




Applying attribute-based classification and typology



to enrich intertidal and seabed mapping in Queensland

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Why classify ecosystems?

- For seamless ecosystem-based management, land to sea, across the whole-of-system
- To understand intertidal and subtidal ecosystem nature and extent
- To understand the biological, physical & chemical factors influencing them
- To unify hundreds of mapping datasets, all collecting different parameters
- To extend the usefulness of mapping data that people are collecting in the field to a range of different purposes and potential uses
- To identify knowledge gaps, reduce redundancy, target future inventory



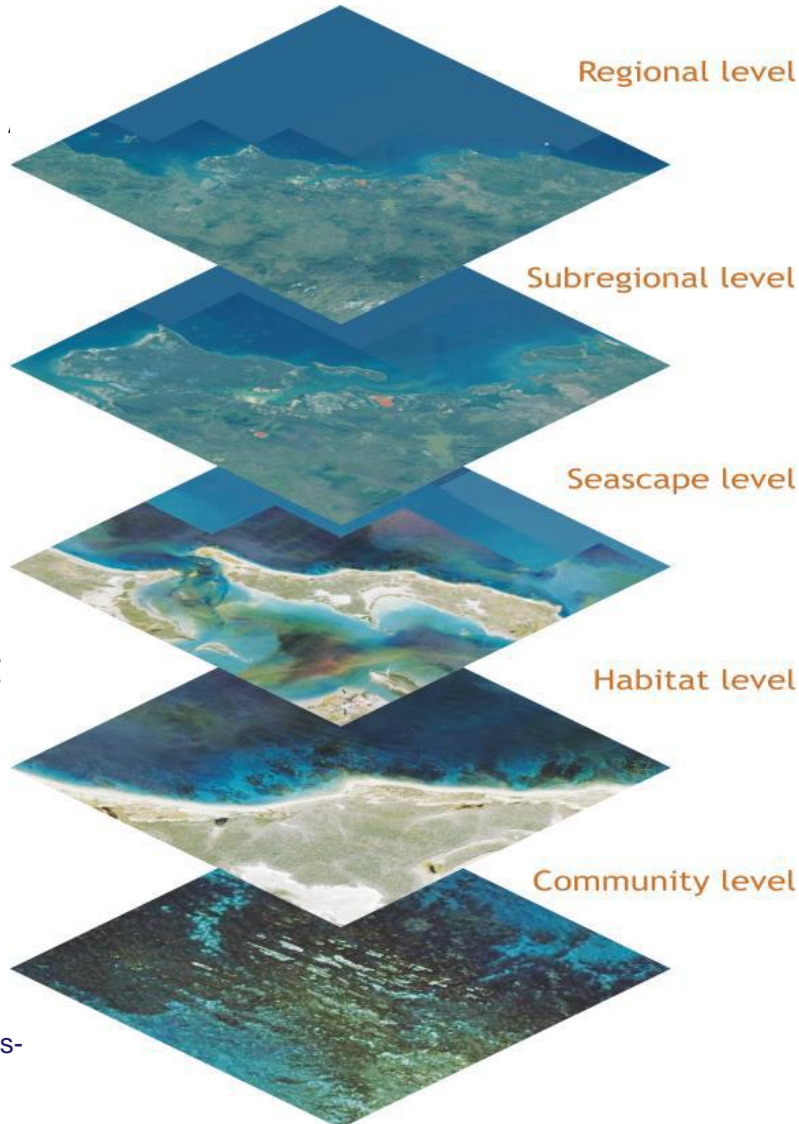
The Queensland Intertidal & Subtidal Ecosystem Classification Scheme



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PRINCIPLES & STANDARDS

- Compatible with national ANAE / NISB classification standards
- Compatible with Qld Regional Ecosystems and Wetlands frameworks
- 5 Level spatial hierarchy
- Attributes of the Scheme reflect the factors that underpin the nature & extent of ecosystems



<https://wetlandinfo.des.qld.gov.au/wetlands/what-are-wetlands/definitions-classification/classification-systems-background/intertidal-subtidal/>

The Scheme's Structure and Documentation

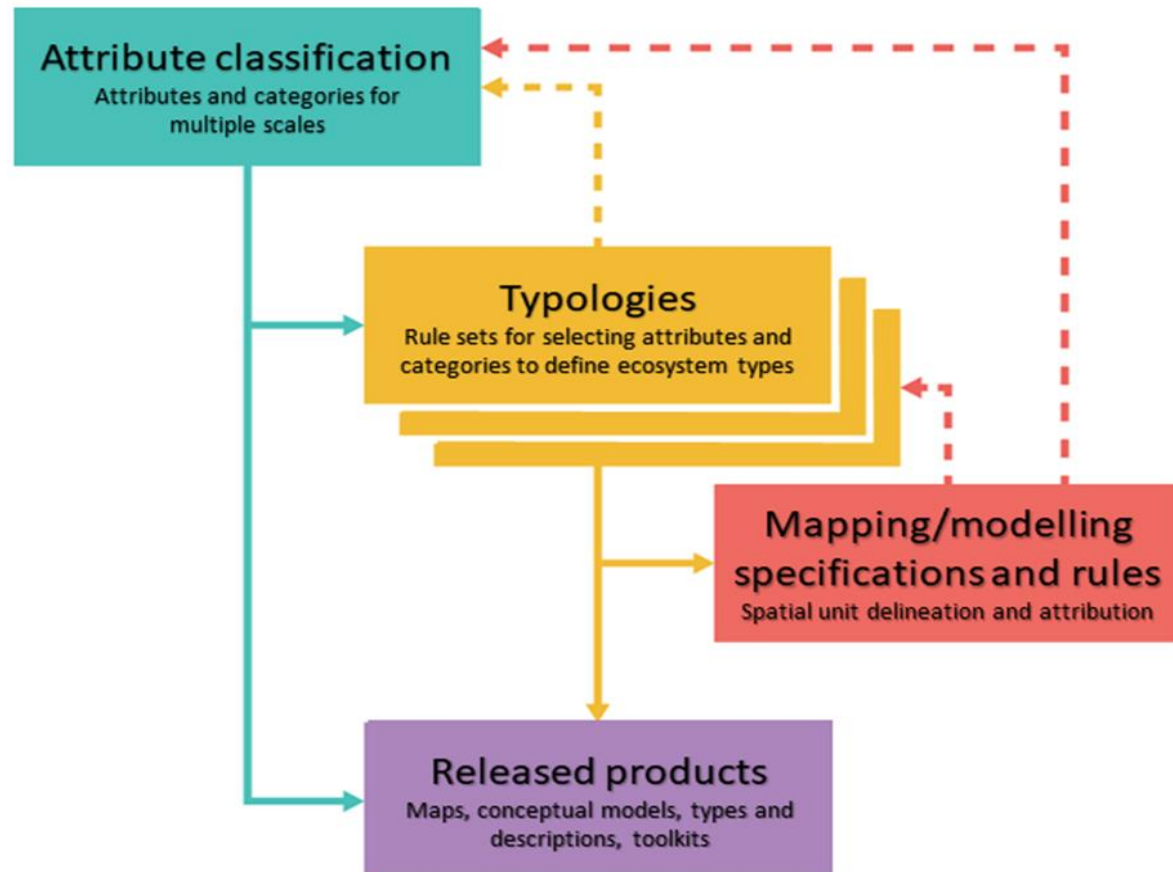


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- Distinguishes between attribute classification, typology and mapping steps

MODULE DOCUMENTATION

- [Module 1](#): Introduction to the intertidal and subtidal ecosystem classification scheme
- [Module 2](#): Literature review of intertidal and subtidal classification
- Module 3: Attributes, categories, and metrics for the intertidal and subtidal ecosystem ([as Attributes web pages](#))
- [Module 4](#): Mapping method

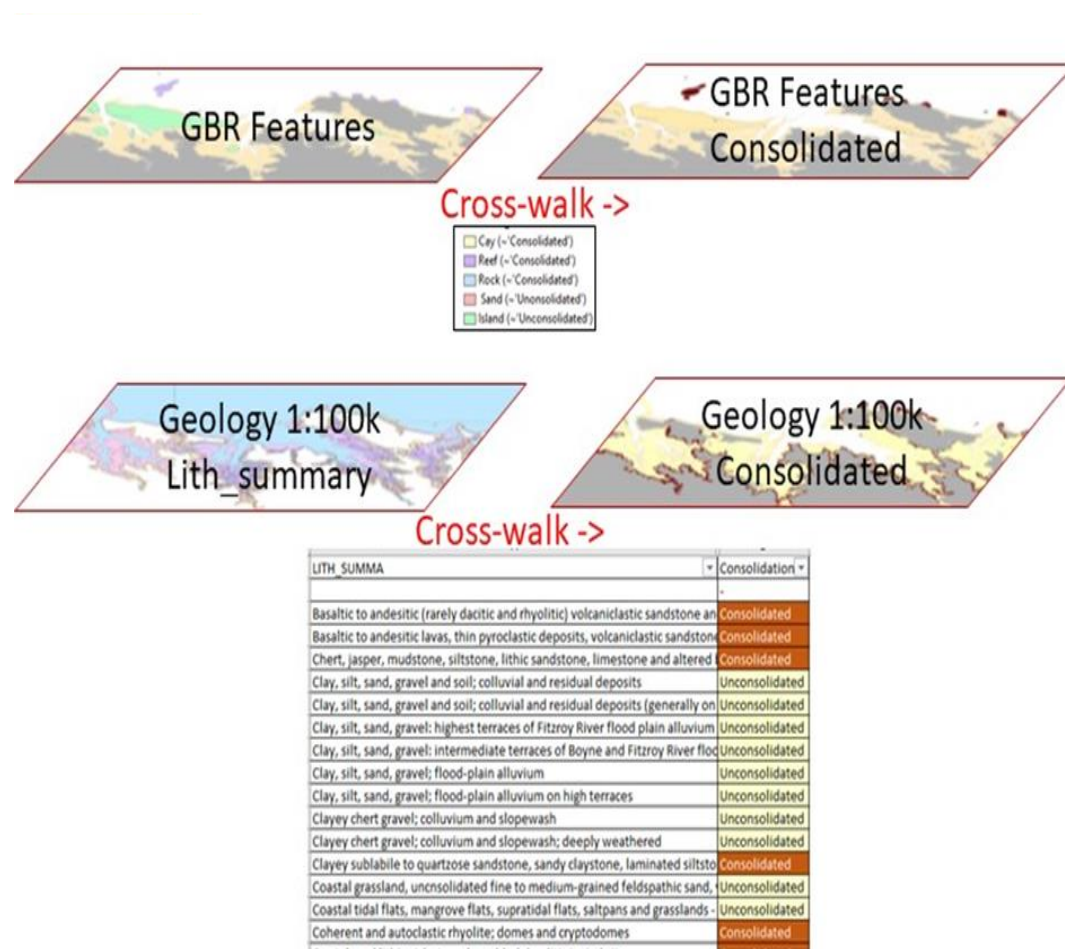


Intertidal & Subtidal Attributes of the Scheme



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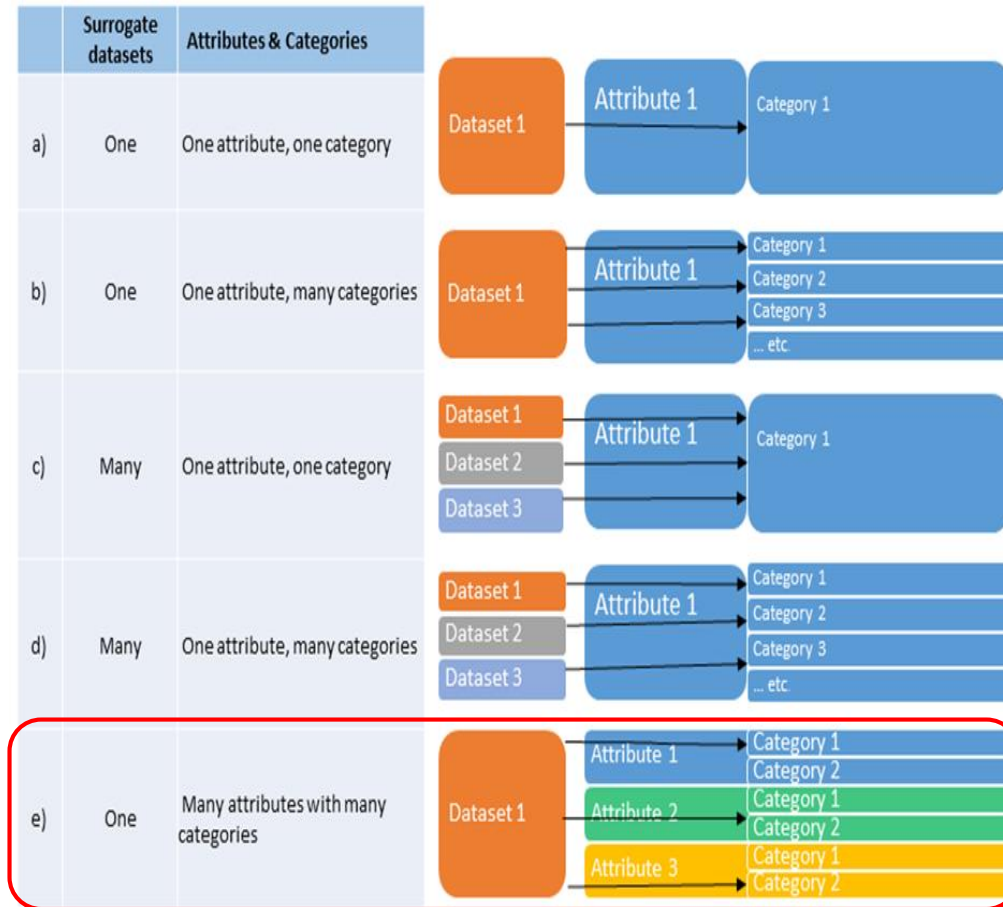
- Overlapping benthic & water column classifications
- Attributes and qualifiers
 - Themes:
 - terrain
 - substrate
 - biota
 - hydrology – physical
 - hydrology – chemical
- Provide standards for data inventory, collection & collation
- Crosswalk to unify datasets based on attributes & categories in common



Crosswalking - ways to apply source datasets to attributes & categories



- Bathymetry underpins :
 - [Benthic depth](#)
 - [Terrain slope](#)
 - [Terrain roughness](#)
 - [Terrain relative relief](#)
 - [Terrain morphology](#)
 - [Substrate consolidation](#)
 - [Substrate grain size](#) / sediment texture (e.g. using MBES)
 - [Structural macrobiota](#)
 - Water column attributes e.g. [energy magnitude](#), water clarity (benthic irradiance), attributes to extract from 3D / 4D hydrodynamic models



Intertidal & Subtidal Seascape Level Ecosystem Mapping

- Extent: Central Queensland State Coastal Waters

- [WetlandMaps interactive mapping](#)

- Links to 94 [ecosystem types](#)

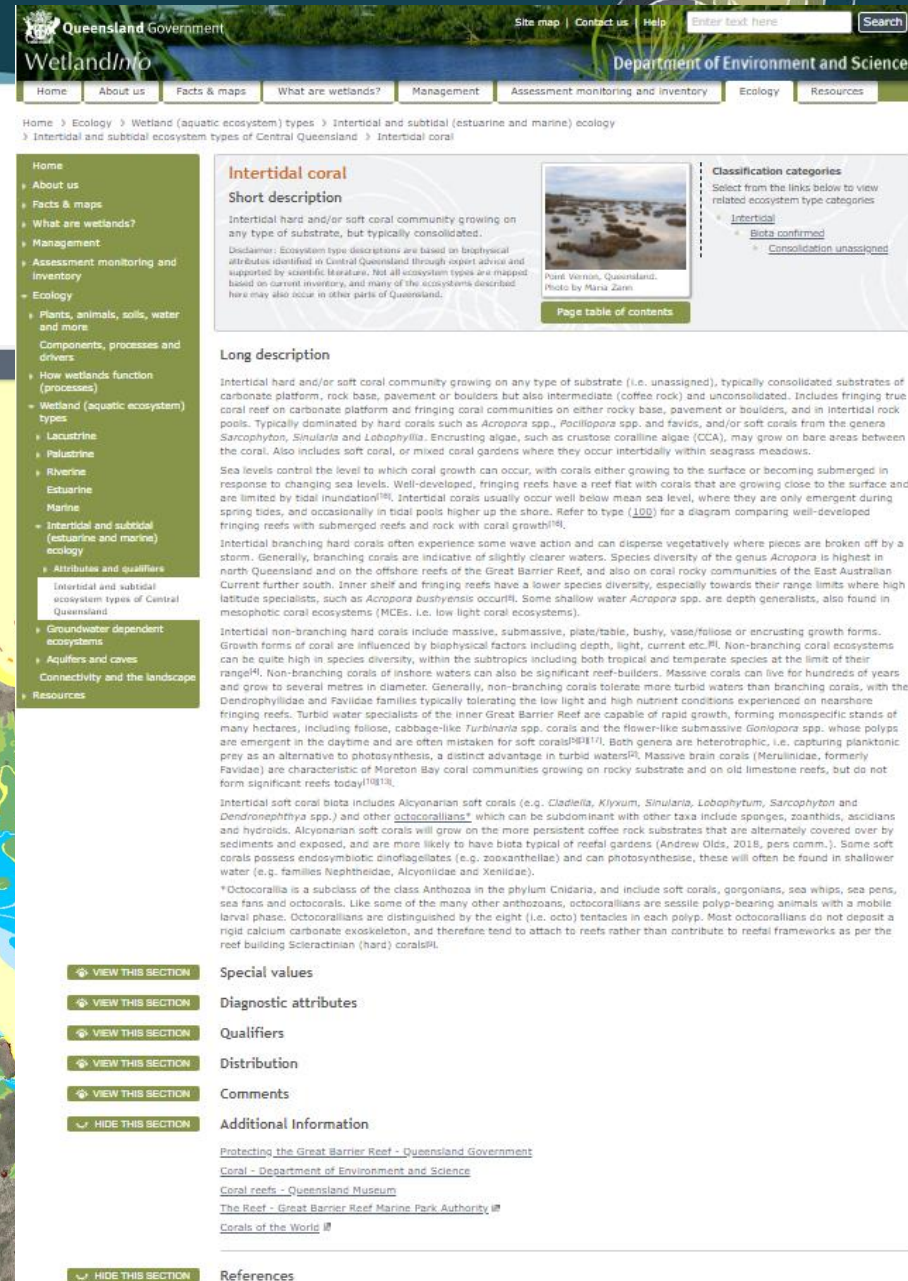
- Types a combination of 8 attributes, each a data synthesis layer

- [Attributes and qualifiers](#)

- [Mapping method factsheet](#)

- [Poster](#)

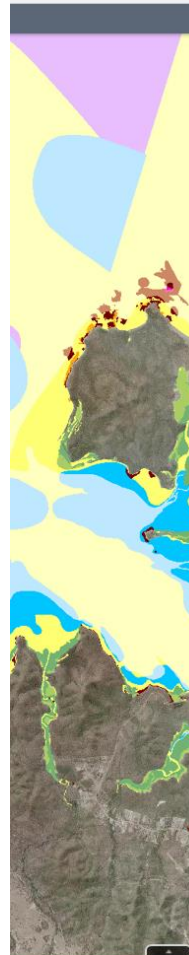
- [Module 4](#) detailed mapping method



The screenshot shows the 'WetlandInfo' website interface. At the top, it features the Queensland Government logo and navigation links for 'Site map', 'Contact us', 'Help', and a search bar. The main navigation menu includes 'Home', 'About us', 'Facts & maps', 'What are wetlands?', 'Management', 'Assessment monitoring and inventory', 'Ecology', and 'Resources'. The breadcrumb trail reads: 'Home > Ecology > Wetland (aquatic ecosystem) types > Intertidal and subtidal (estuarine and marine) ecology > Intertidal and subtidal ecosystem types of Central Queensland > Intertidal coral'.

The page content is divided into several sections:

- Home**: A vertical sidebar menu with expandable sections for 'About us', 'Facts & maps', 'What are wetlands?', 'Management', 'Assessment monitoring and inventory', 'Ecology', 'Plants, animals, soils, water and more', 'Components, processes and drivers', 'How wetlands function (processes)', 'Wetland (aquatic ecosystem) types', 'Lacustrine', 'Palustrine', 'Riverine', 'Estuarine', 'Marine', 'Intertidal and subtidal (estuarine and marine) ecology', 'Attributes and qualifiers', 'Groundwater dependent ecosystems', 'Aquifers and caves', 'Connectivity and the landscape', and 'Resources'.
- Intertidal coral**: The main heading for the current page.
- Short description**: A brief overview of the intertidal coral community, including a disclaimer about the accuracy of the information.
- Classification categories**: A tree diagram showing the classification of 'Intertidal coral' into 'Beta confirmed' and 'Consolidation unassigned'.
- Long description**: A detailed text-based description of the intertidal coral ecosystem, covering its characteristics, distribution, and the factors influencing its growth.
- Special values**, **Diagnostic attributes**, **Qualifiers**, **Distribution**, and **Comments**: A series of buttons for navigating through different data synthesis layers.
- Additional Information**: A list of external resources and references related to the intertidal coral ecosystem.
- References**: A list of scientific publications cited in the document.



Intertidal coral

Short description

Intertidal hard and/or soft coral community growing on any type of substrate, but typically consolidated.

Disclaimer: Ecosystem type descriptions are based on biophysical attributes identified in Central Queensland through expert advice and supported by scientific literature. Not all ecosystem types are mapped based on current inventory, and many of the ecosystems described here may also occur in other parts of Queensland.



Point Vernon, Queensland.
Photo by Marie Jones

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Classification categories

Select from the links below to view related ecosystem type categories

- Intertidal
 - Beta confirmed
 - Consolidation unassigned

Long description

Intertidal hard and/or soft coral community growing on any type of substrate (i.e. unassigned), typically consolidated substrates of carbonate platform, rock base, pavement or boulders but also intermediate (coffee rock) and unconsolidated. Includes fringing true coral reef on carbonate platform and fringing coral communities on either rocky base, pavement or boulders, and in intertidal rock pools. Typically dominated by hard corals such as *Acropora* spp., *Pocillopora* spp. and *Favites*, and/or soft corals from the genera *Sarcophyton*, *Sinularia* and *Leptophyllia*. Encrusting algae, such as crustose coralline algae (CCA), may grow on bare areas between the coral. Also includes soft coral, or mixed coral gardens where they occur intertidally within seagrass meadows.

Sea levels control the level to which coral growth can occur, with corals either growing to the surface or becoming submerged in response to changing sea levels. Well-developed, fringing reefs have a reef flat with corals that are growing close to the surface and are limited by tidal inundation^[1]. Intertidal corals usually occur well below mean sea level, where they are only emergent during spring tides, and occasionally in tidal pools higher up the shore. Refer to type [100] for a diagram comparing well-developed fringing reefs with submerged reefs and rock with coral growth^[1].

Intertidal branching hard corals often experience some wave action and can disperse vegetatively where pieces are broken off by a storm. Generally, branching corals are indicative of slightly clearer waters. Species diversity of the genus *Acropora* is highest in north Queensland and on the offshore reefs of the Great Barrier Reef, and also on coral rocky communities of the East Australian Current further south. Inner shelf and fringing reefs have a lower species diversity, especially towards their range limits where high latitude specialists, such as *Acropora bushyensis* occur^[1]. Some shallow water *Acropora* spp. are depth generalists, also found in mesophotic coral ecosystems (MCEs) i.e. low light coral ecosystems.

Intertidal non-branching hard corals include massive, submassive, plate/table, bushy, vase/foliose or encrusting growth forms. Growth forms of coral are influenced by biophysical factors including depth, light, current etc.^[1]. Non-branching coral ecosystems can be quite high in species diversity, within the subtropics including both tropical and temperate species at the limit of their range^[1]. Non-branching corals of inshore waters can also be significant reef-builders. Massive corals can live for hundreds of years and grow to several metres in diameter. Generally, non-branching corals tolerate more turbid waters than branching corals, with the *Dendrophyllia* and *Favidae* families typically tolerating the low light and high nutrient conditions experienced on nearshore fringing reefs. Turbid water specialists of the inner Great Barrier Reef are capable of rapid growth, forming monospecific stands of many hectares, including foliose, cabbage-like *Turbinaria* spp. corals and the flower-like submassive *Goniopora* spp. whose polyps are emergent in the daytime and are often mistaken for soft corals^{[2][1]}. Both genera are heterotrophic, i.e. capturing planktonic prey as an alternative to photosynthesis, a distinct advantage in turbid waters^[1]. Massive brain corals (*Merulinidae*, formerly *Favidae*) are characteristic of Moreton Bay coral communities growing on rocky substrate and on old limestone reefs, but do not form significant reefs today^{[1][1]}.

Intertidal soft coral biota includes Alcyonarian soft corals (e.g. *Cladella*, *Kivuum*, *Sinularia*, *Leptophyllum*, *Sarcophyton* and *Dendrotophylla* spp.) and other *octocorallians*¹ which can be subdominant with other taxa include sponges, zoanthids, ascidians and hydroids. Alcyonarian soft corals will grow on the more persistent coffee rock substrates that are alternately covered over by sediments and exposed, and are more likely to have biota typical of reefal gardens (Andrew Olds, 2018, pers comm.). Some soft corals possess endosymbiotic dinoflagellates (e.g. zooxanthellae) and can photosynthesise, these will often be found in shallower water (e.g. families *Nephtheidae*, *Alcyoniidae* and *Xeniidae*).

¹ Octocorallia is a subclass of the class Anthozoa in the phylum Cnidaria, and include soft corals, gorgonians, sea whips, sea pens, sea fans and octocorals. Like some of the many other anthozoans, octocorallians are sessile poly-bearing animals with a mobile larval phase. Octocorallians are distinguished by the eight (i.e. octo) tentacles in each polyp. Most octocorallians do not deposit a rigid calcium carbonate exoskeleton, and therefore tend to attach to reefs rather than contribute to reefal frameworks as per the reef building Scleractinian (hard) corals¹.

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Special values

Diagnostic attributes

Qualifiers

Distribution

Comments

Additional Information

[Protecting the Great Barrier Reef - Queensland Government](#)

[Coral - Department of Environment and Science](#)

[Coral reefs - Queensland Museum](#)

[The Reef - Great Barrier Reef Marine Park Authority](#)^[1]

[Corals of the World](#)^[1]

References

1. ¹ Alquezar, R, Scannell, J & Boyd, W 2011, *Coastal fringing reefs of the Burnett Mary Region 2011. A report to the Burnett-Mary Regional Group*, Centre for Environmental Management, Central Queensland University, Gladstone, Queensland.

Where to next?



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- Work with other institutions, agencies, stakeholders, citizen scientists to promote the use and standards of the Scheme to capture seabed and intertidal benthic inventory
- Collaborate with institutions to refine and enrich attribute datasets
- Are you collecting seabed data in Queensland? You need to classify using the Queensland Intertidal and Subtidal Ecosystem Classification Scheme!

Get in touch with us!

wetlands@des.qld.gov.au

