

Incorporating coral into the tidal tapestry

Classification, typology and mapping of the intertidal and subtidal benthic habitats of the Wide Bay / Great Sandy region

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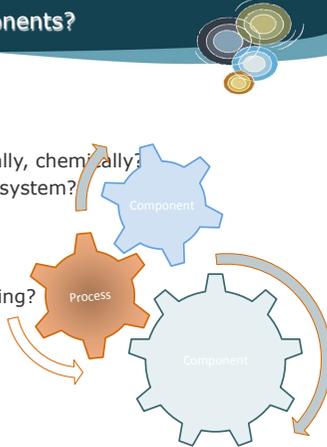

Queensland
Wetlands Program



Why classify and type ecosystem components?

To answer management questions:

- What is it?
 - What is it composed of – biologically, physically, chemically?
 - What factors influence the pattern of the ecosystem?
- Where is it?
 - Is it enduring and mappable, or transient?
 - Are the patterns, factors or influences changing?
- How does it work?
 - Ecosystem processes – dynamic, models etc.



Wide Bay / Great Sandy region Where and why?

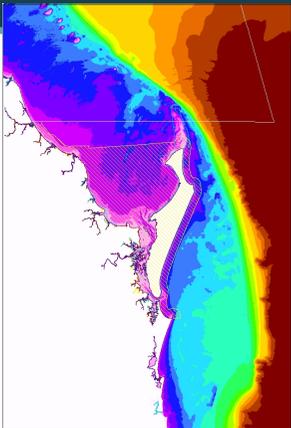
Where?

- State waters 3NM *but conceptually to shelf edge ~200m depth*
- Project area: Baffle Creek - Double Is Pt
- Includes Fraser Is WHA / Breaksea Spit
- In GBR lagoon near GBRMP
 - Fringing reefs, corals, seagrass
 - What other habitats?

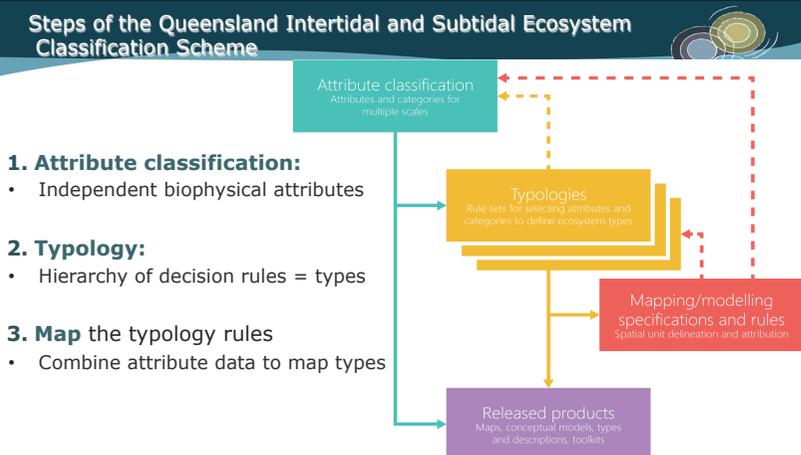
Why classify, type and map?

For general management & planning of:

- Great Sandy Marine Park
- Great Sandy Strait Ramsar area



Steps of the Queensland Intertidal and Subtidal Ecosystem Classification Scheme



- 1. Attribute classification:**
 - Independent biophysical attributes
- 2. Typology:**
 - Hierarchy of decision rules = types
- 3. Map the typology rules**
 - Combine attribute data to map types

How? Using the *Interim* Queensland Intertidal and Subtidal Classification Scheme

Step 1: Compile the attribute classification
- A pool of biophysical factors influencing ecosystem nature and extent

- Independent and non-hierarchical
- Separate benthic and water column attribute classifications
- Water column is highly variable:
3D + dimension of time
- Overlap each other:
water column attributes directly influence the benthos and vice versa

Attribute selection	
Salinity	Temperature
W. column depth	Energy source
Turbidity	pH

Substrate grain size	Inundation
Struct. macrobenthos	Benthic depth
Energy mag.	Oxygen

DEFINE a PURPOSE of the classification & typology

To inform:
•decision-making, management and planning
for
•Great Sandy Marine Park and for
• the Great Sandy Strait Ramsar area

Project: purpose and principles	Purpose for this typology
Define level / purpose: Benthic typology for Queensland (multiple levels)	Seascape scale benthic typology for Great Sandy Marine Park
Types consider and make provision for temporal variability	Types consider and make provision for temporal variability
Types relevant to management needs and species/ecosystems	Types relevant to management needs and species/ecosystems
Types provide representation of biological diversity/variation	Types provide representation of biological diversity/variation
Higher levels of scale inform lower levels, e.g. habitats stratified by seascapes	Demonstrate Seascape scale considering implications for other levels of classification/typing.
Types selected are practical for mapping	Types selected are practical for mapping

3 Expert panel workshops

- Classification:** select attributes & devise draft typology
- Typology & mapping**
- Review & endorse** the final mapping

Panel: Scientists, managers, stakeholders

- NPSR/QPWS Marine Parks
- EHP Qld Wetland Program
- CSIRO
- DAF
- BMRG
- JCU (seagrass)
- USC (coral reef / seagrass / mangrove connectivity)
- UQ (HB corals, remote sensing)

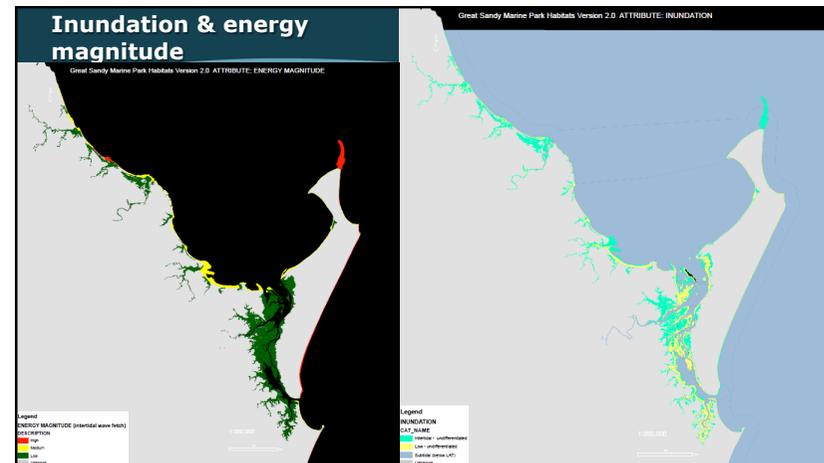
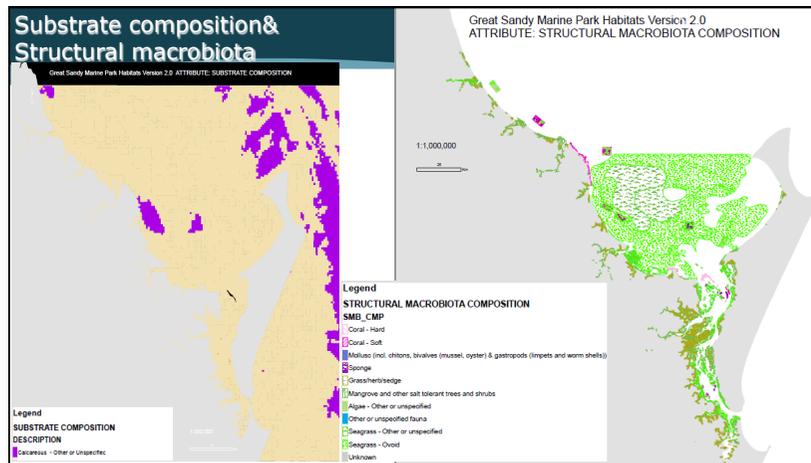
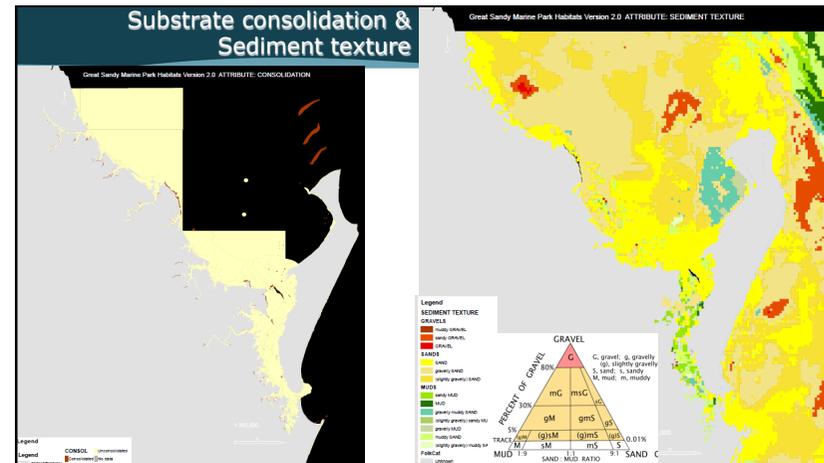
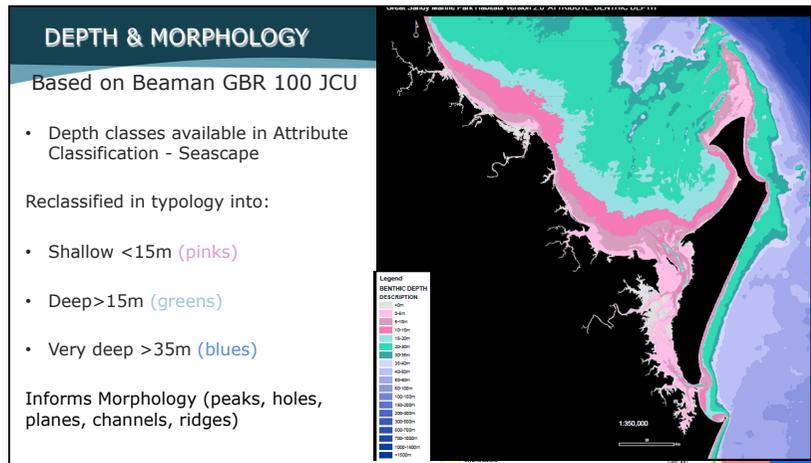
8 ATTRIBUTES FEATURE DATASETS ...arranged in hierarchy

Attributes... are biophysical factors of habitats

The panel chose 8 attributes from those available in the Classification

Based on the hierarchy the panel created a DECISION TREE of ECOSYSTEM TYPES

	INUNDTN	inundation (tidal)
	SMB_CMP	structural macrobenthos composition
	CONSOL	consolidation (rockiness for ecosystem attachment)
	SED_TEX	sediment texture
	BDEPTH	benthic depth
	NRG_MAG	energy magnitude (wave)
	T_MORPH	terrain morphology
	SUB_CMP	substrate composition



30 biophysical types

30 biophysical types

- Shallow vs deep types
- On consolidated or unconsolidated
- On carbonate or terrigenous (from land)

Reefs may include coral if we knew!

- Moon Point coffee rock reefs (ReefCheck inventory verified)

Seagrass types:

- Shallow, more persistent
- Deeper ephemeral, ovoid

BIOPHYSICAL HABITAT TYPES GSMP Ver1.2

Fauna habitats

- H04_Intertidal corals
- H05_Shallow subtidal corals
- H17_Deep reefal gardens
- H06_Deep subtidal corals
- H07_12_BOULDER with coral platform
- H16_Shallow subtidal reefal gardens (incl)
- H12_Coral platform
- H30_Intertidal reefal gardens (co-type or dominant type H13_Intertidal seagrass)

Flora habitats

- H02_Saltmarsh
- H03_Mangroves
- H13_Intertidal seagrass
- H14_Shallow subtidal seagrass
- H15_Deep seagrass
- H18_Other flora (inc. algae)

Consolidated habitats

- H08_High energy rocky shore/ headland /platform
- H07_08_High energy BOULDER rocky shore/ headland /platform
- H09_Other Rocky shore/headland & rocky platform
- H07_09_Other BOULDER rocky shore/ headland /platform
- H07_Boulders
- H07_10_Shallow BOULDER reef
- H10_Shallow reef (inc. coffee rock reef)
- H11_Deep reef (inc. coffee rock reefs & ledges)

Unconsolidated habitats

- H20_High energy beaches
- H22_Moderate - low energy Sand (Beaches, Banks, Bars, Plains, etc.)
- H21_Claypan, Mudflats, Saltpans & Muds
- H23_Other intertidal un-consolidated (inc. gravel, pebbles, cobbles)
- H25_Subtidal sand (bars, dunes, plains etc)
- H24_Subtidal muds
- H26_Other subtidal un-consolidated (inc. gravel, pebbles, cobbles)

Other habitats

- H29_Tidal influence (channel morphology) with low to moderate wave energy
- H27_Tidal influence outside channels with low to moderate wave energy
- H28_Shallow to deep subtidal unknown <35m
- H01_Very deep holes and gutters (inc. reefs and unconsolidated)

Output: 30 types, 8 attributes, 80 datasets: a data rich tapestry

Data-rich

- Drill down into the attributes
- Link to original source datasets

Information-rich

- RE-like descriptions of habitats based on biophysical attributes, extent, values
- Photos of habitat types

BIOPHYSICAL TYPES layer

TYPE_overlaps layer

ATTRIBUTES layers

- Benthic depth
- Consolidation
- Inundation
- Energy magnitude (wave)
- Sediment texture
- Structural macrobenthos composition CoHa
- Substrate composition
- Terrain morphology

Legend for Attributes:

- consolidated
- intertidal

Knowledge gaps - mesophotic reefs, bathymetry, seagrass

Seagrass survey extended to Rooney's Point
 Depths beyond that are also suitable for seagrass
 >Target for future inventory

Mesophotic reefs (30 - 100 m) may exist ...
 Need field validation + bathymetry surveys
 Can't see them on Matthew Flinders' soundings!

Morphology - what's in the **palaeochannels**?

PRIORITIES FOR DEEP SEA SURVEYS (>30m)

Map showing bathymetry, seagrass, and reef habitats. Labels include 'Devo gutters and holes', 'Mary palaeochannel', and 'Limit of the study area'. A legend for 'PRIORITIES FOR DEEP SEA SURVEYS (>30m)' is provided.

OUTCOMES AND FUTURE DIRECTIONS

- A baseline map of 30 biophysical habitats - Version 2.0 in CQ project
- Second chance for inventory and classification feedback step to inform future mapping

Central Queensland project (DAF1498CQA-2)

- Deliver Queensland Intertidal and Subtidal Classification System
- Upgrade DEM to 30m (Beaman - JCU)
- Classify and map habitats Double Island Point to Fitzroy: with naturalness qualifiers
- Aquatic Conservation Assessment : attribute biodiversity values CQ (*not* Wide Bay / Great Sandy)

SEQ...? KNOWLEDGE GAP south from Double Island Point

GBR nearshore and coastline...?