Australian Government

Queensland Government

Frequently asked questions

Reef Water Quality Report Card 2019

Reef 2050 Water Quality Improvement Plan

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1. What are the key highlights in Report Card 2019?

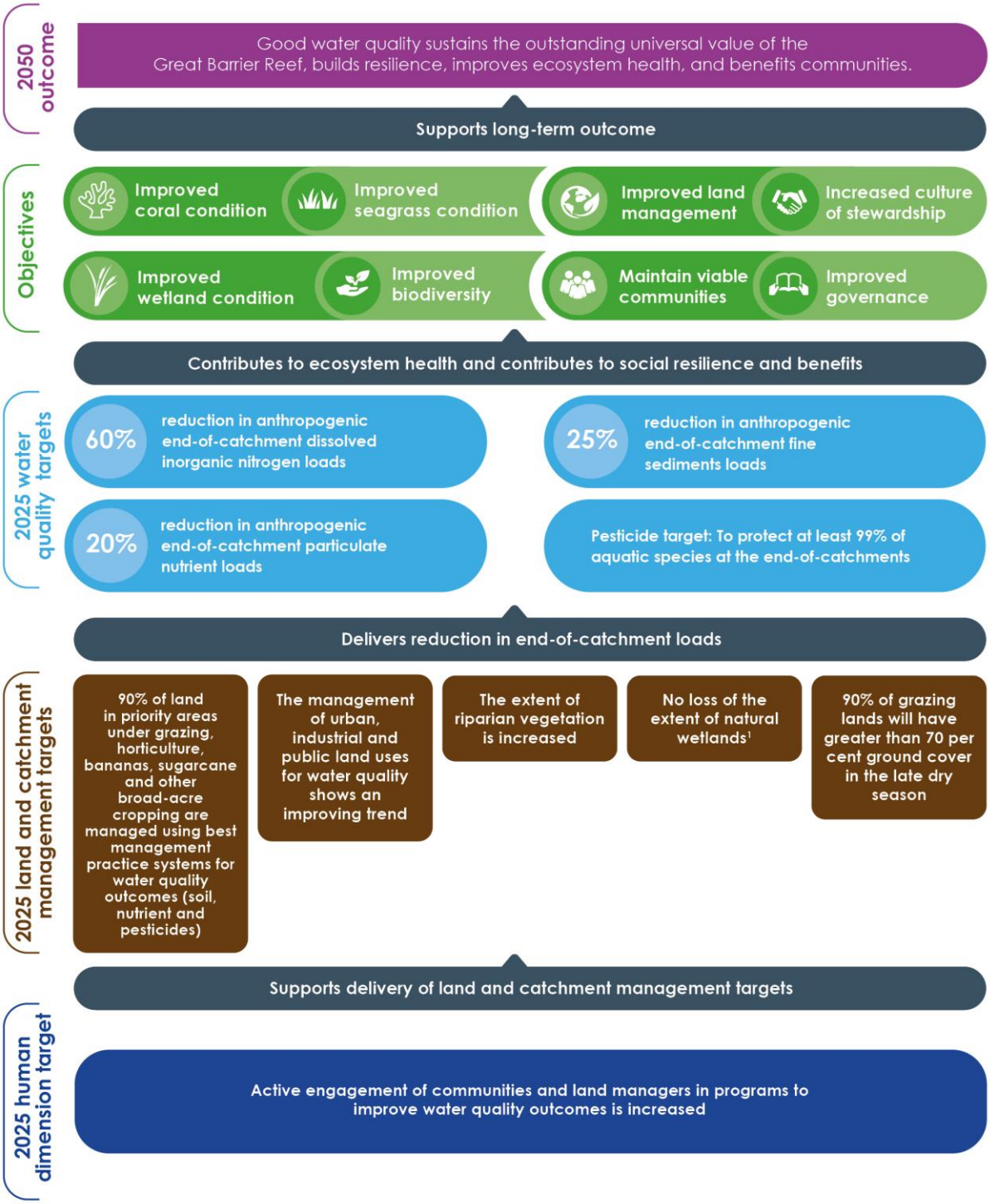
- Modelling showed there was **very good progress** towards the **dissolved inorganic nitrogen target** across the Great Barrier Reef catchment with an **annual reduction of 4.3%**. The **greatest reductions** were in the **Wet Tropics** (**7.4%**) and **Burdekin** (**4.5%**) **regions**. The **Herbert catchment** (Wet Tropics region) had the **greatest annual reduction** (**9.4%**).
- There was **good progress** in **reducing fine sediment loads** in the **Mary catchment** (Burnett Mary region), with a **1.3%** modelled annual **reduction** due to targeted investment in fencing to exclude cattle from waterways.
- **The Burdekin** and **Wet Tropics** regions recorded the **largest increase** in best practice **nutrient management** for **sugarcane, up 6.3% and 6.1%** respectively. Improved nutrient management was delivered through the Queensland Government Nitrogen Project and the Australian Government Reef Trust: Reef Alliance Growing a Great Barrier Reef project.
- The **Kolan catchment** (Burnett Mary region) **met the pesticide target** (to protect at least 99% of aquatic species) in 2018-2019. The **Pioneer catchment** (Mackay Whitsunday region) recorded the **greatest improvement (up 4.5%)** with 80.5% of aquatic species protected from the harmful effects from pesticides.
- The proportion of grazing land across the Great Barrier Reef catchments with adequate **ground cover** to reduce erosion was **58%**, **below** the **target** of 90% with many areas continuing to be **drought declared**.
- **Overall inshore marine condition** remained **poor** in 2018-2019, with coral and seagrass in poor condition and water quality rated moderate. The Wet Tropics and Burnett Mary regions were in moderate condition overall and the Cape York, Burdekin, Mackay Whitsunday and Fitzroy regions were in poor condition overall.

2. What are the Reef 2050 Water Quality Improvement Plan targets?

The Reef 2050 Water Quality Improvement Plan 2017-2022 seeks to improve the quality of water flowing from the catchments adjacent to the Great Barrier Reef. The plan builds on previous water quality plans by setting separate targets for reducing water pollution from each catchment to enable better prioritisation of actions.

Water quality targets define the required reductions in sediment and nutrient loads by 2025 for the catchments discharging to the Reef. The pesticide target defines the required protection level for aquatic ecosystems.

The 2025 targets are:



Best management practices are defined by this Reef 2050 Water Quality Improvement Plan's water quality risk frameworks priority areas as defined in Appendix 3

[1] Natural wetlands include lakes, swamps and estuarine wetlands.

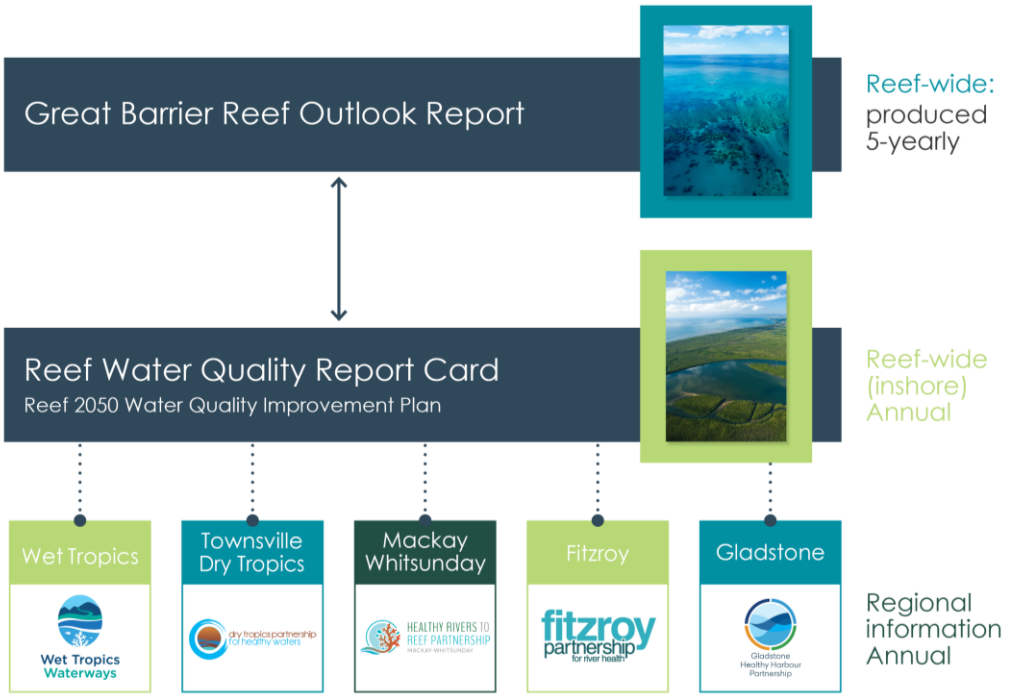
For more information, see the Targets page.

3. How does the Reef Water Quality Report Card relate to other reporting programs?

There are a range of monitoring and reporting programs for the Great Barrier Reef including:

- The Reef water quality report card summarises progress towards the Reef 2050 Water Quality Improvement Plan land management practice, catchment indicator and water quality targets, as well as inshore marine and wetland condition objectives. It is produced through the Paddock to Reef Integrated Monitoring, Modelling and Reporting Program.
- Regional report cards build on the underpinning science of the Reef water quality report card, including some of the marine monitoring and modelling information, and add local data from local governments, ports, industry and other partners.
- Coral reef information in the Reef water quality report card focuses on the health of inshore reefs collected through the Great Barrier Reef Marine Monitoring Program, a collaboration between the Great Barrier Reef Marine Park Authority and the Australian Institute of Marine Science. Data collected from inshore reefs complements over 30 years of data from the Long-term Monitoring Program which surveys an additional 47 mid-shelf and offshore reefs across the Great Barrier Reef region – the longest continuous record of change in Reef communities over such a large geographic area.
- The Great Barrier Reef Outlook Report 2019 examines the overall condition of the Reef's health, pressures, and likely future. This report also considers factors which influence the health of the Reef, but which occur outside the Reef, such as climate change and land use practices. The Outlook Report and the Reef water quality report card have different grading scales and operate over different spatial areas and time scales. The Outlook Report provides a summary every five years (the most recent report covers 2014 to 2019), whereas the Reef water quality report card provides a one-to-two year summary of catchment management progress, water quality and inshore marine health.
- The Reef 2050 Integrated Monitoring and Reporting Program is a coordinated and integrated monitoring, modelling and reporting program for the Reef and its adjacent catchment, and will help track the progress towards targets and objectives of the Reef 2050 Long-Term Sustainability Plan.

For more information, see the Report card explainer.



4. What period does the Reef Water Quality Report Card 2019 cover?

The Reef Water Quality Report Card 2019 assesses the results of Reef 2050 Water Quality Improvement Plan actions reported up to June 2019.

5. Have the results been independently reviewed?

The Independent Science Panel reviews and provides scientific advice on key elements of the Paddock to Reef program including the program design and major outputs such as the Reef water quality report cards.

In addition, each part of the program undergoes additional peer and external review processes. For example, the Source Catchments modelling framework has been reviewed extensively with international independent reviewers finding the modelling approach is best practice and highly innovative.

6. Why are confidence ratings used, and how are they determined?

A semi-quantitative, multi-criteria analysis approach is used to measure confidence for each key indicator in the report card. This is needed due to the range and variability of reporting data sets that underpin the results. Having a single, consistent multi-criteria framework enables comparison across reporting themes. The assessment considers the maturity of the methodology, level of validation, representativeness of the data, directness of the indicator and measured error.

The Independent Science Panel reviews the method and confidence scoring for each report card.

7. Why is progress towards achieving the land management targets slow?

The Reef Water Quality Report Card 2019 assesses the results of Reef 2050 Water Quality Improvement Plan actions reported up to June 2019.

Many landholders have improved their land management practices, but the results reflect the large scale of change still required to meet the ambitious targets. The Australian and Queensland governments are investing $667 million to deliver actions in the Reef 2050 Water Quality Improvement Plan through to 2022 to ramp up this progress.

There are also some significant challenges to address such as extensive gullies which have eroded over many years. Increased resources and new approaches are being trialled to more effectively address the required landscape scale changes in the future.

Results are considered a conservative estimate of progress as not all land management activities undertaken during the reporting period have been reported to the Paddock to Reef program. Significant time is needed to engage land managers and detailed project planning must be undertaken before management practices and water quality can improve.

Over coming years, results from existing and additional programs will be reported including further investments through the Australian Government's Reef Trust and the Reef Trust - Great Barrier Reef Foundation Partnership, the Queensland Government's Reef Water Quality Program and Natural Resources Investment Program.

These report card results will help guide policy approaches and prioritise investment in future water quality projects. New prioritisation tools will help improve the cost effectiveness of investments and drive further progress towards the targets.

8. Why is the focus on farmers and graziers?

Everyone, not just farmers, needs to play their part in improving water quality. While it is important that all industries minimise run-off to the Reef, the largest contribution to nutrient, sediment and pesticide run-off is broad scale agriculture.

Urban and other land uses, including mining and industrial, contribute less than 1% to the fine sediments discharged onto the Reef. Urban areas contribute 9% of the anthropogenic dissolved inorganic nitrogen load, and may be important at local scales. (2017 Scientific Consensus Statement).

The Reef 2050 Water Quality Improvement Plan addresses all land-based sources of water pollution including run-off from urban, industrial and public lands. It also recognises the importance of people in creating change.

Partnerships across all sectors at all levels continue to be key to making progress towards the water quality targets. This includes governments working together with agriculture, industry, urban development and construction, conservation, community and natural resource management stakeholders to improve the quality of water flowing from the catchment to the Reef.

A new urban stewardship framework is currently being developed to assess and report on the level of urban water stewardship in Reef catchments to demonstrate the degree to which urban water managers are contributing to improving water quality. It is expected that this new reporting will be incorporated into the report card in future years.

9. How is marine water quality assessed?

Given the size of the Great Barrier Reef and the dynamic and changing nature of conditions the Reef experiences (such as weather, water movement and river discharges), it is impossible to rely solely on in-water monitoring data to confidently assess marine water quality over entire zones or regions. Marine water quality scores are estimated using the eReefs model which integrates multiple lines of evidence including satellite imagery. The eReefs model accounts for weather conditions, water movement, freshwater river discharges and pollutant loads to provide daily estimates of water quality across the Great Barrier Reef and through the water column.

10. Why do we model water quality?

To confidently measure water quality in the Great Barrier Reef (without the use of models), we would need sufficient monitoring to assess changing conditions over a long time and across a large area. Using remote sensing (satellite imagery) helps to overcome this problem. However, there are issues when cloud cover prevents assessment of the marine waters and turbidity hinders independent measures of sediment and nutrients. This happens frequently during the wet season when most of the discharge from rivers occurs.

eReefs model results are validated by comparing them against monitoring data in specific locations to determine how well the model is predicting the conditions occurring in the Great Barrier Reef lagoon. The validation results are available in a comprehensive report.

11. What impact has coral bleaching had on the Reef?

Sea surface temperatures were above-average over the summer months of 2018-2019 (Bureau of Meteorology 2020) but were not warm enough to cause severe bleaching and mortality at monitored inshore coral sites.

Consecutive marine heatwaves in the summers of 2016 and 2017 resulted in back-to-back mass coral bleaching events and widespread mortality of corals in shallower reef habitats. The ecosystem continues to show evidence of damage from previous cyclones and these mass bleaching events.

For the monitoring period (2005 to 2019), coral bleaching accounts for around 13 per cent of the impacts to inshore reefs (although it is highly variable between species, reefs and across years).

The condition and recovery of Great Barrier Reef coral is heavily dependent on windows of no severe disturbances such as cyclones and bleaching.

Other reports, such as the *Reef snapshot: summer 2019-20*, reported severe bleaching of some inshore reefs. The snapshot uses more recent data than the Report Card 2019 and monitors different reefs.

Further information on marine condition and trends is on the Great Barrier Reef Marine Park Authority's website.

12. Why is there no coral data reported in some areas, such as Cape York and Burnett Mary?

The Great Barrier Reef Marine Monitoring Program provides the inshore marine assessment for the report cards. The program does not assess inshore corals in the Cape York or Burnett Mary regions.

13. Why is inshore marine condition poor?

The Reef is under pressure from multiple threats that are cumulative and increasing. Poor marine condition reflects the complex interaction between ecological processes and a range of pressures, including above average sea temperatures, rainfall, river flow, pollutant run-off, extreme weather events, coral-eating crown-of-thorns starfish predation and coral disease that can all affect the Reef.

14. Why is seagrass condition still poor?

Inshore seagrass remained poor for the seventh consecutive year. The decline in inshore seagrass condition in 2018-2019 is due to a combination of exposure to brown and green waters which reduce light required for growth, the legacy of severe weather events in past years, coupled with elevated temperatures (McKenzie et al. 2020).

In particular, in the Burdekin region, the February 2019 flood affected seagrass meadow abundance and extent, with large declines in seagrass at five of the six monitoring sites.

The poor result reflects combined monitoring data from all six regions and for three indicators: abundance, reproductive output and tissue nutrients. There is variability at different seagrass meadows, sites and regions.

Some seagrass meadows at locations that were relatively free from disturbances in recent years showed signs of recovery and had a stable or improving trend.

Refer to the Marine Monitoring Program publications for more information on the condition and trend of seagrass and seagrass meadows.

15. What is the Paddock to Reef program?

The Paddock to Reef Integrated Monitoring, Modelling and Reporting Program (Paddock to Reef program) provides the framework for evaluating and reporting progress towards the Reef 2050 Water Quality Improvement Plan targets and objectives through the report card.

Monitoring and modelling of water quality occurs across a range of attributes, from paddock scale through to sub-catchment, catchment, regional and Great Barrier Reef-wide.

The Paddock to Reef program evaluates management practice adoption and effectiveness, catchment condition, pollutant runoff and inshore marine condition. The program areas are inter-linked and integrated through a common assessment and reporting framework. For more information, visit Paddock to Reef.

16. Why do we use modelling, not just monitoring?

Monitoring shows pollutant loads leaving catchments vary significantly from year to year, mainly due to differences in annual rainfall and run-off. Therefore, modelling is used to estimate the long-term annual pollutant load reductions due to the adoption of improved land management practices. This removes the impact of factors such as climate variability and allows us to determine the expected benefits of improved land management now rather than monitoring for decades to see a trend.

Research suggests that time lags to see improvements from land management practice change in monitoring data could range from years for pesticides up to decades for nutrients and sediments. This is due to factors such as the high degree of variability in rainfall year to year. The models use measured changes in land management and well-documented and accepted methods and assumptions. Long-term water quality monitoring data is used to validate and improve the models, continuously improving confidence in the estimates of water quality over time.

17. How is land management practice adoption assessed and why do results look worse compared to water quality improvements in some areas?

The Paddock to Reef program management practice component monitors the adoption of a range of farm management practices. Land management practice adoption benchmarks describe a starting point for agricultural management. These benchmarks are reviewed every five years and this report card details progress from the 2016 benchmark based on reported improvements in land management practices.

Progress towards the water quality targets is modelled based on reported changes in land management practice adoption. Reductions in the loads of pollutants at the end of catchment are a reflection of this change.

Management practice adoption results are based on cumulative progress towards the Reef 2050 Water Quality Improvement Plan land management targets. Water quality results are based on the minimum annual reductions required to achieve the water quality Improvement targets.

The Reef 2050 Water Quality Improvement Plan land management targets specifically identify and monitor the adoption of best management practice systems for water quality outcomes (soil, nutrient and pesticides). These are the agricultural practices identified as having the lowest risk to water quality. Landholders moving from high risk to moderate risk land management practices also deliver significant water quality improvements but these changes are not captured in the uptake of best management (lowest risk) practice. Therefore, it is possible to see water quality improvements resulting from shifts out of high risk to moderate risk practices without seeing equivalent increases in the uptake of best management practices.

18. How is progress towards the loads reductions targets assessed?

Catchment modelling estimates average annual loads of key pollutants for each of the 35 catchments draining to the Great Barrier Reef. It reports on reductions from the anthropogenic baseline load each year based on the adoption of improved land management practices.

Catchment load reduction targets to 2025 are set for the whole of the Great Barrier Reef, the six regions and 35 catchments. Progress towards the targets is reported as the reduction since the last report card as well as the overall cumulative reduction to date.

Scores are based on the minimum annual reductions required to achieve the 2025 target (the required reduction divided by the number of years remaining). The scoring assesses if the annual reductions are on track to achieve the targets.

$$Annual\ progress\ required = \frac{2025\ target - 2016\ cummulative\ reductions}{time\ from\ 2016\ to\ achieve\ target\ (9\ years)}$$

19. Why are 'best practices' in the report card different to those in the industry-led best management practice (BMP) programs?

Progress towards the Reef 2050 Water Quality Improvement Plan management practice adoption target is reported using industry specific management practice frameworks (water quality risk frameworks).

For sugarcane, horticulture and grains, practices are ranked from low risk (for innovative practices that pose the lowest water quality risk) to high risk (superseded practices that have the highest water quality risk). For grazing, they are ranked from very low soil erosion and water quality risk to moderate-to-high soil erosion and water quality risk. The frameworks allocate a percentage weighting to each practice, depending on its relative potential influence on off-farm water quality. They are based on evidence and backed by research.

Industry BMP programs support individual landholders in assessing their own management and comparing it with commonly accepted industry standards. Under the industry BMPs, most practices that are described as 'at industry standard' align with moderate risk in the Reef 2050 Water Quality Improvement Plan risk framework. Practices that are 'above industry standard' generally align with the moderate–low or lowest risk in the framework. Over time, it is expected that the framework's best practices will become industry standard.

Water Quality Risk Framework

Lowest risk	Moderate-low risk	Moderate risk	High risk
Innovative	Best Practice	Minimum	Superseded

Industry BMP programs (generalised)

Above Industry Standard	Industry Standard	Below Industry Standard

20. What industry Best Management Practice (BMP) data is used in the report card?

Practice change programs and projects report data at a farm level, de-identified to protect grower privacy, which is then used in modelling.

To date, industry BMP programs have supplied limited data to indicate the adoption of improved farm management practices (progress toward adoption targets) for consideration in the Reef water quality report card.

Industry BMP data was used to help develop the farm management practice adoption benchmarks which estimate the existing extent of adoption of key practices.

21. What is the impact of drought on ground cover reporting?

Ground cover reporting is an objective measure of the level of cover in the dry season derived from analysis of satellite imagery.

Across regions and catchments, ground cover varies due to localised rainfall, land management and landscape type. Annual rainfall data is included to show where there has been above or below average rainfall.

Climatic cycles of droughts and rains associated with El Nino and La Nina, and other longer-term climate phenomena, can have a pronounced effect on the level of cover. During drought conditions, ground cover levels will vary from long-term averages with the recent drought resulting in low ground cover levels across the Great Barrier Reef catchment.

For areas in extended drought, ground cover levels are likely to decline, however there may be a lag effect. Similarly, it may take time for ground cover levels to increase and become stable after the onset of above-average rainfall. Recovery can also be further delayed if the land is already degraded due to poor land management.

Maintaining ground cover during drier periods is important to protect the landscape from degradation when rain does eventually come. High intensity rainfall when droughts break can often present the greatest risk of soil erosion and increased sediment entering waterways.

22. How is riparian extent measured and why are the results unchanged?

Changes in riparian vegetation extent are assessed every four years. Results were last updated in Report Card 2017 and 2018 for the reporting period 2013 to 2017 and are due to be updated again in 2021-2022.

The riparian area is defined as any area within 50 metres of a (mapped) stream or riverine wetland which is compatible with 'Category R' riparian vegetation, defined in Queensland's vegetation management framework. The riparian vegetation reporting is separated into two components, riparian forest and riparian ground cover. Data derived from satellite imagery is used to estimate the amount of riparian forest cover and ground cover. Clearing of riparian forest is then measured using data from the Statewide Landcover and Trees Study for the period of reporting (i.e. the most current is 2013 to 2017).

Vegetation management laws passed by the Queensland Government in 2018 regulate clearing to conserve remnant vegetation, minimise land degradation, maintain ecological processes and prevent the loss of biodiversity. This includes the regulation of clearing vegetation within 50 metres of an identified regrowth watercourse in all Great Barrier Reef catchments. For further information refer to https://www.qld.gov.au/environment/land/management/vegetation

23. What does pesticide risk measure?

Pesticide risk is the estimated average per cent of aquatic species that are protected from the direct impacts of the mixtures of pesticides in a waterway and, therefore, should not experience adverse effects from pesticides. Generally, as pesticide concentrations increase, the percentage of species protected will decrease and the effects on organisms will worsen. For example, if the pesticide risk is 95%, this means 95% of aquatic species in an ecosystem should be protected. It also means 5% are expected to experience some effects such as reduced growth, reproduction or population. In order for the pesticide target (99%) to be met, pesticide concentrations need to be reduced to ensure an additional 4% of species are protected.

Pesticide risk is based on an estimate of the percentage of species that should be protected from the harmful effects of up to 22 pesticides commonly detected in catchments during the wet season, but only at those locations where water is sampled. For more detail see (https://www.reefplan.qld.gov.au/tracking-progress/reef-report-card/methods-to-create-report-card).

24. How do we measure and report pesticide risk?

The 2019 pesticide condition results are calculated using monitoring data. Results from the end-of-catchment monitoring are scaled up to represent the risk at the whole-of-catchment, regional and Great Barrier Reef scales. Pesticide risk can vary as you move up the catchment, particularly as you get closer to the source of pesticides. Pesticide monitoring results are reported through an interactive story map.

As the 2019 pesticide condition is based on monitoring data, it is important not to view changes from a single year of results as a trend that can be explained by changes in land management. Trends will only be perceptible if the change is observed over several years.

25. How is wetland extent measured and why are results unchanged?

Changes in wetland extent are reported every four years based on updated mapping. Results were updated in Report Card 2017 and 2018 to include the 2013-2017 reporting period and are due to be updated again in 2021-2022.

The results detail the loss of natural and modified wetlands for all four-year reporting periods as a percentage of change in the wetland extent in relation to the start of the reporting period.

26. How is wetland condition reported and why are results unchanged?

Changes in wetland condition occur more slowly over time compared to other indicators so are assessed approximately every two years. Results were updated in Report Card 2017 and 2018 for the reporting period 2016 to 2018.

The Great Barrier Reef Wetland Monitoring Program tracks trends in pressures on wetlands and the state of wetland environmental values.

A random sample of wetlands were monitored using multiple indicators to assess both pressure and state. The change in condition was calculated by comparing results against the baseline.

The intent is for wetland condition to be reported at the regional scale in future report cards where there are sufficient monitoring sites.

27. What are the standout results?

Sugarcane

Programs contributing to improved sugarcane results include the Smartcane Best Management Practice program, Queensland Government’s Reef Extension program, Australian Government's Reef Trust: Reef Alliance Growing a Great Barrier Reef project, Australian Government's Reef Trust: Project Catalyst Revamp project, Australian Government's Reef Trust: Reverse tender project, Queensland Government’s Reef compliance program, Queensland Government's Burdekin Nutrient Management Project, Queensland Government's Delivering tailored solutions to Mackay Whitsunday sugarcane growers project, Australian Government's Reef Trust: Mackay Whitsunday Isaac Sustainable Agriculture - sugarcane project, Queensland Government’s Protecting our Chemicals and Cane to Creek projects.

Nutrient management

The Wet Tropics region recorded significant increases in the area of sugarcane land managed using best practice for nutrient management since 2018. This included an increase of 16.2% in the Tully catchment, 13.7% in the Murray, 4.8% in the Mulgrave-Russell and 4.4% in the Johnstone.

The Burdekin region also recorded increases including 6.4% in the Burdekin catchment and 6.1% in the Haughton.

The Proserpine catchment in the Mackay Whitsunday region recorded an increase of 8.6%.

All improvements were due to an increase in the area using best practice for managing nitrogen surplus.

Sediment management

The Wet Tropics region recorded significant increases in the area of sugarcane land managed using best practice for soil management since 2018. This included an increase of 17.7% in the Daintree catchment, 15.5% in the Mossman, 11.9% in the Murray, 7.5% in the Johnstone and 6.2% in the Herbert.

This was mostly due to using best practice for fallow management such as planting legumes and reducing tillage operations prior to planting. An increase in controlled traffic farming in the Johnstone, Murray and Herbert catchments also contributed to the results.

There was also an increase of 5.2% in the area managed using best practice for soil management since 2018 in the Proserpine catchment (Mackay Whitsunday region). This was due to using best practice for fallow management.

Pesticide management

The Wet Tropics region recorded significant increases in the area of sugarcane land managed using best practice for pesticide management since 2018. This included an increase of 22% in the Mossman catchment, 13.2% in the Daintree, 7.8% in the Tully and 5.3% in the Johnstone.

This was mostly due to an increase in best practice pesticide management including avoiding residual pesticides and only using them in problem situations or sites. It was also due to residual pesticides being applied using banded spraying in the Mossman, Johnstone and Tully catchments.

Grains

There was a 1.5% increase in grain farming land managed using best management systems since 2018 in both the Burdekin and Fitzroy regions, with the main improvements being for soil management in the Burdekin and nutrient management in the Fitzroy.

Sediment management

There was a 4.4% improvement in best practice sediment management since 2018 in the Burdekin catchment and a 2% increase in the Fitzroy catchment. This was driven by an increase in contour banks and the repair and or redesign of inefficient streambanks, mostly through the Australian Government's Reef Trust: Reef Alliance Growing a Great Barrier Reef project.

Nutrient management

There was a 1.4% improvement in best practice nutrient management since 2018 in the Fitzroy catchment. This was a result of managing nitrogen surplus, mostly through the Australian Government's Reef Trust: Reef Alliance Growing a Great Barrier Reef project.

Grazing

There was an increase of 154,653ha (1.1%) in the area managed using best practice for pasture management since 2018 in the Burdekin catchment and an increase of 108,846ha (0.7%) in the Fitzroy catchment. This was due to an increase in better matching stocking rates to carrying capacity.

The Queensland Government’s Reef Extension program and Australian Government's Reef Trust: Reef Alliance Growing a Great Barrier Reef projects contributed to these results.

Bananas

There was an increase of 4.5% in the area of banana land managed using best practice for nutrient management since 2018 in the Johnstone catchment This was due to an increase in managing nitrogen surplus through the Australian Government's Reef Trust: Reef Alliance Growing a Great Barrier Reef project.