Where to focus our coastal monitoring priorities in Victoria?

What are the projected impacts on the coast?

How will this impact upon coastal assets, both on and near to the coast?
Coastal erosion at Greys beach Geraldton

Greys Beach in Geraldton has been badly affected by erosion.

ABC News: Gian De Poloni

PHOTO: Erosion at Marengo beach on the Great Ocean Road has increased to one metre a year. (ABC News: Simon O'Brien)
Project Objectives

• Decision support framework
• Spatial prioritisation for coastal monitoring
• State-wide Coastal Climate Change Impact Assessment

• Approach that can be:
  • Refined and reapplied
  • Readily shared
  • Modular approach
Approach

- Regional Scale – Sediment Compartments
- Focus at a 2nd pass risk (impact) assessment
- Based around
  - Climate futures – Sea Level Rise, Storm Surge
  - Scenarios – Time and Scale
  - Erosion and Inundation Hazards
- Focused on areas and assets impacted based on:
  - Exposure, Sensitivity and Adaptive Capacity
Project Stages

Preliminary – approach, definitions, and datasets

Stage 1 – Likely erosion impact ratings

Stage 2 – Likely inundation impact ratings

Stage 3 – Impact rating profile of significant assets and coastal planning units

Spatial Validation of Results
Stage 1 – Erosion Rating

1. Identify and assign **coastal attributes** likely to influence impact of coastal erosion processes.

2. Determine a likely ‘coastal erosion impact rating’ to **coastal segments** (50m sections of coast).

3. Assign ‘coastal erosion impact rating’ to entire **study area** (50m² polygrid).
Erosion Rating - Conceptual Framework

- **EXPOSURE (E)**
  - (hazard exposure likelihood to direct or indirect stressors)

- **SENSITIVITY (S)**
  - (consequence of sensitivity to climate stressors)

- **POTENTIAL IMPACT (I)**
  - \( I = E \times S \)
  - (risk rating to exposure and sensitivity)

- **ADAPTIVE CAPACITY (A)**
  - (mitigative controls or intrinsic ability)

- **VULNERABILITY (V)**
  - \( V = I \times A \)
  - (adjusted risk based off impact and mitigative capacity)

IPCC Vulnerability Framework
For every 50m section of coastline

Exposure (E)
Coastal Type
Orientation
Fetch
Bathymetric profile
Wave Height
Wave Energy
For every 50m section of coastline

Sensitivity (S)
- Erodibility
- Compartment Sediment Sensitivity
For every 50m section of coastline:

**Adaptive Capacity (A)**
- Intertidal / Coastal vegetation
- Reefs
- Engineered coastal structures
## Coastal Asset Impact Ratings

### Great Ocean Road

<table>
<thead>
<tr>
<th>Feature Type</th>
<th>Feature</th>
<th>Unit</th>
<th>Quantity</th>
<th>Very Low</th>
<th>Low</th>
<th>Moderate</th>
<th>High</th>
<th>Very High</th>
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<tr>
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<td>Km</td>
<td>66.37</td>
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<td>47.38</td>
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<td>2637.54</td>
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</table>

**Erosion rate rise along Victoria’s Great Ocean Road prompts effort to bolster beach sand dunes**

By Marian J Paul

Updated 30 May 2017, 11:20 pm

*PHOTO: Erosion at Marshall Beach on the Great Ocean Road has increased to one metre a year (ABC News, Managed Page)*
Stage 2 - Inundation Factors

1. Sea Level Rise and Storm Surge
2. 1 in 100 Year Flood Events
3. Coastal Acid Sulphate Soils (CASS)
4. Assign to Study Region
5. Assign to Individual Assets
# Coastal Asset Impact Ratings

<table>
<thead>
<tr>
<th>Feature</th>
<th>Feature Type</th>
<th>Unit</th>
<th>Quantity</th>
<th>2040 SLR</th>
<th>2100 SLR</th>
<th>2040 STM</th>
<th>2100 STM</th>
<th>2040 Flood</th>
<th>2100 Flood</th>
<th>2040 CASS</th>
<th>2100 CASS</th>
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<td>Line</td>
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<td>16.41</td>
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<td>21.08</td>
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<td>0.16%</td>
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<tr>
<td>Landscape Significance - State</td>
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<td>0.16%</td>
<td>5.69%</td>
<td>5.53%</td>
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<td></td>
</tr>
<tr>
<td>Boat Ramps</td>
<td>Line</td>
<td>Km</td>
<td>0.00%</td>
<td>0.00%</td>
<td>0.00%</td>
<td>0.00%</td>
<td>0.00%</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Apollo Bay Wharf</td>
<td>Line</td>
<td>Km</td>
<td>0.00%</td>
<td>0.00%</td>
<td>0.00%</td>
<td>0.00%</td>
<td>0.00%</td>
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<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Great Otway National Park</td>
<td>Polygon</td>
<td>Ha</td>
<td>2.00%</td>
<td>16.33</td>
<td>14.43</td>
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<td>0.95</td>
<td>0.62%</td>
<td>0.55%</td>
<td>0.04%</td>
<td>0.04%</td>
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**Erosion Rate Rise along Victoria’s Great Ocean Road prompts effort to bolster beach sand dunes**

Opening 10 May 2017, 11:00am

Inundation map shows areas at risk of erosion and flooding. Details on the map can be found in the supplementary report.
Coastal Asset Impact Ratings

1. Assign erosion and inundation impact rating to significant (economic, social and environmental) assets

2. Summarise findings for coastal sediment compartment units (to support planning decisions)
### DELWP Priority Assets

<table>
<thead>
<tr>
<th>Priority Asset</th>
<th>Significance</th>
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<tbody>
<tr>
<td>Barwon South West</td>
<td>Australian Natural Heritage site&lt;br&gt;Nationally significant Tourist destination&lt;br&gt;Regionally significant tourist destination&lt;br&gt;Nationally significant landscape&lt;br&gt;State significant landscape</td>
</tr>
<tr>
<td>Great Ocean Road</td>
<td>Asset of national importance&lt;br&gt;Regional Boating facilities&lt;br&gt;Regionally strategic port and harbour&lt;br&gt;State marine precinct&lt;br&gt;Regional Boating facilities&lt;br&gt;Regionally significant landscape&lt;br&gt;National Park</td>
</tr>
<tr>
<td>Port of Portland, Port of Geelong, Geelong West, North Shore, Apollo Bay, Torquay, Portarlington, St Leonards, Queenscliff</td>
<td>RAMSAR listed wetland&lt;br&gt;Significant Open Space&lt;br&gt;National Park</td>
</tr>
<tr>
<td>Great Otway National Park</td>
<td>State significant landscape&lt;br&gt;Regionally significant landscape&lt;br&gt;Coastal Park</td>
</tr>
<tr>
<td>Discovery Bay Coastal Park</td>
<td>State significant landscape&lt;br&gt;Coastal Park</td>
</tr>
<tr>
<td>Port Phillip Bay Western Shoreline and Bellarine Peninsula</td>
<td>Ramsar listed wetland&lt;br&gt;Significant Open Space&lt;br&gt;National Park</td>
</tr>
<tr>
<td>Bells Beach Surfing Recreation Reserve</td>
<td>Victoria heritage register&lt;br&gt;Nationally significant landscape</td>
</tr>
<tr>
<td>Central</td>
<td>Integrated economic triangle&lt;br&gt;State Boating precinct&lt;br&gt;Internationally significant Tourism destination&lt;br&gt;Integrated economic triangle&lt;br&gt;State Boating precinct</td>
</tr>
<tr>
<td>Melbourne Port and CBD</td>
<td>Metropolitan activity centre&lt;br&gt;RAMSAR listed wetland&lt;br&gt;Significant Open Space</td>
</tr>
<tr>
<td>Port of Hastings</td>
<td>Ramsar listed wetland&lt;br&gt;Significant Open Space</td>
</tr>
<tr>
<td>Cowes, Olivers Hill, Mornington, Patterson Lakes, Mordialloc Creek, Sandringham, Werribee South</td>
<td>Metropolitan activity centre&lt;br&gt;RAMSAR listed wetland&lt;br&gt;Significant Open Space</td>
</tr>
<tr>
<td>Frankston</td>
<td>Ramsar listed wetland&lt;br&gt;Significant Open Space</td>
</tr>
<tr>
<td>Edithvale Seaford wetlands, Western Port, Port Phillip Bay Western Shoreline</td>
<td>Ramsar listed wetland&lt;br&gt;Significant Open Space</td>
</tr>
<tr>
<td>Mornington Peninsula and Western Port Biosphere Reserve, Point Nepean and Mornington Peninsula</td>
<td>UNESCO Biosphere Reserve&lt;br&gt;National Park&lt;br&gt;Significant Open Space</td>
</tr>
<tr>
<td>North Western Port Nature Conservation Reserve, Jawbone Flora and Fauna Reserve, The Spit Wetland Reserve, Point Cook Coastal Park</td>
<td>Site of International geological and geomorphological significance&lt;br&gt;Register of National Estate</td>
</tr>
<tr>
<td>Beaumaris Cliffs</td>
<td>UNESCO Biosphere Reserve&lt;br&gt;National Park&lt;br&gt;Significant Open Space</td>
</tr>
<tr>
<td>Gippsland</td>
<td>State significant Tourist destination&lt;br&gt;National Park&lt;br&gt;State significant landscape&lt;br&gt;National Park&lt;br&gt;State significant Tourist destination&lt;br&gt;RAMSAR listed wetland&lt;br&gt;Nationally significant wetlands</td>
</tr>
<tr>
<td>Wilson Promontory National Park</td>
<td>UNESCO Biosphere Reserves&lt;br&gt;State significant landscape&lt;br&gt;National Park&lt;br&gt;State significant Tourist destination&lt;br&gt;RAMSAR listed wetland&lt;br&gt;Nationally significant wetlands</td>
</tr>
</tbody>
</table>

1. Great Ocean Road  
2. Port of Portland, Port of Geelong, Geelong West, North Shore, Apollo Bay, Torquay, Portarlington, St Leonards, Queenscliff  
3. Lady Bay (Warnambool) to Port Fairy  
4. Port Phillip Bay Western Shoreline and Bellarine Peninsula  
5. Bells Beach Surfing Recreation Reserve  
6. Melbourne Port and CBD  
7. Cowes, Olivers Hill, Mornington, Patterson Lakes, Mordialloc Creek, Sandringham, Werribee South  
8. Frankston  
9. Edithvale Seaford Wetlands, Western Port, Port Phillip Bay Western Shoreline  
10. Mornington Peninsula and Western Port Biosphere Reserve, Point Nepean and Mornington Peninsula National Park, French Island National Park  
11. North Western Port Nature Conservation Reserve, Jawbone Flora and Fauna Reserve, The Spit Wetland Reserve, Point Cook Coastal Park  
12. Beaumaris Cliffs  
13. Wilson Promontory National Park  
14. Gippsland Lakes region  
15. Paynesville and Lakes Entrance, Metung, Leech Sport and Mallacoota Corner Inlet  
16. Phillip Island to Inverloch