Submission by the National Climate Change Adaptation Research Facility

Thank you for the opportunity to provide a submission to the inquiry of the Productivity Commission on Regulatory and Policy Barriers to Effective Climate Change Adaptation.

NCCARF welcomes this opportunity to make a submission commenting on the Issues Paper (October 2011).

This submission:

1. provides an overview of the National Climate Change Adaptation Research Facility (NCCARF)
2. outlines NCCARF activities pertinent to the inquiry, and
3. provides input in response to the Productivity Commission issues paper.

1. An overview of NCCARF

The role of the National Climate Change Adaptation Research Facility (NCCARF) is to lead the Australian research community to generate the biophysical, social and economic information needed by policy- and decision-makers in government, and in vulnerable sectors and communities, to manage the risks of climate change impacts.

NCCARF pursues this role through four main programs:

- research to develop new information;
- synthesis and integration of existing information;
- networks that coordinate Australia's research community, build capacity and support effective interaction between research and decision-making communities; and,
- communication and knowledge adoption.

All these activities focus on delivering information to decision-makers to support climate change adaptation investments and initiatives. Community and end user engagement is a key component of all activities undertaken by NCCARF.

Research to develop new information

Under the Australian Research Grants Program (ARGP), there was an initial investment of $27 million by the Australian Government for the thematic research activity to address the priorities identified by the National Climatic Change Adaptation Research Plans (NARPs). NCCARF seeks every opportunity to leverage this funding, at program and project level. Additional funding of $7 million for research programs has been leveraged from three organisations (the National Health and Medical Research Council, Fisheries Research and Development Corporation, and National Water Commission).

Research projects in the ARGP focus on addressing prioritised research questions identified in NCCARF's National Climate Change Adaptation Research Plans (NARPs). The NARPs were developed following a major consultative process, in conjunction with research

producers and users, including policy and decision makers in government at all levels, industry and business. Each of the nine Plans identify critical knowledge gaps, set research priorities based on these gaps, and identify science capacity that could be harnessed to conduct research to address these gaps.

NCCARF has produced Implementation Plans to identify the most effective pathways to undertake research to address priorities in each NARP.

On the basis of outcomes from the NARPs and implementation planning, open research calls are held and a rigorous process is followed to assess proposals. The projects in this Program are listed as Category A grants on the DISSR website. Such grants are highly regarded by Universities and their researchers, which ensures a wide range of proposals are received. NCCARF works with successful proponents to ensure that end-users needs are considered in the project, that there is opportunity for end-user engagement at all points, and that communication of results to end-users is a focus throughout each project.

All the funds allocated to the ARGP have been committed and NCCARF together with FRDC in the Marine Biodiversity and Resources theme and NHMRC in the Human Health theme are managing 97 projects. Most results will be delivered in late 2012/early 2013.

Synthesis and Integrative Research (SIR)

NCCARF conducts a Program of Synthesis and Integrative Research, which is aimed at:

- drawing together existing information relevant to climate change adaptation to address a particular issue; and,
- developing a body of 'integrative' knowledge which considers broad issues that are not particular to one theme. These often require an interdisciplinary and 'solutions-based' approach.

Existing and planned projects focus on addressing the needs of decision makers working in the adaptation space, producing new insights and underpinning knowledge for decision making. User needs are regularly canvassed by NCCARF through discussions with a range of stakeholders around Australia. SIR projects are required to include substantial engagement with end-users throughout the project lifecycle and to continually consider the optimal approaches required to support relevant end-users.

NCCARF has funded 44 SIR projects. These generally have a shorter timeframe than the ARGP projects and as such many of these have been completed and are easily accessible through the NCCARF website. Two-page fact sheets have been produced for each project and widely disseminated to support end-users.

Adaptation Research Networks

NCCARF has established and manages eight Adaptation Research Networks around its priority themes (the Adaptation and Indigenous Communities theme forms a sub-network within the Social, Economic and Institutional Dimensions Network). These Networks are hosted by research institutions around Australia. Their critical role is in fostering a collaborative, inclusive environment to create opportunities for:

- capacity building around adaptation research and action, and,
- positive engagement between communities of researchers and decision makers.

Networks now have over 4500 members nationally. Over 50% of this membership is from government, industry and the community.

Communication and Knowledge Adoption

NCCARF will be successful if stakeholders have the information that they need to successfully adapt to climate change. NCCARF's knowledge communication and adoption activities focus on ensuring that decision makers have access to information they can readily use. These activities aim to:

- Ensure that climate change adaptation knowledge is delivered to priority end users at the right time, and in the right way via targeted communications products, activities and decision support tools.
- Build a better understanding of the need to adapt to climate change impacts, and the importance of research to support adaptation decision making.
- Raise NCCARF's profile as a trusted and credible source of information relevant to climate adaptation.
- Engage and work in partnership with priority research end users in the development and delivery of knowledge communication products and activities.
- Build and host effective research networks, forums, and other mechanisms to support the exchange of information and resources.

2. NCCARF Activities Pertinent to the Productivity Commission Inquiry

NCCARF is managing 141 research projects in its Thematic and SIR Programs. Many of these projects are relevant to the Productivity Commission Inquiry. Most projects are not completed and NCCARF is happy to work with the Commission to ensure that it has access to relevant results and conclusions as they become available. NCCARF will also ensure that the Productivity Commission is invited to stakeholder workshops which may be relevant to the Productivity Commission Inquiry.

A full list of projects is provided as attachment A.

3. NCCARF Response to Productivity Commission Inquiry

Adaptation and market forces – who should pay?

Government intervention is justified by market failure only, and this is clearly the view of the Productivity Commission. Nevertheless, the list of potential and actual market failures associated with adaptation is long, including:

1. Underprovision by the market of climate information for adaptation;
2. Failure of insurance mechanisms as a viable market option in the face of large-scale and extensive climate change;
3. Failure of private agents to act to manage risks through re-location of infrastructure due to huge transaction costs and fixed costs of change;
4. Lack of concern about discounted future risks leading to socially sub-optimal investment decisions;
5. Market failures associated with ecosystems, including lack of property rights and lack of economic prices leading to major under-investment by private agents. For adaptation, this includes coastal protection, water and soil management, land cover and use management – already areas of market failure.

Mitigation of climate change includes a series of technological interventions which, in the context of an appropriate carbon price, can be sold. There are fewer equivalent adaptation-related technologies. For adaptation, the private sector has less incentive to act, leaving the

state in this role. It is likely that governments will be required to bear the bulk of the costs for adaptation.

The Productivity Commission has adopted a very market-focussed approach to its inquiry. This could lead to important social, welfare and environmental considerations being neglected.

A combination of market forces, policy and regulation and incentives is more likely to result in change. Each of these mechanisms can also hamper action in certain circumstances, and an adaptive approach is required which may adjust the degree to which each of these levers is pulled.

- The concept of "limits to adaptation" is important to consider. It is not likely to be possible to adapt effectively to all impacts of climate change, particularly if the level of climate change is greater than the lower ranges of current predictions.

Barriers to adaptation

- *Knowledge barriers*: Lack of sufficient knowledge to support action is a barrier to adaptation. Governments, business, industry and community may have insufficient knowledge of the extent and intensity of climate change, of the available actions to take in the face of climate change, the costs and benefits of these actions, and how to plan and manage for the time frames associated with climate change, to allow them to respond effectively to climate change.

  There is a need to continually identify critical knowledge gaps and to prioritise research being conducted to ensure that work is done that is needed by stakeholders. There is also a need to harness the climate change adaptation research community and work with them to ensure that their research is focussed on addressing research gaps.

  Lack of research capacity is a major barrier to the development of appropriate knowledge to underpin adaptation. There is a need for targeted training to ensure that Australia has the necessary capacity to generate knowledge to underpin decision making for adaptation, and the skills required for action.

- *Leadership barriers*: Leadership is often cited as a barrier to climate change adaptation (e.g., Moser and Ekstrom, 2010). It is important for initiating the adaptation process and sustaining momentum. Leadership can help with obtaining the funding required to adapt and with ensuring that knowledge continues to be developed to support the needs of "Adaptation Practitioners".

- *The role of uncertainty*: Uncertainty about climate change effects at fine spatial and temporal scales is often cited as a reason for inaction. However, a little thought provides many examples of human activity where uncertainty about the future does not raise barriers to action and decision-making, and forward planning in the defence and financial sectors would just be two examples. We have to ask, therefore, whether uncertainty about the future is simply an excuse for inaction, in which case it is necessary to explore more deeply to understand the true reasons for inaction, whether these be financial, psychological or legal.

Co-benefits

- There is a need to recognise the variety of activities that take place for purposes other than climate change adaptation, but which could be climate change adaptation actions. It may be possible to build on or adjust these to enhance the adaptation outcomes. For example, marine parks may be managed to protect present day biodiversity. In doing so they may help protected areas to be more resilient to climate change impacts such as large scale flooding.

  At the same time, it is necessary to recognise that some of these activities may be maladaptations, particularly when we consider timescales – actions that we take today to protect ourselves against climate change and variability may turn out to increase our vulnerability to climate change impacts several decades in the future. Decision making around large-scale infrastructure with long lifetimes is an area prone to such timescale-related maladaptations.

  In a world of moving baselines and longer planning/management horizons, adaptive management must be flexible and responsive to unforeseen outcomes.

ARGP	Emergency Management	*A spatial vulnerability analysis of urban populations to extreme heat events in Australian capital cities*	**Loughann**	Monash University
ARGP	Emergency Management	*Recovery from disaster experience: its effect on perceptions of climate change risk and on adaptive behaviours to prevent, prepare, and respond to future climate contingencies*	**Boon**	James Cook University
ARGP	Emergency Management	*Agent based simulation framework for improved understanding and enhancement of community and organisational resilience to extreme events*	**Padgham**	RMIT University
ARGP	Emergency Management	*Harnessing private sector logistics for emergency food and water supplies in flood prone areas.*	**Dobes**	Australian National University
ARGP	Emergency Management	*Public understandings, risk perceptions, and responses to climate change and associated natural disasters*	**Reser**	Griffith University
ARGP	Emergency Management	*Adaptation of the built environment to climate change induced increased intensity of natural hazards*	**King**	James Cook University
ARGP	Emergency Management	*Changing Perceptions about Climate Change*	**Reser**	Griffith University
ARGP	Emergency Management	*The Right Tool for the Job: Achieving climate change adaptation outcomes through improved disaster management policies, planning and risk management strategies*	**Howes**	Griffith University
ARGP	Emergency Management	*Developing an Excel spread sheet tool for local governments to compare and prioritise investment in climate adaptation*	**Trueck**	Macquarie University
ARGP	Emergency Management	*Understanding the Pacific's adaptive capacity to emergencies in the context of climate change*	**Willetts**	University of Technology, Sydney
ARGP	Emergency Management	*Exploring the adaptive capacity of emergency management using agent-based modelling*	**Padgham**	RMIT University
ARGP	Settlements & Infrastructure	*Past, Present and Future Landscapes: Understanding Alternative Futures for Climate Change Adaptation of Coastal Settlements and Communities.*	**Hurley**	University of New England
ARGP	Settlements & Infrastructure	*Reforming Planning Processes Trial: Rockhampton 2050*	**Fry**	Rockhampton Regional Council
ARGP	Settlements & Infrastructure	*Development of tools that allow Local Governments to translate climate change impacts on assets into strategic and operational financial and asset management plans.*	**Balston**	University of South Australia
ARGP	Settlements & Infrastructure	*Pathways to Climate Adapted and Healthy Low Income Housing*	**Barnett**	CSIRO Climate Adaptation Flagship
ARGP	Settlements & Infrastructure	*A model framework for assessing risk and adaptation to climate change on Australian coasts*	**Woodroffe**	University of Wollongong
ARGP	Settlements & Infrastructure	*Enhancing the resilience of seaports to a changing climate*	**McEvoy**	RMIT University
ARGP	Settlements & Infrastructure	*Limp, leap or learn?: Developing a legal framework for adaptation planning in Australia*	**MacDonald**	University of Tasmania
ARGP	Settlements & Infrastructure	*Strata Title in a world of climate change: Managing greater uncertainty in forecasting and funding common property capital expenditure*	**Guilding**	Griffith University
ARGP	Settlements & Infrastructure	*A Framework for Adaptation of Australian Households to Heat Waves*	**Saman**	University of South Australia
ARGP	Settlements & Infrastructure	*Robust optimization of urban drought security for an uncertain climate*	**Kuczera**	University of Newcastle
ARGP	Settlements & Infrastructure	*Analysis of institutional adaptability to redress electricity infrastructure vulnerability due to climate change*	**Foster/Sharma**	UniQuest (UQ) & University of Technology, Sydney
ARGP	Settlements & Infrastructure	*Climate Change and the Welfare Sector – Risk and Adaptation of Australia's Vulnerable and Marginalised*	**Mallon**	ACOSS
ARGP	Settlements & Infrastructure	*Australia's Country Towns 2050: What will a Climate Adapted Settlement Pattern Look Like?*	**Beer**	University of Adelaide
ARGP	Settlements & Infrastructure	*Coastal urban climate futures in SE Australia: from Wollongong to Lakes Entrance*	**Norman**	University of Canberra
ARGP	Settlements & Infrastructure	*What would a climate-adapted Australian settlement look like?*	**Griggs**	Monash University
ARGP	Terrestrial Biodiversity	*The architecture of resilient landscapes: scenario modelling to reveal best-practice design principles for climate adaptation.*	**Doer**	CSIRO
ARGP	Terrestrial Biodiversity	*Optimal habitat protection and restoration for climate adaptation.*	**Fuller**	University of Queensland
ARGP	Terrestrial Biodiversity	*Climate-resilient vegetation of multi-use landscapes: exploiting genetic variability in widespread species.*	**Byrne**	DEC WA
ARGP	Terrestrial Biodiversity	*Adaptation strategies for Australian birds*	**Garnett**	Charles Darwin University
ARGP	Terrestrial Biodiversity	*Determining future invasive plant threats under climate change: an interactive decision tool for managers.*	**Hughes**	Macquarie University
ARGP	Terrestrial Biodiversity	*Developing management strategies to mtitgate increased coextinction rates of plant-dwelling insects through global climate change.*	**Moir**	University of Melbourne
ARGP	Terrestrial Biodiversity	*Determining high risk vegetation communities and plants species in relation to climate change in the Australian alpine region.*	**Pickering**	Griffith University
ARGP	Terrestrial Biodiversity	*The role of refugia in ecosystem resilience and maintenance of terrestrial biodiversity in the face of global climate change*	**Williams**	James Cook University
ARGP	Terrestrial Biodiversity	*Adapted future landscapes – from aspiration to implementation*	**Meyer**	University of Adelaide
ARGP	Primary Industries	*Will Primary Producers Continue to Adjust Practices and Technologies, Change Production Systems or Transform Their Industry – An Application of Real Options*	**Hertzler**	University of Sydney
ARGP	Primary Industries	*Adaptive capacity and adaptive strategies of broadacre farms experiencing climate change.*	**Kingwell**	University of Western Australia and Dept of Agriculture and Food WA
ARGP	Primary Industries	*EverFarm® - Design of climate adapted perennial-based farming systems for dryland agriculture in southern Australia.*	**Abadi**	Future Farm Industries CRC (FFI CRC)
ARGP	Social, Economic & Institutional Dimensions	*Extreme heat and climate change: adaptation in culturally and linguistically diverse (CALD) communities*	**Bi**	University of Adelaide
ARGP	Social, Economic & Institutional Dimensions	*What about me? Factors affecting individual adaptive coping capacity across different population groups*	**Unsworth**	University of Western Australia
ARGP	Social, Economic & Institutional Dimensions	*Impact of Climate Change on Disadvantaged Groups: Issues and Interventions*	**Hugo**	University of Adelaide
ARGP	Social, Economic & Institutional Dimensions	*The Legal, Institutional and Cultural Barriers to Adaptation to Sea-Level Rise in Australia*	**Barnett**	University of Melbourne
ARGP	Social, Economic & Institutional Dimensions	*Changes to Country and Culture, Changes to Climate: strengthening institutions for Indigenous resilience and adaptation*	**Weir**	Australian Institute of Aboriginal and Torres Strait Islander Studies (AIATSIS)
ARGP	Social, Economic & Institutional Dimensions	*Heat-Ready: Adapting Aged Care Facilities to prevent premature death in elderly Australians.*	**Black**	University of Sydney
ARGP	Social, Economic & Institutional Dimensions	*Developing adaptively: The role and capacities of private sector development institutions in urban climate change adaptation.*	**Dodson**	Griffith University
ARGP	Social, Economic & Institutional Dimensions	*Every state for themselves? Learning from cross-border regulatory instruments to support and promote climate change adaptation in Australia*	**Steele**	Griffith University
ARGP	Social, Economic & Institutional Dimensions	*An assessment of Australia's existing statutory frameworks, associated institutions, and policy processes: do they support or impede national adaptation planning and practice?*	**Hussey**	Australian National University
ARGP	Social, Economic & Institutional Dimensions	*Social networks analysis: bridging degrees of separation to enhance climate change adaptation*	**Kinnear**	Central Queensland University
ARGP	Social, Economic & Institutional Dimensions	*Costs and coasts: an empirical assessment of physical and institutional climate adaptation pathways*	**McAlister**	CSIRO
ARGP	Social, Economic & Institutional Dimensions	*Valuing adaptation under rapid change: anticipatory adjustments, maladaptation and transformation*	**Jones**	Victoria University
ARGP	Social, Economic & Institutional Dimensions	*Rental housing, climate change and adaptive capacity: a case study of Newcastle, NSW*	**Instone**	University of Newcastle
ARGP	Social, Economic & Institutional Dimensions	*Enhancing the Adaptive Capacity of Small-to- Medium Enterprises (SMEs) to Climate Change and Variability*	**Kuruppu**	University of Technology, Sydney
ARGP	Social, Economic & Institutional Dimensions	*Cognitive and affective barriers to climate change adaptation: Exploring the risk and adaptation appraisals of South Australians to different climate risks*	**Bi**	University of Adelaide
ARGP	Social, Economic & Institutional Dimensions	*Water Trade, Climate Change and Irrigator Adaptability in the Murray-Darling Basin*	**Wheeler**	University of South Australia
ARGP	Social, Economic & Institutional Dimensions	*Assessing the potential for, and limits to, insurance and market-based mechanisms for encouraging climate change adaptation*	**McAneney**	Macquarie University
ARGP	Freshwater Biodiversity	*Novel methods for managing freshwater refuges against climate change in southern Australia.*	**Robson**	Murdoch University
ARGP	Freshwater Biodiversity	*Predicting water quality and ecological responses to a changing climate: informing adaptation initiatives.*	**Dyer**	University of Canberra
ARGP	Freshwater Biodiversity	*Joining the dots: integrating climate and hydrological projections with freshwater ecosystem values to develop adaptation options for conserving freshwater biodiversity*	**Barmuta**	University of Tasmania
ARGP	Freshwater Biodiversity	*Adaptive management of Ramsar wetlands*	**Kingsford**	University of New South Wales
ARGP	Freshwater Biodiversity	*Impacts of elevated temperature and CO2 on the critical processes underpinning resilience of aquatic ecosystems*	**Thompson**	Monash University
ARGP	Freshwater Biodiversity	*Building the climate resilience of arid zone freshwater biota: identifying and prioritising processes and scales for management*	**Davis**	Monash University
ARGP	Freshwater Biodiversity	*The role of refugia in ecosystem resilience and maintenance of terrestrial biodiversity in the face of global climate change*	**Van Der Wal**	James Cook University
ARGP	Freshwater Biodiversity	*Adapting to climate change: a risk assessment and decision framework for managing groundwater dependent ecosystems with declining water levels*	**Chambers**	Murdoch University
ARGP	Freshwater Biodiversity	*Contributing to a sustainable future for Australia's biodiversity under climate change: conservation goals for dynamic management of ecosystems*	**Dunlop**	CSIRO Climate Adaptation Flagship
ARGP	Indigenous Communities	*Learning from the past, adapting in the future: identifying pathways to successful adaptation in Indigenous communities*	**Parsons**	University of Melbourne
ARGP	Indigenous Communities	*Living Change: Adaptive housing responses to climate change in the town camps of Alice Springs*	**Horne**	RMIT University
ARGP	Indigenous Communities	*Indigenous voices in climate change adaptation: Addressing the challenges of diverse knowledge systems in the Barmah-Millewa*	**Griggs**	Monash University
ARGP	Indigenous Communities	*Aboriginal responses to climate change in arid zone Australia – Regional understandings and capacity building for adaptation*	**Memmott**	University of Queensland
ARGP	Indigenous Communities	*Understanding how the use of intertidal marine resources by Indigenous women in the Northern Territory will be affected by climate change and their referred adaptation options*	**Fleming**	NT Government, Darwin Aquaculture Centre
ARGP	Indigenous Communities	*Towards a Framework and Process to identify Indigenous vulnerability and adaptive capacity to Climate Change*	**Low Choy**	Griffith University
ARGP	Indigenous Communities	*Future change in ancient worlds: Indigenous adaptation in northern Australia*	**Larkin**	Charles Darwin University
ARGP	Indigenous Communities	*Community Based Adaptation to Climate Change: The Arabunna, South Australia*	**Nursey-Bray**	University of Adelaide
ARGP	Human Health	*Changing Heat: direct impacts of temperature on health and productivity - current risks and climate change projections*	**Dear**	Australian National University
ARGP	Human Health	*Climate Change and Rural Communities: Integrated study of physical and social impacts, health risks and adaptive options*	**McMichael**	Australian National University
ARGP	Human Health	*Dengue transmission under climate change in Northern Australia: linking ecological and population based models to develop adaptive strategies*	**Harley**	Australian National University
ARGP	Human Health	*Projection of the impact of climate change on the transmission of Ross River virus disease*	**Tong**	Queensland University of Technology
ARGP	Human Health	*Health impacts of climate change on Indigenous Australians: identifying climate thresholds to enable the development of informed adaptation strategies*	**Green**	University of New South Wales
ARGP	Human Health	*Climate Change impacts on Workplace Heat Extremes: Health Risk Estimates and Adaptive Options*	**Hanna**	Australian National University
ARGP	Human Health	*Displaced twice? Investigating the impact of Queensland floods on the wellbeing and settlement of a cohort of men from refugee backgrounds living in Brisbane and Toowoomba*	**Correa-Velez**	La Trobe University
ARGP	Marine Biodiversity and Resources	*Adaptive management of temperate reefs to minimise effects of climate change: developing effective approaches for ecological monitoring and predictive modelling*	**Barrett**	University of Tasmania
ARGP	Marine Biodiversity and Resources	*Adapting to the effects of climate change on Australia's deep marine reserves*	**Thresher**	CSIRO
ARGP	Marine Biodiversity and Resources	*Vulnerability of an iconic Australian finfish (Barramundi, Lates calcarifer) and related industries to altered climate across tropical Australia*	**Jerry**	James Cook University
ARGP	Marine Biodiversity and Resources	*Identification of climate-driven species shifts and adaptation options for recreational fishers: learning general lessons from a data rich case*	**Gledhill**	CSIRO
ARGP	Marine Biodiversity and Resources	*Management implications of climate change impacts on fisheries resources of tropical Australia*	**Welch**	James Cook University
ARGP	Marine Biodiversity and Resources	*Changing currents in marine biodiversity governance and management responding to climate change*	**Lockwood**	University of Tasmania
ARGP	Marine Biodiversity and Resources	*Human adaptation options to increase resilience of conservation-dependent seabirds and marine mammals impacted by climate change*	**Hobday**	CSIRO
ARGP	Marine Biodiversity and Resources	*Management implications of climate change effects on fisheries in Western Australia*	**Caputi**	Western Australian Fisheries and Marine Research Laboratories
ARGP	Marine Biodiversity and Resources	*Beach and surf tourism and recreation in Australia: vulnerability and adaptation*	**Raybould**	Bond University
ARGP	Marine Biodiversity and Resources	*Effects of climate change on reproduction, larval development and population growth of coral trout*	**Pratchett**	James Cook University
ARGP	Marine Biodiversity and Resources	*Pre-adapting a Tasmanian coastal ecosystem to ongoing climate change through reintroduction of a locally extinct species*	**Bax**	University of Tasmania and CSIRO
ARGP	Marine Biodiversity and Resources	*Ensuring that the Australian oyster industry adapts to a changing climate: a natural resource and industry spatial information portal for knowledge action and informed adaptation fram*	**Davis**	University of Wollongong
S&IR	Adaptaive Capacity Project	*An assessment of the nature and utility of adaptive capacity research*	**Smith**	University of the Sunshine Coast
S&IR	Historical Case Studies	*Adaptation Lessons from Cyclone Tracy*	**McAneney**	Macquarie University
S&IR	Historical Case Studies	*Indigenous experience of Cyclone Tracy*	**Haynes**	Macquarie University
S&IR	Historical Case Studies	*East Coast Lows and the Newcastle-Central Coast Pasha Bulker Storm*	**Willgoose**	University of Newcastle
S&IR	Historical Case Studies	*Storm tides, coastal erosion and inundation*	**Tomlinson**	Griffith University
S&IR	Historical Case Studies	*The 2008 floods in Queensland: A case study of vulnerability, resilience and adaptive capacity*	**Apan**	University of Southern Queensland
S&IR	Historical Case Studies	*Impacts and adaptation response of infrastructure and communities to heatwaves: the southern Australian experience of 2009*	**Reeves**	Queensland University of Technology
S&IR	Historical Case Studies	*Drought and the Future of Rural Communities: Drought impacts and adaptation in regional Victoria, Australia*	**Kiem**	University of Newcastle
S&IR	Historical Case Studies	*Resilience and Water Security in Two Outback Cities*	**Albrecht**	Murdoch University
S&IR	Historical Case Studies	*Learning from experience: Historical Case Studies and Climate Change Adaptation*	**Kiem**	University of Newcastle and NCCARF
S&IR	Forest Vulnerability Assessment	*1. Establishing the need and consultation with key stakeholders in forest policy and management under climate change.*	**Wallace**	University of the Sunshine Coast
S&IR	Forest Vulnerability Assessment	*2. Biophysical impacts of climate change on Australia's forests*	**Medlyn**	Macquarie University
S&IR	Forest Vulnerability Assessment	*3. Socio-economic implications of climate change with regard to forests and forest management*	**Cockfield**	University of Southern Queensland
S&IR	Forest Vulnerability Assessment	*4. Climate change adaptation options, tools and vulnerability*	**Turton**	James Cook University
S&IR	Forest Vulnerability Assessment	*5. A Preliminary Assessment of the Vulnerability of Australian Forests to the Impacts of Climate Change: Synthesis*	**Kitching**	Griffith University
S&IR	Coastal Ecosystems Response to Climate Change	*Adapting to climate change in the coastal zone*	**Hadwen**	Griffith University
S&IR	Learning from regional climate analogues	*Learning from Regional Analogues – Part One*	**Kellett**	University of South Australia
S&IR	Limits to Adaptation	*Limits to climate change adaptation in the Great Barrier Reef: Scoping ecological, institutional and economic limits*	**Evans**	James Cook University
S&IR	Limits to Adaptation	*Climate change adaptation in the Australian Alps: Impacts, strategies, limits and management*	**Pickering**	Griffith University
S&IR	Limits to Adaptation	*Climate Change Adaptation in the Coorong, Murray Mouth and Lakes Alexandrina and Albert*	**Gross**	Australian National University
S&IR	Limits to Adaptation	*Limits to climate change adaptation in floodplain wetlands: the Macquarie Marshes*	**Kingsford**	University of New South Wales
S&IR	Limits to Adaptation	*Limits to Climate Change Adaptation for Two Low-Lying Communities in the Torres Strait*	**Smithers**	James Cook University
S&IR	Limits to Adaptation	*Limits to climate change adaptation for small inland communities affected by drought*	**Kiem**	University of Newcastle
S&IR	N/A	*Investigating factors that inhibit and enable adaptation strategies following the 2010/11 floods*	**King**	James Cook University
S&IR	Literature review: impacts of climate change	*iClimate Project*	**Poloczanska**	CSIRO Climate Adaptation Flagship
S&IR	Flooding in Australia	*Damage to buildings during the 2010-2011 Eastern Australia flooding events*	**Mason**	Macquarie University (Risk Frontiers)
S&IR	Flooding in Australia	*Living with floods: key lessons from Australia and abroad*	**Hussey**	Australian National University
S&IR	Flooding in Australia	*Extractive resource development in a changing climate: learning the lessons from recent weather events in Queensland, Australia*	**Sharma**	University of Queensland
S&IR	Overcoming Barriers	*Cross-Scale Barriers to Adaptation in Local Government, Australia*	**Kuruppu**	University of Technology, Sydney
S&IR	Uncertainty	*Bridging the gap between end user needs and science capability: dealing with uncertainty in future scenarios*	**Verdon-Kidd**	University of Newcastle
S&IR	Uncertainty	*Understanding end-user decisions and the value of climate information under the risks and uncertainties of future climates.*	**Randall**	University of Sydney
S&IR	Food Security	*Australian Food Security: Impact of Climate Change for Risk Management: How prepared are food industry leaders?*	**Michael**	Wondu Business & Technology Services
S&IR	Food Security	*Creating a climate for food security: the business, people & landscapes in food production*	**Wardell-Johnson**	Curtin University
S&IR	Food Security	*Urban food security, urban resilience and climate change*	**Burton**	Griffith University
S&IR	Communication	*Enhancing climate change communication: Strategies for profiling and tergeting Australian Interpretive communities*	**Hine**	University of New England
S&IR	Communication	*Climate Change in the Board Room*	**Johnston**	Future Ready
S&IR	Systems thinking to support decision making	*Overcoming challenges for decision making about climate change*	**Maani**	University of Queensland
S&IR	Systems thinking to support decision making	*Adapt between the flags-enhancing the capacity of Surf Life Saving Australia to cope with climate change and to leverage adaptation within coastal communities*	**Sano**	Griffith University
S&IR	Web-based tools for adaptation	*Web-based tools for adaptation - an international and Australian review*	**Webb**	Australian National University
S&IR	Adaptation in Industry and Business	*Climate change adaptation for Australian Minerals Industry Professionals:Best Practice Guidelines*	**Guirco**	University of Technology, Sydney
S&IR	Adaptation in Industry and Business	*Climate change adaptation: a framework for best practice in financial risk assessment, governance and disclosure*	**West**	Griffith University
S&IR	Adaptation and Mitigation: Potential for and management o	*Identifying low risk climate change mitigation and adpataton in catchment management while avoiding unintended consequences*	**Finlayson**	Charles Sturt University
S&IR	Economics and Adaptation	*Leading gifted horses to water: the economics of cliamte change adaptation in government- sponsored irrigation in victoria.*	**Crase**	La Trobe University
S&IR	Economics and Adaptation	*The economics of government as an insurer of last resort for climate change adaptation*	**Dobes**	ANU