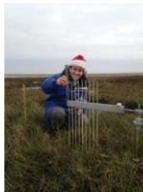


Victorian Coastal Monitoring Program

2nd International Workshop on Waves, Storm Surges and Coastal Hazards

Lawrance Ferns (Marine Biodiversity Policy & Programs)



The Victorian Coastal Monitoring Program (VCMP) is a \$4 million component of the *Protection of Victoria's Iconic Beaches and Coastline Program 2016-2020* funded by the Victorian Sustainability Fund (Ministerial budget priority 2016).

A further budget of \$0.74 million was integrated in 2017-19 from the Sustainability Fund Project *Wave Climate Data to Improve Coastal Climate Change Modelling and Projections*. The objective of this project is to:

- improve the quality of Victoria's wave climate data so that modelled projections of the present and future effects of climate change on coastal hazards can be made with more certainty; and
- use these improved models to better inform coastal planning and adaptation decisions

Significant co-investment with universities, local government and citizen science volunteer groups has been sought:

- ***Improving coastal erosion assessments:*** (\$4M Sustainability Fund; \$200K from Port Phillip Bay Fund plus co-investment of cash/in-kind of \$3.8M from University Partners)
 - Priority open coast beach locations
 - Port Phillip Bay beaches
 - Priority locations of Western Port Bay
- * ***Coastal wave monitoring and sea level rise modelling*** (\$740K Sustainability Fund, plus co-investments of \$145 Biodiversity Division & \$900K from University Partners)



The VCMP was launched by the Minister for Energy, Environment & Climate Change in November 2017

Biodiversity Division (Knowledge and Decision Systems)

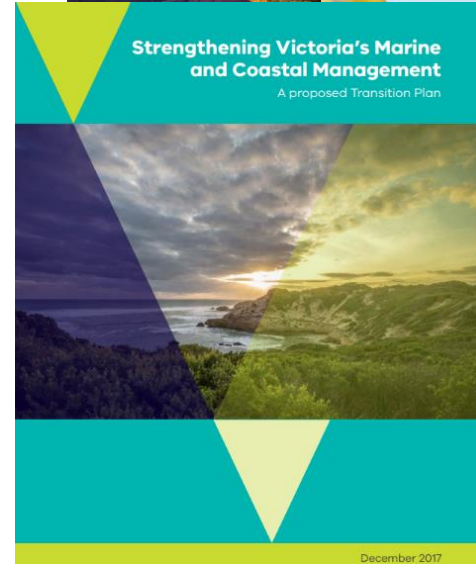
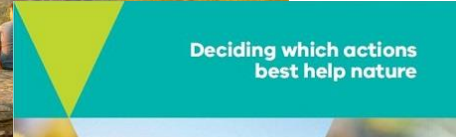
- Decision support systems (eg. NaturePrint, Strategic Management Prospects)
- Knowledge management (eg. Biodiversity Knowledge Framework; Net Gain reporting)
- Policy advice (eg. Threatened species common assessment, Regional Forest Agreement)

➤ Marine Biodiversity Policy and Programs

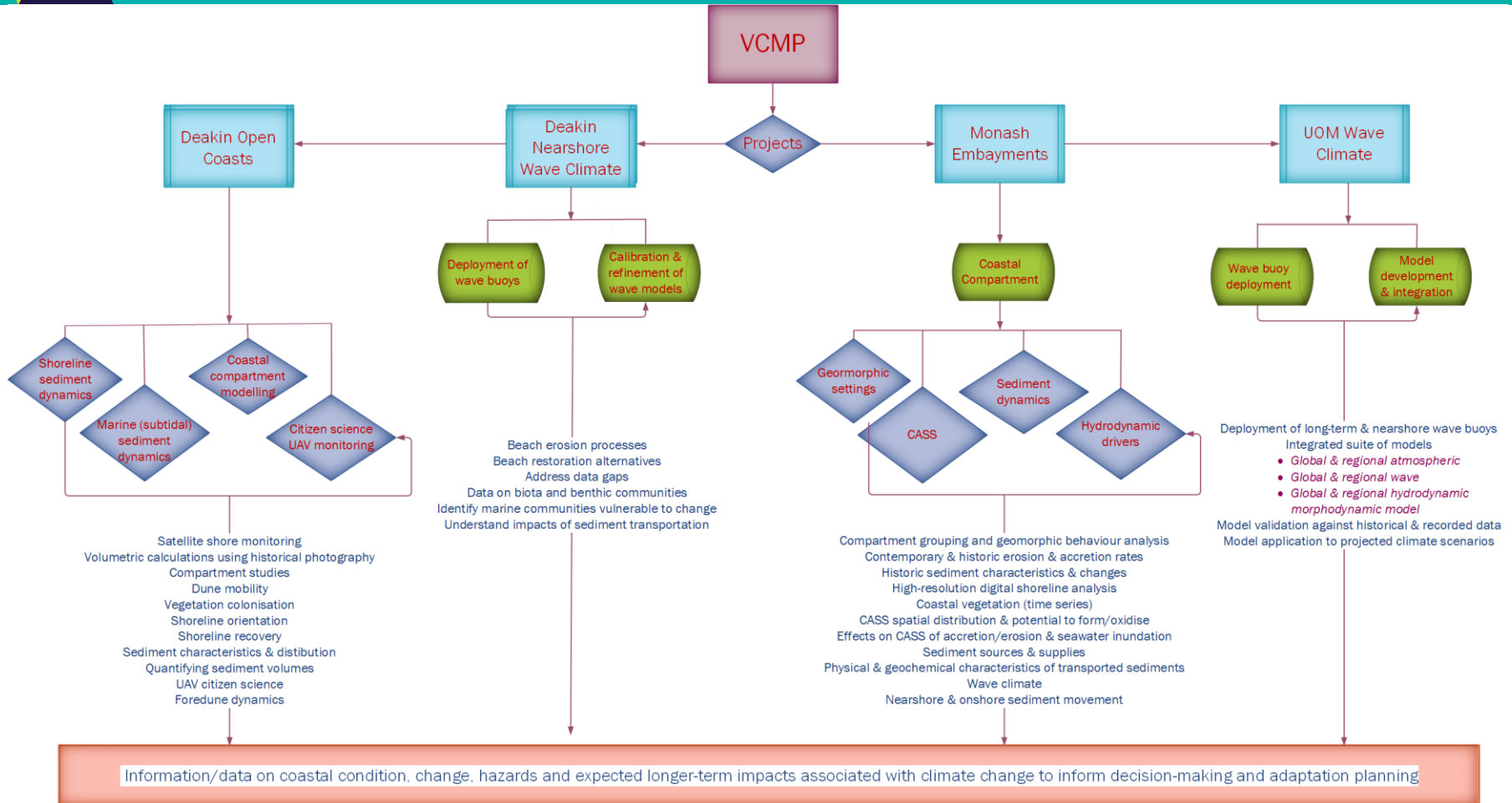
- Policy and technical advice on marine and coastal biodiversity
- Development and management of marine & coastal biodiversity science projects and decision support systems
- On-ground actions to manage threats to marine biodiversity (Biodiversity Response Planning).

Land Management Policy Division

- Coordinate implementation of the transition plan for the *Marine & Coastal Management Act 2018*
- Marine & Coastal Policy and Marine Spatial Planning Guidelines (2019)
- Marine & Coastal Strategy (2020)



VCMP Design Logic



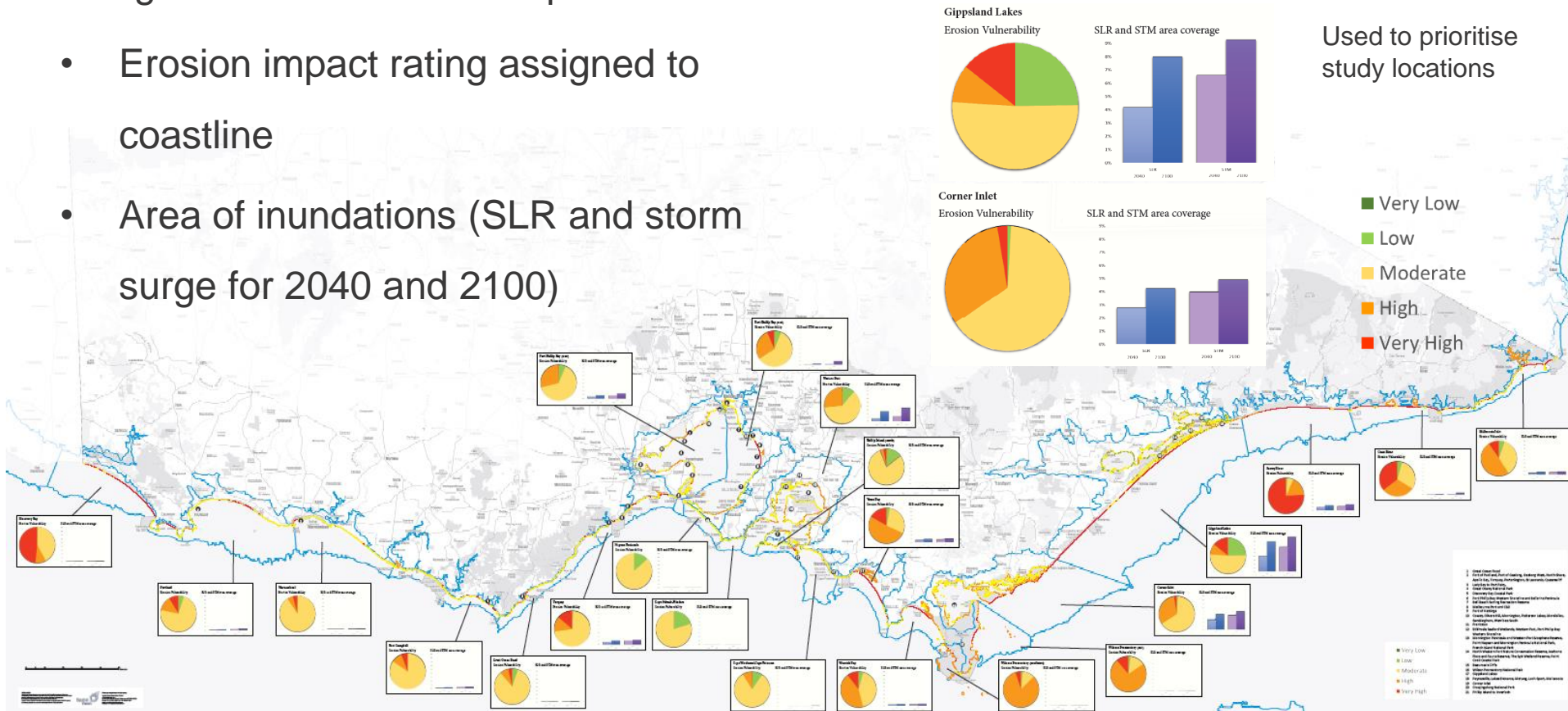
2nd Pass State-wide Hazard Assessment 2017

Assignment to Coastal Compartments:

- Erosion impact rating assigned to coastline
- Area of inundations (SLR and storm surge for 2040 and 2100)

Led by Spatial Vision

Used to prioritise study locations



2nd Pass State-wide Hazard Assessment 2017

Coastal Erosion Vulnerability

Priority Asset	Coastal Erosion		Sea Level Rise		1% AEP Storm Surge	
	High	Very High	20cm	82cm	20cm	82cm
GREAT OCEAN ROAD	66.4 Km					

Gippsland Lakes

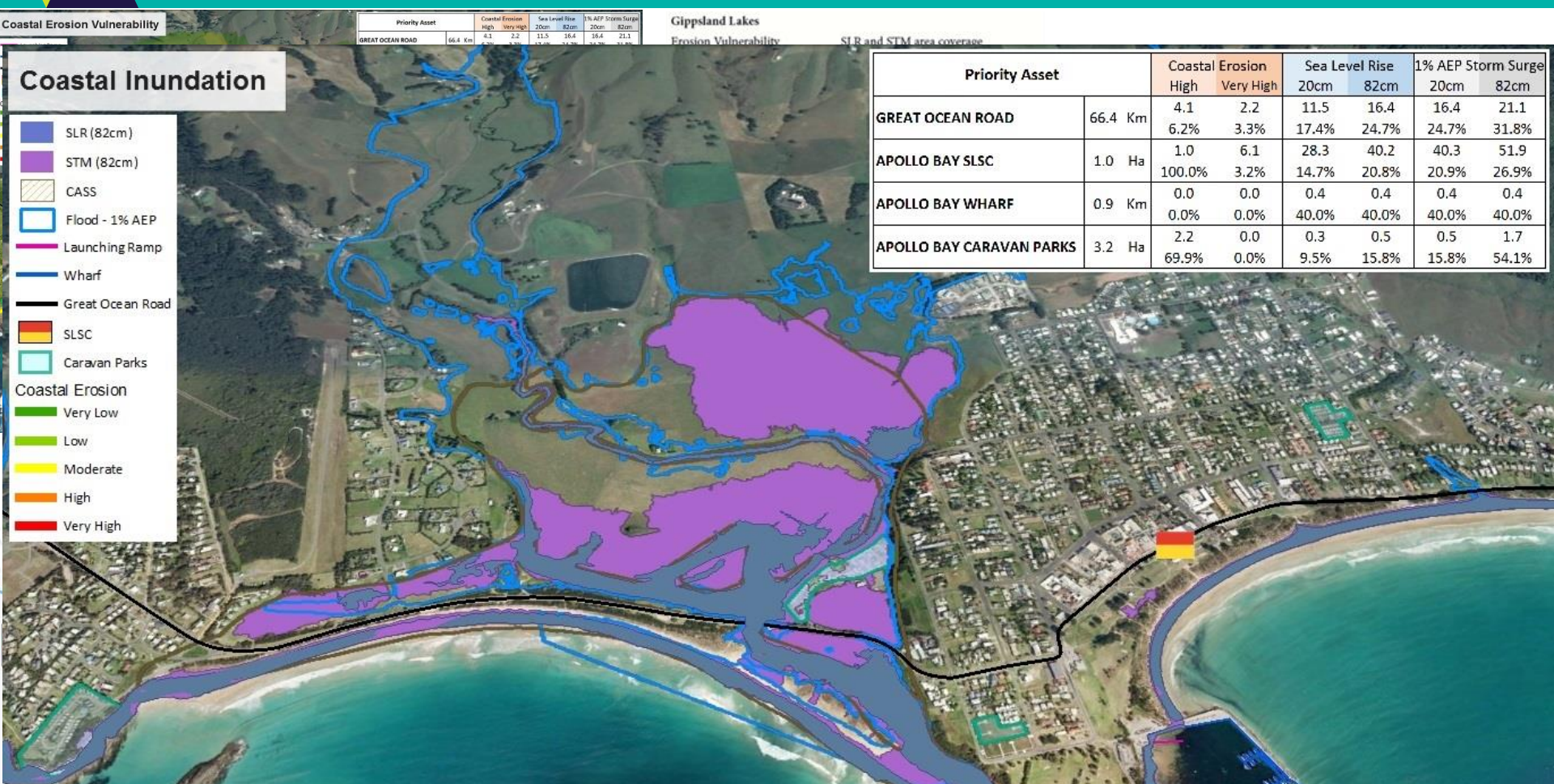
Erosion Vulnerability

SLR and STM area coverage

Priority Asset		Coastal Erosion		Sea Level Rise		1% AEP Storm Surge	
		High	Very High	20cm	82cm	20cm	82cm
GREAT OCEAN ROAD	66.4 Km	4.1	2.2	11.5	16.4	16.4	21.1
		6.2%	3.3%	17.4%	24.7%	24.7%	31.8%
APOLLO BAY SLSC	1.0 Ha	1.0	6.1	28.3	40.2	40.3	51.9
		100.0%	3.2%	14.7%	20.8%	20.9%	26.9%
APOLLO BAY WHARF	0.9 Km	0.0	0.0	0.4	0.4	0.4	0.4
		0.0%	0.0%	40.0%	40.0%	40.0%	40.0%
APOLLO BAY CARAVAN PARKS	3.2 Ha	2.2	0.0	0.3	0.5	0.5	1.7
		69.9%	0.0%	9.5%	15.8%	15.8%	54.1%

Coastal Inundation

-  SLR (82cm)
-  STM (82cm)
-  CASS
-  Flood - 1% AEP
-  Launching Ramp
-  Wharf
-  Great Ocean Road
-  SLSC
-  Caravan Parks
- Coastal Erosion**
-  Very Low
-  Low
-  Moderate
-  High
-  Very High



Open Coast Sub-Program

Shoreline Sediment Dynamics

Marine (subtidal) Sediment Dynamics

Coastal Compartment Modelling and Visualisation

Coastal UAV and Citizen Science

Led by
Deakin University &
University of Melbourne

Images courtesy of David
Kennedy & Chloe Morris

Expert advisory board
workshop held in March 2019



Modelling #1
Delft3D Hydrodynamic Coastal Process Modelling: waves, tides, morphology.

Modelling #4 *
COVE/CEM2D long-term climate change response modelling: SLR, WC.

Modelling #2
Delft3D Hydrodynamic Coastal Process Modelling: waves, tides, morphology.

Modelling #5 *
COVE/CEM2D long-term climate change response modelling: SLR, WC.

Modelling #3 **
XBeach storm impact modelling.

Modelling #7 **
PCR storm impact modelling.

Modelling #6
COVE/CEM2D long-term climate change response modelling: SLR, WC.

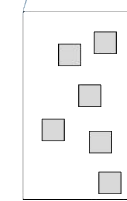
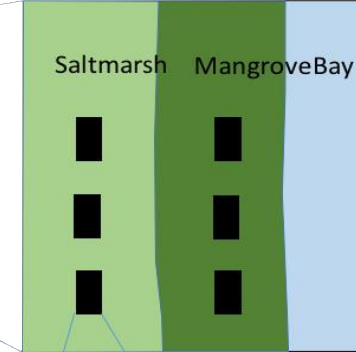
	Xbeach	Delft3D	CEM2D
Morphology	x	x	x
Roughness		x	
Wave Climate	x	x	x
Wave Breaking and Transformation	x	x	x
Wind	x	x	
Tides	x	x	x
Time Varying Water Level	x	x	x
Groundwater Flooding	x		
Flow	x	x	
Viscosity		x	
Salinity		x	
Temperature		x	
Heat flux		x	
Pollutants and Tracers		x	
Sediment Transport	x	x	x
Avalanching	x		
Dredging/Dumping		x	
Dunes	x		
Vegetation	x		
Obstacles		x	

Embayments Sub-Program

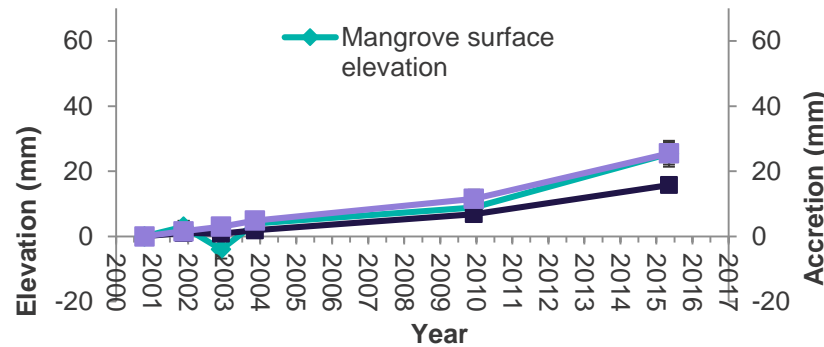
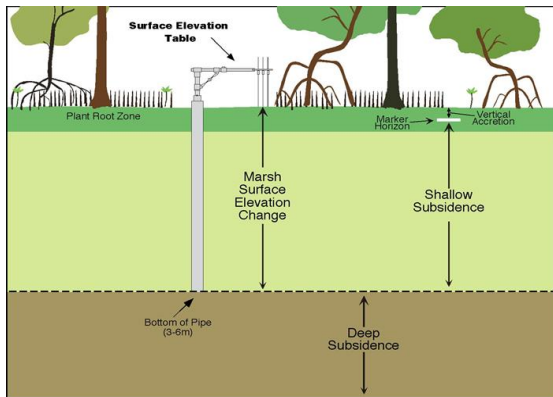
The project has four themes:

- Geomorphic setting
- Coastal acid sulphate soils
- Sediment dynamics
- Hydrodynamic drivers

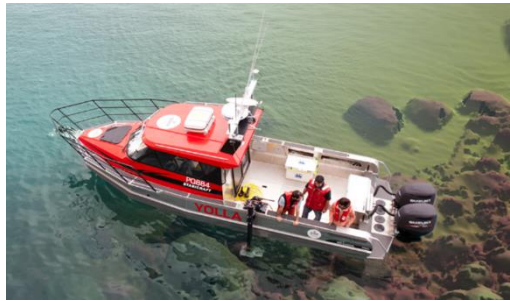
Led by
Monash University partnership with
University of Wollongong, Macquarie University



Six random quadrats
Within each plot



Coastal Waves and Sea Level Rise Sub-Program



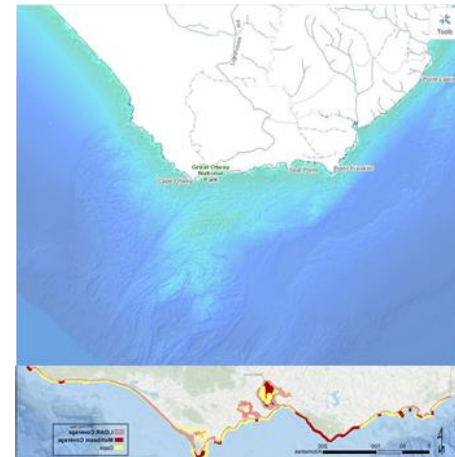
Led by
University of Melbourne with Deakin University

Images courtesy of Daniel Ierodiaconou

2nd International Workshop on Waves, Storm Surges
& Coastal Hazards, Melbourne 10-15 November 2019.

3 larger offshore buoys and 9-10 *smaller inshore buoys over 2 years

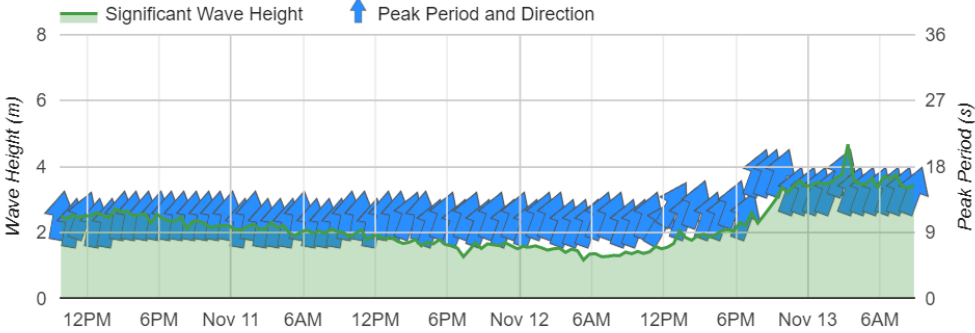
* Wave spotter monitoring initiated <https://vicwaves.com.au> (Portland, Port Fairy, Apollo Bay)





Port Fairy Buoy – [-38.3817°, 142.2878°] – Latest Observations at 12 Nov, 22:20

[Go to Port Fairy Buoy Data Page](#)



Significant Wave Height	Peak Period	Peak Direction	Directional spreading
3.58 m	14.62 s	201.49 degrees	16.59 degrees

Use of Drone Technology

Deakin University

Images courtesy of Daniel Ierodiaconou



Bridge gap between traditional remote sensing and field observations

Satellite

Plane



Gap

Field

Global

100km

100m

10m

1

cm

Citizen Science

12 Citizen Science Groups – 15 areas – Over 100 volunteers

Training and technical support led by Deakin University

DELWP provides Responsible Officer



Deakin University

VIEWER

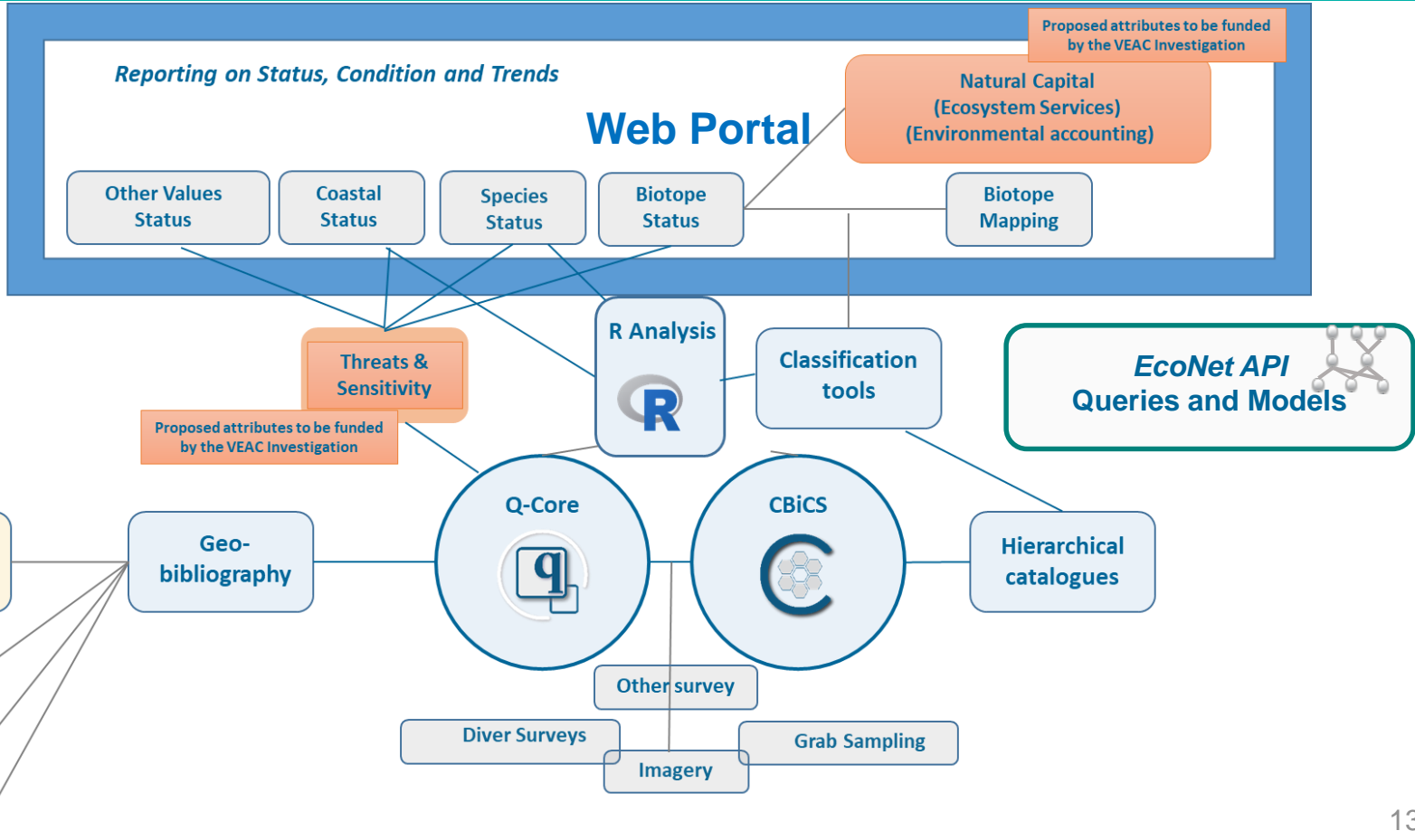
A screenshot of a web-based terrain measurement tool interface. The interface includes a sidebar on the left with a 'New Measurement' section showing a 'Result' table and a 'Terrain' section. The main area displays a 3D terrain model with a semi-transparent volume overlay. The volume is labeled 'Net = 55.10 m³'. The interface also features a top navigation bar with 'My Projects', 'Map Tools', and 'Search' options, and a right sidebar with 'ACCOUNT' and 'Map Settings' options. A teal arrow points from the drone image above to the interface, and another teal arrow points from the interface to a group of people icon.

Result	
Volume Added:	126.75 m³
Volume Removed:	-71.65 m³
Net:	55.10 m³

Terrain (09 Oct 2015)	
Zoom In	Remove

Orthophoto (09 Oct 2015)	
Zoom In	Remove





CoastKit – Supports the *Marine Knowledge Framework*

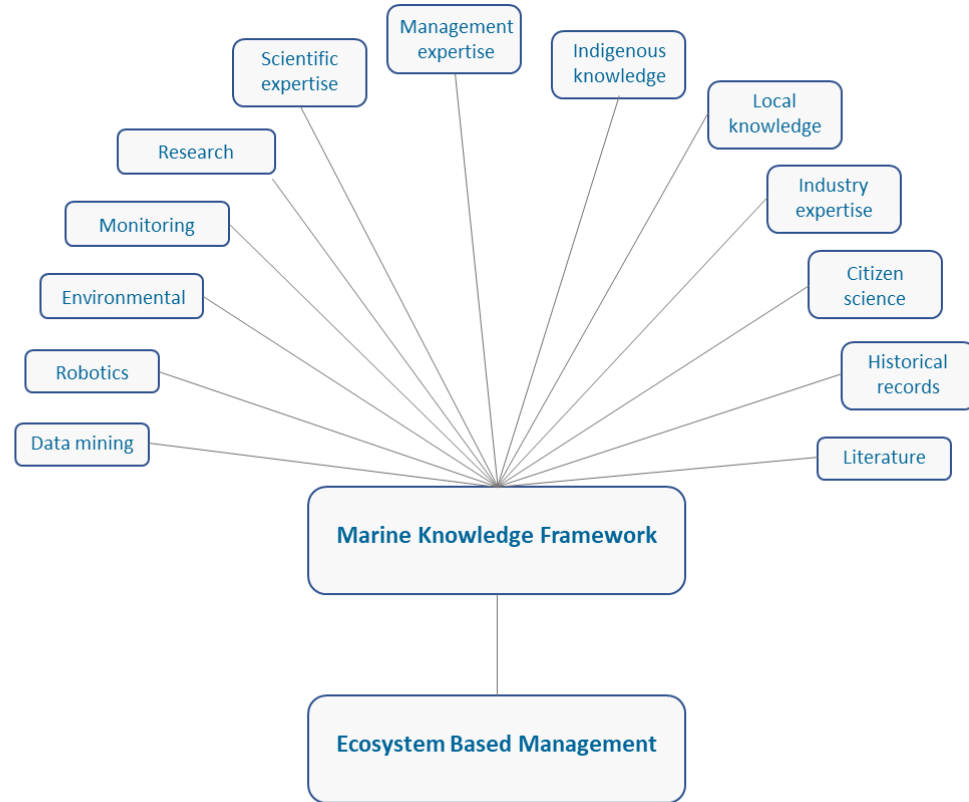
Objectives

Support evidence based decision making

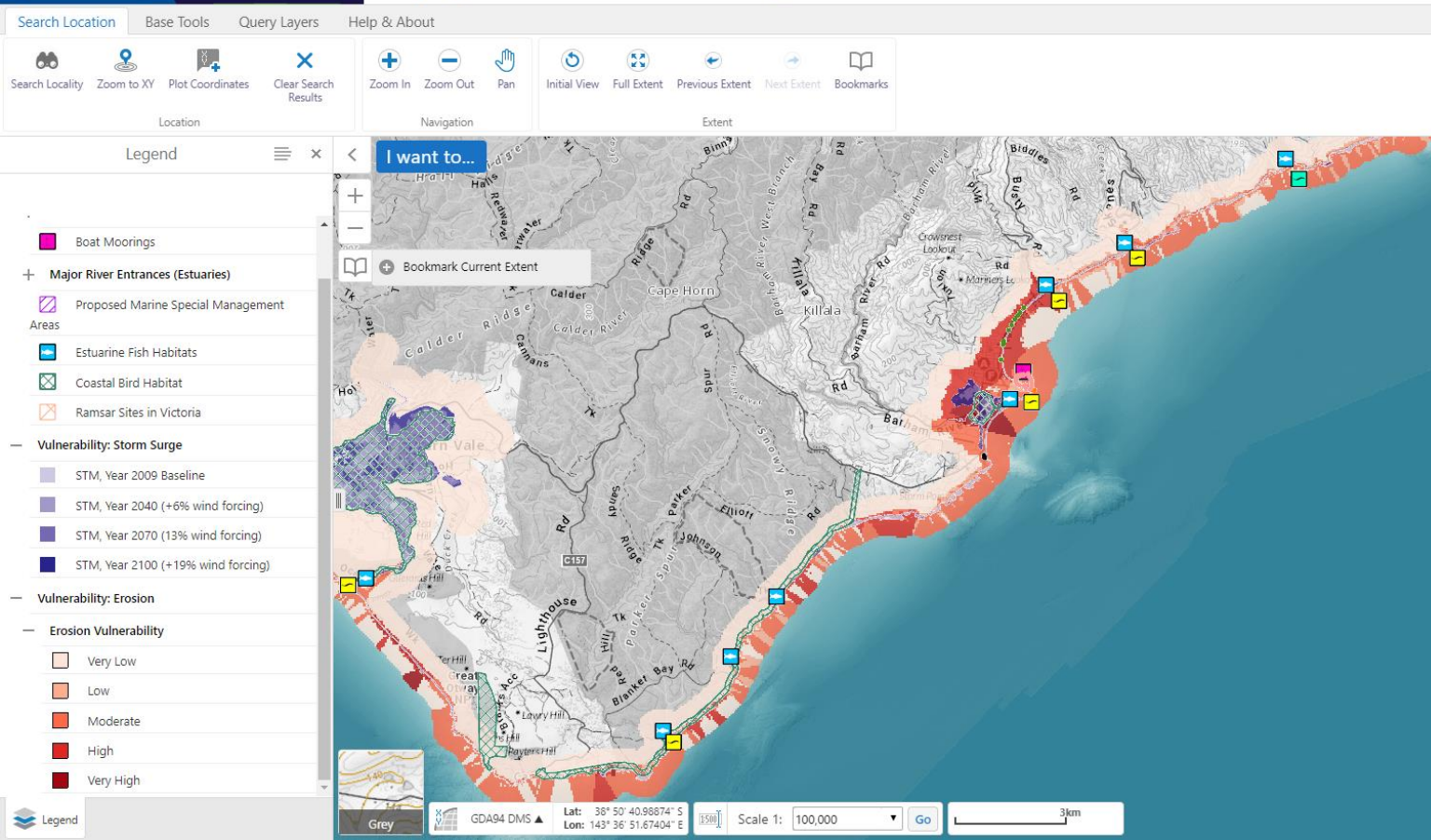
- Systematic framework for aggregating knowledge
- Combine and provide information as needed
- Scenario modelling – what if?
- Optimise social and ecological aspects

Requirements

- Ecosystem based
- Lines of evidence
- Provide for uncertainty, knowledge gaps
- Transparent, accessible
- Objective outputs
- Reliable, trustworthy
- Flexible, agile, updatable



CoastKit Web Mapping Portal



Erosion & Sea Level Rise Vulnerability

Apollo Bay

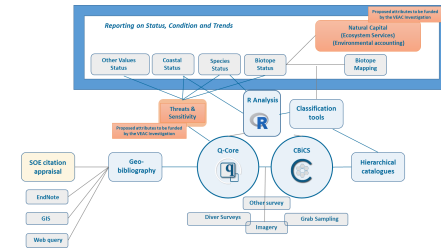
CoastKit Web Mapping Portal

The screenshot displays the CoastKit web mapping portal interface. The browser address bar shows the URL: `bio-dev-geo-01.biodiversity.vic.gov.au/Html5Viewer/Index.html?configBase=http://bio-dev-geo-01.biodiversity.vic.gov.au/Geocortex/Essentials/REST/sites/CoastKit/viewers/2...`. The page header includes the Victoria Government logo and the text "Coast Kit" and "coastmaps.biodiversity.vic.gov.au".

The interface features a top navigation bar with "Common Tools", "Search Location", "Print & Draw", and "Help & About". Below this is a toolbar with icons for "CoastKit Info", "Identify", "Print", "Export Map Image", "Select based on Condition", "Filter based on Condition", "Zoom In", "Zoom Out", "Pan", "Previous Extent", and "Initial View".

The main map area shows a coastal region with various layers overlaid. A search bar at the top of the map area contains the text "I want to...". The "Layers" panel on the left is expanded to show "Coast Layers". The "Erosion Vulnerability" layer is selected and expanded, showing a legend with five categories: Very Low (lightest red), Low (light red), Moderate (medium red), High (dark red), and Very High (darkest red). Other layers include "SLR and Storm Surge", "Storm Surge (100 year event)", "Sea Level Rise (SLR)", "eMapWater selection", "Reference Maps", "Terrain", and "Bathymetry".

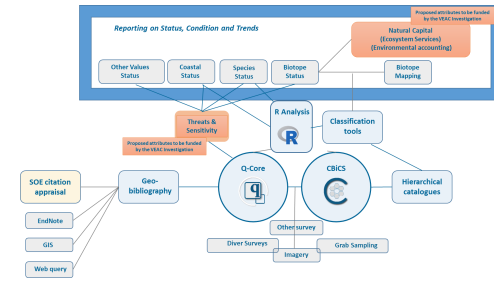
The bottom of the map area includes a scale bar (Scale 1: 1,000,000) and a "Go" button.



Erosion & Sea Level Rise Vulnerability

CoastKit Web Mapping Portal

The screenshot shows the CoastKit web mapping portal interface. The browser address bar displays the URL: `bio-dev-geo-01.biodiversity.vic.gov.au/Html5Viewer/Index.html?configBase=http://bio-dev-geo-01.biodiversity.vic.gov.au/Geocortex/Esse...`. The page header includes the "Coast Kit" logo and the URL `coastmaps.biodiversity.vic.gov.au`. The interface features a top navigation bar with "Common Tools" (Search Location, Print & Draw, Help & About) and "Tool Labels". Below this is a "Layers" panel with a "Filter Layers..." search box and a list of layers including "Acid Sulphate Soils", "Active CASS 2040 (modelled)", "Active CASS 2070 (modelled)", "Active CASS 2100 (modelled)", "CASS Presence", "Erosion Vulnerability", "SLR and Storm Surge", "Storm Surge (100 year event)", "Sea Level Rise (SLR)", "eMapWater selection", "Reference Maps", "Vicmap Features of Interest", "Administrative Boundaries", "Locality Boundaries", and "Local Government Areas". A "I want to..." search box is overlaid on the map, showing a search for "Port Phillip Bays Bathymetry (DEM)" with a high resolution of -31.850000 meters. The map displays various geographical features, including the French-Elizabeth-Sandstone Islands (Uninc), and is overlaid with a red and orange color scheme representing erosion and sea level rise vulnerability. The map includes a scale bar (Scale 1: 250,000) and a "Glen" unit indicator.



Erosion & Sea Level
Rise Vulnerability

Western Port

CoastKit Web Mapping Portal

CoastKit Victoria

bio-dev-geo-01.biodiversity.vic.gov.au/Html5Viewer/Index.html?configBase=http://bio-dev-geo-01.biodiversity.vic.gov.au/Geocortex/E...

Coast Kit

coastmaps.biodiversity.vic.gov.au

Common Tools Search Location Print & Draw Help & About

CoastKit Info Identify Print Export Map Image Select based on Condition Filter based on Condition Zoom In Zoom Out Pan Previous Extent Initial View

Layers

Filter Layers...

Filter

eMapWater selection

Coastal Infrastructure

Coastal Protection Structure

- Breakwater
- Groyne
- Revetment
- Seawall
- Wharfs
- Other

Boat Moorings

Piers and Jetties

Boat Access Points

Marine Environment

Marine Wildlife

Marine Habitat

Reference Maps

Vicmap Features of Interest

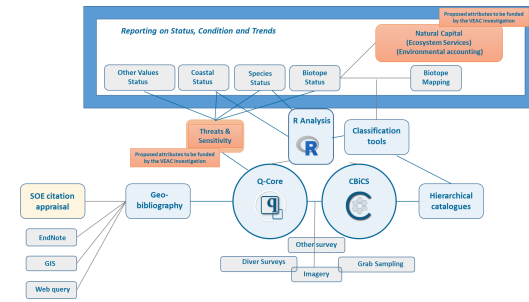
Administrative Boundaries

Locality Boundaries

Local Government Areas

Scale 1: 10,000

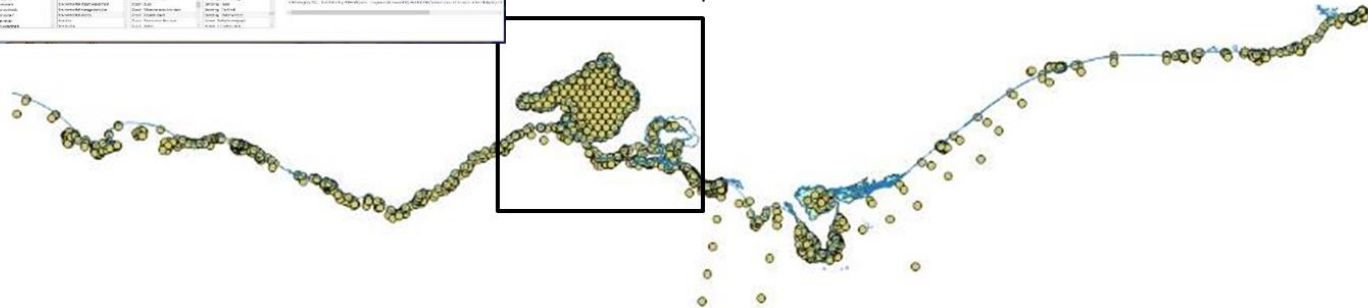
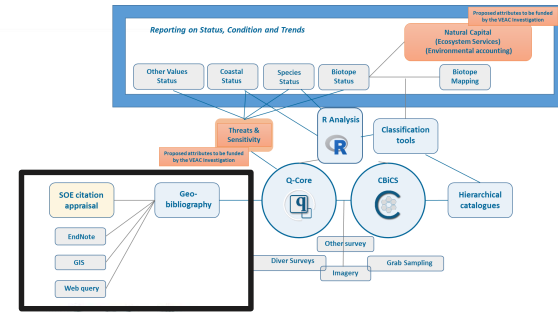
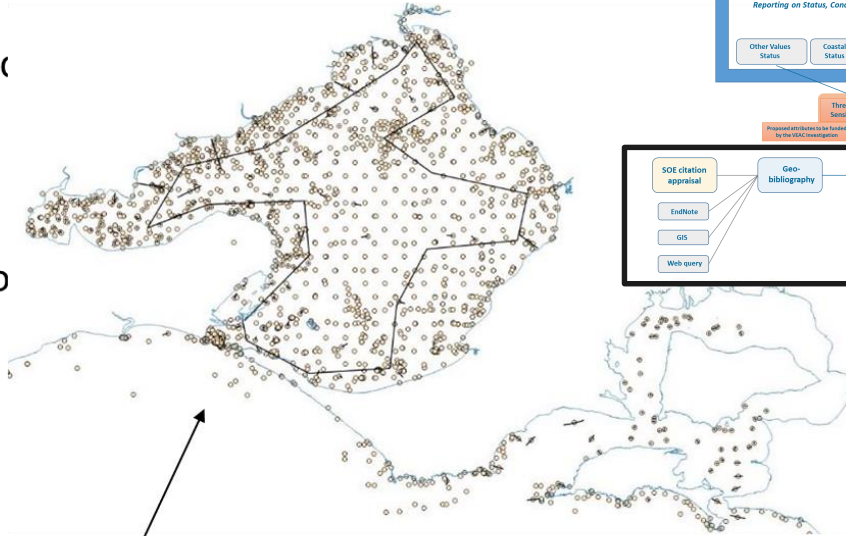
0.3km



Coastal Infrastructure

CoastKit – Geobibliography tool

- Bibliographic review of historic studies and data sets – To support *SOE Reporting*
- Studies appraised, spatially referenced and searchable in a geobibliography database.

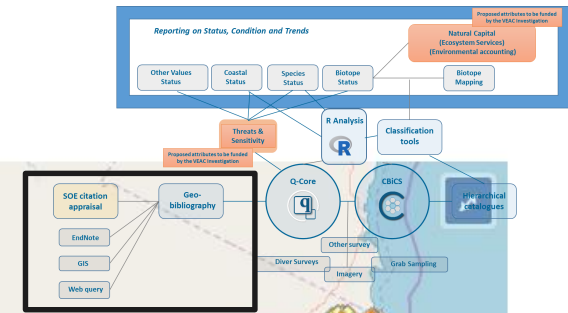
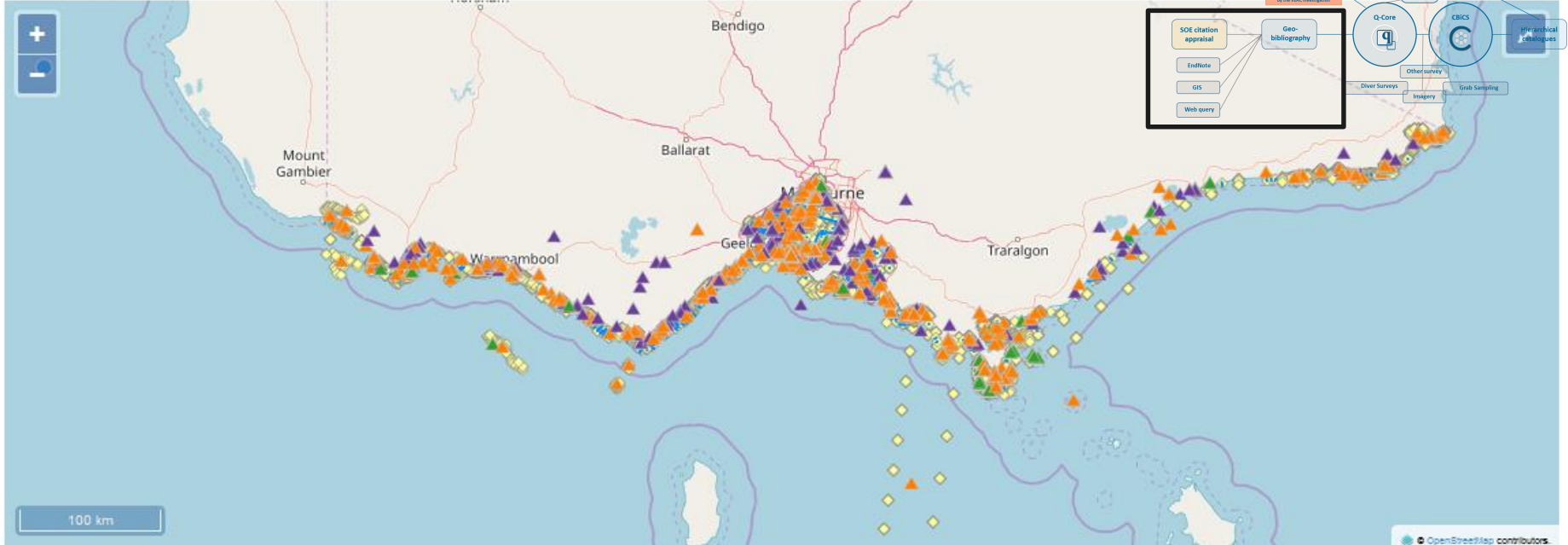


CoastKit – Geobibliography tool

Geo-bibliography

Filter: Search [Back to full list](#)

Geometry type



Download map

Download citations

Download for EndNote

Spatially documents research and project studies, provides ratings of applicability for further investment and SOE Reporting.

Questions