

Groundwater dependent ecosystem mapping background

Version 1.5

Groundwater is an important resource in Australia that plays an important ecological role in directly and indirectly sustaining a range of aquatic and terrestrial ecosystems. A basic requirement for managing these ecosystems dependent on groundwater, or groundwater dependent ecosystems (GDEs), is to know where they exist and the extent and nature of their dependence on groundwater resources.

What are groundwater dependent ecosystems?

GDEs are defined as "ecosystems which require access to groundwater on a permanent or intermittent basis to meet all or some of their water requirements so as to maintain their communities of plants and animals, ecological processes and ecosystem services" (Richardson et al. 2011).

Typology of groundwater dependent ecosystems

GDEs are grouped into types based on their groundwater reliance and are further grouped into sub-types based on their aquatic or terrestrial system. Further information on GDE typology is included in 'Queensland Groundwater Dependent Ecosystem Mapping Method: A method for providing baseline mapping of groundwater dependent ecosystems in Queensland' (Department of Science, Information Technology and Innovation 2015).

- Ecosystems dependent on the surface expression of groundwater (surface expression GDEs)
 - Lacustrine wetland GDEs
 - Lacustrine wetlands are typically large, open water-dominated systems (e.g. lakes) outside river channels. They have less than 30% vegetation cover and are larger than 8 hectares or, if smaller than 8 hectares, are more than 2 metres deep. Lacustrine wetland GDEs are those lacustrine wetlands that have connected gaining or connected variable gaining/losing groundwater connectivity.
 - Palustrine wetland GDEs
 - Palustrine wetlands are primarily vegetated non-channel environments. They include billabongs, swamps, bogs and have more than 30% emergent vegetation. Palustrine wetland GDEs are those palustrine wetlands that have connected gaining or connected variable gaining/losing groundwater connectivity.
 - Riverine water body GDEs
 - Riverine wetlands are all wetlands and deepwater habitats within a channel. Riverine wetland GDEs are those riverine water bodies contained within a channel that have connected gaining or connected variable gaining/losing groundwater connectivity.

- Estuarine wetland GDEs
 - Estuarine wetlands are those with oceanic water sometimes diluted with freshwater run-off from the land. Estuarine wetland GDEs are those estuarine wetlands that have either connected gaining or connected variable gaining/losing groundwater connectivity.
- Near-shore marine GDEs
 - Near-shore marine wetlands include the area of ocean from the coastline or estuary, extending to 6 meters below the low water mark. Near-shore marine wetland GDEs are those near-shore marine wetlands that have connected gaining or connected variable gaining/losing groundwater connectivity.
- Ecosystems dependent on the sub-surface presence of groundwater (terrestrial GDEs)
 - Regional ecosystem GDEs
 - Regional ecosystems are vegetation communities in a bioregion that are consistently associated with a particular combination of geology, landform and soil (Neldner et al. 2012). Regional ecosystem GDEs are those regional ecosystems where their components access groundwater within their root zone on at least an ephemeral basis.
 - Riverine wetland GDEs
 - Riverine wetlands are all wetlands and deepwater habitats within a channel. Riverine regional ecosystem GDEs are those streamside regional ecosystems, associated with wetlands contained within a channel, which have connected gaining or connected variable gaining/losing groundwater connectivity.
- Ecosystems dependent on the subterranean presence of groundwater (subterranean GDEs)
 - Aquifers
 - Subterranean wetlands (aquifers) are wetlands occurring below the surface of the ground that are fed by groundwater. Aquifer ecosystems are innately GDEs. Aquifer GDEs provide habitat for specialised fauna (i.e. stygofauna).
 - Cave GDEs
 - Subterranean wetlands (caves) are wetlands occurring below the surface of the ground that are fed by groundwater. Cave ecosystem GDEs are those cave ecosystems that have either connected gaining or connected variable gaining/losing groundwater connectivity.

Groundwater dependent ecosystem mapping

The Queensland Groundwater Dependent Ecosystem Mapping Method

The Queensland Government employs a consultative process that integrates local, expert knowledge of landscapes (and the ecosystems within them) with detailed spatial data in order to map GDEs across catchments. The Queensland GDE Mapping Method capitalises on pre-existing ecosystem mapping data (e.g. regional ecosystem and wetlands mapping) available state wide for Queensland at 1:100,000 scale or better. The method overcomes one of the key criticisms often levelled at broader scale mapping methods – that information from local and regional experts, with significant understanding of landscape processes and ecosystems, is not incorporated into the data sets used by decision makers. The full method is detailed in ‘Queensland Groundwater Dependent Ecosystem Mapping Method: A method for providing baseline mapping of groundwater dependent ecosystems in Queensland’ (Department of Science, Information Technology and Innovation 2015).

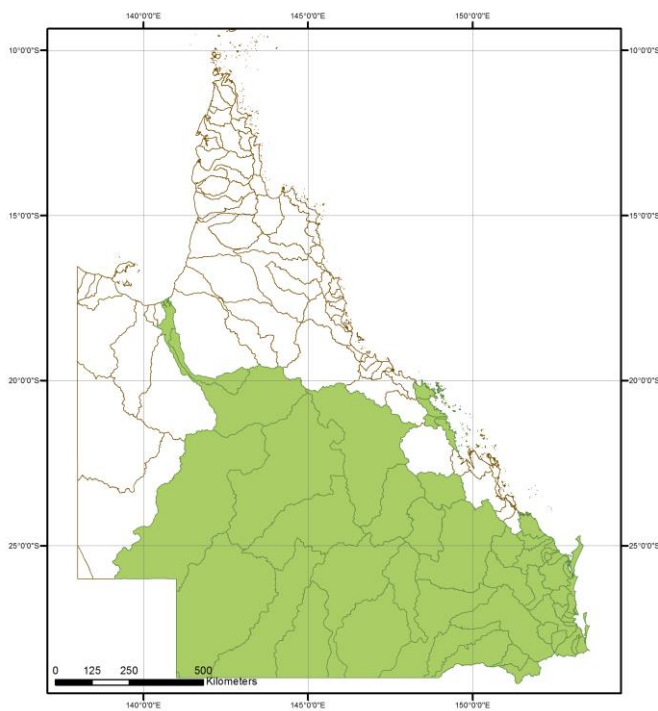
Groundwater dependent ecosystem mapping products

The Queensland GDE Mapping consists of five spatial data sets:

- Surface expression GDEs (point features)
- Surface expression GDEs (line features)
- Surface expression GDEs (area features)
- Terrestrial GDEs (area features)
- Subterranean GDEs - caves (area features)

The Queensland GDE Mapping is supported by a suite of complementary products including mapping rule-sets (description of why an ecosystem was identified as potentially groundwater dependent) and pictorial conceptual models (graphical representations of the key drivers, processes and interrelationships between groundwater and ecosystems).

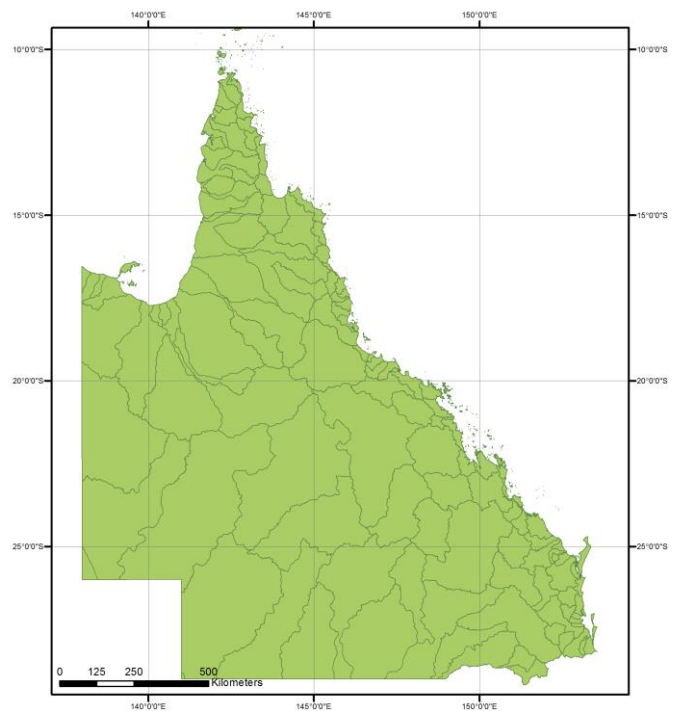
Current extent of Queensland groundwater dependent ecosystem mapping



Ecosystems dependent on the surface expression of groundwater (line features)

Ecosystems dependent on the surface expression of groundwater (area features)

Ecosystems dependent on the sub-surface presence of groundwater (area features)



Ecosystems dependent on the surface expression of groundwater (point features)

Ecosystems dependent on the subterranean presence of groundwater – caves (area features)

Groundwater dependent ecosystem mapping version history

- Version 1.5 – released in March 2017
 - Mapping from version 1.4 with updates to surface expression GDE (line and area features) and terrestrial GDE (area features) to include revised mapping for the eastern Murray-Darling Basin catchments, and updates to version 1.4 surface expression GDE (point features) for the whole of Queensland.
- Version 1.4 – released in December 2015
 - Mapping from version 1.3 with updates to surface expression GDE (line and area features) and terrestrial GDE (area features) to include additional mapping for the Comet, Dawson and Mackenzie catchments, and updates to version 1.0 subterranean GDEs (area features) for the whole of Queensland.
- Version 1.3 – released in July 2015
 - Mapping from version 1.2 with updates to surface expression GDE (line and area features) and terrestrial GDE (area features) to include additional mapping for the Lake Eyre Basin and surrounding catchments, and updates to version 1.1 surface expression GDEs (point features) to include additional mapping for the whole of Queensland.
- Version 1.2 – released in May 2015
 - Mapping from version 1.1 with updates to surface expression GDE (line and area features) and terrestrial GDE (area features) to include additional mapping for South East Queensland.
- Version 1.1 – released in May 2013
 - Mapping from version 1.0 with updates to surface expression GDE (point, line and area features) and terrestrial GDE (area features) to include additional mapping for Pumicestone Passage catchment and Mackay-Whitsunday.
- Version 1.0 – released in October 2012
 - Surface expression GDE (point, line and area features) and terrestrial GDE (area features) for eastern Murray-Darling Basin and Wide Bay-Burnett.
 - Subterranean GDE – caves (area features) for the whole of Queensland.

Citation

Queensland Government (2017) *Groundwater dependent ecosystem mapping background: version 1.5*, Queensland Government, Brisbane.