HEALTHY WATERS
PARTNERSHIP
dry tropics

Townsville Dry Tropics
Waterways Report Card

KEY INSIGHTS

from the 2024 Technical Report

Reporting on the most recent monitoring data,
collected July 2022 to June 2023.

Healthy Waters Partnership for the Dry Tropics

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1. Overview and Introduction

The Healthy Waters Partnership for the Dry Tropics is one of five regional bodies formed to report on waterway and reef ecosystem health in the areas of Queensland adjacent to and including the Great Barrier Reef. The Partnership is an independent collaboration of more than 20 government, industry, science, research, and community partners.

About the Townsville Dry Tropics Waterways Report Card

Each year, the Healthy Waters Partnership gathers and evaluates environmental data sourced from the most reliable and comprehensive sources in our region. The resulting Waterways Report Card presents an overview of the most recent condition of local waterway environments, based on monitoring data from the previous year. In 2024 the report is based on data collected from July 2022 to June 2023.

Report Card results are reviewed by two independent technical and science panels before being published for free public access and used by decision-makers and community. Details of the Report Card methodology can be found in the *Methods for Townsville Dry Tropics 2022–2023 Report Card (released 2024)*.

Sources of data

The annual Waterways Report Card relies on data from the following sources: Townsville City Council, Port of Townsville Limited, Australian Institute of Marine Science (AIMS), Department of Environment, Science, and Innovation (DESI), Queensland Herbarium, Great Barrier Reef Catchment Loads Monitoring Program (GBR-CLMP), James Cook University (TropWATER), Ornatas, Tangaroa Blue Foundation, ReefCheck Australia, the Bureau of Meteorology (BOM), the National Oceanic and Atmospheric Administration (NOAA), and the Queensland Spatial Catalogue.

2. Key Insights: Climate & Land Use

Climate conditions are critically linked to the dynamics of our waterways and catchments. In the reporting year 2022 to 2023 the Townsville region saw no major flooding or cyclone events, but climate conditions were far from uneventful.

Rainfall

Rainfall in both the Black and Ross Basins came in notable peaks and troughs, 'very much above the monthly average' in July, October, and November of 2022, and 'very much below the monthly average' in May and June 2023, cumulating in an 'average' annual total.

Why rainfall matters

Heavy rainfall can flush sediment, nutrients, and litter through our catchments, having an impact on whole ecosystems. At the same time, months with less rain tend to see our Dry Tropics soils dry out and vegetation become sparser – making sediment runoff into waterways more likely when rain returns.

Air temperature

Annual average air temperature was 24.8°C in the Ross Basin, exceeding the basin's long-term annual mean by 0.8° C. The Black Basin's average was 24.2°C, exceeding its mean by 1.1°C. For five months, both Ross and Black Basins recorded temperatures in the highest 1% of the long-term monthly mean for that month. The year's reporting shows there was little reprieve from warm air temperatures across our region.

Why temperatures matter

Warm air temperatures can affect our water systems in many ways. As temperatures increase, less oxygen can dissolve in water, reducing its availability for fish and plants. Warmer air also promotes the excessive growth of weeds and algae in our freshwater systems, further reducing dissolved oxygen. In marine environments, coral and seagrass are particularly sensitive to unrelenting heat, with coral further subject to competition for space from macroalgae.

Sea surface temperatures

Sea surface temperatures in our reporting region were 'average' or 'above average' for every month. Temperatures were higher offshore than inshore, a reverse from the previous year, possibly related to high levels of rainfall cooling coastal areas. Sustained sea surface temperatures can impact the health and resilience of coral and seagrass.

Land use

The three most significant land use types in both the Ross and Black Basins are 'grazing', 'conservation', and 'urban/intensive', as defined by the Australian Land Use and Management (ALUM) Classification.

In total, 'urban/intensive' land use — towns, residences, developments, and intensive industries — is the third largest land use type in our reporting region:

Grazing area: 1252.00 km^2
Conservation area: 1030.77 km^2
Urban/intensive area: 285.70 km^2

3. Key Insights: Water Quality

The Ross and Black are Townsville's two basins, and water quality is monitored in both their freshwater (upstream) and estuarine (downstream) environments.

Water quality in the Ross Basin receives 'good' grades but is declining

In the 2024 Report Card the Ross Basin receives an overall grade of 'good' for water quality in both its freshwater and estuarine environments. This represents a decline from 'very good' to 'good' in the estuarine environment due to increased levels of nutrients.

Monitoring also shows there are more nutrients in the Ross Basin freshwater environment than found in previous years, particularly in the Bohle River sub-basin.

Bohle sub-basin receives 'poor' water quality grades

For the fifth Report Card in a row, elevated levels of nutrients have been found in the Bohle River freshwater sub-basin.

The grade for total phosphorus in this sub-basin remains 'very poor' and the grade for nitrogen has declined from 'poor' to 'very poor'.

In the Bohle River's estuarine environment, Louisa Creek receives notable water quality grades: a 'moderate' for physical-chemical properties — which measure turbidity and dissolved oxygen — and a 'poor' for overall nutrients, comprising of a 'very poor' for total phosphorus.

Despite only covering about 10% of Townsville's Local Government Area, almost 50% of our population is packed into this sub-basin. This means half of our town is gardening, driving, building, planting, and operating in the Bohle. It bears a significant urban load.

The data behind the Report Card does not identify specific sources of the nutrient pollution, but the Partnership suggests cumulative factors are having an impact. Declining water quality in the Bohle does require investigation.

Why nutrient levels matter:

Balanced levels of nutrients such as nitrogen and phosphorus in waterways are crucial for maintaining ecosystem health. Excessive levels of nutrients, often stemming from agricultural runoff, wastewater discharge, or urban stormwater, can lead to algal blooms, depleting oxygen levels and suffocation of aquatic organisms. Conversely, insufficient nutrient levels can impede the growth of essential organisms within the food web, leading to imbalances and potential collapse of the ecosystem.

Black Basin grades remain 'good' for water quality, with some exceptions

For the fifth year in a row, both freshwater and estuarine environments of the Black Basin retain their overall 'good' grades for water quality, with no significant changes seen in nutrient levels or physical-chemical properties at a basin level.

However, there are exceptions in some freshwater creeks. Althaus Creek and Sleeper Log Creek both receive 'very poor' grades for turbidity. Althaus Creek shows ongoing issues with total phosphorus, and Ollera Creek receives a 'very poor' for low dissolved oxygen.

In the Black's estuarine environment, Crystal Creek showed improvements in turbidity. Rollingstone Creek receives a 'poor' grade for dissolved inorganic nitrogen — the continuation of a trend seen in previous reports.

Further investigation would be required to identify possible causes for these specific grades within the Black Basin.

Why turbidity matters:

'Turbidity' measures suspended particles in waterways, such as sediments (clays and silts), organic matter, and microorganisms, and can affect the way sunlight penetrates water. High turbidity can interfere with the photosynthesis of algae and aquatic plants and can interrupt fish reproduction and migration by smothering spawning beds or affecting water temperature.

In the Dry Tropics, our fine-particle dry soils are a common driver of turbidity in stormwater runoff; especially where there is a lack of established vegetation in the riparian areas along our creeks and rivers.

Pesticides data included in Technical Report for first time

For the first time, pesticides data has been included in the Townsville Dry Tropics Technical Report, albeit at a limited number of sites. The two monitored sites — in the Ross River and Black River — receive 'very low risk' grades for pesticide risk levels, meaning that at least 99% of waterway species are not at risk from pesticide toxicity at those sites. Although grades indicate that there is 'very low risk', it is notable that traces of several pesticides were found in these waterways.

4. Key Insights: Habitat

Waterway habitat is graded in the Report Card by measuring changes to the extent of vegetation types along our waterways over the previous two reporting years. Types of vegetation measured are riparian vegetation, wetland vegetation, mangroves, and saltmarsh.

Areas of riparian vegetation remain stable in the Ross Basin in both the freshwater (upstream) and estuarine (downstream) environments but have decreased notably in the Black Basin estuarine environment.

This year's Report shows that riparian extent has remained 'moderate' in the Ross freshwater environment and 'good' in the Ross estuarine environment.

The Black Basin however, while recording a slight increase of riparian vegetation in the freshwater environment, saw grades fall from 'good' to 'very poor' in its estuarine environment. This was due to a decrease in riparian vegetation extent.

In the Black Basin estuarine (downstream) environment, the opposite is true for mangrove and saltmarsh extent.

In the estuarine environment, the Black Basin recorded its first increase in mangrove and saltmarsh vegetation, whereas mangrove and saltmarsh in the Ross Basin decreased.

Why river habitat matters:

Waterway vegetation plays a crucial role in supporting the health and function of aquatic ecosystems by stabilising creekbanks, improving water quality, regulating water temperature, providing habitat, and enhancing floodplain functionality. Established vegetation also defends our homes and towns in times of flood, cyclone, and rough coastal weather.

Protecting and restoring riparian, mangrove, and saltmarsh vegetation is essential for maintaining the health and resilience of waterways and the ecosystems and communities they support.

5. Key Insights: Marine Zones

The Townsville Dry Tropics Waterways Report Card brings together monitoring data for Cleveland Bay, Halifax Bay, and the Offshore Zone beyond Magnetic and Palm Islands.

Cleveland Bay water quality has declined from 'very good' to 'good'

In the 2022-2023 reporting year, Cleveland Bay water showed decline in physical-chemical properties, a measurement that considers turbidity, total suspended solids, and 'Secchi depth' — another technique used to assess water clarity.

Waters of the Magnetic Island Sub-Zone on the other hand, received a 'very good' grade for physical-chemical properties.

Conversely, where nutrient levels are concerned, Cleveland Bay receives a 'very good' overall, but the Magnetic Island Sub-Zone receives a 'very poor' for nutrients.

Reasons for these results may be many. Considerations include that the Magnetic Island Sub-Zone is subject to stringent Water Quality Objectives in line with its World Heritage Area values. Additionally, its proximity to the infrastructure of Magnetic Island's residential areas is a factor. These results have been consistent for the last five years, with further investigation required to identify possible causes for these specific grades.

For concentrations of Chlorophyll *a*, Cleveland Bay receives a grade of 'very good', as does the Magnetic Island Sub-Zone. Chlorophyll *a* is used by microscopic organisms that conduct photosynthesis and form the base of the marine food web, providing essential energy and nutrients to higher levels of life. While it is fundamental to support the food web, excess availability of Chlorophyll *a* can increase the proliferation of microscopic organisms in the water column. This then can contribute to turbidity and lower light availability, negatively affecting coral and seagrass.

For habitat, Cleveland Bay receives a 'moderate' grade

Habitat grades for Cleveland Bay are calculated using cover, composition, and health data of seagrass and coral in Cleveland Bay.

The 2024 Townsville Waterways Report Card shows seagrass in Cleveland Bay has declined slightly against the previous reporting year, but its area of coverage has increased for several meadows across the Bay.

Coral in Cleveland Bay has fluctuated over the last four years, receiving a 'poor' grade in the most recent Report Card.

Macroalgae is settling into Cleveland and Halifax Bays

Significantly, 5 of 7 coral monitoring sites in Cleveland and Halifax Bays show a concerning amount of macroalgae (seaweed), resulting in 'very poor' grades recorded at Geoffrey Bay, Pandora South, Havannah South, Pandora North, and Havannah North. The presence of macroalgae as a dominant component of a reef ecosystem indicates a disturbance or imbalance in the system, often associated with excess nutrients and coral decline.

Juvenile coral in the Offshore Zone continues to recover

All coral reefs in the Offshore Zone receive habitat grades of 'good' or 'moderate' in this year's Report Card, with juvenile coral density graded 'very good' at 7 of 9 surveyed reefs.

6. Key Insights: Fish

The 2024 Townsville Waterways Report Card includes updated freshwater fish data for the second time since 2021. 61 species of fish were caught during sampling across the Townsville Dry Tropics region to inform this year's Report Card.

Fish grades reflect two factors: the proportion of indigenous fish species present against expected numbers, and the proportion of non-indigenous (alien or translocated) fish species present against total numbers.

In both Ross and Black Basins, fish grades have declined against the previous monitoring period

In 2024 the Ross Basin retains a 'moderate' grade for fish, but scores lower against the last monitoring period due to an increased proportion of non-indigenous fish found in the basin.

The Black Basin receives a 'good' grade, but monitoring shows a reduction in indigenous fish numbers.

Why fish indigeneity matters:

The balance of indigenous and non-indigenous (invasive) fish in a waterway can be a strong indicator of water health.

Indigenous fish species are typically adapted to the local environment and have evolved within the natural ecological framework of the waterway. Their presence in healthy numbers indicates a stable and functioning ecosystem.

Conversely, a proliferation of invasive fish species, which are often introduced from other regions or through improper aquarium disposal, lack natural predators or controls. They can disrupt native ecosystems by outcompeting indigenous fish for resources. Invasive fish can also have a negative impact on water quality and biodiversity, compromising the overall health of the waterway.

7. Key Insights: Litter

Litter grades across the Dry Tropics reporting region are defined by 'pressure' levels: how much pressure the local environment may be under from the amount of litter present.

The data used to calculate the litter grades comes from Tangaroa Blue Foundation's Australian Marine Debris Initiative Database (AMDI) and is collected by volunteers and partners through the ReefClean program, funded through the Australian Government's Reef Trust.

Litter was collected at 26 sites in our region.

Sites under 'very high pressure' include Big Rock and Picnic Bays on Orpheus Island; and Fig Tree Bay on Orpheus is under 'high pressure'.

In Townsville, Ross Creek, Lake Idalia, and Bushland and Shelly Beaches are under 'Moderate pressure'. The same is true of Fantome Island within the Palm Group and Florence Bay at Magnetic Island.

The remaining 17 sites received 'low' or 'very low pressure' grades, a welcomed increased from the previous year where only 11 sites were subject to lower grades of litter pressure. Of notable improvement, Horseshoe Bay at Magnetic Island, went from 'high pressure' to 'very low pressure' over the reporting year.

8. Ahead: More coming from the Healthy Waters Partnership for the Dry Tropics

The Healthy Waters Partnership produces reports and engagement tools to connect our community and decision-makers with the latest and best available waterways-focussed environmental data.

After the July 2024 release of our Waterways Report Card, we'll be working on a 'Corals of Cleveland Bay' story-map, scoping a potential expansion into the Burdekin, and continuing to support projects out of a Community Action Plan we facilitated in partnership with Reef Ecologic and the Great Barrier Reef Foundation.

Our more than 20 partners have a raft of projects in motion that prioritise the health of our local waterways. Case studies of their action are shared via the Partnership's website and social media channels.

Partnering to improve the values of our catchments and Reef