

Wetland extent monitoring methods

Reef Water Quality Report Card 2023–2025

Reef 2050 Water Quality Improvement Plan



© State of Queensland, 2026.

The Queensland Government supports and encourages the dissemination and exchange of its information. This work is licensed under a Creative Commons Attribution 4.0 International License.



Under this licence you are free, without having to seek our permission, to use this publication in accordance with the licence terms. You must keep intact the copyright notice and attribute the State of Queensland as the source of the publication.

For more information on this licence, visit creativecommons.org/licenses/by/4.0/

The Department of the Environment, Tourism, Science and Innovation acknowledges Aboriginal and Torres Strait Islander peoples as the Traditional Owners and custodians of the land. We recognise their connection to land, sea and community, and pay our respects to Elders past and present.

The department is committed to respecting, protecting and promoting human rights, and our obligations under the Human Rights Act 2019.

Disclaimer

This document has been prepared with all due diligence and care, based on the best available information at the time of publication. The government holds no responsibility for any errors or omissions within this document.

Any decisions made by other parties based on this document are solely the responsibility of those parties. Information contained in this document is from a number of sources and, as such, does not necessarily represent government or departmental policy.

The Queensland Government is committed to providing accessible services to Queenslanders from all culturally and linguistically diverse backgrounds. If you have difficulty in understanding or accessing this document, you can contact us for assistance and we will arrange for this publication to be made available in an alternative format.

Citation

Australian and Queensland governments. 2026. Wetland extent monitoring methods, Reef Water Quality Report Card 2023–2025, State of Queensland, Brisbane.

CONTENTS

- Wetland extent monitoring 4
- Wetland mapping..... 4
 - Regional ecosystem mapping 4
 - Wetland mapping..... 4
- Change in wetland extent reporting 5
- Assessing progress towards the target 6
- Semiquantitative confidence ranking 6
- Glossary 7
- References..... 8

Wetland extent monitoring

This report summarises the data and methods used for reporting progress towards the Reef 2050 Water Quality Improvement Plan 2025 land and catchment management targets. Land and catchment management targets aim to deliver reduction in end-of-catchment loads. The target for wetland extent is as follows (Australian and Queensland Governments 2018):

- No loss of the extent of natural wetlands.

Natural wetlands include lakes, swamps and estuarine wetlands. Catchment management targets aim to increase ground cover and riparian vegetation and to prevent further loss of wetland extent. Healthy wetlands can assist with filtering pollutants from the water in some situations. The condition of Reef wetlands is captured as an objective of improved water quality and is included under the ecosystem health theme in the Reef 2050 Water Quality Improvement Plan.

Wetlands are mapped every four years until 2017 (2001, 2005, 2009, 2013, 2017) and every two years after 2017 (2019, 2021, etc.). Changes in wetland extent are reported for each period (2001-2005, 2005-2009, 2009-2013, 2013-2017, 2017-2019, 2019-2021, etc.). Reporting on changes in wetland extent include comparisons of current wetland extent with pre-clearing extent.

Wetland mapping

Wetland mapping is derived primarily from two main source data sets: Biodiversity of Pre-Clearing and Remnant Regional Ecosystem (regional ecosystem mapping) and wetland waterbodies.

Regional ecosystem mapping

Regional ecosystem mapping consists of: 1) 'pre-clearing mapping derived primarily from 1960s aerial photographs in conjunction with a range of other imagery and information' including geology and soils mapping, historical survey records and field survey; and 2) remnant cover mapping 'derived primarily from Landsat Thematic Mapper (TM) imagery in conjunction with larger scale SPOT imagery and aerial photography' (Neldner et al. 2020). The Landsat TM satellite imagery used is supplied and rectified by the State Land and Tree Study (SLATS) (Neldner et al. 2020). 'Remnant mapping shows the extent of vegetation at the time of the imagery and is updated about every two years' (Neldner et al. 2020). All regional ecosystems are classified in the accompanying Regional Ecosystem Description Database including their wetland system.

Generally, the mapping is validated to a scale of 1:100,000 which includes over 8,000 wetland ground-truthing sites, however coastal areas may be compiled at 1:50,000 scale and specific targeted areas may be compiled at 1:25,000 scale (e.g. some urban areas, property level assessments including Property Map of Assessable Vegetation under the *Vegetation Management Act 1999*).

Regional ecosystem mapping is updated every two years. This process requires:

- processed and supplied satellite imagery from SLATS
- change detection based on an analysis of differences in satellite imagery used to generate the current mapping and more recent satellite imagery processed and supplied by SLATS.

There is usually a one-year turnaround time from the date of satellite image capture and the supply of processed imagery and change detection to the Queensland Herbarium for use in the regional ecosystems mapping update. Improvements in regional ecosystem mapping are backcast over all time periods.

Wetland mapping

Wetland mapping is a multi-step process that can be broadly grouped into four phases (Queensland Department of Environment and Science 2022a). Wetland mapping represents the maximum extent of a

wetland with wetland dynamism (e.g. changes in wetland inundation included as additional attributes on the mapping).

Wetland waterbodies are derived every two to four years based on an analysis of open water as detected from Landsat TM supplied imagery, rectified and transformed by the Remote Sensing Centre. Wetland waterbodies are classified with wetland system and wetland habitat hydrological modification. Wetland habitat hydrological modification distinguishes natural wetlands (those where no activities are observed at the habitat level that alter wetland hydrology) from modified wetlands (e.g. those where bunding, cultivation, cropping, controlled surface hydrology, channel construction, partial draining, excavation or partial infilling activities are observed at the habitat level).

Wetland waterbodies are compiled with wetland regional ecosystem mapping (derived from remnant cover mapping and supplemented with woody vegetation extent data from the Remote Sensing Centre) to map wetland extent. Improvements in wetland mapping are backcast over all time periods.

Change in wetland extent reporting

The Queensland Wetland System and Type Extent Statistics Method: A Method to Provide Baseline Wetland System and Type Extent Trend Statistics for Wetlands in Queensland (Queensland Department of Environment and Science 2022b) is applied to report on changes in wetland extent in the Great Barrier Reef catchment by reporting area and wetland system.

Broadly, wetlands are allocated based on spatial location to a reporting area and their extent is summarised by reporting area, wetland system, and wetland habitat hydrological modification. Wetland extent and changes in wetland extent are reported on for the following wetland systems in the Great Barrier Reef catchment:

- Palustrine wetland systems (e.g. swamps)
- Lacustrine wetland systems (e.g. lakes)
- Intertidal wetland systems that are dominated by mangrove or salt flat.

Riverine wetland systems, subtidal wetland systems, and intertidal wetland systems not dominated by mangrove or salt flat are not included in the analysis.

The extent of natural and slightly modified wetlands and change in extent is reported on for each wetland system by reporting area and region. Improvements in wetland mapping are backcast over all time periods and wetland extent reporting provides revised figures for all time periods. This avoids conflating trends in on-ground change in wetland extent with trends in the comprehensiveness and accuracy of source data capture processes.

Assessing progress towards the target

In the Reef Water Quality Report Card 2023–2025, wetland mapping is used to report on the current extent of wetlands and the change in wetland extent. The change in extent is reported as a percentage of the current extent to enable comparison between catchments of different sizes. The change in extent is also reported for some reporting periods as an average change in extent over two years to enable comparison between reporting periods of different lengths. Results are reported at the Great Barrier Reef-wide, regional, catchment and major sub-catchment scales.

Progress towards the wetland extent target is assessed in line with the definitions outlined below:

Progress	Definition
Target Met	Percentage of loss during the reporting period is less than 0.05% of natural wetlands in the reporting region.
Declining	Percentage of loss during the reporting period is equal to or greater than 0.05% of natural wetlands in the reporting region.

Semiquantitative confidence ranking

Data confidence ●●●●○

A multi-criteria analysis was used to score the confidence in each indicator used in the report card from low to high. The approach combined the use of expert opinion and direct measures of error for program components where available. Wetland extent received a four-dot confidence ranking.

Glossary

Natural wetlands: Wetlands where activities that modify wetland hydrology and/or structures associated with these activities cannot be observed from aerial or satellite imagery and are not known from field survey data.

Modified wetlands: Former natural wetlands where activities that modify wetland hydrology and/or structures associated with these activities have been observed from aerial or satellite imagery or from field survey data.

Slightly modified wetlands: Modified wetlands where the nature of these activities and/or structures are considered to enable the wetland to retain many of their functional and ecological characteristics.

Highly modified wetlands: Modified wetlands where the nature of these activities and/or structures are considered to significantly degrade the wetland's functional and ecological characteristics.

Artificial wetlands: Artificial wetlands refer to anthropogenically constructed wetlands where no natural or modified wetlands existed prior to the commencement of construction.

Wetland extent: Wetland extent refers to the maximum areal extent of the wetland.

Baseline wetland extent: Baseline wetland extent is a relative term referring to the maximum areal extent of the wetland at the start of a given reporting period.

Pre-clearing wetland extent: Pre-clearing wetland extent refers to the maximum areal extent of the wetland prior to clearing (Nelder et al. 2020).

Historical loss: Estimated difference between pre-clearing wetland extent and 2001 wetland extent. As wetland mapping does not have a pre-clearing baseline, historical loss is estimated from an analysis of Regional Ecosystem mapping.

Reporting period: Reporting period refers to the time over which changes in wetland extent are calculated. Generally, reporting periods parallel the temporal resolution of available wetland extent time-series data. Wetland mapping reporting periods will be four years in length from 2001-2017 and every two years thereafter.

Palustrine wetland system: Palustrine wetland system 'includes all nontidal wetlands dominated by trees, shrubs, persistent emergent, emergent mosses or lichens, and all such wetlands that occur in tidal areas where salinity due to ocean-derived salts is below 0.5‰. It also includes wetlands lacking such vegetation, but with all the following three characteristics: (1) where active waves are formed or bedrock features are lacking; (2) where the water depth in the deepest part of basin less than 2m at low water; and (3) the salinity due to ocean-derived salts is still less than 0.5‰.' (Queensland Department of Environment and Science 2022b).

Lacustrine wetland system: Lacustrine wetland system 'includes wetlands and deepwater habitats with all of the following characteristics: (1) situated in a topographic depression or a dammed river channel; (2) lacking trees, shrubs, persistent emergents, emergent mosses or lichens with greater than 30% areal coverage; and (3) total area exceeds 8ha...Similar wetland and deepwater habitats totalling less than 8ha are also included in the Lacustrine System if an active wave-formed or bedrock shoreline feature makes up all or part of the boundary, or if the water depth in the deepest part of the basin exceeds 2m...at low water. Lacustrine waters may be tidal or nontidal, but ocean-derived salinity is always less than 0.5‰.' (Queensland Department of Environment and Science 2022b).

Intertidal wetland system: Intertidal wetlands consist of estuarine and/or marine systems located 'between the level of high tide and low tide.' (Queensland Department of Environment and Science 2022b).

SLATS: Statewide Landcover and Trees Study.

References

Australian Government and Queensland Government 2018, Reef 2050 Water Quality Improvement Plan, Queensland Government, Brisbane.

Queensland Department of Environment and Science 2022a, Queensland Wetland Mapping Method: A Method to Provide Baseline Mapping of Wetland Extent Change in Queensland. Version 2.0. Queensland Department of Environment and Science, Brisbane.

Queensland Department of Environment and Science 2022b, Queensland Wetland Definition Guideline. Version 2.0. Queensland Department of Environment and Science, Brisbane.

Neldner, V.J., Wilson, B.A., Dillewaard H.A., Ryan, T.S., Butler, D. W., McDonald, W.J.F., Addicott, E.P. and Appelman, C.N. 2020, Methodology for Survey and Mapping of Regional Ecosystems and Vegetation Communities in Queensland. Version 5.1. Queensland Herbarium, Queensland Department of Environment and Science, Brisbane.