

Department of Planning and Environment

'We've never been more certain about the seafloor'

Insights for Coastal Management

Kinsela, Linklater, Ingleton, Morris, Sutherland, Hanslow

environment.nsw.gov.au

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Sediment Compartments

e.g. Terrigal/Wamberal

Woodroffe et al. (2012), Eliot (2013), Mariani et al. (2013), Kinsela et al. (2016)

sea floor data is essential for almost every aspect of coastal management...

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SeaBedNSW: Marine LiDAR Surveys 2018

- Fugro LADS (ALB): dual sensor terrestrial + bathy
- 44 Secondary Sediment Compartments
- 6394km²; ~25 survey days
- bathy-topo (cloud, grid), reflectance, imagery, QA4LiDAR
- Bathymetry <20m to 48m;

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Geoscience Australia

ELVIS since Nov 2019 <https://elevation.fsdg.org.au/>
 AusSeabed (future) <https://portal.ga.gov.au/persona/marine>

Grid, point cloud, aerial imagery, reflectance (GDA2020)

Monthly Orders

Orders by Data Class

Number of orders containing the data from the data class. Note that orders can contain data from multiple data classes.

Jobs per Industry

environment.nsw.gov.au

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SEED – Sharing and Enabling Environmental Data
<https://www.seed.nsw.gov.au>

use the **QR Code** on the postcard search **'SeaBedNSW'** on SEED or visit the **'Offshore Mapping'** via webpage

watch the tutorial download layers: contours, landforms

Seabed NSW has a new online web viewer on the SEED Environmental Data Portal, giving users a detailed view of the NSW coastline. Seabed NSW gives councils improved data to model coastal hazards for coastal management planning and provides the community with a better understanding of their local coastal environment.

Scan the QR code to view Seabed NSW layers on the SEED Environmental Data Portal

<https://www.environment.nsw.gov.au/research-and-publications/our-science-and-research/our-research/water/offshore-mapping>

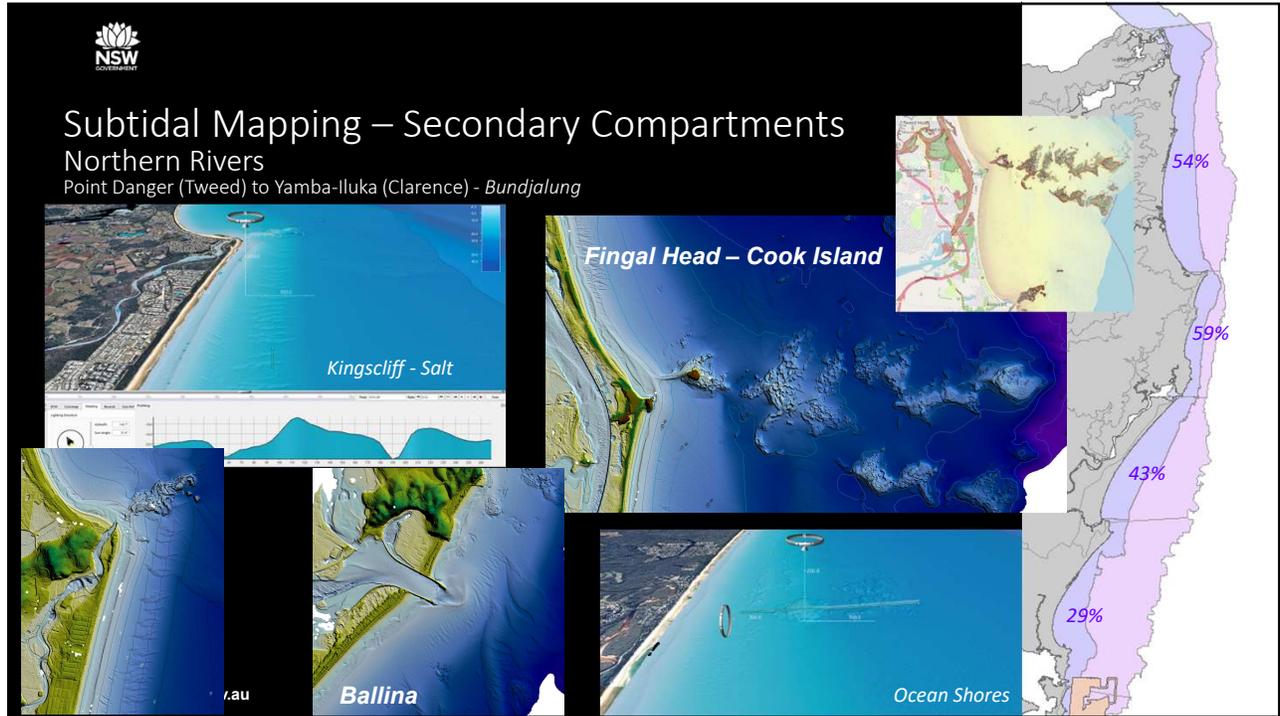
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State-wide landforms (sub-tidal)
 Geomorphometric Analysis
 Linklater et al 2019

6 - class typology based on DEM - LiDAR + MB
 Long Reef - Collaroy, Dee Why

2 - class seabed typology based on Aerial Imagery

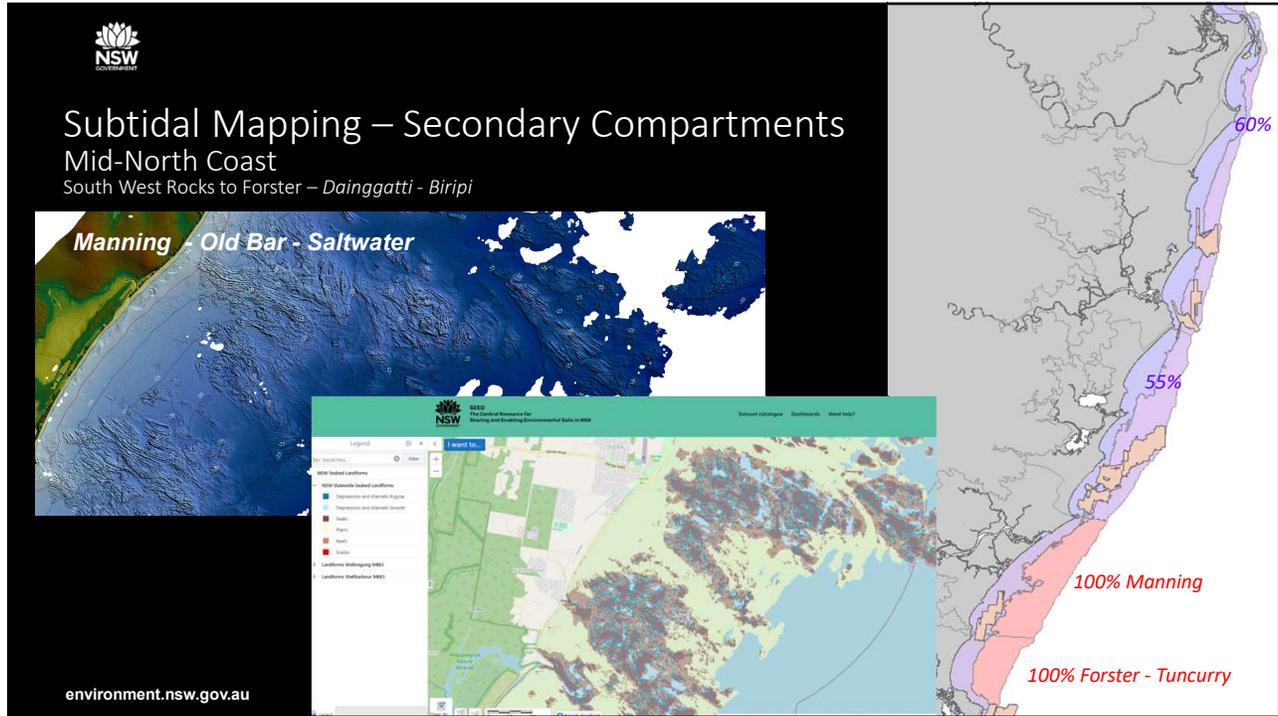
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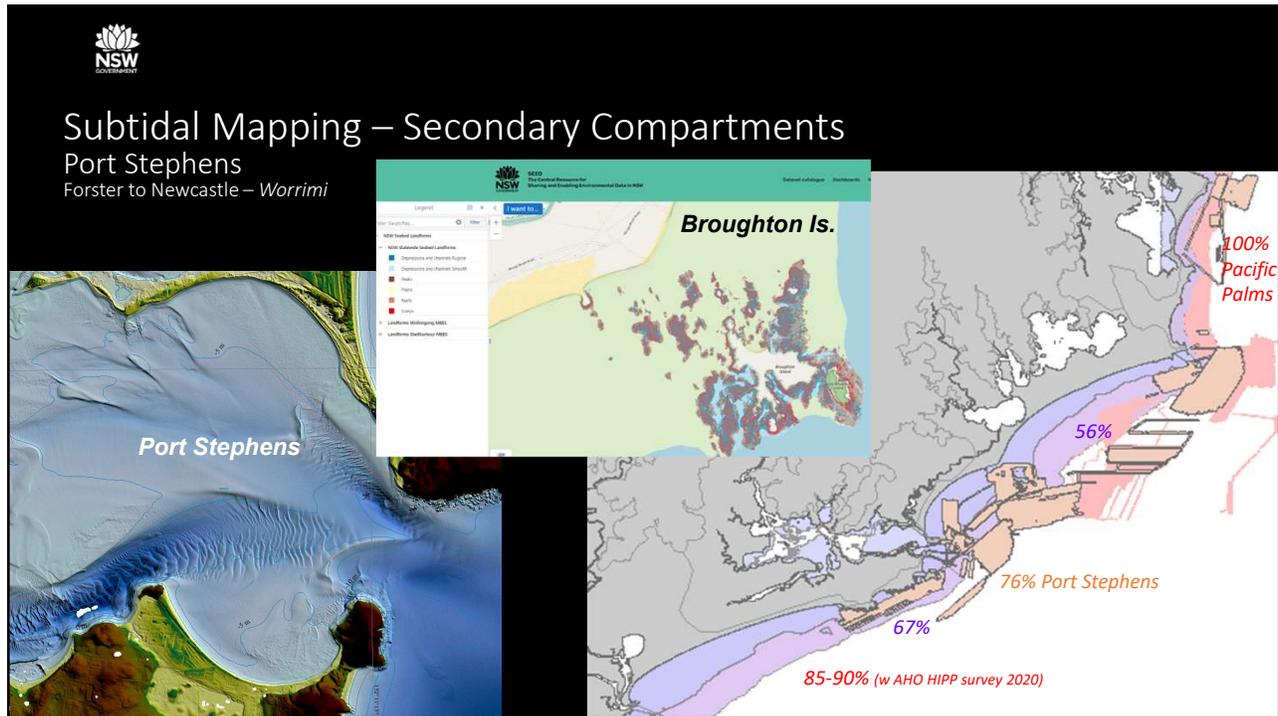
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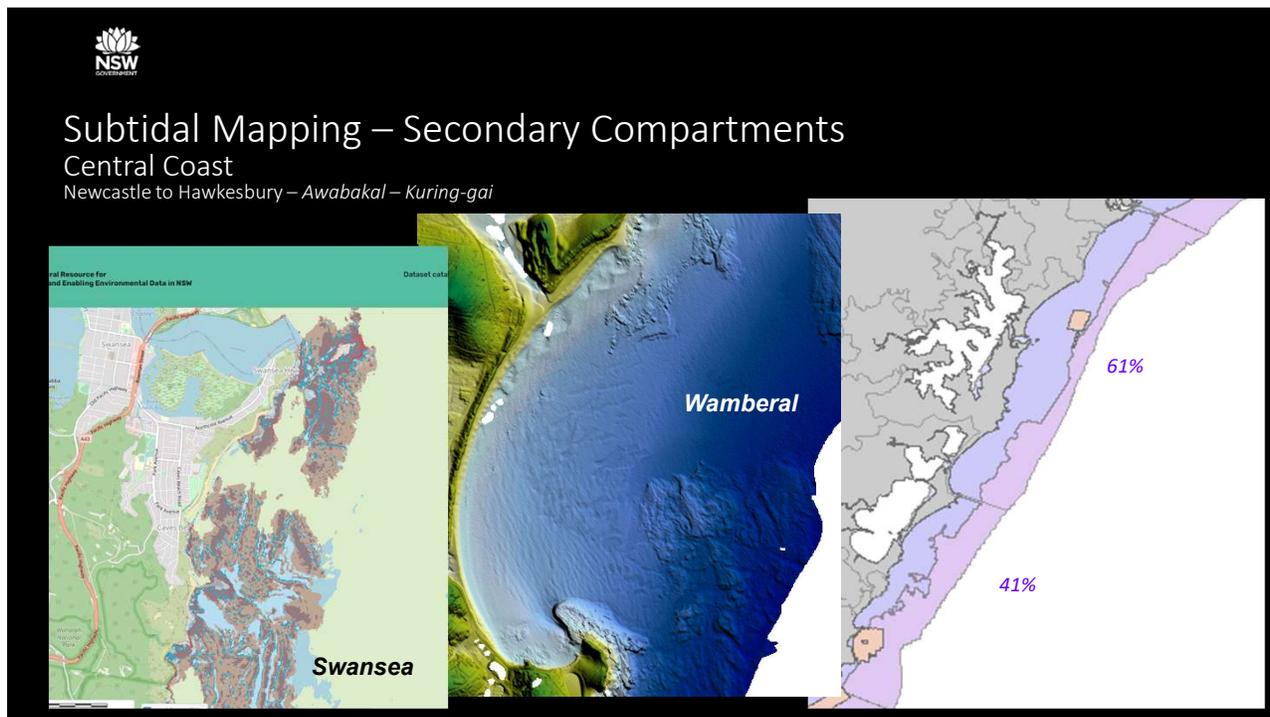
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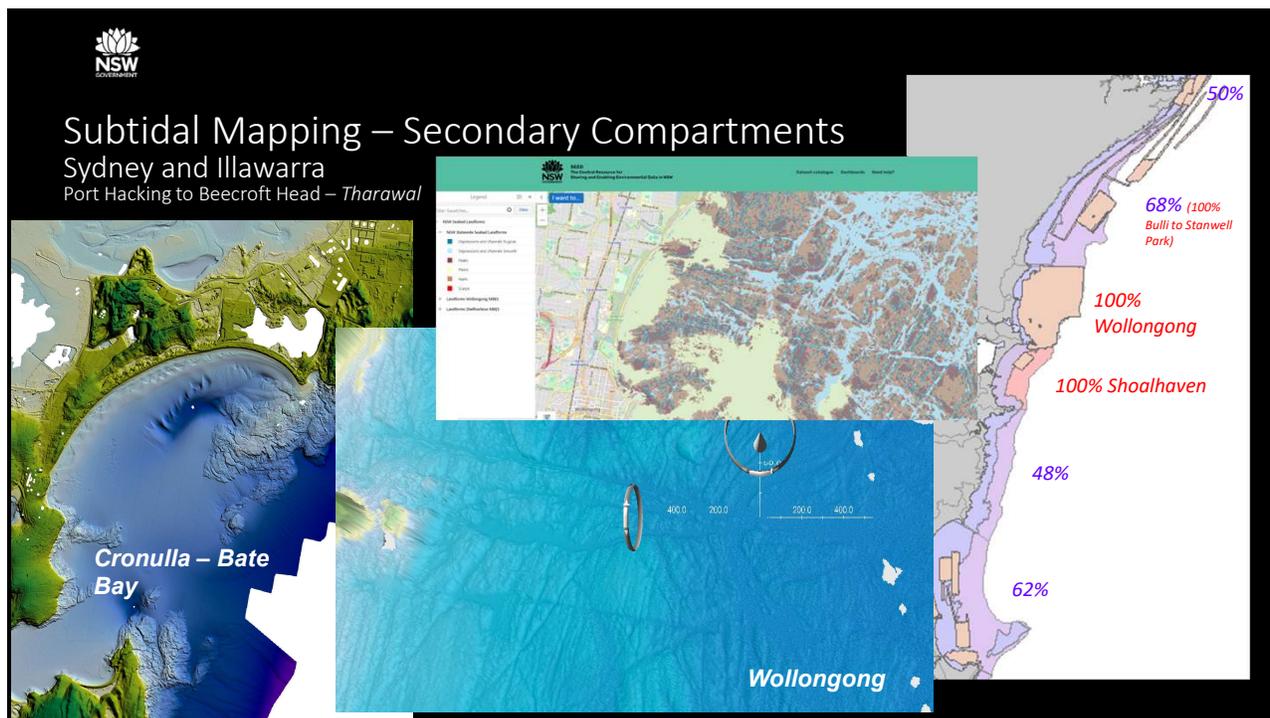
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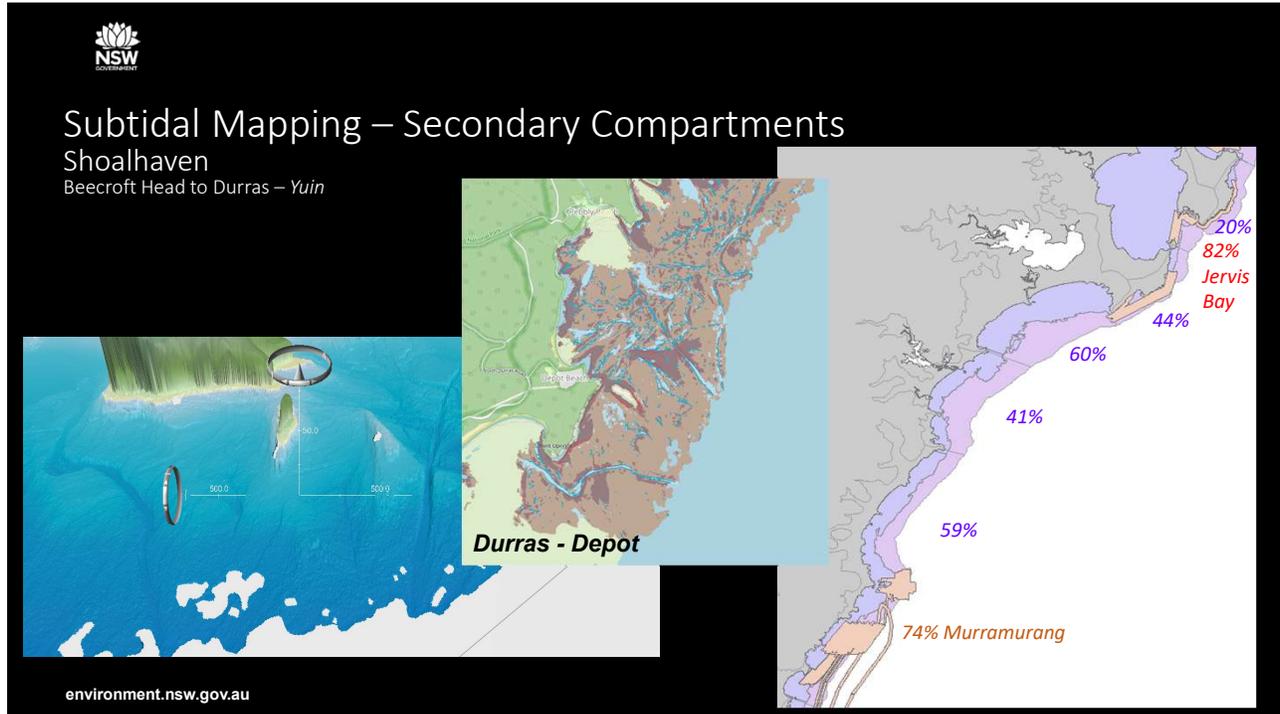
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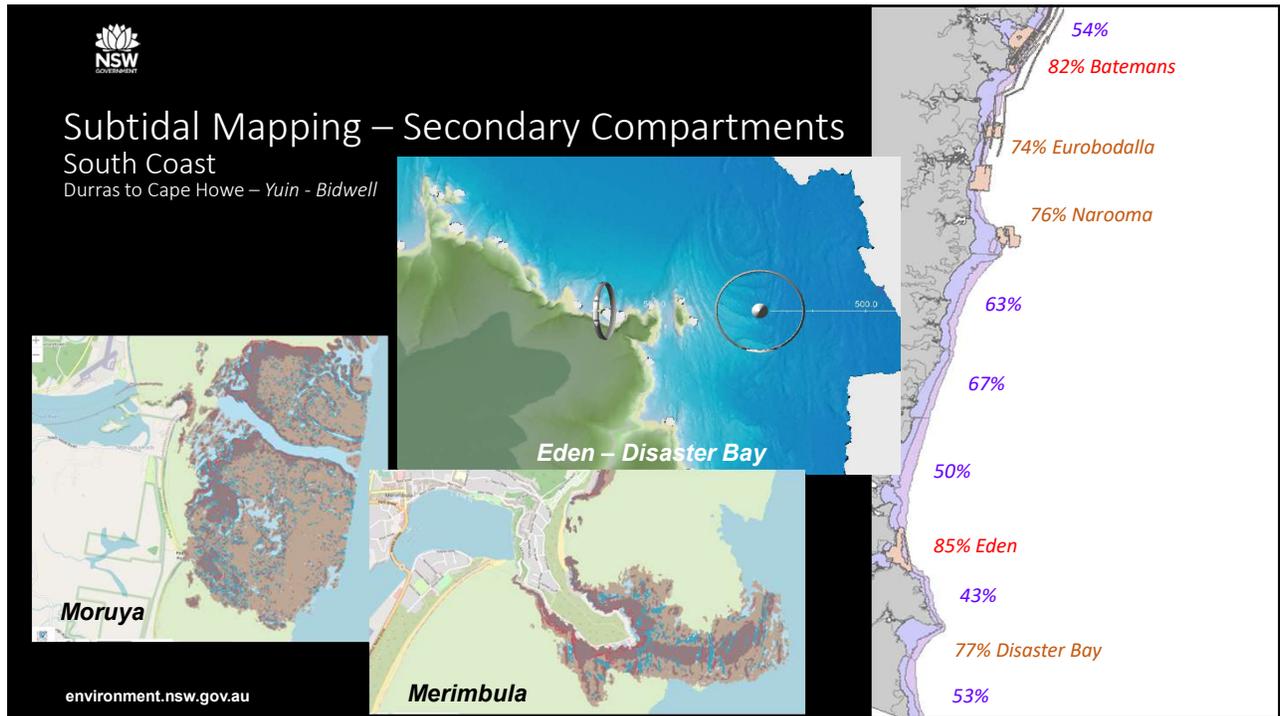
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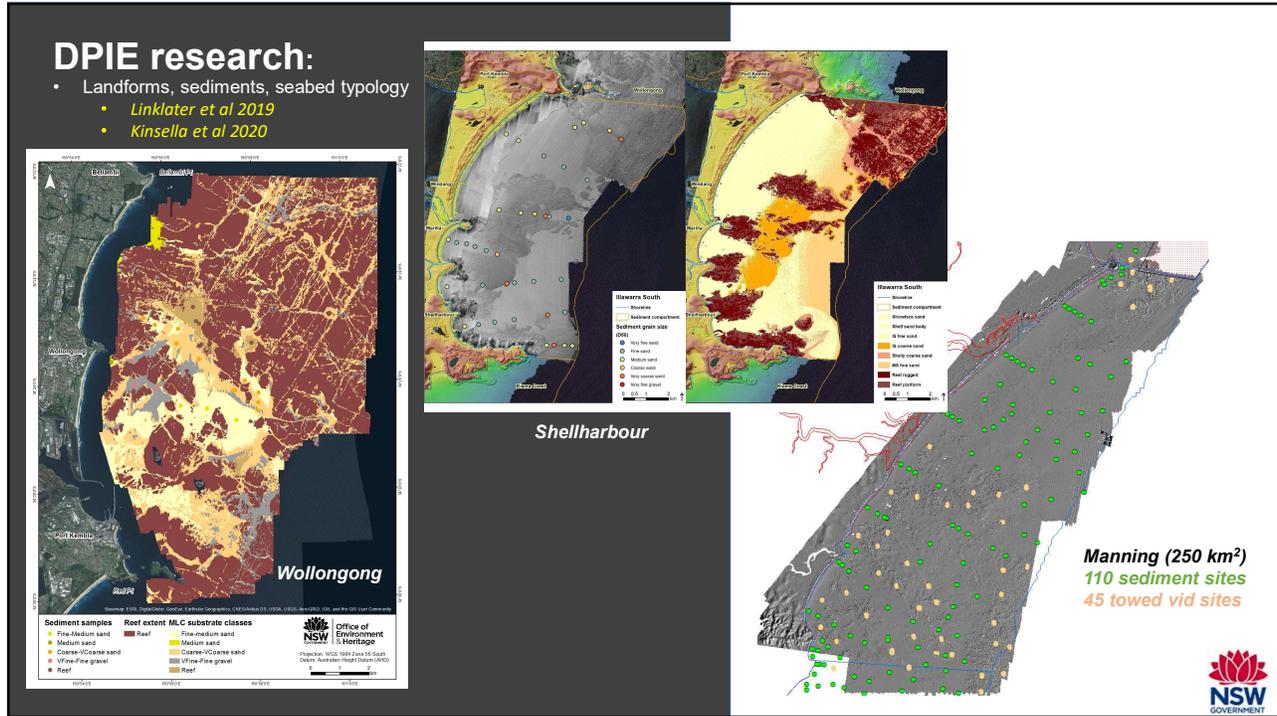
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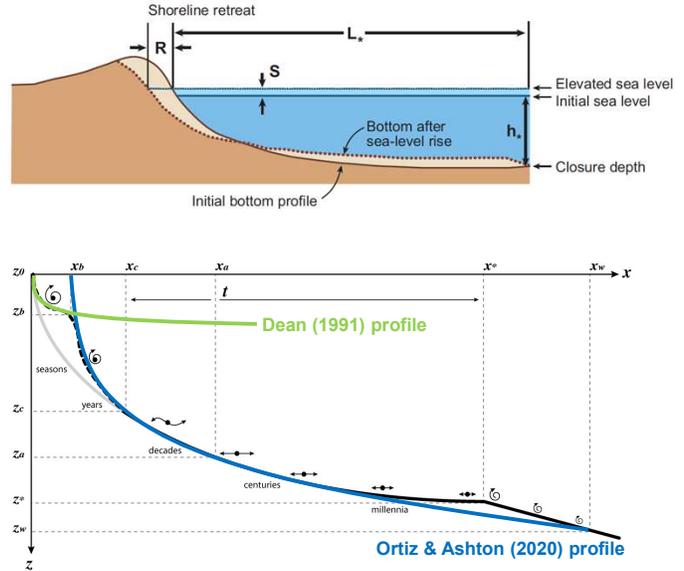
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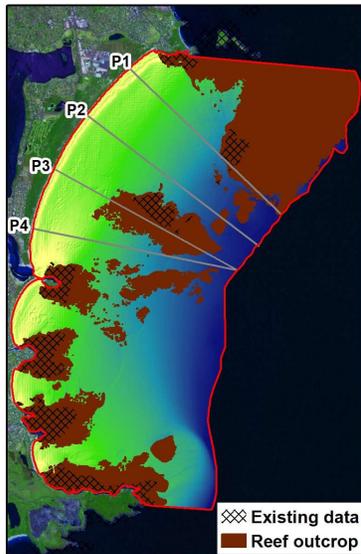
Potential for profile response to sea level rise (Bruun effect)

- 'Bruun effect' – coastal profile shifts upward & landward with sea-level rise
- Sand could be lost from the active beach system to an offshore sink, causing shoreline recession
- Does this potential exist in different settings, and how can we quantify it throughout a compartment?
- We can compare profiles from high-resolution seabed mapping data with theoretical equilibrium profiles based on wave climate & sediment type

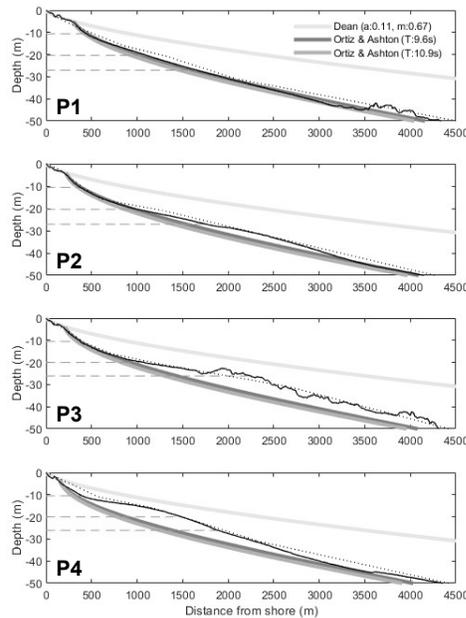


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Example of profile variation along a continuous sandy beach



Kinsela et al. (2020) *Estuaries & Coasts*



Graded shoreface profile – consistent with theoretical equilibrium between waves & sediment

Overfit lower shoreface – relict sediment lobe on inner shelf

Overfit lower shoreface – underlying reef structure outcrops at the seabed

Overfit shoreface – ebb tidal delta deposit from Lake Illawarra entrance

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Profile analysis reduces uncertainty in shoreline change predictions

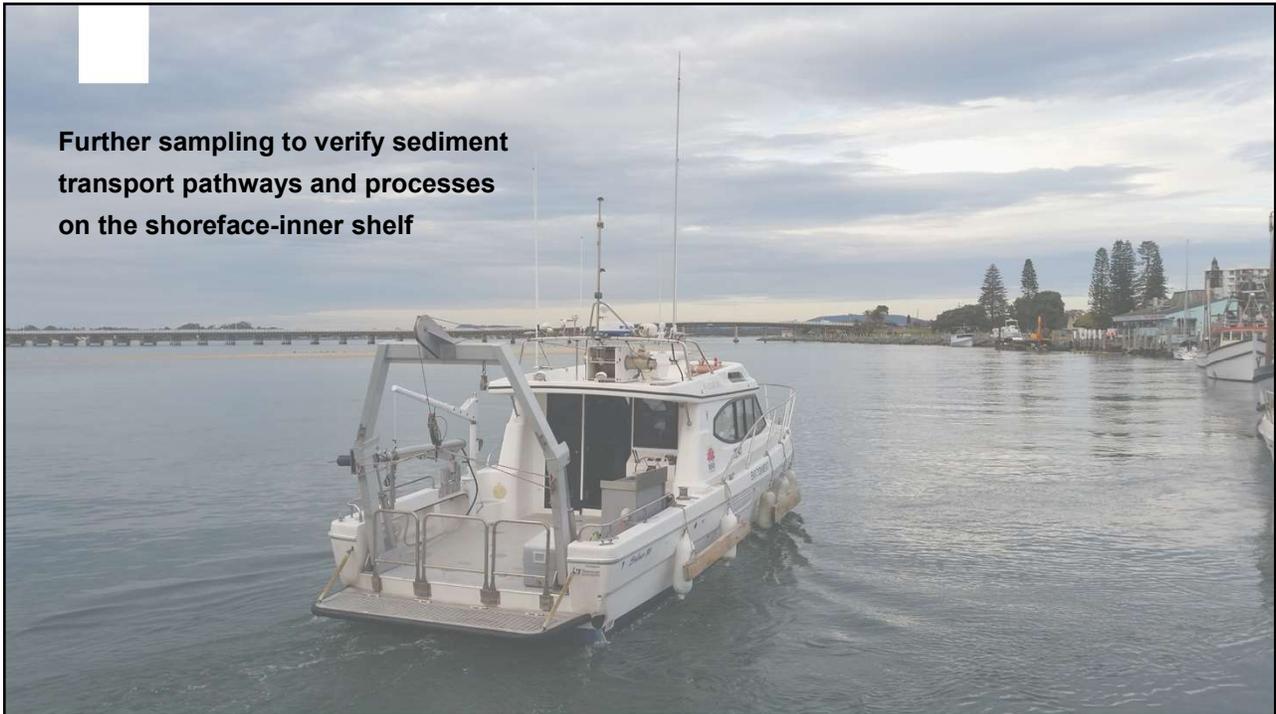
- We have accurate shoreface profile survey data for all NSW beaches
- Theoretical equilibrium profiles can be generated using wave climate & sediment data
- By comparing survey and theoretical profiles we can assess the potential for the Bruun effect
- Using a series of profiles or using spatial analysis to quantify profile change volume within a sediment compartment



Example of a reduction in future shoreline change predictions where the potential Bruun effect was found to be lower after profile analysis using high-resolution seabed mapping

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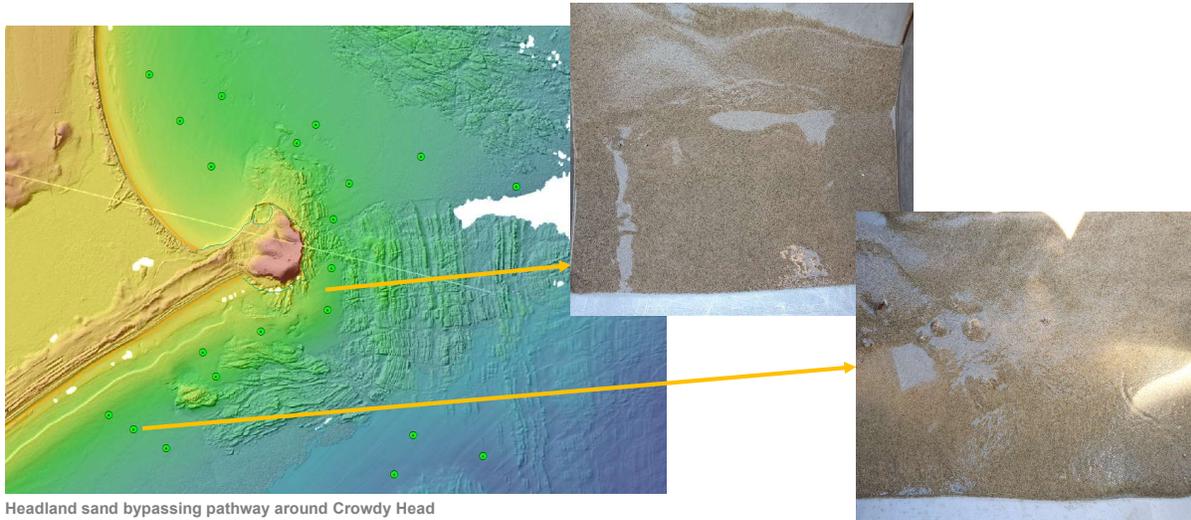
Further sampling to verify sediment transport pathways and processes on the shoreface-inner shelf



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Headland sand bypassing pathways

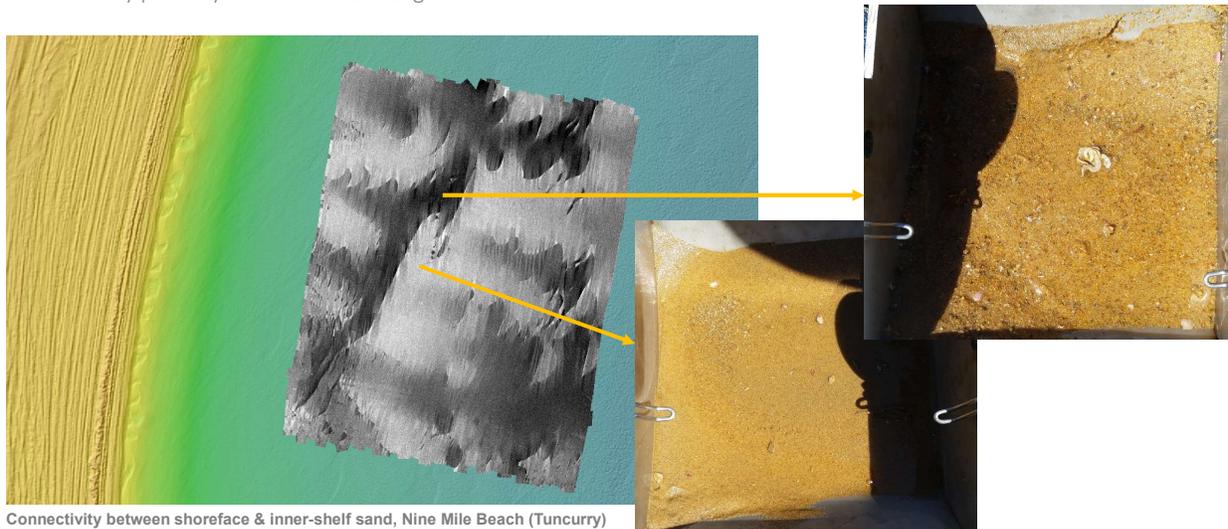
- evaluate secondary compartment boundaries (open, closed, leaky?)
- map tertiary/sub compartments for sediment budget analysis and modelling



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Shoreface-inner shelf sand supply to beaches

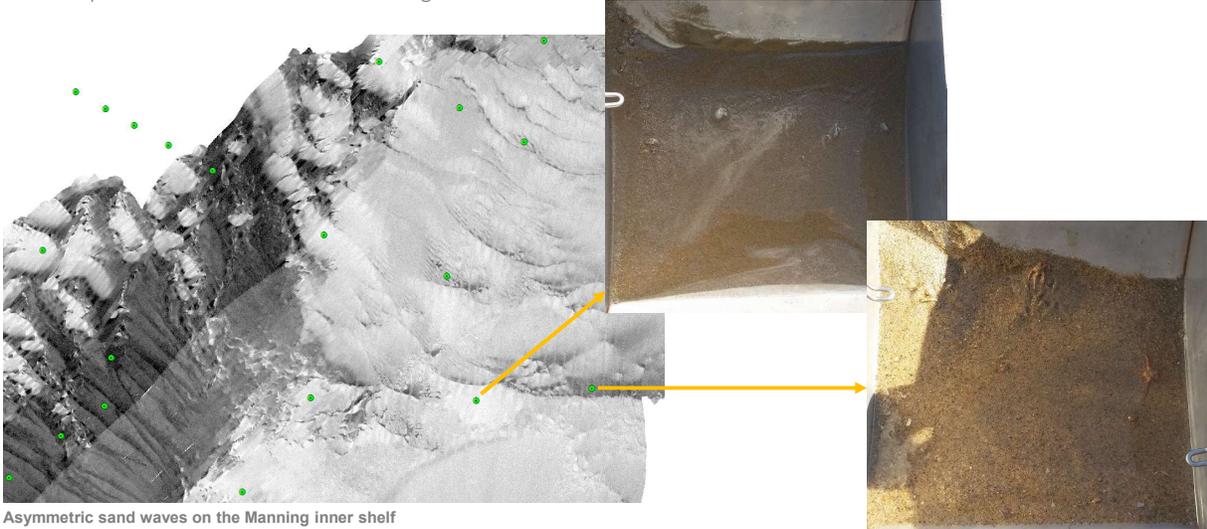
- map shoreface sediment types and distributions off accreting/stable/receding beaches
- identify pathways and measure change over time & after storm events



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Inner shelf sediment bedforms

- evidence of sediment mobility, transport direction and driving hydrodynamic processes
- map the distribution & character along the coast



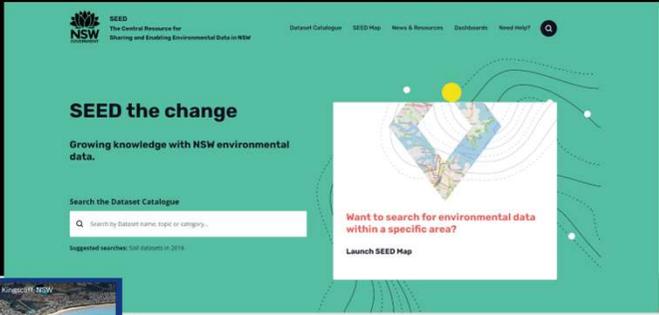
Asymmetric sand waves on the Manning inner shelf

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Thank you

Department of Planning and Environment

Seabed NSW: a detailed view of the NSW coastline to assist planning



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