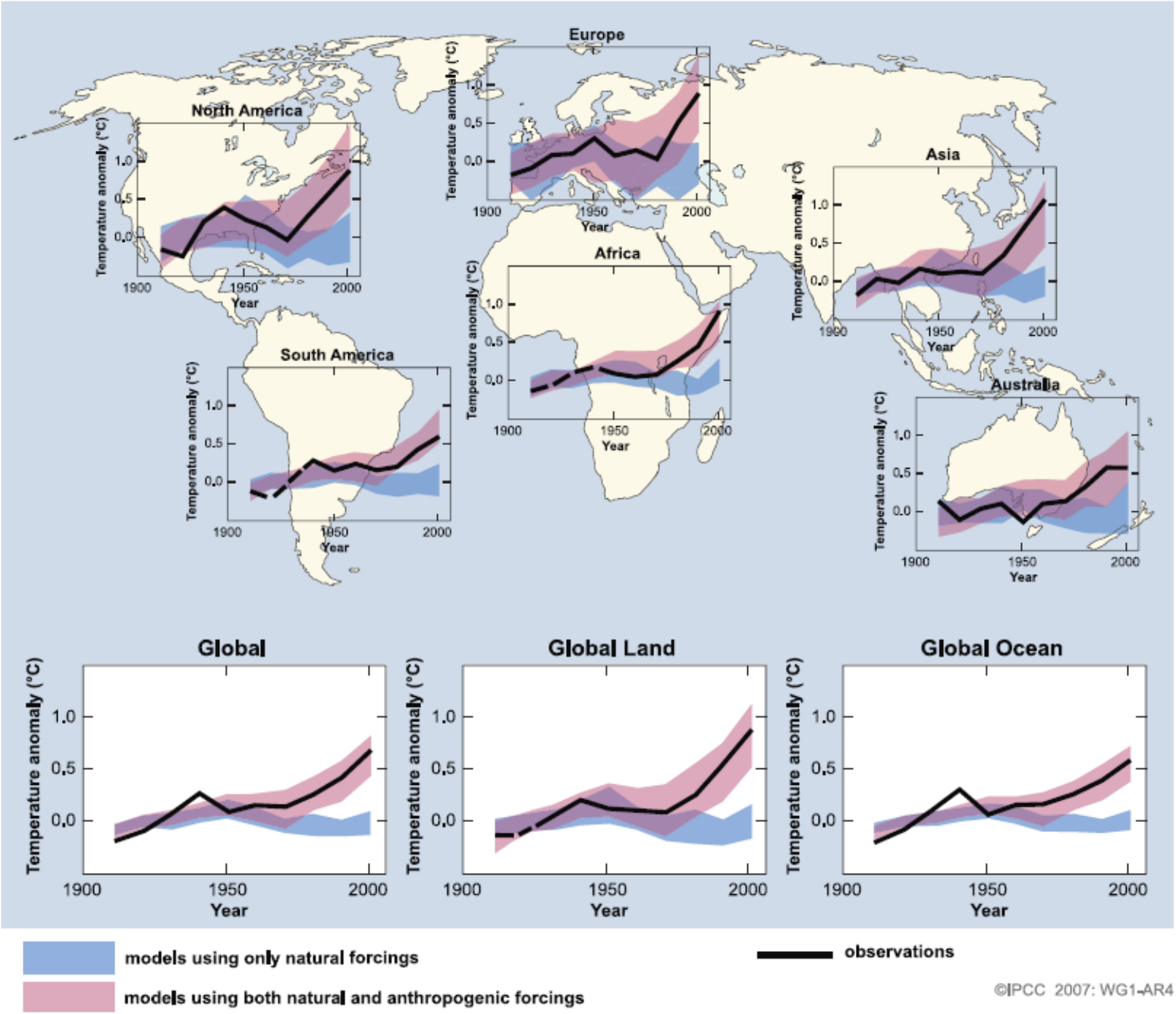
AUSTRALIA

COASTS AND CLIMATE CHANGE COUNCIL

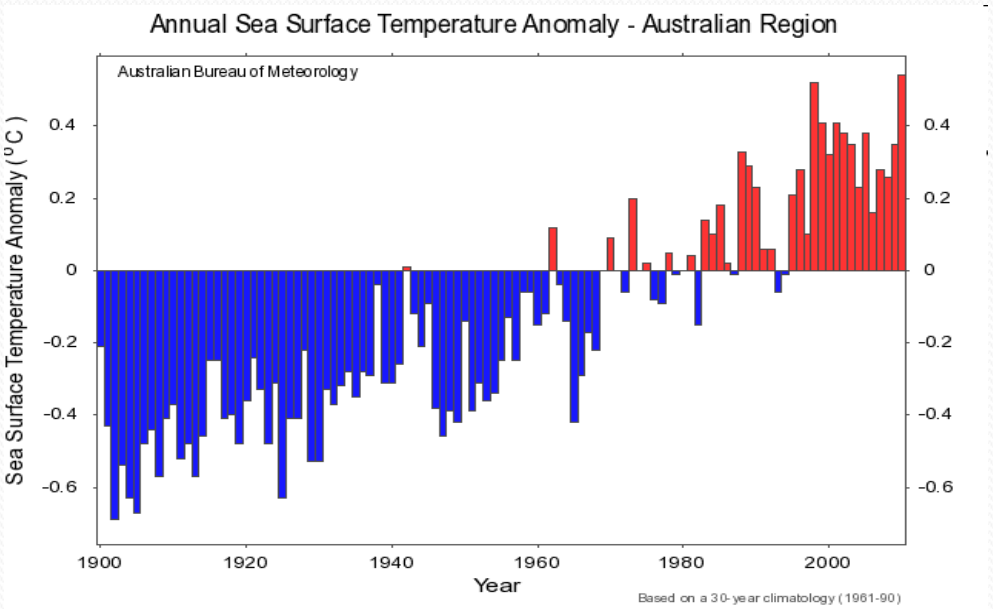
Professor Bruce Thom AM
Chair, Coasts and Climate Change Council

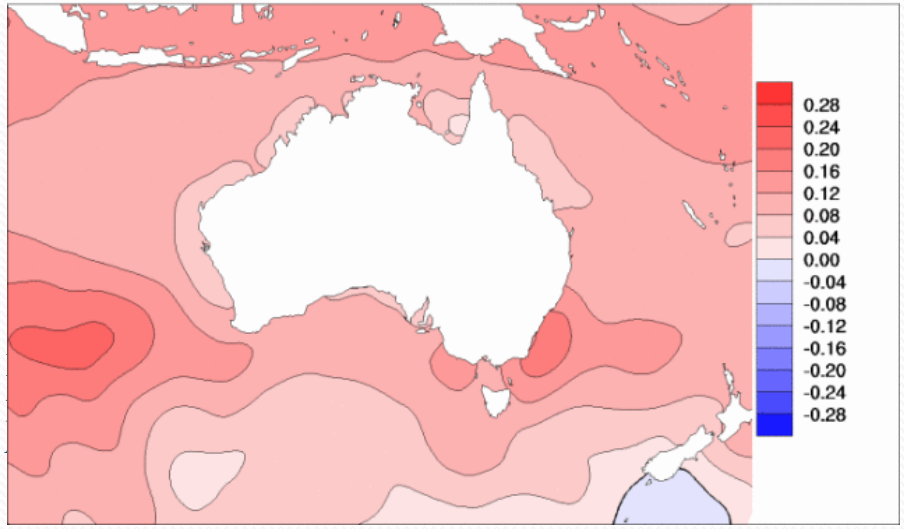
May 2011

Global and Continental Temperature Change



Sea Surface Temperature Trends





Sea Surface Temperature Increases are consistent with warming over the land surface.

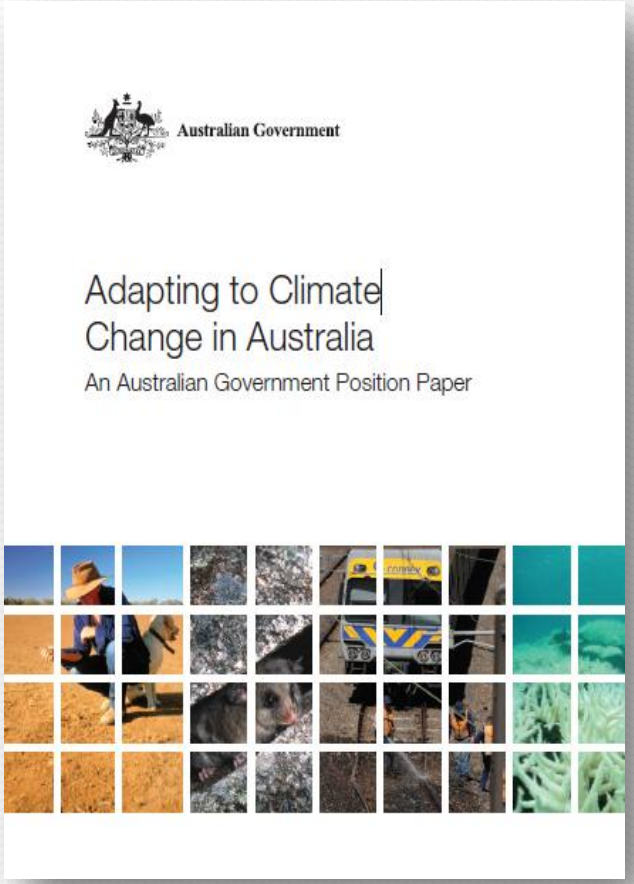
Strongest warming trends are in the Tasman Sea and Indian Ocean

Total warming in these areas has reached up to 1°C

Referred to in a presentation by the Assistant Director of Climate Information Services Bureau of Meteorology given on 29 March 2011 at the National Sea Change Taskforce Conference

National adaptation policy

- Australian Government policy position on adaptation released 2010
- Coastal management an initial national priority for adaptation action

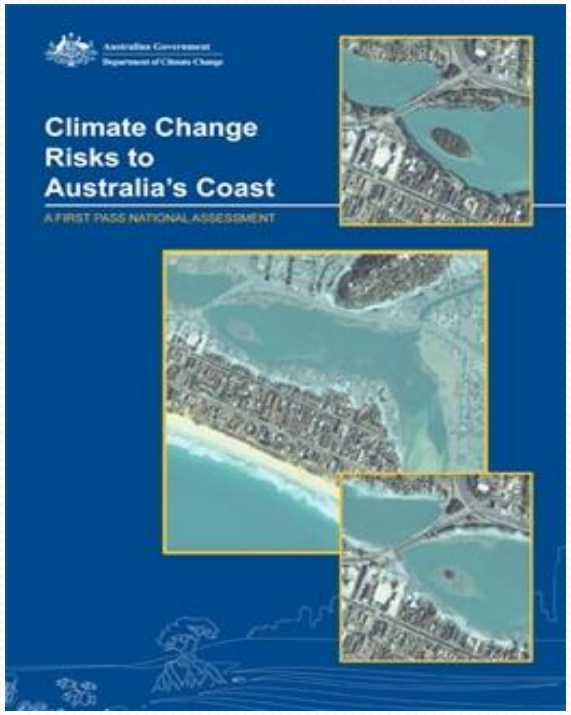


Coastal adaptation – a national issue

House of Representatives Committee inquiry: *Managing our Coastal Zone in a Changing Climate*

- released October 2009
- significant consultation
- recognised the challenge and called for a national approach to policy reform and risk assessment

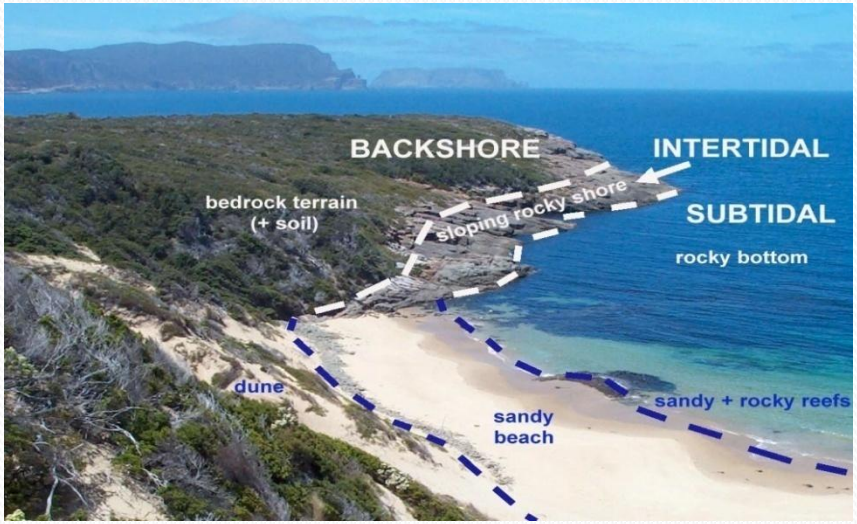
National coastal risk assessment 2009

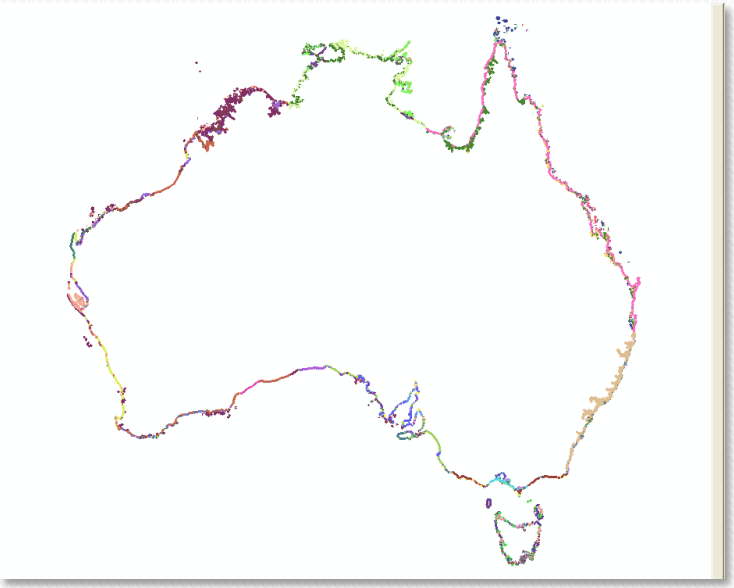


- **Qualitative** assessment of risk to natural assets
- **Quantitative** assessment of risk to critical infrastructure and essential services
- **Quantitative** assessment of risk to residential properties

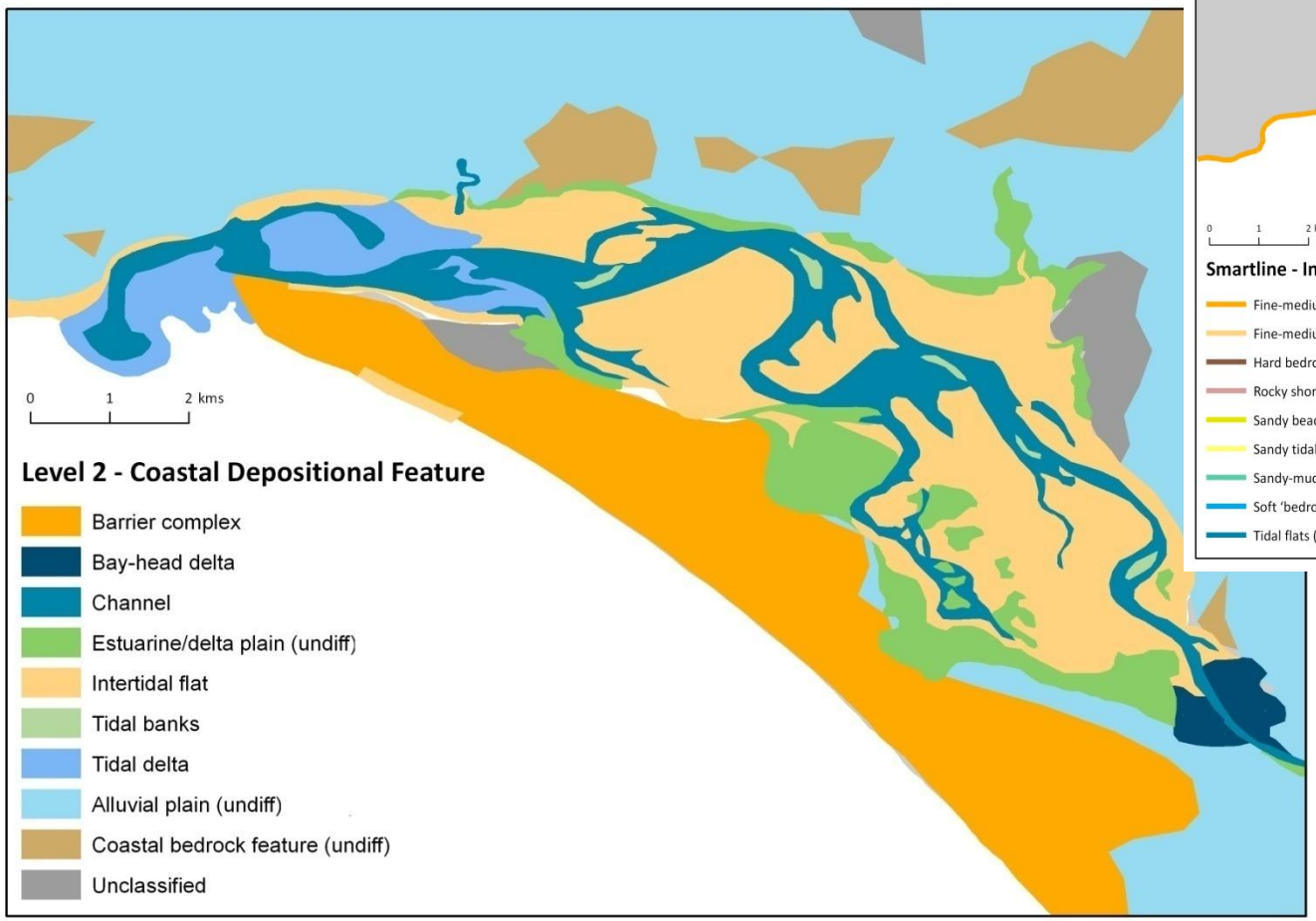
Key inputs to risk assessment

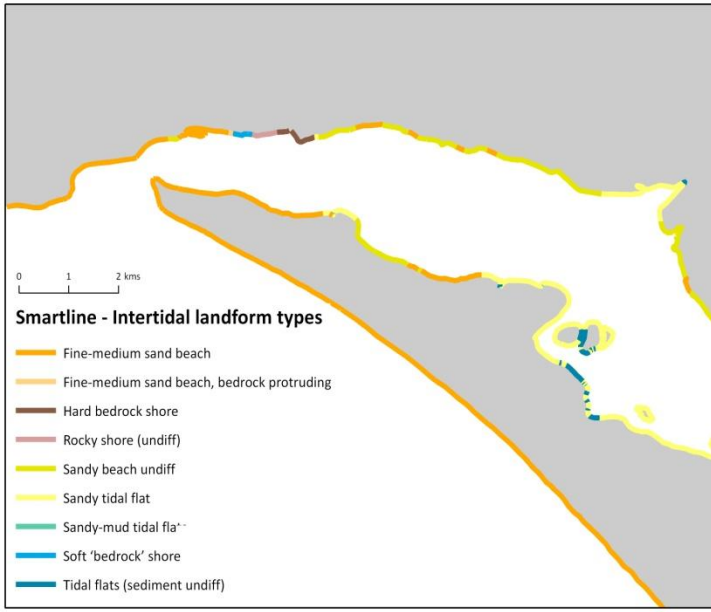
- Smartline – mapping coastal landform type for Australian coastline
- Mid resolution digital elevation model





Mapping coastal stability



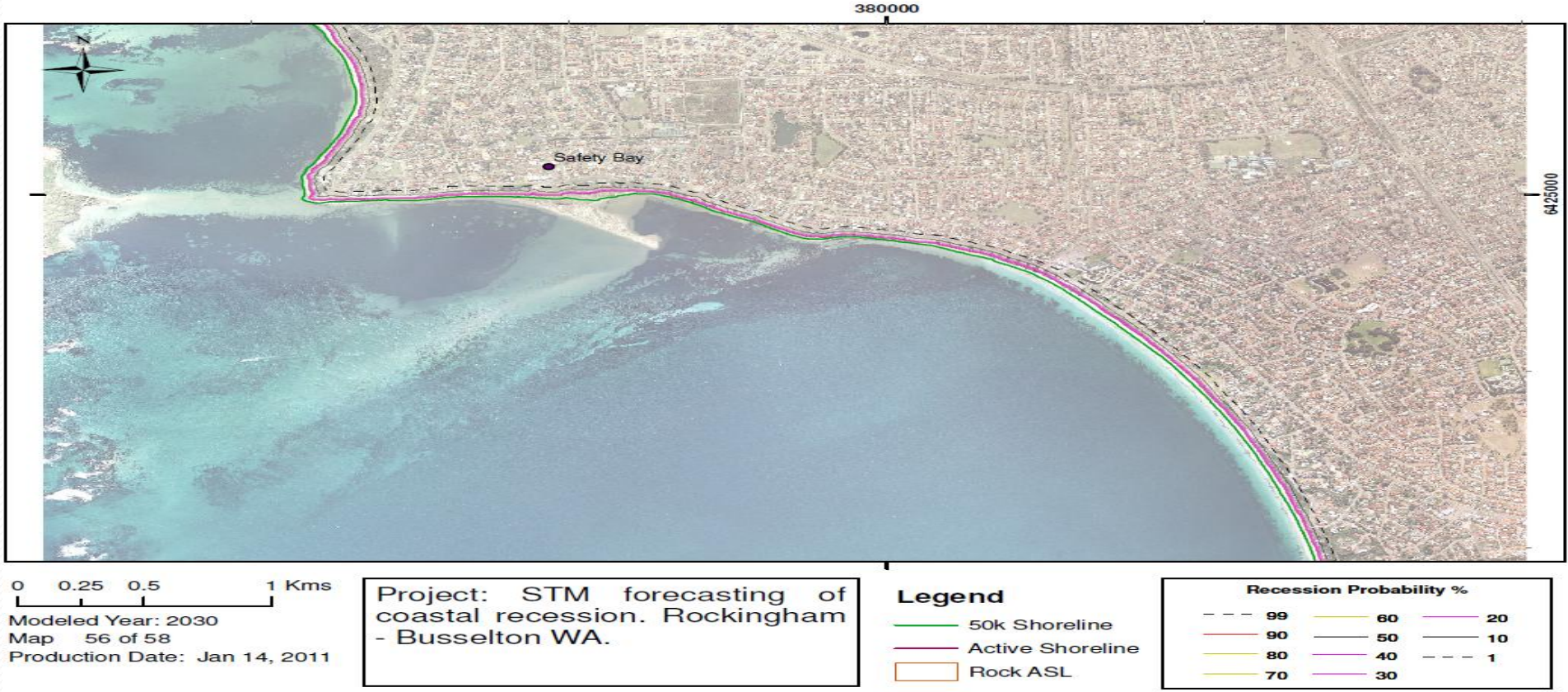


Elevation modelling and products

- high resolution elevation data and imagery acquired for key urban areas
- online web portal developed providing limited access to data – *government and research agencies*
- piloting a web-based sea-level rise visualisation tool – *decision makers*

Modelling new shoreline – south west WA

- 2030 - estimates of trend range through a few tens of metres.
- Erosion and subsequent beach recovery will probably mask climate change impacts for the next few decades

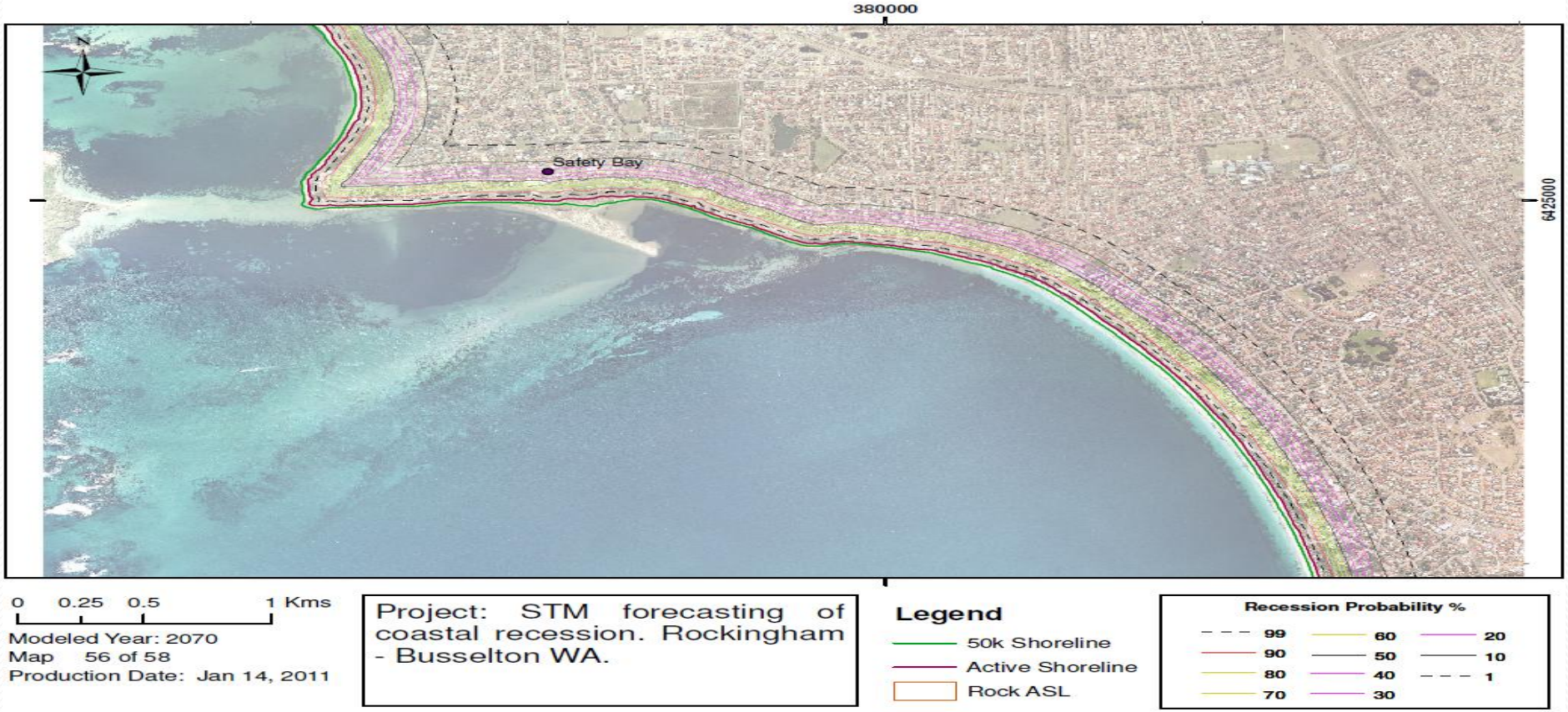


Source University of Sydney, Peter Cowell (2011)

Modelling new shoreline – south west WA

From 2030-2100 coastal recession probably in the order of hundreds of metres

Eventually long term recession trends (due to SLR) will overwhelm other effects



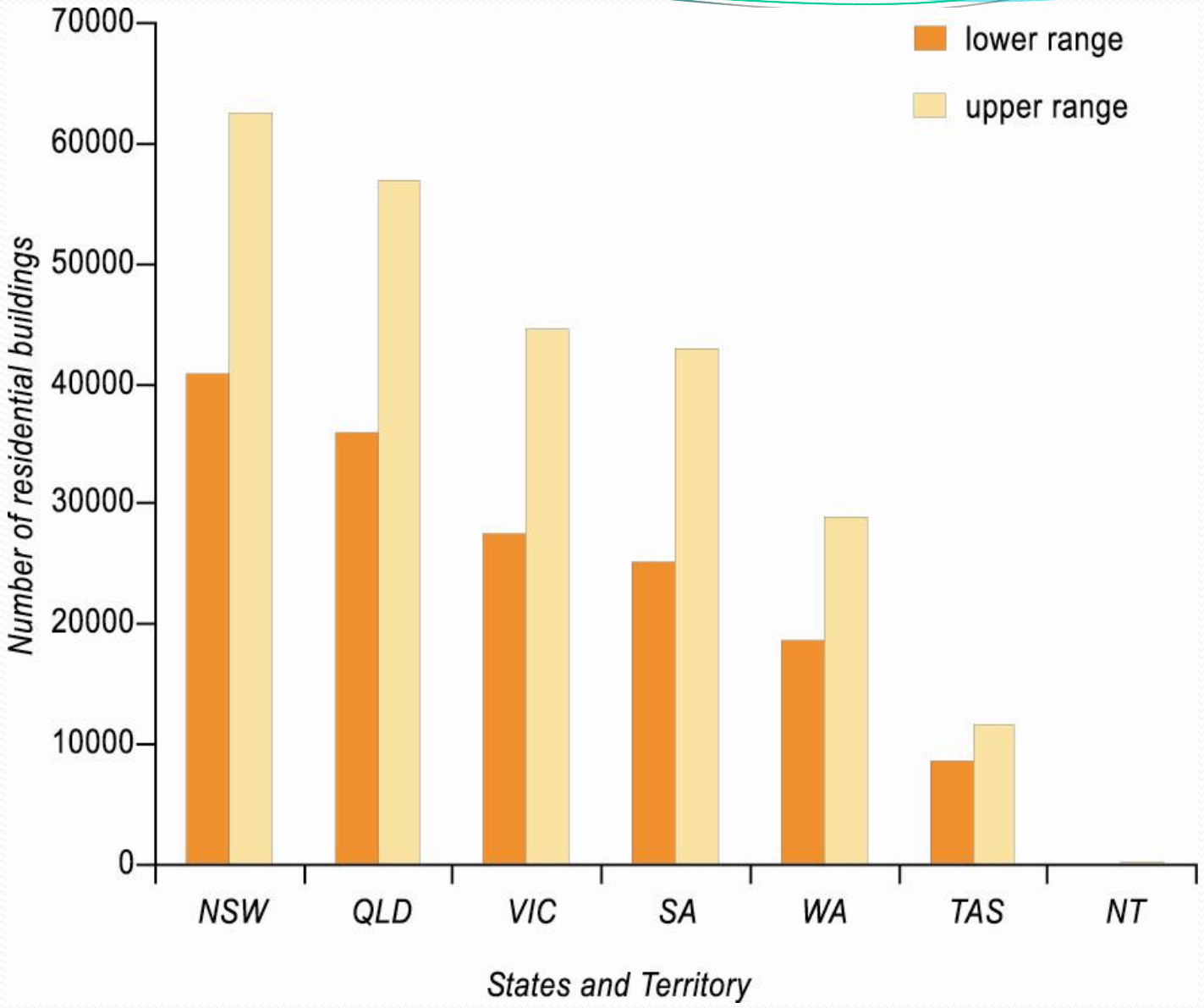
Source University of Sydney, Peter Cowell (2011)

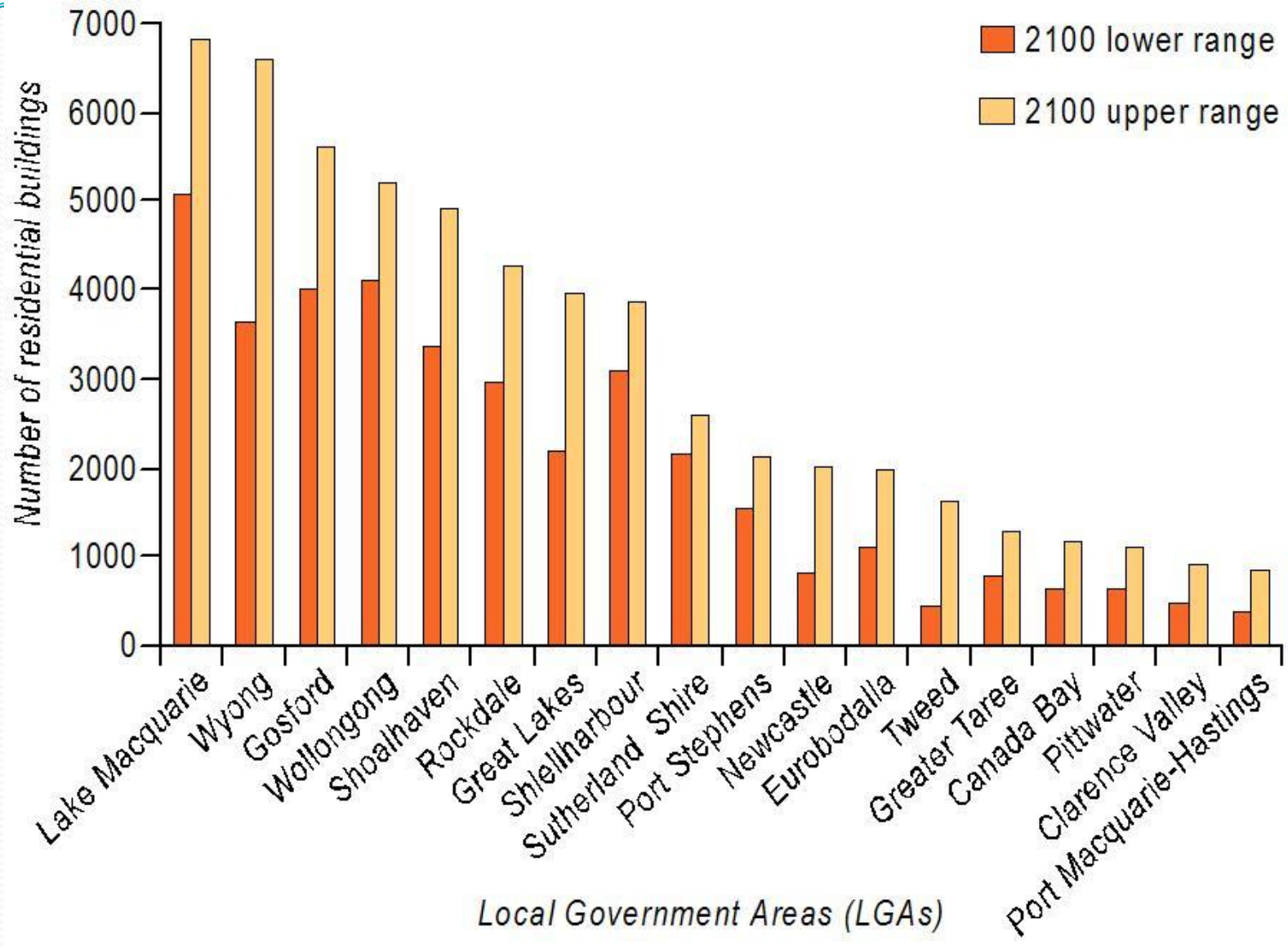
Not just an open coast issue

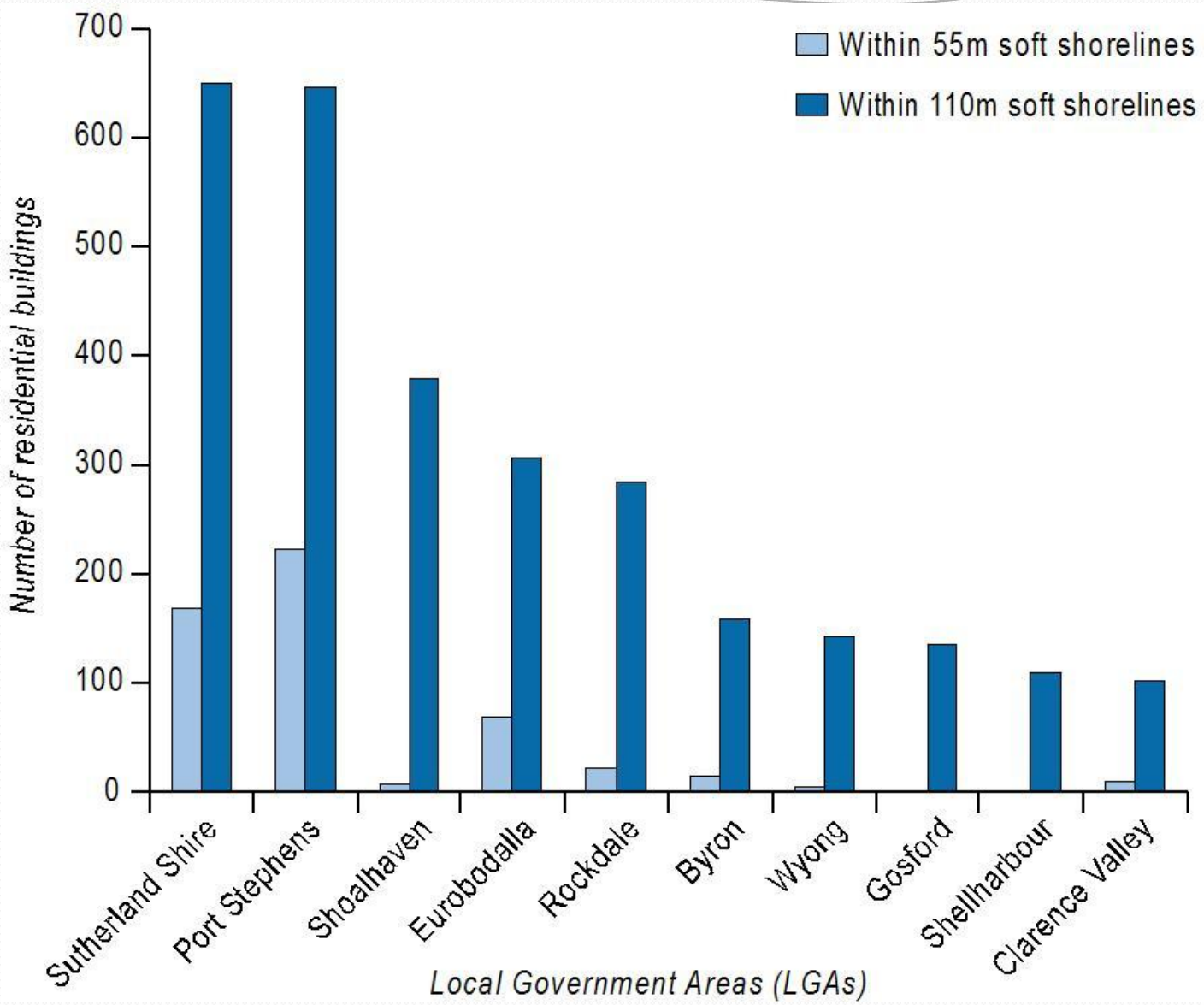
- Dune system provides a natural buffer for the open coast areas in many areas (where it hasn't been built on)
- More problematic for many low lying areas near lakes, rivers estuaries and lagoons
- Protecting these areas will be difficult - building walls may cause problems for catchment flood water drainage

Communicating inundation risk

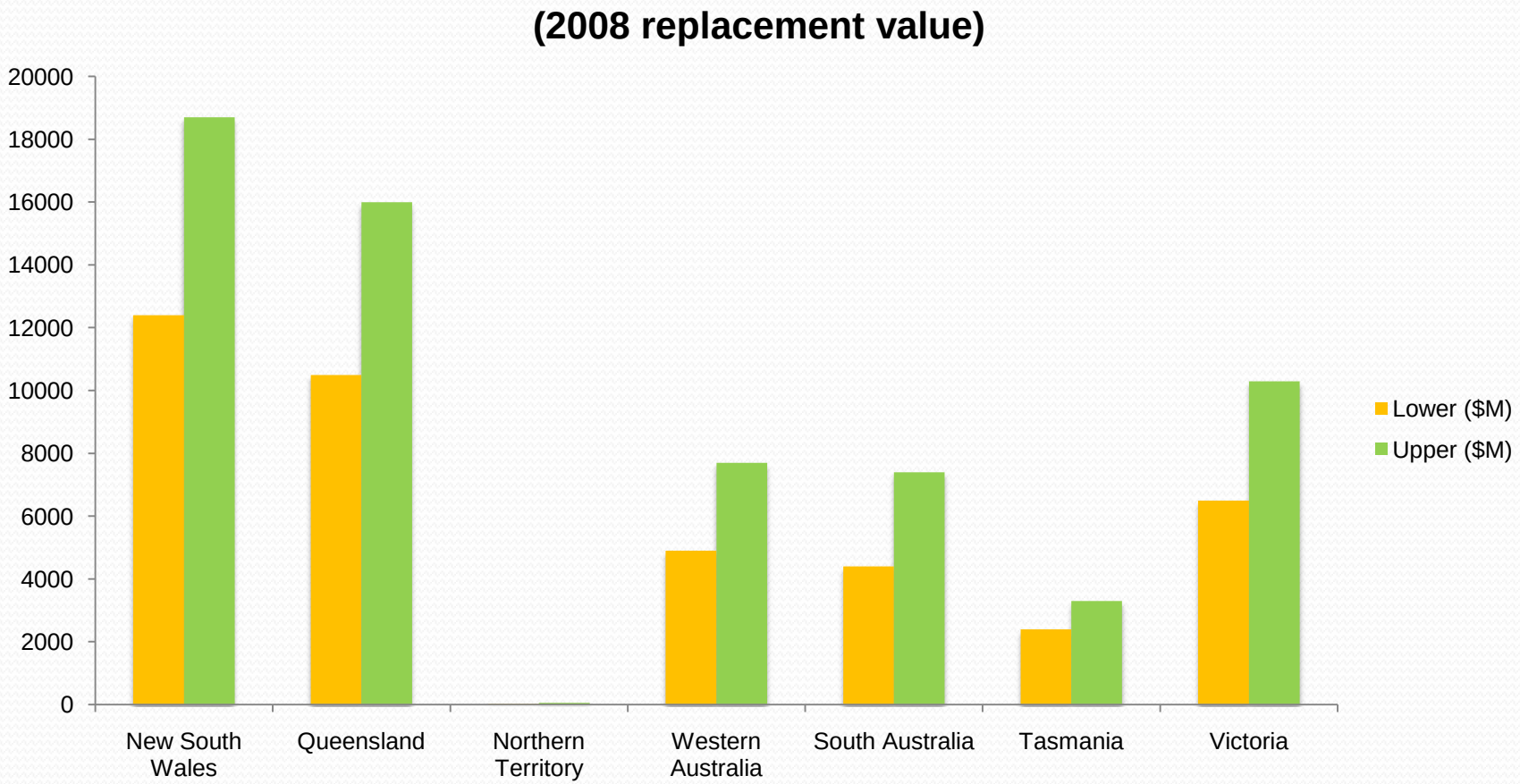
- Online maps produced in key urban areas for general public showing different inundation scenarios for 2100


lower range
upper range
70000
60000
50000
40000
30000
20000
10000
0
Number of residential buildings
NSW
QLD
VIC
SA
WA
TAS
NT
States and Territory


2100 lower range
2100 upper range
Number of residential buildings
7000
6000
5000
4000
3000
2000
1000
0
Lake Macquarie
Wyong
Gosford
Wollongong
Shoalhaven
Rockdale
Great Lakes
Shlellharbour
Sutherland Shire
Port Stephens
Newcastle
Eurobodalla
Tweed
Greater Taree
Canada Bay
Pittwater
Clarence Valley
Port Macquarie-Hastings
Local Government Areas (LGAs)


Within 55m soft shorelines
Within 110m soft shorelines
Number of residential buildings
700
600
500
400
300
200
100
0
Sutherland Shire
Port Stephens
Shoalhaven
Eurobodalla
Rockdale
Byron
Wyong
Gosford
Shellharbour
Clarence Valley
Local Government Areas (LGAs)

Value of residential property exposed 1.1 m SLR



Early action cost effective

Impact of a 1-in-500 year event in south-east Queensland, 2030

Adaptation options for residences in south-east Queensland	People affected 2030	Buildings affected	Total cost
BAU (same planning and building regulation as today)	616,000	124,800	$4 billion
Planning regulations tightened to allow no further risky development	378,000	83,2000	$2.6 billion
Above planning change, plus retrofit/reclaim to maintain existing level of risk	270,000	47,9000	$1.5 billion

- Source: CSIRO

Coastal Settlements – Issues and Needs

1966
(40,000 people)

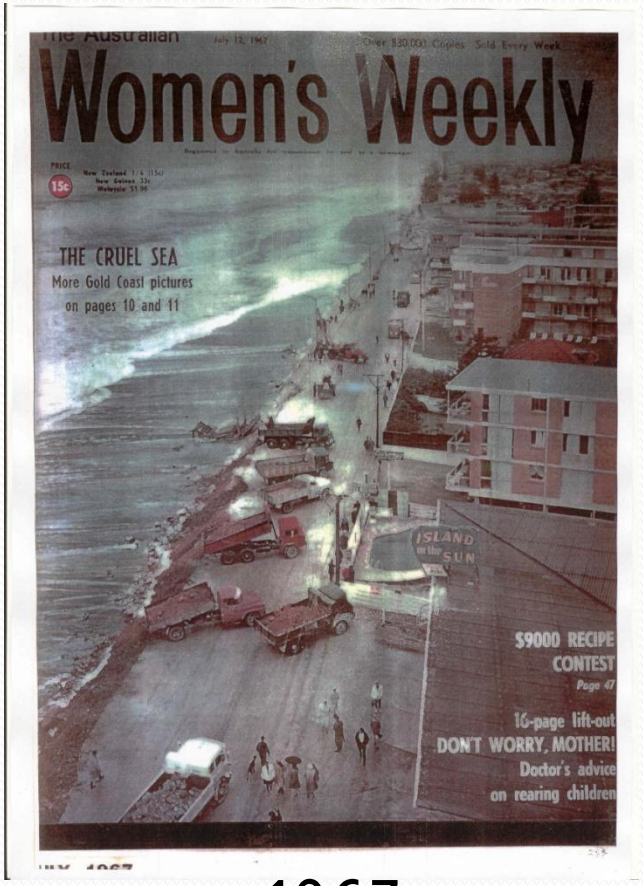
Now
(500,000 people)

1967 Storms
Surfers Paradise Esp, Gold Coast

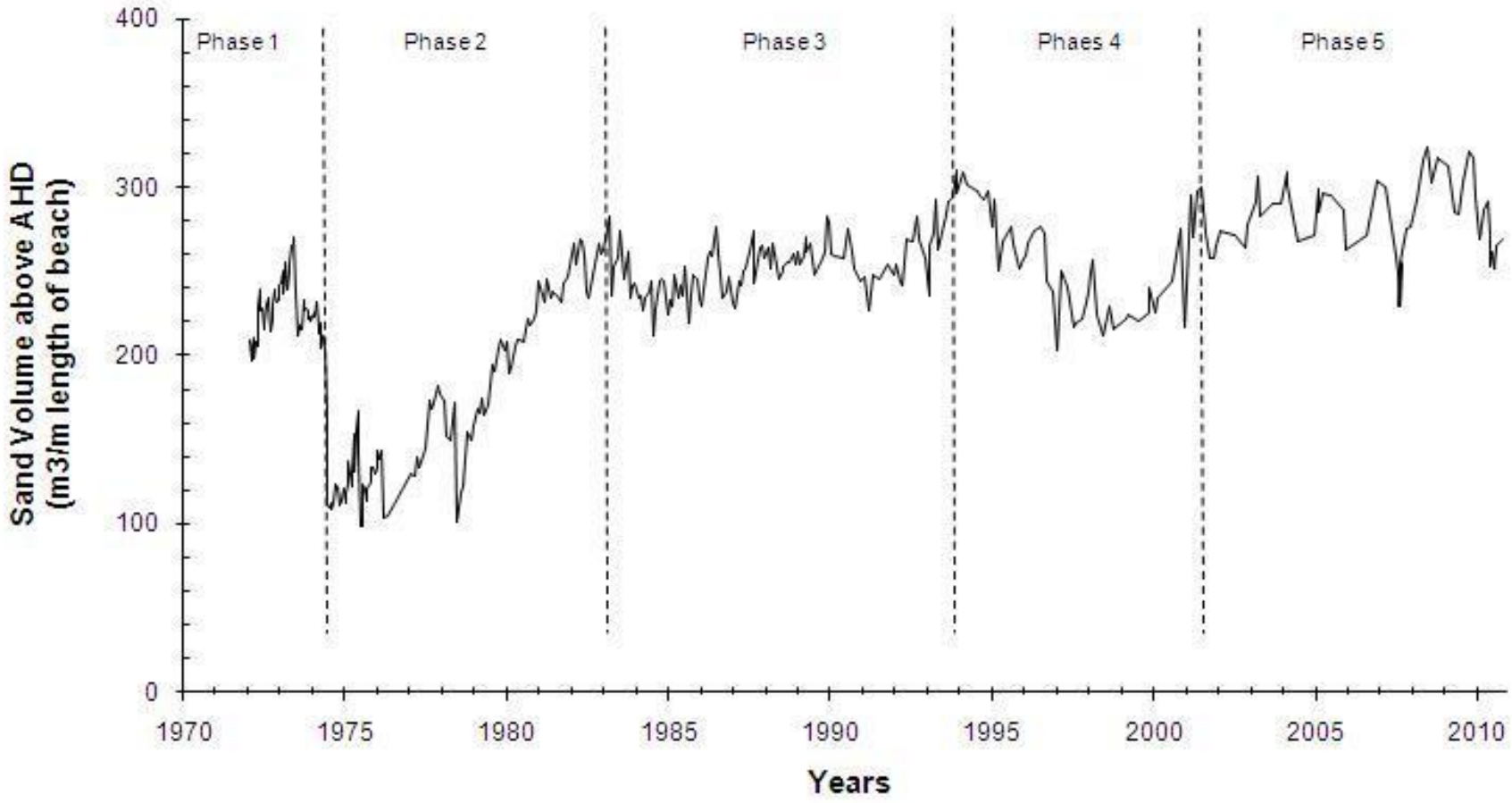
Extreme Events

2002

- Jan – May 1967: Cyclones Dinah, Barbara, Dulcie, Elaine and Glenda
- June 1967: 3 East Coast Lows
- 8 million cubic metres of sand eroded from beaches
- How big an event was it?

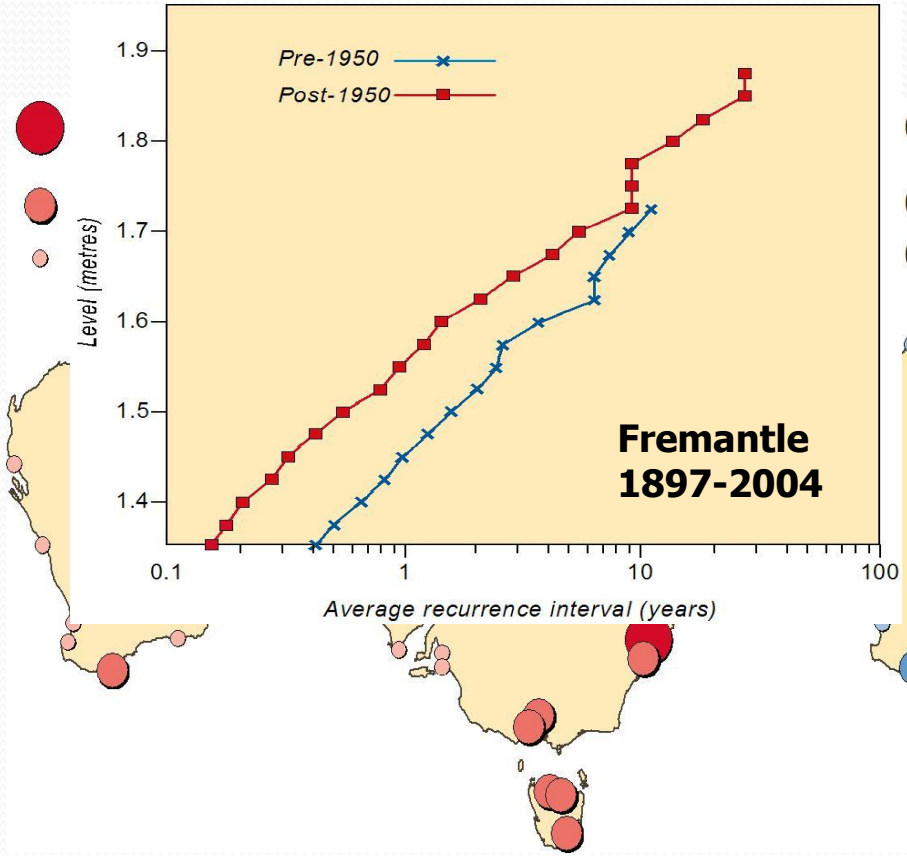


1967


Phase 1
Phase 2
Phase 3
Phaes 4
Phase 5
Sand Volume above AHD
(m3/m length of beach)
400
300
200
100
0
1970
1975
1980
1985
1990
1995
2000
2005
2010
Years

High Sea-level Events:

Increase in Frequency



A Snapshot of Future Sea Levels: Photographing the King Tide

12 January 2009

Department of
Environment, Climate Change and Water NSW

56: NEWCASTLE, CARRINGTON

Yidal waters penetrating into Hargrave and Garrett Streets, 14 December 2008.

Photo: Bruce Coates, DECCW

57: NEWCASTLE, CARRINGTON

Tidal waters of the Hunter River submerging Robertson Street, 14 December 2008.

Photo: Bruce Coates, DECCW.

Climate Change Predictions

STORMINESS (East Coast)

- **entering a new phase of IPO – more storms anyway**
- **climate change may increase frequency and intensity of storms**
- **Increase of 15% in maximum intensity – causing a doubling in property damage. Storm surge levels increase by 0.3m for 1 in 100 year event in 2050.**

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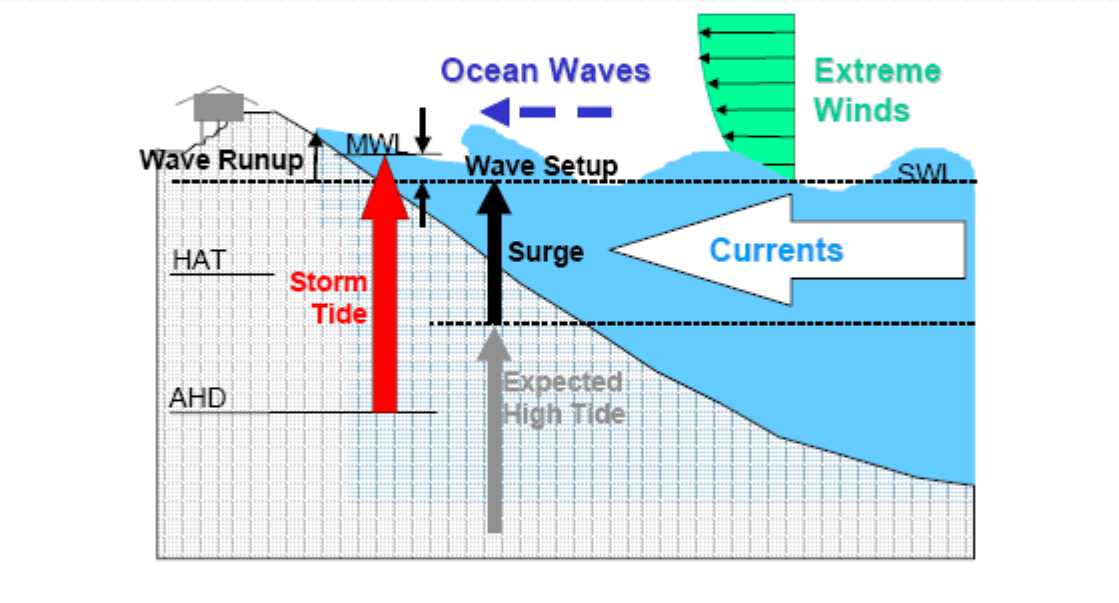


Planning for the Future

- The combination of major storm events with future sea level rise is the dominant factor to consider for adaptive coastal planning and management
- Erosion and inundation combined with climate change are the dominant coastal hazards
- Numerous potentially feasible adaptation options are available at varying costs

Pressures on Local Government

- Demand for infrastructure and service provision
- Changes in the social ‘mix’ of communities
- Rising property values affect housing affordability
- Waterfront gentrification & marina development
- Lack financial capabilities
- Lack specific planning and management expertise
- Increased future liability due to SLR
- Compensation claims

Climate change, planning and uncertainty

Many LGAs face (at least) 3 problems:

1. Lack of funds (eg, to undertake mapping exercises).
2. Lack of expertise (eg, to assess impacts which may change over time).
3. Litigious ratepayers and developers (leading back to 1).

This may lead to timidity in the face of hard decision making.

SIX Guideline Principles

- **Risk identification**

1. Assess and evaluate coastal risks taking into account the sea level rise planning benchmark
2. Advise the public of coastal risks

- **Land use planning**

3. Avoid intensifying land use in coastal risk areas
4. Consider options to reduce land use intensity in coastal risk areas

- **Development assessment**

5. Minimise the exposure to coastal risks from proposed development
6. Implement appropriate management responses and adaptation strategies

Identifying coastal risk areas

- Sea level rise planning benchmarks – 0.4m to 2050 and 0.9m to 2100
- Manuals & guides (coast & floodplain)
- Investigation areas – prior to completing new studies
- Make information public

Factors for strategic planning

Regional strategies, LEPs and local studies

- Incorporate coastal risk studies
- Consider effects of coastal protection works
- Accommodating new growth
- Managing existing developed areas
- Maintain foreshore access, amenity and open space and protect coastal environments

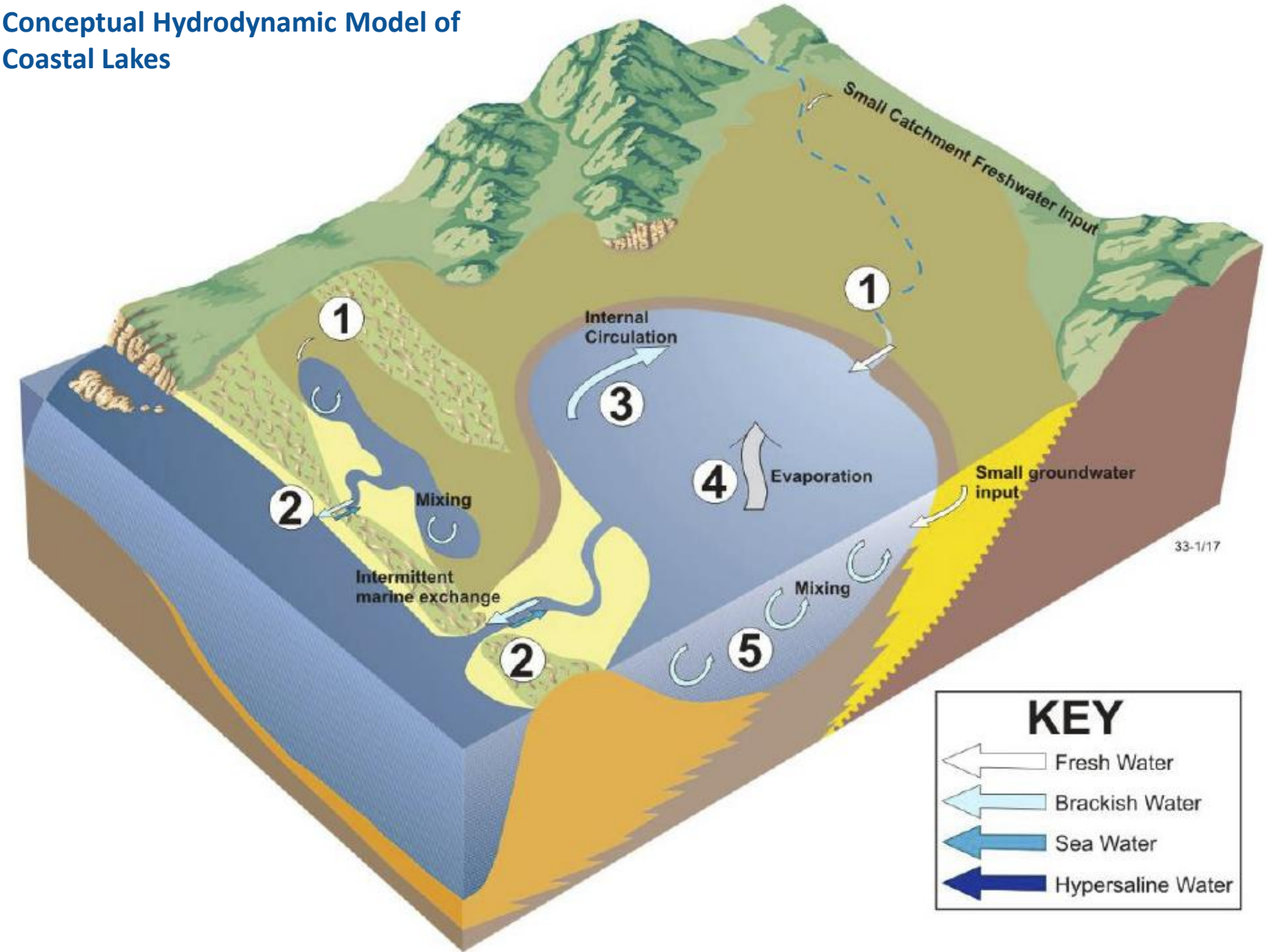
Planning Criteria for assessing DAs

- Avoid or minimise exposure to immediate coastal risks
- Provide for safety of residents, workers and occupants on-site
- Do not adversely affect safety of public off-site
- Do not increase coastal risks to nearby properties
- Ensure infrastructure and services maintain their function
- Accommodate natural coastal processes
- Protect coastal ecosystems
- Maintain existing amenity and access

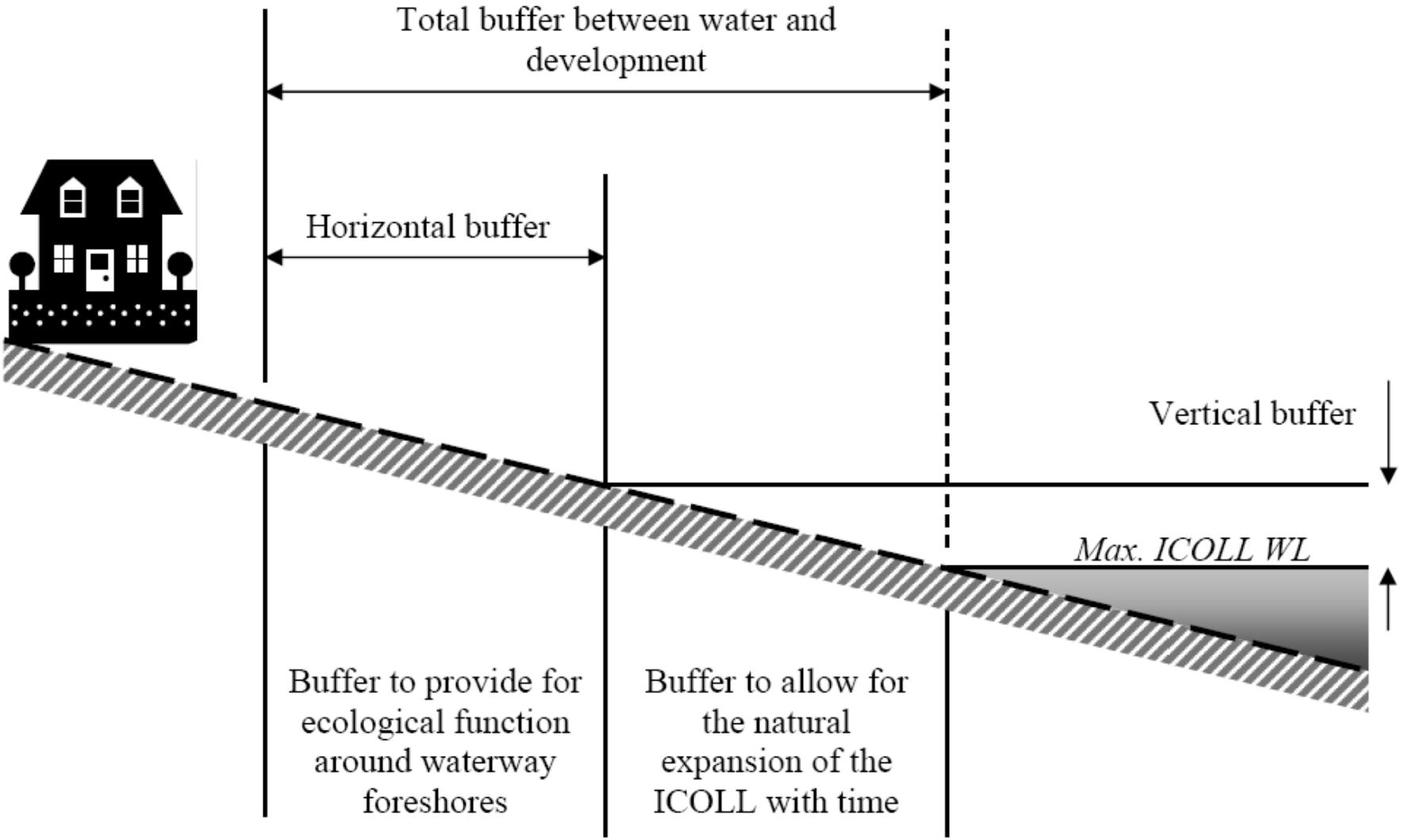
Ocean control on flood levels

direct sea level impacts

Conceptual Hydrodynamic Model of Coastal Lakes



Foreshore profile of a coastal lake illustrating the concept of vertical and horizontal buffers



National policy reform

- Sea level rise benchmarks
- Risk guidance framework
- Legacy issues, insurance, legal liability and property rights
- Building codes and design standards
- Integrated urban, regional and infrastructure planning
- Consistent approaches to risk assessment

Next steps for the Coasts Council

- Engage with professions and governments to explore issues and appropriate practices that will help meet the challenges of sea level rise and potentially increased severity of storms and floods

- Advise Minister on priorities for national coastal adaptation action and reform

Thank you

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