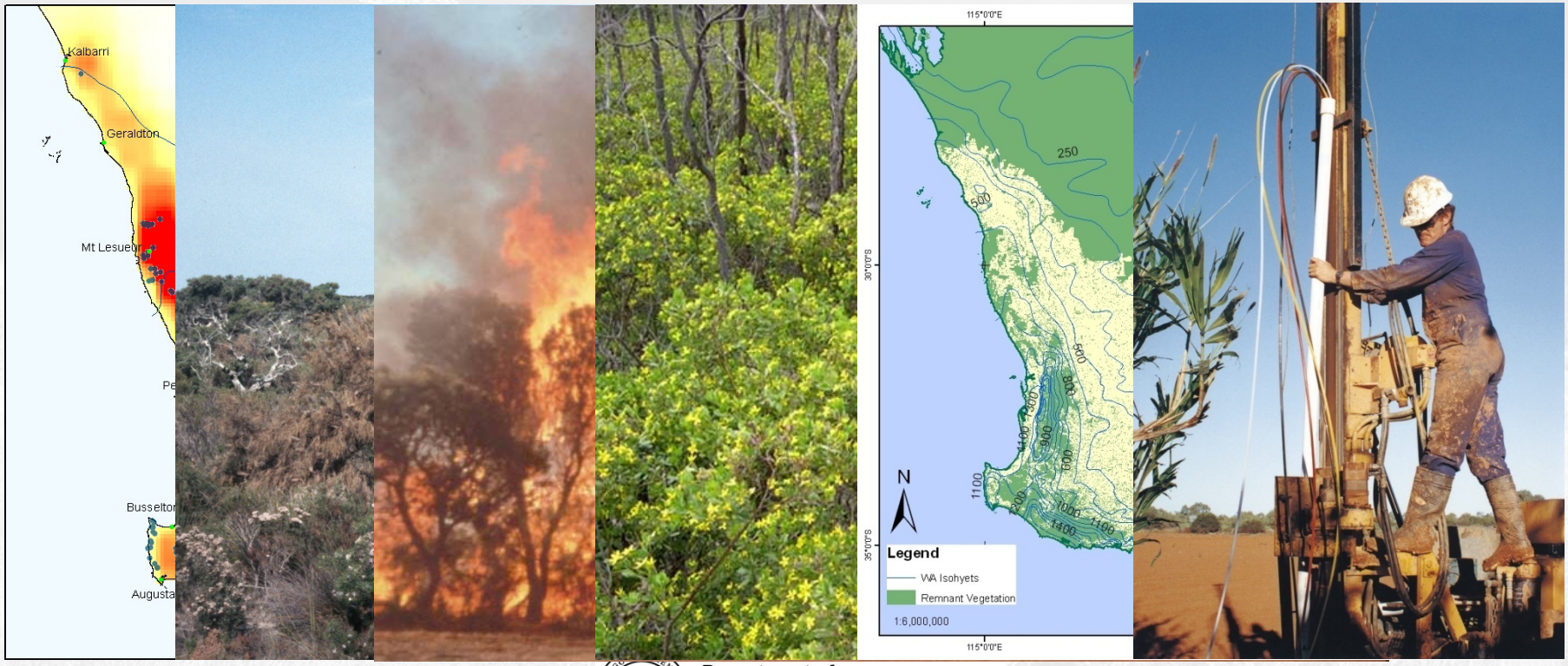
Current and future climate change is expected to affect biodiversity in WA

- *directly* through changes in temperature, rainfall and the frequency of extreme events; and
- *indirectly* through altering factors such as sea level, stream flow, groundwater levels, fire regimes and the nature and intensity of existing biodiversity threats
- *increases* in atmospheric CO_2 concentrations will also affect biodiversity

WA's biodiversity is already under pressure from a number of threatening processes which vary in importance and intensity across the state



THE OFFICE OF CLIMATE CHANGE

OCC established within DEC in May 2007 as part of former Government's *Premier's Climate Change Action Statement.*

Key objectives include:

- Lead development of policy advice on greenhouse issues in WA and coordinate whole of Government responses to climate change related issues;
- Represent WA in intergovernmental negotiations and policy development;
- Undertake and review economic analysis of greenhouse policy, emissions trading and carbon markets;
- Implement the Government's adaptation to climate change program, coordinate the Indian Ocean Climate Initiative; and
- Work across each sector of the economy in conjunction with relevant State agencies to assess greenhouse gas abatement opportunities and policy measures.

THE OCC TEAM

Communications:
Gemma O'Sullivan

Personal Assistant to Director:
Sarah Jones

Administration:
Anita-Gai Milne

Science and Technology:
I-Lyn Loo

Director:
Vacant

Mitigation Team:
Lisa Harry
Liz Humphries
Sarah Gill

Policy Manager:
Anne Mathews

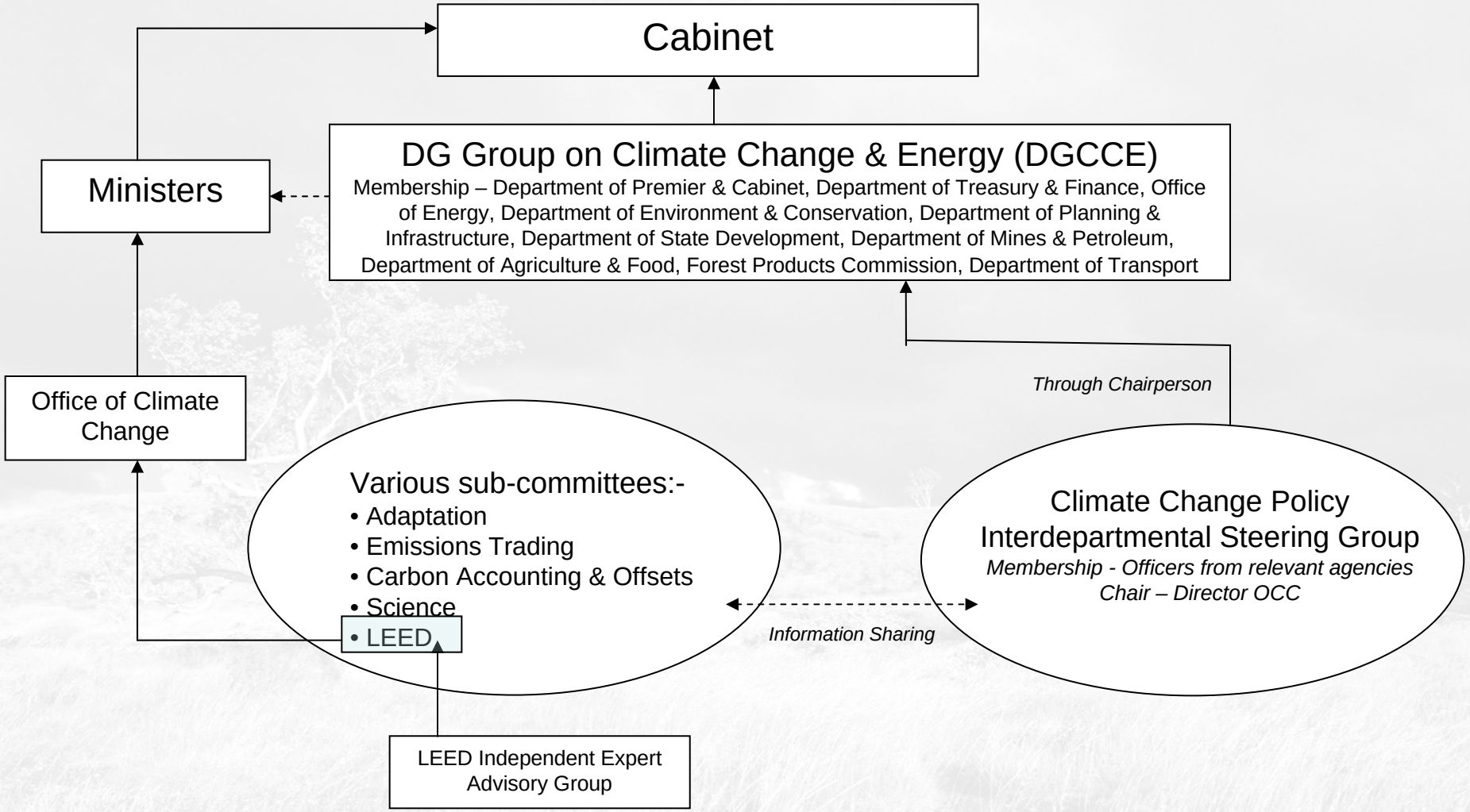
Carbon Accounting:
Greg Mueller

Adaptation Team:
James Duggie
Kylie Meakins
Shirene Hickman
Brett Crabtree

LEED Manager:
Anthony Stuart

Economist:
Charles Crouch

WA CLIMATE CHANGE GOVERNANCE FRAMEWORK



THE OFFICE OF CLIMATE CHANGE

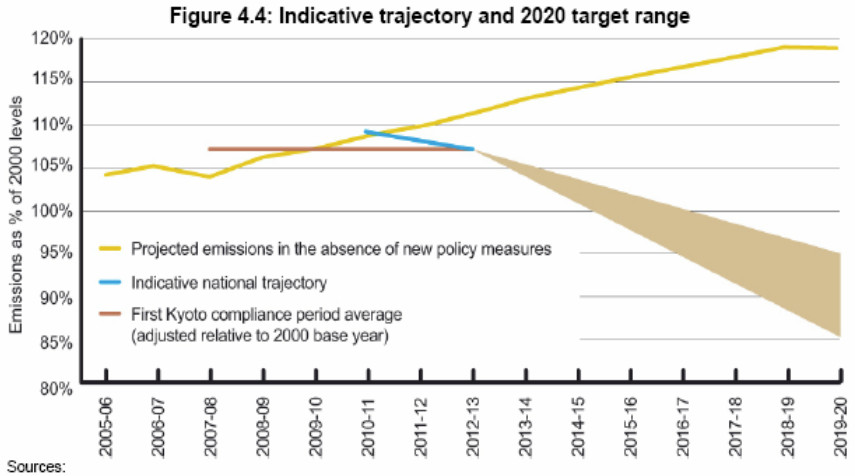
OCC has two main work streams:

- Adaptation – adapting to the unavoidable impacts of climate change.
- Mitigation – reducing greenhouse gas emissions and enhancing their sinks.
- Emissions trading primarily responsibility of Treasury's *Emissions Trading Unit*

COMMONWEALTH PROGRAMS – CPRS

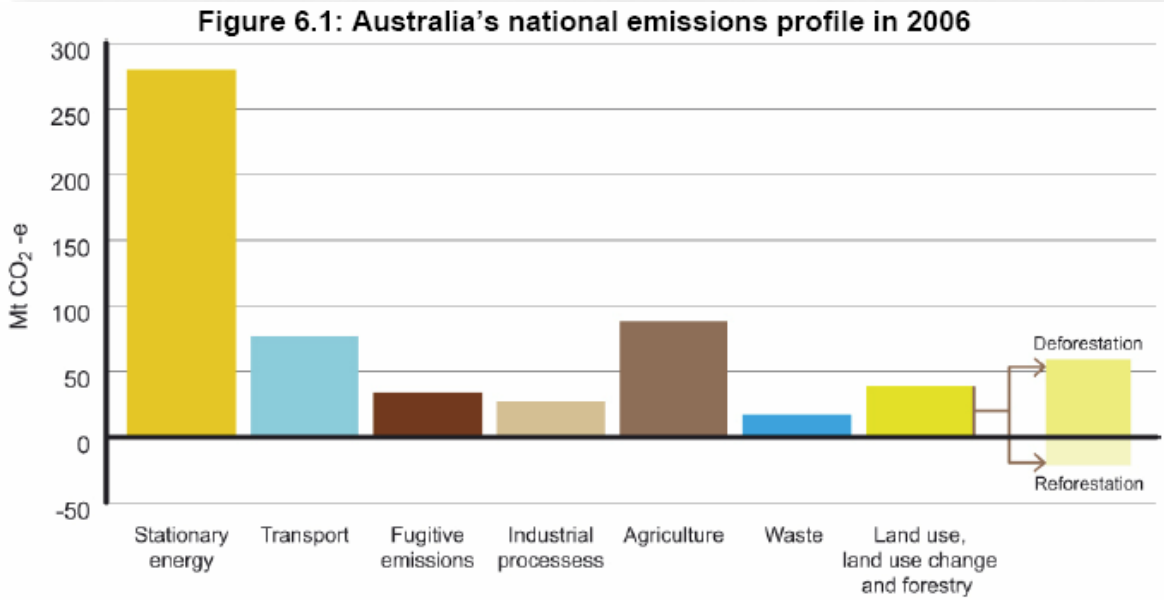
Carbon Pollution Reduction Scheme is a *Cap and Trade* emissions trading scheme:

- Identify the emissions that are to be covered
- Set the “cap” or the total number of permits to be made available for each year – cap reduces over time making permits more expensive
- Total number of permits equals total allowable emissions (1 permit = right to emit 1 t CO2-e)
- At the end of compliance period a firm must surrender permits equal to its emissions for the period or pay a penalty
- Permits can be auctioned by Gov’t or given to compensate for scheme impacts
- Permits can be traded:
  - Firms that have more permits than they need can sell them or keep them for future compliance periods
  - Firms that need more permits can buy them



COMMONWEALTH PROGRAMS – CPRS

- Commonwealth intends to implement broad based emissions trading scheme mid 2011
  - Subject to negotiations in Federal Parliament & possibly the outcome of the next Federal Election
- Will cover all except LULUCF and Agriculture – agriculture to be indefinitely excluded
  - Forestry can opt in
  - Only directly cover 25 Kt emitters (10 Kt for some
- Prices initially capped at $10 per tonne first year, then $40 plus cpi plus 5% for next four years then prices set by market



COMMONWEALTH PROGRAMS – CPRS

- EITEs compensated at 60% (66%) and 90% (94.5%) of industry average emissions until competitors have equivalent carbon price
  - •Declines by 1.3% “carbon productivity” annually
  - •EITEs based on emissions intensity
- SAIs (coal fired power stations) receive compensation to reflect asset value impact
- Fuel excise “holiday” removes impact on transport fuels for 1st 3 years
- Assistance for low income families via pension increases, tax changes and transitional payments
- Assistance for impacted businesses and regions via $1.15 billion *Climate Change Action Fund*

Commonwealth Government Programs

- Low Emission Technology Support programs
  - Research & Development programs for low emission tecchnologies

  (www.climatechange.gov.au & www.ret.gov.au)
- $4.5 billion Clean Energy Initiative
- $600m pa *Climate Change Action Fund* to support business energy efficiency opportunities
- Renewable energy target requires 20% (45,000 gigawatt-hours) of Australia's energy by 2020 to come from renewable sources

COMMONWEALTH PROGRAMS – TECHNOLOGICAL SUPPORT

- $4.5 billion Clean Energy Initiative includes
  - •CCS Flagships Program - supporting construction and demonstration of large scale integrated carbon capture and storage projects in Australia.
  - •Solar Flagships Program - supporting construction and demonstration of large scale solar power stations in Australia.
  - •Australian Centre for Renewable Energy - promote the development, commercialisation and deployment of renewable energy technologies
- CPRS will also deliver $600m pa *Climate Change Action Fund* to support business energy efficiency opportunities

www.climatechange.gov.au & www.ret.gov.au

JOINT COMMONWEALTH/STATE PROGRAMS – ENERGY EFFICIENCY

- National Partnership Agreement on Energy Efficiency agreed between States and Commonwealth in July 2009
- Will deliver nationally consistent energy efficiency measures in most cases implemented by States:
  - Household information
  - Assistance to business
  - Efficiency standards in buildings
  - Improved air conditioner standards
  - Smart grid and DSM
  - Improved energy efficiency of Government operations
- Implementation plans currently being developed

National Climate Change Adaptation Research Facility (NCCARF) (1)

Four key elements:

1. National Adaptation Research Plans (NARPs)
2. Adaptation Research Networks
3. Grant Scheme for research projects to fund the implementation of NARPs
4. Synthesis & integration projects

National Climate Change Adaptation Research Facility (NCCARF) (2)

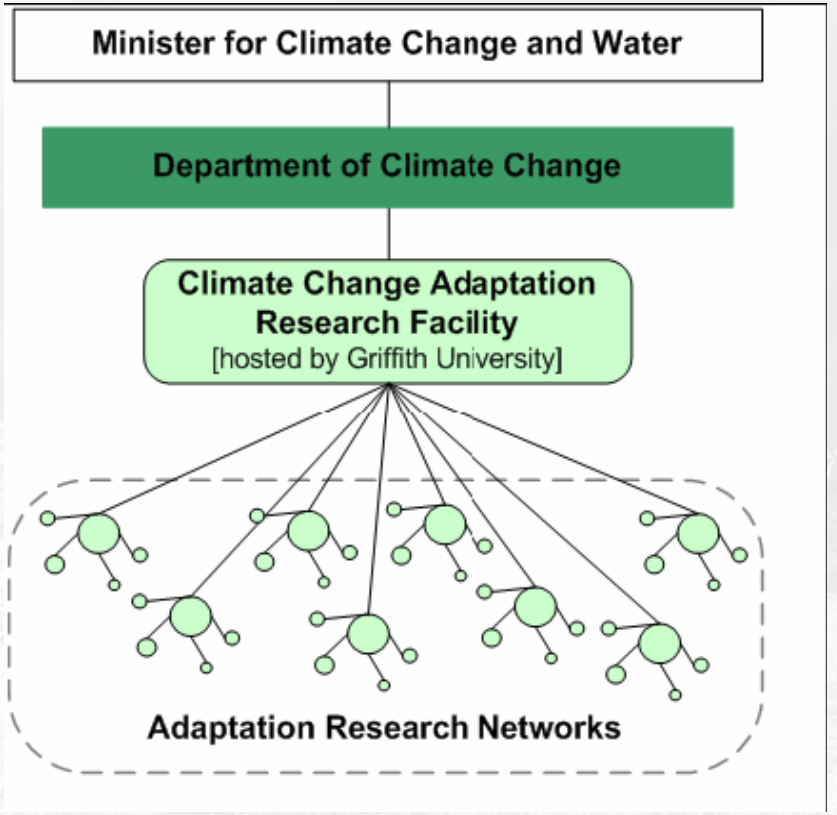
- Funded by Australian Department of Climate Change - over four years to support Climate Change Adaptation
- “Leading the research community in a national interdisciplinary effort to generate the information needed by decision-makers in government and in vulnerable sectors and communities to manage the risks of climate change impacts.”
- Adaptation Research Networks (ARNs) –
  - The aim is to foster an inclusive collaborative research environment to advance regional and sectoral knowledge about the impact of climate change and vulnerability and adaptation options.
  - Eight themes
- National Adaptation Research Plans (NARPs)
  - are being prepared to identify major research priorities for in various thematic areas.
  - Eight themes

National Climate Change Adaptation Research Facility (NCCARF) (3)

In 2008 a public call invited bids to host these networks.

There are now eight Adaptation Research Networks (ARNs)

Each ARN represents a multi disciplinary and multi-organisational team.



NCCARF
Adaptation Research Nodes and Host Organisations

Marine Biodiversity and Resources	**University of Tasmania**
Primary Industries	**Land and Water Australia**
Water Resources and Freshwater Biodiversity	**Griffith University, Queensland**
Terrestrial Biodiversity	**James Cook University, Townsville**
Human Health	**National Centre for Epidemiology and Population Health (NCEPH), Australian National University**
Settlements & Infrastructure	**University of New South Wales**
Social, economic and institutional dimensions	**University of Melbourne**
Disaster Management and Emergency Services	**RMIT University, Melbourne**

NCCARF
Adaptation Research Nodes

- Facilitating networking & promoting collaboration to implement the NARP research agenda
- Assist with research grant schemes
- Websites
- E-newsletters
- Early Career Academic support
- Conferences and Forums
- Reference Paper preparation

WA GOVERNMENT PROGRAMS

- SEDO provides grants in renewable energy including:

  Remote Area Power Supply Program

  Renewable Energy Water Pumping Program

  Regional Energy Efficiency Program

  Rural Renewable Energy Program

  Renewable Remote Power Generation Program

  www.sedo.energy.wa.gov.au

- Department of Commerce provides research support such as via Centres of Excellence, major research facilities eg WAMSI, WAERA

  www.commerce.wa.gov.au

OFFICE OF CLIMATE CHANGE POLICIES AND PROGRAMS

- 2007 *Premiers Climate Change Action Statement* outlined extensive range of programs including:
  - •$36.5 million Low Emissions Energy Development Fund
  - •60% state abatement target
  - •20% renewable energy target
  - •60% cleaner energy target
  - •$4 million IOCI program
- But many of these were in response to lack of Commonwealth action and now abandoned or scaled back
- Complementary measures principle that all climate change policies "complement" CPRS
- Likely to mean that future State policies focus on adaptation or areas of market failure

COMPLEMENTARY MEASURES REVIEW (i)

A State-based review of climate change mitigation policies and measures to identify those policies and measures that are non-complementary with the proposed CPRS;

in order to:

develop a "coherent and streamlined set of climate change measures across jurisdictions to complement Commonwealth implementation of the CPRS."

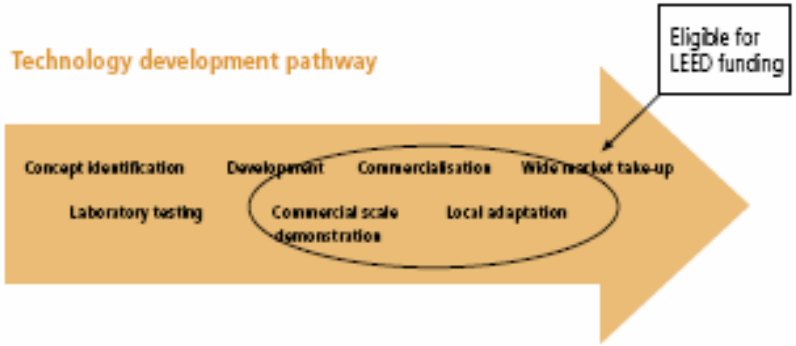
- The CPRS is intended to overcome the market failure that exists with respect to greenhouse gases.
- *Market failure refers to situations when a market, left to itself, does not allocate resources efficiently.*
- The failure to price the emissions of greenhouse gases is a market failure.

COMPLEMENTARY MEASURES REVIEW (ii)

- Policies and measures that were developed for the same purpose as the CPRS, that is, to reduce greenhouse gas emissions, are deemed incompatible with the CPRS (i.e. ‘non-complementary’).
- Policies and measures that will alter the carbon price signal by obscuring or distorting the price of carbon, such as through subsidies, will have the potential to interfere with the effective operation of the CPRS and will be incompatible with the CPRS (i.e. ‘non-complementary’).
- **There is a clear expectation that jurisdictions will take action to amend, terminate or phase out non-complementary measures.**
- WA will report on outcomes to COAG.

LOW EMISSIONS ENERGY DEVELOPMENT FUND

- Low Emissions Energy Development (LEED) Fund established in May 2007 via former Government's *Premier's Climate Change Action Statement (PCCAS)*
- PCCAS established with $36.5 million total funding including four funding rounds totalling $35.5 million
- Intent to provide support to low emissions technology in pre commercialisation parts of technology development chain
  - Leveraged fund – 3:1 to maximise LEED Fund effectiveness and manage Government risk
  - LEED open to all technologies reducing emissions from consumption of fuels to produce energy (includes demand side management)



INDIAN OCEAN CLIMATE INITIATIVE STAGE 3

- Stage 3 research agreement was signed in March 2008
- Produce detailed climate change scenarios for both the SW and NW WA to enable assessments of climate change impacts and the development of adaptation options
- Improve understanding of extreme events, such as tropical cyclones and high temperatures and rainfall events, which is important to conduct vulnerability assessments
- More information at www.ioci.org.au

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OFFICE OF CLIMATE CHANGE POLICIES AND PROGRAMS

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- Complementary measures principle that all climate change policies “complement” CPRS

CCAMS (i)

- Climate Change Adaptation and Mitigation Strategy (CCAMS) a major work program of OCC over next 18 months
- Government's election platform committed to "work with industry, scientists, local government and conservation groups to develop a Climate Change Adaptation Strategy"
- CCAMS will cover both adaptation and mitigation
- Intent is to deliver a long term framework to:
    - reduce climate change risk to WA; and
    - capture the opportunities

CCAMS (ii)

- CCAMS will be developed following extensive consultation with key stakeholders including industry, scientists, households, local government and the community
- Public release of Issues Paper for comment to guide first stage of public consultation process
    - OCC will also consult via targeted workshops
- Development of draft CCAMS and release for public comment
- Public launch of final CCAMS
- Effective consultation will be key to development of CCAMS – urge participation – register to receive Issues Paper via anne.mathews@dec.wa.gov.au

CCAMS (iii)

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CCAMS (iv)

Issues Paper Themes:

- Knowledge (generation, disseminating);
- Innovation, Development and Uptake of New technologies
- Capturing Opportunities;
- The Market Context;
- Adapting to Climate Change; and
- Governance;

CCAMS (v)

- James' Summary:
  - How do we ensure that State Government gets it's own house in order?
    - (State Agency Strategies, Policies, Operations, Service delivery appropriately take into account climate change risks and vulnerabilities, and priorities for addressing them?)
  - What is the State Government's role in supporting external stakeholders (private sector, households, NGO's etc)?

CCAMS Science

- Science Sub-Committee of CCPISG

  (Climate Change Adaptation Interdepartmental Steering Group)

  Colin Yates member of this for DEC

  - Inventory of current climate change science research across State Government
  - Gaps analysis about across State Government climate science needs (and then external stakeholder needs)
  - To inform CCAMS
  - Current thinking: State Agencies to pursue their specific climate science agendas, OCC to assist in facilitating shared priorities across State Agencies
  - Contact: I-Lyn Loo I-Lyn.Loo@dec.wa.gov.au

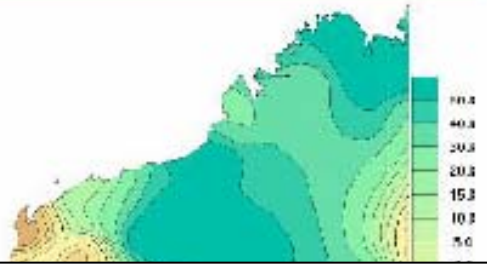
Biodiversity Climate Change Unit (BCCU)

Personnel: The BCCU includes research scientists from all Science Division programs. It includes strengths in:

- Ecology
- Modeling
- Surveys
- Phytogeography and genetics
- Fire science
- Disease science
- Taxonomy
- Monitoring
- Data management

Collaboration: Western Australia is the largest single jurisdiction in the world, and contains some of the world's most complex ecosystems. DEC Science and the BCCU seek and welcome collaboration with research scientists in WA, Australia or elsewhere.

WA's regional rainfall patterns have already changed significantly



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Data sets and management
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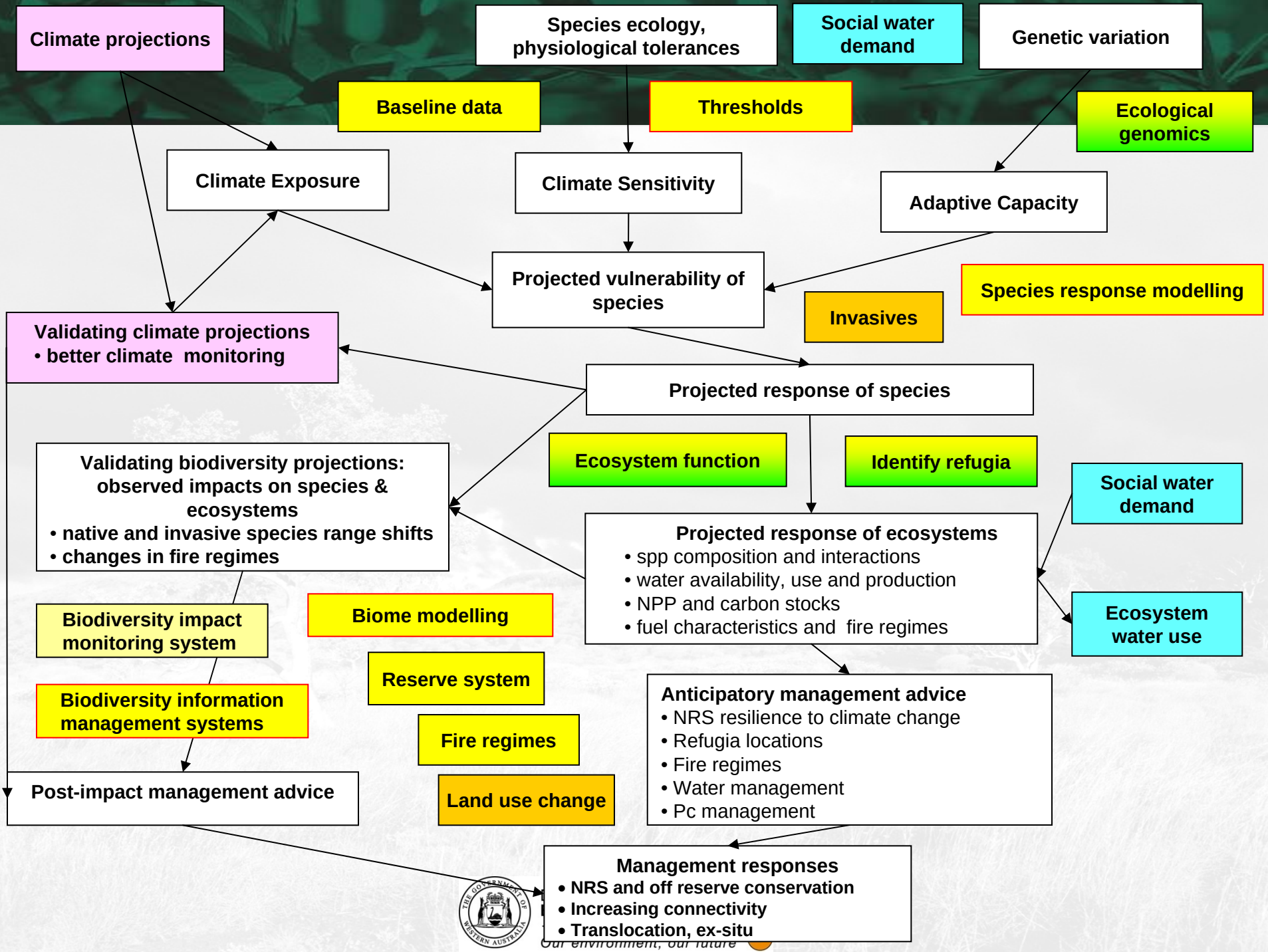
E-mail: paul.gioia@dec.wa.gov.au

Department of Environment and Conservation
Science Division

Biodiversity Climate Change Unit

The unit will co-ordinate and undertake research on the effects of climate change on biodiversity in WA

- Provide sound science-based risk assessment and response planning advice for managing the impacts of unavoidable climate change on WA's biodiversity
- Raise climate change adaptation research and analytical capacity in DEC


Climate projections
Species ecology, physiological tolerances
Social water demand
Genetic variation
Baseline data
Thresholds
Ecological genomics
Climate Exposure
Climate Sensitivity
Adaptive Capacity
Projected vulnerability of species
Species response modelling
Invasives
Validating climate projections
• better climate monitoring
Projected response of species
Validating biodiversity projections: observed impacts on species & ecosystems
• native and invasive species range shifts
• changes in fire regimes
Ecosystem function
Identify refugia
Social water demand
Projected response of ecosystems
• spp composition and interactions
• water availability, use and production
• NPP and carbon stocks
• fuel characteristics and fire regimes
Ecosystem water use
Biodiversity impact monitoring system
Biome modelling
Reserve system
Biodiversity information management systems
Fire regimes
Anticipatory management advice
• NRS resilience to climate change
• Refugia locations
• Fire regimes
• Water management
• Pc management
Post-impact management advice
Land use change
Management responses
• NRS and off reserve conservation
• Increasing connectivity
• Translocation, ex-situ

Change is inevitable but the details are uncertain – how can we adapt?

- New investment in bio-adaptation research that
  - increases our knowledge about which species and ecosystems are most vulnerable (modelling, determining physiological tolerances)
  - Understand and determine ecosystem thresholds
  - identifies climate refuges
- New investment in observation and quantitative evaluation to test research predictions and detect climate change impacts on biodiversity
- A review of our conservation goals to consider how we manage transformation and change?
- Give biodiversity as much space as possible to evolve and transform through continued and new investment
  - in managing and minimizing the impact of threatening processes
  - in projects that increase ecological connectivity where this is deemed appropriate
  - in additions to the National Reserve System to fill gaps and include refuges
  - in off-reserve conservation

Climate Change Adaptation & DEC

Questions:

- How have (and should) climate change impact considerations influence DEC policies and programs?
- Where conservation objectives may need to be revised, how to we pursue and manage such reviews? (complex and sensitive issues involved)
- What may be needed to help ensure that projections for climate change impacts are incorporated into all relevant DEC planning and policies?

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COMMONWEALTH PROGRAMS – TECHNOLOGICAL SUPPORT

- Currently range of low emission technology support programs from Commonwealth and other States and Territories (from Garnaut Review)
- CPRS will also deliver $600m pa *Climate Change Action Fund* to support business energy efficiency opportunities

www.climatechange.gov.au & www.ret.gov.au

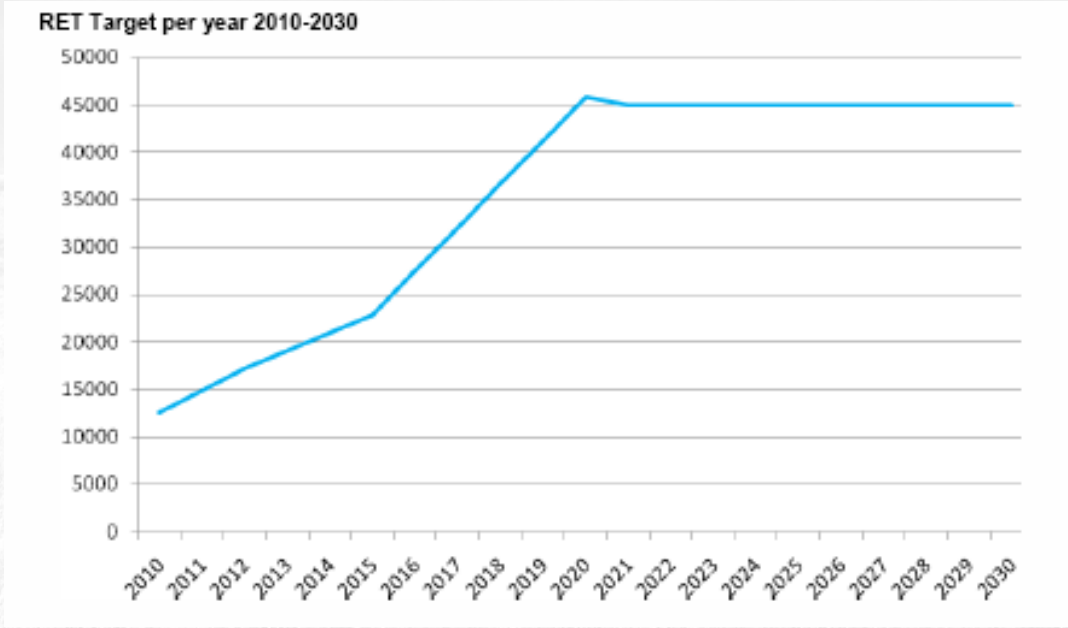
Table 18.2 Research and development programs in Australia targeting low-emissions technologies

Policy/fund name	Description	Funding
Low Emissions Technology Demonstration Fund	Supports the commercial demonstration of technologies that have the potential to deliver large-scale greenhouse gas emissions reductions in the energy sector.	$410 million over 11 years
Renewable Energy Development Initiative	A competitive merit-based dollar-for-dollar grants program supporting renewable energy innovation and commercialisation.	$100 million over seven years
Solar Cities	Demonstrates how solar power, smart meters, energy efficiency and new approaches to electricity pricing can be combined.	$93.8 million over nine years
Energy Technology Innovation Strategy (Victorian Government)	Assists the commercialisation of coal drying, coal gasification and geosequestration technologies, distributed generation energy efficiency, and renewable and enabling technologies. This funding supports some Low Emissions Technology Demonstration Fund projects.	Up to $369 million
Queensland Future Growth Fund	Supports the deployment of low-emissions coal and renewable energy technologies. Will operate separately from the Queensland state budget.	$350 million
Green Car Innovation Fund	Aims to support the manufacturing of low-emissions vehicles in Australia. Will operate on a matched funding basis at a ratio of 1:3 public:private.	$500 million over five years
National Low Emissions Coal Fund	Aims to reduce greenhouse gas emissions and secure jobs in the coal industry by stimulating investment in clean coal technologies with matched funds at a ratio of 1:2 public:private.	$500 million over seven years
Renewable Energy Fund	Targets renewable energy demonstration projects with private sector funds matched at a ratio of 2:1 public:private. Funding distributed through competitive grants, based on the goal of encouraging a range of technologies across a range of geographic areas. Fifty million dollars has been earmarked for dollar-for-dollar matched funding for private investors in the geothermal industry.	$500 million over seven years
Energy Innovation Fund	Investments targeted equally towards the Australian Solar Institute (solar thermal), photovoltaic research and development, and general clean energy research and development, including energy efficiency, energy storage technologies and hydrogen transport fuels.	$150 million over four years

Sources: Prime Ministerial Task Group on Emissions Trading (2007); Australian Treasury (2008).

COMMONWEALTH PROGRAMS – RET

- Renewable energy target requires 20% (45,000 gigawatt-hours) of Australia's energy by 2020 to come from renewable sources
- Wholesale electricity purchasers must buy RECs equal to renewable energy liability
- RECs can be created from renewable generation, SHW and existing waste coal mine gas stations
- EITEs partially exempted
- Penalty charge $65 per MWh



CMR FINDINGS

Measures identified as:	Internal Review	External Review
• **Complementary** **continue for their intended duration**	28	15
• **Transitional** **treat as per specific recommendations**	1	3
• **Non-Complementary unless modified** **consider within the context of the CCAMS, or, through direct cabinet recommendation**	1	8
• **Non-Complementary** **discontinue no later than the commencement of the CPRS.**	1	3
	31	*29*
Measures Reviewed	**60**	