

DRAFT FACTSHEET The Queensland Intertidal and Subtidal Ecosystem Classification Scheme - Mapping method

The Queensland Intertidal and Subtidal Classification Scheme delivers mapping of Central Queensland tidal ecosystems to inform the management and protection of these wetlands. Ecosystem types are described in terms of their biophysical influences (attributes) which underpin the mapping. This system complements existing mapping done for other Queensland wetlands and terrestrial Regional Ecosystems and fills a critical data gap for management.

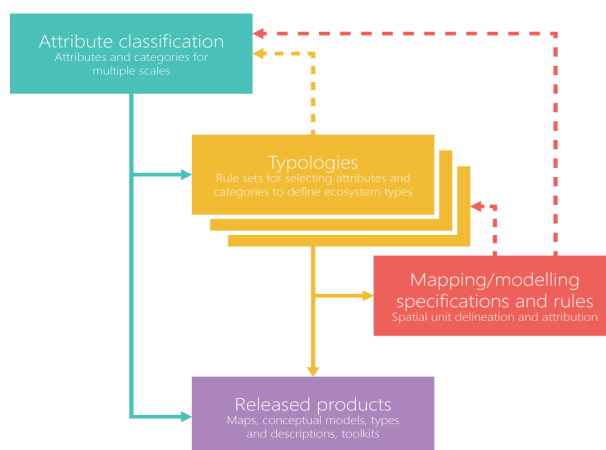
Background

Understanding the nature, extent and values of ecosystems is integral to their effective management. Intertidal and subtidal ecosystem mapping for Central Queensland provides comprehensive information about the distribution of intertidal and subtidal wetlands (ranging from saltmarsh and mangroves to coral reefs and seagrass meadows), classified and mapped at a scale that provides sufficient detail to support management actions and/or further mapping and inventory work. This is the first comprehensive mapping of intertidal and subtidal ecosystems in Queensland.

To produce the ecosystem mapping, an attribute classification and typology was devised, based on biophysical attributes from the Queensland Intertidal and Subtidal Ecosystem Classification Scheme (scheme). Substantial but disparate mapping of tidally-influenced ecosystems has been conducted across Central Queensland using different methods and scales. Guided by the scheme, these datasets were 'cross-walked' where possible into a common language and understanding. This has enabled alignment of spatial datasets for 'stitching' according to the common biophysical attributes of the scheme. Thus, data from different datasets for any given attribute have been classified using the same metrics (categories and thresholds), allowing them to be incorporated into comprehensive and seamless intertidal and subtidal ecosystem type mapping.

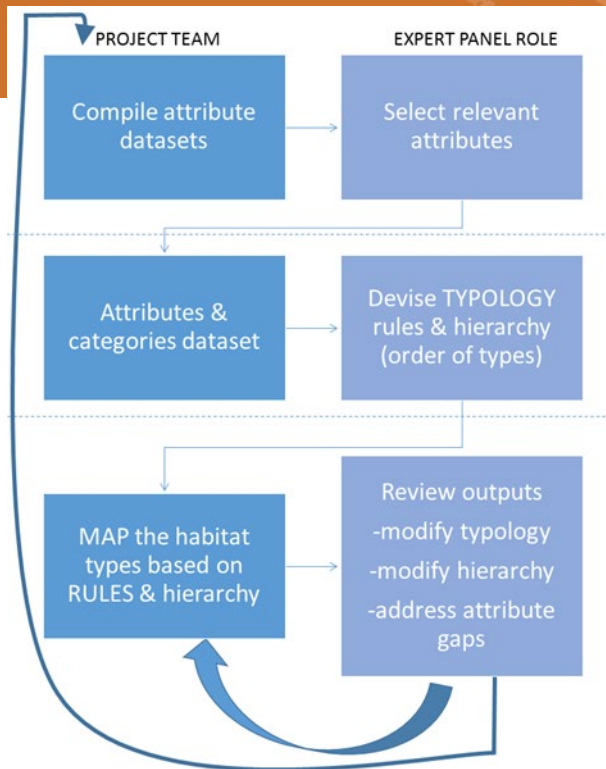
Methodology

The principles of the Queensland Intertidal and Subtidal Ecosystem Classification Scheme that form the basis for the intertidal and subtidal ecosystem



classification and mapping for Central Queensland include:

- An attribute-based classification underpinned by a strong integrating framework for multiple disciplines
- A core consistent knowledge base of biophysical attributes that incorporate and build upon existing knowledge to produce a more consistent and comprehensive mapping product
- A distinct mapping which applies attribute classification, typology and mapping stages to provide a consistent, measurable, transparent, repeatable and flexible system. Confidence is explicitly defined, enabling an ability to trace mapping back to its base data source
- Mapping and classification that extends, integrates with and complements existing, proven techniques for aquatic ecosystem classification and assessment, notably other attribute-based mapping including Queensland Wetland mapping and Regional Ecosystems mapping.



The methodology comprises distinct stages where the mapping team is guided by an expert technical working group and informed by the scheme:

1. Attribute classification stage:

- a. Assemble base data for core biophysical attributes by cross-walking to the categories of the scheme
- b. Select relevant attributes that influence intertidal and subtidal ecosystems and shortlist them for a particular scale and purpose. This step is guided by a technical working group through a facilitated workshop. Participants determine appropriate categories, thresholds and qualifiers to use.

2. Typology stage:

- a. Determine the scale and purpose of the typology
- b. Determine which attributes are most crucial to the purpose of the typology by ordering the attributes in a hierarchy.
- c. ‘Collapse down’ the categories that are not necessary to split different types
- d. Define and run rule-sets, which relate to one or more attributes and categories in combination. Each rule-set equates to an ecosystem type based upon a particular combination of attributes and categories. Rule-sets are captured in a spreadsheet.

Attributes behind the intertidal and subtidal mapping

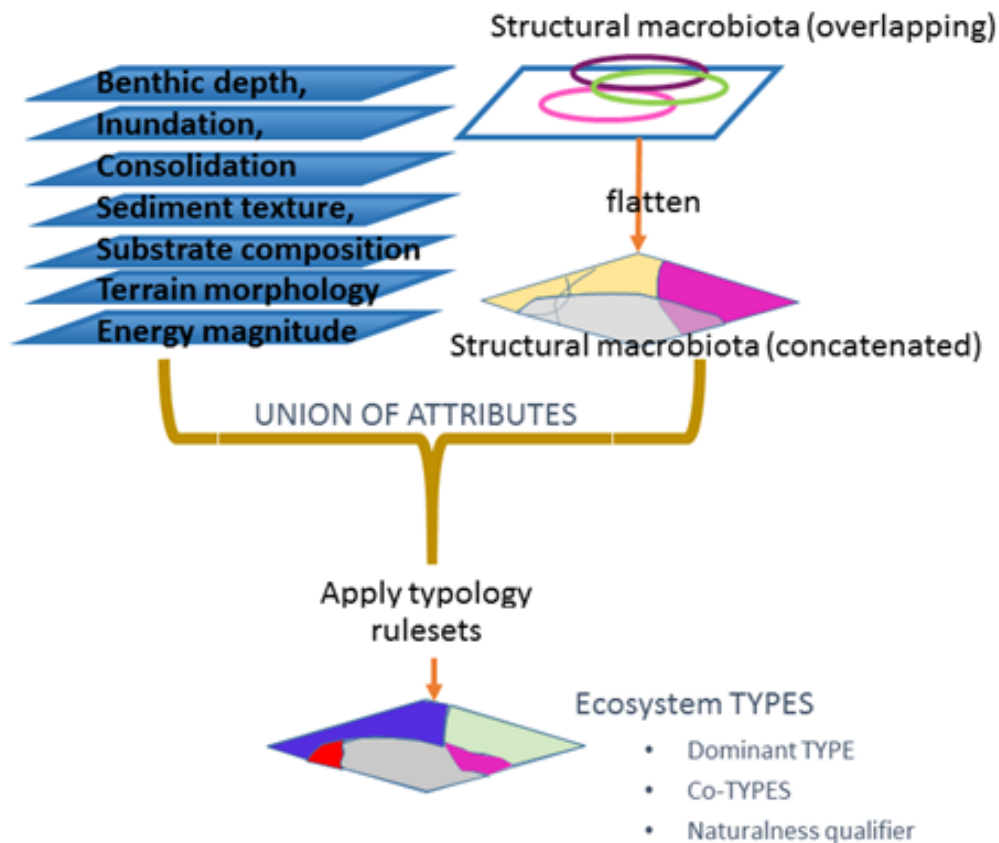
The technical working group selected eight biophysical attributes to underpin the 95 different ecosystem types:

- Benthic depth: A 30m digital bathymetric elevation model (DEM) was collated from existing data by Robin Beaman from James Cook University.<weblink>
- Inundation: areas that are tidally influenced
- Consolidation: for the attachment of biota
- Sediment texture: e.g. sandy mud, muddy sand etc.
- Substrate composition: e.g. terrigenous or carbonate
- Energy magnitude: high or low wave energy
- Terrain morphology: shape of the sea floor
- Structural macrobiota composition: animal and plants forming 3D structure for other biota to live.

- e. Review and refine ecosystem type rule-sets (reclassification) after viewing the mapping for preliminary types
- f. Name the types and describe them in terms of their combinations of biophysical attributes and categories

3. Mapping is an iterative process that is guided by feedback from the technical working group:

- a. Align the mapping purpose with the attribute classification and typology
- b. Map the attributes and categories based upon relevant inventory datasets, with sources from the technical working group
- c. Map the ecosystem types according to rule-sets for particular combinations of attributes and categories. To do this a Python script combined the attribute datasets, matching the combinations with the ecosystem types in the spreadsheet (2d) and re-ordered them in the correct hierarchy (step 2b). See figure on p 3.
- d. Review and refine the mapping and ecosystem type rule-sets in consultation with the technical working group. This is an iterative process that may involve several consultations.



GIS method to implement attribute-based ecosystem type mapping for Central Queensland (3c)

Updated mapping and data sources

The intertidal and subtidal mapping and typology for Central Queensland updates the Great Sandy / Wide Bay mapping (GSWB Ver 1). Datasets, attributes and ecosystem-type rules were informed by high resolution aerial orthophotography, LiDAR elevation models, and recent inventory datasets that validated the original prototype mapping. The Central Queensland intertidal and subtidal mapping is based upon imagery and spatial inventory data from 2015, including as many as 220 different datasets underpinning eight attributes.

Products

The intertidal and subtidal mapping and classification project for Central Queensland delivered:

- a peer-reviewed and trialled [intertidal and subtidal classification and mapping methodology](#) (Module 1)
- a comprehensive [review of classification schemes](#) that places the Queensland Intertidal and Subtidal Ecosystem Classification Scheme in context ([Module 2](#))
- [maps](#) <link to mapping page> displaying Central Queensland's intertidal and subtidal ecosystems in a number of different formats (pdf, KML using Google maps, via online download, and through WetlandSummary and WetlandMaps)

- [descriptions of intertidal and subtidal ecosystem types](#) <link> based on their underlying biophysical attributes
- online documentations of [biophysical attributes](#) <link> that underpin the mapping, including qualifiers <link to naturalness qualifier> to describe change
- [Central Queensland intertidal and subtidal data](#) <link to mapping page> is provided as the following datasets:
 - Intertidal biota, unmapped-biota, consolidated and unconsolidated layers
 - Subtidal biota, unmapped-biota, consolidated and unconsolidated layers
 - Naturalness qualifiers showing where biophysical attributes are modified by anthropogenic activity
 - Mapping of biophysical attributes including benthic depth and other attributes

These products are available on *WetlandInfo*—the Queensland Wetlands Program's comprehensive first stop-shop for wetlands information, resources and tools.

Applications

The products of this project can be used to:

- provide a primary tool and framework to support policy development

- guide prioritisation and on-ground works investment in natural resource management
- inform the tracking of changes in ecosystem extent and type and inform the design of monitoring programs (e.g. for water quality and habitat condition - report cards)
- prioritise knowledge gaps for inventory and data acquisition
- assesses values and processes, including ecosystem services and values, representation for fish habitat areas and marine park zonings
- assesses connectivity and interactions between ecosystem types and processes
- form a base to predict species presence/absence based upon ecosystem types (e.g. GBR, Ramsar)
- develop management guidelines for intertidal and subtidal ecosystems based upon key characteristics
- inform resource utilisation, regulation, management and offsets
- enable integrated planning and policy for intertidal and subtidal habitats across agencies and jurisdictions
- inform identification of Matters of National and State Environmental Significance (MNES, MSES) (including Outstanding Universal Value of World Heritage areas and criteria under Ramsar)
- assist with the assessment of climate change impacts
- provide a sound basis for Marine Park and Fisheries habitat, management and review; and initiatives to protect the Great Barrier Reef
- assist with development assessments, other management decisions (e.g. Environmental Impact Assessments, coastal approvals) and frontline services

This project was led by the Department of Environment and Science in collaboration with the Department of Agriculture and Fisheries (DAF), and the Gladstone Ports Corporation (GPC). Contributions are also being provided from other Queensland universities, Geoscience Australia, Commonwealth Scientific and Industrial Research Organisation (CSIRO), the Great Barrier Reef Marine Park Authority (GBRMPA) natural resource management (NRM) bodies and consultants of the above organisations.

DAF has provided financial assistance to this project as a fish habitat initiative (DAF 1498CQA-2), meeting approved development related fish habitat offset requirements for Gladstone Ports Corporation Limited.

This project is working where possible with allied DAF-funded projects to value-add knowledge and enhance fish habitat outcomes.

The project is undertaken through the intergovernmental Queensland Wetlands Program (QWP). QWP's governance group provides project governance; an Advisory Group will provide strategic advice; and an interdisciplinary team will produce the mapping and products.

Get involved

Email wetlands@des.qld.gov.au to find out more. If you have a purpose or use for biophysical attribute data or benthic ecosystem types, or are doing research on a relevant or related project, we would like to hear from you. Please email us to join the mailing list and find out about future workshops and project outcomes.

The Queensland Wetlands Program supports projects and activities that result in long-term benefits to the sustainable management, wise use and protection of wetlands in Queensland. The tools developed by the Program help wetlands landholders, managers and decision makers in government and industry. The Queensland Wetlands Program is currently funded by the Queensland Government.

Contact wetlands@des.qld.gov.au
or visit www.wetlandinfo.des.qld.gov.au

QWP/2018/12

Project participants and Links