

BENTHIC ECOSYSTEMS AND OFFSHORE WIND FARMS

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(with thanks to H. Houridis, R. Przeslawski and L. Howitt)

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Benthic habitats, ecology and links

- Benthic habitats include all seabed types, plus seabed-like habitats. For example:
 - Soft sediments
 - Unconsolidated hard substrates
 - Hard substrates
- Benthic ecology: is the study of organisms that make up seabed communities, their biology and interactions with each other and other parts of the ecosystem.
 - Infauna
 - Epifauna (sessile and mobile invertebrates)
 - Seaweeds
 - Seagrasses



Key factors for benthic ecology

- Offshore wind farm development will interact with benthic ecology in the following ways:
 - Seabed disturbance during construction
 - Modified or novel habitats formed on and by turbine and substation foundations, cable armour, scour protection.
 - Local changes to hydrodynamics
 - Underwater noise and electromagnetic fields
 - Risk of contamination by heavy metals or hydrocarbons
 - Risk of introduction or spread of non-indigenous marine species



Predicted changes

Changes to benthic habitats will be semi-permanent:

- Potential repowering of renewable resource
- Hard to remove scour protection
- Trade-off between full removal and loss of habitat and biota

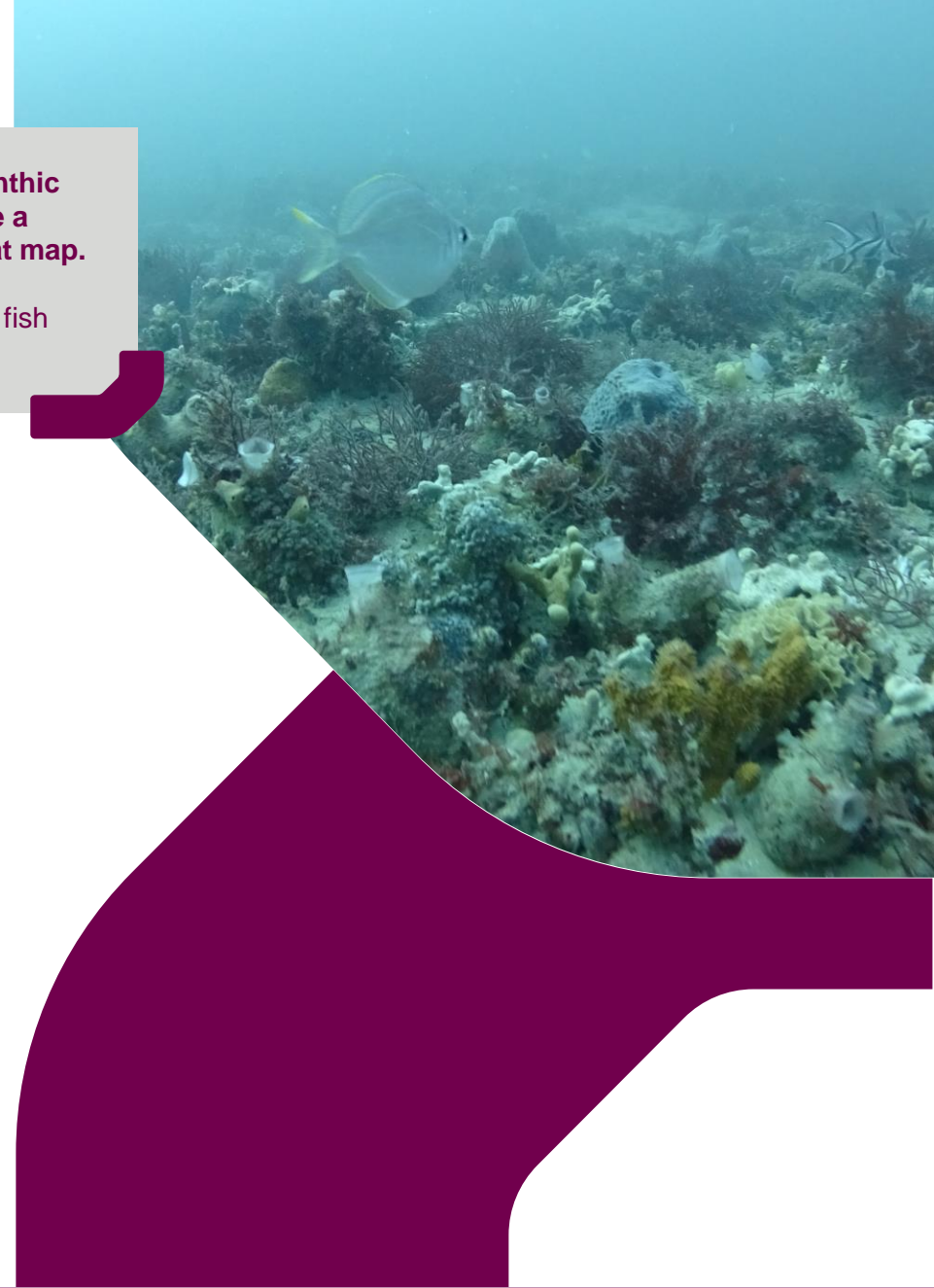
- Increase in amount and complexity of hard-substrate habitat available
 - Hard, 'reef-like' habitats typically support higher biodiversity than bare sand.
 - Step change in amount of infrastructure (and activity) in marine environment
- Localised changes to hydrodynamics
- Examples of flow on effects:
 - Different fish community structure
 - More foraging habitat for Australian fur seal, cormorants



What do we need for impact assessment?

The key outcome from benthic ecology studies should be a **detailed, defensible habitat map**. Supports mitigation through micro-siting, assessments of fish habitat.

- Geophysical data including bathymetry, seabed composition.
- Oceanographic setting such as currents, waves, water quality, nutrient availability, light.
- Biogeographic setting including connectivity, endemism.
- Existing habitats, benthic communities, temporal variability.
- How benthic communities develop (recruitment)



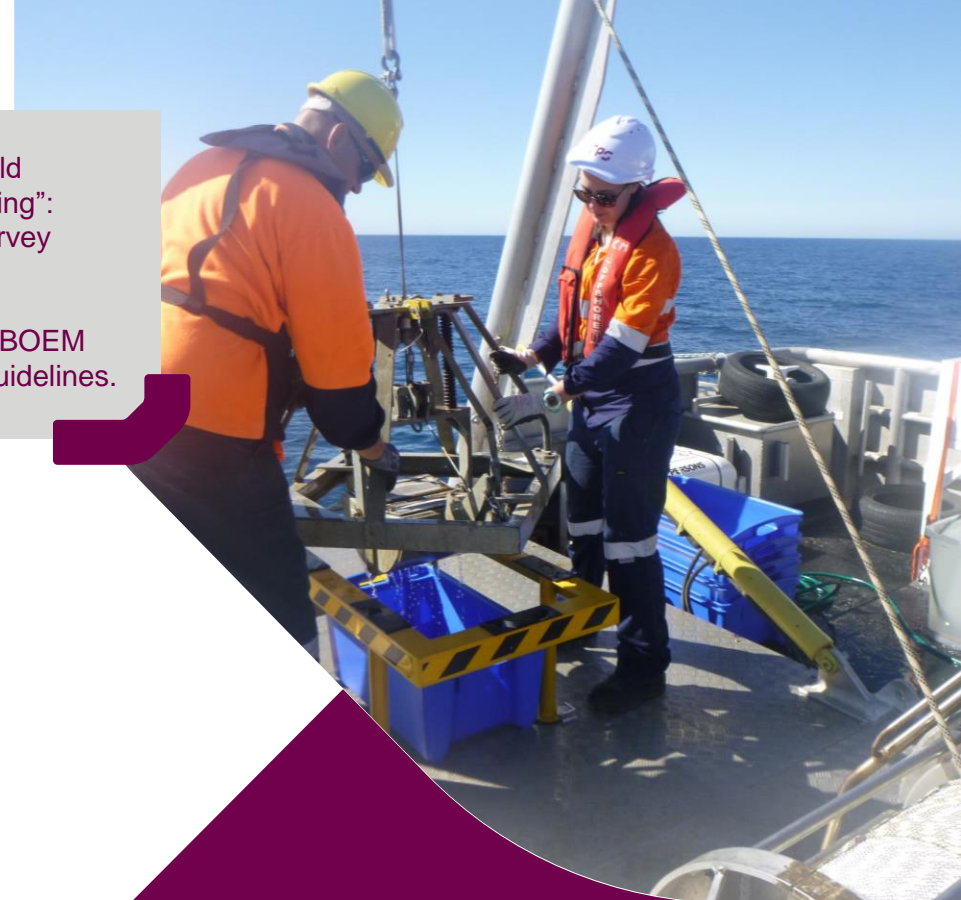
Survey tools, techniques, challenges and guidelines

- Survey design needs to consider:
 - Zone of Influence
 - Site conditions including geophysics, oceanography, climate
 - Sampling effort and techniques informed by guidelines AND local context.
- Cameras the primary tool for hard substrates.
- Sediment grab sampling for soft sediments.

NESP have published “Field Manuals for Marine Sampling”: locally-relevant general survey guidelines

Natural England (UK) and BOEM (US) have OFW specific guidelines.

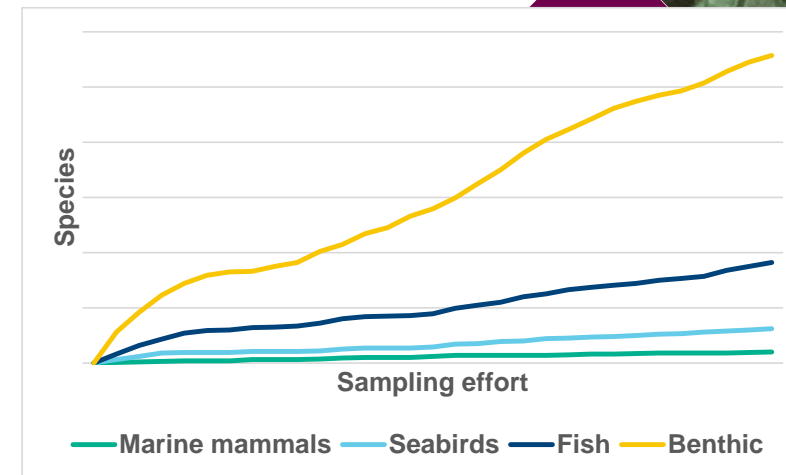
Take advantage of equipment deployments to study how benthic communities develop.



The biodiversity challenge

Australia has outstanding marine biodiversity with likely hundreds or thousands of benthic species in a typical offshore wind project site.

- Can be 50 or more species in relatively simple habitats, increasing as habitats become more complex.
- Many species are cryptic or undescribed.
- Very limited taxonomic expertise.
- Analysis of infauna samples and imagery is very time consuming.



Assessment criteria

Objectives and targets derived from legislation for benthic ecosystems can be general, qualitative.

There is a lack of management plans and recovery plans.

- Commonwealth
 - EPBC Act significant impact guidelines
 - Marine bioregional plans
- State
 - Some State-based work to define, delineate and rank benthic habitats / biotopes
 - Victoria is ranking biotopes for replaceability and defining Key Ecological Features.

There is no marine bioregional plan for the Southeast Marine Bioregion where 12 feasibility licences issued



Path to better impact assessment

- Better definition of benthic habitats (or biotopes) and their value.
- Make better use of digital technology and AI.
- Better access to taxonomic expertise
- Clearer objectives for benthic ecosystems.
- A more mature appreciation of NIMS and their role in ecosystems.
- Cumulative impacts and ecosystem resilience



Nature positive agenda

The Australian Government has set a national target to protect and conserve 30% of Australia's landmass and 30% of Australia's marine areas by 2030 (the '30 by 30' target). This aligns with Target 3 of the Kunming-Montreal Global Biodiversity Framework (GBF). DCCEW, 2024.

- Artificial reefs – typically seen as positive by the community, particularly recreational anglers.
- Placement of scour protection and cable protection: similar techniques being used to re-establish shellfish reefs in southern Australia.
- '30 by 30 target'
 - Opportunity to set aside areas within each OFW as no-take?
 - Studies show even small marine protected areas support biodiversity
- Climate change mitigation?

QUESTIONS?

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