Wet Tropics Waterways

WET TROPICS REPORT CARD 2026

WATERWAY ENVIRONMENT RESULTS

REPORTING ON DATA: JULY 2024-JUNE 2025

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1. EXECUTIVE SUMMARY

The results presented in this document describe the state and condition for freshwater basin, estuarine, inshore marine and offshore marine environments. The results include scaled scores and grades for indicators, indicator categories, indices, and overall reporting zones, within each environment. The 2024-25 reporting year provides updated results for all indicators reported annually, where data are available, and also for longer-term indicators that are scheduled for update and have new data available. The indicator category and index groupings of indicators updated for 2024-25 are presented in Table i.

Table i. The indicator categories and indices reported for each of the four environments. Indicator categories not updated for 2024-25 are shown in grey.

Environment	Index	Indicator category (indicator)
Basins	Water quality	All indicator categories
	Habitat & hydrology	Habitat modification (impoundment length)*
		Flow
		Invasive weeds (instream)*
		Wetland extent*
		Riparian extent*
	Fish (All basins except Herbert)	Indigenous species*
		Non-indigenous species*
Estuaries	Water quality	All indicator categories
	Habitat & hydrology	Fish barriers*
		Flow
		Riparian extent*
		Mangrove and saltmarsh (extent)*
		Mangrove and saltmarsh (condition) – Barron, Johnstone, Moresby, Hinchinbrook Channel only
		Seagrass (Trinity Inlet and Moresby zones only)
Inshore marine	Water quality	All indicator categories
	Coral	All indicator categories
	Seagrass	All indicator categories (North and South zones only)
Offshore marine	Water quality	Discontinued
	Coral	All indicator categories

*signifies long-term indicators, which are usually updated every three to four years.

Comparisons between years must take into account any differences in monitoring, methodology and addition of indicators. The inshore marine monitoring has remained more consistent than basin, estuary and offshore marine monitoring over the reporting years and this facilitates direct comparison of the state and condition of these waterways between reporting periods. The reporting of offshore marine coral condition was modified for 2021-22 onwards due to an update in the sampling design which has decreased the number of reefs surveyed and increased the survey frequency to every year. The reporting of offshore marine water quality was suspended as of 2020-21 due to decommissioning of the Marine Water Quality dashboard. It is proposed that contextual reporting of offshore water quality will be developed and implemented as part of the 2027 Program Design update for regional report cards, and this will replace reporting based upon scoring and grading. The rationale for this proposal is presented in Section 7.1.

The overall scores and grades across all waterway environments and reporting zones for 2024-25 ranged between 'moderate' to 'very good'. These results are produced from the aggregation of multiple indicators which are affected by a wide range of conditions and impacts, including climate, and are examined further within this report. Confidence levels associated with the results are based on assessment of the methods and analyses and are also presented. This document is intended to be read in conjunction with the methods technical report WTW 2026 available for download here, which details indicator selection, data collection, data analysis and scoring procedures for all indicators, and methods for scoring confidence.

Climate

For 2024-25, annual rainfall was above the long term mean in all basins except for the Daintree region, with the highest rainfall anomalies occurring in the lower Herbert and Murray basins. Monthly rainfall totals were above average or very much above average for all basins in August, and very much above average for all basins in December. During February intense rainfall events occurred in the south of the region due to a tropical low, and rainfall totals were within the highest one percent for the Murray and Herbert basins. Record monthly rainfall was recorded at several locations including 1.7 m at Cardwell (lower Murray Basin) and 2.1 m at Macknade (lower Herbert Basin). Annual discharge of the major rivers was higher than the long-term mean at all monitoring sites with discharge very much higher for the Murray River at Bilyana (nearly twice the annual average) and Herbert River at John Row Bridge (nearly three times the annual average).

The sea surface temperatures for 2024-25 showed the likelihood of coral bleaching across the Wet Tropics inshore and offshore zones decreased from the previous year but remained elevated with large areas of the inshore and offshore zones at a probable or possible likelihood of coral bleaching. For the inshore the likelihood of coral bleaching was highest in the Central and North zones, whilst for the offshore zone the likelihood of coral bleaching was highest in the southern area.

Waterways

The index and overall scores and grades for the 2024-25 reporting period and the overall scores and grades from previous years are presented for quick reference for each waterway environment in Tables ii – v below. The indices of each waterway environment are comprised of multiple indicators and the scores and grades are presented in full at the relevant sections and in Appendix G for previous years. Selected key messages for results of particular interest are provided and refer to indicators which are presented in detail within the results sections.

The following standardised scoring ranges and grades are used for the grading and scoring of results:
■ Very Poor = 0 to <21 | ■ Poor = 21 to <41 | ■ Moderate = 41 to <61 | ■ Good = 61 to <81 | ■ Very Good = 81 – 100 | ■ nd indicates no data available.

Whilst the weather events that occurred during 2024-25 reporting period impacted the conditions of waterways within the Wet Tropics region, the effects are not necessarily shown in changes of scores or grade across all environments and indices. This may be due to the complexity of interactions between weather events and waterway condition, the resilience of ecosystems, and the timing of the waterway monitoring activities.

Basins

The assessment of basins is based upon: water quality, comprising nutrients (dissolved inorganic nitrogen and filterable reactive phosphorus), sediments (total suspended solids) and pesticide risk; habitat and hydrology, comprising habitat extent (riparian and wetlands), habitat modification (impoundment length), flow, and invasive weeds; and fish, comprising native species and introduced species (translocated and non-Australian).

Table ii. Basin index and overall results for 2024-25 and overall results for preceding years.

Basins	Water quality	Habitat and hydrology	Fish	24-25	23-24	22-23	21-22	20-21	19-20	18-19	17-18	16-17	15-16
Daintree	91	77	92	87	84	79	83	83	85	82	81	81	81
Mossman	79	65	84	76	70	70	69	72	74	63	67	63	55
Barron	64	44	63	57	55	52	56	54	54	61	61	64	63
Mulgrave	72	65	69	69	67	74	73	74	73	68	71	64	64
Russell	73	67	88	76	76	78	78	79	75	75	75	70	68
Johnstone	72	56	69	65	66	68	67	70	71	67	67	68	68
Tully	64	54	84	67	70	71	72	75	72	61	64	64	61
Murray	55	60	60	58	56	63	64	63	61	57	59	55	54
Herbert	68	55	83	68	70	68	71	70	71	59	66	66	67

Basin key messages

- Overall condition of basins was: 'very good' for the Daintree, 'moderate' for the Barron and Murray, and 'good' for all other basins. For the majority of basins, the highest scoring index was fish.

Water quality

- The Murray continued to have the poorest condition with respect to pesticide toxicity, and the grade remained 'very poor' with the pesticide risk remaining very high, since the previous year.
- Pesticide risk for the Mossman decreased from moderate to very low and the grade improved from 'moderate' to 'very good' since the previous year.
- Grades for sediment (total suspended solids) were 'very good' for all basins except for the Barron and the Herbert, which were 'good'.
- DIN improved from 'moderate' to 'good' for the Mossman which was the second increase of grade in successive years.
- The grade for DIN declined from 'good' to 'moderate' for the Russell and Johnstone since the previous year.
- FRP improved from 'moderate' to 'good' for the Mossman, and from 'good' to 'very good' for Tully.

Habitat and hydrology

- For the flow indicator the Herbert remained 'good', the Russell and Murray improved from 'good' to 'very good' and all other basins improved from 'moderate' to 'good'.

- 2024-25 had the return of more typical timing for the wet season rainfall and flow events across the region compared to 2023-24 when the region was affected by Severe Tropical Cyclone Jasper from mid-December.
- Wetland extent was 'moderate' for the Daintree, 'poor' for Mulgrave and Russell, and 'very poor' for all other basins. All grades were unchanged from the previous assessment.
- Wetland area losses since the previous assessment year (2019) occurred in the Daintree, Mossman, Tully, Murray and Herbert basins and ranged between one to three hectares.

Estuaries

The assessment of estuaries is based upon: water quality, comprising nutrients (dissolved inorganic nitrogen and filterable reactive phosphorus), physical-chemical (turbidity and dissolved oxygen), chlorophyll *a*, and pesticide risk; and habitat and hydrology, comprising habitat extent (riparian and mangrove-saltmarsh), fish barriers, flow, and seagrass.

Table iii. Estuary index and overall results for 2024-25 and overall results for preceding years.

Estuary	Water quality	Habitat and hydro-logy	24-25	23-24	22-23	21-22	20-21	19-20	18-19	17-18	16-17	15-16	14-15
Daintree	80	59	70	64	68	69	73	76	70	72	70	70	nd
Dickson Inlet	78	63	71	73	69	68	77	77	79	77	69	74	nd
Barron	60	53	56	50	50	51	62	57	53	54	55	46	62
Trinity Inlet	65	51	58	55	64	64	64	63	56	57	64	66	59
Russell-Mulgrave	73	69	71	66	68	69	73	75	68	70	72	72	75
Johnstone	73	53	63	61	61	61	70	69	65	65	65	57	nd
Moresby	71	55	63	55	63	60	66	70	66	65	67	66	53
Hinchinbrook Ch.	65	72	69	68	72	69	72	78	74	77	81	78	nd

Estuary key messages

- For overall condition of estuaries, the Barron and Trinity Inlet remained 'moderate', the Moresby improved from 'moderate' to 'good' and all other estuaries remained 'good' since the previous year.

Water quality

- The pesticide risk metric score was unchanged for the Daintree estuary and decreased for Russell-Mulgrave and Johnstone estuaries since the previous year.
- For the Russell-Mulgrave estuary and Johnstone estuary diuron, metolachlor and imidacloprid were the major contributing chemicals.
- Chlorophyll *a* had a general improvement across the region since 2023-24, particularly for the Daintree, Trinity Inlet, Moresby and Hinchinbrook estuaries when they all had their lowest score for chlorophyll *a* over the 11 years.
- For turbidity all estuaries were graded 'very good' except for Hinchinbrook Channel which was 'good'. Since the previous year the Daintree, Barron, Johnstone and Moresby all improved from 'good' to 'very good'.

- Over the last eight years Trinity Inlet has consistently scored substantially lower than all other estuaries for dissolved oxygen.

Habitat and hydrology

- For mangrove and saltmarsh extent, Barron, Trinity Inlet were both graded 'moderate' due to losses from historical development and urbanisation.
- The Johnstone estuary declined from 'good' to 'moderate' since the previous assessment.
- All other estuaries were graded 'good' or 'very good'
- For mangrove and saltmarsh extent from 2019 to 2021 a loss of 0.1 km^2 was recorded for the Johnstone estuary and a loss of 0.2 km^2 was recorded for Hinchinbrook Channel.
- For shoreline mangrove habitat condition, zone scores had minimal change, and grades were unchanged from previous assessment year for all estuaries surveyed during 2024-25 (Barron, Johnstone, Moresby and Hinchinbrook Channel).
- For estuary riparian extent, the grades ranged from 'very poor' for Johnstone to 'good' for Moresby with all other estuaries graded 'poor' or 'moderate'.
- Since the 2019 assessment, riparian extent in 2021 has increased slightly for Russell-Mulgrave and Hinchinbrook Channel.
- The Barron flow score increased substantially from 39 ('poor') to 74 ('good') since the previous year.
- The Russell-Mulgrave flow score increased substantially from 50 ('moderate') to 82 ('very good') since the previous year.
- The Johnstone's grade for flow remained 'good' since the previous year, and the score remained 61.
- Improvement of flows for the Barron and Russell-Mulgrave estuaries was due to the return of a more typical rainfall pattern, including the timing of the wet season rainfall and flow events, after the previous year which was affected by Severe Tropical Cyclone Jasper (TC Jasper).
- Estuarine seagrass condition remained 'poor' for Trinity Inlet and remained 'very poor' for the Moresby estuary.

Inshore

The assessment of the inshore marine environment is based upon: water quality, comprising water clarity (total suspended solids and turbidity), nutrients (oxidised nitrogen, particulate nitrogen and particulate phosphorus), chlorophyll *a*, and pesticide risk; coral, comprising change in coral cover, juvenile density, macroalgae, coral cover, and composition; and seagrass, comprising biomass, area, and species composition, or percent cover and resilience.

Table iv. Inshore marine index and overall results for 2024-25 and overall results for preceding years.

Inshore zone	Water Quality	Coral	Sea-grass	24-25	23-24	22-23	21-22	20-21	19-20	18-19	17-18	16-17	15-16
North	69	37	43	**49**	**59**	**66**	**64**	**57**	**60**	**60**	**54**	**48**	**52**
Central	62	48	nd	**55**	**54**	**63**	**60**	**61**	**67**	**59**	**57**	**57**	**62**
South	55	43	27	**41**	**47**	**55**	**53**	**51**	**56**	**47**	**41**	**37**	**44**
Palm Island	40	43	nd	**41**	**57**	**61**	**56**	**55**	**59**	**56**	**51**	**57**	**59**

Inshore marine key messages

- Overall inshore scores decreased for the North, South and Palm Island zones, whilst the grades for all zones remained 'moderate', since the previous year.

Water quality

- In early February 2025 major flooding occurred for the Tully River and the Herbert River, and also river systems to the south of the Wet Tropics region including the Burdekin, causing substantial flood plumes in coastal marine waters from the river discharge.
- Water quality grades were 'good' for the North and Central zones, 'moderate' for the South zone and 'poor' for the Palm Island zone.
- Water quality index grades declined for the North, South and Palm Island zones since the previous year.
- For pesticides, the risk was very low for the North, Central and South zones and the three zones were graded 'very good'. Pesticides risk results were not available for the Palm Island zone.
- Water clarity declined from 'very good' to 'good' in the North zone (based on total suspended solids only) and from 'good' to 'moderate' for the Palm Island zone.
- The Palm Island zone monitoring recorded peak total suspended solid concentrations and turbidity during the February storm and flood events.
- Chlorophyll *a* grades declined from 'good' to 'moderate' for the North, Central and South zones, with the largest decrease in score occurring for the North zone from 80 to 54.
- Chlorophyll *a* concentrations in the North zone were highest in February at the three sites in the transect from the mouth of the Barron River northwards.
- For the Palm Island zone, oxidised nitrogen declined from 'very good' to 'poor' and particulate phosphorus declined from 'good' to 'poor'. Oxidised nitrogen, particulate phosphorus and particulate nitrogen showed correlation between peak concentrations and the February flood events.

Coral

- The tropical low in early 2025 produced storm damage to reefs in the Palm Island zone and brought heavy rainfall events with extensive flooding of rivers from the southern Wet Tropics to the Burdekin.
- Substantial loss of coral occurred at shallow sites at reefs in the Palm Island and South zones due to low salinity of floodwater inundation.
- The coral index grades remained 'moderate' for the Central, South and Palm Island zones, and 'poor' for the North zones. The scores decreased for all zones, except for the Central zone which was unchanged, since the previous year. The largest decrease in score occurred for the South zone.
- In the North zone coral condition remained poor and slightly decreased in score mainly due to lag effects from impacts associated with TC Jasper in 2023-24. The coral cover grade remained 'poor' with a slight improvement at Snapper North. The cover change indicator declined to 'moderate', reflecting the reduced rates of recovery for Snapper North and a lack of recovery for Snapper South. Following high mortality of macroalgae caused by floodwater inundation from TC Jasper impacts in 2023-24, a substantial increase in macroalgae cover has occurred at Snapper Island reefs and the macroalgae indicator grade declined to 'moderate'.
- Coral cover of the Central zone remained 'good' and declined slightly since the previous year. The composition and cover change indicators remained 'moderate', and the macroalgae and

juvenile coral indicators remained 'poor'. Over the last several years macroalgae cover has increased, characterised by persistent dense mats of red macroalgae particularly at Franklands West. Crown-of-thorns starfish densities at above outbreak levels were recorded at Fitzroy East, High East and Franklands East. Feeding scars are typically present at all reefs surveyed in the Central zone.

- For the South zone, coral cover decreased substantially in score and declined from 'moderate' to 'poor' since the previous year. This resulted from exposure to low salinity floodwaters from the heavy rainfall events and high river discharges, including the Tully and Herbert, in February 2025. Cover change continued to decrease in score with the decline likely linked to disease or reduced growth in corals as a result of stress from exposure to floodwaters over multiple years. The macroalgae indicator improved from 'poor' to 'moderate' due to floodwater impacts which reduced macroalgae cover. The juvenile coral indicator declined substantially from 'good' to 'moderate' since the previous year, with lower juvenile densities on coral reefs at 2 m depth compared to 5 m depth.
- The coral reefs of the Palm Island zone were impacted from a severe storm with high winds and damaging waves, and from floodwater inundation in February 2025. Coral cover decreased substantially in score and declined from 'moderate' to 'poor' since the previous year mainly due to exposure to low salinity floodwaters. The most extreme impacts on coral cover occurred at Lady Elliot Reef, with 90% of hard corals at 2 m depth, and 22% of hard coral at 5 m depth killed by floodwaters. The composition indicator declined from 'moderate' to 'poor' and this is associated with a lowering of *Acropora* representation within the hard coral community. Macroalgae indicator scores increased markedly at several reefs, however, the reduction of macroalgal cover, producing the higher scores, was due to low salinity from floodwaters and storm damage.

Seagrass

- Seagrass condition assessments continued to capture the impacts of TC Jasper, with some sites surveyed for the first time since the event.
- Seagrass condition in the North zone remained 'moderate' and decreased in score since the previous year.
- Seagrass condition in the South zone remained 'poor' and decreased in score since the previous year.

Offshore

The offshore zone for 2024-25 was assessed only from the coral index. The water quality index has not been available since 2020-21, and consequently an overall offshore score and grade has not been produced since 2019-20. Up to and including 2019-20, the water quality index comprised total suspended solids and chlorophyll *a.* The coral index is comprised of juvenile density, change in coral cover, and coral cover.

Table v. Offshore marine index and overall results for 2024-25 and overall results for preceding years.

Water quality	Coral	24-25	23-24	22-23	21-22	20-21	19-20	18-19	17-18	16-17	15-16
nd	**62**	Insuf-ficient data	Insuf-ficient data	Insuf-ficient data	Insuf-ficient data	Insuf-ficient data	**70**	**73**	**75**	**83**	**84**

Table vi. Offshore marine coral index for 2024-25 and preceding years.

Year	24-25	23-24	22-23	21-22	20-21	19-20	18-19	17-18	16-17	15-16
Coral	62	65	61	61	54	51	59	56	73	75

Offshore marine key messages

- Due to the lack of water quality monitoring, there was insufficient data to provide an overall grade and score for the offshore zone.

Water quality

- Water quality reporting for the offshore zone has been proposed to be presented in contextual form in future reports.

Coral

- Offshore coral monitoring for 2024-25 captured the impacts of TC Jasper and the severe marine heat wave that occurred during 2023-24.
- During 2024-25 much of the offshore zone had a 'likelihood of probable coral bleaching' due to heat stress.
- The offshore coral index remained 'good' but decreased from 65 to 62 since the previous year.
- The juvenile density indicator remained 'very good' and the score of 92 was unchanged.
- Coral cover remained 'moderate' and the score decreased from 46 to 42.
- Coral change remained 'moderate' and the score decreased from 56 to 51.
- Of the nine monitored reefs the coral condition index decreased at eight reefs and increased at one reef.
- Coral loss was greatest at reefs north of Cairns, primarily due to the impacts of TC Jasper and the high to very high levels of bleaching during 2023-24.

Confidence

The assessment of waterway condition and state also includes a measure of the confidence surrounding the data and analysis used for the indicators and indicator categories that constitute the indices. Assessment of confidence is based upon five criteria covering the maturity of the method (stage of development), level of data validation, representativeness (spatial and temporal factors, and sample size), directness of measurements, and measured error. The confidence rank is based on the score of the summed criteria. Confidence of an index is the average of the contributing indicator categories. Table vii presents the confidence ranks of the indices for each of the waterway environments. Confidence at the indicator and indicator category level is presented in the relevant section of the report.

Table vii. Confidence ranks of the indices for each waterway environment.

Environment	Water quality	Habitat and hydrology	Fish	Coral	Seagrass
Basin	3	3	3	-	-
Estuary	2 to 4	3	nd	-	-*
Inshore	3	-	nd	4	3
Offshore	nd	-	nd	4	-

Confidence rank: 1 (very low); 2 (low); 3 (moderate); 4 (high); 5 (very high). nd indicates no data available, - indicates index is not applicable. * note that estuary seagrass is included in the habitat and hydrology index.

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Terms and Acronyms

AIMS	Australian Institute of Marine Science
Basin	An area of land where surface water runs into smaller channels, creeks or rivers and discharges into a common point. A basin may include unconnected sub-basins which discharge at separate points.
Biomass	The total quantity or weight of organisms over a given area or volume.
BoM	Bureau of Meteorology
Chl-*a*	Chlorophyll-*a*: a measure used to estimate phytoplankton biomass. It is widely considered a useful proxy to measure nutrient availability and the productivity of a system.
CTF	Cease-to-flow
CV	Coefficient of variation
DETSI	Department of the Environment, Tourism, Science and Innovation
DHW	Degree heating weeks
DIN	Dissolved inorganic nitrogen
DO	Dissolved oxygen
EC	Enclosed coastal marine water body
Ecosystem	A dynamic complex of plant, animal and microorganism communities and their non-living environment interacting as a functional unit.
Ecosystem health	An ecological system is healthy and free from distress if it is stable and sustainable - that is, if it is active and maintains its organisation and autonomy over time and is resilient to stress.
Estuary environment	The aquatic environment at the interface between freshwater and marine ecosystems and includes mid-estuary (ME) and lower-estuary (LE) waters (WTHWP 2018).
Fish (as an index)	Fish community health is assessed and included in the ecosystem health assessments (coasters). Inclusion in the report card will contribute to an assessment of the health of local fish communities.
Fish Barriers (as an indicator)	Fish barriers relate to any man-made barriers which prevent or delay connectivity between key habitats which has the potential to impact migratory fish populations, decrease the diversity of freshwater fish communities and reduce the condition of aquatic ecosystems (Moore, 2016).

Flow (as an indicator)	Flow relates to the degree that the natural river flows have been modified in the region's waterways. This is an important indicator due to its relevance to ecosystem and waterway health.
FNQROC	Far North Queensland Regional Organisation of Councils
FRP	Filterable Reactive Phosphorus
GBR	Great Barrier Reef
GBR CLMP	Great Barrier Reef Catchment Loads Monitoring Program
GBR Report Card	Great Barrier Reef Report Card developed under the Reef 2050 Water Quality Improvement Plan (2018).
GBRMPA	Great Barrier Reef Marine Park Authority
GV	Guideline Value
Impoundment length	An indicator used in the 'instream habitat modification' indicator for freshwater basins in the region. This index reports on the proportion (%) of the linear length of the main river channel when inundated at the Full Supply Level of an artificial instream structures such as dams and weirs.
Index	Is generated by indicator categories (e.g. the water quality index is made up of nutrients, water clarity, chlorophyll-*a* and pesticides indicator categories)
Indicator	A measure of one component of an environmental dataset (e.g. particulate nitrogen)
Indicator category	Is generated by one or more indicators (e.g. water clarity made up of total suspended solids and turbidity)
Inshore marine environment	Includes enclosed coastal (EC), open coastal (OC) and mid-shelf (MS) waters, extending east to the boundary with the offshore waters (WTHWP 2018).
In-stream Habitat Modification (as an indicator)	This basin indicator category is made up of two indicators: fish barriers and impoundment length.
IQQM	Integrated water quantity and quality simulation model – used to model pre-development flow for the flow tool score calculations.
LE	Lower estuary water type
LTMP	Long-Term Monitoring Program
Macroalgae (cover)	An indicator used in part to assess coral health. Macroalgae is a collective term used for seaweed and other benthic (attached to the bottom) marine algae that are generally visible to the naked eye.
ME	Mid-estuary water type

Measure	A measured value that contributes to an indicator score for indicators that are comprised of multiple measurements (e.g. flow, estuary fish barriers).
MMP	Great Barrier Reef Marine Monitoring Program – A collaboration between GBRMPA, JCU and AIMS. This provides water quality, coral and seagrass data for the inshore zones of the report card.
MS	Mid-shelf marine water body
MWQ	Marine water quality (MWQ) dashboard and data – Bureau of Meteorology.
NAMAC	Natural Asset Management Advisory Committee
NO_x	Oxidised nitrogen (nitrate and nitrite)
OC	Open coastal marine water body
Offshore marine environment	Includes all offshore waters within the Wet Tropics NRM marine region.
Overall Score	The overall scores for each reporting zone used in the report card are generated by an index or an aggregation of indices.
P2R	Paddock to Reef Integrated Monitoring, Modelling and Reporting Program
Palustrine wetlands	Primarily vegetated non-channel environments of less than eight hectares. Examples of palustrine wetlands include billabongs, swamps, bogs, springs, etc.
Pesticides (as an indicator)	Incorporating up to 22 herbicides and insecticides with different modes of action. A list of the relevant chemical components is provided in the Methods Report.
Pesticide Risk Metric	Refers to the methodology for estimation of ecological risk associated with pesticide pollution.
Phys-chem	The physical-chemical indicator category that includes two indicators: dissolved oxygen (DO) and turbidity.
PN	Particulate nitrogen
POISE	Proportion of indigenous fish species expected
PONI	Proportion of non-indigenous fish
PONSE	Proportion of native (fish) species expected
PP	Particulate phosphorus
Pre-clearing	Pre-clearing vegetation is defined as the vegetation or regional ecosystem present before clearing. This generally equates to terms such as ‘pre-1750’ or ‘pre-European’ used elsewhere (Neldner et al., 2019).

Pre-development flow	The pattern of waterflows, during the simulation period, using the IQQM computer program as if there were no dams or other water infrastructure in the plan area, and no water was taken under authorisations in the plan area. (Queensland Government 2016).
PRM	Pesticide Risk Metric
PSII herbicides	Photosystem II inhibiting herbicides (Ametryn, Atrazine, Diuron, Hexazinone, Tebuthiuron, Bromacil, Fluometuron, Metribuzin, Prometryn, Propazine, Simazine, Terbuthylazine, Terbutryn)
PSII-HEq	Photosystem II herbicide equivalent concentrations, derived using relative potency factors for each individual PSII herbicide with respect to a reference PSII herbicide, diuron (Gallen *et al.* 2014).
QPSMP	Queensland Ports Seagrass Monitoring Program
Queensland Government	The Queensland Government includes several departments that provide data sources and support for the report card. Key departments for the report card are the Department of Environment and Sciences (includes management of the GBR CLMP), the Department of Regional Development, Manufacturing and Water (includes management of water monitoring), and the Department of Resources (includes management of Queensland Spatial).
REMP	Receiving Environment Monitoring Plan
Resilience (MMP seagrass indicator)	Measure of the capacity of seagrass to cope with disturbances.
Riparian Extent (as an indicator)	An indicator used in the assessments of both basin and estuarine zones. This indicator uses mapping resources to determine the extent of the vegetated interface between land and waterways in the region.
SF	Scaling factor - A value used to set scoring range limits for indicators.
Standardised condition score	The transformation of indicator scores into the Wet Tropics Report Card scoring range of 0 to 100.
TSS	Total suspended solids
Waterway	All freshwater, estuarine and marine bodies of water, including reefs, and storm drains, channels and other human-made structures in the WT region.
Water quality guideline	For purposes of waterway assessment, the term water quality guideline refers to values for condition assessment of water quality drawn from a range sources including water quality objectives scheduled under the Environmental Protection (Water and Wetland Biodiversity) Policy 2019 (DES 2020), and water quality guideline values obtained from the Queensland Water Quality Guidelines (DEHP 2009), the GBRMPA Guidelines (GBRMPA 2010) and the ANZG (2018).

Water quality objective (WQO)	Water quality objective refers to values for condition assessment of water quality scheduled under the Environmental Protection (Water and Wetland Biodiversity) Policy 2019 (DES 2020).
WTW	Wet Tropics Waterways (previously known as Wet Tropics Healthy Waterways Partnership WTHWP)

2. INTRODUCTION

2.1. General

Wet Tropics Waterways was launched in July 2016 with the release of the 'Pilot Report Card' in December 2016 which reported on the 2014-15 year. Report cards have been released annually since the release of the pilot report card with the current 'Report Card 2026' reporting on the 2024-25 year (1 July 2024 to 30 June 2025) and from here on is referred to as the Report Card. The Report Card includes water quality and ecosystem state and condition assessments for freshwater, estuarine, inshore marine and offshore marine environments. In some cases where seasonal monitoring programs extend outside of the financial year period, for example freshwater fish and inshore coral, the data from the whole monitoring period is included. For monitoring programs that collect data less frequently than annually (e.g. wetland extent) then the most recent data set is included.

The summary scores from 2015-16 to 2023-24 are presented alongside the 2024-25 scores in each waterway environment section. The complete scores for each waterway environment are presented in full at the relevant section for 2024-25 and in Appendix G for previous years. For details on the design of the Report Card program including reporting zones for the waterway environments, refer to the Program Design (WTHWP 2018) and for details of the methods applied for the Report Card refer to the current methods technical report (WTW 2026).

2.2. Purpose of this Document

The purpose of this document is to provide detailed results of monitoring and assessment activities to support the Report Card. The results presented in this document are assessments of the state and condition for freshwater basin, estuarine, inshore marine and offshore marine environments. A log of the updates applied for 2024-25 results technical report is presented in Appendix I.

This document presents scaled scores and grades for indicators, indicator categories, indices, and for overall reporting zones within each environment. Key messages are presented for indicators that have been updated for the current reporting period. Included in this document are the confidence scores associated with the results, which are based on assessment of the methods and analyses, used to obtain the data. The data collection periods for indicators, indicator categories and indices are presented in the methods technical report (WTW 2026).

2.3. Terminology and Scoring

The Report Card assesses different indicators of ecosystem health to report on overall state and condition. Scores for indicators are aggregated depending on the aspect of the ecosystem they are assessing, such as water quality, coral or fish. The terminology used in this document for defining the level of aggregation of indicators is as follows.

- An indicator is a measured variable (e.g. particulate nitrogen) or generated from more than one measure, for example the flow indicator is generated from multiple hydrological measures.

- Indicator categories (e.g. nutrients) are generated by the averaging of indicators.
- Where an indicator category is represented by a single indicator, the indicator category score is equal to the indicator score.
- Indices (e.g. water quality) are generated by the averaging of indicator categories.
- Overall score is generated by the averaging of indices.

Overall scores and scores for indices are represented in the Report Card and website by a coaster (Figure 1). Presentation of the coaster can be without the indicator category outer ring as in the case of the Report Card publication. The overall scores are produced from a high level of aggregation which means these scores will be slow to change. It is important to take notice of the scores for indicators and indicator categories which can change more over time than overall scores.

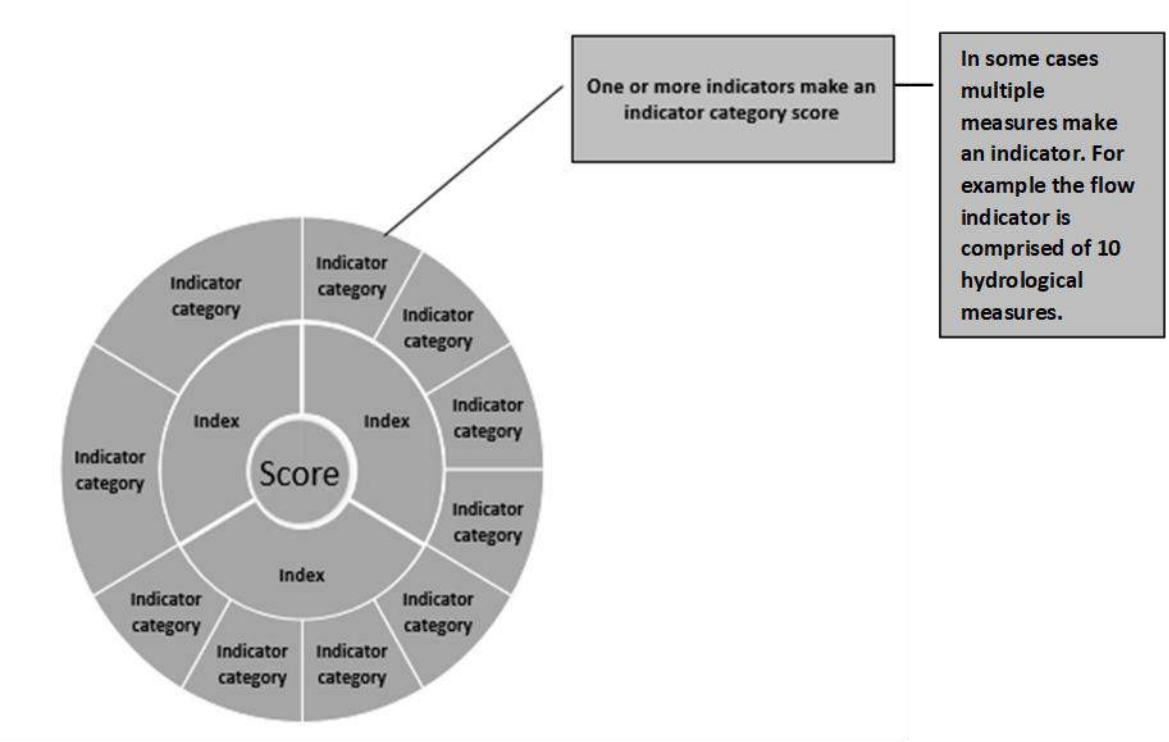

Figure 1 Terminology used for defining the level of aggregation of indicators.

Scoring of indicators is conducted using scales developed for setting scoring ranges according to the Report Card grading system of 'very poor', 'poor', 'moderate', 'good' and 'very good'. Indicator scales are specific to indicators and are converted (if required) to a standardised scale of between 0 - 100 (Table 1). In some cases the specific indicator scoring ranges are aligned with the standardised scoring range (e.g. basin nutrients) whilst other specific indicators' scoring ranges differ from the standardised scoring range (e.g. risk based indicators such as pesticides) and require conversion to the standardised scoring ranges. The indicator results tables present both the specific indicator scores and the standardised indicator scores. The standardised scale allows for the aggregation of indicators, indicator categories and indices and is calculated to one decimal place to allow for

differentiation between grades. For presentation in the summary tables the scores are then rounded down and presented as integers.

Table 1 Standardised scoring ranges and corresponding condition grades.

Scoring range	Condition grade and colour code
81-100	Very Good
61 to <81	Good
41 to <61	Moderate
21 to <41	Poor
0 to <21	Very Poor

Values for condition assessment of water quality are drawn from a range of sources including water quality objectives scheduled under the Environmental Protection (Water and Wetland Biodiversity) Policy 2019 Wet Tropics basins (DES 2020) and water quality guideline values obtained from the Queensland Water Quality Guidelines (DEHP 2009), the GBRMPA Guidelines (GBRMPA 2010) and the ANZG (2018). Further explanation on which values were used for condition assessment is outlined in Appendix B . For the purposes of this assessment and to simplify terminology, all values obtained from these sources will be referred to as water quality guideline values.

The assessment results in the Report Card were rated in terms of the confidence surrounding the analysis. Confidence scores range from 4.5 to 13.5 and are assigned a confidence ranking from 1 (low) to 5 (high) totalled for each index.

Further details of the terminology and levels of aggregation and confidence scoring are provided in the methods technical report (WTW 2026).

3. CLIMATIC INFLUENCES IN THE REGION

Rainfall

For the 2024-25 period annual rainfall totals for the Wet Tropics region were highest in the Russell Basin and lowest in the Barron Basin (Figure 2, top). Annual rainfall was above the long term mean in all basins except for the Daintree Basin, with the highest rainfall anomalies occurring in the lower Herbert and Murray basins Figure 2, bottom).

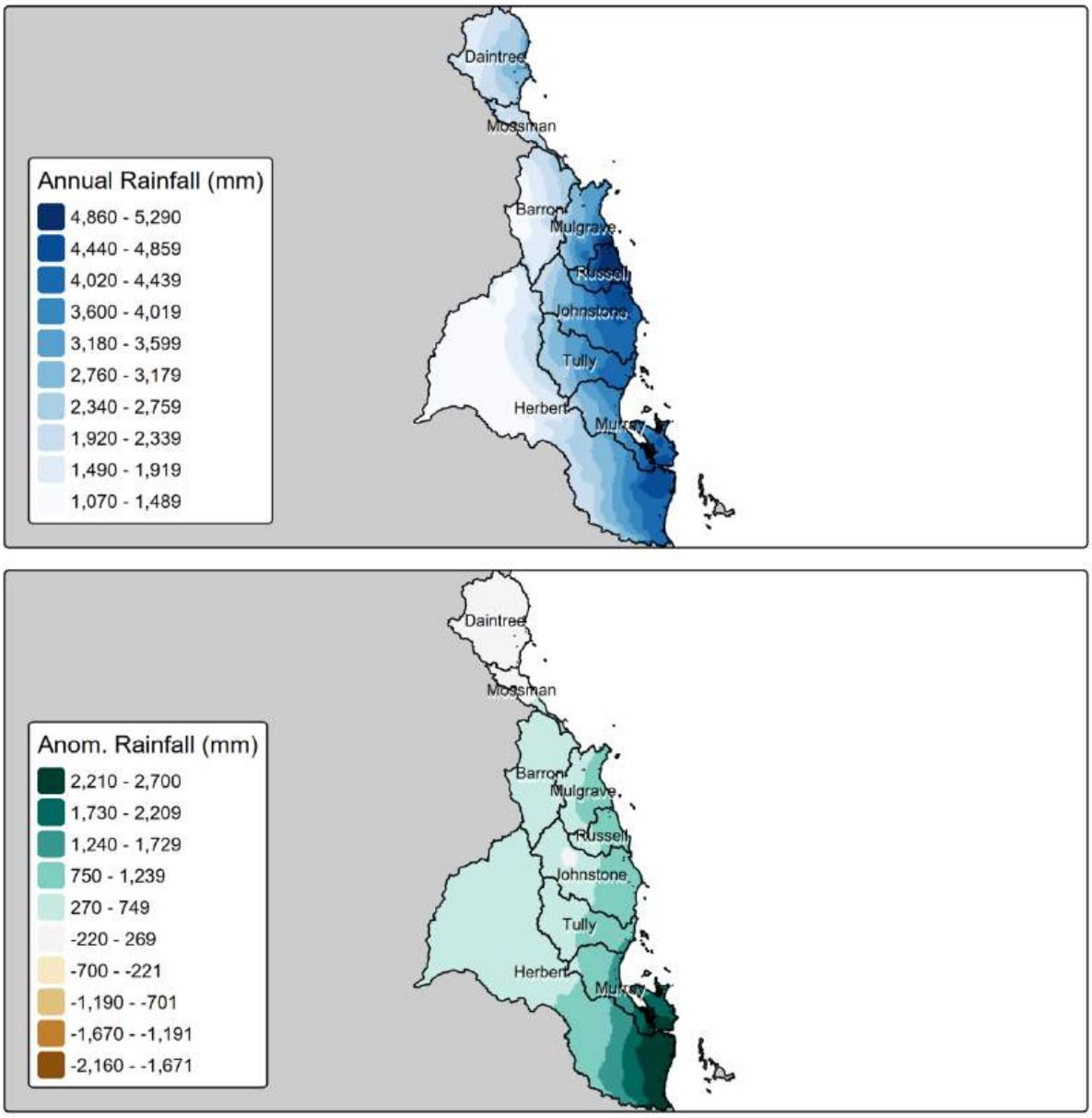

Figure 2 Annual rainfall total (top) and rainfall anomaly of total annual rainfall from long-term mean annual rainfall (bottom) for the Wet Tropics region during 2024-25.
Data for the map was sourced from the Bureau of Meteorology Australian Water Outlook (https://awo.bom.gov.au/) using a long-term mean based upon historical rainfall records from 1991 to 2025.

The annual rainfall percentile category was very much above average (≥90 - <99 percentile) for the Murray and Herbert, average for the Daintree and Mossman basins, and above average (≥70 - <90 percentile) for all other basins (Figure 3). The Herbert recorded the largest difference at 171% of its long-term mean (Table **2**). The annual rainfall totals for 2024-25 were the highest compared to the previous 12 years for the Murray and Herbert, whilst for all other basins the annual rainfall totals decreased compared to the peak that occurred the previous year (Appendix A, Figure 18**).**

Table 2 Annual rainfall statistics for basin areas of the Wet Tropics for 2024-25.

	Total (mm)	Long-term mean (mm)	Anomaly (mm +/- long-term mean)	Percentage of long-term mean
Daintree	2281	2332	-51	98
Mossman	2172	2040	132	107
Barron	1860	1476	384	126
Mulgrave	3406	2654	752	128
Russell	4605	3762	843	122
Johnstone	3679	2989	691	123
Tully	3326	2560	766	130
Murray	3641	2212	1429	165
Herbert	2111	1234	876	171

Data was sourced from the Bureau of Meteorology Australian Water Outlook using historical data for 1991-2025.

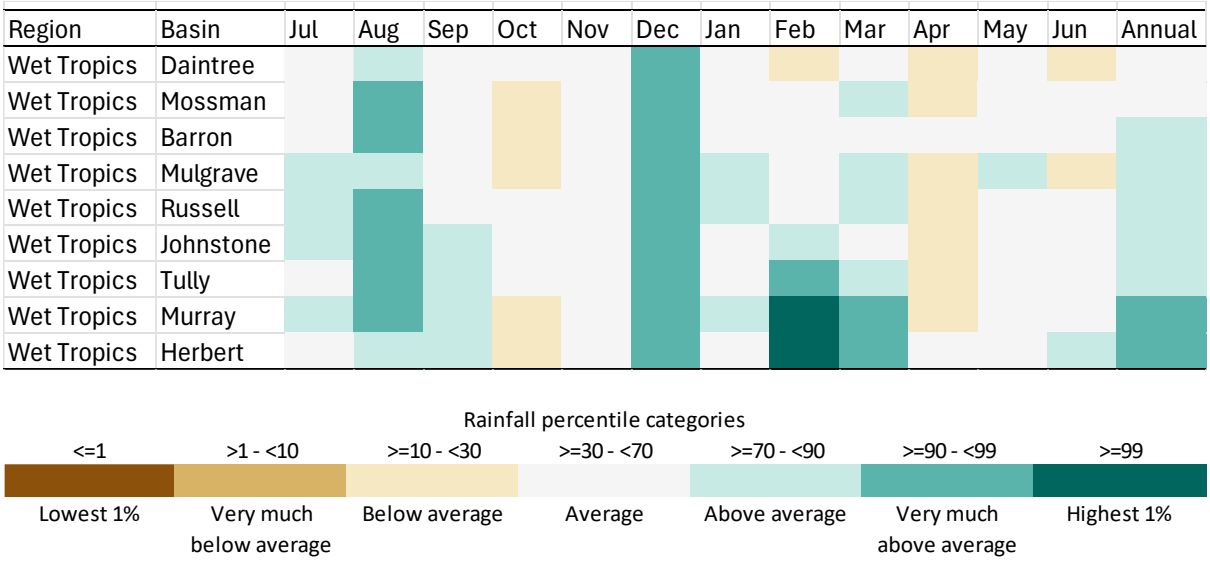

Figure 3 Monthly rainfall percentiles and annual mean percentiles for basin areas of the Wet Tropics (2024-25).
Data was sourced from the Bureau of Meteorology Australian Water Outlook using historical data for 1991-2025.

The percentiles of monthly rainfall totals were above average or very much above average for all basins in August, and very much above average for all basins in December. Monthly rainfall percentiles during February were variable across the region with drier conditions in northern basins

(below average or average) increasing to rainfall totals within the highest one percent for Murray and Herbert basins. (Figure 3).

The intense rainfall events during February in the south of the region resulted from a tropical low and a monsoon trough. Record monthly rainfall was recorded at several locations affected by the rainfall events including 1.7 m at Cardwell (lower Murray Basin) and 2.1 m at Macknade (lower Herbert Basin) (BoM 2025). The streets of Ingham and surrounding areas of the lower Herbert basin were inundated by the floodwaters.

River discharge

Annual discharge of the major rivers (Figure 4) was higher than the long-term mean at all monitoring sites with discharge very much higher for the Murray River at Bilyana (nearly twice the annual average) and Herbert River at John Row Bridge (nearly three times the annual average). The high annual discharge for the southern major rivers was driven by above average annual rainfall in that part of the region, which included heavy rainfall events from the tropical low and monsoon that occurred during February.

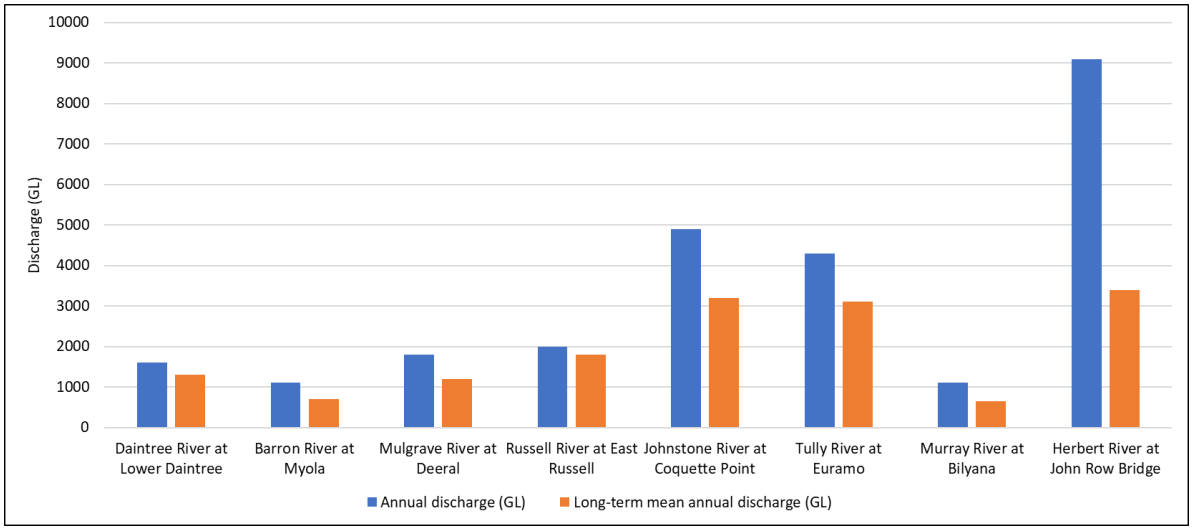

Figure 4 Long-term mean annual discharge and discharge for 2024 – 2025 recorded from gauging stations at the most downstream locations of the major river channel for freshwater basins.
Long-term mean annual discharge is based on historical gauging station records until present from the Department of Local Government, Water and Volunteers (https://water-monitoring.information.qld.gov.au/) and Department of the Environment, Tourism, Science and Innovation (https://apps.des.qld.gov.au/water-data-portal/). Historical flow records dated from 1957 for the Barron at Myola, 1972 for the Tully River at Euramo and 1915 for the Herbert River at Ingham. For recently constructed gauging stations modelled data was used from 1986 until they became operational which was 2018 for the Murray, 2017 for the Daintree, 2015 for Johnstone River at Coquette Point and 2013 for the Mulgrave and Russell.

Sea surface temperature

The sea surface temperatures for 2024-25 showed the likelihood of coral bleaching across the Wet Tropics inshore and offshore zones decreased from the previous year but remained high with large areas of the inshore and offshore zones at a ‘probable’ or ‘possible’ likelihood of coral bleaching (Figure 5). The likelihood of coral bleaching is determined from degree heating weeks (DHW) which accumulate over the summer period, and maximum DHW values typically occur between January to March. For the inshore zones the likelihood of coral bleaching was highest in the central and

northern zones, whilst for the offshore zone the likelihood of coral bleaching was highest in the southern area. The high sea-surface temperatures of 2023-24 resulted in high to very high levels of bleaching in the offshore zone with greatest coral loss from bleaching experienced at reefs north of Cairns.

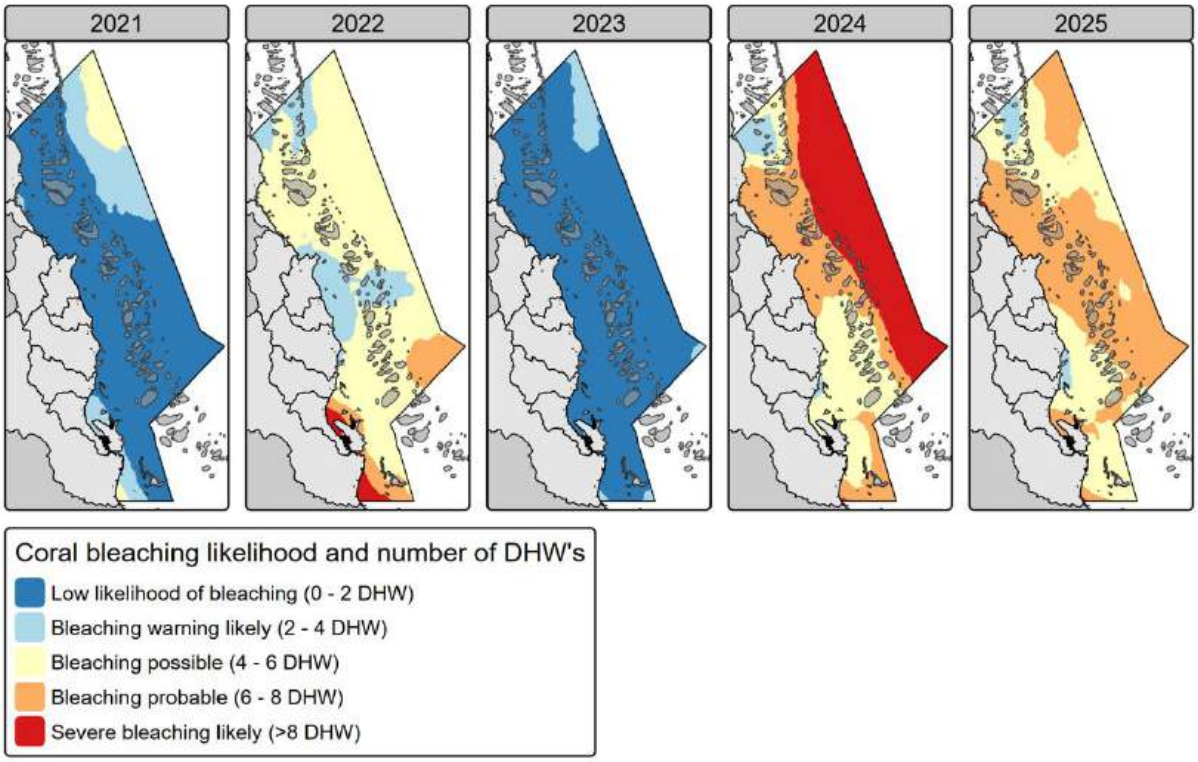

Figure 5 Annual maximum degree heating week (DHW) estimates for likelihood of coral bleaching from 2020-21 to 2024-25 (financial year period) for the Wet Tropics inshore and offshore marine environments. Data are the annual maximum degree heating week estimates for each ~25 km^2 pixel. Data were sourced from NOAA coral reef watch.

Note: Degree heating week (DHW) is an accumulated measurement of sea surface temperature that assesses the instantaneous bleaching heat stress during the prior 12-week period. Maximum values occur over the warmer months, generally January-March. Significant coral bleaching usually occurs when the DHW value reaches 4°C-weeks. By the time the DHW value reaches 8°C-weeks, severe, widespread bleaching and significant mortality are likely.

Key messages

- Annual rainfall was above the long term mean in all basins except for the Daintree region, with the highest rainfall anomalies occurring in the lower Herbert and Murray basins.
- The annual rainfall totals for 2024-25 were the highest compared to the previous 12 years for the Murray and Herbert.
- The percentiles of monthly rainfall totals were above average or very much above average for all basins in August, and very much above average for all basins in December.
- Monthly rainfall percentiles during February were variable across the region with drier conditions in northern basins (below average or average) increasing to rainfall totals within the highest one percent for Murray and Herbert basins.

- The intense rainfall events during February in the south of the region resulted from a tropical low and monsoon trough.
- Record monthly rainfall for February was recorded at sites in the lower Murray Basin and lower Herbert Basin.
- Annual discharge was higher than the long-term mean for all major rivers, with discharge very much higher for the Murray River at Bilyana (nearly twice the annual average) and Herbert River at John Row Bridge (nearly three times the annual average).
- The sea surface temperatures across the Wet Tropics inshore and offshore zones for 2024-25 showed the likelihood of coral bleaching decreased from the previous year but remained high with large areas of the inshore and offshore zones at 'probable' or 'possible' likelihood of coral bleaching.

Offshore water quality

The Technical Working Group recommended in early 2025 that the reporting of offshore water quality is more effective using a contextual approach and should replace the scoring and grading approach. The rationale for this recommendation was based upon the following points.

- The offshore area for each report card is an extremely large water body in comparison to the other reporting zones.
- Offshore water quality under typical conditions is rarely affected by catchment influences.
- Applying a score and grade implies that the condition of offshore water quality can be affected by current management actions.
- Average conditions across an offshore zone are expected to consistently score and grade highly with very minimal change over time under current management arrangements.

Proposed information to be included for contextual reporting of offshore water quality include historical data of key indicators (e.g. chlorophyll a and total suspended solids or their surrogates) derived from eReefs, and mapping of flood plume extent for key indicators, which may include turbidity, total suspended solids, chlorophyll a and nutrients, derived from MMP inshore water quality reports and directly from remote sensing sources. Contextual reporting of offshore water quality will be developed and implemented as part of the 2027 Program Design update for regional report cards. Note that limitations on annual reporting of offshore water quality using eReefs data include the biennial timing of data releases which align with the Reef Report Card reporting cycle.

4. FRESHWATER BASINS

The freshwater basin reporting zones and the water quality site locations are shown in Figure 6. An additional site (Great Barrier Reef Catchment Loads Monitoring Program (GBR CLMP)) is shown in the upper catchment of the Tully Basin; this is used as a reference site for water quality but is not included in the Report Card condition assessment.

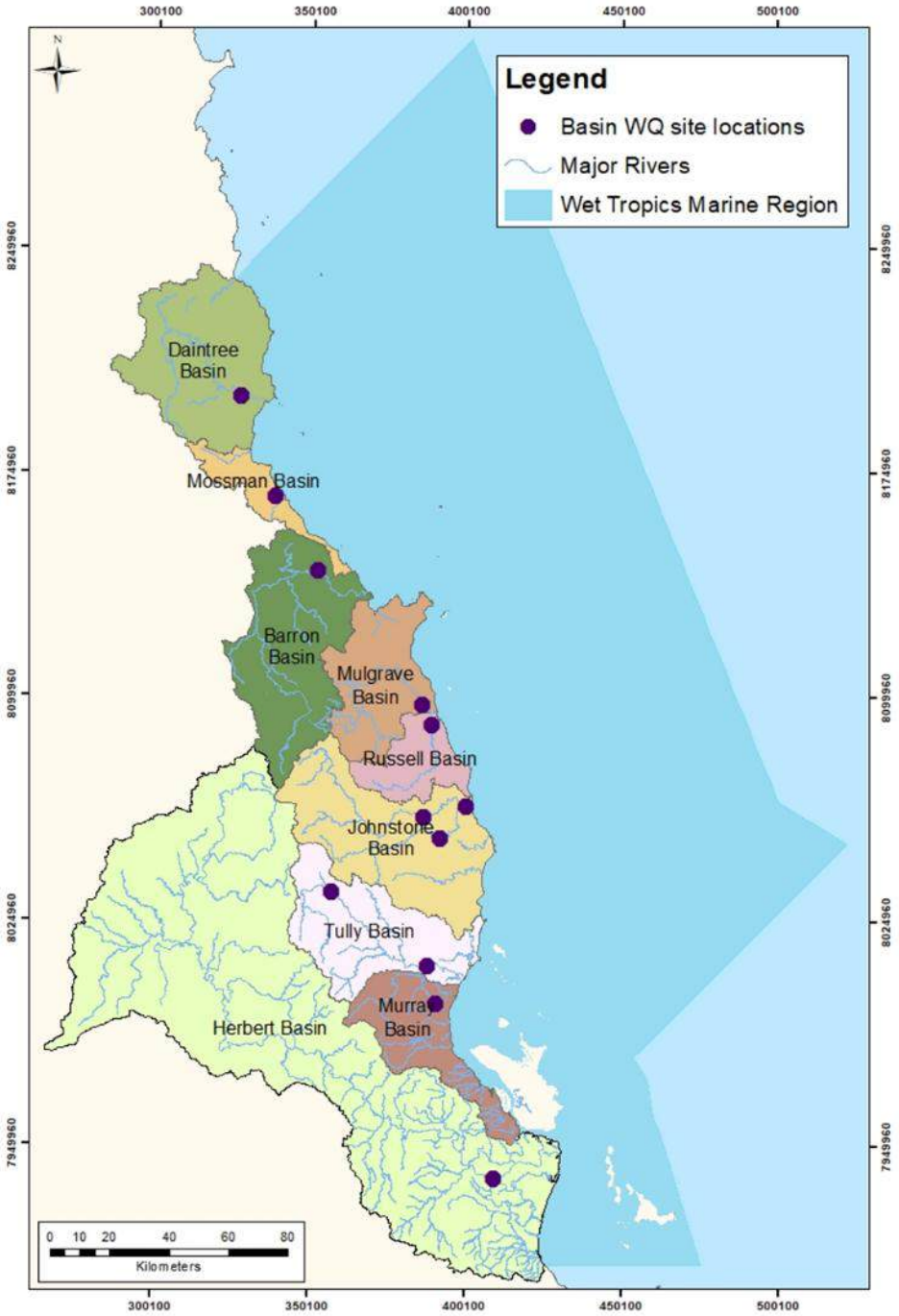

Figure 6 Freshwater basin water quality (WQ) monitoring site locations and basin reporting zones. The site in the upper Tully Basin is used as a GBR CLMP reference site and is not used for the Report Card condition assessment. The most downstream site in the Johnstone Basin is located in the estuary zone at Coquette Point. It is used for assessment of pesticides only for the Johnstone Basin.

The position of the water quality monitoring sites in relation to primary land use in the Wet Tropics region is shown in Figure 7 and provides a graphical presentation of land use upstream of the sites, which potentially affects the water quality of the samples collected. Note that the impact of land use downstream of the sampled sites, or in separate sub-basins, is not reflected in the water quality samples. The land use map also provides context for the habitat and hydrology indicators including riparian vegetation extent and wetland extent. Figure 7 shows the location of the Tully Gorge GBR CLMP reference site and its isolation from disturbed landscapes.

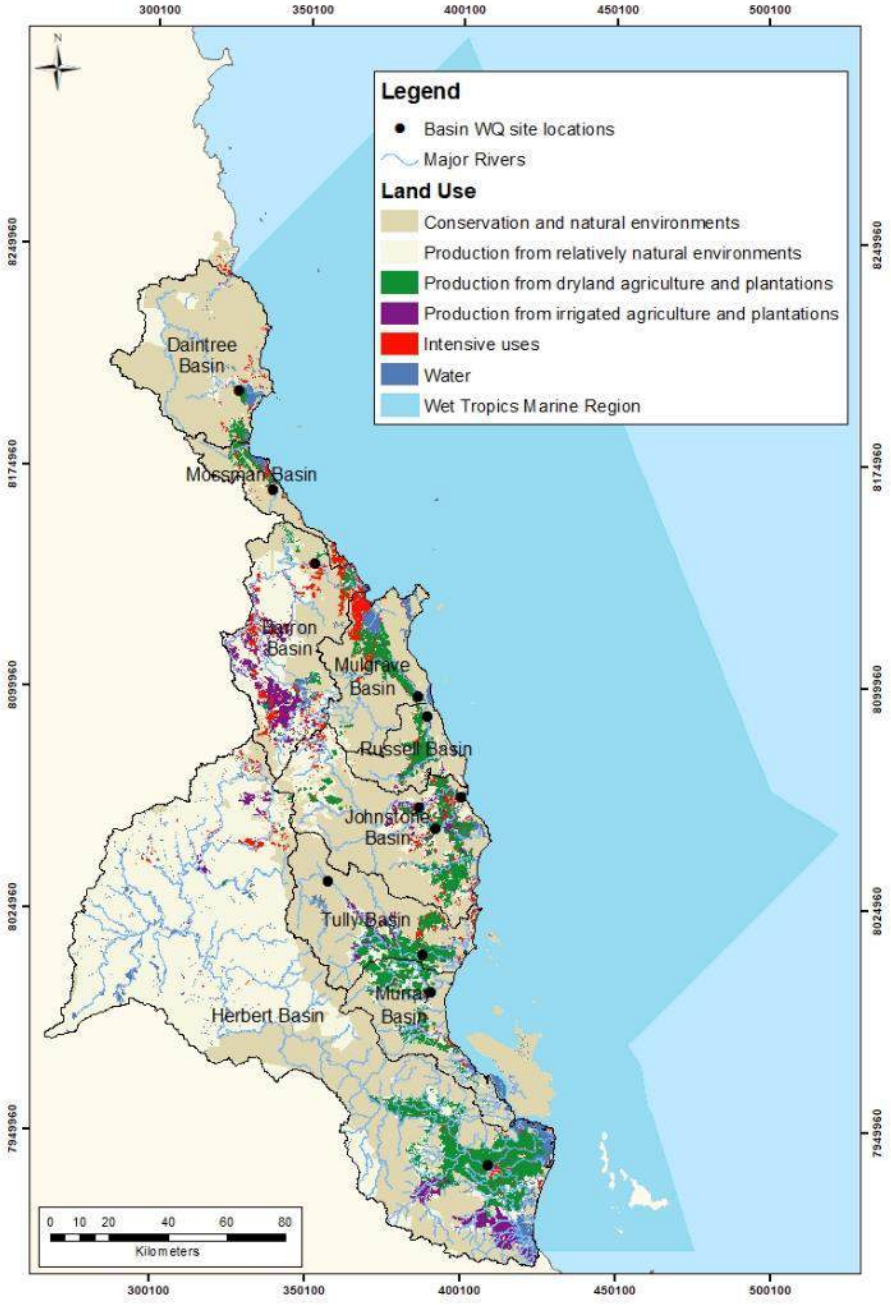

Figure 7 Location of freshwater basin water quality (WQ) monitoring site locations and primary land use in the Wet Tropics region. Source: Queensland Land Use Mapping Program Wet Tropics NRM region 2015 land use data set. http://qldspatial.information.qld.gov.au/

4.1. Water Quality

The methods for scoring water quality are described in the methods technical report (WTW 2026). The water quality index is comprised of sediment (total suspended solids (TSS)), nutrients, (dissolved inorganic nitrogen (DIN) and filterable reactive phosphorus (FRP)) and pesticides (pesticide risk).

The water quality index grades for 2024-25 were the same as the previous year for all basins (Table 3). The Daintree had the highest score (91) and graded 'very good', the Murray had the lowest score (55) and graded 'moderate', whilst all other basins were graded 'good'. The most substantial change in water quality index score from the previous year occurred for the Mossman Basin (64 to 79) with improvement from 'moderate' to 'good' for nutrients (both DIN and FRP) and pesticide risk (Table 5 and Appendix G Table 98), noting that monitoring for this basin is typically limited to base-flow conditions. The water quality scores tend to reflect the proportion of land use in catchments upstream of monitoring sites that is natural or relatively natural versus land uses developed for production (Figure 7), with the Daintree having the highest proportion of natural land use and the highest score and the Murray having the lowest proportion of natural land use and the lowest score.

Table 3 Basin water quality index scores and grades for all reporting years

	Water quality									
Basin	**24-25**	**23-24**	**22-23**	**21-22**	**20-21**	**19-20**	**18-19**	**17-18**	**16-17**	**15-16**
Daintree	91	83	82	87	88	91	84	82	nd	nd
Mossman~	79	64	68	64	66	78	69	71	nd	nd
Barron	64	64	64	75	70	69	74	78	81	82
Mulgrave	72	72	72	69	73	69	66	66	63	62
Russell	73	80	75	74	75	67	75	68	70	73
Johnstone	72	75	75	70	75	78	75	69	72	79
Tully	64	72	64	65	71	71	68	63	66	65
Murray	55	53	51	57	49	49	59	nd	nd	nd
Herbert	68	72	65	70	66	73	61	71	76	80

Scoring range: Very Poor = 0 to <21 | Poor = 21 to <41 | Moderate = 41 to <61 | Good = 61 to <81 | Very Good = 81 – 100. nd indicates no data or insufficient data available. ~Mossman River was assessed for base-flow only.

Pesticides

The pesticide risk metric (PRM) values (expressed as percentage of species protected) represents the average pesticide risk over the wet season for 182 days when exposed to a mixture of up to 22 different pesticides, including nine PSII herbicides (Photosystem II inhibitors), 10 non PSII herbicides and three insecticides. The 22 pesticides and their mode of action are listed in Section 2.2.1 of the methods technical report (WTW 2026). The wet season is determined as commencing when a rise in river water level occurs, but which is co-incident with an increase in aqueous pesticide concentrations (Warne *et al*. 2020 and Warne *et al*. 2023). For each basin the PRM scores and standardised scores are presented in Table 4. The standardised scores for pesticides are also presented in Table 5 alongside the other water quality indicator scores, and in Appendix G Table 98 to Table 106 for the previous years (2015-16 to 2023-24). The results of relative contribution of pesticide chemicals for the standard pesticide reporting sites are presented in Figure 8. Sampling for pesticides was expanded in 2017-18 and 2018-19, in order to populate the Pesticide Risk Baseline, and dropped back to a more routine sampling regime in 2019-20 and 2020-21, which did not include the Barron Basin. Pesticide monitoring has been conducted at several sub-catchment sites across the

Wet Tropics region for 2024-25 and previous years in addition to the standard pesticide reporting sites, and the relative contribution of chemicals to pesticide risk are presented for these additional sites for reference (Appendix B, Figure 22) although they do not contribute to the basin pesticide risk scores.

Note that for 2016-17 and 2015-16 the PRM was calculated from 13 PSII herbicides. The back-calculated PRM for 2016-17 for the 22 pesticides was provided for reference in the results technical report for 2017-18 (WTW 2019).

Table 4 The percentage of species protected for basins using the pesticide risk metric, based upon 22 pesticides, and the standardised pesticide scores for the 2024-25 reporting period.

	Pesticide risk metric	
Basin	**Percent species protected**	**Standardised score**
Daintree	>99	98
Mossman	>99	84
Barron	nd	nd
Mulgrave	97.6	74
Russell	96.7	69
Johnstone (Goondi)	>99	-
Johnstone (Coquette Point)	97.0	71
Tully	90.1	41
Murray	71.7	18
Herbert	96.3	67

Pesticide risk metric scoring range: Very Poor = <80% (very high risk)| Poor = <90 to 80% (high risk)| Moderate = <95 to 90% (moderate risk)| Good = <99 to 95% (low risk)| Very Good = ≥99% (very low risk). **Standardised scoring range:** Very Poor = 0 to <21 | Poor = 21 to <41 | Moderate = 41 to <61 | Good = 61 to <81 | Very Good = 81 – 100. Note: the catchment upstream of the North Johnstone site is a sub-basin of the Johnstone Basin and only the Coquette Point site is used for scoring the Johnstone Basin. nd indicates no data or insufficient data available, - indicates not applicable as the North Johnstone site is not used to calculate the basin water quality score.

Additional information is provided in Appendix E about the pesticide risk metric, how pesticides can interact with waterway ecosystems and how to interpret the scoring ranges including percent of species protected.

The pesticide risk levels for the Daintree and Mulgrave were unchanged from the previous year, remaining very low risk and low risk, respectively. Pesticide risk for the Mossman improved substantially from moderate risk to very low risk (see Mossman Basin land use transition section below for more information). The Russell, Johnstone (Coquette Point) and Herbert all remained low risk although their scores decreased from the previous year. Pesticide risk for the Tully declined from low risk to moderate risk, and for the Murray pesticide risk remained very high and the score decreased from 20 to 18, since the previous year (Table 5 and Appendix G Table 98).

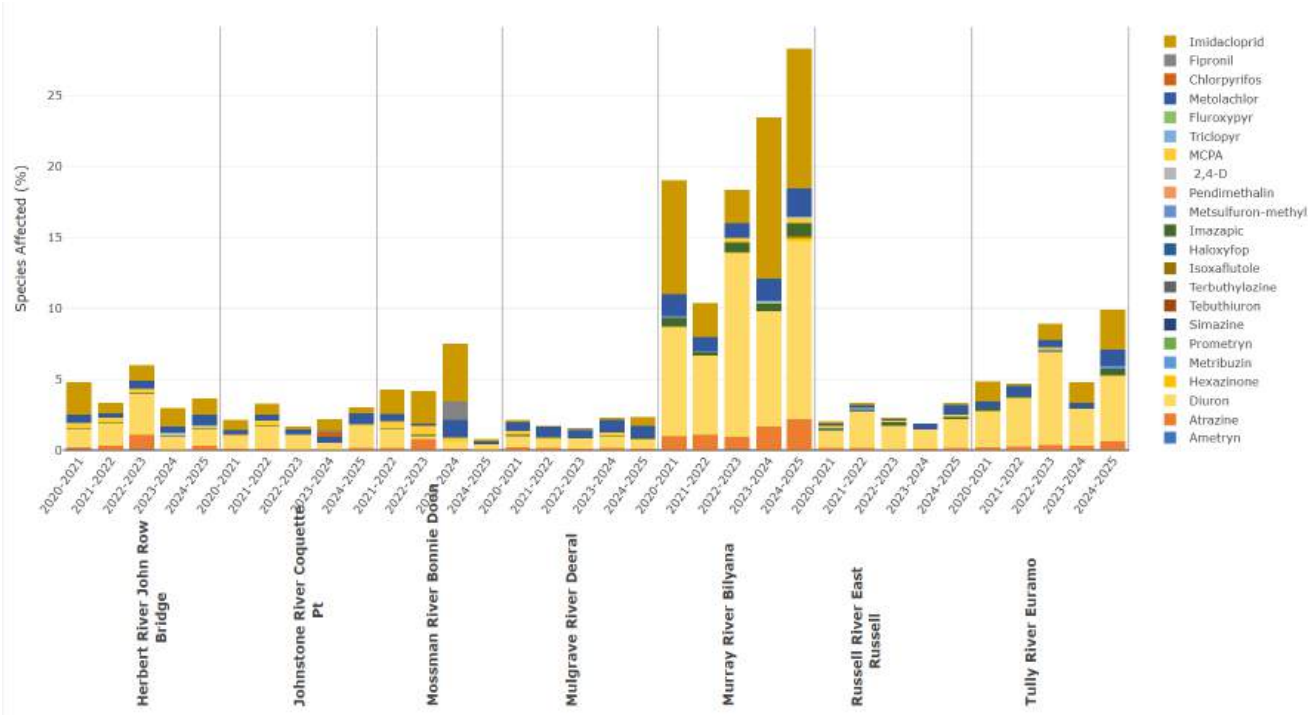

Figure 8 The relative contribution of pesticide types at standard basin reporting sites for 2020-21, to 2024-25. Of the full suite of 22 pesticides only those that contributed >0.1% of the toxicity are shown (the remainder had negligible contribution to toxicity).
Source: Pesticide Risk Metric produced through the Queensland Government Department of the Environment, Tourism, Science and Innovation. Note: Daintree and North Johnstone sites were excluded due to the very low concentrations recorded.

The relative contribution of chemicals to pesticide risk over the last five years for each site is presented in Figure 8. Diuron (PS II herbicide), imidacloprid (insecticide) and metolachlor (other herbicide) are typically the chemicals with the highest relative contribution across the sites, with atrazine (PS II herbicide) and imazapic (other herbicide) also notable contributors at some sites, particularly the Murray. Since the previous year, the Tully had an increase of all five of these chemicals, whilst Mossman had a decline in all five chemicals.

As with previous years, the Murray River at Bilyana continued to have the highest pesticide risk across the standard reporting sites of the Wet Tropics basins. Of the two major contributing chemicals, diuron risk increased and imidacloprid risk decreased for 2024-25 compared to the previous year whilst overall pesticide risk was at its highest over the last five years (> 25 percent species affected) (Figure 8). The higher pesticide risk at the Murray end-of-system site (Bilyana) compared to the other standard reporting sites may relate to its location on the relatively small catchment of the Murray River which has a relatively low discharge (Figure 9) and a high proportion of upstream area under agricultural land use (Figure 7 and Figure 9). In contrast, the adjacent end-of-systems sites of the Herbert River and Tully River have much larger catchment areas, considerably higher discharge (Figure 4) and have higher proportions of natural and relatively natural land in their upstream catchments (Figure 7). These different features could contribute to the substantially higher pesticide risk scores in the Murray where there is more agricultural pressure per unit catchment area coupled with a smaller area of total catchment runoff and lower capacity to dilute pesticide inputs.

Note that the annual pesticide risk values reported in the Reef Water Quality Report Card can differ from those presented in the Wet Tropics Report Card for the same basins. This is because the pesticide risk value reported in the Wet Tropics Report Card represents the runoff from the land area (and its land use) upstream of the GBR CLMP monitoring site located within the catchment. Whereas the pesticide risk value reported in the Reef Water Quality Report Card represents the land area (and its land use) of the whole catchment, which is larger than that upstream of the monitoring site. This is particularly relevant for the Murray Basin which has numerous sub-catchments dominated by natural land uses which are unconnected to the Murray River where the GBR CLMP monitoring site is located (Figure 7).

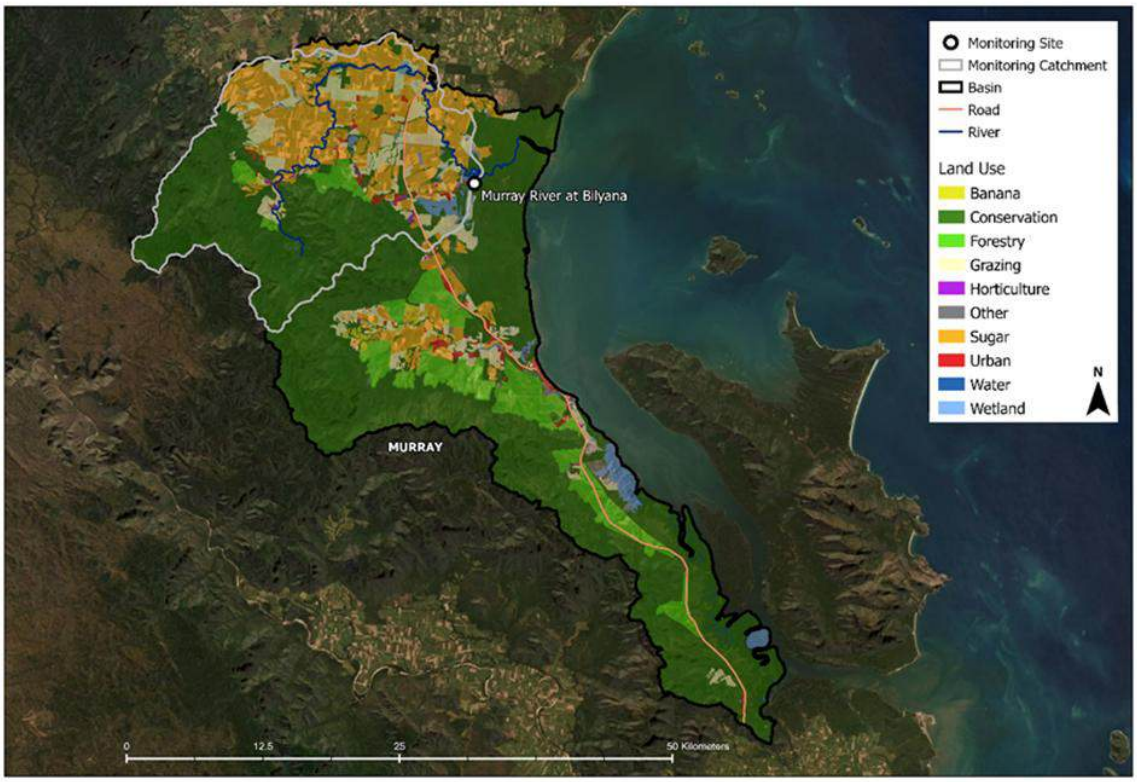

Figure 9 Land use of the Murray Basin and catchment area of the Murray River upstream of the monitoring site at Bilyana.

Pesticide concentrations for water samples collected by Water Quality and Investigations for the GBR CLMP, which includes the monitoring sites in the Wet Tropics region, are available from the Pesticide Reporting Portal.

Key messages: pesticides

- The Murray continued to have the poorest condition with respect to pesticide toxicity, and the grade remained 'very poor' with the pesticide risk remaining very high, since the previous year.
- Pesticide risk for the Mossman decreased from moderate to very low and the grade improved from 'moderate' to 'very good' since the previous year.

- The Daintree continued to have very low concentrations of pesticides, and a very low toxicity risk.
- The Russell, Johnstone (Coquette Point) and Herbert all remained low risk.
- The pesticide risk for the Tully increased from low risk to moderate risk.

Sediment and nutrients

The scores and grades for water quality indicators, indicator categories and water quality index for 2024-25 are presented in Table 5. The complete water quality scores for 2023-24 back to 2015-16 are presented in Appendix G Table 98 to Table 106. Water quality scores for 2014-15 are available from the results visualisations at the WTW website. The water quality monthly values for TSS, DIN and FRP concentrations along with scores and grades are presented separately for high flow and base-flow conditions in Appendix B (Table 57 to Table 66). Box and whisker plots of all data points for TSS, DIN and FRP concentrations of each basin for high flow and base-flow are presented in Appendix B (Figure 19 to Figure 21). Note that water quality sampling for the Mossman Basin was limited to lower flow conditions only, whilst for the Daintree Basin site water quality reporting for base-flow periods began in 2019-20, and added to the reporting for high flow periods, which began in 2017-18. Further information is available in the methods technical report (WTW 2026).

Table 5 Basin water quality index, indicator category and indicator scores and grades for the 2024-25 reporting period and water quality index results for 2023-24.

Basin	Sediment	Nutrients			Pesticides	Water quality	Water quality 2023-24
	TSS	DIN	FRP	**Nutrients**			
Daintree	**90**	82	90	**86**	**98**	**91**	**83**
Mossman~	**90**	64	65	**64**	**84**	**79**	**64**
Barron	**76**	40	65	**52**	**nd**	**64**	**64**
Mulgrave	**90**	48	58	**53**	**74**	**72**	**72**
Russell	**90**	48	71	**60**	**69**	**73**	**80**
Johnstone	**90**	59	50	**55**	**71**	**72**	**75**
Tully	**81**	53	90	**71**	**41**	**64**	**72**
Murray	**90**	48	67	**57**	**18**	**55**	**53**
Herbert	**78**	50	68	**59**	**67**	**68**	**72**

Scoring range: Very Poor = 0 to <21 | Poor = 21 to <41 | Moderate = 41 to <61 | Good = 61 to <81 | Very Good = 81 – 100. nd indicates no data or insufficient data available. *Pesticide score was calculated from monitoring at the Coquette Point GBR CLMP site on the Johnstone River downstream of the confluence with the South Johnstone River. ~Mossman River was assessed for base-flow only. For each basin DIN and FRP indicator values are averaged to provide the nutrient indicator category score (presented in bold) and the three indicator categories (sediment, nutrients and pesticides) are averaged to provide the WQ score (all presented in bold).

For 2024-25 the grades for sediment (total suspended solids) were ‘very good’ for all basins except for the Barron and the Herbert, which were ‘good’. Grades improved from ‘good’ the previous year to ‘very good’ for the Daintree and Murray. From 2014-15 to 2024-25, sediment has scored consistently high with grades of ‘good’ or ‘very good’ for all basins except for the Barron in 2019, which graded ‘moderate’.

For 2024-25, DIN improved from ‘moderate’ to ‘good’ for the Mossman which was the second increase of grade in successive years (see Mossman Basin land use transition section below for more information). The grade for DIN declined from ‘good’ to ‘moderate’ for Russell and Johnstone since the previous year. The Daintree grade of ‘very good’ was unchanged and all other basins remained ‘moderate’.

FRP improved from ‘moderate’ to ‘good’ for the Mossman, and from ‘good’ to ‘very good’ for Tully. FRP remained ‘very good’ for the Daintree and all other basins were unchanged and graded either ‘good’ or ‘moderate’.

The trends over time of water quality indicators can be assessed over the 11 year life of Wet Tropics Report Card. Temporal analysis can provide useful insights into water quality and bio-physical interactions. The Interactive visualisations for all indicator scores and zones can be viewed for all reporting years on the WTW website dashboard.

Key messages: sediment

- Grades for sediment (total suspended solids) were ‘very good’ for all basins except for the Barron and the Herbert, which were ‘good’.
- Grades improved from ‘good’ the previous year to ‘very good’ for the Daintree and Murray
- Since 2014-15 sediment scores have been consistently high, with grades of ‘good’ or ‘very good’ for all basins expect for the Barron in 2019, which graded ‘moderate’.

Key messages: nutrients

- DIN improved from ‘moderate’ to ‘good’ for the Mossman which was the second increase of grade in successive years.
- The grade for DIN declined from ‘good’ to ‘moderate’ for Russell and Johnstone since the previous year.
- FRP improved from ‘moderate’ to ‘good’ for the Mossman, and from ‘good’ to ‘very good’ for Tully.

The water quality index is a proxy for condition and is generated by comparing instantaneous water quality measurements (for example nutrient concentrations) against guideline values. The results do not directly relate to measurement of sediment, nutrient and pesticide loads. Programs that assess pollutant loads, for example Paddock to Reef, also apply modelling to standardise the effects of rainfall and climate variation (Hateley et al. 2014). This means that, during drier years, condition assessments such as the water quality index may represent areas that are identified as high risk for water quality more favourably than loads assessments. Condition assessments should therefore not be used as a proxy for loads.

Mossman Basin land use transition and water quality

Information in this section about the sugarcane industry and management practices for the Mossman Basin were provided by Mossman Canegrowers Limited.

The Mossman Basin is currently undergoing a transition in agricultural land use. Primary production in the Mossman Basin has been dominated by sugar cane, which has constituted 10% of land use of the entire basin. The 127-year-old Mossman Sugar Mill was a central component of the industry and

has now been permanently closed following final processing for the 2023 sugarcane harvest. The 2024 and 2025 harvests were transported to the Mulgrave Sugar Mill but were not economically viable, and transportation will not continue. Since closure of the Mill, sugar cane production has declined, and for 2025 the total tonnes harvested were less than half of the typical totals when the mill was operational. With the decline in cane production there has been substantial reductions in fertiliser rates, which is predominantly nitrogen forms, and pesticide application rates, which during 2024 and 2025 were typically limited to essential maintenance.

Upstream of the Mossman-South Mossman confluence, the Mossman River with a total catchment area of 105 km^2 at site MR2/MR4 has a substantially smaller upstream agricultural land footprint than that of the South Mossman with total catchment area of 89 km^2 at site SMR (Figure 10).

Figure 10 Water quality monitoring sites for the Mossman River. Nutrients and sediments sampled at sites MR2, MR4, SMR1 and MR5 by Douglas Shire Council, and pesticide sampling site at Bonnie Doon managed by the Great Barrier Reef Catchment Loads Monitoring Program (GBR CLMP). Mossman River sub-catchments have a yellow border and South Mossman River sub-catchments have an orange border.

Water quality monitoring of nutrients and sediments occurs at five sites on the Mossman River (Figure 10) typically during base-flow conditions. For 2024-25, the seasonal median concentration of DIN was lower than previous years at sites MR2/MR4 with all monthly samples meeting guideline values, and this improved the grade of 'poor' and 'moderate' for previous years to 'good', coinciding with reduced production and fertiliser application for sugarcane. This pattern did not occur for site SMR1, where DIN concentrations for 2024-25 consistently exceeded guideline values for all monthly

samples, and were similar to previous years. The distinction in DIN concentrations between the sites may relate to the difference in area of agricultural land use upstream of the sites in addition to practice change.

Since the water quality sampling for nutrients and sediments does not typically include high flow events, the assessment of DIN concentrations is mostly limited to the dry season and provides an incomplete picture of annual nutrient dynamics for the Mossman River.

Pesticide monitoring for the Mossman River occurs at Bonnie Doon, which is downstream of the Mossman-South Mossman confluence (Figure 10) and is conducted throughout the wet season, when pesticides are highly mobile. During 2024-25 pesticide risk reduced from moderate to very low for the Mossman River since the previous year. This decline in pesticide risk has coincided with the decrease of sugarcane production and the substantially reduced application rates of pesticides for the 2024 and 2025 growing seasons. It is possible that in the near future more extensive application of herbicides at rates high enough for transition from sugar cane to other primary production uses will occur.

Since the closure of the mill the agriculture sector in the Mossman Basin has been trialing alternative crops to sugarcane including peanuts, soya bean, maize, sorghum and bana grass (some for seed and some for potential use in bio-fuels), whilst cattle grazing has been expanded in the north of the basin where rainfall is higher. With the transition from sugarcane to other primary production activities, tracking water quality will provide valuable insights into land use and catchment interactions with waterway health.

Confidence

Confidence scores and ranks for sediment, nutrients, pesticides and water quality index for freshwater basin water quality results are shown in Table 6. Confidence scores (1 – 3) for each criterion were weighted according to the 2017 updated methods for assessing confidence (WTHWP 2017). There was higher confidence in the sediment and nutrients results than in the pesticide results. For all three indicator categories ‘representativeness’ received the lowest score available (1 out of a possible 3). This was due to the low spatial representation of monitoring in the basins where monitoring mostly occurs at a single site and pesticides are monitored for only part of the year (wet season only).

Table 6 Confidence associated with sediment, nutrients and pesticides results in freshwater basins.

Indicator category	Maturity of methodology (x0.36)	Validation (x0.71)	Represent-ativeness (x2)	Directness (x0.71)	Measured error (x0.71)	Final score	Rank
Sediment	3	3	1	3	2	8.8	3
Nutrients	3	3	1	3	2	8.8	3
Pesticides	3	2	1	2	2	7.3	2
Water quality index							
Basins with pesticide monitoring*	3	2.7	1	2.7	2	8.3	3
Basins without pesticide monitoring*	3	3	1	3	2	8.8	3

Confidence criteria are scored 1-3 and then weighted by the value identified in parenthesis. Final scores (4.5 – 13.5) are the sum of the weighted confidence criteria. **Rank based on final score:** 1 (very low): 4.5 – 6.3; 2 (low): >6.3 – 8.1; 3 (moderate): >8.1 – 9.9; 4 (high): >9.9 – 11.7; 5 (very high): >11.7 – 13.5. *All basins have pesticide monitoring except for the Barron. Pesticide monitoring in the Barron Basin ceased after the 2018-19 reporting year.

4.2. Habitat and Hydrology

The habitat and hydrology index scores and grades for all reporting years are presented in Table 7, and the index consists of instream habitat modification, flow, riparian extent, wetland extent and invasive weeds.

The habitat and hydrology index is comprised of four longer-term indicator categories that are scheduled to be updated every four years: wetland extent (updated for 2024-25), riparian extent, invasive weeds (updated for 2019-20), instream habitat modification (impoundment length (updated for 2022-23) and fish barrier indicators (in development)). Note that the riparian extent indicator has not been updated since reporting for the Wet Tropics commenced (2014-15 data) due to a lack of appropriate pre-clear mapping data. The Program Design provides the full schedule for when new data are to be presented for longer-term indicators that are reported for periods longer than a year (WTHWP 2018). The annual scores for the habitat and hydrology index from 2015-16 to 2016-17 represented changes resulting from the addition of indicators and not changes in existing indicator scores themselves. During the reporting period from 2015-16 to 2016-17, invasive weeds reporting commenced in 2015-16 and flow reporting commenced in 2016-17, whilst riparian extent, wetland extent and impoundment length were not updated during these reporting periods. Changes in scores between 2019-20 to 2021-22 were due to the annual update of the flow indicator, with all other indicators remaining unchanged. Changes in score from 2023-24 to 2024-25 were mainly due to the update of the flow indicator (wetland extent scores have very minimal or no change since the previous assessment).

Table 7 Basin habitat and hydrology index scores and grades for all reporting years

Basin	Habitat and hydrology									
	24-25	23-24	22-23	21-22	20-21	19-20	18-19	17-18	16-17	15 -16
Daintree	77	77	77	78	78	78	80	80	81	81
Mossman	65	64	65	68	72	68	56	63	63	55
Barron	44	39	45	45	44	46	47	45	47	43
Mulgrave	65	59	65	66	67	66	63	71	65	66
Russell	67	61	66	69	69	66	63	69	70	63
Johnstone	56	55	57	60	64	63	59	65	65	57
Tully	54	54	58	62	63	56	54	65	61	57
Murray	60	56	58	55	58	55	56	58	55	54
Herbert	55	55	56	59	60	56	57	61	56	54

Scoring range: ■ Very Poor = 0 to <21 | ■ Poor = 21 to <41 | ■ Moderate = 41 to <61 | ■ Good = 61 to <81 | ■ Very Good = 81 – 100.

Habitat modification (instream)

The habitat modification indicator category was not updated for 2024-25. The most recent results were based upon the impoundment length indicator only (updated for 2022-23), since the fish barrier condition indicator is still in development. Impoundment length scores and grades are provided in Table 8. Since the previous assessment there were no changes to existing impoundments or construction of new impoundments. The 2022-23 assessment did identify four existing impoundments in the region that were not included in the previous assessments. The additional impoundments were the Tully Falls Weir impounding 3.6 km of waterway on the Tully River (Tully Basin), Gedges crossing impounding 2.9 km of waterway on the Herbert River (Herbert Basin), Victoria Mill weir impounding 4.2 km of waterway on Palm Creek (Herbert Basin) and Lagoon Creek weir (Herbert) impounding 1.5 km of waterway on Lagoon Creek. The additional impounded waterway lengths resulted in a decrease in score of 57 to 52 for the Tully Basin and 92 to 87 for the Herbert Basin whilst the grades remained moderate for the Tully Basin (5.3 % of waterway length impounded) and very good for the Herbert Basin (0.7 % of waterway length impounded) (Table 8). There were no impoundments on streams of order three or higher in the Daintree, Mossman, Mulgrave, Russell, and Murray basins, and 0.1% impounded streams on the Johnstone giving a condition score of ‘very good’. The Barron received a ‘poor’ with 7.7% of the total length of the streams (order three and above) impounded by artificial structures. The Barron and Tully have the lowest scores due to large water infrastructure such as Tinaroo Dam (Barron) and Koombooloomba Dam (Tully). The impoundment length indicator is updated every four years and was initially reported for the 2014-15 reporting period.

Table 8 Results for impoundment length indicator for basins.

Basin	Not impounded (km)	Impounded (km)	Total (km)	% total	Standardised score	Grade
Daintree	2,795	0	2,795	0.0	100	VG
Mossman	335	0	335	0.0	100	VG
Barron	791	66	857	7.7	36	P
Mulgrave	344	0	344	0.0	100	VG
Russell	174	0	174	0.0	100	VG
Johnstone	782	1	783	0.1	98	VG
Tully	457	26	483	5.3	52	M
Murray	351	0	351	0.0	100	VG
Herbert	3,282	22	3,304	0.7	87	VG

Impoundment (% total): Very Poor = ≥10% | Poor = 7 to <10% | Moderate = 4 to <7% | Good = <4 to 1% | Very Good <1%. **Standardised scoring range:** Very Poor = 0 to <21 | Poor = 21 to <41 | Moderate = 41 to <61 | Good = 61 to <81 | Very Good = 81 – 100

The score and grade for the habitat modification indicator category are presented in Table 9.

Table 9 Results for habitat modification indicator category for basins.

Basin	Fish barrier condition score	Impoundment length condition score	Habitat modification grade
Daintree	nd	100	VG
Mossman	nd	100	VG
Barron	nd	36	P
Mulgrave	nd	100	VG
Russell	nd	100	VG
Johnstone	nd	98	VG
Tully	nd	52	M
Murray	nd	100	VG
Herbert	nd	87	VG

Scoring range: Very Poor = 0 to <21 | Poor = 21 to <41 | Moderate = 41 to <61 | Good = 61 to <81 | Very Good = 81 – 100. nd indicates no data available.

Habitat extent

Of the two habitat extent indicators, wetland extent was updated for 2024-25 from mapping data of 2021. Riparian extent has not been updated since the 2014-15 reporting year due to insufficient data.

The scoring and grading of habitat extent is based upon the percentage of habitat extent loss and applies formulas to convert the percent loss value to a standardised score (Table 10). Further information on the methods used for generating the habitat extent indicators are provided in the methods technical report (WTW 2026).

Table 10 Scoring ranges, grades and standardisation formula for the habitat extent indicators.

Percent of habitat loss	Grade	Scaling of scores for aggregation
≤5.0%	Very Good	VG = 81+ ABS((19 - ((score-0) *(19/4.9))))
>5.0-15.0%	Good	G= 61+ ABS((19.9 - ((score -5.1) *(19.9/9.9))))
>15-30.0%	Moderate	M=41+ ABS((19.9 -((score -15.1) *(19.9/14.9))))
>30-50%	Poor	P= 21+ ABS((19.9- ((score -30.1) * (19.9/19.9))))
>50%	Very Poor	VP=ABS((20.9 - ((score-50.1) *(20.9/49.9))))

The riparian extent percent loss since pre-clearing, and the scores and grades are shown for each basin in Table 11.

Table 11 Results for riparian vegetation extent indicator: percent loss from pre-clearing to 2013.

Basin	Riparian extent loss (%) to 2013	Standardised score	Grade
Daintree	0.0	99	VG
Mossman	11.5	68	G
Barron	11.1	68	G
Mulgrave	6.1	78	G
Russell	5.7	79	G
Johnstone	8.1	74	G
Tully	9.0	72	G
Murray	7.8	75	G
Herbert	3.9	85	VG

Riparian extent (% loss): Very Poor = >50% | Poor =>30 to 50% | Moderate = >15 to 30% | Good = >5 to 15% | Very Good ≤5%. **Standardised scoring range:** : ■ Very Poor = 0 to <21 | ■ Poor = 21 to <41 | ■ Moderate = 41 to <61 | ■ Good = 61 to <81 | ■ Very Good = 81 – 100. **Note**: These results are for extent of riparian (woody vegetation), not condition.

The Daintree and Herbert scored 'very good', with all other basins scoring 'good'. The midlands and uplands generally have better riparian extent due to protected areas and less development, whilst the lowlands are poorer due to development and land use.

The riparian extent indicator has not been updated in its current form due to considerable development of the data sources (satellite imagery and data processing) that were initially provided by the Remote Sensing Centre, Department of the Environment, Tourism, Science and Innovation. To enable updates to the riparian extent indicator the method and mapping sources have been revised and, pending technical reviews, it will be introduced for the 2025-26 assessment year.

The wetland extent indicator has been updated for 2024-25 from the latest Queensland Wetland Mapping Version 7 (DETSI 2025) which was released in 2025 and assessed wetlands as at 2021. The wetland extent percent loss since pre-clearing as at 2021, and the standardised scores and grades, along with the hectares lost since 2019, are shown for each basin in Table 12.

Table 12 Results for wetland extent indicator: percent wetland loss from pre-clearing to 2021 and hectares lost from 2019-2021.

Basin	Wetland Extent Loss (%) to 2021	Standardised	Hectares lost 2019 - 21
Daintree	19.6	54	3
Mossman	62.8	15	1
Barron	76.6	9	0
Mulgrave	39.1	31	0
Russell	45.9	25	0
Johnstone	54.6	19	0
Tully	63.0	15	1
Murray	51.1	20	1
Herbert	55.6	18	2

Wetland extent (% loss): Very Poor = >50% | Poor =>30 to 50% | Moderate = >15 to 30% | Good = >5 to 15% | Very Good ≤5%. **Standardised scoring range:** Very Poor = 0 to <21 | Poor = 21 to <41 | Moderate = 41 to <61 | Good = 61 to <81 | Very Good = 81 – 100. **Note:** These results are for wetland extent (palustrine water bodies), not condition of wetlands.

The Daintree was graded 'moderate', the Mulgrave and Russell graded 'poor' and all other basins graded 'very poor'. These results include a high level of historical loss of wetland extent since pre-clearing to 2021, due to development. Wetland area losses since 2019 occurred in the Daintree, Mossman, Tully, Murray and Herbert basins and ranged between one to three hectares. Only very slight changes in score for select basins have occurred since the previous assessment. Wetland loss is low in areas with no development or low levels of development, for example wetlands are largely intact in the upper freshwater catchment of the Daintree Basin. The wetland extent indicator is typically updated every four years.

Key messages: habitat extent

- Wetland extent was 'moderate' for the Daintree, 'poor' for Mulgrave and Russell, and 'very poor' for all other basins. All grades were unchanged from the previous assessment.
- Wetland area losses since 2019 occurred in the Daintree, Mossman, Tully, Murray and Herbert basins and ranged between one to three hectares.

Invasive weeds (aquatic)

The invasive weeds indicator was not updated for 2024-25 and the indicator is currently under review with reporting planned to recommence for the 2025-6 reporting year. The most recent assessment was for 2019-20. Information on the status of the recent outbreak of the Amazon frogbit (*Limnobium laevigatum*) in the Wet Tropics region was provided in the previous results technical report (WTW 2023).

The assessment of invasive aquatic weeds divides the actual basin impact score by the potential basin impact score of the basins to produce the percent impact score for each basin which are converted to standardised scores (0-100) (Table 13). Invasive weeds had the greatest percent impact score in the Murray and Herbert basins (both 'very poor') with substantial percent impact scores in

the Barron and Johnstone ('poor'). Daintree, Mulgrave and Russell were moderately impacted. The lowest impacts were recorded in the Tully ('good') and Mossman ('very good').

Table 13 Results for invasive weed potential impact scores and grades for basins 2019-20.

Basin	Basin impact score	Potential impact score	Percent impact score	Standardised score	Grade
Daintree	1,174	8,692	13.5	54.4	M
Mossman	126	1,098	11.5	81.0	VG
Barron	1,962	12,512	15.7	34.7	P
Mulgrave	732	4,917	14.9	43.8	M
Russell	589	3,863	15.2	41.0	M
Johnstone	2,741	16,594	16.5	24.7	P
Tully	1,357	11,238	12.1	71.2	G
Murray	1,068	6,234	17.1	19.9	VP
Herbert	7,659	38,983	19.7	19.3	VP

Invasive weed percent impact score: Very Poor > 16.8 | Poor >15.2-16.8 | Moderate >12.8-15.2 | Good >11.5-12.8 | Very Good 0-11.5. **Standardised scoring range:** Very Poor = 0 to <21 | Poor = 21 to <41 | Moderate = 41 to <61 | Good = 61 to <81 | Very Good = 81 – 100.

Flow

All basins were assessed with the flow indicator for 2024-25 except for the Daintree Basin which was not assessable due to the lack of modelled pre-development data. The flow assessment site of South Johnstone River at Upstream Central Mill Qld (gauging station 112101B) was decommissioned during 2024-25 and flow data from this site is no longer available for the flow indicator.

The flow indicator includes an assessment of the rainfall type for the reporting year and then compares the flows from the reporting year to modelled pre-development flows from past years with the same rainfall type. This means that the flow metrics for the reporting year provide scores based upon previous years with similar rainfall totals. The results are to be interpreted within the context of the prevailing rainfall conditions for the reporting year. The rainfall type for 2024-25, calculated by the flow indicator (Table 14), was 'wet' for all basins. Note that some differences can occur between rainfall classification produced by the flow indicator tool and BoM climate reporting (Figure 3) due to differences between the analyses used to assess rainfall.

For the Wet Tropics region, the annual rainfall was very much above average for the Murray and Herbert, the two most southerly basins, average for the two most northerly basins (Daintree and Mossman), and above average for all other basins (Table 2) . Monthly rainfall in August and December was above average for all basins (Figure 3). Intense rainfall events during February in the south of the region resulted from a tropical low and monsoon trough, and record monthly rainfall was recorded at locations in the lower Murray and lower Herbert basins.

For flows since the previous year, the Herbert remained 'good', the Russell and Murray improved from 'good' to 'very good' and all other basins improved from 'moderate' to 'good'. This general improvement across most of the region for the flow indicator was due to the return of a more typical rainfall pattern for the region including the timing of the wet season rainfall and flow events. During 2023-24 the influence of Severe Tropical Cyclone Jasper (TC Jasper) with the early onset of

the wet season and intense rainfall and flood events from mid-December contributed to poorer scores at flow assessment sites across the region.

For 2024-25, all flow assessments sites except Rudd Creek in the Herbert Basin, which was 'moderate', were graded either 'good' or 'very good' (Appendix C, Table 82). This means flows at these sites were not substantially altered from modelled pre-development in their capacity to provide key ecological values of water holes, low flow spawning fish, riffle habitats and fisheries production. The scores for Rudd Creek, which is an intermittently flowing system during average or drier years, are susceptible to rainfall events that extend the periods of flow particularly when this occurs during months that are more typically dry. This was evident from the poor scores for the flow measures of cease to flow and low flows for Rudd Creek (Appendix C Table 82). Note that for the Johnstone Basin, the score and grade cannot be compared directly to previous years because of the loss of the South Johnstone site, however, the scores from the remaining flow assessment sites (Appendix C Table 82) can be compared to previous years, and this shows the Liverpool Creek site improved from 'poor' to 'very good' whilst the scores for the two sites on the Johnstone River remained 61 ('good'), since the previous year.

Table 14 Rainfall type and number of flow assessment sites for 2024-25, and standardised flow indicator basin scores and grades for the 2024-25 and previous years.

Basin	Rainfall type	Number of assessment sites	Score and grade 24-25	Score and grade							
				23-24	22-23	21-22	20-21	19-20	18-19	17-18	16-17
Daintree	-		nd				nd	nd	nd	nd	nd
Mossman	Wet	1	61	57	61	75	95	75	61	95	95
Barron	Wet	7	74	46	78	77	69	80	65	51	62
Mulgrave	Wet	2	75	43	75	78	80	75	55	93	61
Russell	Wet	2	92	61	86	91	91	76	61	95	95
Johnstone	Wet	3*	64	60	72	77	96	92	66	97	96
Tully	Wet	2	61	60	80	95	100	61	43	99	80
Murray	Wet	2	85	65	75	61	78	61	68	78	61
Herbert	Wet	12	67	65	73	80	86	66	69	92	62

Standardised scoring range: ■ Very Poor = 0 to <21 | ■ Poor = 21 to <41 | ■ Moderate = 41 to <61 | ■ Good = 61 to <81 | ■ Very Good = 81 – 100. nd: no data available to assess the flow indicator for the Daintree Basin.
* The South Johnstone River at Upstream Central Mill site has been decommissioned as of 2024-25, meaning the Johnstone Basin flow assessment is now based upon four sites.

Key messages: flow

- Monthly rainfall in August and December was above average across the region.
- Intense rainfall events during February resulted in record monthly rainfall at locations in the lower Murray and lower Herbert basins.
- Since the previous year, the Herbert remained 'good', the Russell and Murray improved from 'good' to 'very good' and all other basins improved from 'moderate' to 'good'.
- 2024-5 had the return of more typical timing for the wet season rainfall and flow events across the region compared to 2023-24 when the region was affected by TC Jasper from mid-December.

- All flow assessments sites except Rudd Creek in the Herbert Basin, which was 'moderate', were graded either 'good' or 'very good'.
- Rudd Creek, which is an intermittently flowing system during average or drier conditions, had poorer scores due to higher flows during dry season months.

Habitat and hydrology index

The 2024-25 scores and grades for basin habitat and hydrology indicator categories and index are presented in Table 15. The habitat and hydrology indicator categories and index scores for basins from 2023-24 back to 2015-16 are presented in Appendix G Table 107 to Table 115.

Table 15 Results for habitat and hydrology indicator categories and index for 2024-25

Basin	Flow	Invasive weeds	Habitat modifi-cation	Riparian extent (change)	Wetland extent (change)	2024-25
Daintree	nd	54	100	99	54	77.3
Mossman	61	81	100	68	15	65.1
Barron	74	34	36	68	9	44.8
Mulgrave	75	43	100	78	31	65.9
Russell	92	41	100	79	25	67.7
Johnstone	64	24	98	74	19	56.3
Tully	61	71	52	72	15	54.8
Murray	85	19	100	75	20	60.2
Herbert	67	19	87	85	18	55.6

Scoring range: ■ Very Poor = 0 to <21 | ■ Poor = 21 to <41 | ■ Moderate = 41 to <61 | ■ Good = 61 to <81 | ■ Very Good = 81 – 100. nd indicates no data available. The habitat and hydrology index (scores in bold) is an average of the five indicator categories.

Confidence

Confidence for habitat and hydrology results are shown in Table 16. Confidence scores (1 – 3) for each criterion have been weighted according to the 2017 updated methods for assessing confidence (WTHWP 2017).

Table 16 Confidence associated with habitat and hydrology indicator results in basins.

	Maturity of method-ology (x0.36)	Valid-ation (x0.71)	Represent-ativeness (x2)	Direct-ness (x0.71)	Measured error (x0.71)	Final	Rank
Impoundment length	2	2	3	2	1	10.2	4
Riparian extent	2	2	2	2	2	8.9	3
Wetland extent	3	2	2	2	2	9.3	3
Invasive weeds	2	2	3	2	2	10.9	4
Flow: Mossman, Mulgrave, Russell, Tully, Murray	1	2	1	1	1	5.2	1
Flow: Barron, Johnstone, Herbert	1	2	2	1	1	7.2	2
Habitat and Hydrology							
Daintree	2.3	2	2.5	2	1.8	10.5	4
Mossman, Mulgrave, Russell, Tully, Murray	2	2	2.2	1.8	1.6	9.6	3
Barron, Johnstone, Herbert	2	2	2.4	1.8	1.6	9.8	3

Confidence criteria are scored 1-3 and then weighted by the value identified in parenthesis. Final scores (4.5 – 13.5) are the sum of the weighted confidence criteria. **Rank based on final score:** 1 (very low): 4.5 – 6.3; 2 (low): >6.3 – 8.1; 3 (moderate): >8.1 – 9.9; 4 (high): >9.9 – 11.7; 5 (very high): >11.7 – 13.5.

4.3. Fish

The basin fish index was not updated for 2024-25. The basin fish assessment commenced in the 2017-18 reporting period with assessments for the Mulgrave and Russell basins. The assessment was expanded in 2019-20 and surveys were conducted in all basins except for the Daintree. The assessment was updated in 2022-23 reporting period for the Herbert Basin from surveys conducted from 2021-22 across the basin. The assessment was updated in 2023-24 for all basins except the Herbert. The results and key messages from the most recent fish assessments are presented below.

The 2023-24 fish surveys included the Daintree for the first time and was the first comprehensive fish assessment for the Daintree Basin and covered 40 sites including both the Daintree River catchment and the Bloomfield River catchment. The number of sites surveyed, the total number of fish species caught, and the number of alien species (species introduced into Australia) and translocated species (Australian species moved to areas outside their natural distribution) caught for the 2023-24 reporting period for each basin and the 2022-23 reporting period for the Herbert Basin are presented in Table 17. The results for the proportion of indigenous fish species (POISE) caught and the proportion of non-indigenous fish (PONI) caught (comprised of the proportion of alien fish and translocated fish measures) are presented as indicator scores and standardised scores in Table 18. Further results of the fish assessment in Appendix D present the list of fish species caught in the

Wet Tropics region (Table 84), the fish species caught at the sites within each basin (Table 85 to Table 93), the translocated and alien species caught within each basin (Table 94) and box plots for sites within each basin in relation to the proportion of indigenous species expected indicator, and to the proportion of non-indigenous fish indicator, for each fish assessment period (Figure 25 and Figure 26). The scores and grades for the fish indicators and index for the 2019-20 and 2017-18 reporting years are presented in Appendix G Table 116 and Table 117.

Table 17 The number of sites surveyed, the total number of species caught, and the number of alien and translocated species caught, for each basin during the 2023-24 fish surveys, and 2021-22 (Herbert Basin only) fish surveys.

Survey period	Basin	Number of sites	Number of species caught	Number of alien species caught	Number of translocated species caught
2024	Daintree	40	35	1	2
2023	Mossman	12	21	2	0
2023	Barron	11	27	3	9
2023	Mulgrave	10	30	5	0
2023	Russell	10	29	2	0
2023	Johnstone	11	25	3	3
2023	Tully	10	30	4	1
2023	Murray	12	29	4	2
2021-22	Herbert	16	53	3	6

It is important to note that 'Translocated' refers to Australian native species that were found in waterways within which they do not naturally occur, and 'Alien' refers to fish species from outside of Australia. Some species are indigenous to the lowland sections of some basins but have been translocated to upper sections above waterfalls. This is particularly the case for the Barron Basin (Burrows 2004).

Translocation of fish species in the Wet Tropics region has occurred for over 100 years and more recently this activity has been regulated with the introduction of permits for fish stocking in 1996 (Burrows 2004). The stocking of fish under permits in the Wet Tropics region has been conducted in lower river reaches of the Barron, Mulgrave, Russell, Johnstone, Tully, Murray and Herbert and also in the more heavily stocked impoundments of Tinaroo Falls Dam (Barron River, Atherton Tablelands) and Koombooloomba Dam (headwaters of the Tully River) (Burrows 2004). Fish species stocked under permits in these two impoundments in recent years are barramundi (*Lates calcarifer*) and sooty grunter (*Hephaestus fuliginosus*), with limited stocking of northern saratoga (*Scleropages jardini*) in Tinaroo Falls Dam (Queensland Government 2020). These species do not naturally occur at these locations. Of these species, barramundi is unable to develop self-sustaining populations in impoundments due to its life cycle requirement for migration to marine environments to reproduce, whilst sooty grunter has established self-sustaining populations in Koombooloomba Dam (Burrows 2004). There has been no evidence that northern saratoga became successfully established in Lake Tinaroo (Queensland Government 2020). These populations can potentially contribute to the number of translocated fish reported for the fish assessment if they move from impoundments into connected waterways that are surveyed.

Table 18 Results for the freshwater basin fish indicators and index for 2023-24 and 2022-23.

		Fish indicator scores				Standardised scores		
Reporting period	**Basin**	**POISE**	Prop Trans	Prop Alien	**PONI**	**POISE**	**PONI**	**Fish**
2023-24	Daintree	0.85	0.00	0.00	0.00	85	100	**92**
	Mossman	0.72	0.00	0.00	0.00	68	100	**84**
	Barron	0.75	0.05	0.01	0.07	73	53	**63**
	Mulgrave	0.73	0.00	0.04	0.04	70	69	**69**
	Russell	0.84	0.00	0.01	0.01	84	91	**88**
	Johnstone	0.75	0.00	0.01	0.05	73	64	**69**
	Tully	0.71	0.00	0.00	0.00	68	100	**84**
	Murray	0.58	0.00	0.04	0.04	48	71	**60**
2022-23	Herbert	0.73	0.00	0.00	0.01	70	95	**83**

Fish indicator scoring range POISE: Very Poor = 0 to <0.4 | Poor = 0.4 to <0.53 | Moderate = 0.53 to <0.67 | Good = 0.67 to <0.8 | Very Good = 0.8 – 1; **PropTrans, PropAlien, PONI:** Very Poor = >0.2 to 1 | Poor = >0.1 to 0.2 | Moderate = >0.05 to 0.1 | Good = >0.03 to 0.05 | Very Good = 0 to 0.03. **Standardised scoring range:** Very Poor = 0 to <21 | Poor = 21 to <41 | Moderate = 41 to <61 | Good = 61 to <81 | Very Good = 81 – 100. Fish indicator scores are the proportion of indigenous species expected (POISE), and proportion of non-indigenous fish (PONI). The PONI indicator is the median of the proportion of translocated fish (PropTrans) and proportion of alien fish (PropAlien) measures summed for each site, consequently an indicator score of 0.00 can be achieved if the majority of sites have a proportion equal to zero. nd indicates no data available.

The Mulgrave and the Murray basins had substantial declines in the fish index score since their previous assessment. The Mulgrave declined from 'very good' to 'good' with the score decreasing from 84 to 69. This was predominantly due to the drop in score and grade for the PONI indicator. Since the last assessment, the proportion of non-indigenous fish numbers increased. These were all alien species, and the number of alien species caught increased from three (spotted tilapia (*Pelmatolapia mariae*), guppy (*Poecilia reticulata*) and platy (*Xiphophorus maculatus*)) to five (adding Mozambique tilapia (*Oreochromis mossambicus*) and swordtail (*Xiphophorus hellerii*)). Six out of the 10 sites had zero or low numbers of alien fish whilst the other four sites had substantially higher numbers of alien fish caught. All sites for the Mulgrave were coastal and two sites with higher numbers of alien fish were in areas of high modification due to recent and past highway construction (Wrights Creek catchment, WTW 2026 (Methods Technical Report Appendix F)), with the other two sites occurring in areas of agricultural land use. Whether the change in PONI score is due to temporal variability or represents an increase in distribution and/or populations of alien species in coastal freshwater streams of the Mulgrave requires further investigation.

The Murray declined from 'good' to 'moderate' with the score decreasing from 80 to 60. This was predominantly due to the drop in score and grade for the POISE indicator. Since the last assessment, the number of indigenous species caught compared to the expected number declined across sites. Indigenous fish species including flagtail perchlet (*Ambassis miops*), black spine-cheek gudgeon (*Eleotris melanosoma*) and silver biddy (*Gerres filamentosus*) were caught in 2019-20 surveys but not in 2023 surveys.

The fish index for the Mossman basin improved in grade from 'good' to 'very good' with the score increasing from 77 to 84, which was due to the change of grade and score for POISE from 'moderate' (55) to 'good' (68) reflecting an improvement in the proportion of expected indigenous species

caught. The Barron Basin improved in grade from 'moderate' to 'good' with the score increasing from 48 to 63, which was due to improved grades and scores for both indicators, with POISE rising from 'moderate' (60) to 'good' (73) and PONI rising from 'poor' (35) to moderate (53).

The Daintree was the highest scoring basin with a fish index score of 92 and grades of 'very good' for both POISE and PONI. The basin had the highest diversity of indigenous fish species (32) which included the endangered Bloomfield River cod (*Guyu wujalwujalensis*) which is endemic to the Bloomfield catchment, and other species not captured in the other basins (barhead pipefish (*Coelonotus* c.f. *leiaspis*) and freshwater moray (*Gymnothorax polyuranodon*)). The basin also had the lowest diversity of alien species captured, with only the guppy (*Poecilia reticulata*), caught at 6 sites across the Daintree and Bloomfield river catchments. Other notable findings from the Daintree Basin fish assessment include the following.

- The known range of the endangered Bloomfield River cod was substantially increased with its distribution confirmed at multiple sites in Bairds Creek subcatchment of the upper Bloomfield River catchment. This adds to its known distribution within Roaring Meg Creek (upper Bloomfield).
- New records of the alien species *Poecilia reticulata* (guppies) at sites within the Daintree and Bloomfield river catchments.
- The presence of the translocated predatory species *Hephaestus tulliensis* (Tully grunter) was confirmed in Roaring Meg Creek (upper Bloomfield) and at sites in the Stewart Creek subcatchment of the Daintree River.
- New information of the distribution of the translocated Wet Tropics tandan (*Tandanus tropicanus*) across multiple sites within the Daintree and Bloomfield river catchments.

The 2022-23 results for the Herbert were based on surveys at fewer sites in the upper Herbert Basin and four additional sites in the coastal areas of the Herbert Basin compared to the previous assessment. Since the previous assessment, the fish index remained 'very good', POISE declined from 'very good' to 'good', and PONI remained 'very good' and increased in score. The sites in the upper basin have a much lower number of expected indigenous species than the coastal sites, and typically scored higher for POISE, whilst the scores for PONI were typically higher for the coastal sites which tended to have higher species diversity and abundance of native fish. Fish communities are separated between the coastal waterways and upper catchments of the Herbert Basin by the Herbert River Gorge which is a physical barriers of the mountainous terrain.

Whilst the 2019-20 and 2022-23 results for the Herbert Basin had 'very good' grades for the proportion of non-indigenous fish numbers across the survey sites, the highly invasive species Mozambique tilapia (*Oreochromis mossambicus*) was detected during both survey runs. For the 2019-20 surveys (reported for 2019-20), the species was present at low numbers at three sites in the upper Herbert Basin (Rudd Creek, Wild River and Herbert River), and in the 2021-22 surveys (reported for 2022-23), the species was present at higher numbers across two sites in the upper Herbert Basin (Rudd Creek and Herbert River) and was also present in the main channel of the Herbert River in the lower basin. More recent fish monitoring in the Herbert Basin (2022-23) as part of the Fish Homes and Highways fish barrier project (Terrain NRM 2024) has detected the presence of *O. mossambicus* at Tyto wetlands on Log Bridge Creek, a tributary of Palm Creek which drains into the main channel of the Herbert River in the lower basin. Multiple fish surveys for this project have caught increasing numbers of *O. mossambicus* over 18 months period at the Tyto Wetland site.

These findings demonstrate the importance of freshwater fish surveys to detect changes in the distribution and abundance of invasive fish species and identify locations and spread of invasive fish species such as *O. mossambicus* to enable targeted management and control.

Fish stocking

From the Queensland Department of Agriculture and Fisheries fish stocking records in Wet Tropics basins for 2010 to 2018, the only species stocked during this period has been barramundi. The most recent stocking and the most fish stocked has been in impoundments with Tinaroo Falls Dam receiving the greatest numbers (Table 19). Numbers stocked into rivers was highest for the Herbert River but occurred in 2010 whilst lower numbers were stocked into the other river locations in the Mulgrave and Russell basins during 2012 (Table 19). The most likely influence of fish stocking on survey results would be linked to the impoundments in the Barron and Tully basins due to the high numbers stocked and the more recent stocking events. There were no barramundi recorded during assessments at sites within the Barron Basin and the species was only recorded at two Tully sites, both in lowland tributaries of the Tully River (Appendix D), demonstrating that stocked barramundi could not have had a substantial effect on Report Card results.

Table 19 Barramundi stocking locations, year and numbers stocked for the Wet Tropics region from 2010 to 2018.

Basin	Location	Year	Total stocked
Barron	Barron River	2012	500
	Tinaroo Falls Dam	2010-18	141007
	Copperlode Dam	2016-17	26925
Mulgrave	Trinity Inlet	2012	500
	Mulgrave River	2012	500
Russell	Russell River	2012	500
Tully	Koombooloomba Dam	2010-2018	15370
Herbert	Herbert River	2010	8741

Data source: Queensland Government (https://www.data.qld.gov.au/dataset/queensland-freshwater-fish-stocking-records)

Key messages: fish

2023-24 assessment period (all basins except the Herbert)

- The Daintree Basin had the highest indigenous species diversity, the lowest number of alien species (a single species) and had the highest fish index score.
- All basins, except for the Barron and Johnstone, were graded ‘good’ or ‘very good’ for the proportion of non-indigenous fish indicator (PONI) meaning they had low proportion of translocated and alien species.
- All basins, except for the Murray, were graded ‘good’ or ‘very good’ for the proportion of indigenous species expected (POISE), whilst Murray declined from ‘good’ to ‘moderate’ for this indicator. Several species of indigenous fish species were caught in 2019-20 surveys but not in 2023 surveys of the Murray.
- The fish index for the Mossman Basin improved in grade from ‘good’ to ‘very good’ reflecting an improvement in the proportion of expected indigenous species caught.

- The Barron Basin improved in grade from 'moderate' to 'good' due to improved grades and scores for both the proportion of indigenous species expected and the proportion of non-indigenous fish indicators.
- The known range of the endangered Bloomfield River cod was substantially increased with its distribution confirmed at multiple sites within an additional subcatchment of the upper Bloomfield River (Daintree Basin).

2022-23 assessment period (Herbert basin only)

- The fish index remained 'very good' for the Herbert Basin.
- The proportion of indigenous species expected declined from 'very good' to 'good' whilst the proportion of non-indigenous fish (translocated and alien species) remained 'very good'.

Fish communities and risk to species from pesticides

Whilst the 2019-20 risk assessment of pesticides identified high risk to species of biota for the Murray River (graded 'poor' with 80 - <90% of species protected), the health of the waterways in terms of the fish index for the Murray basin (based upon fish species counts and species diversity but not species population health) was graded 'good'. The pesticide risk metric is based on the results of toxicity tests (generally under laboratory or mesocosm conditions) that provide measures of the effects of pesticides upon a wide range of (predominantly non-fish) species. The species most at risk from pesticides depends on the type of pesticides that they are exposed to. This occurs because pesticides are designed to kill or knock down 'pest' species. Ideally, pesticides target the pest organism with minimal effects on non-target organisms. For example, herbicides are designed to target plants (weeds); therefore (in general) they are a higher risk to other phototrophic species, i.e. algae and aquatic plants (including seagrass and coral), but a lower risk to animal species. In contrast, insecticides are designed to target insects, and therefore are (in general) a higher risk to aquatic insects and other arthropods (e.g. crabs, lobsters, prawns and copepods), but a lower risk to plant and other non-invertebrate animal species. That said, many of the organisms upon which the effects of pesticides have been tested are likely to be components of fish habitat (e.g. aquatic algae and plants) and diet (e.g. aquatic macroinvertebrates). These indirect impacts to the non-target organisms in catchments exposed to pesticide risk are still unknown at this stage and require further investigation.

Additional information is provided in Appendix E about the pesticide risk metric, how pesticides can interact with waterway ecosystems and how to interpret the scoring ranges including per cent of species protected.

Confidence

Confidence fish indicator results are shown in Table 20. Confidence scores (1 – 3) for each criterion have been weighted according to the revised methods for assessing confidence (WTHWP 2017).

Table 20 Confidence associated with fish indicator results in basins.

	Maturity of methodology (x0.36)	Validation (x0.71)	Represent-ativeness (x2)	Direct-ness (x0.71)	Measured error (x0.71)	Final	Rank
Native richness	1	2	2	3	1	8.6	3
Pest fish relative abundance	1	2	2	3	1	8.6	3
Fish index	1	2	2	3	1	8.6	3

Confidence criteria are scored 1-3 and then weighted by the value identified in parenthesis. Final scores (4.5 – 13.5) are the sum of the weighted confidence criteria. **Rank based on final score:** 1 (very low): 4.5 – 6.3; 2 (low): >6.3 – 8.1; 3 (moderate): >8.1 – 9.9; 4 (high): >9.9 – 11.7; 5 (very high): >11.7 – 13.5.

4.4. Overall basin scores and grades

The index and overall scores and grades for 2024-25 are presented in Table 21, and the overall scores and grades for each reporting year are presented in Table 22. The overall score is averaged from the water quality, habitat and hydrology and fish indices. When comparing overall scores and grades between years it is important to note that differences relate to the addition of indicators as well as changes in scores over time. The habitat and hydrology index scores represent the addition of indicators for invasive weeds in 2015-16 (updated every four years) and flow in 2016-17 (updated annually), with updates to the wetland extent (2024-25), impoundment length (2022-23) and invasive weeds (2019-20). The riparian extent, (first reported for 2014-15) has not been updated as yet. The water quality index scores have been updated annually. Fish assessment reporting began in 2017-18 for the Mulgrave and Russell basins and has since been expanded to all basins.

Table 21 Index and overall scores and grades for 2024-25.

Basins	Water quality	Habitat and hydrology	Fish	Overall
Daintree	91	77	92	87
Mossman	79	65	84	76
Barron	64	44	63	57
Mulgrave	72	65	69	69
Russell	73	67	88	76
Johnstone	72	56	69	65
Tully	64	54	84	67
Murray	55	60	60	58
Herbert	68	55	83	68

Scoring range: ■ Very Poor = 0 to <21 | ■ Poor = 21 to <41 | ■ Moderate = 41 to <61 | ■ Good = 61 to <81 | ■ Very Good = 81 – 100.

Table 22 Overall basins scores and grades for 2024-25 and all previous years.

Basins	24-25	23-24	22-23	21-22	20-21	19-20	18-19	17-18	16-17	15-16
Daintree	87	84	79	83	83	85	82	81	81*	81*
Mossman	76	70	70¥	69¥	72¥	74¥	63	67	63*	55*
Barron	57	55	52¥	56¥	54¥	54¥	61	61	64	63
Mulgrave	69	67	74¥	73¥	74¥	73¥	68¥	71¥	64	64
Russell	76	76	78¥	78¥	79¥	75¥	75¥	75¥	70	68
Johnstone	65	66	68¥	67¥	70¥	71¥	67	67	68	68
Tully	67	70	71¥	72¥	75¥	72¥	61	64	64	61
Murray	58	56	63¥	64¥	63¥	61¥	57	59*	55*	54*
Herbert	68	70	68¥	71¥	70¥	71¥	59	66	66	67

Scoring range: ■ Very Poor = 0 to <21 | ■ Poor = 21 to <41 | ■ Moderate = 41 to <61 | ■ Good = 61 to <81 | ■ Very Good = 81 – 100. *Scores do not include the water quality index and represent habitat and hydrology index only. ¥Score includes the fish index for years up to 2022-23, note that as from 2023-24 all basins included fish index scores.

5. ESTUARIES

The locations of the estuary reporting zones are shown in Figure 11. Monitoring and assessment of estuarine indicators was conducted in the vicinity of the reporting zone locations as described in the methods technical report (WTW 2026).

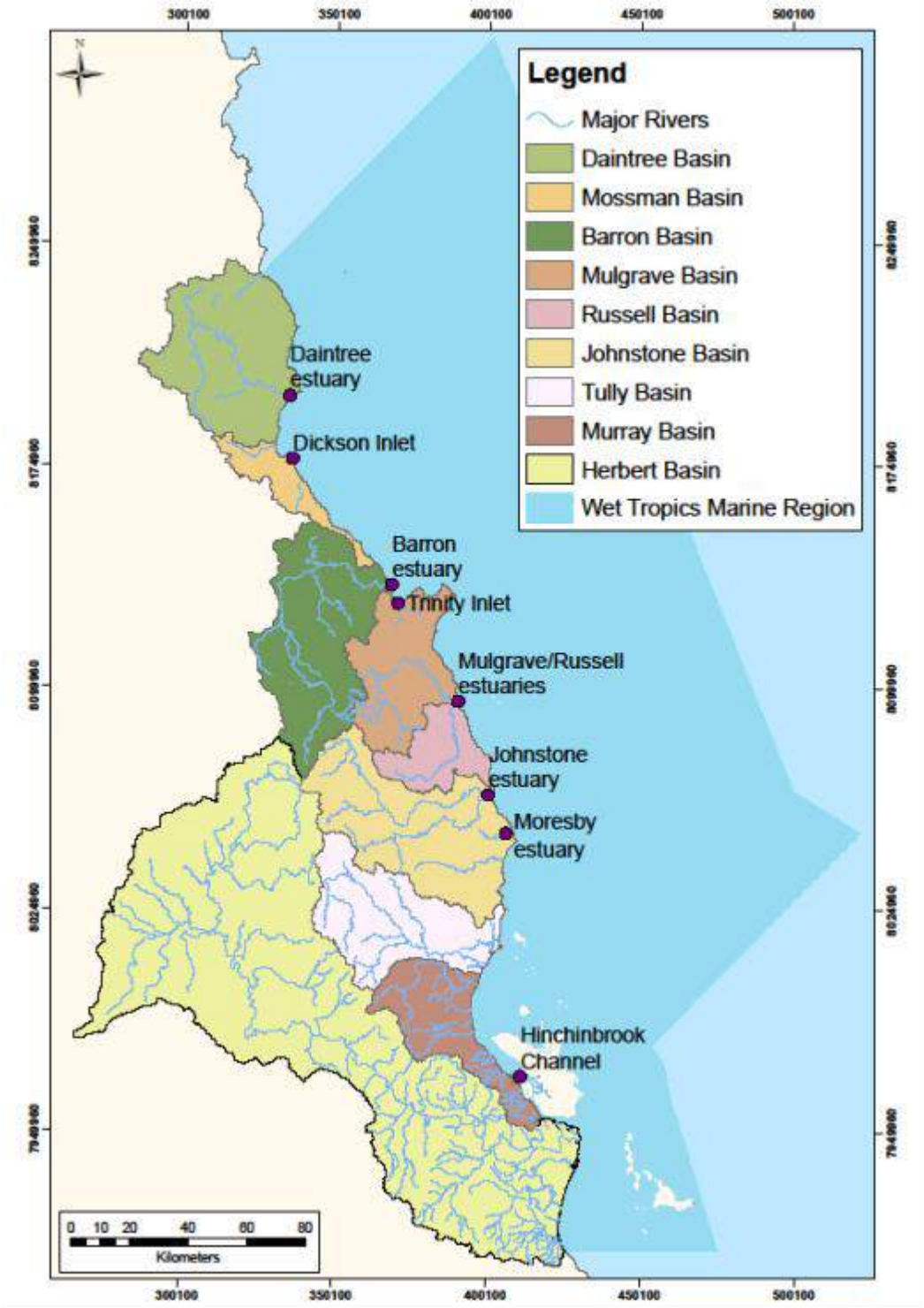

Figure 11 Location of estuary reporting zones.

5.1. Water Quality

Details of the monitoring frequency, indicators, and sample and site locations are provided in the methods technical report (WTW 2026). The water quality index is comprised of pesticides (pesticide risk), phys-chem (turbidity and dissolved oxygen), nutrients (dissolved inorganic nitrogen and filterable reactive phosphorus) and chlorophyll *a*.

The water quality index grades for 2024-25 were unchanged from the previous year for all estuaries except for Trinity Inlet and Moresby which both improved from 'moderate' to 'good', and Dickson Inlet which declined from 'very good' to 'good'.

Table 23 Estuary water quality index scores and grades for all years.

Estuary	Water quality									
	24-25	23-24	22-23	21-22	20-21	19-20	18-19	17-18	16-17	15-16
Daintree	80	70	78	79	88	92	81	85	80	79
Dickson Inlet	78	81	72	71	82	81	83	80	64	nd
Barron	60	55	45	46	70	60	61	66	64	50
Trinity Inlet	65	59	69	73	73	70	58	65	78	83
Russell-Mulgrave	73	71	70	72	79	80	72	66	75	78
Johnstone	73	67	68	67	77	76	76	67	72	63
Moresby	71	55	71	67	76	83	80	79	81	78
Hinchinbrook Channel	65	63	73	73	79	85	77	82	90	85

Scoring range: Very Poor = 0 to <21 | Poor = 21 to <41 | Moderate = 41 to <61 | Good = 61 to <81 | Very Good = 81 – 100. nd indicates no data available.

Pesticides

For the three estuaries where pesticides are reported, the monitoring sites are the GBR CLMP end of system sites as used for freshwater basins. Sampling for pesticides was expanded in 2017-18 and 2018-19 in order to populate the Pesticide Risk Baseline, and dropped back to a more routine sampling regime in 2019-20 which did not include the Barron estuary. The pesticide risk metric (PRM) value for the Russell-Mulgrave was calculated as the average value of the two basins. The PRM values (expressed as a percentage of species protected) represent the average pesticide risk over the wet season for 182 days when exposed to a mixture of up to 22 different pesticides, including nine PSII herbicides (Photosystem II inhibitors), 10 non PSII herbicides and three insecticides. The 22 pesticides and their mode of action are listed in Section 2.2.1 of the methods technical report (WTW 2026). The wet season is determined as commencing when a rise in river water level occurs, but which is co-incident with an increase in aqueous pesticide concentrations (Warne *et al*. 2020 and Warne *et al*. 2023). For each estuary the PRM score is presented in Table 24 and the relative contributions of chemicals to pesticide risk for 2024-25 and previous years at the basin pesticide sites used for estuary reporting are presented in Figure 12 (note that results for Russell and Mulgrave are provided separately). The standardised scores for pesticides are presented in Table 24 and Table 25 for 2024-25 and in Appendix G Table 118 to Table 126 for the previous reporting years. Note that for 2016-17 and 2015-16 the PRM was calculated from 13 PSII herbicides. The back-calculated PRM for 2016-17 for the 22 pesticides was provided for reference in the results technical report for 2017-18 (WTW 2019).

Table 24 The percentage of species protected for estuaries using the pesticide risk metric, based upon 22 pesticides, and the standardised pesticide scores for the 2024-25 reporting period.

Estuary	Pesticide risk metric Percent species protected	Standardised score
Daintree	> 99	98
Russell-Mulgrave	97.2	71
Johnstone (Coquette Point)	97.0	71

Pesticide risk metric scoring range: ■ Very Poor = <80% (very high risk)| ■ Poor = <90 to 80% (high risk)| ■ Moderate = <95 to 90% (moderate risk)| ■ Good = <99 to 95% (low risk)| ■ Very Good = ≥99% (very low risk). **Standardised scoring range:** ■ Very Poor = 0 to <21 | ■ Poor = 21 to <41 | ■ Moderate = 41 to <61 | ■ Good = 61 to <81 | ■ Very Good = 81 – 100. Note that the most recent result for the Barron estuary was for 2018-19 with > 99% percentage of species protected.

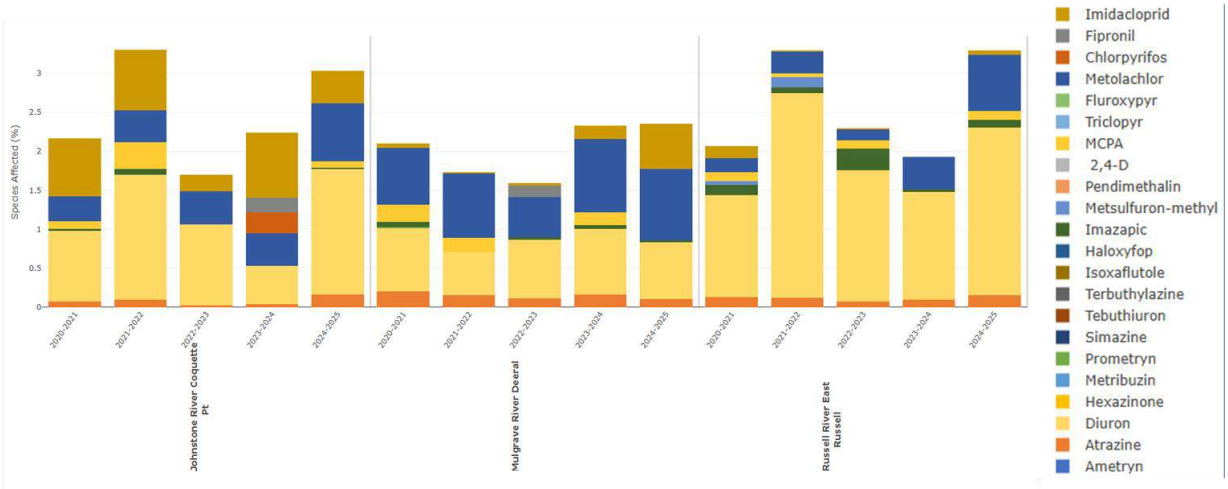

Figure 12 The relative contribution of pesticide types at Johnstone, Mulgrave and Russell pesticide monitoring sites for 2020-21, to 2024-25. Of the full suite of 22 pesticides only those that contributed >0.1% of the toxicity are shown (the remainder had negligible contribution to toxicity).

Source: Pesticide Risk Metric produced through the Queensland Government Department of the Environment, Tourism, Science and Innovation. Note: the Daintree site was excluded due to the very low concentrations recorded.

For pesticides in 2024-25 the Daintree estuary was graded 'very good' and the Russell-Mulgrave and Johnstone estuaries were graded 'good' which equates to pesticide toxicity of very low risk and low risk, respectively. In comparison to 2023-24, the pesticide score increased from 86 to 98 in the Daintree, whilst the Russell-Mulgrave and Johnstone both declined from 75 to 71 (Table 25 and Appendix G Table 118). The major contributing chemicals were diuron (PSII herbicide) and metolachlor (other herbicide) at the Mulgrave, Russell and Johnstone sites, with imidacloprid (pesticide) also contributing at the Mulgrave and Johnstone sites (Figure 12). Contributing chemicals are not reported at the Daintree site due to the very low concentrations recorded.

Key messages: pesticides.

- Estuaries with pesticide monitoring (Daintree, Russell-Mulgrave and Johnstone) were at low risk or very low risk from pesticide toxicity.
- Grades for pesticides in 2024-25 remained the same for all three monitored estuaries.
- The risk metric score improved for the Daintree estuary and declined for Russell-Mulgrave and Johnstone estuaries, since the previous year.
- For the Russell-Mulgrave estuary and Johnstone estuary diuron, metolachlor and imidacloprid were the major contributing chemicals.

Whilst there is no targeted monitoring of pesticides in the Hinchinbrook Channel, both the Murray River and Herbert River are monitored for pesticides and drain into the north and the south of the channel, respectively. The additional monitoring site on Catherina Creek (reported in Appendix B p. 104) also drains into the Herbert River close to the river mouth. The pesticide monitoring data, particularly the relative contribution of chemicals for these rivers (Figure 8 and Appendix B Figure 22) can provide insight into pesticide types and risk of waters entering the channel noting that dilution of river discharge occurs when mixing with the enclosed coastal waters of the channel.

Additional information is provided in Appendix E about the pesticide risk metric, how pesticides can interact with waterway ecosystems and how to interpret the scoring ranges including per cent of species protected.

Chlorophyll *a*, nutrients and physical-chemical

The scores and grades for the water quality index for all reporting years are presented in Table 23. The scores and grades for the water quality indicators, indicator categories and water quality index for 2024-25 are presented in Table 25. The scores and grades for indicators, indicator categories and water quality indices from previous reporting years (2023-24 back to 2015-16) are presented in Appendix G Table 118 to Table 126. Water quality scores for 2014-15 are available from the results visualisations at the WTW website. For estuary reporting zones where more than one water type is monitored, the annual scores and grades for chlorophyll *a*, turbidity, dissolved oxygen, dissolved inorganic nitrogen (DIN) and filterable reactive phosphorus (FRP) are aggregated from mid-estuary and lower estuary/enclosed coastal water types. The annual medians, condition scores and grades for each reporting zone are presented in Appendix B Table 67 to Table 74.

Table 25 Scores and grades for estuary water quality indicator, indicator category and index (WQ) for 2024-25, and WQ index for 2023-24.

	Chl *a*	Nutrients			Phys/Chem				Pest-icides	WQ	WQ 23-24
Estuary	Chl *a*	DIN	FRP	**Nut-rients**	Turb-idity	DO Low	DO High	**Phys/ Chem**	Pest-icides		
Daintree	**56**	66	90	**78**	90	90	90	**90**	**98**	**80**	**70**
Dickson Inlet	**90**	67	65	**66**	90	70	90	**80**	**nd**	**78**	**81**
Barron	**53**	31	59	**45**	90	73	85	**81**	**nd**	**60**	**55**
Trinity Inlet	**61**	72	72	**72**	90	34	90	**62**	**nd**	**65**	**59**
Russell-Mulgrave	**90**	43	80	**62**	84	56	90	**70**	**71**	**73**	**71**
Johnstone	**90**	22	61	**41**	90	90	90	**90**	**71**	**73**	**67**
Moresby	**60**	65	90	**77**	90	63	90	**76**	**nd**	**71**	**55**
Hinchinbrook Channel	**32**	90	90	**90**	74	76	90	**75**	**nd**	**65**	**63**

Scoring range: ■ Very Poor = 0 to <21 | ■ Poor = 21 to <41 | ■ Moderate = 41 to <61 | ■ Good = 61 to <81 | ■ Very Good = 81 – 100. Risk metric scores for pesticide are from GBR CLMP sites as per freshwater basins. nd indicates no data available. For each estuary DIN and FRP indicator values are averaged to provide the Nutrient indicator category score (presented in bold) and that the turbidity and DO indicator scores (using the lowest of the two DO values) are averaged to provide the Phys/Chem indicator score (presented in bold). The indicator categories (Chl *a*, nutrients, Phys/Chem and Pesticides) are averaged to provide the WQ score (all presented in bold). **Note:** Pesticides are from GBR CLMP high flow data as per freshwater basins.

For chlorophyll *a* in 2024-25, the grades for Dickson Inlet, Russell-Mulgrave and Johnstone all remained 'very good' and Hinchinbrook Channel remained 'poor', the Daintree improved from 'poor' to 'moderate', Trinity Inlet improved from 'moderate' to 'good', the Moresby improved from 'very poor' to 'moderate' whilst the Barron declined from 'good' to 'moderate'. With the exceptions of the Barron and the Johnstone, all estuaries increased in score since the previous year meaning their median annual chlorophyll *a* concentrations were lower. The largest increase in score was 14 to 60 for the Moresby. The chlorophyll *a* results for 2024-25 show a general improvement across the region since 2023-24, and particularly for the Daintree, Trinity Inlet, Moresby and Hinchinbrook estuaries which all had their lowest score for chlorophyll *a* over the 11 years since commencement of the Wet Tropics Report Card (Figure 13). Conditions that could promote biomass of phytoplankton and the high chlorophyll *a* concentrations that have been recorded in the estuaries include increased quantities of bioavailable nutrients such as DIN and FRP for phytoplankton growth, and longer residence times which allow for phytoplankton populations to develop and grow. Flood events mobilise and transport nutrients to river mouths and the shape, size and structure of estuaries can regulate water movement including flows entering from river catchments, tidal influences and residence times. Further investigation is required to identify the conditions that have led to past increases of chlorophyll *a* concentrations for these four estuaries.

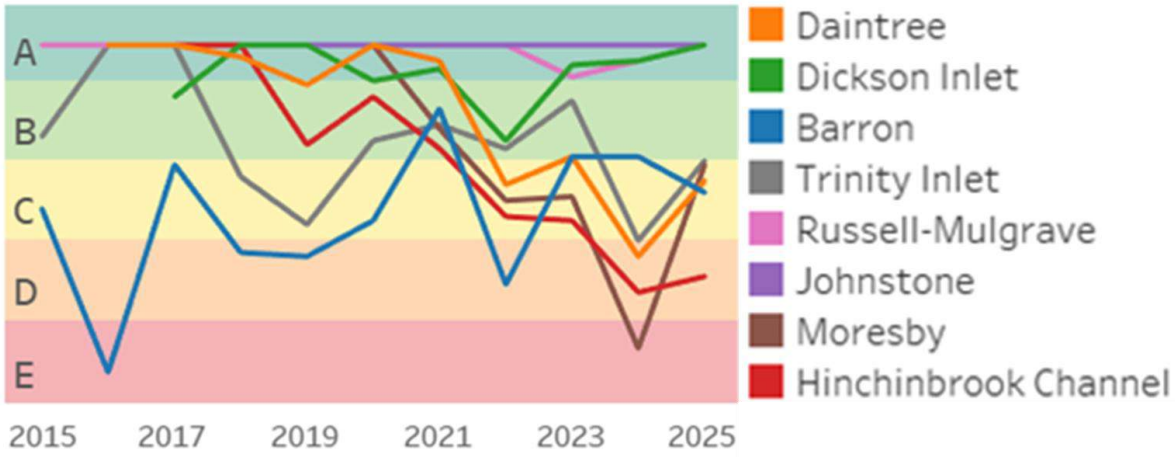

Figure 13 Chlorophyll *a* grades and scores for all estuaries from 2014-15 to 2024-25. (E – very poor (0-20), D – poor (21-40), C – moderate (41-60), B – good (61-80), A – very good (81-100)).

Notable changes to the DIN indicator since the previous year were an improvement from 'moderate' to 'good' for Trinity Inlet, 'poor' to 'moderate' for Russell-Mulgrave, and from 'very poor' to 'poor' for Johnstone. All other estuary grades for DIN remained unchanged. Since the previous year FRP declined from 'very good' to 'good' for Dickson Inlet and Trinity Inlet, and improved from 'poor' to 'moderate' for the Barron and from 'moderate' to 'good' for the Johnstone. The FRP score for Russell-Mulgrave increased from 61 to 80 and the grade remained 'good'. FRP grades for all other estuaries were unchanged from the previous year.

For turbidity all estuaries were graded 'very good' except for Hinchinbrook Channel which was 'good'. Since the previous year the Daintree, Barron, Johnstone and Moresby all improved from 'good' to 'very good'.

Dissolved oxygen grades declined from 'good' to 'moderate' for the Russell-Mulgrave, improved from 'good' to 'very good' for the Johnstone, remained 'very good' for the Daintree and remained 'good' for all other estuaries except Trinity Inlet which remained 'poor'.

Over the last seven years Trinity Inlet has consistently scored substantially lower than all other estuaries for dissolved oxygen (Figure 14). Trinity Inlet is a relatively large estuary in the Wet Tropics comprised of a network of mangrove channels and receives freshwater flows from a small sub-catchment of the Mulgrave Basin. The Trinity Inlet sub-catchment also includes a substantial urban footprint with waterways such as Chinaman Creek and Wrights Creek draining areas with some of the highest levels of residential and industrial development within the Wet Tropics region. The limited supply of freshwater draining into the estuary and inputs from surrounding urban environment may result in lower dissolved oxygen saturation compared to smaller estuaries fed by catchments with greater freshwater flows and lower levels of urban development. An assessment of available long-term monitoring dissolved oxygen saturation data for Trinity Inlet collected by the Queensland Department of Environment and Science was presented in WTW 2022 (Appendix B p.132). The historical data was collected at sites across a greater spatial coverage of the estuary than the sites used for the Wet Tropics Report Card, which are located in the western arm and were established to inform the Receiving Environment Monitoring Plan (REMP) for Cairns Regional

Council. The long-term monitoring sites show a gradient of dissolved oxygen saturation which is highest at downstream sites and lowest at upstream sites on the western arm. The gradient is likely due to a positive effect of tidal waters on dissolved oxygen saturation which reduces with distance from estuary mouth, the influence of land use development on water quality along the western arm, and the limited freshwater inflows.

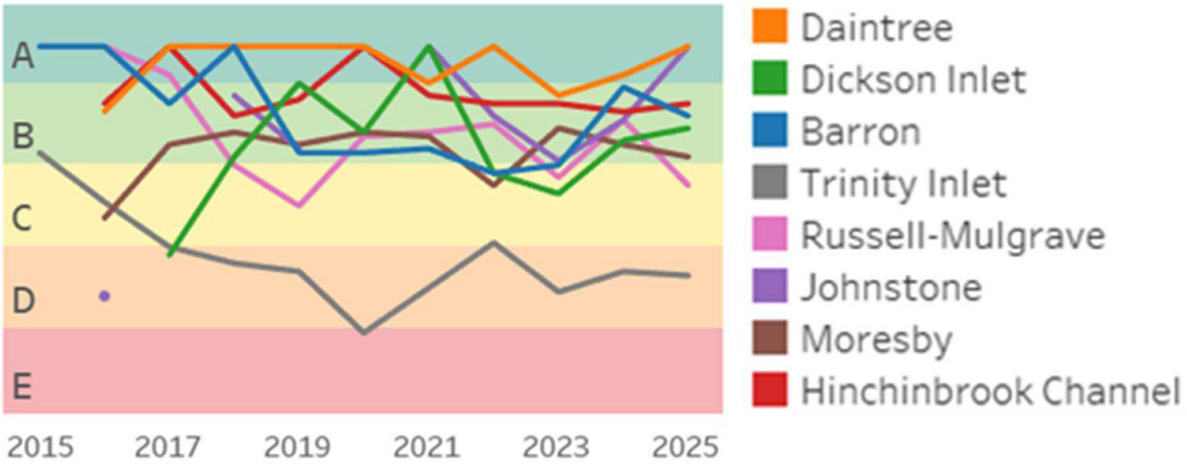

Figure 14 Dissolved oxygen (percent saturation (low)) grades and scores for all estuaries from 2014-15 to 2024-25. (E – very poor (0-20), D – poor (21-40), C – moderate (41-60), B – good (61-80), A – very good (81-100)).

Key messages: chlorophyll *a*, nutrients, physical-chemical.

- Chlorophyll *a* had a general improvement across the region since 2023-24, particularly for the Daintree, Trinity Inlet, Moresby and Hinchinbrook estuaries.
- DIN improved from 'moderate' to 'good' for Trinity Inlet, and from 'very poor' to 'poor' for the Johnstone.
- For turbidity all estuaries were graded 'very good' except for Hinchinbrook Channel which was 'good'. Since the previous year the Daintree, Barron, Johnstone and Moresby all improved from 'good' to 'very good'.
- Dissolved oxygen grades declined from 'good' to 'moderate' for the Russell-Mulgrave, improved from 'good' to 'very good' for the Johnstone.
- Over the last eight years Trinity Inlet has consistently scored substantially lower than all other estuaries for dissolved oxygen.

On the 29th September 2025, Trinity Inlet was impacted by a chemical spill, with 10,000 litres of kerosene and bitumen entering Smiths Creek from the Boral asphalt site as reported by the Queensland Government. This event occurred after the 2024-25 reporting period and the waterway health results for Trinity Inlet in this report do not cover impacts from the incident. The Traditional Owners for the waterways that include Trinity Inlet, the Gimuy Walubara Yidinji Elders Aboriginal Corporation, have been conducting extensive water quality and ecological health monitoring in collaboration with CSIRO in Trinity Inlet for several years. It is expected that waterway health data sourced from the Gimuy Walubara Yidinji Elders Aboriginal Corporation monitoring, in addition to Queensland Government and Cairns Regional Council monitoring will be available for the Wet

Tropics Waterways to provide information on waterway health impacts from the incident for the 2025-26 reporting year.

Confidence

Confidence scores are presented in Table 26. Confidence scores (1 – 3) have been weighted according to the 2017 updated methods for assessing confidence (WTHWP 2017). Confidence in pesticides is expected to improve as the methodology and analysis of the pesticide risk metric calculations progress in subsequent years.

Table 26 Confidence for water quality indicator categories and index in estuary reporting zones.

	Maturity of methodology (x0.36)	Validation (x0.71)	Represent-ativeness (x2)	Directness (x0.71)	Measured error (x0.71)		
Indicator categories							
Phys-chem	3	3	1*, 1.5	3	1[#], 2		
Nutrients	3	3	1*, 1.5	3	1[#], 2		
Chl-*a*	3	3	1*, 1.5	3	1[#], 2		
Pesticides[$]	3	2.1	1	2.5	2		
Water quality Index						**Final score**	**Rank**
Daintree	3	2.9	1.4	2.8	2	**9.4**	**3**
Dickson Inlet	3	3	1	3	1	**8.1**	**2**
Barron	3	3	1	3	2	**8.8**	**3**
Trinity Inlet	3	3	1.5	3	2	**9.8**	**3**
Russell-Mulgrave	3	2.9	1	2.8	2	**8.6**	**3**
Johnstone	3	2.9	1	2.8	1.3	**8.1**	**2**
Moresby, Hinchinbrook Channel	3	3	1.5	3	2	**9.8**	**3**

[$]Pesticide scores apply to Daintree, Russell-Mulgrave and Johnstone estuaries. *The lower representativeness score applies to Dickson Inlet, Barron, Russell-Mulgrave and Johnstone estuaries due to a lower frequency of sampling events for their monitoring programs. [#]The lower measured error score applies to Dickson Inlet and the Johnstone estuary due to differences in quality assurance and quality control of the monitoring program. Confidence criteria are scored 1-3 and then weighted by the value identified in parenthesis. Final scores (4.5 – 13.5) are the sum of the weighted confidence criteria. **Rank based on final score:** 1 (very low): 4.5 – 6.3; 2 (low): >6.3 – 8.1; 3 (moderate): >8.1 – 9.9; 4 (high): >9.9 – 11.7; 5 (very high): >11.7 – 13.5.

5.2. Habitat and Hydrology

The habitat and hydrology index consists of: estuary fish barriers, flow, riparian extent, mangrove and saltmarsh extent, mangrove habitat condition, and seagrass condition (for estuaries where it is known to be a significant habitat). Of these, three are longer-term indicators that are intended to be updated every four years: mangrove and saltmarsh extent (updated for 2024-25), riparian extent (updated for 2024-25) and fish barriers (Hinchinbrook Channel updated for 2022-23, Daintree, Dickson Inlet and Barron updated for 2021-22). The indicator for shoreline mangrove habitat condition was introduced in 2020-21 and provides measures of condition to complement mangrove extent reporting. Initially, shoreline mangrove habitat condition was reported for the Daintree, Dickson Inlet, Barron, Trinity Inlet and Russell-Mulgrave estuaries. For 2024-25 shoreline mangrove habitat condition assessments were completed for Barron, Johnstone, Moresby and Hinchinbrook Channel estuaries.

The Program Design (WTHWP 2018) provides the full schedule for when new data are to be presented for longer-term indicators that are reported for periods longer than a year. The fish barrier results were incorporated from 2015-16, and the flow indicator, which commenced in 2016-17, has been updated annually. Seagrass indicators for Trinity Inlet and Moresby River have been updated each year.

The habitat and hydrology index scores and grades for all reporting years are presented in Table 27. The index scores have remained fairly consistent over reporting years with little change in grades (Table 27). For 2024-25 the largest changes in score were for the Barron (44 to 53) and Russell-Mulgrave (60-69 improving to 'good'), primarily due to a substantial increase in score for flow.

Table 27 Estuary habitat and hydrology index grades and scores for all years.

Estuary	24-25	23-24	22-23	21-22	20-21	19-20	18-19	17-18	16-17	15-16
Daintree	59	59	59	59	59	60	60	60	60	60
Dickson Inlet	63	65	65	65	72	74	74	74	74	74
Barron	53	44	55	55	54	54	45	43	45	41
Trinity Inlet	51	51	59	54	54	57	55	50	50	48
Russell-Mulgrave	69	60	67	67	67	69	65	75	69	67
Johnstone	53	54	56	56	63	62	54	63	58	51
Moresby	55	56	56	52	56	58	54	51	53	54
Hinchinbrook Channel	72	72	72	65	65	71	71	72	72	72

Scoring range: ■ Very Poor = 0 to <21 | ■ Poor = 21 to <41 | ■ Moderate = 41 to <61 | ■ Good = 61 to <81 | ■ Very Good = 81 – 100. nd indicates no data available.

Note that for the 2024-25 habitat extent reporting, the 2021 mangrove and saltmarsh extent data, and estuary riparian extent data was obtained from the most recent Regional Ecosystem mapping (Version 13.1). The habitat extent data for 2013, 2017 and 2019 was based upon previous versions of the Regional Ecosystem mapping. Some slight differences of habitat extent between version releases can occur due to updates in mapping accuracy which is not related to actual change in habitat extent.

Mangrove and saltmarsh

Mangrove and saltmarsh habitat extent

The mangrove and saltmarsh habitat extent indicator was updated for all estuary zones in 2024-25 using the most recent release of the Regional Ecosystem data set (Version 13.1: 2021 remnant and pre-clearing mapping, released in 2024).The procedures for scoring and grading habitat extent are outlined in Section 4.2 for basins and the same approach is used for estuaries. More details of the methods and procedures are provided in the methods technical report (WTW 2026).

The mangrove and saltmarsh extent loss from pre-clearing for 2021, 2019, 2013 and 1997, and the scores and grades for 2021 are shown in Table 28. The results show the historic loss of extent due to development which is particularly evident for the Barron and Trinity Inlet (Mitchell *et al*. 2009) with both graded 'moderate'. More recently mangrove communities in the Barron and Trinity Inlet estuaries have been effectively managed to ensure no major new clearing and to allow for some revegetation. For mangrove and saltmarsh extent from 2019 to 2021 a loss of 0.1 km^2 was recorded for the Johnstone estuary and a loss of 0.2 km^2 for Hinchinbrook Channel. (Table 28). The Johnstone estuary declined from 'good' to 'moderate' since the previous assessment due to this habitat loss. The Daintree, Russell-Mulgrave, and Hinchinbrook Channel were graded 'very good' whilst Dickson Inlet and Moresby were graded 'good'. The assessment of area remaining for mangroves and saltmarsh as separate vegetation types shows that historically saltmarsh has lost more extent as a percentage of pre-clearing than mangroves across all estuaries with the exception of the Johnstone estuary which has recorded an increase in area of saltmarsh since pre-clearing (Table 29).

Table 28 Mangrove and saltmarsh area (km^2) for preclear, 2019 and 2021, with percent (%) loss from pre-clear to 2021, change in area for 2019 to 2021, and standardised scores for the 2021 assessment.

	Pre-clear	2019	2021		Change (km^2)	2021
	km^2	km^2	km^2	% loss	2019-2021	Score
Daintree	22.3	21.9	21.9	1.8	0.0	93
Dickson Inlet	12.7	11.1	11.1	12.3	0.0	66
Barron	13.8	9.8	9.8	28.6	0.0	42
Trinity Inlet	44.4	33.1	33.1	25.5	0.0	47
Russell-Mulgrave	6.5	6.5	6.4	1.3	0.0	94
Johnstone	3.0	2.6	2.5	17.8	-0.1	57
Moresby	32.6	31.4	31.4	3.7	0.0	85
Hinchinbrook Channel	194.5	187.4	187.2	3.7	-0.2	85

Mangrove and saltmarsh extent (% loss): Very Poor = >50% | Poor =>30 to 50% | Moderate = >15 to 30% | Good = >5 to 15% | Very Good ≤5%. **Standardised scoring range:** Very Poor = 0 to <21 | Poor = 21 to <41 | Moderate = 41 to <61 | Good = 61 to <81 | Very Good = 81 – 100. Note: these results are for mangrove and saltmarsh extent, not condition of mangrove and saltmarsh habitat.

Table 29 Mangrove and saltmarsh pre-clearing, and 2021 area and extent remaining, presented as separate vegetation type.

	Mangroves			Saltmarsh		
Estuary	**Area pre-clearing (km^2)**	**Area 2021 (km^2)**	**Extent remaining (%)**	**Area pre-clearing (km^2)**	**Area 2021 (km^2)**	**Extent remaining (%)**
Daintree	21.97	21.63	98.50	0.32	0.26	83.60
Dickson Inlet	9.55	9.12	95.50	3.13	2.00	63.80
Barron	13.72	9.81	71.50	0.04	0.01	37.80
Trinity Inlet	38.50	30.65	79.60	5.93	2.47	41.60
Russell-Mulgrave	6.51	6.45	99.10	0.03	0.00	0.00
Johnstone	3.01	2.48	82.20	0.00	0.01	n/a
Moresby	27.80	25.87	93.10	4.75	5.48	115.40
Hinchinbrook Channel	178.85	173.64	97.10	15.62	13.58	86.90

Both mangrove and saltmarsh habitats are affected by changing climatic conditions including trends in rainfall and sea level. Rainfall and sea level can alter the extent of each of these habitats and also influence their proportion of relative cover. Changes in rainfall trends have been shown to increase mangrove extent in response to higher rainfall and cause die back in response to lower rainfall, with an opposite effect on tidal saltmarsh extent (Duke et al. 2019). Rises in sea level have been shown to impact tidal wetlands by reducing their seaward extent and causing landward migration, where topography allows (Albert et al. 2017).

Key messages: mangrove and saltmarsh extent

- Barron and Trinity Inlet estuaries scored the poorest and were both graded 'moderate' due to losses from historical development and urbanisation.
- The Johnstone estuary declined from 'good' to 'moderate' since the previous assessment.
- All other estuaries were graded 'good' or 'very good'.
- For mangrove and saltmarsh extent from 2019 to 2021 a loss of 0.1 km^2 was recorded for the Johnstone estuary and a loss of 0.2 km^2 was recorded for Hinchinbrook Channel.

Shoreline mangrove habitat condition

For 2024-25, shoreline mangrove habitat condition was updated for the Barron, Johnstone, Moresby and Hinchinbrook Channel estuary zones. The shoreline mangrove habitat condition indicator is comprised of the following three measures and their associated features (listed in brackets): habitat structure (cover, stand density, stand maturity), canopy cover (cover) and habitat impact (mangrove damage, shoreline modification). The results of the shoreline mangrove assessments completed for 2024-25, 2023-24 and 2021-22 for each estuary are presented in Table 30.

Whilst the first shoreline mangrove habitat condition assessments were based on surveys conducted over the 2020-21 reporting period for the Daintree, Dickson Inlet, Barron, Trinity Inlet and Russell-Mulgrave estuaries, it was recommended that the 2021-22 scores are used as a baseline that more accurately reflects the state and condition of shoreline mangrove habitats in Wet Tropics estuaries due to an increase in the length of the shoreline surveyed (WTW 2023). The results of the 2020-21 assessments are available in previous results technical reports.

Table 30 Shoreline mangrove habitat condition indicator, measure and feature results for 2024-25, 2023-24 and 2021-22 survey years.

Estuary	Survey year	Habitat structure				Canopy cover	Habitat impact			Mangrove habitat condition
		Cover	Density	Maturity	**Structure**	**Cover**	Damage	Modif-ication	**Impact**	
Daintree	21-22	84	82	90	**85**	**66**	94	92	**93**	**81**
Dickson Inlet	21-22	75	75	80	**76**	**61**	48	37	**43**	**60**
Barron	24-25	72	77	77	**75**	**57**	86	61	**74**	**68**
	23-24	74	77	78	**76**	**56**	86	61	**73**	**69**
	21-22	79	79	82	**80**	**70**	79	60	**70**	**73**
Trinity Inlet	21-22	60	88	80	**76**	**70**	82	29	**55**	**67**
Russell-Mulgrave	23-24	73	83	78	**78**	**68**	84	83	**84**	**77**
	21-22	73	74	80	**75**	**61**	75	69	**72**	**70**
Johnstone	24-25	50	68	71	**63**	**77**	78	68	**73**	**71**
	23-24	53	62	73	**63**	**81**	73	72	**73**	**72**
Moresby	24-25	92	94	91	**93**	**78**	100	100	**100**	**90**
	23-24	85	92	89	**89**	**86**	100	86	**93**	**89**
	21-22	86	90	90	**89**	**72**	100	72	**86**	**82**
Hinchinbrook Channel	24-25	93	78	87	**86**	**73**	97	90	**94**	**84**
	21-22	96	81	85	**87**	**66**	99	94	**97**	**83**

Standardised scoring range: Very Poor = 0 to <21 | Poor = 21 to <41 | Moderate = 41 to <61 | Good = 61 to <81 | Very Good = 81 – 100. nd indicates no data or insufficient data was available.

Of the estuaries surveyed for 2024-25, the shoreline mangrove habitat condition indicator score was lowest for the Barron (68), which was graded 'good' condition, and highest for Moresby (90) which was graded 'very good' condition. The Johnstone was graded 'good' and Hinchinbrook Channel was graded 'very good'.

Since the 2021-22 assessments, the Barron declined in condition due to impacts associated with flooding from TC Jasper during 2023-24. Impacts due to the flooding were particularly evident from the loss of shoreline habitat and this was represented in the decline of the habitat structure and canopy cover measures. Following the impacts, shoreline mangrove habitat condition has stabilised during 2024-25 with all measures having very similar scores to the previous year.

For the Johnstone estuary, the habitat structure measure which assesses mangrove plants at the shoreline had an increase in score for the density feature (grade remained 'good'), whilst the cover feature had a slight decrease in score (grade remained 'moderate'), since the previous year. For the cover feature, the score remained the lowest out of the eight estuaries. The canopy cover measure, which assesses the canopy density of mangrove stands, also decreased slightly with the grade declining from 'very good' to 'good' but remained high compared to the other estuaries. In terms of habitat impact the damage feature improved in score since the previous year and remained 'good'.

Measures for the Moresby increased in score and remained 'very good' for habitat structure (93) and habitat impact (100), whilst canopy cover declined from 'very good' to 'good', since the previous

year. Since major impacts to the shoreline mangrove habitat condition associated with Severe Tropical Cyclone Yasi in 2011, there has been continued improvement of overall condition.

For Hinchinbrook Channel the shoreline mangrove habitat condition demonstrated little change in overall score since the previous assessment, three years ago, indicating stability of condition. Whilst slight changes in scores occurred for all features the grades of the three measures remained stable, with habitat structure and habitat impact graded 'very good' and canopy cover graded 'good'.

Mangroves occur in low-energy coastal environments and are vulnerable to extreme weather events such as floods and cyclones. In 2019, record flooding in the Daintree River caused severe damage to shoreline mangrove habitats, particularly areas upstream of the lower estuary. Although habitat structure scored highly for the Daintree, the lower score for canopy cover, which measures canopy density, reflects the impacts of extreme weather events. This type of impact was also evident on mangrove canopy cover of the Barron estuary following impacts from TC Jasper. For estuaries that have not been recently impacted by severe weather events, it is likely that loss of habitat structure and canopy cover is linked to estuary modification and elevated nutrient, sediment, and chemical pollution from catchment urban and agricultural land use (McKenzie 2021).

Habitat impact scores represent the degree of catchment and estuary land use modification and level of human estuary influence, with estuaries in more developed and populated areas typically having lower (worse) habitat impact scores. As an example, from the 2021-22 assessment, Dickson Inlet received a 'moderate' habitat impact grade and the lowest score (43) reflecting the relatively high levels of mangrove habitat damage and modification along shorelines, whilst Hinchinbrook Channel, which is the largest system and has relatively low levels of human disturbance along shorelines, had the least amount of habitat impact recorded.

Key messages: Shoreline mangrove habitat condition

- For all four estuaries surveyed during 2024-25 the mangrove habitat condition zone scores had minimal change, and grades were unchanged from the previous assessment year.

Mangrove and saltmarsh extent and mangrove habitat condition

When combining the shoreline mangrove habitat condition indicator and the mangrove and saltmarsh extent indicator into the indicator category for mangrove and saltmarsh habitat condition and extent (Table 31), Trinity Inlet and Barron River estuaries were graded 'moderate', whereas Dickson Inlet and Johnstone were graded 'good', and the Daintree, Russell-Mulgrave, Moresby and Hinchinbrook Channel systems were graded 'very good'.

Table 31 Mangrove habitat condition and extent indicator category results.

	Shoreline mangrove habitat condition	Mangrove and saltmarsh extent	Habitat condition and extent
Daintree	81	93	**87**
Dickson	60	66	**63**
Barron	68*	42	**55**
Trinity	67	47	**57**
Russell-Mulgrave	77	94	**86**
Johnstone	71*	57	**64**
Moresby	90*	85	**88**
Hinchinbrook Channel	84*	85	**85**

Standardised scoring range: ■ Very Poor = 0 to <21 | ■ Poor = 21 to <41 | ■ Moderate = 41 to <61 | ■ Good = 61 to <81 | ■ Very Good = 81 – 100. nd indicates no data or insufficient data was available. *Indicates estuaries that were updated from 2024-25 shoreline mangrove habitat condition assessments.

Estuarine riparian extent

The estuarine riparian extent indicator was updated for all estuary zones in 2024-25 using the most recent release of the Regional Ecosystem data set (Version 13.1: 2021 remnant and pre-clearing mapping released in 2024). The procedures for scoring and grading habitat extent are outlined in Section 4.2 for basins and the same approach is used for estuaries. More details of the methods and procedures are provided in the methods technical report (WTW 2026).

The estuarine riparian vegetation extent scores and grades for 2021 are shown in Table 32 and report on the changes in extent and not the condition of the riparian vegetation.

Table 32 Estuarine riparian vegetation area (km^2) for preclear, 2019 and 2021, with percent (%) loss from pre-clear to 2021, change in area for 2019 to 2021, and standardised scores for the 2021 assessment.

	Pre-clear	2019	2021		Change (km^2)	2021
	km^2	km^2	km^2	% loss	2019-2021	Score
Daintree	3.5	2.1	2.0	41	0.0	29
Dickson Inlet	0.6	0.5	0.5	25	0.0	47
Barron	2.0	1.1	1.1	48	0.0	23
Trinity Inlet	8.8	7.4	7.3	16	0.0	59
Mulgrave-Russell	5.7	3.0	3.2	44	+0.2	26
Johnstone	4.5	1.0	1.0	77	0.0	9
Moresby	2.0	1.8	1.8	12	0.0	67
Hinchinbrook Channel	10.7	8.4	8.5	21	+0.1	53

Riparian extent (% loss): Very Poor = >50% | Poor =>30 to 50% | Moderate = >15 to 30% | Good = >5 to 15% | Very Good ≤5%. **Standardised scoring range:** Very Poor = 0 to <21 | Poor = 21 to <41 | Moderate = 41 to <61 | Good = 61 to <81 | Very Good = 81 – 100. *Riparian area extent (km^2) shown in brackets. Note: These results are for riparian extent (woody vegetation), not condition of riparian vegetation.

The grades ranged from 'very poor' for Johnstone to 'good' for Moresby. The results relate to historic loss of extent from pre-clearing to 2021 due to development including agricultural land use. The results show that since the 2019 assessment, riparian extent in 2021 has increased slightly for Russell-Mulgrave and Hinchinbrook Channel.

Key messages: estuary riparian extent

- The grades ranged from 'very poor' for Johnstone to 'good' for Moresby with all other estuaries graded 'poor' or 'moderate'.
- Since the 2019 assessment, riparian extent in 2021 has increased slightly for Russell-Mulgrave and Hinchinbrook Channel.

Fish barriers

The fish barrier indicator was not updated for 2024-25. The fish barrier indicator was last updated in 2022-23 for the Hinchinbrook Channel estuary and captured remediation works involving construction of fishways completed at five sites which were previously verified as fish barriers. The update resulted in a grade improvement from 'moderate' (scoring 60) to 'good' (scoring 80) for the Hinchinbrook Channel fish barrier indicator (Table 33). The 2022-23 update followed previous updates to the fish barrier indicator using data from the Regional Lands Partnership fish barrier project covering the Daintree, Mossman and Barron lower catchments (Moore *et al.* 2022), and for

2020-21 covering the Hinchinbrook Channel using data from the Fish Homes and Highways project (Moore *et al.* 2021). Trinity Inlet, Russel-Mulgrave, Johnstone and Moresby estuaries have not been updated since the 2015-16 assessment. Table 33 provides the scores and grades of the 2015-16 assessments for all estuaries and the updated 2022-23, 2021-22 and 2020-21 assessments. Across estuaries the most recent grades for estuary fish barriers ranged from 'moderate' (Barron) to 'very good' (Russell-Mulgrave and Johnstone). The lowest score for barrier density was Moresby and the lowest score for percentage of stream to first barrier was the Barron ('moderate'). There were no low passability barriers in the estuary assessment areas and all estuary zones scored 100 ('very good') for 'stream length to first low passability barrier'.

Table 33 Results for fish barrier indicators in estuaries for the 2022-23 update (Hinchinbrook Channel), the 2021-22 update (Daintree, Dickson Inlet, Barron), the 2020-21 update (Hinchinbrook Channel), and the initial 2015-16 assessment. Assessments applied on Priority 3, 4 and 5 waterways as indicated.

Estuary	Reporting year	Barrier density (km per barrier on Priority 3, 4 and 5 waterways)	Stream length to the first barrier (% of total stream length) on Priority 3 and 4 waterways)	Stream length (% of total length) to the first low passability barrier on Priority 4 waterways	Fish barriers (standardised score)
Daintree	2021-22	5.8	75.2	no low pass barriers	61
	2015-16	6.5	76.2	no low pass barriers	61
Dickson Inlet	2021-22	15.0	81.3	no low pass barriers	80
	2015-16	No barriers	No barriers	no low pass barriers	100
Barron	2021-22	3.5	67.1	no low pass barriers	60
	2015-16	11.8	55.6	no low pass barriers	61
Trinity Inlet	2015-16	5.8	74.1	no low pass barriers	61
Russell-Mulgrave	2015-16	29.6	88.0	no low pass barriers	81
Johnstone	2015-16	19.8	90.7	no low pass barriers	81
Moresby	2015-16	2.6	82.1	no low pass barriers	61
Hinchinbrook Channel*	2022-23	17.8	68.1	no low pass barriers	80
	2020-21	15.2	11.9	no low pass barriers	60
	2015-16	28.6	71.2	no low pass barriers	80

Barrier density (km): Very Poor = 0 to 2 km | Poor = >2 to 4 km | Moderate = >4 to 8 km | Good = >8 to 16 km | Very Good >16 km.

Stream to 1st barrier (%): Very Poor = 0 to <40% | Poor = 40 to <60% | Moderate = 60 to <80% | Good = 80 to <100% | Very Good 100%

Stream to 1st low passability barrier (%): Very Poor = 0 to 60% | Poor = >60 to 80% | Moderate = >80 to 90% | Good = >90 to <100% | Very Good 100%

Standardised scoring range: Very Poor = 0 to <21 | Poor = 21 to <41 | Moderate = 41 to <61 | Good = 61 to <81 | Very Good = 81 – 100.

The total stream length of priority 3 and 4 waterways and the number of barriers identified in the assessments for each estuary are presented in Table 34 based upon their most recent assessment.

Table 34 Total stream length of priority 3 and 4 waterways, and number of identified barriers for the most recent estuary fish barrier assessments.

Estuary and assessment year	Total stream length of priority 3 and 4 waterways	Number of barriers
Daintree (2021-22)	151	26
Dickson Inlet (2021-22)	15	1
Barron (2021-22)	60	17
Trinity Inlet (2015-16)	58	10
Russell-Mulgrave (2015-16)	266	9
Johnstone (2015-16)	197	10
Moresby (2015-16)	13	5
Hinchinbrook Channel (2022-23)	517	29

Hinchinbrook Channel 2022-23 update.

The 2022-23 update for the Hinchinbrook Channel estuary fish barrier improved the scores for 'barrier density' and the 'Stream length to the first barrier' measures calculated from the 2020-21 update based on the Fish Homes and Highways project (see below). The improved scores were the direct consequence of remediation works on fish barriers as part of the Fish Homes and Highways project. The Fish Homes and Highways project included funding for works to improve the passage of fish across barriers selected from prioritised fish barrier sites. These works included five sites with verified barriers within the Hinchinbrook Channel estuary zone. The most substantial change in score was for 'Stream length to the first barrier' measure due to remediation of the rock weir barrier on the main channel of the Herbert River at Gedges Crossing through the construction of a rock fishway which has connected the 250 km of upstream waterways that have no barriers to the downstream reaches of the Herbert River. The other four fish barrier remediation works included three sites on priority waterways which connected a further 40 km of upstream waterways that have no barriers (two sites on Lannercost Creek and one site on Five Mile Creek) whilst the remaining site was on Lagoon Creek, which is in the estuary waters which are not included for the 'Stream length to the first barrier' measure. The addition of the five fishway sites also reduced the 'barrier density' measure from 34 to 29 across the assessable estuary waterways and increased the km per barrier value from 15.2 to 17.8.

The fish barrier remediation works completed through the Fish Homes and Highways project are reported in Terrain NRM (2024) and include sites outside of the assessable area of Hinchinbrook Channel estuary zone. Information from the report on the sites included in the fish barrier indicator is presented in Appendix H and shows images of the sites before and after the fish barrier remediation works.

Daintree, Dickson Inlet and Barron 2021-22 update.

The 2021-22 update of fish barriers for the Daintree, Dickson Inlet and Barron estuaries added verified fish barriers in all three estuaries to those included in the 2015-16 assessment. These additional barriers are not recent developments and were present during the 2015-16 assessment, but the mapping methods used in the initial assessment did not identify them. The updated grades

and scores for fish barriers in the three estuary zones are presented in Table 33. None of the additional barriers were low passability and the grade for 'stream percentage to the first low passability barrier' for all three estuary zones has remained 'very good'. The 2021-22 assessment included field visits to previously inaccessible sites which were classed as barriers in the 2015-16 assessment based on Google Earth satellite imagery. From the field visits three sites listed as barriers were removed for the Daintree and one for the Barron. In addition, one site listed as a barrier for the Barron was removed after confirmation it was not located on a priority waterway when using the Queensland Globe watercourse mapping.

For the Daintree 2021-22 assessment five barriers were added. These barriers were not discernible as barriers using the original mapping and waterway layer for the 2015-16 assessment. All five are minor barriers on smaller waterways (priority 3) except the minor barrier at the mouth of Orsova creek which is a priority 4 waterway, and this barrier was immediately upstream of a much more substantial barrier on Stewart Creek. A total of 26 barriers were identified and included in the updated assessment for the Daintree estuary. These updates resulted in the 'km stream length per barrier' to decrease from 6.5 to 5.8 and the 'stream length to first barrier as a percentage of total stream length' to decrease from 76.2% to 75.2% however these changes did not alter the score, which remained on 61, or grade, which remained 'good' (Table 33).

Dickson Inlet had no barriers identified in the 2015-16 assessment but the use of the Queensland Globe inland waters watercourse layer expanded the waterways classified as priority. This additional mapping identified a single minor barrier on Crees Creek, which is a low gradient stream order 2 waterway, and resulted in a 'km stream length per barrier' of 15 ('good') and a 'stream length to first barrier as a percentage of total stream length' of 81.3% ('good') (Table 33). Overall Dickson Inlet declined from a score of 100 ('very good') to 81 ('good').

The 2021-22 assessment added 13 verified barriers for the Barron estuary. A total of 17 barriers have now been identified on priority waterways for the Barron estuary area. 10 of the additional barriers were identified due to the use of the Queensland Globe inland waters watercourse layer which included priority waterways (stream order 3 and 4) not displayed on the layer used for the 2015-16 assessment. The other three barriers were located on an unnamed stream order 1 waterway but which was within estuary waters (priority 5) close to Cairns Airport. The increase of identified barriers to 17 in the Barron estuary resulted in the 'km stream length per barrier' decreasing from 11.8 ('good') to 3.5 ('poor') whilst the 'stream length to first barrier as a percentage of total stream length' increased from 55.6% ('poor') to 67.1% ('moderate') due to field verification of a suspected but previously inaccessible barrier on Freshwater Creek which was confirmed as a bridge. Overall, the Barron estuary declined from 'good' (61) to 'moderate' (60) as a result of the updated assessment (Table 33).

Hinchinbrook Channel 2020-21 update.

The 2020-21 update of fish barriers for the Hinchinbrook Channel estuary, based upon assessments conducted for the Fish Homes and Highways project (Moore *et al.* 2021), added 16 verified fish barriers to the 18 fish barriers verified in the 2015-16 assessment. These additional barriers were not recent developments and were present during the 2015-16 assessment, but the mapping methods used in the initial assessment did not identify them. The updated 2020-21 grades and scores for fish

barriers in the Hinchinbrook Channel are presented in Table 33. Due to the higher number of verified fish barriers the grade for barrier density declined from 'very good' to 'good'. None of the additional barriers were low passability and the grade for 'stream percentage to the first low passability barrier' has remained 'very good'. Of the additional barriers seven were upstream of barriers identified in 2015-16 and three were located in the estuary network (priority 5 waterways) meaning they did not contribute to the scoring for 'stream percentage to first barrier' (WTW 2022). The remaining five additional barriers all contributed to lowering the scores for 'stream percentage to first barrier'. The most significant of these was a rock weir on the Herbert River used as a pump site located approximately 29 km upstream of the Herbert River mouth. Whilst this barrier was drowned out during higher flows and was not visible from satellite imagery during these occasions (as was the case for the imagery data set used for the 2015-16 assessment), the head-loss during lower flows (~1 m) was a barrier to fish passage. The total assessable stream length for the Hinchinbrook Channel estuary is 517 km and this barrier had a total of 250 km of connected waterways upstream without fish barriers.

Summary

The estuary fish barrier results show that the movement of fish from freshwater to estuary in the Wet Tropics is less impacted by physical barriers than other regions (for example Mackay Whitsunday (Moore 2016)) and reflect the absence of low passability man-made barriers, such as dams and weirs, in the estuary reporting zones. However, the actual connectivity of the waterway network may be affected by other impacts such as biological, chemical, and environmental barriers for example instream invasive weeds and poor water quality.

Flow

The flow indicator includes an assessment of the rainfall type for the reporting year and then compares the flows from the reporting year with modelled pre-development flows from past years with the same rainfall type. This means that the flow metrics for the reporting year provide scores based upon previous years with similar rainfall totals. The results are to be interpreted within the context of the prevailing rainfall conditions for the reporting year. The flow assessment site of South Johnstone River at Upstream Central Mill Qld (gauging station 112101B) was decommissioned during 2024-25 and flow data from this site is no longer available for the flow indicator meaning the Johnstone estuary is now assessed from the single flow assessment site North Johnstone River at Tung Oil (gauging station 112004A).

For flows during 2024-25 the Barron and Johnstone estuaries were graded 'good' and the Russell-Mulgrave was graded 'very good', and the basins draining into the three estuaries were all classified with a 'wet' rainfall type (Table 35). Details of the scores for each flow assessment site and the 10 measures of flow that constitute the site scores are provided in Appendix C Table 82.

For the Barron estuary the score increased substantially from 39 ('poor') to 74 ('good') since the previous year. Flows to the Barron estuary are assessed from the Myola gauging station on the Barron River and the Freshwater Creek gauging station, and flows at both assessment sites were graded as 'good'. For the Russell-Mulgrave estuary the score increased substantially from 50 ('moderate') to 82 ('very good'). Of the three flow assessment sites for this estuary the Mulgrave River and Babinda Creek sites were both graded 'good' and the Russell River site was graded 'very

good'. Note that for the Johnstone estuary, the score and grade cannot be compared directly to previous years because of the loss of the South Johnstone site, however, the score for North Johnstone River at Tung Oil (Appendix C Table 82), which is the remaining flow assessment site, can be compared to previous years and remained 61 ('good').

This substantial improvement of the flow indicator for the Barron and Russell-Mulgrave estuaries was due to the return of a more typical rainfall pattern for the region including the timing of the wet season rainfall and flow events (Section 3). During 2023-24 the influence of TC Jasper with the early onset of the wet season and intense rainfall and flood events from mid-December contributed to poorer scores at flow assessments which were very evident for the Barron and Russell-Mulgrave estuaries.

In all other Wet Tropics estuaries, the flow indicator was not assessable due to the lack of modelled pre-development data and additionally the lack of flow assessment sites for Dickson Inlet, Moresby and Hinchinbrook Channel.

Table 35 Rainfall type and number of flow assessment sites for 2024-25, and standardised estuary flow indicator score and grade for 2024-25 and the previous years.

Estuary	Rainfall type	Number of assessment sites	Flow 24-25	Flow 23-24	22-23	21-22	20-21	19-20	18-19	17-18	16-17
Daintree	-	-	nd	nd	nd	nd	nd	nd	nd	nd*	nd*
Dickson Inlet	-	-	nd	nd	nd	nd	nd	nd	nd	nd	nd
Barron	Wet	2	74	39	79	79	75	93	57	49	59
Trinity Inlet	-	-	nd	nd	nd	nd	nd	nd	nd	nd	nd
Russell-Mulgrave	Wet	3	82	50	79	81	84	75	57	98	74
Johnstone	Wet	1*	61	61	71	71	98	95	65	98	81
Moresby	-	-	nd	nd	nd	nd	nd	nd	nd	nd	nd
Hinchinbrook Channel	-	-	nd	nd	nd	nd	nd	nd	nd	nd	nd

Scoring range: ■ Very Poor = 0 to <21 | ■ Poor = 21 to <41 | ■ Moderate = 41 to <61 | ■ Good = 61 to <81 | ■ Very Good = 81 – 100. nd indicates no data or insufficient data was available. *Note that for the Johnstone estuary the site South Johnstone River at Upstream Central Mill was decommissioned as of the reporting year 24-25, and that flows for the Johnstone estuary are assessed from the single site North Johnstone River at Tung Oil

Further information on the methods applied for the flow indicator are available in the full report for the flow indicator project (Stewart-Koster *et al.* 2018) and in the Wet Tropics Report Card methods technical report (WTW 2026). Both are available from the WTW website.

Key messages: flow

- The Barron and Johnstone estuaries were graded 'good' and the Russell-Mulgrave was graded 'very good'.
- The Barron estuary score increased substantially from 39 ('poor') to 74 ('good') since the previous year.
- The Russell-Mulgrave estuary score increased substantially from 50 ('moderate') to 82 ('very good') since the previous year.
- The Johnstone's grade remained 'good' since the previous year, and the score remained 61.

- Improvement of flows for the Barron and Russell-Mulgrave estuaries was due to the return of a more typical rainfall pattern, including the timing of the wet season rainfall and flow events, after the previous year which was affected by TC Jasper.

Seagrass

Seagrass condition scores and grades for 2024-25 and previous reporting years are presented in Table 36. The 2024-25 seagrass site and indicator scores and grades for the two reported estuaries are presented in Table 37. Note that the seagrass site score is the minimum indicator value, unless species composition is zero, in which case it is the average of species composition and the next lowest scoring indicator. The estuary condition score is the average of the site scores.

Table 36 Estuary seagrass condition score and grade for 2024-25 and previous years.

Estuary	24-25	23-24	22-23	21-22	20-21	19-20	18-19	17-18	16-17	15-16
Daintree	-	-	-	-	-	-	-	-	-	-
Dickson Inlet	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
Barron	-	-	-	-	-	-	-	-	-	-
Trinity Inlet	28	25	58	38	42	54	46	31	30	21
Russell-Mulgrave	-	-	-	-	-	-	-	-	-	-
Johnstone	-	-	-	-	-	-	-	-	-	-
Moresby	3	9	14	0	18	25	8	0	7	13
Hinchinbrook Channel	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd

Seagrass score (QPSMP): Very Poor = 0 to <21| Poor = 20 to <41 | Moderate = 40 to <61 | Good = 60 to <81 | Very Good = 81 – 100. For further information on calculation of scores refer to the methods technical report (WTW 2026). ^ - indicates that it does not occur at the location. nd indicates no data available.

Estuarine seagrass condition improved for Trinity Inlet, which remained 'moderate', and declined for the Moresby estuary which remained 'very poor', since the previous year. Due to the timing of the surveys, which typically occur in October to November, the results for 2024-25 captured effects on seagrass from TC Jasper, whilst the surveys for 2023-24 occurred before TC Jasper.

Table 37 Estuary seagrass site scores and grades for 2024-25.

Estuary	Site	Biomass	Area	Species composition	Site score and grade
Trinity Inlet	CN20	0	0	0	0
	CN19	41	33	83	33
	CN33	57	52	100	52
Moresby	MH1	28	0	100	0
	MH2	0	0	0	0
	MH3	0	0	0	0
	MH4	73	11	24	11
	MH5	42	6	100	6

Seagrass score (QPSMP): Very Poor = 0 to <21 | Poor = 20 to <41 | Moderate = 40 to <61 | Good = 60 to <81 | Very Good = 81 – 100. Note that the seagrass site score is the minimum indicator value, unless species composition is zero, in which case it is the average of species composition (0) and the next lowest scoring indicator.

Trinity Inlet (1 intertidal meadow (CN20), 2 subtidal meadows (CN19, CN33)).

- Estuary seagrass remained in 'poor' condition for the second consecutive year.

- Subtidal meadows CN19 and CN33 had ‘poor’ or ‘moderate’ biomass and area condition, but species composition remained ‘very good’.
- Condition declines between 2022–2023 and 2023–2024 were attributed to consistently low benthic light below *Zostera muelleri* growth requirements in Trinity Inlet for much of 2023 due to above-average rainfall.
- Continued low light levels in 2024, and impacts from TC Jasper, ultimately resulted in the loss of intertidal meadow CN20 in 2024–2025.
- The loss of CN20 contrasted with improvement for C19 and CN33 due to increased scores for the biomass indicator since the previous year.

Moresby Estuary – Mourilyan Harbour (4 intertidal meadows (MH1 – MH4), 1 subtidal meadow (MH5))

- Overall seagrass condition in this zone remained ‘very poor’. Meadow MH2 (Lily Island) remains absent for the fifth year, and Meadow MH3 (Seaforth Bank) was also absent this year.
- There was a slight improvement in biomass in the *Z. muelleri*-dominated Bradshaw Meadow (MH1) due to active restoration efforts; however, meadow extent remained well below the long-term average and declined over the past year following loss of some restored patches due to TC Jasper and heavy rainfall.
- Seagrass area condition declined from ‘poor’ to ‘very poor’ in Meadows MH4 and MH5, and biomass condition declined from ‘good’ to ‘poor’ in Meadow MH5 (subtidal channel meadow).

Key messages: estuary seagrass

- Estuarine seagrass condition remained ‘poor’ for Trinity Inlet and remained ‘very poor’ for the Moresby estuary.
- For Trinity Inlet, continued low light levels in 2024, and impacts from TC Jasper, ultimately resulted in the loss of the intertidal seagrass meadow.
- For the Moresby estuary slight improvement in biomass occurred due to active restoration in some areas, whilst high rainfall impacts reduced meadow extent including areas previously restored.

Recommendations for expanding seagrass monitoring and information about current seagrass monitoring projects that could assist expansion is presented in Appendix I and was provided by the James Cook University TropWATER Seagrass Team.

Estuary Restoration Update:

Seagrass restoration was scaled up in the Wet Tropics in 2024 through a BHP funded project led by TropWATER, JCU who partnered with Traditional Owner groups (Gimuy Walubarra Yidinji, Yirrganydji, Mandubarra and Goondoi), and volunteers from OzFish, high schools, university students and landcare. A six-week campaign in August and September saw approximately 8,000 seagrass (*Zostera muelleri*) propagules collected, processed and planted into two restoration meadows in Cairns and Moresby. Extreme rainfall followed by major flooding in February and March 2025 resulted in high mortality of planted shoots. This planting was replicated from July to September 2025 with monitoring ongoing.

Habitat and hydrology index

The scores and grades for estuary habitat and hydrology indicators, indicator categories and the index for 2024-25 are presented in Table 38. The indicators, indicator categories and indices for previous reporting years are presented in Appendix G Table 129 to Table 135.

Table 38 Results for estuary habitat and hydrology (H&H) indicator categories and index for the 2024-25.

Estuary	Mangrove & saltmarsh	Riparian extent	Flow	Fish barriers	Seagrass	H&H index
Daintree	87	29	nd	61	-~	59
Dickson Inlet	63	47	nd	80	nd	63
Barron	55	23	74	60	-	53
Trinity Inlet	57	59	nd	61	28	51
Russell-Mulgrave	86	26	82	81	-	69
Johnstone	64	9	61	81	-	53
Moresby	88	67	nd	61	3	55
Hinchinbrook Channel	85	53	nd	80	nd	72

Scoring range: ■ Very Poor = 0 to <21 | ■ Poor = 21 to <41 | ■ Moderate = 41 to <61 | ■ Good = 61 to <81 | ■ Very Good = 81 – 100. ~ - indicates that it does not occur at the location. nd indicates no data available.

Confidence

Confidence scores are presented below. Confidence scores (1 – 3) have been weighted according to the 2017 updated methods for assessing confidence (WTHWP 2017).

Confidence scores for estuary seagrass monitoring are provided in Table 39. Confidence in species composition is slightly lower due to the maturity of the methodology, which has been peer reviewed but not published.

Table 39 Confidence associated with the seagrass indicators in estuary reporting zones.

	Maturity of methodology (x0.36)	Validation (x0.71)	Represent-ativeness (x2)	Directness (x0.71)	Measured error (x0.71)
Biomass	3	3	2	3	2
Area	3	3	2	3	2
Sp. Composition	3	3	2	3	1
Seagrass	3	3	2	3	1.7

Confidence criteria are scored 1-3 and then weighted by the value identified in parenthesis.

Confidence in the results for the five habitat and hydrology indicators for estuaries are presented in Table 40. Note: riparian extent in estuarine zones is assessed using a different method to freshwater zones and scores differently for confidence.

Table 40 Confidence associated with habitat and hydrology indicator results in the estuary reporting zones.

	Maturity of methodology (x0.36)	Validation (x0.71)	Represent-ativeness (x2)	Directness (x0.71)	Measured error (x0.71)	Score	Rank
Estuary fish barriers	1	2	3	2	2	10.6	4
Riparian extent	2	2	2	1	2	8.2	3
Mangrove & saltmarsh extent	2	2	2	1	2	8.2	3
Mangrove habitat condition	3	2	2	3	1	9.3	3
Seagrass*	2.7	3	2	3	1.7	10.6	4
Flow#	1	2	3	1	1	9.2	3
Habitat and hydrology index (Trinity Inlet and Moresby	**1.9**	**2.3**	**2.3**	**1.8**	**2.0**	**9.5**	**3**
Habitat and hydrology index (Barron, Russell-Mulgrave, Johnstone)	**1.7**	**2.0**	**2.5**	**1.3**	**1.7**	**9.1**	**3**
Habitat and hydrology index (other estuaries	**1.7**	**2.0**	**2.4**	**1.3**	**2.0**	**9**	**3**

*Seagrass applies to Trinity Inlet and Moresby only; #Flow applies to Barron, Russell-Mulgrave and Johnstone only. Confidence criteria are scored 1-3 and then weighted by the value identified in parenthesis. Final scores (4.5 – 13.5) are the sum of the weighted confidence criteria. **Rank based on final score:** 1 (very low): 4.5 – 6.3; 2 (low): >6.3 – 8.1; 3 (moderate): >8.1 – 9.9; 4 (high): >9.9 – 11.7; 5 (very high): >11.7 – 13.5.

5.3. Overall estuary scores and grades

The index and overall scores and grades for 2024-25 are presented in Table 41, and the overall estuary scores and grades for each reporting year are presented in Table 42. Since 2016-17 the overall score is aggregated from the water quality and habitat and hydrology indices. For 2014-15 and 2015-16 the estuaries represented by the habitat and hydrology index only were Moresby and Dickson Inlet, respectively. When comparing overall scores and grades between years it is important to note that differences relate to the addition of indicators as well as changes in scores over time. The habitat and hydrology index scores represent the addition of indicators for fish barriers in 2015-16, flow in 2016-17 and shoreline mangrove habitat condition for select estuaries from 2020-21. For habitat and hydrology, the flow indicator scores (reported for Barron, Russell-Mulgrave and Johnstone), seagrass indicator scores for Trinity Inlet and Moresby, and the water quality index scores for all estuaries have been updated annually.

Table 41 Estuary index and overall scores and grades for 2024-25.

Estuary	Water quality	Habitat and hydrology	Overall
Daintree	80	59	**70**
Dickson Inlet	78	63	**71**
Barron	60	53	**56**
Trinity Inlet	65	51	**58**
Russell-Mulgrave	73	69	**71**
Johnstone	73	53	**63**
Moresby	71	55	**63**
Hinchinbrook Channel	65	72	**69**

Scoring range: ■ Very Poor = 0 to <21 | ■ Poor = 21 to <41 | ■ Moderate = 41 to <61 | ■ Good = 61 to <81 | ■ Very Good = 81 – 100.

For 2024-25 the Barron and Trinity Inlet remained 'moderate', Moresby improved from 'moderate' to 'good', and all other estuaries remained 'good' since the previous year.

Table 42 Estuary overall scores and grades for all years.

Estuary	24-25	23-24	22-23	21-22	20-21	19-20	18-19	17-18	16-17	15-16	14-15
Daintree	70	64	68	69	73	76	70	72	70	70	nd
Dickson Inlet	71	73	69	68	77	77	79	77	69	74*	nd
Barron	56	50	50	51	62	57	53	54	55	46	62
Trinity Inlet	58	55	64	64	64	63	56	57	64	66	59
Russell-Mulgrave	71	66	68	69	73	75	68	70	72	72	75
Johnstone	63	61	62	61	70	69	65	65	65	57	nd
Moresby	63	55	63	60	66	70	66	65	67	66	53*
Hinchinbrook Channel	69	68	72	69	72	78	74	77	81	78	nd

Scoring range: ■ Very Poor = 0 to <21 | ■ Poor = 21 to <41 | ■ Moderate = 41 to <61 | ■ Good = 61 to <81 | ■ Very Good = 81 – 100. *Estuaries do not include the water quality index and represent habitat and hydrology index only.

6. INSHORE MARINE

Reporting for the inshore zone includes results for water quality, coral and seagrass. The inshore zone includes enclosed coastal, open coastal and mid-shelf marine water types, extending east to the boundary with the offshore waters (Figure 15). This grouping of water types is consistent with that used by the Marine Monitoring Program (MMP) in the Wet Tropics region for their annual inshore monitoring reports, for example see Gruber *et al.* (2020).

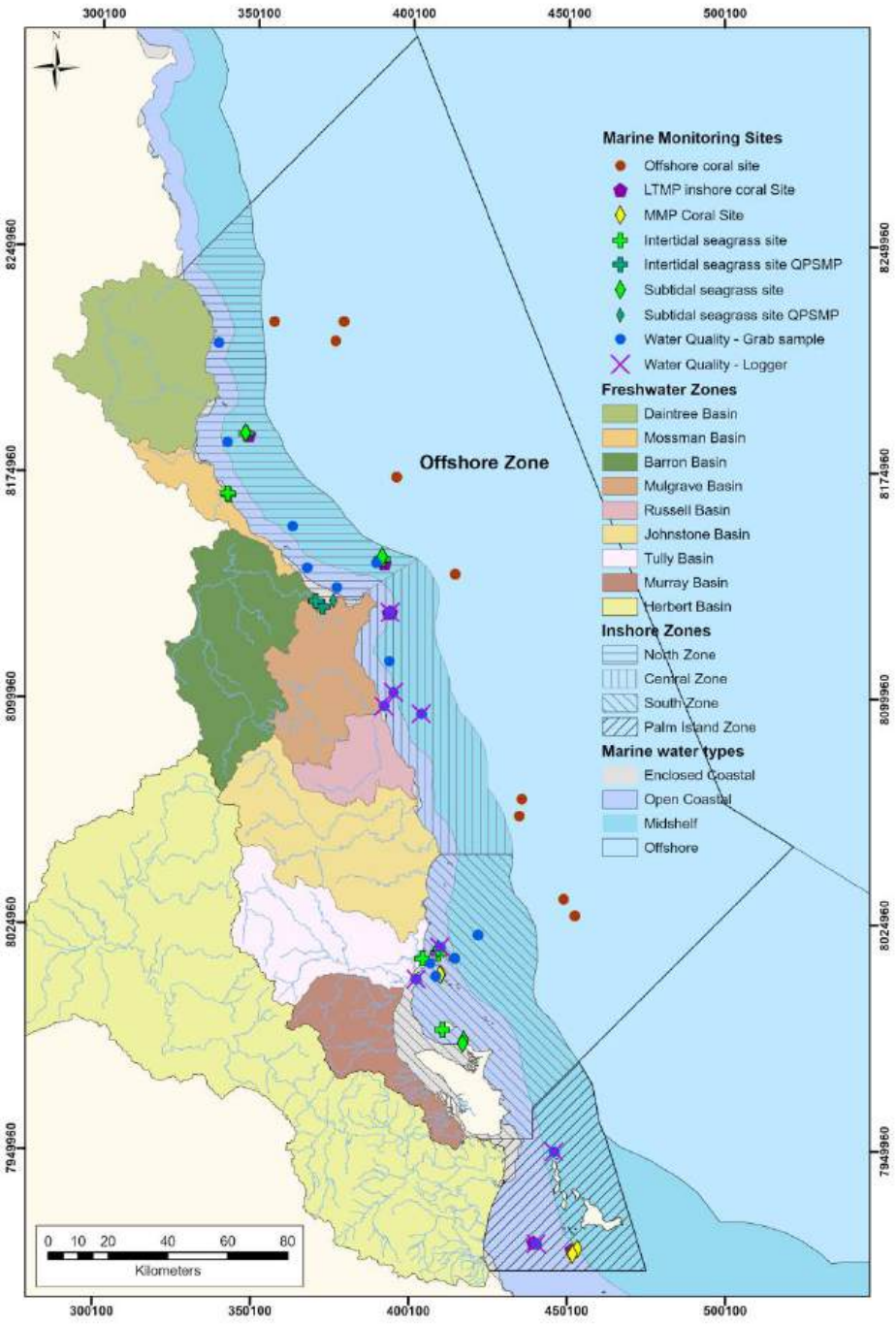

Figure 15 Reporting zones and monitoring sites for the inshore and offshore marine environments.

6.1. Water Quality

Inshore water quality index scores for all years are presented in Table 43 and the water quality indicator, indicator category and index scores for 2024-25 are presented in Table 44. On Table 44 an indicator category score may not be equal to the average of the contributing indicator scores for indicator categories that have multiple indicators (water clarity and nutrients). This is because the zone indicator category score is not calculated as the average of the zone indicator scores, instead, the indicator categories are first calculated for each site and then the site scores are averaged to provide the zone score. Inshore water quality indicator, indicator category and index scores for previous years are presented in Appendix G Table 136 to Table 144. The 2024-25 water quality indicator annual means for all inshore water quality monitoring sites, the indicator scores before standardisation, and all water quality measurements taken by grab samples for each monitoring site are presented in Appendix B (Table 75, Table 76 and Table 77). All inshore water quality scores are calculated from *in-situ* data from the MMP. The methods for scoring inshore marine water quality are provided in the methods technical report (WTW 2026).

The water quality index grade and score for the central zone improved slightly from the previous year and remained 'good' (62). All other zones declined in grade: the North zone from 'very good' to 'good', the South zone from 'good' to 'moderate', and the Palm Island zone from 'good' to 'poor'. The largest change in score was the Palm Island zone which decreased from 69 to 40 and was due in part to the absence of pesticide monitoring for this zone, since pesticide risk is typically low which translates to a high contributing score to the water quality index.

Table 43 Inshore water quality index grades and scores for all years.

Zone	24-25	23-24	22-23	21-22	20- 21	19-20	18-19	17-18	16-17	15-16
North	69	83	82	81	72	91	85	66	69	79
Central	62	61	71	62	60	74	58	53	58	64
South	55	63	75	60	52	72	44	47	47	60
Palm Island	40	69	75	68	62	65	60	53	64	69

Scoring range: ■ Very Poor = 0 to <21 | ■ Poor = 21 to <41 | ■ Moderate = 41 to <61 | ■ Good = 61 to <81 | ■ Very Good = 81 – 100.

Pesticide monitoring for inshore zones using passive samplers recommenced in 2022-23 following a suspension of monitoring in recent years. A list of pesticides assessed for inshore zones is presented in the methods technical report (WTW 2026). For 2024-25 there was no monitoring for the Palm Island zone, and all other zones had very low risk of pesticide toxicity and were graded 'very good'. The high scores were similar to those of previous years which were all very low risk except for the Central zone in 2016-17 which was low risk (Appendix G Table 136 to Table 144).

Table 44 Inshore marine water quality indicator, indicator category and index (WQ) results for 2024-25, and for the 2023-24 index.

Zone	Water clarity			Chl *a*	Nutrients				Pest-icides	WQ	WQ 23-24
	TSS	Tur-bidity	**Water clarity**	Chl *a*	NOx	PN	PP	**Nutrients**	Risk metric		
North	66	nd	**66**	**54**	78	51	50	**61**	**96**	**69**	83
Central	66	65	**67**	**51**	53	27	50	**43**	**86**	**62**	61
South	29	61	**43**	**49**	61	20	31	**44**	**84**	**55**	63
Palm Island	33	69	**53**	**41**	21	22	34	**26**	**nd**	**40**	69

Scoring range: ■ Very Poor = 0 to <21 | ■ Poor = 21 to <41 | ■ Moderate = 41 to <61 | ■ Good = 61 to <81 | ■ Very Good = 81 – 100. nd indicates no data available. Note that the water clarity and nutrient indicator scores and indicator category scores (presented in bold) are calculated from the annual data for each site first and then site values are averaged to give the indicator or indicator category zone scores. For each zone the indicator category scores are averaged to provide the WQ score (also presented in bold).

Intense rainfall over extended periods often results in flooding events of catchment waterways and pronounced plumes within marine waters as result of river discharge. Plumes often occur during the wet season and result in salinity gradients, high suspended sediments and nutrient concentrations, and elevated chlorophyll *a* concentrations within affected marine waters (Leahy *et al.* 2026). Satellite imagery provides insight into plume extent and assists with interpreting water quality dynamics. During 2024-25 substantial rainfall, flooding and river discharge events occurred particularly in the southern area of the Wet Tropics region as covered in Section 3. In early February 2025 major flooding occurred for the Tully River and the Herbert River, and also river systems to the south of the Wet Tropics Region including the Burdekin. Large floods in the river systems to the south of the Wet Tropics can affect inshore zones within the region, particularly the Palm Island zone, due to the prevailing northerly coastal currents. The flood plumes were very distinct during the major flood events for the Tully and Herbert rivers, with the plume from the Herbert dissipating in the open coastal waters 10 days later (Figure 16).

In contrast to the record flooding events in 2023 related to TC Jasper, the North zone experienced moderate flooding during 2024-25. During February a dissipated flood plume was evident from the Barron River (Figure 16) and this coincided with the scheduled MMP water quality monitoring conducted for the North Region. In the previous year, the severe weather conditions due to TC Jasper delayed water quality monitoring during peak river discharge in mid-December and consequently monitoring could not occur over the period of highest discharge from the Barron River (WTW 2025). The timing of water quality sampling in relation to wet season rainfall events and river discharge was likely to have contributed to the lower water quality indicator and index scores for 2024-25 compared to 2023-24 for the North region.

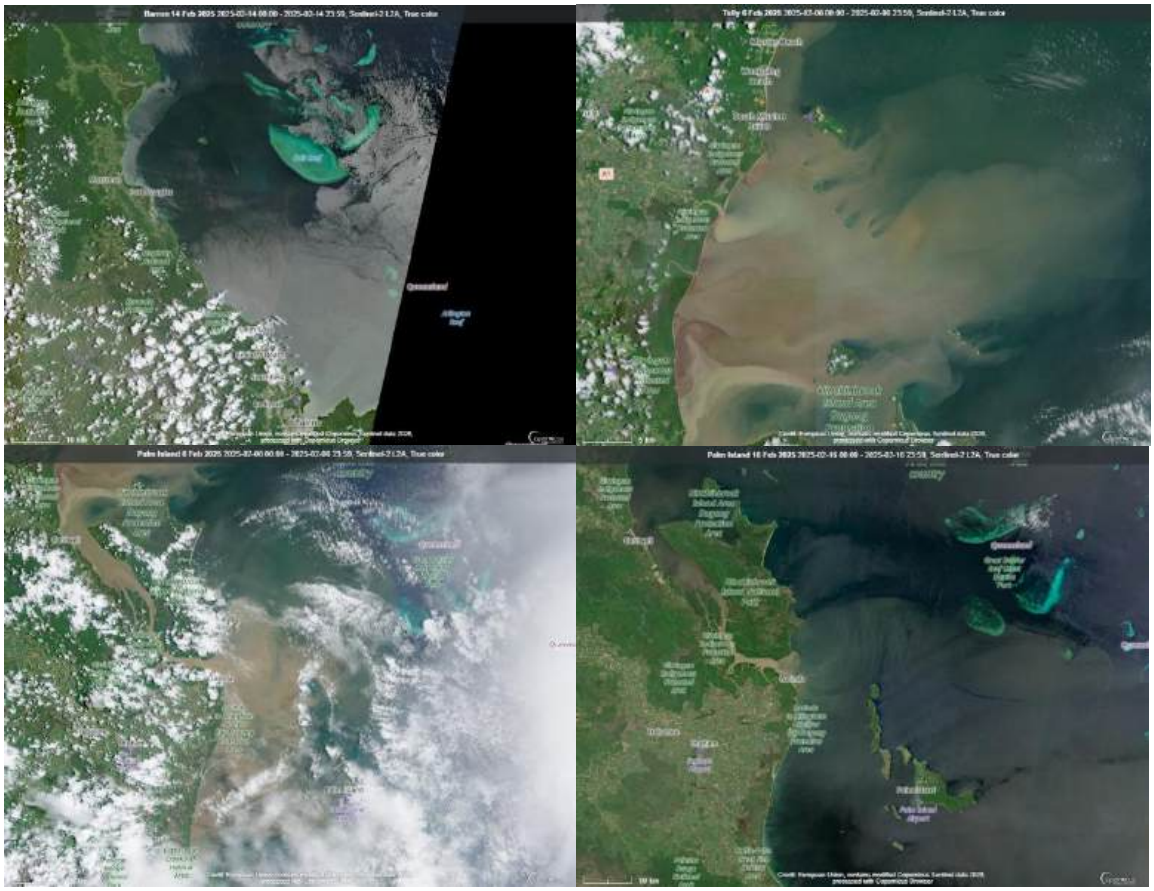

Figure 16 True colour satellite images of flood plumes for the Barron River on the 14th February 2025 (top left), the Tully River on the 5th February 2025 (top right), and the Herbert River on the 6th February 2025 (bottom left) and on the 16th February 2025 (bottom right). Source: https://dataspace.copernicus.eu/explore-data/data-collections/sentinel-data/sentinel-2

Water clarity declined in North zone from 'very good' to 'good' since the previous year, and this was based on TSS grab samples alone as there are no turbidity loggers located in the North zone. Water clarity for the other three zones is derived from both TSS grab samples and from turbidity loggers. For the Central and South zones, water clarity grades of 'good' and 'moderate', respectively, were unchanged from the previous year. For the Central zone, TSS and turbidity both remained 'good', whilst for the South zone, turbidity improved from 'moderate' to 'good' and TSS remained 'poor'. Water clarity declined from 'good' to 'moderate' for the Palm Island zone, with TSS declining from 'very good' to 'poor' and turbidity remaining 'good'.

The disparity between TSS and turbidity scores for the Palm Island zone were related to the frequency and timing of monitoring at the two water quality sites BUR1 and BUR2 (Figure 17). At both sites the highest TSS concentrations were recorded from grab samples in early February 2025, which coincided with the active monsoon event and associated record flooding across Ingham and Townsville. The turbidity logger at BUR2 recorded the highest NTU on the 2nd and 3rd February, which coincided with the severe storm preceding the flood events, and was indicative of resuspension. For BUR1, the logger was not operational from late November 2024 to 8th February 2025, and consequently it did not record the period of peak turbidity recorded at BUR2. The loggers provided continual records of turbidity during their operational deployment periods, and this included dry season periods that typically have greater water clarity. In contrast the TSS grab

sampling occurred from late October to June with sample frequency higher during the wet season. This meant that the loggers, particularly at site BUR1, provided greater representation of seasonal periods with higher water clarity than that of the grab sampling.

The reason for the disparity between TSS and turbidity scores for the South zone differed from that of the Palm Island zone. The south zone has six monitoring sites for grab samples, five in open coastal waters and one in enclosed coastal waters. Turbidity loggers are present at one open coastal site and at the enclosed coastal site. Turbidity guideline values are considerably higher for enclosed coastal waters than open coastal waters, whilst there are no TSS guideline values for enclosed coastal waters. Turbidity and TSS scored very poorly at the same open coastal site, whilst turbidity scored very highly with the less stringent guideline values at the enclosed coastal site. This meant aggregation of the turbidity scores from the two sites produced a value that was just within the 'good' threshold.

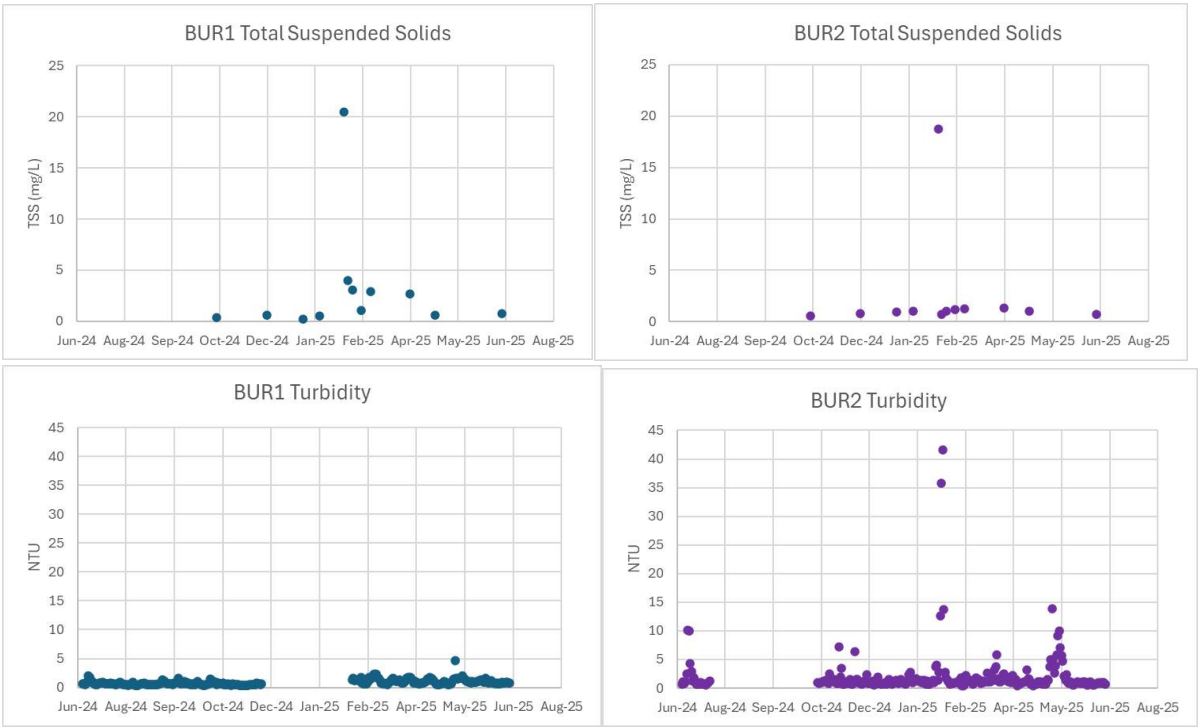

Figure 17 Concentration of total suspended solids (TSS) from grab samples and turbidity (NTUs) from loggers at the two Palm Island zone sites (BUR1 and BUR2) over the 2024-25 reporting year. (Data source: Marine Monitoring Program, Great Barrier Reef Marine Park Authority, 2026)

Chlorophyll *a* grades declined from 'good' to 'moderate' for the North, Central and South zones, with the largest decrease in score occurring for the North zone from 80 to 54. For the Palm Island zone, chlorophyll *a* improved from 'poor' to 'moderate' since the previous year although the score only increased slightly from 39 to 41. Chlorophyll *a* concentrations in the north zone were highest in February at the three sites in the transect from the mouth of the Barron River northwards (C8, C6, C5), whilst concentrations were lower at sites further from the coast (C11) and further north (C4, C1) (Appendix B Table 77, and WTW 2026 for site locations). This pattern suggests phytoplankton biomass was stimulated by wet season river discharge events from the Barron River.

Nutrients decreased in score for the North and South zone but remained 'good' and 'moderate', respectively; the Central zone improved from 'poor' to 'moderate', whilst the Palm Island zone declined from 'good' to 'poor'. Oxidised nitrogen (NO_x) declined from 'very good' to 'good' in the North zone and from 'very good' to 'poor' in the Palm Island zone, it remained 'good' in the South zone and improved substantially from 'very poor' to 'moderate' in the Central zone. In the Palm Island zone the highest concentrations of NO_x occurred during February at both sites, which coincided with the major flooding events across the Ingham and Townsville areas. Particulate nitrogen (PN) remained 'moderate' for the North zone, improved from 'very poor' to 'poor' for the Central zone, remained 'very poor' for South zone, and remained 'poor' for the Palm Island zone, since the previous year. Particulate phosphorus (PP) declined from 'good' to 'moderate' for the North zone, from 'good' to 'poor' for the Palm Island zone, and remained 'moderate' and 'poor' for the Central and South zones, respectively, since the previous year. For the Palm Island zone, PP and PN did show some correlation between higher concentrations and the periods of major flooding, but not as pronounced as for NO_x (Appendix B Table 77).

Key messages: water quality

- In early February 2025 major flooding occurred for the Tully River and the Herbert River, and also river systems to the south of the Wet Tropics region including the Burdekin, causing substantial flood plumes in coastal marine waters from the river discharge.
- Water quality grades were 'good' for the North and Central zones, 'moderate' for the South zone, and 'poor' for the Palm Island zone.
- Water quality index grades declined for the North, South and Palm Island zones since the previous year.
- For pesticides, the risk was very low for the North, Central and South zones and the three zones were graded 'very good'.
- Pesticides risk results were not available for the Palm Island zone. This contributed to the lower water quality grade since pesticide risk is typically very low and provides a high score towards the water quality index.
- Water clarity declined from 'very good' to 'good' in the North zone (based on total suspended solids only) and from 'good' to 'moderate' for the Palm Island zone. The Central and South zones remained 'good' and 'moderate', respectively.
- The Palm Island zone monitoring recorded peak total suspended solid concentrations and turbidity during the February flood events that also coincided with storm conditions meaning resuspension will have been a contributing factor.
- Chlorophyll *a* grades declined from 'good' to 'moderate' for the North, Central and South zones, with the largest decrease in score occurring for the North zone from 80 to 54.
- Chlorophyll *a* concentrations in the North zone were highest in February at the three sites in the transect from the mouth of the Barron River northwards.
- Nutrient grades remained 'good' and 'moderate' for the North and South zones, respectively, whilst the Central zone improved from 'poor' to 'moderate' and the Palm Island zone declined from 'good' to 'poor'.
- For the Palm Island zone, oxidised nitrogen declined from 'very good' to 'poor', particulate phosphorus declined from 'good' to 'poor' and particulate nitrogen remained 'poor'. All three nutrient forms showed correlation between peak concentrations and the February flood events.

For 2024-25 the guideline values used for scoring inshore marine waters for the Wet Tropics Report Card have remained unchanged and this provides inshore marine water quality reporting that is consistent and comparable with all previous years. In 2020 the guideline values for oxidised nitrogen (NO_x) were updated for coastal and marine waters of the Wet Tropics and scheduled in the Environmental Protection (Water and Wetland Biodiversity) Policy 2019—the EPP (Water and Wetland Biodiversity) (DES 2020). An account of recent inshore oxidised nitrogen guideline updates, and the effect of changes on indicator scores using results up to 2021-22 is provided in Appendix B (p. 119). Inshore marine water quality guideline values used for scoring have been reviewed as part of the program design update (2026) and the most appropriate guidelines using a consistent approach across regional report cards will be applied for future report cards.

Confidence

Confidence for the inshore marine water quality results for all zones are shown in Table 45. The lower confidence score for pesticides is due to the method being recently developed which has received less peer review than the more established methods for other water quality indicators. Confidence scores (1 – 3) have been weighted according to the 2017 updated methods for assessing confidence (WTHWP 2017) (Maturity of Methodology 0.36, Validation 0.71, Representativeness 2, Directness 0.71, Measured error 0.71).

Table 45 Confidence associated with the water quality indicators for inshore marine zones.

	Maturity of methodology (x0.36)	Valid-ation (x0.71)	Represent-ativeness (x2)	Direct-ness (x0.71)	Measured error (x0.71)	Final	Rank
Nutrients	3	3	1	3	3	9.5	3
Chl-*a*	3	3	1	3	3	9.5	3
Water clarity	3	3	1	3	3	9.5	3
Pesticides	1	3	1	3	2	8.0	2
Water quality index	2.5	3	1	3	2.8	9.1	3

Confidence criteria are scored 1-3 and then weighted by the value identified in parenthesis. Final scores (4.5 – 13.5) are the sum of the weighted confidence criteria. **Rank based on final score:** 1 (very low): 4.5 – 6.3; 2 (low): >6.3 – 8.1; 3 (moderate): >8.1 – 9.9; 4 (high): >9.9 – 11.7; 5 (very high): >11.7 – 13.5.

6.2. Coral

Report card update

The MMP Inshore coral calculation method for scoring the composition indicator has been updated as from the 2024-25 reporting year. The composition indicator value is now set to zero for reefs at which there is zero cover of hard corals. This change has been applied to historical indicator and index scores and reduces the composition indicator and coral condition index for the North zone in 2024.

In the South zone no composition scores were estimated between 2015-16 and 2019-20 at Bedarra as the composition score requires comparison to a baseline of at least 5 prior observations. This lack of score for the composition indicator for those early years continued until 2024 despite the availability of a baseline. The omission of these scores was noted and back calculated in 2025.

A table comparing the previous and updated scores for the composition indicator and the coral condition index is provided in the inshore coral section of previous years' results (Appendix G Table 145).

The grades and scores for the coral condition index for all years are presented in Table 46 (note the index scores have been updated with the composition indicator revisions). For 2024-25 the coral index scores decreased for all zones since the previous year, except for the Central zone which was unchanged, whilst the grades remained 'poor' for the North zone and 'moderate' for the other zones since the previous year. The largest decrease in score occurred for the South zone, which dropped from 50 to 43.

Table 46 Inshore marine coral index scores and grades for all years.

Inshore Zone	24-25	23-24	22-23	21-22	20-21	19-20	18-19	17-18	16-17	15-16
North	37	40*	54	51	44	44	44	51	46	46
Central	48	48	55	58	63	61	60	61	57	60
South	43	50	56	60	61	63*	62*	54*	59*	55*
Palm Island	43	45	47	45	49	53	52	49	49	49

Standardised scoring range: ■ Very Poor = 0 to <21 | ■ Poor = 21 to <41 | ■ Moderate = 41 to <61 | ■ Good = 61 to <81 | ■ Very Good = 81 – 100. * indicates Coral index results which were affected by the revised Composition indicator calculation method.

For 2024-25 the coral indicators and condition index for each inshore zone are presented in Table 47, whilst the coral indicator and condition index scores for each site are presented in Appendix F (Table 96) for reference. The following assessment of inshore coral condition is based on findings from the Marine Monitoring Program Inshore Coral Report (Thompson *et al.* 2026), where more detailed assessment of the coral condition for sites in the Wet Tropics inshore zones is provided.

Table 47 Inshore marine coral indicators, and index scores and grades for 2024-25.

Inshore Zone	Juvenile	Macroalgae	Cover	Change	Composition	Coral index
North	24	53	28	58	20	37
Central	28	35	61	54	57	48
South	43	47	40	36	50	43
Palm Island	26	68	38	37	45	43

Standardised scoring range: ■ Very Poor = 0 to <21 | ■ Poor = 21 to <41 | ■ Moderate = 41 to <61 | ■ Good = 61 to <81 | ■ Very Good = 81 – 100.

There were no occurrences of tropical cyclones across the inshore zones during 2024-25, however the tropical low in early 2025 produced storm damage to reefs in the Palm Island zone and brought heavy rainfall events with extensive flooding of rivers from the southern Wet Tropics to the Burdekin Region in February. The flooding led to discharge of more than 6 times the long-term medians from catchments in the Burdekin Region producing flood plumes that can extend to the southern Wet Tropics inshore zones driven by northerly coastal currents. Major floods also occurred across catchments from the Herbert River to the Tully River (Section 6.1, Figure 16).

Substantial loss of coral occurred at reefs in the Palm Island and South zones and was attributed to the low salinity from inundation of floodwaters, particularly at the shallow depths where salinity loggers have shown greater persistence of lower salinity water. A mass mortality event of giant clams also occurred at Orpheus Island in the Palm Island zone which was due to sustained conditions of low salinity in the shallow marine waters resulting from the high rainfall event. The coral loss from low salinity floodwaters was in addition to the previous year when all coral were killed at Snapper South reefs in the North zone due to extreme river discharges associated with TC Jasper (WTW

2025). As was observed in the North zone the previous year, the low salinity floodwaters in the Palm Island zone caused substantial macroalgae mortality and increased the score for the macroalgae indicator, which partially offset decreases in other indicators. In the Palm Island zone there was also clear evidence of damage to corals from rough conditions caused by the Tropical Low in early 2025.

Although coral bleaching had a probable or possible likelihood across most of the inshore zones during 2024-2025 (Figure 5) there was no major loss of coral on the reefs monitored that was attributed to heat stress.

North zone

- Coral condition which remained poor, had a slight decrease in score which was mainly attributed to lag effects from impacts associated with TC Jasper in 2023-24.
- The coral cover indicator remained 'poor' with a slight improvement at Snapper North since TC Jasper, although this was offset by a decline in cover for the Low Isles which accounted for the impacts from TC Jasper, since the previous survey for the Low Isles occurred before the tropical cyclone.
- Coral cover for Snapper South sites remained zero, with no improvement since TC Jasper. Recovery of coral cover will depend upon the process of recruitment and growth of juveniles.
- The cover change indicator has declined to 'moderate', reflecting the reduced rates of recovery for Snapper North and the lack of recovery for Snapper South.
- The composition indicator was unchanged in score and remained 'very poor' since the previous year.
- The Macroalgae indicator was 'good' in 2023-24, when high mortality of macroalgae was caused by floodwater inundation, but the grade declined to 'moderate' in 2024-25 following an increase in macroalgae cover at Snapper North 5 m, and particularly rapid recolonisation of red species at Snapper South 5 m.
- The juvenile coral indicator improved from 'very poor' to 'poor' due to the increase in juvenile density at the Low Isles, which offset the very low densities at Snapper Island sites.

Central zone

- The coral cover indicator remained at the lower threshold of 'good' with a very slight decrease in score to 61 since the previous year. The substantial decline of cover in 2023-24 was attributed to a combination of impacts including persistent crown-of-thorns starfish presence, the heat stress and flood inundation of that year, and chronic pressures.
- Coral cover scores changed notably at several sites since the previous year, with increases of cover at some sites offsetting decreases at other sites.
- The cover change indicator has remained 'moderate' over the last three years, with scores declining each year reflecting reduced rates of recovery in hard coral cover between disturbance events. This has followed the previous seven years which were all graded 'good'.
- The composition indicator has continued as 'moderate' for the last four years. Composition scored zero at three of the 13 sites which typically indicates a low representation of *Acropora.*
- Macroalgae score has remained 'poor' since the previous year after a continued decline in score since 2020-21 when the grade was 'good'. Over this period of declining score, increased macroalgae cover has occurred at both 2 m and 5 m depths and has been characterised by persistent dense mats of red macroalgae particularly at Franklands West.
- The juvenile coral score remined 'poor', and whilst there is substantial variation of juvenile density across sites, the trend for reefs at 2 m has been a decline since 2020-21.
- Crown-of-thorns starfish densities at above outbreak levels were recorded at Fitzroy East, High East and Franklands East during 2024-25. Feeding scars are typically present at all reefs surveyed in the Central zone. In addition, a single large individual was recorded at Fitzroy

West. There were 678 and 71 individuals removed from the Frankland group and Fitzroy Island, respectively, during 2024–2025 by the Crown-of-thorns Starfish Program. More information on the Crown-of-thorns Starfish Control Program including latest results is available from the project dashboard.

South zone

- The coral cover indicator decreased substantially in score and declined from 'moderate' to 'poor' since the previous year. This resulted from exposure to low salinity floodwaters from the heavy rainfall events and high river discharges, including the Tully and Herbert, in February 2025.
- The cover change indicator continued to decrease in score since 2019-20 and declined to 'poor'. Whilst a high score was recorded for Dunk North 5 m, all other sites scored poorly. The decline in score over time is likely linked to disease as a result of stress from exposure to floodwaters and elevated temperatures in recent years.
- The composition indicator remained 'moderate' and has declined since 2020-21 when it peaked with a grade of 'very good'.
- The macroalgae indicator improved substantially from 'poor' to 'moderate' and scores increased at most sites. However, this improvement was attributed to the impacts of floodwaters which reduced macroalgae cover.
- The juvenile coral indicator declined substantially from 'good' to 'moderate' since the previous year. Density of juveniles tended to be poorer for coral reefs at 2 m depth compared to 5 m depth and the increases of juvenile coral in 2023-24 at Dunk South, Dunk North and Bedarra were reversed for 2024-25.

Palm Island zone

- During the summer of 2024-25, the coral reefs of the Palm Island zone were impacted from a localised severe storm with high winds and damaging waves, and from floodwater inundations in February 2025, when heavy rainfall and flooding events occurred in the catchments to the south including the Burdekin, and the adjacent Herbert River catchment.
- The coral cover indicator decreased substantially in score and declined from 'moderate' to 'poor' since the previous year. This was a result of exposure to low salinity floodwaters from the extreme rainfall events and high river discharges, and physical impacts of wind and waves from the storm event.
- The most extreme impacts on coral cover occurred at Lady Elliot, with 90% of hard corals at 2 m depth, and 22% of hard coral at 5 m depth killed by floodwaters.
- The cover change indicator remained 'poor' but varied considerably among sites.
- The composition indicator remained 'moderate' but decreased from 58 to 45 and this decline is associated with a lowering of *Acropora* representation within the hard coral community.
- The macroalgae indicator improved substantially from 'poor' to 'good' and scores increased at most sites. Macroalgae indicator scores increased markedly at Pandora 2 m, and at Lady Elliot Reef and Havannah Island, however the reduction of macroalgal cover was a result of lowered salinity due to floodwater exposure and from storm damage.
- The juvenile coral indicator remained 'poor' but declined in score. Whilst juvenile density was high at select sites, particularly Pandora North 5 m, density was poor and declines have occurred at most of the sites.

Key messages: inshore coral

- A tropical low in early 2025 produced storm damage to reefs in the Palm Island zone and brought heavy rainfall events with extensive flooding of rivers from the southern Wet Tropics to the Burdekin.
- Substantial loss of coral occurred at reefs in the Palm Island and South zones due to low salinity of floodwater inundation.
- The coral index grades for all zones remained 'moderate' and the scores decreased for all zones since the previous year, except for the Central zone which was unchanged. The largest decrease in score occurred for the South zone,
- In the North zone coral condition remained 'poor' and slightly decreased in score mainly due to lag effects from impacts associated with TC Jasper in 2023-24. The coral cover grade remained 'poor' with a slight improvement at Snapper North. The cover change indicator declined to 'moderate', reflecting the reduced rates of recovery for Snapper North and a lack of recovery for Snapper South. Following high mortality of macroalgae caused by floodwater inundation from TC Jasper impacts in 2023-24, a substantial increase in macroalgae cover has occurred at Snapper Island reefs and the macroalgae indicator grade declined to 'moderate'.
- Coral cover of the Central zone remained 'good' and declined slightly since the previous year. The composition and cover change indicators remained 'moderate', and the macroalgae and juvenile coral indicators remained 'poor'. Over the last several years macroalgae cover has increased, characterised by persistent dense mats of red macroalgae particularly at Franklands West. Crown-of-thorns starfish densities at above outbreak levels were recorded at Fitzroy East, High East and Franklands East. Feeding scars are typically present at all reefs surveyed in the Central zone.
- For the South zone, coral cover decreased substantially in score and declined from 'moderate' to 'poor' since the previous year. This resulted from exposure to low salinity floodwaters from the heavy rainfall events and high river discharges, including the Tully and Herbert, in February 2025. Cover change continued to decrease in score with the decline likely linked to disease as a result of stress from exposure to floodwaters over multiple years. The macroalgae indicator improved from 'poor' to 'moderate' due to floodwater impacts which reduced macroalgae cover. The juvenile coral indicator declined substantially from 'good' to 'moderate' since the previous year, with lower juvenile densities on coral reefs at 2 m depth compared to 5 m depth.
- The coral reefs of the Palm Island zone were impacted from a severe storm with high winds and damaging waves, and from floodwater inundation in February 2025. Coral cover decreased substantially in score and declined from 'moderate' to 'poor' since the previous year mainly due to exposure to low salinity floodwaters. The most extreme impacts on coral cover occurred at Lady Elliot Reef, with 90% of hard corals at 2 m depth, and 22% of hard coral at 5 m depth killed by floodwaters. The composition indicator remained 'moderate' but decreased from 58 to 45 and this decline is associated with a lowering of *Acropora* representation within the hard coral community. Macroalgae indicator scores increased markedly at several reefs, however, the reduction of macroalgal cover was due to low salinity from floodwaters and storm damage.

Confidence

Confidence in the inshore marine coral results are shown in Table 48. Confidence scores (1 – 3) have been weighted according to the 2017 updated methods for assessing confidence (WTHWP 2017) (Maturity of Methodology 0.36, Validation 0.71, Representativeness 2, Directness 0.71, Measured error 0.71).

Table 48 Confidence scoring of the coral index for the inshore marine zones.

Maturity of methodology (x0.36)	Validation (x0.71)	Represent-ativeness (x2)	Directness (x0.71)	Measured error (x0.71)	Final	Rank
3	3	2	3	1	10.1	4

Confidence criteria are scored 1-3 and then weighted by the value identified in parenthesis. Final scores (4.5 – 13.5) are the sum of the weighted confidence criteria. **Rank based on final score:** 1 (very low): 4.5 – 6.3; 2 (low): >6.3 – 8.1; 3 (moderate): >8.1 – 9.9; 4 (high): >9.9 – 11.7; 5 (very high): >11.7 – 13.5.

6.3. Seagrass

The methods for reporting seagrass including the combined display approach for presenting results from the two seagrass programs (MMP and QPSMP) are provided in the methods technical report (WTW 2026). The inshore marine zone seagrass condition scores and grades for 2024-25 and previous years are presented in Table 49. The site scores and grades for the two reported inshore zones are presented in Table 50. Note that for the QPSMP the seagrass site score is the minimum of the indicator values unless species composition is the lowest, in which case it is the average of species composition and the next lowest scoring indicator. For the MMP, the seagrass site score is the average of the indicator values. The condition score for an inshore zone is the average of the site scores. Seagrass indicator and condition scores for previous years are presented in Appendix G Table 156 to Table 163.

Table 49 Inshore marine zone seagrass condition results for 2024-25 and previous years.

Inshore zone	24-25	23-24	22-23	21-22	20-21	19-20	18-19	17-18	16-17	15-16
North	43#	52#	64#	60#	57#	46	53	46	30	30
Central	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
South	27#	30#	36#	40#	40#	35	35	23	6	18
Palm Island	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd

Scoring range: ■ Very Poor = 0 to <21 | ■ Poor = 21 to <41 | ■ Moderate = 41 to <61 | ■ Good = 61 to <81 | ■ Very Good = 81 – 100. nd indicates no data available. #The MMP updated seagrass condition indicators for 2020-21 with the removal of tissue nutrient status and replacement of reproductive effort with resilience. For further information on calculation of seagrass scores refer to methods technical report (WTW 2026). **Note:** as from 2016-17 results for inshore seagrass are provided by MMP as whole numbers within the 0-100 scoring range for zones that are represented solely by MMP seagrass data (South inshore zone). This ensures consistent reporting by the WT Report Card and MMP for scores that are on the boundary between grades and for which grades may be affected by the method used for the rounding of decimal places.

The inshore seagrass scores are likely to be influenced by the monitoring programs that are present. Given that the QPSMP and MMP designs and indicators differ, the condition assessments are not directly comparable due to the different seagrass characteristics that are measured, and the different monitoring approaches. It is recommended to refer to the technical reports from each monitoring program to assist the interpretation of the results in more detail. For the QPSMP refer to the latest Annual Monitoring Report available at https://researchonline.jcu.edu.au/ and for the MMP refer to the latest 'Marine Monitoring Program: Annual Report for inshore seagrass monitoring' available at https://elibrary.gbrmpa.gov.au/jspui/.

Table 50 Seagrass site scores and grades calculated from indicators from QPSMP and MMP for 2024-25.

Inshore zone	Site code	Habitat/depth	QPSMP			MMP		Site score and grade
			Biomass	Area	Species compo-sition	Percent cover	Resil-ience	
North	CN13	Coast/intertidal	50	87	96	nd	nd	50
	YP1 & YP2	Coast/intertidal	nd	nd	nd	38	33	36
	CN34	Coast/intertidal	68	55	89	nd	nd	55
	CN11	Coast/subtidal	55	81	100	nd	nd	55
	GI1 & GI2	Reef/intertidal	nd	nd	nd	81	59	70
	LI1	Reef/intertidal	nd	nd	nd	13	3	8
	GI3	Reef/subtidal	nd	nd	nd	75	63	69
	LI2	Reef/subtidal	nd	nd	nd	0	5	3
South	LB1 & LB2	Coast/intertidal	nd	nd	nd	0	15	8
	MS1 & MS2	Coast/subtidal	nd	nd	nd	50	nd	50
	DI1 & DI2	Reef/intertidal	nd	nd	nd	19	53	36
	GOI[#]	Reef/subtidal	nd	nd	nd	nd	nd	nd
	DI3	Reef/subtidal	nd	nd	nd	0	30	15

Scoring range: ■ Very Poor = 0 to <21 | ■ Poor = 21 to <41 | ■ Moderate = 41 to <61 | ■ Good = 61 to <81 | ■ Very Good = 81 – 100. nd indicates no data available. Note that for the QPSMP the seagrass site score is the minimum of the indicator values, whilst for the MMP the seagrass site score is the average of the indicator values.

Inshore seagrass in the North zone remained in 'moderate' condition and decreased in score whilst seagrass in the South zone remained in 'poor' condition and decreased in score, since the previous year. For QPSMP results, due to the timing of the surveys which typically occur in October to November, the results for 2024-25 captured effects on seagrass from TC Jasper, whilst the surveys for 2023-24 occurred before TC Jasper. The MMP results for 2024-25 continued to capture impacts from TC Jasper, since condition assessment for 2023-24 was from surveys both before and after TC Jasper. The 2024-25 MMP conditions assessments also included surveys following the 2025 major flooding events that affected the South zone (Leahy *et al.* 2026).

North zone

Location of MMP sites and QPSMP meadows – Cairns (3 meadows: CN11, CN13, CN34), Yule Point (2 averaged intertidal sites: YP1, YP2), Green Island (2 averaged intertidal sites: GI1, GI2; 1 subtidal site: GI3), Low Isles (1 intertidal site: LI1; 1 subtidal site: LI2).

- Overall seagrass condition remained in 'moderate' condition.
- Seagrass condition for inshore QPSMP monitoring meadows (Cairns Harbour) declined from 'good' or 'very good' condition in 2023-2024 (monitored prior to TC Jasper) to 'moderate' condition in 2024-2025. Species composition remained 'very good' for these three meadows – moderate scores were driven by declines in biomass or area.
- Seagrass condition at Green Island improved from 'moderate' to 'good' at both the intertidal and subtidal sites.
- Seagrass at the Low Isles sites remained 'very poor' for the seventh year, with resilience and % cover indicators 'very poor'.

South zone

Location of MMP sites – Lugger Bay (2 averaged intertidal sites: LB1, LB2), Missionary Bay (2 averaged subtidal sites: MS1, MS2), Dunk Island (2 averaged intertidal sites: DI1, DI2; 1 subtidal site: DI3), Goold Island: GOI (suspended site). No QPSMP meadows.

- Seagrass condition remained 'poor' and decreased in score since the previous year.
- Percent cover condition remained 'very poor' at both Dunk Island sites.
- Lugger Bay resilience declined from 'poor' to 'very poor', and percent cover remained 0%.
- Missionary Bay seagrass remained in satisfactory condition for the second year.

Key messages: inshore seagrass

- Seagrass condition assessments continued to capture the impacts of TC Jasper, with some sites surveyed for the first time since the event.
- Seagrass condition in the North zone remained 'moderate' and decreased in score since the previous year.
- Seagrass condition in the South zone remained 'poor' and decreased in score since the previous year.

Recommendations for expanding seagrass monitoring and information about current seagrass monitoring projects that could assist expansion is presented in Appendix I and was provided by the James Cook University TropWATER Seagrass Team.

Confidence

Confidence in the inshore seagrass results is shown in Table 51 for the two monitoring programs. Confidence scores (1 – 3) have been weighted according to the 2017 updated methods for assessing confidence (WTHWP 2017) (Maturity of Methodology 0.36, Validation 0.71, Representativeness 2, Directness 0.71, Measured error 0.71).

Table 51 Confidence scoring of seagrass indices used in the MMP and QPSMP monitoring for inshore marine zones.

	Maturity of methodology (x0.36)	Validation (x0.71)	Represent-ativeness (x2)	Directness (x0.71)	Measured error (x0.71)	Final	Rank
MMP Seagrass index	2.5	3	1	3	2	**8.6**	**3**
QPSMP Seagrass index	3	3	1	3	2	**8.8**	**3**

Confidence criteria are scored 1-3 and then weighted by the value identified in parenthesis. Final scores (4.5 – 13.5) are the sum of the weighted confidence criteria. **Rank based on final score:** 1 (very low): 4.5 – 6.3; 2 (low): >6.3 – 8.1; 3 (moderate): >8.1 – 9.9; 4 (high): >9.9 – 11.7; 5 (very high): >11.7 – 13.5.

6.4. Inshore fish

Whilst there is no current reporting for inshore fish due to the lack of appropriate monitoring and indicators, the Integrated Monitoring and Reporting (IMR) Reef Fish Monitoring Program, funded by GBRF and led by the Australian Institute of Marine Science (AIMS) in collaboration with University of the Sunshine Coast (UniSC), James Cook University (JCU) including TropWATER and Marine Data Tech was expected to provide outputs that provide a framework for reporting on marine fish for regional report cards. The framework intended to use long-term monitoring data from the LTMP

reef fish surveys and specifically developed indicators of marine fish, which can address the monitoring gap. A summary of recent activities from the project is provided below.

- Annual underwater visual surveys of reef fishes and benthic communities on the fringing reef slopes of eight inshore island groups.
- Bi-annual surveys of fishes in nursery seascapes in the central GBR (Mission Beach to Townsville) in collaboration with Traditional Owners and Indigenous rangers using stereo Remote Underwater Video Systems (RUVS) and stereo Baited Remote Underwater Video Systems (BRUVS). These surveys have identified a number of potential seagrass monitoring locations in the Girringun TUMRA and at Palm Islands.
- Annual surveys of fish and habitat using stereo RUVS and BRUVS with Traditional Owners and Girringun, MingaMinga and Wulgurukaba rangers in coastal waters, and annual deep-water inter-reef surveys throughout the GBR, supplemented by Remotely Operated Videos (ROVs) where feasible.
- Mosman *et al.* (2026) found that key fisheries taxa — including *Lutjanus*, *Lethrinus*, and *Choerodon* — exhibited clear ontogenetic habitat shifts, supporting the seascape nursery concept and highlighting the importance of habitat connectivity. Additional publications are in prep or in review.

6.5. Overall inshore marine scores and grades

The index and overall inshore marine scores and grades for 2024-25 are presented in Table 52 and the overall scores and grades for all years are presented in Table 53. The scores for the North, South and Palm Island zones decreased from the previous year, whilst all zones remained 'moderate' since the previous year.

Table 52 Inshore index and overall scores and grades for 2024-25.

Inshore zone	Water Quality	Coral	Seagrass	Fish	Overall
North	69	37	43	nd	49
Central	62	48	nd	nd	55
South	55	43	27	nd	41
Palm Island	40	43	nd	nd	41

Standardised scoring range: ■ Very Poor = 0 to <21 | ■ Poor = 21 to <41 | ■ Moderate = 41 to <61 | ■ Good = 61 to <81 | ■ Very Good = 81 – 100. nd indicates no data available.

Table 53 Inshore overall scores and grades for all years.

Inshore zone	24-25	23-24	22-23	21-22	20-21	19-20	18-19	17-18	16-17	15-16
North	49	59	66	64	57	60	60	54	48	52
Central	55	54	63	60	61	67	59	57	57	62
South	41	47	55	53	51	56	47	41	37	44
Palm Island	41	57	61	56	55	59	56	51	57	59

Standardised scoring range: ■ Very Poor = 0 to <21 | ■ Poor = 21 to <41 | ■ Moderate = 41 to <61 | ■ Good = 61 to <81 | ■ Very Good = 81 – 100.

7. OFFSHORE MARINE

The location of the offshore marine reporting zone and monitoring sites are shown in Figure 15.

7.1. Water Quality

Since the 2020-21 reporting year there has been no data available for scoring and grading water quality for the offshore zones of the regional report cards. Up until 2019-20, the data for the offshore assessment of water quality was extracted from the marine water quality (MWQ) Bureau of Meteorology dashboard based on remotely sensed analysis of reflectance. In early 2021 the Bureau of Meteorology advised that the MWQ dashboard and underlying data preparation workflow was to be discontinued. Since 2022, the Technical Working Group for regional report cards and the Independent Science Panel recommended that services and products produced by CSIRO for eReefs are used for offshore water quality reporting and progress towards this has been made.

The water quality indicators and index for past years are presented in full in Appendix G Table 164 to Table 167.

7.2. Coral

The offshore coral indicator and index scores (Table 54) were based upon the surveys of the Long-Term Monitoring Program (LTMP) between August 2024 to May 2025 and represented nine separate reefs in the Wet Tropics region as specified in the methods technical report (WTW 2026). The 2024-25 coral indicator and condition index scores for each reef are presented in Appendix F (Table 97).

The LTMP sampling design was updated for 2021-22 onward (see Report Card update in Appendix G p.182), which means the offshore zone indicator and index results are no longer directly comparable with reported results from years previous to 2021-22 due to a reduced number of sites. The back-calculation of results using the updated survey design (Table 168) are now used for comparison with the results of 2021-22 onwards, consequently all results for offshore coral reporting as from 2021-22 are now evaluated in relation to previous years back-calculated using only results from reefs included in the updated survey design. The offshore coral indicator and index scores for years prior to 2021-22 are still presented in Appendix G Table 168 since they were the scores and grades that represented the offshore zone for the previous report cards.

The offshore coral index remained ‘good’ but decreased from 65 to 62 since the previous year. The juvenile density indicator remained ‘very good’ and the score of 92 was unchanged, coral cover remained ‘moderate’ and the score decreased from 46 to 42, whilst coral change also remained ‘moderate’ and the score decreased from 56 to 51. Since the previous year’s survey of the nine reefs, coral cover decreased at seven reefs and increased at two reefs; the density of juveniles increased at one reef, and decreased at three reefs; coral change increased at two reefs and decreased at five reefs; and the coral condition index decreased at eight reefs and increased at one reef.

Table 54 Results for coral indicators and index for 2024-25.

Coral indicators			Coral index
Juveniles	Coral Cover	Coral Change	24-25
92	42	51	**62**

Standardised scoring range: ■ Very Poor = 0 to <21 | ■ Poor = 21 to <41 | ■ Moderate = 41 to <61 | ■ Good = 61 to <81 | ■ Very Good = 81 – 100.

The following discussion is based upon the Report card results and information sourced from the Long-Term Monitoring Program Annual Summary Report of Coral Reef Condition 2024/25.

The results of the 2024-25 offshore coral surveys captured the impacts of TC Jasper, Severe Tropical Cyclone Kirrily (TC Kirrily) and the extreme marine heat wave that occurred during 2023-24 since they all occurred after the offshore coral surveys for the 2023-24 year. Offshore coral mortality during 2024 was primarily attributed to the mass coral bleaching event of that year, with compounding effects from the cumulative impacts of TC Jasper and some crown-of-thorns starfish activity.

During 2024-25 there were no tropical cyclone crossings of the offshore zone. The major flooding events and flood plumes that occurred for the Burdekin, Herbert and Tully rivers in February 2025 inundated inshore reefs and stretched to mid-shelf waters but not as far as offshore waters. Whilst the sea surface temperatures and accumulated heat stress during 2024-25 were not as high as for 2023-24, much of the offshore zone had a likelihood of probable coral bleaching and coral bleaching was observed on all offshore reefs from aerial surveys conducted in March 2025.

Coral loss was greatest at reefs north of Cairns, and this was primarily due to the combined impacts of wave damage from TC Jasper and the high to very high levels of bleaching during 2023-24. For the offshore reefs to the south of Cairns coral cover was more stable since the reefs had lower exposure to heat stress during 2023-24, and the passage of TC Kirrily in January 2024 had minimal impact.

Whilst there were no Potential, Established or Severe Outbreaks of crown-of-thorns starfish recorded on Central GBR reefs in 2025, low numbers of crown-of-thorns starfish were likely on several reefs as indicated from feeding scars and individuals were observed on Farquharson Reef. More information on the Crown-of-thorns Starfish Control Program including latest results is available from the project dashboard.

The impact of bleaching on coral includes direct effects causing the death of partial or whole coral colonies, and indirect effects that can reduce growth and reproduction and increase disease. With increasing frequency and intensity of coral bleaching events, and the additional impacts of tropical cyclones, poorer water quality and crown-of-thorns starfish, the periods of time between disturbance events are reduced and the capacity for coral communities to recover is more limited.

Key messages: offshore coral

- Offshore coral monitoring for 2024-25 captured the impacts of TC Jasper and the severe marine heat wave that occurred during 2023-24.

- During 2024-25 much of the offshore zone had a likelihood of probable coral bleaching due to heat stress.
- The offshore coral index remained 'good' but decreased from 65 to 62 since the previous year.
- The juvenile density indicator remained 'very good' and the score of 92 was unchanged.
- Coral cover remained 'moderate' and the score decreased from 46 to 42.
- Coral change remained 'moderate' and the score decreased from 56 to 51.
- Of the nine monitored reefs the coral condition index decreased at eight reefs and increased at one reef.
- Coral loss was greatest at reefs north of Cairns, primarily due to the impacts of TC Jasper, and the high to very high levels of bleaching during 2023-24.
- There were no Potential, Established or Severe Outbreaks of crown-of-thorns starfish recorded on offshore reefs.

Confidence

Confidence in the offshore coral results is shown in Table 55.

Table 55 Confidence scoring of the coral index for the offshore marine zone.

Maturity of methodology (x0.36)	Validation (x0.71)	Represent-ativeness (x2)	Directness (x0.71)	Measured error (x0.71)	Final	Rank
3	3	2	3	1	10.1	4

Confidence criteria are scored 1-3 and then weighted by the value identified in parenthesis. Final scores (4.5 – 13.5) are the sum of the weighted confidence criteria. **Rank based on final score:** 1 (very low): 4.5 – 6.3; 2 (low): >6.3 – 8.1; 3 (moderate): >8.1 – 9.9; 4 (high): >9.9 – 11.7; 5 (very high): >11.7 – 13.5.

7.3. Overall offshore marine score and grade

For 2024-25 there was insufficient data to provide an overall grade and score for the offshore zone (Table 56). To produce an overall grade and score, at least two of the three indices are required, based on decision rules for aggregation (WTW 2026). In all previous years the grade for offshore water quality has been 'very good'. It is proposed that contextual reporting of offshore water quality will be developed and implemented as part of the 2027 Program Design update for regional report cards, and this will replace reporting based upon scoring and grading. The offshore fish index is aspirational and there is no reporting currently available. Note that for years prior to 2021-22 the previous LTMP sampling design for the offshore coral surveys was used for scoring and grading the coral index. As from 2021-22 the LTMP has applied an updated sampling design for the coral surveys.

Table 56 Offshore marine scores and grades of indices for 2024-25 and overall scores and grades for 2019-20 and previous years.

Water quality	Coral	Fish	24-25
nd	**62**	nd	ID

23-24	22-23	21-22	20-21	19-20	18-19	17-18	16-17	15-16
ID	ID	ID	ID	70	73	75	83	84

Scoring range: Very Poor = 0 to <21 | Poor = 21 to <41 | Moderate = 41 to <61 | Good = 61 to <81 | Very Good = 81 – 100. nd indicates no data available. ID indicates insufficient data.

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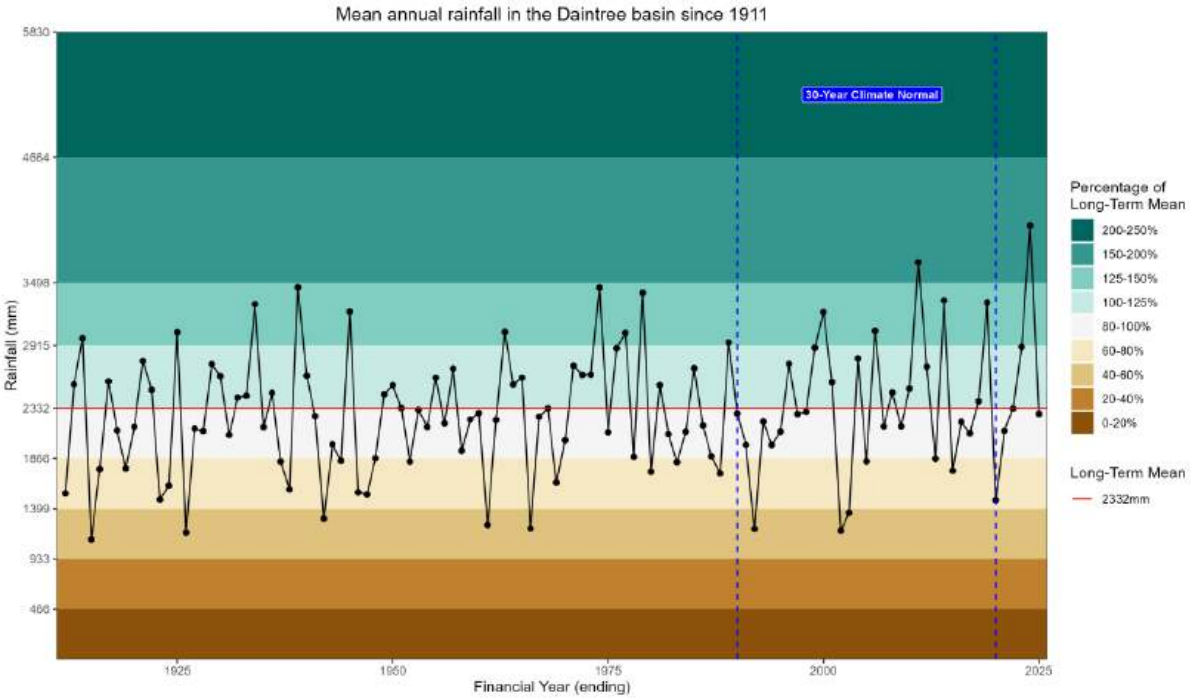
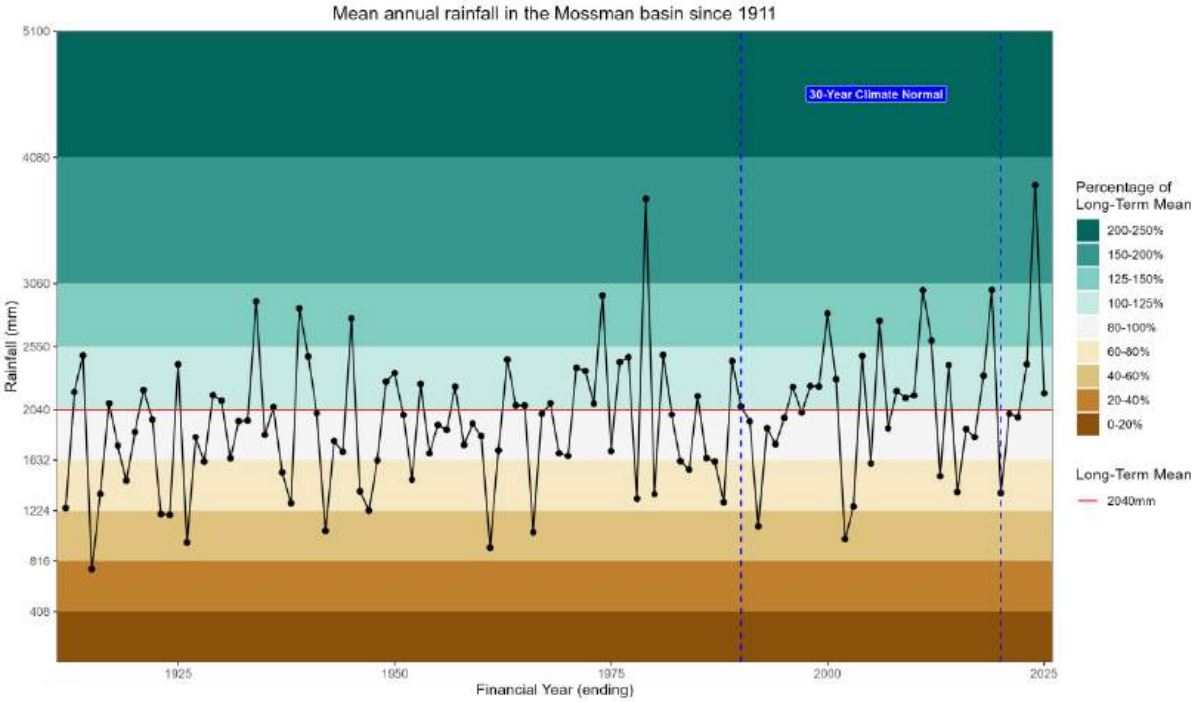
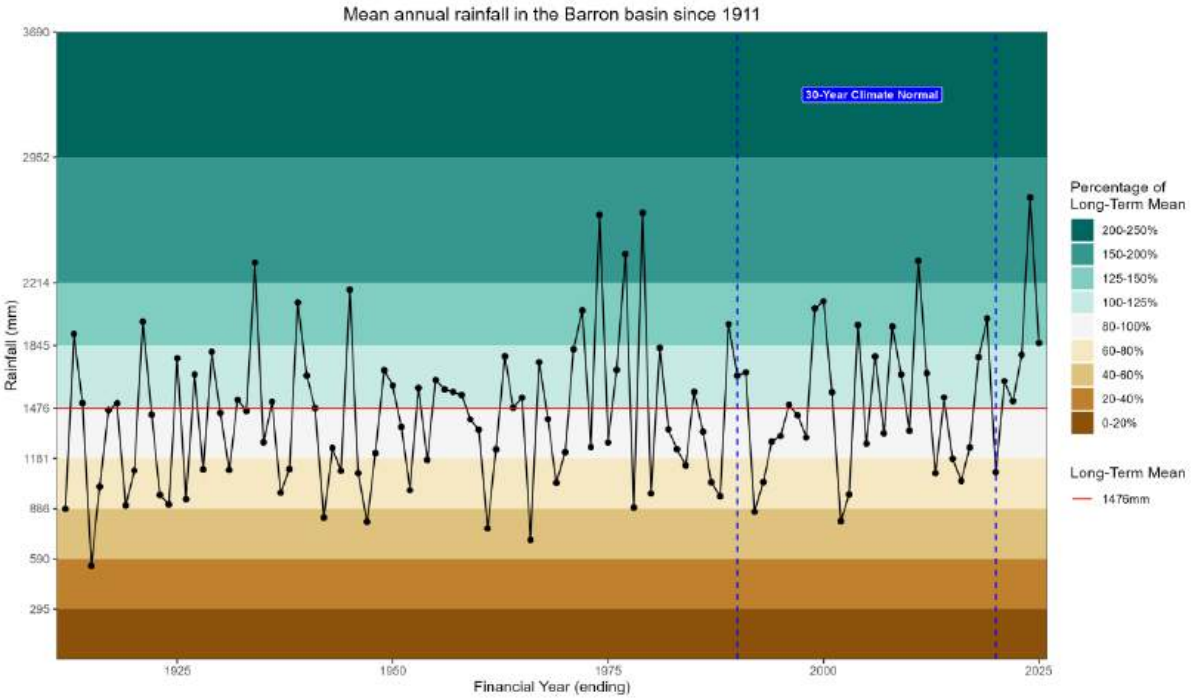
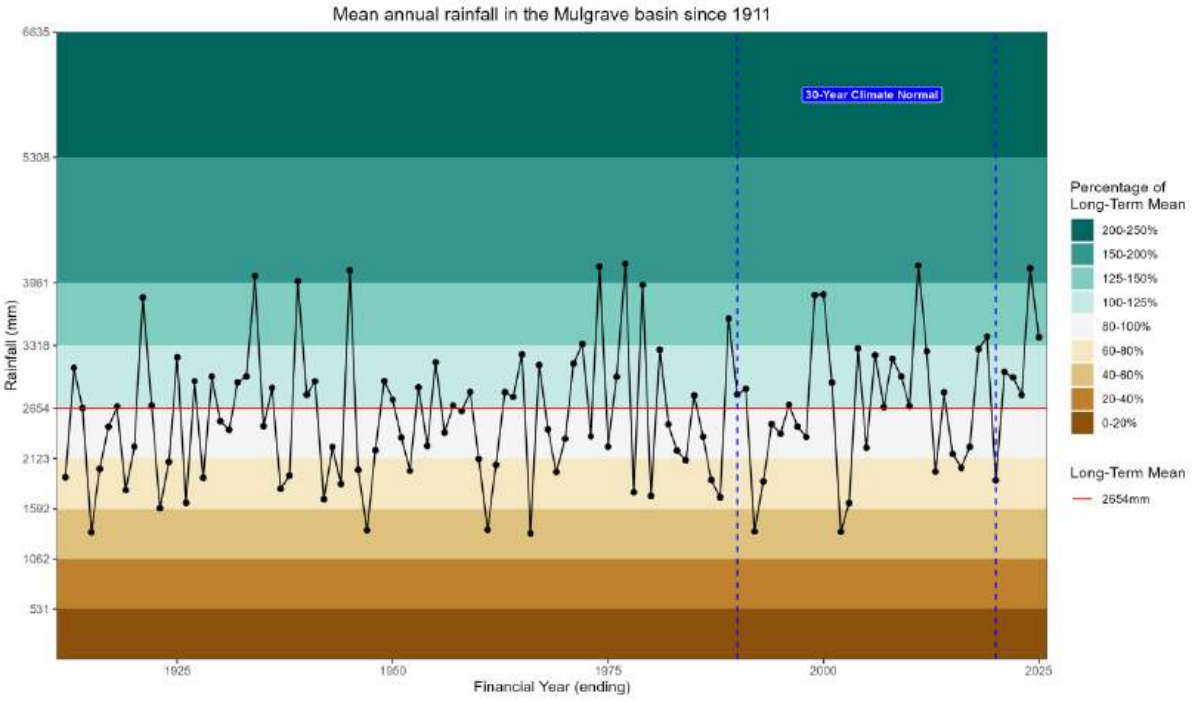
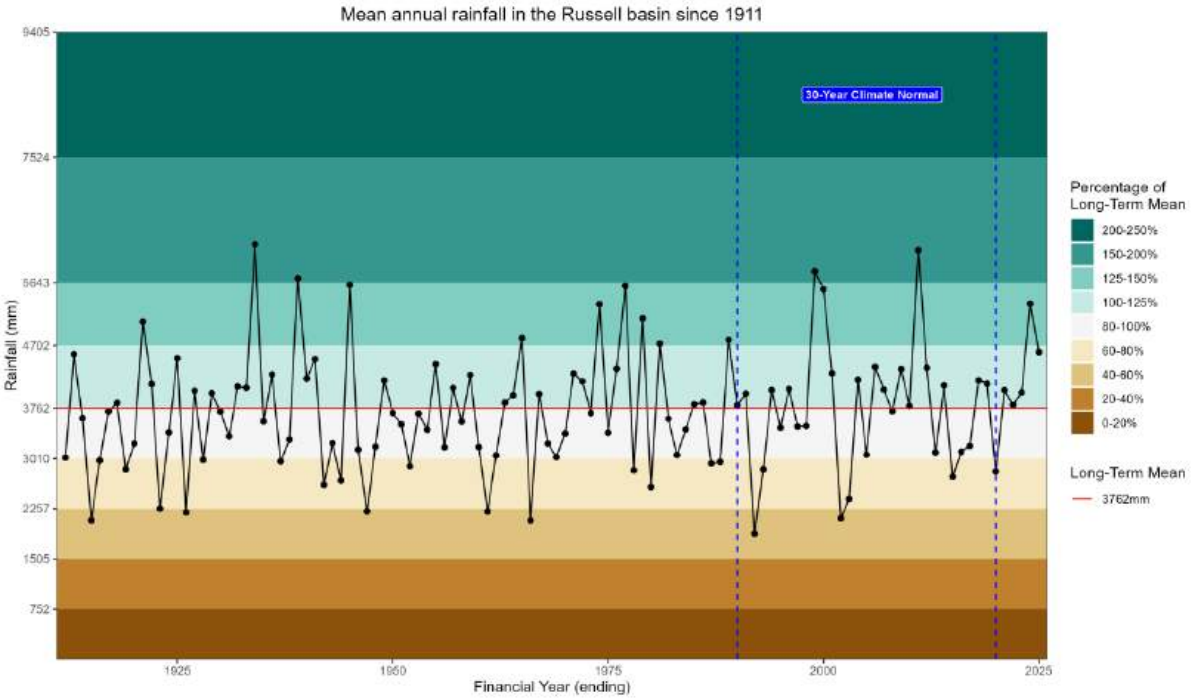
Appendix A. Long-term annual rainfall totals (1911 to 2025) for basin areas of the Wet Tropics

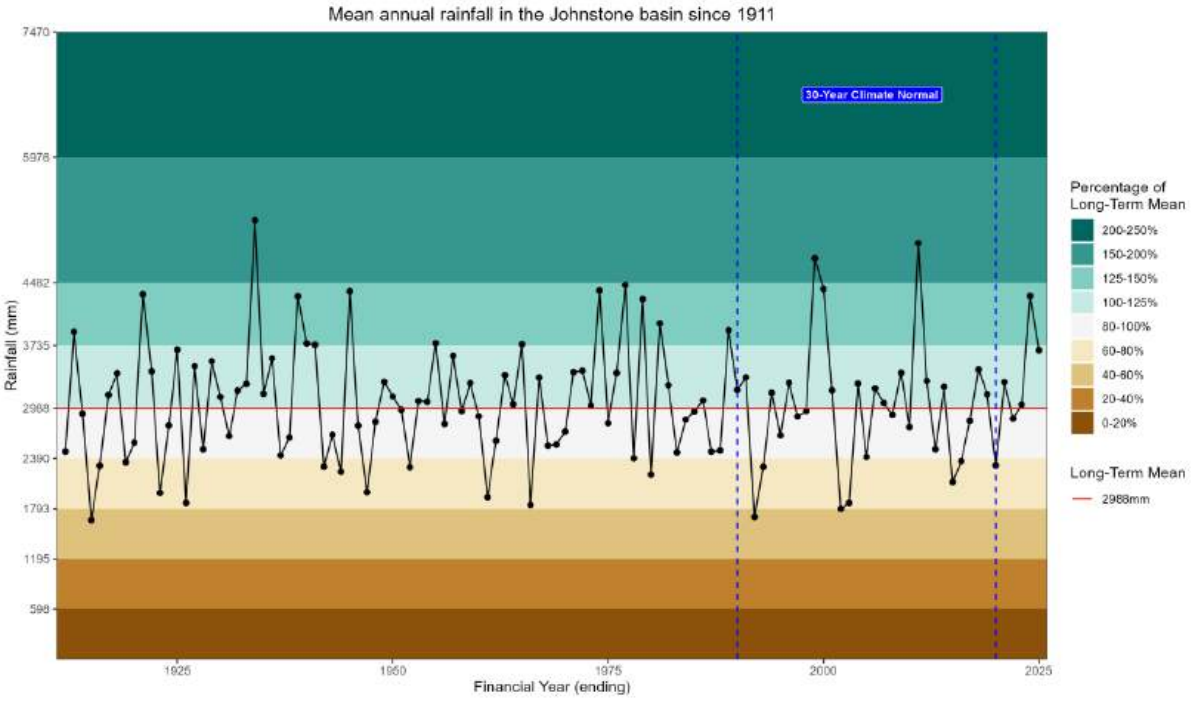


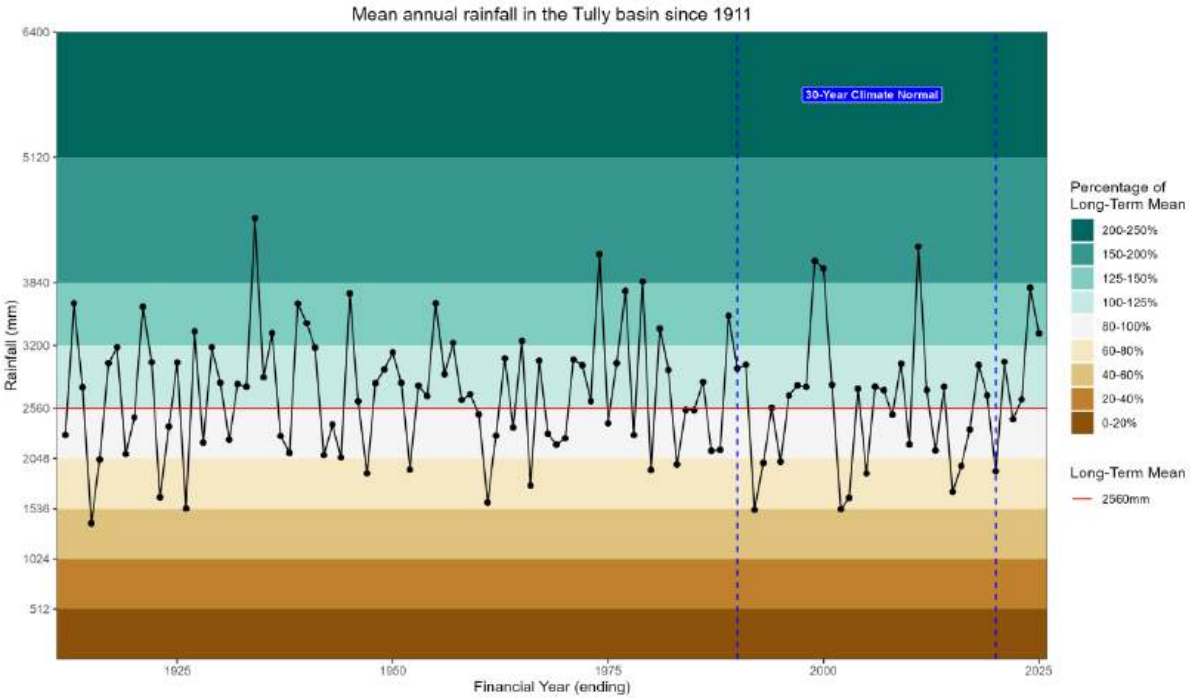


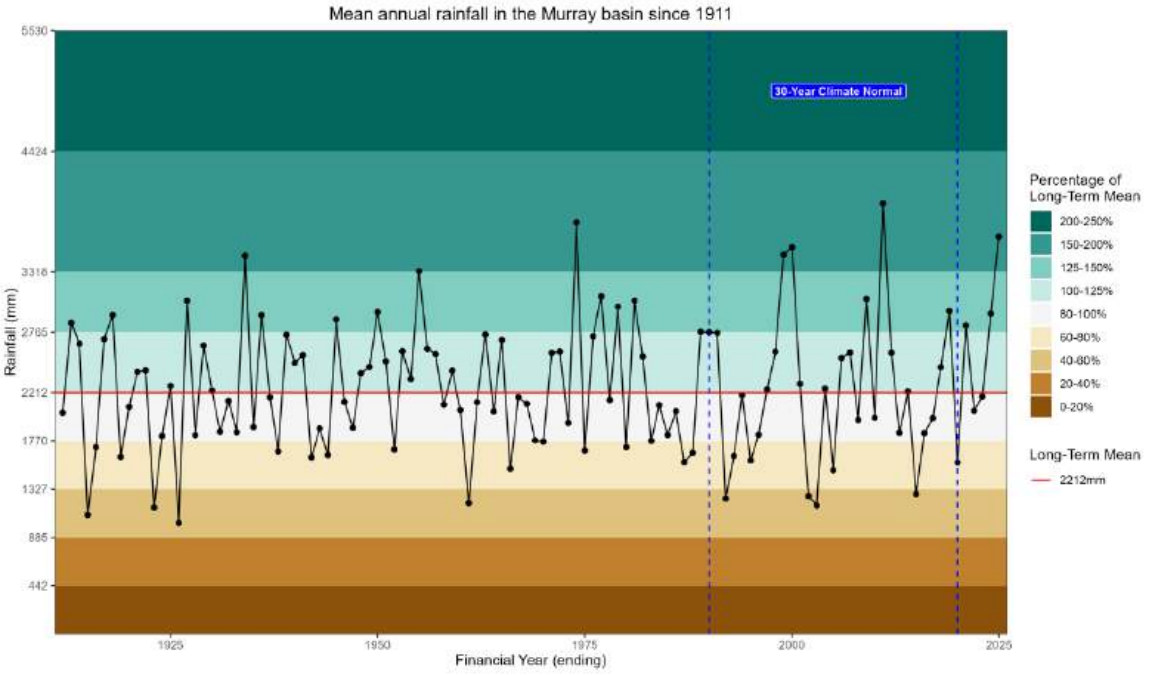

Mean annual rainfall in the Barron basin since 1911
3690
2952
2214
1845
1476
1181
886
590
295
Rainfall (mm)
30-Year Climate Normal
1925
1950
1975
2000
2025
Financial Year (ending)
Percentage of Long-Term Mean
200-250%
150-200%
125-150%
100-125%
80-100%
60-80%
40-60%
20-40%
0-20%
Long-Term Mean
1476mm


Mean annual rainfall in the Mulgrave basin since 1911
6635
5308
3981
3318
2654
2123
1592
1062
531
Rainfall (mm)
30-Year Climate Normal
1925
1950
1975
2000
2025
Financial Year (ending)
Percentage of Long-Term Mean
200-250%
150-200%
125-150%
100-125%
80-100%
60-80%
40-60%
20-40%
0-20%
Long-Term Mean
2654mm


Mean annual rainfall in the Russell basin since 1911
9405
7524
5643
4702
3762
3010
2257
1505
752
Rainfall (mm)
30-Year Climate Normal
1925
1950
1975
2000
2025
Financial Year (ending)
Percentage of Long-Term Mean
200-250%
150-200%
125-150%
100-125%
80-100%
60-80%
40-60%
20-40%
0-20%
Long-Term Mean
3762mm


Mean annual rainfall in the Johnstone basin since 1911
7470
5976
4482
3735
2988
2390
1793
1195
598
Rainfall (mm)
30-Year Climate Normal
1925
1950
1975
2000
2025
Financial Year (ending)
Percentage of Long-Term Mean
200-250%
150-200%
125-150%
100-125%
80-100%
60-80%
40-60%
20-40%
0-20%
Long-Term Mean
2988mm


Mean annual rainfall in the Tully basin since 1911
6400
5120
3840
3200
2560
2048
1536
1024
512
Rainfall (mm)
30-Year Climate Normal
1925
1950
1975
2000
2025
Financial Year (ending)
Percentage of Long-Term Mean
200-250%
150-200%
125-150%
100-125%
80-100%
60-80%
40-60%
20-40%
0-20%
Long-Term Mean
2560mm


Mean annual rainfall in the Murray basin since 1911
5530
4424
3316
2765
2212
1770
1327
885
442
Rainfall (mm)
30-Year Climate Normal
1925
1950
1975
2000
2025
Financial Year (ending)
Percentage of Long-Term Mean
200-250%
150-200%
125-150%
100-125%
80-100%
60-80%
40-60%
20-40%
0-20%
Long-Term Mean
2212mm

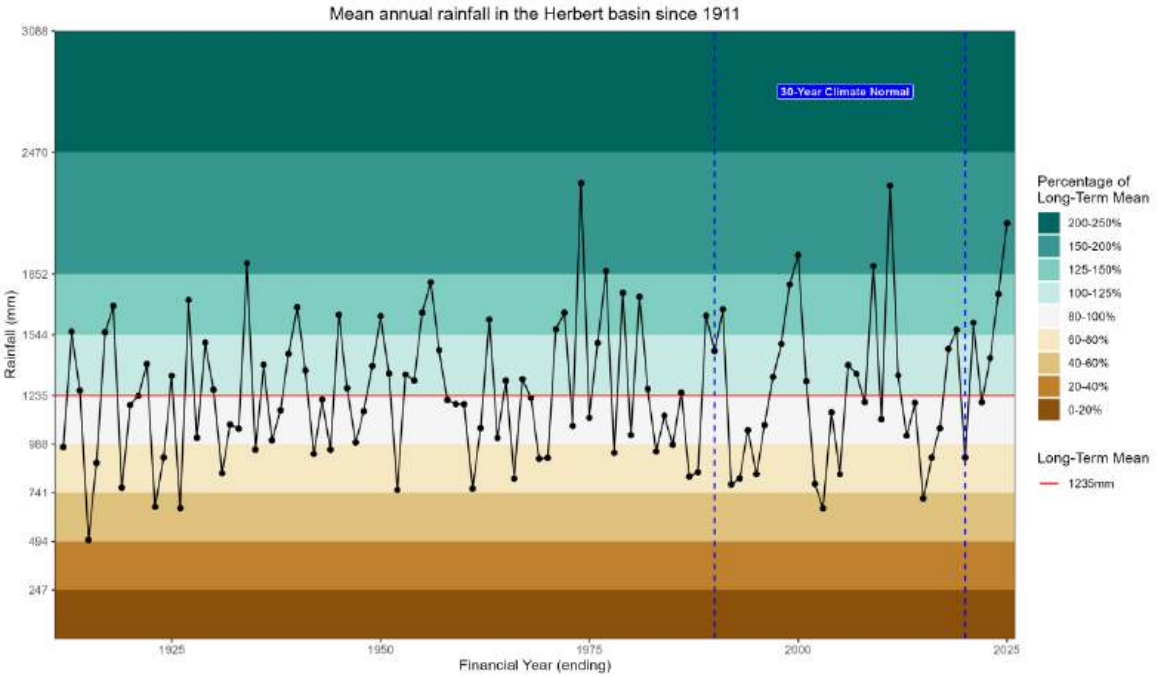


Figure 18. Annual rainfall totals, and long-term annual rainfall average (1911 to 2025) for basins of the Wet Tropics. Data sourced from the Bureau of Meteorology Australian Water Outlook .

Appendix B. Water quality data and scores for basins, estuaries and inshore marine reporting zones

Freshwater basins and estuaries

For each basin the high flow data and baseflow data were evaluated against the water quality objectives for high flow and baseflows at the moderately disturbed level of protection scheduled under the EPP (Water and Wetland Biodiversity) 2019 for Wet Tropics basins (DES 2020) (Table 57 to Table 66). Water quality objectives are referred to as guideline values (GV) to maintain clarity of terms throughout this report. As noted in the methods technical report (WTW 2026) the scheduled high flow guideline values (GVs) were set as the 80th percentile of historical data from the upper Tully Gorge reference site which has naturally low FRP concentrations. Concentrations of FRP are diluted during rainfall run-off events as it takes longer to become soluble than other nutrients, for example DIN. The "moderately disturbed" values for baseflow conditions are derived from 50th percentiles of impacted end of system catchment sites which drain agricultural areas where phosphorus is applied in the form of fertiliser. Consequently, the FRP GVs are lower for high flows than for baseflows.

In the basin water quality tables, the months are listed only if monitoring occurred for the flow type (high flow or low flow) for that month. Sampling intensity is greater during wet season events and sampling is generally once per month during the dry season. For months where more than one sample was taken the water quality data for both high flow and baseflow were calculated to monthly medians before the analysis, and consequently this procedure addressed any potential bias in the raw data relating to sampling intensity. The high flow and base-flow condition scores were multiplied by the proportion of days of the year that high flow or baseflow conditions occurred and were then summed to provide the annual condition score (Table 57 to Table 66). The methods technical document provides full details of the method (WTW 2026). Box and whisker plots of water quality indicator concentrations for high flow and base-flow conditions are presented in Figure 19 to Figure 21 and were conducted on all data points collected during the reporting period and not on the monthly values used for generating scores.

For estuaries, chlorophyll *a*, turbidity, dissolved oxygen, DIN and FRP were evaluated against the scheduled guidelines for the water type at which the sampling site was located (moderately disturbed mid-estuary or lower estuary/enclosed coastal) in accordance with the EPP (Water and Wetland Biodiversity) 2019 for Wet Tropics basins (DES 2020). For estuaries with both mid-estuary and lower estuary/enclosed coastal water types the annual scores were multiplied by the proportion of data values within each water type and then condition scores were summed. The medians, condition scores and grades for each reporting zone are presented in Table 67 to Table 74 below.

The following scoring ranges and grading apply to freshwater basin and estuary water quality and are described in the methods technical report (WTW 2026).

- TSS, DIN FRP, turbidity, DO, Chl *a*: Very Poor = 0 to <21 | Poor = 21 to <41 | Moderate = 41 to <61 | Good = 61 to <81 | Very Good = assigned 90.
- Sediment, nutrients, phys-chem, pesticides: Very Poor = 0 to <21 | Poor = 21 to <41 | Moderate = 41 to <61 | Good = 61 to <81 | Very Good = 81 – 100

Table 57 Daintree Basin water quality monthly values and scores for 2024-25 reporting period.

High flows (>25 m^3/s)	Monthly value (mg/L)	TSS	DIN	FRP	n (days)
	Jul	13	0.05	0.001	
	Aug	7	0.04	0.002	
	Dec	31	0.15	0.004	
	Jan	8	0.06	0.003	
	Feb	21	0.12	0.003	
	Mar	53	0.18	0.003	
	Apr	30	0.05	0.001	
	May	26	0.05	0.001	
	Seasonal	24	0.06	0.003	200
GV (mg/L)		52	0.114	0.004	
SF (mg/L)		191	0.306	0.016	
80th %-tile (mg/L)		31	0.14	0.003	
Condition score		90.0	75.6	90.0	
Grade		VG	G	VG	

Base-flows	Monthly value (mg/L)	TSS	DIN	FRP	n (days)
	Aug		0.02	0.004	
	Oct		0.01	0.003	
	Nov		0.01	0.002	
	Jan		0.01	0.003	
	Jun		0.04	0.002	
	Seasonal		0.01	0.003	165
GV (mg/L)		8	0.060	0.008	
SF (mg/L)		74	0.261	0.013	
80th %-tile (mg/L)			0.02	0.003	
Condition score			90.0	90.0	
Grade		n.d.	VG	VG	

Annual	**TSS**	DIN	FRP	**Nutrients**
Score	90.0	82.1	90.0	86.1
Grade	VG	VG	VG	VG

n(days) is the number of high flow days or base-flow days for the reporting period. GV is guideline value, SF is the scaling factor, 80th %-tile is the 80th percentile of the monitoring data, No.≤ GV is the number of data points less than or equal to the guideline value, and percentile ≤ GV is the percentile of data points less than or equal to the guideline value. TSS data for baseflows was not available. Full explanation of terms and scoring method are provided in WTW 2026.

Table 58 Mossman Basin water quality monthly values and scores for 2024-25 reporting period.

Base-flows (Mossman US)	Monthly value (mg/L)	TSS	DIN	FRP
	Jul	8	0.06	0.005
	Oct	13	0.04	0.004
	Jan	5	0.06	0.004
	May	1	0.05	0.005
	Jun	1	0.05	0.004
	Seasonal	5	0.05	0.004
GV (mg/L)		8	0.060	0.008
SF (mg/L)		74	0.261	0.013
80th %-tile (mg/L)		9	0.06	0.005
Condition score		77.2	90.0	90.0
Grade		G	VG	VG

Base-flows (Mossman WWTP)	Monthly value (mg/L)	TSS	DIN	FRP
	Jul	5	0.04	0.010
	Oct	1	0.05	0.005
	Jan	2	0.06	0.010
	May	2	0.05	0.010
	Jun	2	0.05	0.020
	Seasonal	2	0.05	0.010
GV (mg/L)		8	0.060	0.008
SF (mg/L)		74	0.261	0.013
80th %-tile (mg/L)		3	0.05	0.012
Condition score		90.0	90.0	36.5
Grade		VG	VG	P

Base-flows (South Mossman)	Monthly value (mg/L)	TSS	DIN	FRP
	Jul	6	0.17	0.010
	Oct	4		0.005
	Jan	3	0.13	0.020
	May	2	0.15	0.010
	Seasonal	4	0.15	0.010
GV (mg/L)		8	0.060	0.008
SF (mg/L)		74	0.261	0.013
80th %-tile (mg/L)		5	0.16	0.014
Condition score		90.0	33.6	36.5
Grade		VG	P	P

Base-flows (Mossman DS)	Monthly value (mg/L)	TSS	DIN	FRP
	Jul	2	0.11	0.010
	Oct	1	0.05	0.005
	Jan	5	0.17	0.005
	May	1	0.06	0.005
	Jun	1	0.11	0.010
	Seasonal	1	0.11	0.005
GV (mg/L)		8	0.060	0.008
SF (mg/L)		74	0.261	0.013
80th %-tile (mg/L)		2	0.12	0.010
Condition score		90.0	45.8	72.9
Grade		VG	M	G

Annual (base-flows)	**TSS**	DIN	FRP	**Nutrients**
Score	83.1	64.1	65.3	64.7
Grade	VG	G	G	G

GV is guideline value, SF is the scaling factor, 80th %-tile is the 80th percentile of the monitoring data, No.≤ GV is the number of data points less than or equal to the guideline value, and percentile ≤ GV is the percentile of data points less than or equal to the guideline value. Mossman US refers to sites MR2 and MR4 which are in close proximity upstream of the confluence with South Mossman River. Mossman WWTP refers to site MR4.1 which is just downstream of the Mossman wastewater treatment plant discharge point and just upstream of the confluence with the South Mossman River. SMR refers to the site on the South Mossman River just upstream of the confluence with the Mossman River (SMR1). Mossman DS refers to sites MR5 located on the Mossman River just downstream of the confluence with the South Mossman River. Site details and explanation of terms and scoring method are provided in WTW 2026.

Table 59 Barron Basin water quality monthly values and scores for 2024-25 reporting period.

High flows (>8.2 m^3/s)	Monthly value (mg/L)	TSS	DIN	FRP	n (days)
	July	5	0.24	0.004	
	Aug	7	0.19	0.005	
	Dec	74	0.17	0.012	
	Jan	84	0.18	0.021	
	Feb	76	0.12	0.005	
	Mar	109	0.09	0.004	
	Apr	24	0.10	0.006	
	May	6	0.19	0.005	
	Jun	5	0.47	0.005	
	Seasonal	24	0.18	0.005	265
GV (mg/L)		52	0.114	0.004	
SF (mg/L)		191	0.306	0.016	
80th %-tile (mg/L)		79	0.21	0.008	
Condition score		71.1	39.3	55.8	
Grade		G	P	M	

Base-flows	Monthly value (mg/L)	TSS	DIN	FRP	n (days)
	Sep	8	0.19	0.004	
	Oct	5	0.12	0.006	
	Nov	8	0.12	0.006	
	Seasonal	8	0.12	0.006	100
GV (mg/L)		8	0.060	0.008	
SF (mg/L)		74	0.261	0.013	
80th %-tile (mg/L)		8	0.16	0.006	
Condition score		90.0	43.1	90.0	
Grade		VG	M	VG	

Annual (high flow only, no baseflow data available)	**TSS**	DIN	FRP	**Nutrients**
	76.3	40.4	65.2	52.8
	G	P	G	M

n(days) is the number of high flow days or base-flow days for the reporting period. GV is guideline value, SF is the scaling factor, 80th %-tile is the 80th percentile of the monitoring data, No.≤ GV is the number of data points less than or equal to the guideline value, and percentile ≤ GV is the percentile of data points less than or equal to the guideline value. nd indicates no data available. Full explanation of terms and scoring method are provided in WTW 2026.

Table 60 Mulgrave Basin water quality monthly values and scores for 2024-25 reporting period.

High flows >30 m^3/s	Monthly value (mg/L)	TSS	DIN	FRP	n (days)
High flow	July	6	0.12	0.005	
	Dec	51	0.23	0.022	
	Jan	31	0.12	0.013	
	Feb	16	0.15	0.011	
	Mar	42	0.08	0.012	
	Apr	8	0.20	0.009	
	May	29	0.10	0.006	
	Seasonal	29	0.12	0.011	177
GV (mg/L)		52	0.114	0.004	
SF (mg/L)		191	0.306	0.016	
80th %-tile (mg/L)		40	0.19	0.012	
Condition score		90.0	58.0	25.4	
Grade		VG	M	P	

Base-flows	Monthly value (mg/L)	TSS	DIN	FRP	n (days)
	Jul	3	0.19	0.003	
	Aug	3	0.13	0.004	
	Sep	2	0.09	0.002	
	Oct	2	0.12	0.004	
	Nov	5	0.03	0.002	
	Jan	3	0.28	0.006	
	Jun	2	0.15	0.003	
	Seasonal	2.5	0.13	0.003	188
GV (mg/L)		8	0.060	0.008	
SF (mg/L)		74	0.261	0.013	
80th %-tile		3	0.18	0.004	
Condition score		90.0	39.5	90.0	
Grade		VG	P	VG	

Annual (high flow and baseflow)	**TSS**	DIN	FRP	**Nutrients**
Score	90.0	48.5	58.7	53.6
Grade	VG	M	M	M

n(days) is the number of high flow days or base-flow days for the reporting period. GV is guideline value, SF is the scaling factor, 80th %-tile is the 80th percentile of the monitoring data, No. ≤ GV is the number of data points less than or equal to the guideline value, and percentile ≤ GV is the percentile of data points less than or equal to the guideline value. nd indicates no data available. Full explanation of terms and scoring method are provided in WTW 2026.

Table 61 Russell Basin water quality monthly values and scores for 2024-25 reporting period.

High flows (>39.5 m^3/s)	Monthly value (mg/L)	TSS	DIN	FRP	n (days)
	Aug	14	0.16	0.003	
	Nov	13	0.32	0.006	
	Dec	57	0.27	0.006	
	Jan	41	0.14	0.006	
	Feb	14	0.08	0.006	
	Mar	20	0.10	0.010	
	Apr	22	0.13	0.005	
	May	39	0.14	0.004	
	Seasonal	21	0.14	0.006	171
GV (mg/L)		52	0.114	0.004	
SF (mg/L)		191	0.306	0.016	
80th %-tile (mg/L)		40	0.23	0.006	
Condition score		90.0	52.8	50.8	
Grade		VG	M	M	

Base-flows	Monthly value (mg/L)	TSS	DIN	FRP	n (days)
	Jul	4	0.14	0.002	
	Aug	5	0.14	0.003	
	Sep	2	0.13	0.003	
	Oct	6	0.09	0.002	
	Nov	2	0.05	0.001	
	Jan	3	0.09	0.001	
	Jun	2	0.11	0.002	
	Seasonal	3	0.11	0.002	194
GV (mg/L)		8	0.060	0.008	
SF (mg/L)		74	0.261	0.013	
80th %-tile (mg/L)		4	0.14	0.003	
Condition score		90.0	45.4	90.0	
Grade		VG	M	VG	

Annual (high flow and baseflow)	**TSS**	DIN	FRP	**Nutrients**
Score	90.0	48.9	71.6	60.3
Grade	VG	M	G	M

n(days) is the number of high flow days or base-flow days for the reporting period. GV is guideline value, SF is the scaling factor, 80th %-tile is the 80th percentile of the monitoring data, No. ≤ GV is the number of data points less than or equal to the guideline value, and percentile ≤ GV is the percentile of data points less than or equal to the guideline value. nd indicates no data available. Full explanation of terms and scoring method are provided in WTW 2026.

Table 62 North Johnstone sub-basin water quality monthly values and scores for 2024-25 reporting period.

High flows (>31.6 m^3/s)	Monthly value (mg/L)	TSS	DIN	FRP	n (days)
	Jul	6	0.15	0.007	
	Nov	6	0.05	0.007	
	Dec	3	0.10	0.004	
	Jan	20	0.12	0.008	
	Feb	17	0.16	0.007	
	Mar	11	0.18	0.008	
	April	4	0.15	0.006	
	May	10	0.13	0.005	
	Jun	3	0.12	0.005	
	Seasonal	6	0.13	0.007	262
GV (mg/L)		52	0.114	0.004	
SF (mg/L)		191	0.306	0.016	
80th %-tile (mg/L)		13	0.15	0.007	
Condition score		90.0	55.0	45.7	
Grade		VG	M	M	

Base-flows	Monthly value (mg/L)	TSS	DIN	FRP	n (days)
	Jul	2	0.12	0.004	
	Aug	2	0.08	0.004	
	Oct	2	0.05	0.004	
	Nov	5	0.04	0.004	
	Seasonal	2	0.07	0.004	103
GV (mg/L)		8	0.060	0.008	
SF (mg/L)		74	0.261	0.013	
80th %-tile (mg/L)		3	0.10	0.004	
Condition score		90.0	58.8	90.0	
Grade		VG	M	VG	

Annual (high flow and baseflow)	TSS	DIN	FRP	**Nutrients**
Score	90.0	56.1	58.2	57.1
Grade	VG	M	M	M

n(days) is the number of high flow days or base-flow days for the reporting period. GV is guideline value, SF is the scaling factor, 80th %-tile is the 80th percentile of the monitoring data, No. ≤ GV is the number of data points less than or equal to the guideline value, and percentile ≤ GV is the percentile of data points less than or equal to the guideline value. nd indicates no data available. Full explanation of terms and scoring method are provided in WTW 2026.

Table 63 South Johnstone sub-basin water quality monthly values and scores, and Johnstone combined scores for 2024-25 reporting period.

High flows (>15.0 m^3/s)	Monthly value (mg/L)	TSS	DIN	FRP	n (days)
High flow	Jul	3	0.08	0.009	
	Nov	18	0.12		
	Dec	5	0.12	0.006	
	Jan	37	0.11	0.010	
	Feb	34	0.14	0.008	
	Mar	15	0.14	0.010	
	April	3	0.10	0.008	
	May	10	0.11	0.008	
	June	3	0.08	0.010	
	Seasonal	10	0.11	0.009	275
GV (mg/L)		52	0.114	0.004	
SF (mg/L)		191	0.306	0.016	
80th %-tile (mg/L)		24	0.13	0.010	
Condition score		90.0	63.4	38.1	
Grade		VG	G	P	

Base-flows	Monthly value (mg/L)	TSS	DIN	FRP	n (days)
	Aug	2	0.07	0.008	
	Sep	nd	nd	nd	
	Oct	3	0.06	0.008	
	Nov	5	0.05	0.010	
	Dec	nd	nd	nd	
	Seasonal	3	0.06	0.008	90
GV (mg/L)		8	0.060	0.008	
SF (mg/L)		74	0.261	0.013	
80th %-tile (mg/L)		4	0.07	0.009	
Condition score		90.0	61.0	61.0	
Grade		VG	G	G	

Annual (high flow and baseflow)	**TSS**	DIN	FRP	**Nutrients**
Score	90.0	62.8	43.7	53.2
Grade	VG	G	M	M

Johnstone combined Annual (high flow and base-flow)	**TSS**	DIN	FRP	**Nutrients**
Score	90.0	59.4	51.0	55.2
Grade	VG	M	M	M

n(days) is the number of high flow days or base-flow days for the reporting period. GV is guideline value, SF is the scaling factor, 80th %-tile is the 80th percentile of the monitoring data, No. ≤ GV is the number of data points less than or equal to the guideline value, and percentile ≤ GV is the percentile of data points less than or equal to the guideline value. nd indicates no data available. Full explanation of the terms and scoring method are provided in WTW 2026.

Table 64 Tully Basin water quality monthly values and scores for 2024-25 reporting period.

High flows (>61.2 m^3/s)	Monthly value (mg/L)	TSS	DIN	FRP	n (days)
High flow	Jul	4	0.09	0.001	
	Aug	5	0.10	0.001	
	Nov	43	0.60	0.004	
	Dec	33	0.26	0.003	
	Jan	23	0.13	0.014	
	Feb	21	0.13	0.003	
	Mar	nd	nd	nd	
	Apr	7	0.12	0.001	
	May	20	0.13	0.003	
	Jun	17	0.12	0.001	
	Seasonal	20	0.13	0.003	250
GV (mg/L)		52	0.114	0.004	
SF (mg/L)		191	0.306	0.016	
80th %-tile (mg/L)		27	0.18	0.003	
Condition score		90.0	57.4	90.0	
Grade		VG	M	VG	

Base-flows	Monthly value (mg/L)	TSS	DIN	FRP	n (days)
	Aug	2	0.12	0.001	
	Sep	nd	nd	nd	
	Oct	4	0.10	0.001	
	Nov	50	0.34	0.002	
	Seasonal	4	0.12	0.001	115
GV (mg/L)		8	0.060	0.008	
SF (mg/L)		74	0.261	0.013	
80th %-tile (mg/L)		31	0.25	0.001	
Condition score		63.9	43.6	90.0	
Grade		G	M	VG	

Annual (high flow and base-flow)	**TSS**	DIN	FRP	**Nutrients**
Score	81.8	53.1	90.0	71.5
Grade	VG	M	VG	G

n(days) is the number of high flow days or base-flow days for the reporting period. GV is guideline value, SF is the scaling factor, 80th %-tile is the 80th percentile of the monitoring data, No. ≤ GV is the number of data points less than or equal to the guideline value, and percentile ≤ GV is the percentile of data points less than or equal to the guideline value. Full explanation of the terms and scoring method are provided in WTW 2026.

Table 65 Murray Basin water quality monthly values and scores for 2024-25 reporting period.

High flows (>8.0 m^3/s)	Monthly value (mg/L)	TSS	DIN	FRP	n (days)
High flow	Jul	4	0.14	0.003	
	Nov	8	0.24	0.003	
	Dec	32	0.96	0.010	
	Jan	15	0.23	0.012	
	Feb	7	0.07	0.006	
	Mar	11	0.12	0.007	
	Apr	5	0.16	0.002	
	Jun	3	0.12	0.002	
	Seasonal	8	0.15	0.005	259
GV (mg/L)		52	0.114	0.004	
SF (mg/L)		191	0.306	0.016	
80th %-tile (mg/L)		13	0.24	0.009	
Condition score		90.0	49.5	58.4	
Grade		VG	M	M	

Base-flows	Monthly value (mg/L)	TSS	DIN	FRP	n (days)
	Jul	nd	nd	nd	
	Aug	3	0.12	0.003	
	Oct	2	0.10	0.002	
	Nov	nd	nd	nd	
	Jun	nd	nd	nd	
	Seasonal	3	0.11	0.003	106
GV (mg/L)		8	0.060	0.008	
SF (mg/L)		74	0.261	0.013	
80th %-tile (mg/L)		3	0.12	0.003	
Condition score		90.0	45.9	90.0	
Grade		VG	M	VG	

Annual (high flow and base-flow)	**TSS**	DIN	FRP	**Nutrients**
Score	90.0	48.4	67.6	58.0
Grade	VG	M	G	M

n(days) is the number of high flow days or base-flow days for the reporting period. GV is guideline value, SF is the scaling factor, 80th %-tile is the 80th percentile of the monitoring data, No. ≤ GV is the number of data points less than or equal to the guideline value, and percentile ≤ GV is the percentile of data points less than or equal to the guideline value. Full explanation of the terms and scoring method are provided in WTW 2026.

Table 66 Herbert Basin water quality monthly values and scores for 2024-25 reporting period.

High flows (>44.2 m^3/s)	Monthly value (mg/L)	TSS	DIN	FRP	n (days)
	Jul	2	0.20	0.002	
	Dec	54	0.10	0.011	
	Jan	21	0.10	0.005	
	Feb	85	0.09	0.011	
	Mar	88	0.08	0.009	
	Apr	43	0.11	0.005	
	May	8	0.14	0.004	
	Jun	2	0.19	0.001	
	Seasonal	32	0.10	0.005	229
GV (mg/L)		52	0.114	0.004	
SF (mg/L)		191	0.306	0.016	
80th %-tile (mg/L)		72	0.17	0.010	
Condition score		70.9	64.1	55.8	
Grade		G	G	M	

Base-flows	Monthly value (mg/L)	TSS	DIN	FRP	n (days)
	Jul	nd	nd	nd	
	Aug	3	0.18	0.001	
	Sep	3	0.17	0.002	
	Oct	2	0.17	0.001	
	Nov	3	0.09	0.002	
	Dec	nd	nd	nd	
	Jun	nd	nd	nd	
	Seasonal	3	0.17	0.001	136
GV (mg/L)		8	0.060	0.008	
SF (mg/L)		74	0.261	0.013	
80th %-tile (mg/L)		3	0.18	0.002	
Condition score		90.0	27.0	90.0	
Grade		VG	P	VG	

Annual (high flow and base-flows)	**TSS**	DIN	FRP	**Nutrients**
Score	78.0	50.3	68.6	59.4
Grade	G	M	G	M

n(days) is the number of high flow days or base-flow days for the reporting period. GV is guideline value, SF is the scaling factor, 80th %-tile is the 80th percentile of the monitoring data, No. ≤ GV is the number of data points less than or equal to the guideline value, and percentile ≤ GV is the percentile of data points less than or equal to the guideline value. nd indicates no data available. Full explanation of the terms and scoring method are provided in WTW 2026.

Figure 19 to Figure 21 provide box and whisker plots of water quality indicators for high flow and base-flow conditions (2024-25). The mid-line is the median, the cross is the mean and the box depicts the upper and lower quartiles. The whiskers are the lowest and highest datum within 1.5 IQR (interquartile range) and outliers are datum above or below 1.5 IQR. To present the complete variation of data, the analysis was conducted on all data points collected during the reporting period and not on the monthly values used for generating scores.

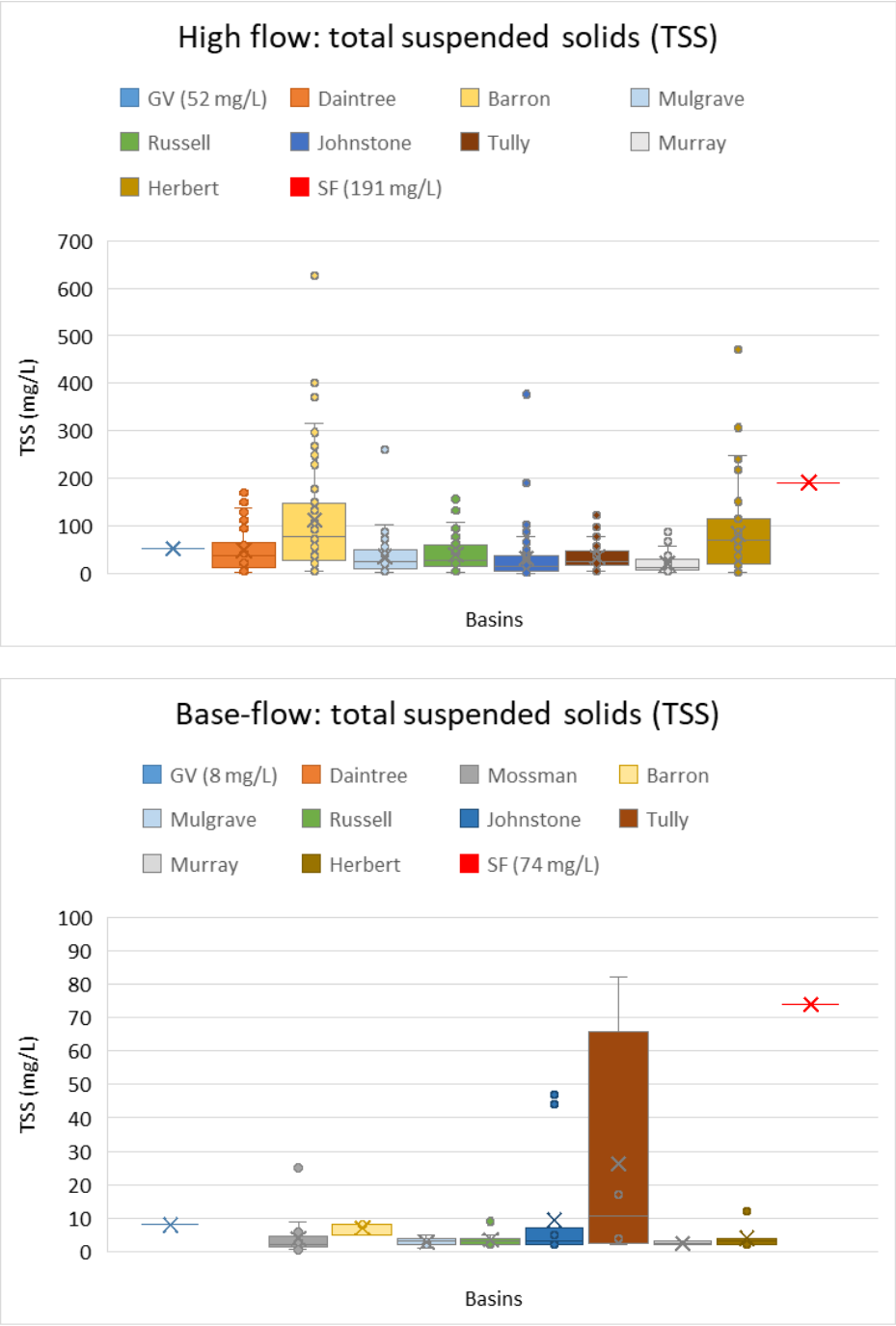
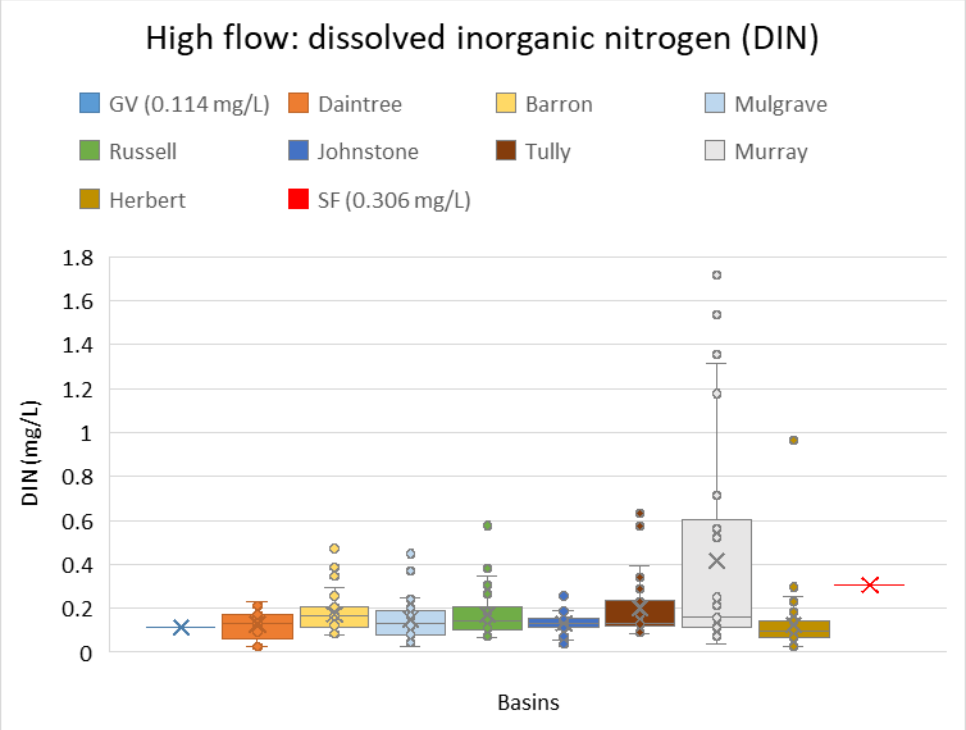


Figure 19 Box and whisker plots of total suspended solids (TSS) concentrations for base-flow and high flow conditions of basins. The mid-line is the median, the cross is the mean, the box depicts the upper and lower quartiles with 1.5 IQR (interquartile range) whiskers and outliers are above or below 1.5 IQR. The guideline value (GV) and scaling factor (SF) are presented.



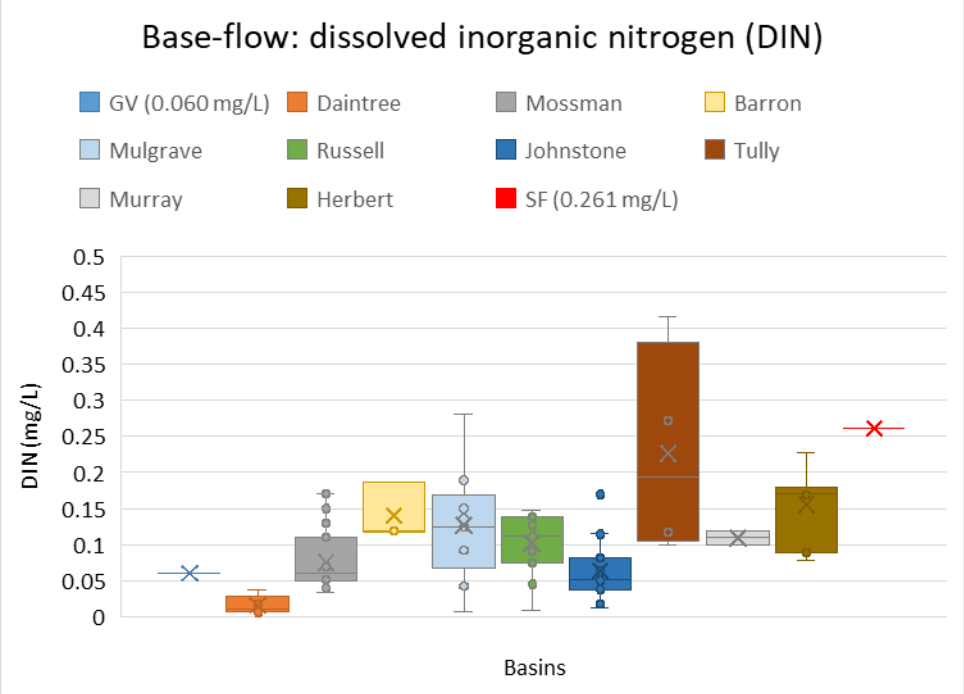


Figure 20 Box and whisker plots of dissolved inorganic nitrogen (DIN) concentrations for base-flow and high flow conditions of basins. The mid-line is the median, the cross is the mean, the box depicts the upper and lower quartiles with 1.5 IQR (interquartile range) whiskers and outliers are above or below 1.5 IQR. The guideline value (GV) and scaling factor (SF) are presented.

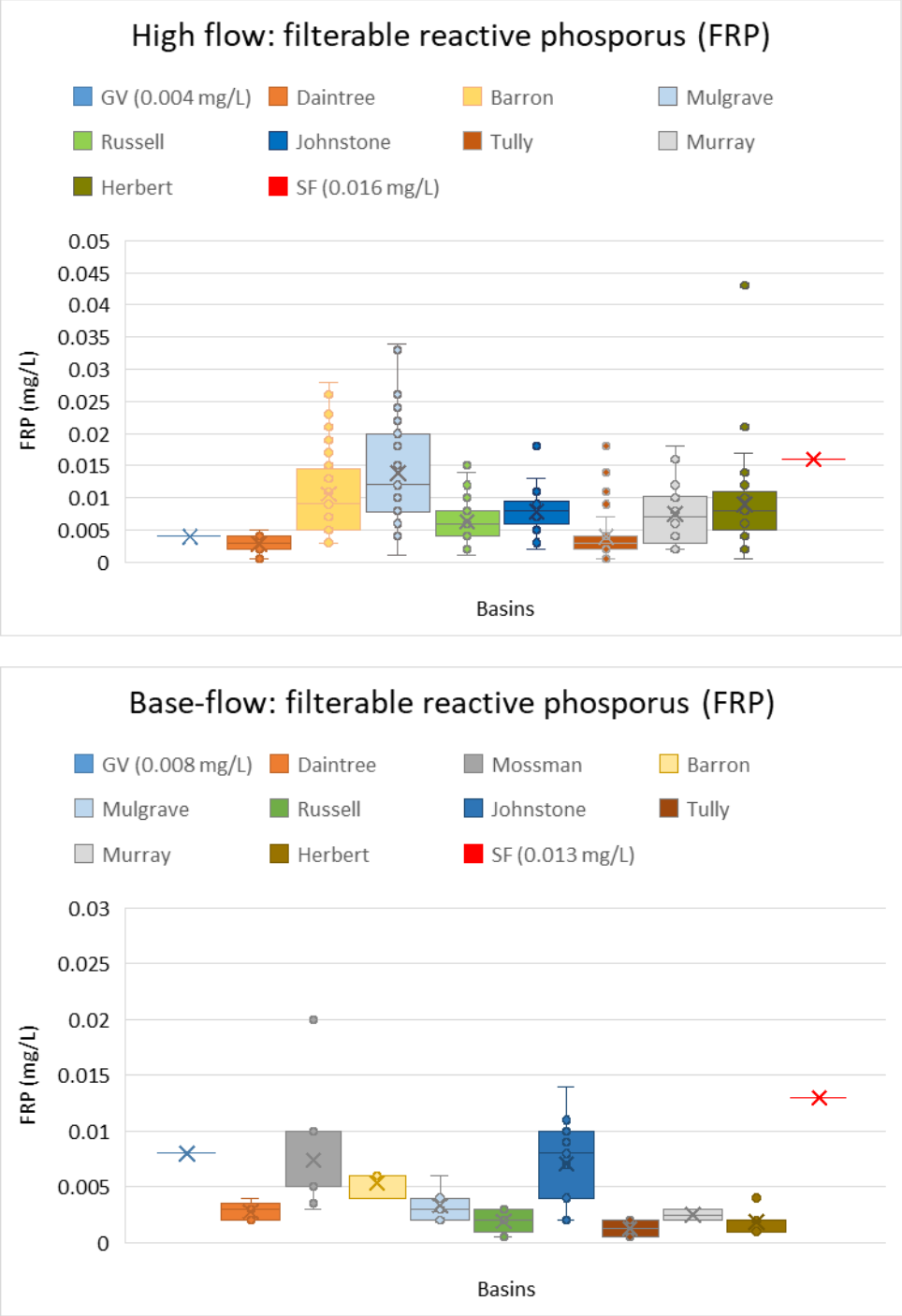


Figure 21 Box and whisker plots of filterable reactive phosphorus (FRP) concentrations for base-flow and high flow conditions of basins. For the Mossman a FRP concentration of 0.01 mg/L was recorded for base-flow, but exceeded the Y-axis concentration range. The mid-line is the median, the cross is the mean, the box depicts the upper and lower quartiles with 1.5 IQR (interquartile range) whiskers and outliers are above or below 1.5 IQR. The guideline value (GV) and scaling factor (SF) are presented.

Basin pesticides: additional monitoring sites.

In addition to the standard pesticide monitoring sites that are used for scoring basin water quality (Section 4.1), there are additional sites where pesticide is monitored by the GBR CLMP and used for calibrations of the Pesticide Risk Metric. These sites provide insight into the use of pesticides in management practices for select sub-catchments within the Wet Tropics region.

For 2024-25, monitoring was conducted at Saltwater Creek (Mossman Basin), Emerald Creek (Barron Basin) and Catherina Creek (Herbert Basin), and the relative chemical contributions with respect to species affected (pesticide risk) is presented in Figure 22. Land use and hydrology has been used to explain the differences recorded for pesticide risk and relative chemical contributions for the additional sites, and which was first reported in more detail in 2021-22 (WTW 2023). The following summaries for each site describe the dominant land use and the pesticide risk including major chemical contributions.

- Saltwater Creek sub catchment draining to the Coral Sea north of Mossman River. Stream order 5, headwaters draining natural rainforest environment and lowland land use dominated by sugarcane production. Pesticide risk was at its lowest range over the last four years, as was the case for the Mossman River site (Figure 8).
- Emerald Creek sub-catchment draining into the Barron River on the Atherton Tablelands. Stream order 4 with headwaters draining natural forested environment, lowland land use dominated by grazing and horticulture. Pesticide risk was lower than the previous monitored year (2022-23): fipronil and imidacloprid continued as the major chemical contributors whilst the contribution of diuron was much lower.
- Catherina Creek tributary draining into the Herbert River downstream of Ingham. Stream order 2 with land use dominated by sugar cane, and upstream catchment of paddock drainage channels connected to creek. Pesticide risk has consistently declined over the last four years although it remained very high and major chemical contributions were from diuron and imidacloprid.

The Catherina Creek site (very high pesticide risk) has the smallest area of catchment, the lowest capacity for catchment run-off, and greatest intensity of upstream agricultural land use. The Saltwater Creek site (very low pesticide risk) has a considerably larger catchment with greater run-off capacity, and upstream land use which includes substantial areas of natural environments.

Locations of the additional pesticide monitoring sites are presented in Figure 23.

References

WTW (Wet Tropics Waterways) 2023. Wet Tropics Report Card 2023 (reporting on data 2021-22). Waterway Environments: Results. Wet Tropics Waterways and Terrain NRM, Cairns.

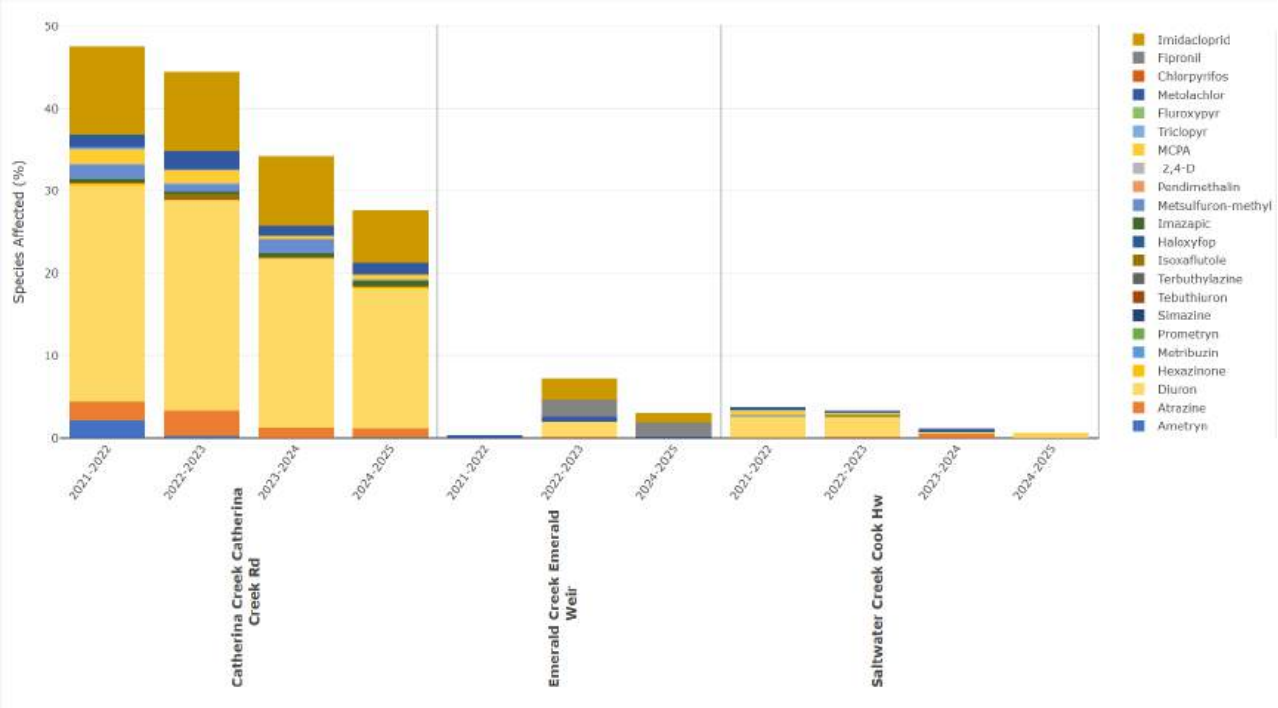


Figure 22 The relative contribution of pesticide types at additional pesticide monitoring sites over the last three years at Saltwater Creek, Emerald Creek, Fig Tree Creek and Catherina Creek. Note there was no pesticide monitoring at Emerald Creek for 2023-24. Of the full suite of 22 pesticides only those that contributed >0.1% of the toxicity are shown (the remainder had negligible contribution to toxicity).

Source: Pesticide Risk Metric produced through the Queensland Government Department of the Environment, Tourism, Science and Innovation.

Figure 23 Additional pesticide site locations for 2024-25 showing catchment area and land use. Top - Saltwater Creek, middle - Emerald Creek, and bottom - Catherina Creek.

Table 67 Daintree estuary 2024-25.

Mid-estuary

	Chl *a* (µg/L)	DIN (mg/L)	FRP (mg/L)	Turbidity (NTU)	DO low (% sat.)	DO high (% sat.)
Annual Median	3.0	0.050	0.002	4.5	85.6	85.6
GV	3.0	0.045	0.005	10.0	80.0	105.0
SF	5.0	0.200	0.010	20.0	50.0	111.0
80th or 20th %-tile	5.3	0.071	0.003	8.5	81.0	88.7
	Chl *a*	DIN	FRP	Turbidity	DO low	DO high
Condition score	61.0	59.1	90.0	90.0	90.0	90.0
Grade	G	M	VG	VG	VG	VG
n	36	36	36	36	36	36

Enclosed coastal

	Chl *a* (µg/L)	DIN (mg/L)	FRP (mg/L)	Turbidity (NTU)	DO low (% sat.)	DO high (% sat.)
Annual Median	2.8	0.005	0.001	1.8	95.9	95.9
GV	2.0	0.025	0.005	10.0	85.0	105.0
SF	5.0	0.200	0.010	20.0	50.0	111.0
80th or 20th %-tile	3.5	0.018	0.003	7.7	94.7	98.3
	Chl *a*	DIN	FRP	Turbidity	DO low	DO high
Condition score	44.3	90.0	90.0	90.0	90.0	90.0
Grade	M	VG	VG	VG	VG	VG
n	12	12	12	12	12	12

Total estuary

	Chl *a*	DIN	FRP	**Nutrients**	Turbid-ity	DO Low	DO High	**Phys/ Chem**	**Pest-icides**	**WQ**
Score	56.9	66.8	90.0	78.4	90.0	90.0	90.0	90.0	98.0	80.8
Grade	M	G	VG	G	VG	VG	VG	VG	VG	G

n is the number of monthly values from all sites used to calculate the annual median. GV is guideline value, SF is the scaling factor, %-tile is the percentile of the monitoring data, No. ≤/≥ GV is the number of data points less/greater than or equal to the guideline value, and percentile ≤/≥ GV is the percentile of data points less/greater than or equal to the guideline value. Full explanations of the terms and scoring method are provided in WTW 2026. Condition scores weighted according to proportion of samples located in each water type: for nutrients, chlorophyll *a* and phys-chem mid-estuary = 0.75 and enclosed coastal = 0.25.

Table 68 Dickson Inlet 2024-25.

Mid-estuary

	Chl *a* (µg/L)	DIN (mg/L)	FRP (mg/L)	Turbidity (NTU)	DO low (% sat.)	DO high (% sat.)
Annual median	1.7	0.033	0.005	2.0	83.4	83.4
GV	3.0	0.045	0.005	10.0	80.0	105.0
SF	5.0	0.200	0.010	20.0	50.0	111.0
80th or 20th %-tile	2.0	0.063	0.006	3.4	60.5	94.1
	Chl *a*	DIN	FRP	Turbidity	DO low	DO high
Condition score	90.0	69.0	61.0	90.0	63.9	90.0
Grade	VG	G	VG	VG	G	VG
n	12	12	12	12	12	12

Lower estuary

	Chl *a* (µg/L)	DIN (mg/L)	FRP (mg/L)	Turbidity (NTU)	DO low (% sat.)	DO high (% sat.)
Annual median	1.6	0.021	0.004	1.4	93.3	93.3
GV	2.0	0.025	0.005	10.0	85.0	105.0
SF	5.0	0.200	0.010	20.0	50.0	111.0
80th or 20th %-tile	1.8	0.061	0.005	2.3	85.2	97.5
	Chl *a*	DIN	FRP	Turbidity	DO low	DO high
Condition score	90.0	63.2	78.6	90.0	90.0	90.0
Grade	VG	G	G	VG	VG	VG
n	4	4	4	4	4	4

Total estuary

	Chl *a*	DIN	FRP	**Nutrients**	Turbidity	DO Low	DO High	**Phys/ Chem**	**Pest-icides**	**WQ**
Score	90.0	67.5	65.4	66.5	90.0	70.5	90.0	80.2	nd	78.9
Grade	VG	G	G	G	VG	G	VG	G		G

N is the number of monthly values from all sites used to calculate the annual median. GV is guideline value, SF is the scaling factor, %-tile is the percentile of the monitoring data, No. ≤/≥ GV is the number of data points less/greater than or equal to the guideline value, and percentile ≤/≥ GV is the percentile of data points less/greater than or equal to the guideline value. Full explanations of the terms and scoring method are provided in WTW 2026. Condition scores weighted according to proportion of samples located in each water type: for nutrients, chlorophyll *a* and phys-chem mid-estuary = 0.75 and lower estuary = 0.25.

Table 69 Barron estuary 2024-25.

Mid-estuary

	Chl *a* (µg/L)	DIN (mg/L)	FRP (mg/L)	Turbidity (NTU)	DO low (% sat.)	DO high (% sat.)
Annual median	2.9	0.120	0.005	4.5	82.2	82.2
GV	3.0	0.045	0.005	10.0	80.0	105.0
SF	5.0	0.200	0.010	20.0	50.0	111.0
80th or 20th %-tile	5.5	0.274	0.0080	6.6	78.7	85.3
	Chl *a*	DIN	FRP	Turbidity	DO low	DO high
Condition score	61.8	31.4	61.0	90.0	73.5	90.0
Grade	G	P	G	VG	G	VG
n	24	24	24	24	24	24

Lower estuary

	Chl *a* (µg/L)	DIN (mg/L)	FRP (mg/L)	Turbidity (NTU)	DO low (% sat.)	DO high (% sat.)
Annual median	3.9	0.103	0.006	6.3	88.7	88.7
GV	2.0	0.025	0.005	10.0	85.0	105.0
SF	5.0	0.200	0.010	20.0	50.0	111.0
80th or 20th %-tile	5.5	0.261	0.007	10.0	82.5	160.9
	Chl *a*	DIN	FRP	Turbidity	DO low	DO high
Condition score	22.3	33.9	54.8	90.0	72.8	65.5
Grade	P	P	M	VG	G	G
n	6	6	6	6	6	6

Total estuary

	Chl *a*	DIN	FRP	**Nutrients**	Turbidity	DO Low	DO High	**Phys/ Chem**	**Pest-icides**	**WQ**
Score	53.9	31.9	59.8	45.8	90.0	73.4	85.1	81.7	nd	60.5
Grade	M	P	M	M	VG	G	G	G		M

n is the number of monthly values from all sites used to calculate the annual median. GV is guideline value, SF is the scaling factor, %-tile is the percentile of the monitoring data, No. ≤/≥ GV is the number of data points less/greater than or equal to the guideline value, and percentile ≤/≥ GV is the percentile of data points less/greater than or equal to the guideline value. Full explanations of the terms and scoring method are provided in WTW 2026. Condition scores weighted according to proportion of samples located in each water type: for nutrients, chlorophyll *a* and phys-chem mid-estuary = 0.80 and lower estuary = 0.20. nd indicates no data or insufficient data available.

Table 70 Trinity Inlet 2024-25.

Mid-estuary

	Chl *a* (µg/L)	DIN (mg/L)	FRP (mg/L)	Turbidity (NTU)	DO low (% sat.)	DO high (% sat.)
Annual median	2.9	0.021	0.004	3.7	65.4	65.4
GV	3.0	0.045	0.005	10.0	80.0	105.0
SF	5.0	0.200	0.010	20.0	50.0	111.0
80th or 20th %-tile	4.2	0.070	0.006	7.0	58.7	73.5
	Chl *a*	DIN	FRP	Turbidity	DO low	DO high
Condition score	63.2	70.8	71.0	90.0	31.3	90.0
Grade	G	G	G	VG	P	VG
n	60	60	60	60	60	60

Lower estuary

	Chl *a* (µg/L)	DIN (mg/L)	FRP (mg/L)	Turbidity (NTU)	DO low (% sat.)	DO high (% sat.)
Annual median	2.7	0.006	0.003	6.4	85.9	85.9
GV	2	0.025	0.005	10.0	85.0	105.0
SF	5.0	0.200	0.010	20.0	50.0	111.0
80th or 20th %-tile	3.1	0.025	0.004	8.4	84.1	87.7
	Chl *a*	DIN	FRP	Turbidity	DO low	DO high
Condition score	47.7	90.0	90.0	90.0	71.2	90.0
Grade	M	VG	VG	VG	G	VG
n	5	5	5	5	5	5

Total estuary

	Chl *a*	DIN	FRP	**Nutrients**	Turbidity	DO Low	DO High	**Phys/ Chem**	**Pest-icides**	**WQ**
Score	61.8	72.6	72.7	72.6	90.0	35.0	90.0	62.5	nd	65.6
Grade	G	G	G	G	VG	P	VG	G		G

n is the number of monthly values from all sites used to calculate the annual median. GV is guideline value, SF is the scaling factor, %-tile is the percentile of the monitoring data, No. ≤/≥ GV is the number of data points less/greater than or equal to the guideline value, and percentile ≤/≥ GV is the percentile of data points less/greater than or equal to the guideline value. Full explanations of the terms and scoring method are provided in WTW 2026. Condition scores weighted according to proportion of samples located in each water type: for nutrients, chlorophyll *a* and phys-chem mid-estuary = 0.91 and lower estuary = 0.09. nd indicates non data or insufficient data available.

Table 71 Russell-Mulgrave 2024-25.

Mid-estuary

	Chl *a* (µg/L)	DIN (mg/L)	FRP (mg/L)	Turbidity (NTU)	DO low (% sat.)	DO high (% sat.)
Annual Median	0.5	0.097	0.003	2.5	78.8	78.8
GV	3.0	0.045	0.005	10.0	80.0	105.0
SF	5.0	0.200	0.010	20.0	50.0	111.0
80th or 20th %-tile	1.3	0.121	0.006	3.5	74.9	83.5
	Chl *a*	DIN	FRP	Turbidity	DO low	DO high
Condition score	90.0	40.7	76.3	90.0	58.4	90.0
Grade	VG	P	G	VG	M	VG
n	5	5	5	5	5	5

Lower Estuary

	Chl *a* (µg/L)	DIN (mg/L)	FRP (mg/L)	Turbidity (NTU)	DO low (% sat.)	DO high (% sat.)
Annual median	1.0	0.060	0.004	3.5	81.1	81.1
GV	2.0	0.025	0.005	10.0	85.0	105.0
SF	5.0	0.200	0.010	20.0	50.0	111.0
80th or 20th %-tile	1.0	0.117	0.005	13.0	75.1	83.5
	Chl *a*	DIN	FRP	Turbidity	DO low	DO high
Condition score	90.0	48.9	90.0	74.6	54.0	90.0
Grade	VG	M	VG	G	M	VG
n	6	5	5	6	6	6

Total estuary

	Chl *a*	DIN	FRP	**Nutrients**	Turbidity	DO Low	DO High	**Phys/ Chem**	**Pest-icides**	**WQ**
Score	90.0	43.4	80.9	62.1	84.9	56.9	90.0	70.9	71.8	73.7
Grade	VG	M	G	G	VG	M	VG	G	G	G

n is the number of monthly values from all sites used to calculate the annual median. GV is guideline value, SF is the scaling factor, %-tile is the percentile of the monitoring data, No. ≤/≥ GV is the number of data points less/greater than or equal to the guideline value, and percentile ≤/≥ GV is the percentile of data points less/greater than or equal to the guideline value. Full explanations of the terms and scoring method are provided in WTW 2026. Condition scores weighted according to proportion of samples located in each water type: for chlorophyll, nutrients, turbidity and dissolved oxygen the mid-estuary = 0.67 and the lower estuary = 0.33.

Table 72 Johnstone estuary 2024-25.

Mid-estuary

	Chl *a* (µg/L)	DIN (mg/L)	FRP (mg/L)	Turbidity (NTU)	DO low (% sat.)	DO high (% sat.)
Annual median	1.9	0.143	0.005	3.7	96.2	96.2
GV	3.0	0.045	0.005	10.0	80.0	105.0
SF	5.0	0.200	0.010	20.0	50.0	111.0
80th or 20th %-tile	2.3	0.190	0.007	5.0	88.9	97.0
	Chl *a*	DIN	FRP	Turbidity	DO low	DO high
Condition score	90.0	22.6	61.0	90.0	90.0	90.0
Grade	VG	P	G	VG	VG	VG
n	18	45	45	35	6	6

Total estuary

	Chl *a*	DIN	FRP	**Nutrients**	Turbidity	DO Low	DO High	**Phys/ Chem**	**Pest-icides**	**WQ**
Score	90.0	22.6	61.0	41.8	90.0	90.0	90.0	90.0	71.0	73.2
Grade	VG	P	G	M	VG	VG	VG	VG	G	G

n is the number of monthly values from all sites used to calculate the annual median. GV is guideline value, SF is the scaling factor, %-tile is the percentile of the monitoring data, No. ≤/≥ GV is the number of data points less/greater than or equal to the guideline value, and percentile ≤/≥ GV is the percentile of data points less/greater than or equal to the guideline value. Full explanations of the terms and scoring method are provided in WTW 2026. nd indicates no data or insufficient data available.

Table 73 Moresby estuary 2024-25.

Mid-estuary

	Chl *a* (µg/L)	DIN (mg/L)	FRP (mg/L)	Turbidity (NTU)	DO low (% sat.)	DO high (% sat.)
Annual median	2.8	0.046	0.001	2.5	78.7	78.7
GV	3.0	0.045	0.005	10.0	80.0	105.0
SF	5.0	0.200	0.010	20.0	50.0	111.0
80th or 20th %-tile	4.6	0.258	0.0030	8.7	65.5	90.4
	Chl *a*	DIN	FRP	Turbidity	DO low	DO high
Condition score	63.1	60.7	90.0	90.0	58.2	90.0
Grade	G	M	VG	VG	M	VG
n	60	60	60	60	60	60

Lower Estuary

	Chl *a* (µg/L)	DIN (mg/L)	FRP (mg/L)	Turbidity (NTU)	DO low (% sat.)	DO high (% sat.)
Annual median	2.7	0.009	0.002	2.1	93.9	93.9
GV	2.0	0.025	0.005	10.0	85.0	105.0
SF	5.0	0.200	0.010	20.0	50.0	111.0
80th or 20th %-tile	3.7	0.023	0.003	5.4	89.5	97.9
	Chl *a*	DIN	FRP	Turbidity	DO low	DO high
Condition score	47.4	90.0	90.0	90.0	90.0	90.0
Grade	M	VG	VG	VG	VG	VG
n	12	12	12	12	12	12

Total estuary

	Chl *a*	DIN	FRP	**Nutrients**	Turbidity	DO Low	DO High	**Phys/ Chem**	**Pest-icides**	**WQ**
Score	60.5	65.6	90.0	77.8	90.0	63.5	90.0	76.7	nd	71.7
Grade	M	G	VG	G	VG	G	VG	G		G

n is the number of monthly values from all sites used to calculate the annual median. GV is guideline value, SF is the scaling factor, 80th %-tile is the 80th percentile of the monitoring data, No. ≤/≥ GV is the number of data points less/greater than or equal to the guideline value, and percentile ≤/≥ GV is the percentile of data points less/greater than or equal to the guideline value. Full explanations of the terms and scoring method are provided in WTW 2026. Condition scores weighted according to proportion of samples located in each water type: for mid-estuary, chlorophyll, nutrients and phys-chem = 0.83; for lower estuary chlorophyll, nutrients and phys-chem = 0.17. nd indicates non data or insufficient data available.

Table 74 Hinchinbrook Channel 2024-25.

Enclosed coastal

	Chl *a* (µg/L)	DIN (mg/L)	FRP (mg/L)	Turbidity (NTU)	DO low (% sat.)	DO high (% sat.)
Annual Median	3.4	0.005	0.003	4.0	91.5	91.5
GV	2.0	0.025	0.005	10.0	85.0	105.0
SF	5.0	0.200	0.010	20.0	50.0	111.0
80th or 20th %-tile	4.7	0.023	0.005	13.1	83.1	94.7
	Chl *a*	DIN	FRP	Turbidity	DO low	DO high
Condition score	32.3	90.0	90.0	74.2	76.4	90.0
Grade	P	VG	VG	G	G	VG
n	33	33	33	33	33	33

Total estuary

	Chl *a*	DIN	FRP	**Nutrients**	Turbidity	DO Low	DO High	**Phys/ Chem**	**Pest-icides**	**WQ**
Score	32.3	90.0	90.0	90.0	74.2	76.4	90.0	75.3	nd	65.9
Grade	P	VG	VG	VG	G	G	VG	G		G

n is the number of monthly values from all sites used to calculate the annual median. GV is guideline value, SF is the scaling factor, 80th %-tile is the 80th percentile of the monitoring data, No. ≤/≥ GV is the number of data points less/greater than or equal to the guideline value, and percentile ≤/≥ GV is the percentile of data points less/greater than or equal to the guideline value. Full explanations of the terms and scoring method are provided in WTW 2026. nd indicates non data or insufficient data available.

Inshore Marine

The annual means of inshore water quality indicators for sites within each reporting zones are presented in Table 75. The water quality scores for reach reporting zone before standardisation are presented in Table 76.

Table 75 Inshore marine water quality annual means and number of measurements taken by grab samples for each monitoring site for 2024-25.

Zone	Site	NO_x (µg/L)	PN (µg/L)	PP (µg/L)	TSS (mg/L)	Turbidity (NTU)	CHL *a* (µg/L))	No. Grab samples
North	C01	0.7	23.7	3.4	2.4		0.49	3
	C011	5.7	14.1	1.7	0.5		0.29	3
	C04	1.0	18.7	2.7	1.1		0.31	3
	C05	1.8	19.4	2.7	1.1		0.53	3
	C06	0.9	27.3	4.4	3.0		0.66	3
	C08	1.4	37.1	6.2	5.0		0.97	3
Central	RM1	2.4	24.8	2.4	0.8	1.2	0.57	5
	RM10	13.2	44.0	7.2	5.2	4.5	0.68	10
	RM3	1.4	27.5	2.8	1.5		0.45	10
	RM7	1.4	23.8	2.3	1.2	0.9	0.35	9
	RM8	2.5	33.0	3.7	2.6	1.1	0.52	10
South	TUL10 (EC)	8.2	48.2	6.2	6.7	4.4	0.92	11
	TUL2	1.3	24.3	2.4	1.3		0.39	11
	TUL3	1.6	32.0	4.1	3.2	3.6	0.74	11
	TUL5	2.0	30.5	4.1	3.2		0.56	11
	TUL6	2.7	39.0	5.1	3.7		0.81	11
	TUL8	3.3	34.9	4.3	4.2		0.65	11
Palm Is	BUR1	4.0	32.5	3.9	3.1	0.9	0.55	12
	BUR2	2.5	30.0	3.7	2.5	1.9	0.58	12

All sites are within open coastal waters except for TUL10 which is within enclosed coastal waters (EC). *indicates values derived solely from continuous logger measurements. #indicates values derived from continuous logger measurements and grab samples.

Table 76 Inshore marine water quality indicator scores for 2024-25 without standardisation.

	Water clarity		Chlorophyll *a*	Nutrients			Pesticides
Zone	TSS	Turbidity	CHL	NO_x	PN	PP	% species protected
North	0.13	nd	-0.12	0.44	-0.16	-0.18	99.8
Central	0.15	0.13	-0.16	-0.13	-0.55	-0.18	99.3
South	-0.52	0.00	-0.20	0.02	-0.67	-0.48	99.1
Palm	-0.46	0.21	-0.33	-0.65	-0.64	-0.44	nd

Scoring range for water clarity, chlorophyll *a* and nutrients: Very Poor = <-0.66 to -1 | Poor = <-0.33 to -0.66 | Moderate = <0 to -0.33 | Good = 0 to 0.5 | Very Good = >0.5 to 1. **Pesticide risk metric scoring range:** Very Poor = <80% | Poor = <90 to 80% | Moderate = <95 to 90% | Good = <99 to 95% | Very Good = ≤99%. nd indicates no data or insufficient data available.

Table 77 Inshore marine water quality measurements taken by grab samples for each monitoring site for 2024-25.

Zone	Site	Date	NO_x (µg/L)	PN (µg/L)	PP (µg/L)	TSS (mg/L)	CHL *a* (µg/L)
North							
	C1	27-Oct-24	0.3	18.2	2.3	1.5	0.23
	C1	13-Feb-25	1.3	24.4	2.6	0.9	0.62
	C1	22-Jun-25	0.5	28.7	5.2	4.9	0.62
	C11	26-Oct-24	0.3	9.7	1.2	0.2	0.10
	C11	13-Feb-25	16.0	20.6	2.4	0.6	0.56
	C11	22-Jun-25	0.8	11.9	1.4	0.6	0.20
	C4	26-Oct-24	0.6	11.0	1.6	0.8	0.14
	C4	14-Feb-25	1.7	24.0	3.1	0.6	0.38
	C4	22-Jun-25	0.5	21.1	3.3	2.1	0.40
	C5	27-Oct-24	0.4	12.7	1.7	0.6	0.15
	C5	14-Feb-25	4.7	24.5	3.1	0.9	0.95
	C5	23-Jun-25	0.4	21.0	3.4	1.9	0.49
	C6	26-Oct-24	0.4	23.2	2.6	1.2	0.31
	C6	13-Feb-25	1.6	30.1	4.2	1.3	0.92
	C6	23-Jun-25	0.6	28.7	6.4	6.5	0.75
	C8	27-Oct-24	0.4	23.0	3.4	2.3	0.31
	C8	14-Feb-25	2.9	45.8	5.9	2.2	1.67
	C8	23-Jun-25	1.0	42.6	9.4	10.6	0.94
Central							
	RM1	26-Oct-24	0.4	13.6	2.0	0.7	0.18
	RM1	02-Dec-24	0.5	30.4	2.2	0.5	0.22
	RM1	13-Feb-25	7.6	26.4	3.7	0.9	0.84
	RM1	12-Mar-25	1.7	36.7	1.9	0.3	0.21
	RM1	21-Jun-25	1.9	17.0	2.3	1.3	0.44
	RM10	16-Jul-24	0.7	34.0	4.5	2.7	0.24
	RM10	25-Oct-24	0.5	22.1	3.7	2.0	0.31
	RM10	02-Dec-24	0.4	25.8	3.3	1.2	0.25
	RM10	08-Jan-25	58.5	53.6	11.1	5.2	0.61
	RM10	22-Jan-25	4.7	30.2	4.1	3.3	0.30
	RM10	12-Feb-25	2.8	38.3	5.8	1.7	1.75
	RM10	25-Feb-25	23.5	57.5	8.8	9.9	1.38
	RM10	12-Mar-25	13.2	37.0	3.7	1.3	0.81
	RM10	13-Apr-25	24.0	81.2	12.5	8.6	1.30
	RM10	21-Jun-25	3.8	60.0	14.5	15.7	1.11
	RM3	16-Jul-24	0.4	20.3	1.4	1.3	0.21
	RM3	25-Oct-24	0.4	15.8	2.1	0.8	0.28
	RM3	02-Dec-24	0.3	21.7	2.0	0.6	0.25
	RM3	08-Jan-25	1.4	30.8	3.0	2.0	0.56
	RM3	22-Jan-25	0.7	19.5	1.6	0.6	0.26
	RM3	12-Feb-25	6.2	27.6	3.8	0.8	1.14

Zone	Site	Date	NO_x (µg/L)	PN (µg/L)	PP (µg/L)	TSS (mg/L)	CHL *a* (µg/L)
	RM3	25-Feb-25	2.5	41.1	3.6	2.1	0.72
	RM3	12-Mar-25	1.0	31.2	2.4	0.9	0.25
	RM3	13-Apr-25	1.0	46.7	4.5	3.8	0.44
	RM3	21-Jun-25	0.5	19.9	3.1	1.7	0.44
	RM7	16-Jul-24	0.4	23.0	2.7	1.6	0.26
	RM7	25-Oct-24	0.4	13.8	1.9	0.7	0.18
	RM7	02-Dec-24	0.4	20.9	2.0	0.5	0.20
	RM7	08-Jan-25	2.4	21.3	1.9	1.0	0.45
	RM7	22-Jan-25	5.1	29.6	2.1	0.7	0.40
	RM7	25-Feb-25	1.8	31.6	3.5	2.1	0.76
	RM7	12-Mar-25	1.1	29.0	2.3	0.6	0.39
	RM7	13-Apr-25	1.1	26.3	2.2	2.5	0.61
	RM7	21-Jun-25	0.6	18.6	2.2	1.3	0.30
	RM8	16-Jul-24	0.3	33.8	2.8	1.6	0.23
	RM8	25-Oct-24	1.2	15.3	2.2	1.1	0.25
	RM8	02-Dec-24	1.0	23.0	2.3	0.7	0.18
	RM8	08-Jan-25	12.0	31.4	4.4	2.5	0.36
	RM8	22-Jan-25	0.4	18.8	1.8	1.5	0.16
	RM8	12-Feb-25	5.1	26.8	4.4	1.6	0.97
	RM8	25-Feb-25	2.2	76.4	6.5	6.2	0.70
	RM8	12-Mar-25	1.0	40.2	2.3	0.2	0.24
	RM8	13-Apr-25	0.8	39.2	6.1	7.1	0.48
	RM8	21-Jun-25	1.1	25.1	3.9	3.7	0.58
South							
	TUL10	15-Jul-24	9.8	37.8	4.2	1.6	0.24
	TUL10	23-Oct-24	0.5	35.4	4.9	4.1	0.41
	TUL10	03-Dec-24	0.5	28.0	3.2	0.9	0.33
	TUL10	07-Jan-25	10.6	84.3	6.9	18.8	0.71
	TUL10	21-Jan-25	1.6	29.6	2.7	0.8	0.22
	TUL10	10-Feb-25	17.2	35.1	6.1	3.1	1.60
	TUL10	24-Feb-25	3.5	52.5	8.3	10.8	1.20
	TUL10	13-Mar-25	6.1	65.1	8.4	13.1	1.57
	TUL10	26-Mar-25	11.7	56.9	8.2	6.4	1.75
	TUL10	14-Apr-25	26.5	61.2	8.8	10.5	0.75
	TUL10	19-Jun-25	2.0	44.4	6.4	4.2	0.85
	TUL2	15-Jul-24	0.3	19.5	1.6	1.5	0.21
	TUL2	24-Oct-24	0.4	13.2	2.0	0.6	0.13
	TUL2	03-Dec-24	0.3	20.6	1.7	0.5	0.16
	TUL2	07-Jan-25	0.6	27.4	1.9	2.4	0.25
	TUL2	21-Jan-25	0.5	20.5	1.6	0.7	0.25
	TUL2	11-Feb-25	8.5	25.8	4.4	1.6	0.79
	TUL2	24-Feb-25	0.8	30.8	3.5	1.8	0.91
	TUL2	13-Mar-25	0.5	25.6	2.0	0.5	0.32

Zone	Site	Date	NO_x (µg/L)	PN (µg/L)	PP (µg/L)	TSS (mg/L)	CHL *a* (µg/L)
	TUL2	27-Mar-25	1.4	28.8	2.9	0.8	0.55
	TUL2	14-Apr-25	0.4	38.2	3.1	2.8	0.41
	TUL2	20-Jun-25	0.3	17.3	2.1	0.7	0.27
	TUL3	15-Jul-24	0.3	25.2	2.4	1.5	0.18
	TUL3	23-Oct-24	0.3	13.6	1.9	0.7	0.14
	TUL3	03-Dec-24	0.2	21.4	2.6	2.4	0.26
	TUL3	07-Jan-25	1.6	35.0	6.0	7.3	0.44
	TUL3	21-Jan-25	0.8	28.3	2.0	1.2	0.15
	TUL3	10-Feb-25	5.2	42.4	6.5	2.1	2.60
	TUL3	24-Feb-25	3.1	52.6	5.6	4.7	0.85
	TUL3	13-Mar-25	0.6	27.0	2.2	0.4	0.22
	TUL3	27-Mar-25	2.2	28.5	3.5	1.0	0.78
	TUL3	14-Apr-25	2.3	51.2	8.6	11.9	0.59
	TUL3	19-Jun-25	0.6	26.1	3.7	2.0	0.52
	TUL5	15-Jul-24	0.3	19.3	2.1	1.0	0.18
	TUL5	24-Oct-24	0.7	15.9	2.3	1.0	0.23
	TUL5	03-Dec-24	0.4	23.1	2.4	1.1	0.25
	TUL5	07-Jan-25	1.0	26.2	3.0	2.0	0.40
	TUL5	21-Jan-25	0.7	21.0	2.0	1.1	0.23
	TUL5	10-Feb-25	8.8	30.2	5.2	2.6	1.41
	TUL5	24-Feb-25	1.8	53.2	7.4	3.9	0.92
	TUL5	13-Mar-25	2.0	31.2	2.8	1.0	0.49
	TUL5	27-Mar-25	4.3	33.3	3.6	1.2	0.71
	TUL5	14-Apr-25	2.3	60.2	10.1	17.9	0.95
	TUL5	20-Jun-25	0.5	22.4	4.3	2.8	0.40
	TUL6	15-Jul-24	0.3	34.0	2.7	1.3	0.28
	TUL6	23-Oct-24	0.3	16.4	2.4	1.1	0.15
	TUL6	03-Dec-24	0.2	21.3	2.6	1.0	0.23
	TUL6	07-Jan-25	4.1	40.8	5.9	3.9	0.53
	TUL6	21-Jan-25	0.2	25.7	2.7	1.8	0.27
	TUL6	10-Feb-25	2.7	51.0	7.3	1.6	2.58
	TUL6	24-Feb-25	9.7	49.0	6.8	5.3	0.87
	TUL6	13-Mar-25	0.8	64.1	7.8	7.3	1.08
	TUL6	27-Mar-25	8.8	37.7	5.5	3.8	1.10
	TUL6	14-Apr-25	1.1	64.0	8.8	12.5	1.21
	TUL6	19-Jun-25	1.6	25.2	3.5	1.6	0.59
	TUL8	15-Jul-24	3.4	19.8	2.0	0.8	0.12
	TUL8	23-Oct-24	0.3	19.3	2.4	0.8	0.21
	TUL8	03-Dec-24	0.6	31.0	3.2	1.0	0.38
	TUL8	07-Jan-25	1.8	35.0	5.5	6.7	0.46
	TUL8	21-Jan-25	3.2	36.4	5.6	5.2	0.47
	TUL8	09-Feb-25	14.1	41.6	5.7	2.5	1.66
	TUL8	24-Feb-25	1.4	47.4	4.9	2.9	1.07
	TUL8	13-Mar-25	0.5	31.9	3.6	1.6	0.65

Zone	Site	Date	NO_x (µg/L)	PN (µg/L)	PP (µg/L)	TSS (mg/L)	CHL *a* (µg/L)
	TUL8	27-Mar-25	6.3	28.8	3.7	1.6	0.93
	TUL8	14-Apr-25	4.1	78.0	9.2	22.1	0.90
	TUL8	19-Jun-25	0.8	14.7	2.0	0.5	0.24
Palm Island							
	BUR1	22-Oct-24	0.3	12.7	1.8	0.4	0.17
	BUR1	03-Dec-24	0.2	31.5	1.5	0.6	0.21
	BUR1	02-Jan-25	0.7	16.8	1.2	0.3	0.17
	BUR1	16-Jan-25	1.0	19.9	2.7	0.6	0.29
	BUR1	06-Feb-25	13.3	65.1	9.3	20.5	0.24
	BUR1	09-Feb-25	11.9	30.6	5.5	4.0	0.91
	BUR1	13-Feb-25	5.3	45.3	6.1	3.1	0.58
	BUR1	20-Feb-25	3.4	44.1	4.1	1.1	1.01
	BUR1	28-Feb-25	2.4	29.6	5.4	2.9	0.45
	BUR1	02-Apr-25	7.9	49.5	4.6	2.7	0.69
	BUR1	23-Apr-25	1.1	29.4	2.8	0.6	0.27
	BUR1	18-Jun-25	1.1	15.5	2.4	0.8	0.53
	BUR2	22-Oct-24	0.3	12.3	1.7	0.5	0.15
	BUR2	03-Dec-24	0.2	34.5	1.8	0.8	0.37
	BUR2	02-Jan-25	0.9	20.8	2.0	0.9	0.24
	BUR2	16-Jan-25	0.2	22.8	3.2	1.0	0.29
	BUR2	06-Feb-25	4.6	76.4	14.4	18.8	0.49
	BUR2	08-Feb-25	0.6	30.3	4.5	0.7	1.07
	BUR2	13-Feb-25	5.7	44.9	4.3	1.1	2.05
	BUR2	20-Feb-25	10.8	30.6	3.1	1.2	0.71
	BUR2	28-Feb-25	1.4	22.6	2.6	1.3	0.40
	BUR2	02-Apr-25	3.9	21.9	2.1	1.3	0.52
	BUR2	23-Apr-25	0.5	24.3	1.9	1.1	0.32
	BUR2	18-Jun-25	0.5	18.6	2.3	0.7	0.41

Update to scheduled oxidized nitrogen guideline values.

Since the Wet Tropics report card was developed in 2016 (reporting on 2014-15) the scoring and grading of inshore water quality (enclosed coastal, open coastal and mid-shelf waters) has applied the guideline values used for the MMP Long-term trend inshore water quality index as published in Lønborg et al. 2016, Waterhouse et al. 2017, and Gruber et al. 2019. These guideline values were the most appropriate at the time and were based on published GBRMPA (2010) and scheduled Queensland Government (DEHP 2009) guideline values.

In 2020 the guideline values for oxidised nitrogen (NO_x) were updated for coastal and marine waters of the Wet Tropics and scheduled in the Environmental Protection (Water and Wetland Biodiversity) Policy 2019—the EPP (Water and Wetland Biodiversity) (DES 2020). The updates involved a change from using a mean to a median of the sample data concentration values for comparison against the

guideline values, and a substantial lowering of the NO_x concentration guideline value for open coastal and mid-shelf waters (Table 78). This update followed similar changes of the NO_x guideline values used for the MMP long-term trend inshore water quality index, applied as from the 2018-19 report (Gruber et al. 2020, p. 186-187) which cited: "This value {2.0 µg L^{-1}} was determined to be too high and not reflective of NO_x concentrations in the Reef lagoon. From the 2018–19 report onwards, a revised NO_x GV of 0.35 µg L^{-1} was used for this version of the Index (provided by the Authority).".

Table 78 Oxidised nitrogen (NO_x) guideline values used for the Wet Tropics report card and introduced with the 2020 scheduled update.

		Guideline values for NO_x (ug/L)	
Water type	**Zone**	**Report card (2016 -)**	**Updated scheduled (2020)**
Enclosed coastal	All inshore zones	10 (mean)	10 (median)
Open coastal	North, Central South	2 (mean)	0.35 (median)
	Palm Island	2 (mean)	0.28 (median)
Mid-shelf	All inshore zones	2 (mean)	0.31 (median)

Updated scheduled values were sourced from Schedule 1 amendments for the Wet Tropics basins coastal waters approved in 2020 (Environmental Protection (Water and Wetland Biodiversity) Policy 2019). The guideline values are compared to either the test data mean (as per Wet Tropics report card methods (WTW 2026) or the median (as per the Environmental Protection (Water and Wetland Biodiversity) Policy 2019).

The effect of using the updated scheduled NO_x guideline values for scoring the 2021-22 inshore water quality, compared to using the Wet Tropics report card guideline values, was to substantially lower the score for NO_x in all zones and also lower the nutrients and water quality scores for the North, Central and Palm Island zone (Table 79).

Note that the 2021-22 NO_x, nutrient and water quality scores show that for the South zone the NO_x score is lower, whilst the nutrient and water quality scores are higher, when using the scheduled guidelines compared to Wet Tropics report card guideline values. This is due to the method of score aggregation used for inshore water quality. The nutrient indicator category is not calculated as the average of the contributing indicator scores for the zone (as they are presented in Table 79 for NO_x, and Table 44 for PN and PP), it is calculated as the average of the contributing indicators for each site and then the site nutrient scores are averaged to produce the zone score.

Table 79 Water quality results for 2021-22 using updated scheduled guideline values for inshore waters of the Wet Tropics region.

Zone	NO_x	Nutrients	Water quality
North	0	50	72
Central	0	36	59
South	24	44	62
Palm Island	0	42	61

Scoring range: Very Poor = 0 to <21 | Poor = 21 to <41 | Moderate = 41 to <61 | Good = 61 to <81 | Very Good = 81 – 100.

Comparing the guideline values for scoring the NO_x indicator over all reporting years shows that the North, Central and Palm Island scores were usually substantially lowered for each year when using the updated scheduled guidelines (Figure 24). In contrast, the South zone has years where using the updated scheduled guidelines increased the score compared to using the Wet Tropics report card

guideline values (e.g. 2017, 2018 and 2019). This is because the South zone is the only zone that includes enclosed coastal sites (two sites pre-2020, one site from 2020 onwards), and the guideline value of 10 µg L^{-1} for enclosed coastal waters was not changed in the scheduled updates. Since the median concentration of the sampled data, instead of the mean, is used to compare with the updated scheduled guideline value (which typically yields a lower concentration value than the mean), the enclosed coastal site scores increased, and the score for the South zone when averaged from all contributing sites increased. As example of how the mean and median can differ, the 2021-22 NO_x sample data for the South zone enclosed coastal site had a mean of 16.23 µg/L, corresponding to 'very poor', and a median of 4.76 µg/L, corresponding to 'very good'.

Figure 24 Time series of the oxidised nitrogen indicator scores and grades for each inshore zone using the Wet Tropics report card guideline values (left) and the updated scheduled guideline values (right).

Due to the effect of using the updated scheduled guidelines on scoring the NO_x indicator, the guideline values have remained unchanged for the purposes of scoring inshore marine waters. This provides inshore marine water quality reporting that is consistent and comparable with all previous years. Inshore marine water quality guideline values used for scoring will be reviewed in the upcoming program design review (2023-25) which will allow for application of the most appropriate guidelines and a consistent approach across regional report cards.

Note that the above explanation is provided for reference and uses inshore water quality results from 2021-22. This was when the decision was made by the TWG and ISP reviews to retain the established Wet Tropics report card NO_x guideline values until the program design review, which is in progress, is completed in 2025.

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Appendix C. Flow indicator detailed results

To account for rainfall variation the flow indicator method assesses the historical rainfall records within each basin. Sites used to provide rainfall data from either station (S) or point (P) locations from the SILO website for each basin are presented in Table 80. The 2024-25 rainfall types for each basin are presented in Table 81.

Table 80 Rainfall data site details.

Basin & data type	Location	Latitude	Longitude	Elevation (m)
Mossman P2	Lower catchment	-16.45	145.4	18
Mossman P1	Mid catchment	-16.4	145.35	76
Barron P1	Upper Barron	-17.35	145.5	788
Barron P2	Tinaroo Falls Dam,	-17.15	145.55	796
Barron S3	Walkamin	-17.13	145.43	594
Barron P3	Biboohra	-16.9	145.4	386
Barron P4	Kuranda Railway	-16.8	145.65	325
Barron P5	Clohesy	-16.9	145.55	406
Barron P6	Upper Freshwater	-16.95	145.7	249
Mulgrave P3	Mulgrave Mill	-17.10	145.8	52
Mulgrave P4	Mt Sophia	-17.15	145.9	211
Mulgrave P5	Deeral	-17.2	145.9	131
Mulgrave P1	Behana Creek	-17.2	145.8	784
Mulgrave P2	Upper-mid Mulgrave	-17.2	145.75	252
Russell P2	Happy Valley	-17.35	145.9	99
Russell P3	Babinda PO	-17.35	145.95	14
Russell P4	Bellenden Kerr bottom	-17.25	145.9	291
Russell P1	Upper-mid Russell	-17.45	145.85	172
Johnstone N P2	Topaz - Towalla	-17.45	145.7	602
Johnstone S S2	Exp Station	-17.61	146.0	18
Johnstone P3	Innisfail	-17.5	146.0	10
Johnstone P1	mid upper Johnstone	-17.6	145.75	430
Tully P2	Kombooloomba	-17.85	145.6	792
Tully P3	Kareeya	-17.75	145.6	469
Tully P4	Sugar Mill	-17.95	145.95	122
Tul P1	Mid Tully	-17.9	145.75	58
Herbert P2	Evelyn State Forest	-17.55	145.5	1056
Herbert P3	Mt. Garnet PO	-17.7	145.1	664
Herbert P4	Gunnawarra	-17.95	145.15	638
Herbert P5	Gleneagle	-18.15	145.35	601
Herbert P6	Elphinstone Pocket	-18.5	146.0	47
Herbert P7	Victoria Sugar Mill	-18.65	146.2	12
Herbert P1	Lower mid Herbert	-18.3	145.7	618
Murray P1	Upper Murray	-18.1	145.8	69
Murray P2	Muenga Creek at Sings	-18.2	145.9	199
Murray P3	US Murray and Muenga	-18.15	145.85	535

The data type used for rainfall was either a station (S) or grid cell (P) and was extracted from the SILO database at https://www.longpaddock.qld.gov.au/silo/point-data/

Table 81 Basin rainfall type for 2024-25.

Basin	Rainfall value	Climate Type	Rainfall data sites	
			Patched point	Data drill
Mossman	4	Wet	-	2
Barron	4	Wet	1	6
Murray	4	Wet	-	5
Russell	4	Wet	-	4
Johnstone	4	Wet	1	3
Tully	4	Wet	-	4
Murray	4	Wet	-	3
Herbert	4	Wet	-	7

Note: rainfall value is assigned to the reporting year based upon rainfall records compared to historical average rainfall. The values are 1 – drought, 2 – dry, 3 average, and 4 – wet.

Table 82 presents the scores for all 10 flow measures, the 30th percentile and standardised score for each flow assessment site along with standardised score for each basin and estuary. Descriptions and definitions for each flow measure are presented in Table 83.

Table 82 Flow measure scores and summary scores for each flow assessment site for 2024-25.

	Gauging station number	CTF: Duration	CTF: Frequency	Below 10%ile: Duration	Below 10%ile: Frequency	Ratio dry/total	CV dry season	Above 50%ile: Duration	Above 50%ile: Frequency	Above 90%ile: Duration	Above 90%ile: Frequency	30th percentile	Standardised score	Gauge catchment (km²)	Adjusted catchment (km²)	Proportion	Satandardised score x proportion	Aggregated score	Climate type
Basin: Site																			
Mossman														106				61	Wet
Mossman River at Mossman	109001A	5	5	5	5	4	4	1	1	5	5	4.0	61	106		1.00	61.0		
Barron														2015				74	Wet
Barron River at Myola	110001D	5	5	5	5	1	1	4	5	5	5	4.7	75	1945	687	0.34	25.6		
Barron River at Mareeba	110002D	5	5	5	5	4	1	1	5	5	5	4.7	75	836	555	0.28	20.7		
Barron River at Picnic Crossing	110003A	5	5	5	5	1	5	1	5	5	5	5.0	80	228	101	0.05	4.0		
Mazlin Creek at Railway Bridge	110018A	5	5	5	5	1	4	4	5	5	4	4.0	61	53	53	0.03	1.6		
Barron River at Bilwon	110020A	5	5	5	5	1	1	4	5	5	5	4.7	75	1258	422	0.21	15.7		
Barron River at Goonara Creek	110021A	5	5	5	5	1	4	1	5	5	5	4.7	75	127	127	0.06	4.7		
Freshwater Creek at Redlynch Estate	110104A	5	5	4	5	4	5	1	5	4	1	4.0	61	70	70	0.03	2.1		
Mulgrave														520				75	Wet
Mulgrave River at The Fisheries	111005A	5	5	5	5	4	5	5	4	5	4	4.7	75	357	357	0.69	51.5		
Mulgrave River at Peets Bridge	111007A	5	5	5	5	4	5	5	4	5	4	4.7	75	520	163	0.31	23.5		
Russell														354				92	Wet
Russell River at Bucklands	111101D	5	5	5	5	4	5	5	4	5	5	5.0	95	315	315	0.89	84.5		
Babinda Creek at The Boulders	111105A	4	4	5	5	4	5	5	5	5	5	4.7	75	39	39	0.11	8.3		
Johnstone														838				64	Wet
Fisher Creek at Nerada	112002A	4	4	5	5	4	5	4	5	5	5	4.0	61	15	15	0.02	1.1		
North Johnstone River at Glen Allyn	112003A	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-		
North Johnstone River at Tung Oil	112004A	5	5	5	5	4	4	4	5	5	4	4.0	61	925	745	0.89	54.2		

	Gauging station number	CTF: Duration	CTF: Frequency	Below 10%ile: Duration	Below 10%ile: Frequency	Ratio dry/total	CV dry season	Above 50%ile: Duration	Above 50%ile: Frequency	Above 90%ile: Duration	Above 90%ile: Frequency	30th percentile	Standardised score	Gauge catchment (km^2)	Adjusted catchment (km^2)	Proportion	Satandardised score x proportion	Aggregated score	Climate type
South Johnstone River at Upstream Central Mill*	112101B																		
Liverpool Creek at Upper Japoonvale	112102A	5	5	5	5	5	5	5	5	5	5	5.0	100	78	78	0.09	9.3		
Tully														1450				61	Wet
Cochable Creek at Powerline*	113004A	5	5	5	5	4	5	1	1	5	5	4.7	75	95	95	0.07	4.9		
Tully River at Euramo	113006A	5	5	5	5	4	5	4	5	4	4	4.0	61	1450	1355	0.93	57.0		
Murray														309				85	Wet
Murray River at Upper Murray	114001A	5	5	5	5	4	5	4	5	5	5	5.0	95	156	156	0.50	48.0		
Meunga Creek at Sing's	114002A	4	4	5	5	5	5	5	5	5	2	4.7	75	153	153	0.50	37.1		
Herbert														8581				67	Wet
Herbert River at Ingham	116001F	5	5	5	5	4	5	4	5	5	5	5.0	95	8581	970	0.11	10.7		
Herbert River at Glen Eagle	116004C	5	5	5	5	4	3	4	4	5	5	4.0	61	5236	3977	0.46	28.3		
Herbert River at Abergowrie	116006B	5	5	5	5	5	4	4	4	5	4	4.0	61	7454	1868	0.22	13.3		
Gowrie Creek at Abergowrie	116008B	5	5	5	5	5	5	5	5	5	5	5.0	100	124	124	0.01	1.4		
Blencoe Creek at Blencoe Falls	116010A	5	5	5	5	4	4	4	4	5	4	4.0	61	226	226	0.03	1.6		
Millstream at Ravenshoe	116011A	5	5	5	5	5	5	4	2	4	5	4.7	75	89	89	0.01	0.8		
Cameron Creek at 8.7km	116012A	5	5	5	5	4	4	4	4	5	5	4.0	61	360	360	0.04	2.6		
Millstream at Archer Creek	116013A	4	4	5	5	5	5	4	5	5	5	4.7	75	308	219	0.03	1.9		
Wild River at Silver Valley	116014A	5	4	5	5	4	5	1	5	4	1	4.0	61	591	591	0.07	4.2		
Blunder Creek at Wooroora	116015A	5	5	5	5	5	5	5	5	5	4	5.0	95	127	127	0.01	1.4		
Rudd Creek@Gunnawarra	116016A	2	2	2	2	5	4	5	5	4	5	2.0	21	127	127	0.01	0.3		
Stone River at Running Creek	116017A	4	5	4	4	4	5	5	4	5	4	4.0	61	157	157	0.02	1.1		

	Gauging station number	CTF: Duration	CTF: Frequency	Below 10%ile: Duration	Below 10%ile: Frequency	Ratio dry/total	CV dry season	Above 50%ile: Duration	Above 50%ile: Frequency	Above 90%ile: Duration	Above 90%ile: Frequency	30th percentile	Standardised score	Gauge catchment (km²)	Adjusted catchment (km²)	Proportion	Satandardised score x proportion	Aggregated score	Climate type
Estuary: Site																			
Barron																		74	Wet
Barron River at Myola	110001D	5	5	5	5	1	1	4	5	5	5	4.7	75	1945	1945	0.97	72.4		
Freshwater Creek at Redlynch Estate	110104A	5	5	4	5	4	5	1	5	4	1	4.0	61	70	70	0.03	2.1		
Russell-Mulgrave																		82	Wet
Mulgrave River at Peets Bridge	111007A	5	5	5	5	4	5	5	4	5	4	4.7	75	520	520	0.59	44.6		
Russell River at Bucklands	111101D	5	5	5	5	4	5	5	4	5	5	5.0	95	315	315	0.41	34.2		
Babinda Creek at The Boulders	111105A	4	4	5	5	4	5	5	5	5	5	4.7	75	39	39	0.04	3.3		
Johnstone																		61	Wet
North Johnstone River at Tung Oil	112004A	5	5	5	5	1	1	4	5	4	4	4.0	61	925	925	1.00	61.0		
South Johnstone River at Upstream Central Mill*	112101B																		

Scoring range: ■ Very Poor = 0 to <21 | ■ Poor = 21 to <41 | ■ Moderate = 41 to <61 | ■ Good = 61 to <81 | ■ Very Good = 81 – 100. 2024-25 flow data records required for scoring were unavailable for North Johnstone River at Glen Allyn (Johnstone Basin). *Flow data is no longer available for South Johnstone River at Upstream Central Mill as the site has been decommissioned.

Table 83 Abbreviations, description, seasonality and hydrologic definitions of the measures used for the flow indicator.

Abbreviation	Description	Season	Hydrologic definition
Below 10%ile: Duration	Low flow Duration	July-Jan	Total duration of flows which remain equal to or below a lower threshold for the reporting period (annual).
Below 10%ile: Frequency	Low flow Frequency	July-Jan	Count of the number of occurrences during which the magnitude of flow falls to or below the threshold during the reporting period (annual).
CV dry season	Low flow variability	July-Dec	Coefficient of variation (stdev/mean) of daily flow for dry season.
Ratio dry/total	Driest six Months	July-Dec	Proportion of annual discharge contributed during the months July-December.
CTF: Duration	Cease to flow Duration	All year	Total duration of where flow ceases during the reporting period (annual).
CTF: Frequency	Cease to flow Frequency	All year	Count of the number of occurrences during which flow ceases during the reporting period (annual).
Above 50%ile: Duration	Medium flow Duration	All year	Total duration of flows which remain equal to or above the 50th percentile threshold for the reporting period (annual)
Above 50%ile: Frequency	Medium flow Frequency	All year	Count of the number of occurrences during which the magnitude of flow passes from below to equal or above the 50th percentile threshold during the reporting period (annual).
Above 90%ile: Duration	High flow duration	All year	Total duration of flows which remain equal to or above the 90th percentile threshold for the reporting period (annual)
Above 90%ile: Frequency	High flow Frequency	All year	Total count of flows which remain equal to or above the 90th percentile threshold for the reporting period (annual)

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Appendix D. Basin fish assessment: key to species and species present at each site survey

Table 84 Key to fish species codes (SppCode). Pest species codes are identified by an asterisk (*).

SppCode	Family	Genus	Species	Common name
AcaPac		*Acanthopagrus*	*pacificus*	Pikey bream
AmbMio	Ambassidae	*Ambassis*	*miops*	Flagtail perchlet
AmbSp1	Ambassidae	*Ambassis*	*sp. 1*	Northern perchlet
AmbVac	Ambassidae	*Ambassis*	*vachellii*	Vachell's glassfish
AmnPer	Terapontidae	*Amniataba*	*percoides*	Barred grunter
AngAus	Anguillidae	*Anguilla*	*australis*	Southern short-finned eel
AngMar	Anguillidae	*Anguilla*	*marmorata*	Giant mottled eel
AngObs	Anguillidae	*Anguilla*	*obscura*	Pacific short-finned eel
AngRei	Anguillidae	*Anguilla*	*reinhardtii*	Long-finned eel
AwaAcr	Gobiidae	*Awaous*	*acritosus*	Roman-nose goby
BunGyr	Eleotridae	*Bunaka*	*gyrinoides*	Bunaka
ButBut	Eleotridae	*Butis*	*butis*	Crimson-tipped gudgeon
CaiRho	Melanotaeniidae	*Cairnsichthys*	*rhombosomoides*	Cairns rainbowfish
CoeLei	Syngnathidae	*Coelonotus*	*c.f. leiaspis*	Barhead pipefish
CraSte	Atherinidae	*Craterocephalus*	*stercusmuscarum*	Fly-specked hardyhead
DenAus	Ambassidae	*Denariusa*	*australis*	Penny fish
EleFus	Eleotridae	*Eleotris*	*fusca*	Brown spine-cheek gudgeon
EleMel	Eleotridae	*Eleotris*	*melanosoma*	Black spine-cheek gudgeon
GamHol*	Poecilidae	*Gambusia*	*holbrooki*	Gambusia
GerFil	Gerreidae	*Gerres*	*filamentosus*	Silver biddy
GiuApo	Eleotridae	*Giurus*	*aporocephalus*	Snake-head gudgeon
GiuMar	Eleotridae	*Giurus*	*margaritacea*	Snake-head gudgeon
GloApr	Apogonidae	*Glossamia*	*aprion*	Mouth almighty
GloAur	Gobiidae	*Glossogobius*	*aureus*	Golden Flathead Goby
GloBel	Gobiidae	*Glossogobius*	*bellendensis*	Mulgrave goby
GloBic	Gobiidae	*Glossogobius*	*bicirrhosus*	Bearded flathead goby
GloGiu	Gobiidae	*Glossogobius*	*giuris*	Tank goby
GloIll	Gobiidae	*Glossogobius*	*illimus*	False Celebes goby
GuyWuj	Percichthyidae	*Guyu*	*wujalwujalensis*	Bloomfield River cod
GymPol	Muraenidae	*Gymnothorax*	*polyuranodon*	Freshwater moray
HepSpp	Terapontidae	*Hephaestus*	*fuliginosus/ tulliensis*	Sooty grunter/ Tully grunter
HypCom	Eleotridae	*Hypseleotris*	*compressa*	Empire gudgeon
HypSp1	Eleotridae	*Hypseleotris*	*sp. 1*	Northern carp gudgeon (undescribed)
KuhMar	Kuhlidae	*Kuhlia*	*marginata*	Spotted flagtail
KuhRup	Kuhlidae	*Kuhlia*	*rupestris*	Jungle perch
LatCal	Latidae	*Lates*	*calcarifer*	Barramundi
LeiEqu	Leiognathidae	*Leiognathus*	*equulus*	Common ponyfish
LeiUni	Terapontidae	*Leiopotherapon*	*unicolor*	Spangled perch
LutArg	Lutjanidae	*Lutjanus*	*argentimaculatus*	Mangrove jack
MegCyp	Megalopidae	*Megalops*	*cyprinoides*	Indo-Pacific tarpon
MelMac	Melanotaeniidae	*Melanotaenia*	*maccullochi*	McCulloch's rainbowfish

SppCode	Family	Genus	Species	Common name
MelSpp	Melanotaeniidae	*Melanotaenia*	*spp.*	Eastern rainbowfish
MelTri	Melanotaeniidae	*Melanotaenia*	*trifasciata*	Banded rainbowfish
MesArg	Terapontidae	*Mesopristes*	*argenteus*	Silver grunter
MicBra	Syngnathidae	*Microphis*	*brachyurus*	Short-tailed pipefish
MogAds	Eleotridae	*Mogurnda*	*adspersa*	Southern purple-spotted gudgeon
MonArg		*Monodactylus*	*argenteus*	Butter bream
MooSeh		*Moolgarda*	*seheli*	Bluespot mullet
MugCep	Mugilidae	*Mugil*	*cephalus*	Sea mullet
MugNot	Gobiidae	*Mugilogobius*	*notospilus*	Freshwater mangrove goby
NemEre	Clupeidae	*Nematalosa*	*erebi*	Bony bream
NeoAte	Plotosidae	*Neosilurus*	*ater*	Butter jew
NeoHyr	Plotosidae	*Neosilurus*	*hyrtlii*	Hyrtl's tandan
NotRob	Tetrarogidae	*Notesthes*	*robusta*	Bullrout
OphSp1	Synbranchidae	*Ophisternon*	*sp. (undescribed)*	Swamp eel
OreMos*	Cichlidae	*Oreochromis*	*mossambicus*	Mozambique tilapia
OxyAru	Eleotridae	*Oxyeleotris*	*aruensis*	Aru gudgeon
OxyLin	Eleotridae	*Oxyeleotris*	*lineolata*	Sleepy cod
OxyNul	Eleotridae	*Oxyeleotris*	*nullipora*	Poreless gudgeon
OxySel	Eleotridae	*Oxyeleotris*	*selheimi*	Northern sleepy cod
PelMar*	Cichlidae	*Pelmatolapia*	*mariae*	Spotted tilapia
PlaSub	Mugilidae	*Planiliza*	*subviridis*	Greenback mullet
PoeRet*	Poecilidae	*Poecilia*	*reticulata*	Guppy
PorRen	Plotosidae	*Porochilus*	*rendahli*	Rendahl's tandan
PseGer	Pseudomugilidae	*Pseudomugil*	*gertrudae*	Spotted blue-eye
PseSig	Pseudomugilidae	*Pseudomugil*	*signifer*	Pacific blue-eye
RedBik	Gobiidae	*Redigobius*	*bikolanus*	Speckled goby
RedChr	Gobiidae	*Redigobius*	*chrysosoma*	Spot-finned goby
ScaArg	Scatophagidae	*Scatophagus*	*argus*	Spotted scat
SchHoe	Gobiidae	*Schismatogobius*	*hoesei*	Scaleless goby
SelMul	Scatophagidae	*Selenotoca*	*multifasciata*	Striped scat
SicLag	Gobiidae	*Sicyopterus*	*lagocephalus*	Red-tailed goby
StrKre	Belonidae	*Strongylura*	*krefftii*	Freshwater longtom
SynHog	Soleidae	*Synclidopus*	*hogani*	Hogan's sole
TanTro	Plotosidae	*Tandanus*	*tropicanus*	Wet Tropics tandan
ToxCha	Toxotidae	*Toxotes*	*chatareus*	Seven-spot archerfish
ToxJac	Toxotidae	*Toxotes*	*jaculatrix*	Banded archerfish
XipHel*	Poecilidae	*Xiphophorus*	*hellerii*	Swordtail
XipMac*	Poecilidae	*Xiphophorus*	*maculatus*	Platy

Table 85 Daintree Basin fish monitoring sites and species present from the 2024 survey. The tick symbol '✓' indicates the species was sampled and a blank cell indicates the species was not sampled. Species marked with * are pest fish species.

Waterway	AmbMio	AngMar	AngObs	AngRei	AwaAcr	BunGyr	CoeLei	EleFus	EleMel	GerFil	GiuApo	GloApr	GloBel	GloIll	GuyWuj	GymPol	HepTul	HypCom	KuhMar	KuhRup	LutArg	MelMac	MelSpp	MelTri	MesArg	MogAds	NotRob	OphSp1	PlaSub	*PoeRet	PseSig	RedBik	SchHoe	SicLag	TanTro
Whyanbeel Creek		✓		✓	✓	✓						✓	✓					✓		✓			✓			✓					✓		✓		✓
Saltwater Creek		✓		✓	✓	✓							✓	✓				✓		✓			✓			✓					✓		✓		✓
Roaring Meg Ck		✓		✓											✓		✓						✓			✓					✓				
Whyanbeel Creek Tributary of Saltwater Ck		✓		✓	✓								✓							✓						✓					✓				✓
				✓	✓	✓								✓				✓		✓			✓			✓					✓		✓		✓
Tachalbadga Ck		✓		✓		✓		✓			✓			✓				✓	✓	✓											✓				
Owen Creek		✓																								✓									
Tributary of Myall Creek		✓	✓	✓		✓		✓			✓			✓		✓		✓	✓	✓			✓										✓		✓
Cooper Creek	✓	✓		✓	✓	✓	✓	✓			✓			✓				✓	✓	✓	✓				✓						✓	✓			
Tributary of Cooper Ck				✓	✓	✓		✓			✓			✓				✓		✓				✓							✓				✓
Baird Creek		✓		✓											✓								✓			✓				✓					✓
Meelele Creek			✓	✓																						✓									
Tributary of Keating Ck				✓											✓								✓			✓				✓					✓
Watermelon Ck		✓		✓																						✓									
Keating Creek		✓		✓											✓								✓			✓									✓
Tributary of Keating Ck																							✓			✓									✓
Baird Creek		✓													✓								✓			✓									✓
Tributary of Baird Ck				✓																			✓			✓									
Baird Creek		✓													✓								✓			✓				✓					✓
Tributary of High Falls Ck				✓	✓													✓		✓								✓			✓				✓
Saltwater Creek		✓		✓	✓	✓							✓	✓				✓		✓			✓			✓	✓				✓		✓		✓
Tributary of Chinaman Ck																		✓		✓											✓				✓

Waterway	AmbMio	AngMar	AngObs	AngRei	AwaAcr	BunGyr	CoeLei	EleFus	EleMel	GerFil	GiuApo	GloApr	GloBel	GloIll	GuyWuj	GymPol	HepTul	HypCom	KuhMar	KuhRup	LutArg	MelMac	MelSpp	MetTri	MesArg	MogAds	NotRob	OphSp1	PlaSub	*PoeRet	PseSig	RedBik	SchHoe	SicLag	TanTro
Bamboo Creek		✓		✓	✓	✓								✓				✓		✓						✓					✓		✓		✓
Douglas Creek		✓		✓	✓	✓								✓			✓			✓											✓				✓
Orsova Creek				✓	✓						✓						✓	✓					✓			✓				✓	✓				✓
Intake Creek				✓	✓	✓		✓			✓	✓		✓				✓		✓			✓			✓	✓				✓				✓
Martins Creek		✓	✓	✓	✓	✓		✓			✓			✓				✓												✓	✓				✓
Niau Creek	✓	✓		✓	✓	✓			✓		✓	✓		✓				✓		✓			✓				✓				✓	✓	✓		✓
Emmagen Creek		✓				✓		✓	✓		✓			✓				✓	✓	✓			✓								✓				
Olufson Creek			✓	✓	✓	✓		✓	✓		✓							✓		✓											✓			✓	
Woobadda River		✓		✓	✓	✓		✓						✓				✓	✓	✓			✓								✓		✓		✓
Woobadda River		✓		✓																						✓									
Granite Creek	✓	✓		✓	✓	✓		✓	✓	✓				✓		✓		✓	✓	✓	✓		✓				✓		✓		✓		✓		✓
Brown Creek				✓				✓			✓							✓		✓		✓	✓			✓					✓				
McLean Creek				✓				✓			✓							✓		✓			✓								✓				✓
Tributary of Forest Ck				✓				✓			✓							✓		✓		✓	✓			✓					✓				
Cassowary Creek		✓	✓	✓	✓	✓					✓	✓		✓				✓					✓			✓				✓	✓				✓
Tributary of Forest Ck				✓							✓							✓		✓		✓	✓			✓					✓				
Hutchinson Creek		✓		✓	✓	✓		✓			✓			✓				✓	✓	✓			✓								✓		✓		✓
Oliver Creek		✓			✓	✓		✓			✓			✓					✓	✓	✓				✓				✓					✓	✓

Table 86 Mossman Basin fish monitoring sites and species present from the most recent survey (2023). The tick symbol '✓' indicates the species was sampled and a blank cell indicates the species was not sampled. Species marked with * are pest fish species.

Waterway	AngMar	AngObs	AngRei	AwaAcr	BunGyr	EleFus	GloIll	HypCom	KuhMar	KuhRup	MelSpp	MogAds	NotRob	OphSp1	*PoeRet	PseSig	RedBik	SchHoe	SicLag	TanTro	XipHel
South Mossman River	✓		✓	✓			✓			✓	✓	✓				✓				✓	
Spring Creek	✓		✓		✓	✓				✓	✓		✓			✓					
Tributary of Ball Creek		✓	✓			✓		✓		✓	✓	✓			✓	✓					
Spring Creek	✓		✓	✓	✓		✓	✓	✓	✓	✓					✓		✓	✓		
Flin Creek	✓		✓								✓	✓			✓						✓
Cassowary Creek											✓	✓			✓	✓					
Ball Creek			✓								✓	✓			✓	✓					
Cassowary Creek			✓					✓			✓	✓			✓	✓					
South Mossman River	✓		✓	✓	✓	✓	✓			✓	✓	✓	✓			✓		✓		✓	
Mossman River	✓		✓	✓	✓		✓	✓	✓	✓			✓			✓	✓	✓		✓	
Mossman River			✓	✓			✓	✓		✓	✓	✓	✓	✓		✓		✓		✓	
Mossman River	✓			✓					✓	✓						✓				✓	

Table 87 Barron Basin fish monitoring sites and species present from the most recent survey (2023). The tick symbol '✓' indicates the species was sampled and a blank cell indicates the species was not sampled. Species marked with * are pest fish species.

Waterway	AngMar	AngRei	AwaAcr	BunGyr	CraSte	EleFus	EleMel	GloApr	GloIll	HepTul	HypCom	KuhRup	LeiUni	MelSpp	MogAds	NeoAte	NeoHyr	NotRob	OphSp1	*OreMos	OxyLin	*PelMar	*PoeRet	PseSig	RedBik	SchHoe	TanTro
Severin Creek														✓	✓												✓
Davies Creek		✓						✓		✓			✓	✓	✓	✓				✓							✓
Oaky Creek					✓			✓		✓			✓	✓	✓		✓						✓				
Wright Creek														✓	✓						✓		✓				✓
Atherton Creek		✓			✓			✓		✓			✓	✓	✓	✓	✓						✓				
Varch Creek		✓												✓	✓												
Poona Creek															✓												
Barron River		✓			✓			✓		✓			✓	✓									✓				
Freshwater Creek	✓	✓	✓	✓		✓	✓		✓		✓	✓		✓				✓	✓			✓	✓	✓	✓	✓	
Tinaroo Creek		✓						✓					✓	✓	✓		✓										
Clohesy River		✓			✓			✓		✓			✓	✓	✓												✓

Table 88 Mulgrave Basin fish monitoring sites and species present from the most recent survey (2023). The tick symbol '✓' indicates the species was sampled and a blank cell indicates the species was not sampled. Species marked with * are pest fish species.

Waterway	AngMar	AngRei	AwaAcr	BunGyr	CaiRho	EleFus	GiuApo	GloApr	GloBel	GloIll	HepTul	HypCom	KuhMar	KuhRup	LutArg	MelSpp	MogAds	MooSpp	NeoAte	NotRob	OphSp1	*OreMos	OxyAru	*PelMar	*PoeRet	PseSig	SicLag	TanTro	*XiphHel	*XiphMac
Little Mulgrave River		✓	✓						✓	✓	✓					✓	✓								✓	✓		✓		✓
Little Mulgrave River	✓	✓	✓						✓	✓	✓		✓			✓	✓									✓		✓		
Fishery Creek	✓	✓	✓		✓	✓								✓									✓			✓	✓	✓		
Tributary of Mulgrave R.		✓		✓					✓	✓	✓					✓										✓		✓		
Tributary of Behana Ck		✓	✓		✓											✓	✓							✓	✓			✓		
Hobson Creek												✓				✓	✓						✓		✓					
Tributary of Behana Ck	✓	✓	✓		✓						✓	✓		✓		✓	✓											✓		
Wright Creek	✓	✓	✓	✓			✓			✓		✓		✓	✓	✓	✓	✓	✓			✓		✓	✓	✓				
Behana Creek		✓	✓	✓	✓	✓	✓	✓		✓	✓	✓				✓	✓			✓	✓		✓		✓	✓		✓		✓
Stony Creek																✓	✓								✓	✓			✓	

Table 89 Russell Basin fish monitoring sites and species present from the most recent survey (2023). The tick symbol '✓' indicates the species was sampled and a blank cell indicates the species was not sampled. Species marked with * are pest fish species.

Waterway	AmbMio	AmbSp1	AngMar	AngRei	AwaAcr	BunGyr	CaiRho	CraSte	EleFus	GiuApo	GloApr	GloBel	GloIll	HepTul	HypCom	KuhMar	KuhRup	MelMac	MelSpp	MogAds	NotRob	OphSp1	OxyAru	*PoeRet	PseGer	PseSig	SchHoe	TanTro	*XipMac
Cane drain				✓	✓		✓	✓	✓	✓					✓			✓	✓	✓			✓	✓	✓	✓			
Harvey Creek			✓	✓			✓									✓	✓		✓	✓		✓	✓			✓		✓	
Pugh Creek			✓	✓			✓					✓		✓												✓		✓	
Pugh Creek			✓	✓		✓	✓					✓	✓	✓			✓		✓	✓						✓		✓	
Babinda Creek			✓	✓	✓		✓	✓				✓	✓									✓	✓			✓		✓	
Tributary of Babinda Ck			✓	✓	✓		✓					✓		✓			✓						✓			✓		✓	
Woopen Creek			✓	✓	✓							✓	✓	✓			✓		✓	✓				✓		✓		✓	
Cane drain		✓		✓											✓				✓	✓				✓	✓	✓			✓
Babinda Creek	✓			✓	✓						✓	✓	✓	✓	✓		✓		✓		✓			✓		✓	✓	✓	
Chooky Chooky Creek				✓	✓	✓		✓			✓	✓	✓		✓				✓	✓	✓		✓	✓		✓		✓	✓

Table 90 Johnstone Basin fish monitoring sites and species present from the most recent survey (2023). The tick symbol '✓' indicates the species was sampled and a blank cell indicates the species was not sampled. Species marked with * are pest fish species.

Waterway	AmbSp1	AngMar	AngRei	AwaAcr	BunGyr	CaiRho	CraSte	GiuApo	GloApr	GloIll	HepTul	HypCom	KuhRup	MelSpp	MogAds	NotRob	OphSp1	OxyAru	*PoeRet	PseGer	PseSig	SchHoe	TanTro	*XipHel	*XipMac
Tributary of Malanda Ck			✓						✓					✓	✓										
Malanda Creek									✓					✓									✓		
Cowley Creek	✓		✓			✓		✓				✓		✓	✓		✓	✓		✓					✓
North Beatrice River		✓									✓			✓	✓				✓				✓	✓	
South Maria Creek	✓		✓		✓	✓		✓		✓		✓		✓	✓						✓		✓		
Tributary of Mena Creek						✓								✓	✓				✓				✓		✓
Muston Creek			✓											✓	✓				✓				✓		
Utchee Creek		✓	✓								✓			✓	✓				✓		✓				
Liverpool Creek		✓	✓	✓			✓			✓	✓		✓	✓	✓	✓					✓	✓	✓		
Scheu Creek											✓		✓	✓	✓		✓								
Middle Brook			✓				✓							✓	✓				✓						

Table 91 Tully Basin fish monitoring sites and species present from the most recent survey (2023). The tick symbol '✓' indicates the species was sampled and a blank cell indicates the species was not sampled. Species marked with * are pest fish species.

Waterway	AmbSp1	AngMar	AngRei	AwaAcr	BunGyr	CraSte	DenAus	GloApr	Glolll	HepTul	HypCom	KuhMar	KuhRup	MegCyp	MelMac	MelSpp	MogAds	NeoHyr	NotRob	OphSp1	*OreMos	OxyAru	OxyNul	*PelMar	*PoeRet	PseGer	PseSig	SchHoe	TanTro	*XipMac
Davidson Creek	✓	✓	✓	✓	✓	✓			✓	✓	✓					✓	✓			✓				✓			✓	✓	✓	✓
Tributary of Davidson Ck			✓	✓							✓				✓	✓	✓	✓				✓				✓	✓		✓	✓
Marquette Creek	✓		✓					✓	✓							✓	✓	✓		✓							✓		✓	
Cane drain	✓		✓			✓	✓				✓			✓	✓	✓	✓				✓		✓	✓		✓				✓
Tributary of Python Creek		✓	✓																											
Tributary of Davidson Ck		✓	✓	✓						✓			✓			✓	✓					✓					✓		✓	
Tributary of Tully River			✓							✓			✓			✓	✓		✓								✓		✓	
Stony Creek			✓	✓					✓	✓						✓	✓					✓					✓		✓	
Bulgun Creek		✓	✓	✓					✓	✓		✓	✓				✓										✓		✓	
Banyan Creek			✓	✓		✓			✓		✓					✓	✓			✓		✓		✓	✓		✓	✓		✓

Table 92 Murray Basin fish monitoring sites and species present from the most recent survey (2023). The tick symbol '✓' indicates the species was sampled and a blank cell indicates the species was not sampled. Species marked with * are pest fish species.

Waterway	AmbSp1	AngMar	AngRei	AwaAcr	BunGyr	CraSte	GiuApo	GloApr	GloIll	HepTul	HypCom	KuhRup	MegCyp	MelMac	MelSpp	MogAds	NemEre	NeoHyr	NotRob	OphSp1	*OreMos	OxyNul	*PelMar	*PoeRet	PseGer	PseSig	SchHoe	TanTro	*XipMac
Stony Creek															✓	✓														
Cane drain						✓									✓	✓						✓			✓					✓
Scrubby Creek				✓						✓	✓	✓	✓		✓	✓													✓	
Tributary of Kennedy Ck		✓	✓																											
Tributary of Woodfield Ck			✓												✓	✓				✓					✓		✓			
Cane drain										✓	✓				✓	✓						✓				✓			✓
Cane drain	✓		✓								✓			✓	✓	✓					✓	✓	✓		✓				✓
Tributary of Meunga Ck			✓	✓							✓				✓	✓								✓		✓			
Murray River			✓	✓	✓	✓		✓	✓	✓	✓				✓	✓								✓		✓	✓		
Murray River	✓	✓	✓	✓		✓			✓	✓	✓				✓	✓	✓		✓					✓		✓			✓
Murray River			✓	✓		✓		✓	✓	✓	✓				✓	✓	✓	✓						✓		✓		✓	
Murray River	✓		✓	✓		✓	✓		✓	✓	✓				✓	✓								✓		✓			

Table 93 Herbert Basin fish monitoring sites and species present from the most recent survey (2021-22, reported for 2022-23). The numeral 1 indicates the species was sampled and the numeral 0 indicates the species was not sampled. Species marked with * are pest fish species.

Waterway	AmbSp1	AngRei	AngMar	AngObs	CraSte	HypSp1	MelSpp	MogAds	AcaPac	AmbMio	AmbVac	AwaAcr	BunGyr	ButBut	EleMel	GerFil	GiuApo	GloApr	GloBic	GloIll	GloLat	HepSpp	HypCom	KuhRup	LatCal	LeiEqu	LeiUni
Trebonne Creek	1	1	0	0	0	1	1	1	0	0	0	0	0	0	0	0	1	0	0	0	0	0	1	0	0	0	1
Tributary of Herbert R.	0	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Breakaway Creek	0	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
Ashton Creek	1	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0
Hawkins Creek	0	1	1	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	1	0	1	1	1	0	0	0
Stone River	1	1	1	0	1	0	1	0	0	0	0	1	0	0	0	0	0	1	0	1	0	1	1	0	0	0	0
Herbert River	1	1	0	0	1	1	1	1	0	0	0	1	0	0	0	0	0	0	0	0	0	1	1	1	1	0	1
Herbert River	0	1	1	1	0	0	1	0	1	1	0	0	0	1	1	1	0	0	1	1	1	1	1	0	1	1	0
Herbert River	1	1	1	0	1	0	1	0	1	0	1	0	1	0	1	1	0	1	0	1	1	1	1	0	1	1	0
Herbert River	1	1	0	0	1	1	1	1	0	0	0	0	1	0	0	1	0	1	0	0	0	1	1	0	1	0	0
Blunder Creek	0	0	0	0	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	1
White Adder Creek	0	1	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Blunder Creek	0	1	0	0	0	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	1
Rudd Creek	1	0	0	0	1	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
Herbert River	0	0	0	0	0	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	1
Herbert River	0	1	0	0	0	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	1

Waterway	LutArg	MegCyp	MesArg	MonArg	MooSeh	NemEre	NeoAte	NeoHyr	NotRob	OphSp1	OxySel	PlaSub	PseSig	RedBik	RedChr	ScaArg	SelMul	StrKre	TanTro	ToxCha	ToxJac	AmnPer	OxyLin	OreMos*	GamHol*	PoeRet*
Trebonne Creek	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Tributary of Herbert R.	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	1
Breakaway Creek	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Ashton Creek	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
Hawkins Creek	0	0	0	0	0	0	0	0	0	1	0	0	1	0	0	0	0	0	1	0	0	0	0	0	0	0
Stone River	0	0	0	0	0	0	0	0	0	1	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0
Herbert River	0	1	0	0	0	1	1	0	0	0	1	0	1	0	0	0	0	1	0	0	0	1	0	0	0	0
Herbert River	1	1	1	0	1	0	0	0	1	0	0	1	1	1	1	1	1	0	0	1	1	0	0	0	0	0
Herbert River	1	0	0	1	0	0	0	0	1	0	0	0	1	1	0	1	0	1	0	0	0	1	0	0	0	0
Herbert River	0	0	0	0	0	1	1	0	1	0	0	0	1	1	0	0	0	1	0	0	0	1	1	1	0	0
Blunder Creek	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0
White Adder Creek	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Blunder Creek	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0
Rudd Creek	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	0
Herbert River	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	1	0	0	0
Herbert River	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0

Table 94 Translocated and alien fish species caught for the 2023-24 and 2022-23 fish reporting periods for each Basin

	2023-24 Reporting								2022-23 Reporting
Origin and Common name	Dain-tree	Moss-man	Barron	Russell	Mulgrave	John-stone	Tully	Murray	Herbert
Translocated									
Barred grunter	-	-	-	-	-	-	-	-	-
Fly-specked hardyhead	-	-	✓	-	-	-	-	-	-
Mouth almighty	-	-	✓	-	-	✓	-	-	-
Golden Flathead Goby	-	-	✓	-	-	-	-	-	-
Sooty grunter	-	-	-	-	-	-	-	-	✓*
Tully grunter	✓	-	✓	-	-	✓	-	-	-
Spangled perch	-	-	✓	-	-	-	-	-	✓*
Bony bream	-	-	-	-	-	-	-	✓	-
Butter jew	-	-	✓	-	-	-	-	-	-
Hyrtl's tandan	-	-	✓	-	-	-	✓	✓	✓*
Sleepy cod	-	-	✓	-	-	-	-	-	✓
Northern sleepy cod	-	-	-	-	-	-	-	-	✓
Rendahl's tandan		-	-	-	-	-	-	-	-
Wet Tropics tandan	✓	-	✓	-	-	✓	-	-	✓*
Alien									
Gambusia	-	-	-	-	-	-	-	-	✓
Mozambique tilapia	-	-	✓	-	✓	-	✓	✓	✓
Spotted tilapia	-	-	✓	✓	✓	-	✓	✓	-
Guppy	✓	✓	✓	✓	✓	✓	✓	✓	✓
Swordtail	-	✓	-	-	✓	✓	-	-	-
Platy	-	-	-	✓	✓	✓	✓	✓	-

'Translocated' refers to Australian native species that were found in waterways within which they do not naturally occur, and 'Alien' refers to fish species from outside of Australia. Note that some species are indigenous to the lowland sections of some basins but have been translocated to upper sections above waterfalls. *denotes species that were translocated to the upper Herbert catchments, whilst for Herbert lowland and coastal sites, only sleepy cod and northern sleepy cod are defined as translocated from the list of potential translocated species.

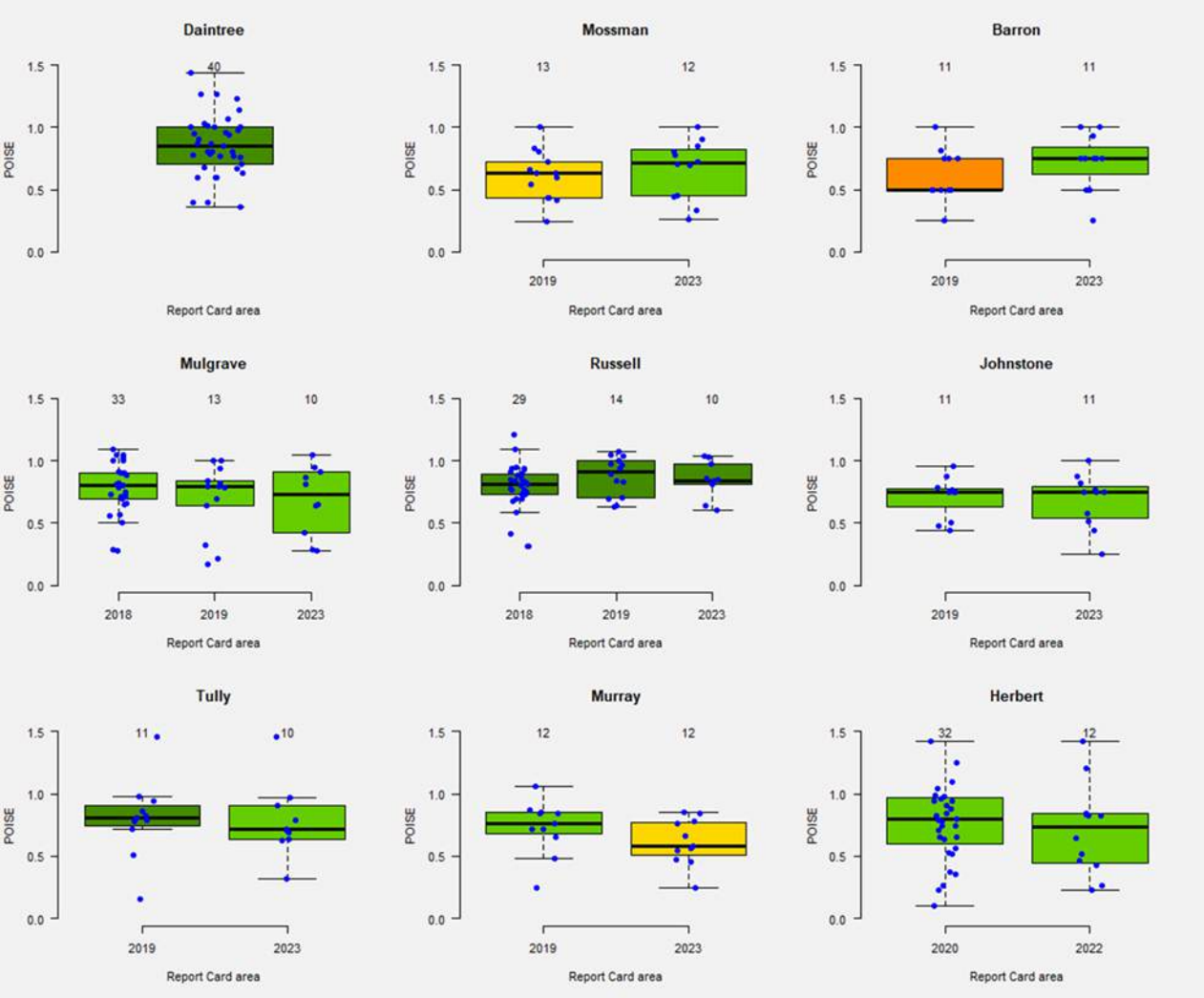

Figure 25 Box plots for sites within each basin in relation to the proportion of indigenous species expected (POISE) indicator for each fish assessment period.

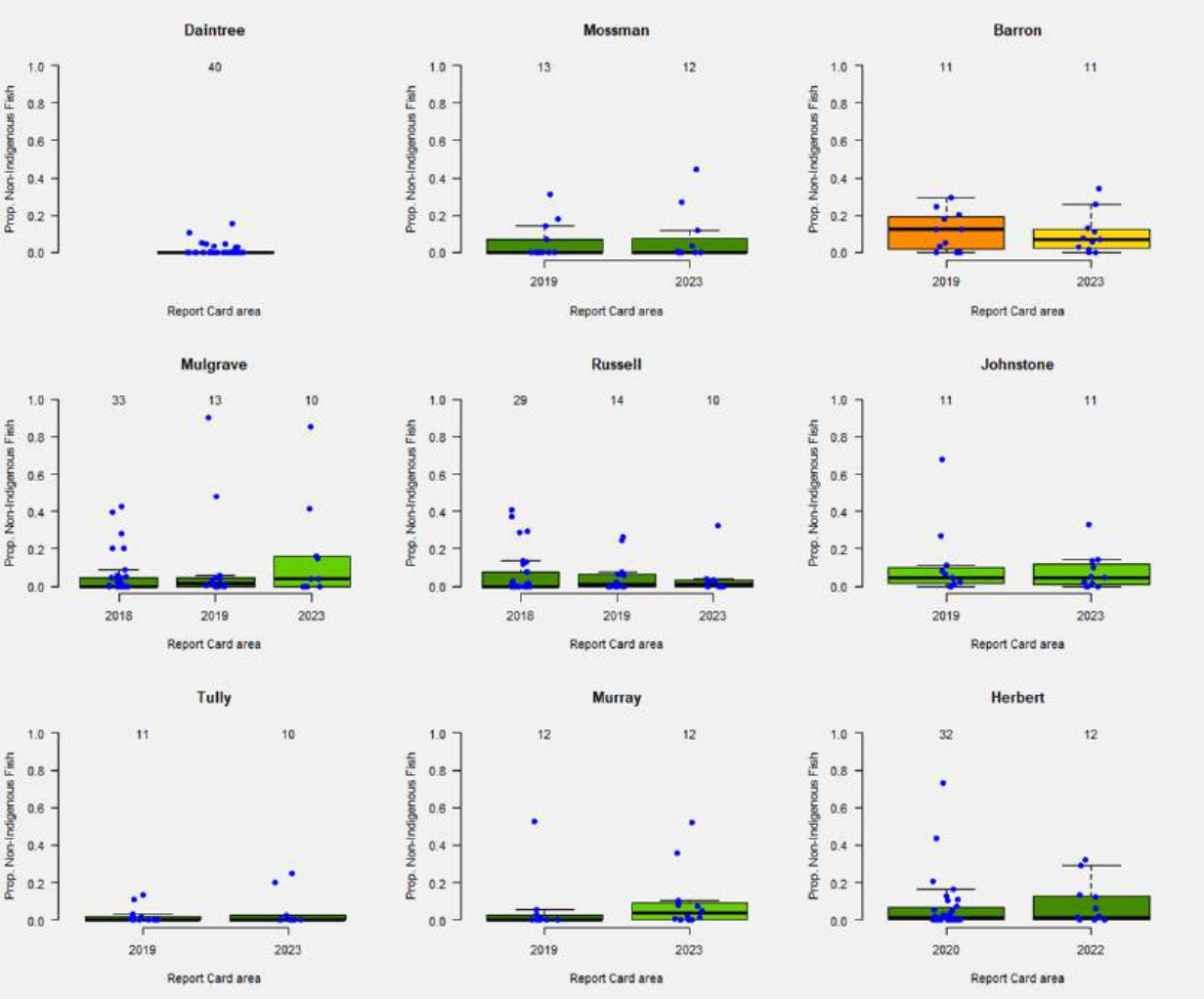

Figure 26 Box plots for sites within each basin in relation to the proportion of non-indigenous fish (PONI) indicator for each fish assessment period.

Appendix E. Interpreting the pesticide risk values and risk categories

The pesticide risk metric is reported as the '% of species' protected from mixtures of pesticides detected in an ecosystem over the wet season (the period when pesticides most commonly occur in catchments and are present at their highest concentrations). How that percentage of species protected in the ecosystem is estimated is described in the methods technical report (WTW 2026) and elsewhere (Warne *et al*. 2020 and Warne *et al*. 2023). But in summary, ecotoxicity experiments provide an indication of how organisms in the ecosystem might respond when they are exposed to different concentrations of pesticides. By collating these (published) experimental data for multiple species, it is possible to derive (i.e. using species sensitivity distributions) the relationship between the concentration of a pesticide and the percentage of species it is likely to affect. Pesticide concentrations detected in an ecosystem can then be compared against the species sensitivity distribution to estimate the percentage of species being affected in the ecosystem. By expanding this process to account for the cumulative impact of multiple pesticides over the wet season, the risk of pesticides can be estimated (i.e. the Pesticide Risk Metric). The Pesticide Risk Metric can estimate the effect of mixtures of up to 22 pesticides frequently detected in waters discharging to the Great Barrier Reef, and from this, the percentage of species that should be protected from the concentrations of the 22 pesticides is estimated.

For example, a pesticide risk value of 95% species protection, means that 95% of aquatic species in an ecosystem should not experience harmful non-lethal or lethal effects (such as reduced growth or reproduction) resulting from exposure to pesticides present in that waterbody. It also means that the most sensitive 5% of aquatic species would be expected to experience some harmful non-lethal effects. The types of organisms that are most sensitive depends on the type of pesticides that they are exposed to, as pesticides are designed to affect specific types of organisms. For example, herbicides are designed to kill plants and therefore algae and aquatic plants (including seagrass and coral) are generally the most sensitive aquatic species to herbicides. Insecticides are designed to kill insects, and therefore, aquatic insects and crustaceans (e.g. crabs, lobsters, prawns and copepods), which are closely related to insects, are the most sensitive aquatic species. As pesticide concentrations increase:

- more species will experience harmful effects;
- the harmful effects will change from non-lethal to lethal; and
- what is affected will increase from individuals, to populations, to whole communities or ecosystems

Fish are relatively insensitive to herbicides and insecticides as they do not have the biochemical pathways that these pesticides affect. Therefore, based on the types and concentrations of pesticides currently being detected in the lower reaches of Great Barrier Reef catchments and the inshore marine ecosystems, it is unlikely that fish mortality or population decline would occur as a direct result of exposure to those pesticides. Rather sublethal and/or indirect effects could occur. For example, Kroon et al. (2013) found that barramundi and coral trout collected along the east coast of Queensland exhibited signs of endocrine disruption (a non-lethal effect) and the extent of this was related to the concentrations of a number of pesticides in the water where the fish were collected. In contrast, the effects on aquatic plants (such as algae and sea grasses) in lower reaches

of Great Barrier Reef catchments and the inshore marine ecosystems are expected to be greater, because they are more sensitive to herbicides, and herbicides are the main kinds of pesticides found in these waterways. This has been shown by Wood et al. (2018) who found that as herbicide concentrations increased, the number of sensitive algal species present in waterways decreased for at least the duration of the wet season. While concentrations of pesticides may not be sufficiently high to kill fish, they could be indirectly affected by pesticides through declines in their food (e.g. fish that eat plants or insects), and/or habitats (e.g. aquatic plants and sea grasses). Such indirect effects could decrease the amount of food and shelter available for organisms, including fish, further up food webs. Instability in a food web can lead to increased vulnerability of an ecosystem to other stressors (e.g. disease) and decrease ecosystem resilience.

The estimates of species protected were divided into five categories ranging from very low to very high risk (Table 95) that were aligned to the ecosystem protection levels used in the Australian and New Zealand Water Quality Guidelines (ANZG, 2018). The alignment of the percentage of species protected, pesticide risk categories and the ecosystem protection levels is shown in Table 95.

Table 95 The alignment of the percentage of protected species, risk category and ecosystem protection levels.

Pesticide risk value (% species protection)	Risk category	Ecosystem condition (ANZG, 2018)
≥ **99%**	Very Low	high conservation or ecological value systems
<99 to **95%**	Low	slightly to moderately disturbed systems
<95 to **90%**	Moderate	
<90 to **80%**	High	highly disturbed systems
<80%	Very High	

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Appendix F. Coral reef site indicator and index scores

Table 96 Inshore coral indicator and index scores (2024-25) for each site.

Zone	Reef	Depth	Com-position	Cover	Change	Juvenile	Macro-algae	Coral condition
North	Snapper North	2	0.00	0.25	0.53	0.04	0.00	0.16
	Snapper North	5	0.50	0.57	0.73	0.19	0.77	0.55
	Snapper South	2	0.00	0.00	0.67	0.00	1.00	0.33
	Snapper South	5	0.00	0.00	0.32	0.01	0.00	0.06
	Low Isles	5	0.50	0.60	0.67	1.00	0.92	0.74
	Green	5	nd	nd	nd	nd	nd	nd
Central	Fitzroy East	2	0.50	0.46	0.44	0.24	0.93	0.51
	Fitzroy East	5	0.00	0.72	0.61	0.40	0.83	0.51
	Fitzroy West	2	1.00	0.74	1.00	0.23	0.35	0.66
	Fitzroy West	5	0.50	0.85	0.63	0.42	0.55	0.59
	Fitzroy West LTMP	5	1.00	0.74	0.33	1.00	0.83	0.78
	Franklands East	2	1.00	0.65	0.40	0.25	0.00	0.46
	Franklands East	5	1.00	0.35	0.50	0.28	0.00	0.43
	Franklands West	2	0.50	0.74	0.46	0.07	0.00	0.35
	Franklands West	5	1.00	0.70	0.50	0.11	0.00	0.46
	High East	2	0.50	0.38	0.14	0.19	0.00	0.24
	High East	5	0.50	0.53	0.36	0.21	0.00	0.32
	High West	2	0.00	0.75	1.00	0.18	0.42	0.47
	High West	5	0.00	0.32	0.74	0.16	0.75	0.39
South	Barnards	2	1.00	0.72	0.38	0.19	0.59	0.57
	Barnards	5	1.00	0.74	0.27	0.46	0.84	0.66
	Bedarra	2	0.50	0.05	0.15	0.22	0.04	0.19
	Bedarra	5	0.50	0.23	0.33	0.79	0.70	0.51
	Dunk North	2	0.00	0.22	0.39	0.36	0.41	0.28
	Dunk North	5	0.50	0.52	0.77	0.68	0.56	0.61
	Dunk South	2	0.50	0.20	0.29	0.17	0.69	0.37
	Dunk South	5	0.00	0.53	0.33	0.58	0.00	0.29
Palm Island	Havannah	2	0.50	0.43	0.36	0.23	0.29	0.36
	Havannah	5	1.00	0.55	0.26	0.23	0.07	0.42
	Havannah North	5	0.50	0.29	0.33	0.74	0.10	0.39
	Lady Elliot	2	0.00	0.04	0.25	0.04	1.00	0.27
	Lady Elliot	5	0.50	0.43	0.43	0.30	1.00	0.53
	Palms East	2	1.00	0.37	0.23	0.10	1.00	0.54
	Palms East	5	1.00	0.50	0.19	0.17	0.97	0.57
	Palms West	2	0.00	0.21	0.56	0.22	1.00	0.40
	Palms West	5	0.00	0.50	0.50	0.46	1.00	0.49
	Pandora	2	0.50	0.25	0.43	0.10	0.61	0.38
	Pandora	5	0.50	0.25	0.47	0.19	0.93	0.47
	Pandora North	5	0.00	0.83	0.50	0.45	0.25	0.40

Note that scores are multiplied by 100 to fit the standardised report card scoring range. nd indicates no data available.

Table 97 Offshore coral indicator and index scores (2024-25) for each site.

Reef	Coral change	Coral cover	Juveniles	Coral condition
Agincourt Reef No.1	0.48	0.58	0.96	0.67
Farquharson Reef	0.23	0.16	0.60	0.33
Feather Reef	0.48	0.59	1.00	0.69
Hastings Reef	0.48	0.28	1.00	0.59
Mackay Reef	0.63	0.27	0.71	0.54
Peart Reef	0.72	0.45	1.00	0.72
St. Crispin Reef	0.59	0.65	1.00	0.75
Taylor Reef	0.79	0.34	1.00	0.71
Thetford Reef	0.20	0.50	1.00	0.57

Note that the Long Term Monitoring Program underwent a sampling redesign for 2021-22 onwards. This reduced the number of sites from 15 to 8 whilst surveys will occur every year at all sites. Details of the redesign are provided in the methods technical report (WTW 2026).

Appendix G. Index, indicator category and indicator scores and grade tables for 2015-16 to 2023-24

Basins

Water quality

Table 98 Basin water quality index, indicator category and indicator scores and grades for the 2023-24 reporting period.

Basin	Sediment	Nutrients			Pesticides	Water quality
	TSS	DIN	FRP	**Nutrients**		
Daintree	**75**	90	90	**90**	**86**	**83**
Mossman~	**90**	50	51	**51**	**51**	**64**
Barron	**72**	52	62	**57**	**nd**	**64**
Mulgrave	**90**	48	58	**53**	**74**	**72**
Russell	**90**	77	73	**75**	**76**	**80**
Johnstone	**85**	77	51	**64**	**75**	**75**
Tully	**90**	54	76	**65**	**61**	**72**
Murray	**79**	48	70	**59**	**20**	**53**
Herbert	**90**	52	66	**59**	**69**	**72**

Scoring range: ■ Very Poor = 0 to <21 | ■ Poor = 21 to <41 | ■ Moderate = 41 to <61 | ■ Good = 61 to <81 | ■ Very Good = 81 – 100. nd indicates no data or insufficient data available. *Pesticide score was calculated from monitoring at the Coquette Point GBR CLMP site on the Johnstone River downstream of the confluence with the South Johnstone River. ~Mossman River was assessed for base-flow only. For each basin DIN and FRP indicator values are averaged to provide the nutrient indicator category score (presented in bold) and that the three indicator categories (sediment, nutrients and pesticides) are averaged to provide the WQ score (all presented in bold).

Table 99 Basin water quality index, indicator category and indicator scores and grades for the 2022-23 reporting period.

Basin	Sediment	Nutrients			Pesticides	Water quality
	TSS	DIN	FRP	**Nutrients**		
Daintree	83	82	73	**78**	**86**	**82**
Mossman~	84	40	68	**54**	**65**	**68**
Barron	80	56	43	**49**	**nd**	**64**
Mulgrave	90	41	60	**50**	**78**	**72**
Russell	90	55	69	**62**	**74**	**75**
Johnstone	90	73	47	**60**	**77**	**75**
Tully	90	44	74	**59**	**45**	**64**
Murray	82	33	59	**46**	**24**	**51**
Herbert	82	38	74	**56**	**57**	**65**

Scoring range: ■ Very Poor = 0 to <21 | ■ Poor = 21 to <41 | ■ Moderate = 41 to <61 | ■ Good = 61 to <81 | ■ Very Good = 81 – 100. nd indicates no data or insufficient data available. *Pesticide score was calculated from monitoring at the Coquette Point GBR CLMP site on the Johnstone River downstream of the confluence with the South Johnstone River. ~Mossman River was assessed for base-flow only. For each basin DIN and FRP indicator values are averaged to provide the nutrient indicator category score (presented in bold) and that the three indicator categories (sediment, nutrients and pesticides) are averaged to provide the WQ score (all presented in bold).

Table 100 Basin water quality index, indicator category and indicator scores and grades for the 2021-22 reporting period.

Basin	Sediment	Nutrients			Pesticides	Water quality
	TSS	DIN	FRP	**Nutrients**		
Daintree	**90**	84	76	**80**	**93**	**87**
Mossman~	**71**	49	64	**57**	**64**	**64**
Barron	**80**	72	68	**70**	nd	**75**
Mulgrave	**80**	33	70	**51**	**77**	**69**
Russell	**90**	58	71	**65**	**69**	**74**
Johnstone	**81**	68	50	**59**	**69**	**70**
Tully	**79**	40	66	**53**	**62**	**65**
Murray	**90**	24	62	**43**	**40**	**57**
Herbert	**83**	43	76	**60**	**69**	**70**

Scoring range: ■ Very Poor = 0 to <21 | ■ Poor = 21 to <41 | ■ Moderate = 41 to <61 | ■ Good = 61 to <81 | ■ Very Good = 81 – 100. nd indicates no data or insufficient data available. *Pesticide score was calculated from monitoring at the Coquette Point GBR CLMP site on the Johnstone River downstream of the confluence with the South Johnstone River. ~Mossman River was assessed for base-flow only. For each basin DIN and FRP indicator values are averaged to provide the nutrient indicator category score (presented in bold) and that the three indicator categories (sediment, nutrients and pesticides) are averaged to provide the WQ score (all presented in bold).

Table 101 Basin water quality index, indicator category and indicator scores and grades for the 2020-21 reporting period.

Basin	Sediment	Nutrients			Pesticides	Water quality
	TSS	DIN	FRP	**Nutrients**		**20-21**
Daintree	**90**	90	73	**81**	**93**	**88**
Mossman~	**90**	34	51	**43**	**nd**	**66**
Barron	**63**	81	72	**76**	**nd**	**70**
Mulgrave	**90**	39	69	**54**	**75**	**73**
Russell	**80**	61	76	**68**	**75**	**75**
Johnstone	**90**	69	53	**61**	**75**	**75**
Tully	**90**	48	77	**62**	**61**	**71**
Murray	**71**	49	60	**55**	**23**	**49**
Herbert	**78**	43	73	**58**	**61**	**66**

Scoring range: ■ Very Poor = 0 to <21 | ■ Poor = 21 to <41 | ■ Moderate = 41 to <61 | ■ Good = 61 to <81 | ■ Very Good = 81 – 100. nd indicates no data or insufficient data available. *Pesticide score was calculated from monitoring at the Coquette Point GBR CLMP site on the Johnstone River downstream of the confluence with the South Johnstone River. ~Mossman River was assessed for base-flow only. For each basin DIN and FRP indicator values are averaged to provide the nutrient indicator category score (presented in bold) and that the three indicator categories (sediment, nutrients and pesticides) are averaged to provide the WQ score (all presented in bold).

Table 102 Basin water quality index, indicator category and indicator scores and grades for the 2019-20 reporting period.

Basin	Sediment	Nutrients			Pesticides	Water quality
	TSS	DIN	FRP	Nutrients		19-20
Daintree	**90**	90	82	**86**	**98**	**91**
Mossman~	**90**	56	76	**66**	**nd**	**78**
Barron	**67**	67	75	**71**	**nd**	**69**
Mulgrave	**72**	39	75	**57**	**78**	**69**
Russell	**68**	46	77	**62**	**71**	**67**
Johnstone	**90**	74	66	**70**	**76**	**78**
Tully	**84**	42	77	**60**	**70**	**71**
Murray	**71**	31	69	**50**	**27**	**49**
Herbert	**90**	46	76	**61**	**68**	**73**

Scoring range: ■ Very Poor = 0 to <21 | ■ Poor = 21 to <41 | ■ Moderate = 41 to <61 | ■ Good = 61 to <81 | ■ Very Good = 81 – 100. nd indicates no data or insufficient data available. *Pesticide score was calculated from monitoring at the Coquette Point GBR CLMP site on the Johnstone River downstream of the confluence with the South Johnstone River. ~Mossman River was assessed for base-flow only. For each basin DIN and FRP indicator values are averaged to provide the nutrient indicator category score (presented in bold) and that the three indicator categories (sediment, nutrients and pesticides) are averaged to provide the WQ score (all presented in bold).

Table 103 Basin water quality index, indicator category and indicator scores and grades for the 2018-19 reporting period.

Basin	Sediment	Nutrients			Pesticides	Water quality
	TSS	DIN	FRP	Nutrients		18-19
Daintree[#]	**68**	90	90	**90**	**85**	**84**
Mossman~	**90**	42	89	**66**	**60**	**69**
Barron	**55**	70	81	**76**	**89**	**74**
Mulgrave	**78**	49	72	**61**	**69**	**66**
Russell	**76**	58	90	**74**	**75**	**75**
Johnstone	**90**	72	69	**70**	**74***	**75**
Tully	**78**	42	90	**66**	**63**	**68**
Murray	**74**	53	77	**65**	**25**	**59**
Herbert	**81**	37	67	**52**	**68**	**61**

Scoring range: ■ Very Poor = 0 to <21 | ■ Poor = 21 to <41 | ■ Moderate = 41 to <61 | ■ Good = 61 to <81 | ■ Very Good = 81 – 100. nd indicates no data or insufficient data available. *Pesticide score was calculated from monitoring at the Coquette Point GBR CLMP site on the Johnstone River downstream of the confluence with the South Johnstone River. [#]Daintree River was assessed for high flows only. ~Mossman River was assessed for base-flow only. For each basin DIN and FRP indicator values are averaged to provide the nutrient indicator category score (presented in bold) and that the three indicator categories (sediment, nutrients and pesticides) are averaged to provide the WQ score (all presented in bold).

Table 104 Basin water quality index, indicator category and indicator scores and grades for the 2017-18 reporting period.

Basin	Sediment	Nutrients			Pesticides	Water quality
	TSS	DIN	FRP	**Nutrients**		**17-18**
Daintree[#]	**90**	70	61	**65**	**90**	**82**
Mossman~	**76**	44	89	**67**	**70**	**71**
Barron	**68**	78	80	**79**	**87**	**78**
Mulgrave	**90**	32	71	**52**	**57**	**66**
Russell	**90**	45	76	**60**	**54**	**68**
Johnstone	**73**	75	70	**72**	**61***	**69**
Tully	**80**	39	73	**56**	**54**	**63**
Murray	**nd**	nd	nd	**nd**	**nd**	**nd**
Herbert	**90**	32	83	**58**	**66**	**71**

Scoring range: ■ Very Poor = 0 to <21 | ■ Poor = 21 to <41 | ■ Moderate = 41 to <61 | ■ Good = 61 to <81 | ■ Very Good = 81 – 100. nd indicates no data or insufficient data available. *Pesticide score was calculated from monitoring at the Coquette Point GBR CLMP site on the Johnstone River downstream of the confluence with the South Johnstone River. [#]Daintree River was assessed for high flows only. ~Mossman River was assessed for base-flow only. For each basin DIN and FRP indicator values are averaged to provide the nutrient indicator category score (presented in bold) and that the three indicator categories (sediment, nutrients and pesticides) are averaged to provide the WQ score (all presented in bold).

Table 105 Basin water quality index, indicator category and indicator scores and grades for the 2016-17 reporting period using the previous pesticide assessment method.

Basin	Sediment	Nutrients			Pesticides	Water quality
	TSS	DIN	FRP	**Nutrients**		**Score**
Daintree	**nd**	nd	nd	**nd**	**nd**	**nd**
Mossman	**nd**	nd	nd	**nd**	**nd**	**nd**
Barron	**76**	90	84	**87**	**nd**	**81**
Mulgrave	**68**	37	72	**55**	**65**	**63**
Russell	**77**	44	90	**67**	**66**	**70**
Johnstone	**81**	70	57	**64**	**71***	**72**
Tully	**78**	41	79	**60**	**61**	**66**
Murray	**nd**	nd	nd	**nd**	**nd**	**nd**
Herbert	**90**	44	90	**67**	**71**	**76**

Scoring range: ■ Very Poor = 0 to <21 | ■ Poor = 21 to <41 | ■ Moderate = 41 to <61 | ■ Good = 61 to <81 | ■ Very Good = 81 – 100. nd indicates no data or insufficient data available. *Pesticide score was calculated from monitoring at the Coquette Point GBR CLMP site on the Johnstone River downstream of the confluence with the South Johnstone River. For each basin DIN and FRP indicator values are averaged to provide the nutrient indicator category score (presented in bold) and that the three indicator categories (sediment, nutrients and pesticides) are averaged to provide the WQ score (all presented in bold).

Table 106 Basin water quality index, indicator category and indicator scores and grades for the 2015-16 reporting period using the previous pesticide assessment method.

Basin	Sediment	Nutrients			Pesticides	Water quality
	TSS	DIN	FRP	**Nutrients**		**Score**
Daintree	**nd**	nd	nd	**nd**	**nd**	**nd**
Mossman	**nd**	nd	nd	**nd**	**nd**	**nd**
Barron	**89**	63	90	**76**	**nd**	**82**
Mulgrave	**71**	29	62	**45**	**71**	**62**
Russell	**90**	45	80	**63**	**66**	**73**
Johnstone	**90**	74	69	**72**	**76***	**79**
Tully	**80**	33	81	**57**	**57**	**65**
Murray	**nd**	nd	nd	**nd**	**nd**	**nd**
Herbert	**90**	59	90	**74**	**76**	**80**

Scoring range: Very Poor = 0 to <21 | Poor = 21 to <41 | Moderate = 41 to <61 | Good = 61 to <81 | Very Good = 81 – 100. nd indicates no data or insufficient data available. *Pesticide score was calculated from monitoring at the Coquette Point GBR CLMP site on the Johnstone River downstream of the confluence with the South Johnstone River. For each basin DIN and FRP indicator values are averaged to provide the nutrient indicator category score (presented in bold) and that the three indicator categories (sediment, nutrients and pesticides) are averaged to provide the WQ score (all presented in bold).

Habitat and hydrology

Table 107 Results of habitat and hydrology index (H&H) and indicator categories for basins 2023-24

Basin	Flow	Invasive weeds	Habitat modification	Riparian extent	Wetland extent	H&H
Daintree	nd	54	100	99	53	**77**
Mossman	57	81	100	68	15	**64**
Barron	46	34	36	68	8	**39**
Mulgrave	43	43	100	78	31	**59**
Russell	61	41	100	79	24	**61**
Johnstone	60	24	98	74	18	**55**
Tully	60	71	52	72	15	**54**
Murray	65	19	100	75	20	**56**
Herbert	65	19	87	85	18	**55**

Scoring range: Very Poor = 0 to <21 | Poor = 21 to <41 | Moderate = 41 to <61 | Good = 61 to <81 | Very Good = 81 – 100. nd indicates no data available.

Table 108 Results of habitat and hydrology index (H&H) and indicator categories for basins 2022-23

Basin	Flow	Invasive weeds	Habitat modification	Riparian extent	Wetland extent	H&H
Daintree	nd	54	100	99	53	**77**
Mossman	61	81	100	68	15	**65**
Barron	78	34	36	68	8	**45**
Mulgrave	75	43	100	78	31	**65**
Russell	86	41	100	79	24	**66**
Johnstone	72	24	98	74	18	**57**
Tully	80	71	52	72	15	**58**
Murray	75	19	100	75	20	**58**
Herbert	73	19	87	85	18	**56**

Scoring range: Very Poor = 0 to <21 | Poor = 21 to <41 | Moderate = 41 to <61 | Good = 61 to <81 | Very Good = 81 – 100. nd indicates no data available.

Table 109 Results of habitat and hydrology index (H&H) and indicator categories for basins 2021-22

Basin	Flow	Invasive weeds	Habitat modification	Riparian extent	Wetland extent	H&H
Daintree	nd	54	100	99	60	**78**
Mossman	75	81	100	68	16	**68**
Barron	77	34	36	68	11	**45**
Mulgrave	78	43	100	78	33	**66**
Russell	91	41	100	79	33	**69**
Johnstone	77	24	98	74	25	**60**
Tully	95	71	57	72	17	**62**
Murray	61	19	100	75	19	**55**
Herbert	80	19	92	85	20	**59**

Scoring range: ■ Very Poor = 0 to <21 | ■ Poor = 21 to <41 | ■ Moderate = 41 to <61 | ■ Good = 61 to <81 | ■ Very Good = 81 – 100. nd indicates no data available.

Table 110 Results of habitat and hydrology index (H&H) and indicator categories for basins 2020-21

Basin	Flow	Invasive weeds	Habitat modification	Riparian extent	Wetland extent	H&H
Daintree	nd	54	100	99	60	**78**
Mossman	95	81	100	68	16	**72**
Barron	69	34	36	68	11	**44**
Mulgrave	80	43	100	78	33	**67**
Russell	91	41	100	79	33	**69**
Johnstone	96	24	98	74	25	**64**
Tully	100	71	57	72	17	**63**
Murray	78	19	100	75	19	**58**
Herbert	86	19	92	85	20	**60**

Scoring range: ■ Very Poor = 0 to <21 | ■ Poor = 21 to <41 | ■ Moderate = 41 to <61 | ■ Good = 61 to <81 | ■ Very Good = 81 – 100. nd indicates no data available.

Table 111 Results of habitat and hydrology index (H&H) and indicator categories for basins 2019-20

Basin	Flow	Invasive weeds	Habitat modification	Riparian extent	Wetland extent	H&H
Daintree	nd	54	100	99	60	78
Mossman	75	81	100	68	16	68
Barron	80	34	36	68	11	46
Mulgrave	75	43	100	78	33	66
Russell	76	41	100	79	33	66
Johnstone	92	24	98	74	25	63
Tully	61	71	57	72	17	56
Murray	61	19	100	75	19	55
Herbert	66	19	92	85	20	56

Scoring range: Very Poor = 0 to <21 | Poor = 21 to <41 | Moderate = 41 to <61 | Good = 61 to <81 | Very Good = 81 – 100. nd indicates no data available.

Table 112 Results of habitat and hydrology index (H&H) and indicator categories for basins 2018-19

Basin	Flow	Invasive weeds	Habitat modification	Riparian extent	Wetland extent	H&H
Daintree	nd	62	100	99	60	80
Mossman	61	36	100	68	16	56
Barron	65	56	36	68	11	47
Mulgrave	55	52	100	78	33	63
Russell	61	41	100	79	33	63
Johnstone	66	29	98	74	25	59
Tully	43	81	57	72	17	54
Murray	68	19	100	75	19	56
Herbert	69	19	92	85	20	57

Scoring range: Very Poor = 0 to <21 | Poor = 21 to <41 | Moderate = 41 to <61 | Good = 61 to <81 | Very Good = 81 – 100. nd indicates no data available.

Table 113 Results of habitat and hydrology index (H&H) and indicator categories for basins 2017-18

Basin	Flow	Invasive weeds	Habitat modification	Riparian extent	Wetland extent	H&H
Daintree	nd	62	100	99	60	80
Mossman	95	36	100	68	16	63
Barron	51	56	36	68	11	45
Mulgrave	93	52	100	78	33	71
Russell	95	41	100	79	33	69
Johnstone	97	29	98	74	25	65
Tully	99	81	57	72	17	65
Murray	78	19	100	75	19	58
Herbert	92	19	92	85	20	61

Scoring range: ■ Very Poor = 0 to <21 | ■ Poor = 21 to <41 | ■ Moderate = 41 to <61 | ■ Good = 61 to <81 | ■ Very Good = 81 – 100. nd indicates no data available.

Table 114 Results of habitat and hydrology index (H&H) and indicator categories for basins 2016-17.

Basin	Flow	Invasive weeds	Habitat modification	Riparian extent	Wetland extent	H&H
Daintree	nd	62	100	99	61	81
Mossman	95	36	100	68	17	63
Barron	62	56	36	68	11	47
Mulgrave	61	52	100	78	34	65
Russell	95	41	100	79	35	70
Johnstone	96	29	98	74	26	65
Tully	80	81	57	72	17	61
Murray	61	19	100	75	21	55
Herbert	62	19	92	85	20	56

Scoring range: ■ Very Poor = 0 to <21 | ■ Poor = 21 to <41 | ■ Moderate = 41 to <61 | ■ Good = 61 to <81 | ■ Very Good = 81 – 100. nd indicates no data available.

Table 115 Results of habitat and hydrology index (H&H) and indicator categories for basins 2015-16.

Basin	Flow	Invasive weeds	Habitat modification	Riparian extent	Wetland extent	H&H
Daintree	nd	62	100	99	61	81
Mossman	nd	36	100	68	17	55
Barron	nd	56	36	68	11	43
Mulgrave	nd	52	100	78	34	66
Russell	nd	41	100	79	35	63
Johnstone	nd	29	98	74	26	57
Tully	nd	81	57	72	17	57
Murray	nd	19	100	75	21	54
Herbert	nd	19	92	85	20	54

Standardised scoring range: Very Poor = 0 to <21 | Poor = 21 to <41 | Moderate = 41 to <61 | Good = 61 to <81 | Very Good = 81 – 100.

Fish

Table 116 Results for freshwater fish indicators and index for 2019-20.

	Fish indicator scores				Standardised scores		
Basin	**POISE**	Prop Trans	Prop Alien	**PONI**	**POISE**	**PONI**	**Fish**
Mossman	0.63	0.00	0.00	0.00	55	100	**77**
Barron	0.67	0.06	0.02	0.13	60	35	**48**
Mulgrave	0.79	0.00	0.01	0.01	79	89	**84**
Russell	0.91	0.00	0.01	0.01	91	94	**92**
Johnstone	0.78	0.00	0.02	0.04	78	66	**72**
Tully	0.80	0.00	0.00	0.00	81	100	**90**
Murray	0.72	0.00	0.00	0.01	68	92	**80**
Herbert	0.81	0.00	0.00	0.02	81	88	**85**

Fish indicator scoring range POISE: Very Poor = 0 to <0.4 | Poor = 0.4 to <0.53 | Moderate = 0.53 to <0.67 | Good = 0.67 to <0.8 | Very Good = 0.8 – 1; **PropTrans, PropAlien, PONI:** Very Poor = >0.2 to 1 | Poor = >0.1 to 0.2 | Moderate = >0.05 to 0.1 | Good = >0.03 to 0.05 | Very Good = 0 to 0.03. **Standardised scoring range:** Very Poor = 0 to <21 | Poor = 21 to <41 | Moderate = 41 to <61 | Good = 61 to <81 | Very Good = 81 – 100. Fish indicator scores are the proportion of indigenous species expected (POISE), and proportion of non-indigenous fish (PONI). The PONI indicator is the median of the proportion of translocated fish (PropTrans) and proportion of alien fish (PropAlien) measures summed for each site. nd indicates no data available.

Table 117 Results for freshwater fish indicators and index for 2017-18.

	Fish indicator scores		Standardised scores		
Basin	Native species richness (PONSE)	Pest fish (Proportion of sample)	Native species richness (PONSE)	Pest fish (Proportion of sample)	Fish Index
Mulgrave	0.769	0.031	76	76	76
Russell	0.813	0.011	82	91	86

Standardised scoring range: Very Poor = 0 to <21 | Poor = 21 to <41 | Moderate = 41 to <61 | Good = 61 to <81 | Very Good = 81 – 100.

Estuaries

Water quality

Table 118 Estuary water quality indicator, indicator category and index scores and grades for 2023- 24.

Estuary	Chl *a*	Nutrients			Phys/Chem				Pest-icides	Water quality
	Chl *a*	DIN	FRP	Nut-rients	Turb-idity	DO Low	DO High	Phys/ Chem	Pest-icides	
Daintree	**37**	65	90	**77**	78	83	90	**80**	**86**	**70**
Dickson Inlet	**86**	70	90	**80**	90	67	90	**78**	**nd**	**81**
Barron	**62**	31	31	**31**	65	80	90	**73**	**nd**	**55**
Trinity Inlet	**41**	59	90	**74**	90	35	90	**62**	**nd**	**59**
Russell-Mulgrave	**86**	26	61	**43**	90	72	90	**81**	**75**	**71**
Johnstone	**90**	19	48	**34**	72	72	90	**72**	**75**	**67**
Moresby	**14**	66	90	**78**	79	66	90	**73**	**nd**	**55**
Hinchinbrook Channel	**28**	90	90	**90**	71	74	90	**73**	**nd**	**63**

Scoring range: ■ Very Poor = 0 to <21 | ■ Poor = 21 to <41 | ■ Moderate = 41 to <61 | ■ Good = 61 to <81 | ■ Very Good = 81 – 100. Risk metric scores for pesticide are from GBR CLMP sites as per freshwater basins. nd indicates no data available. For each estuary DIN and FRP indicator values are averaged to provide the Nutrient indicator category score (presented in bold) and that the turbidity and DO indicator scores (using the lowest of the two DO values) are averaged to provide the Phys/Chem indicator score (presented in bold). The indicator categories (Chl *a*, nutrients, Phys/Chem and Pesticides) are averaged to provide the WQ score (all presented in bold). **Note:** Pesticides are from GBR CLMP high flow data as per freshwater basins.

Table 119 Estuary water quality indicator, indicator category and index scores and grades for 2022- 23.

Estuary	Chl *a*	Nutrients			Phys/Chem				Pest-icides	Water quality
	Chl *a*	DIN	FRP	Nut-rients	Turb-idity	DO Low	DO High	Phys/ Chem	Pest-icides	
Daintree	**62**	69	90	**79**	90	78	90	**84**	**86**	**78**
Dickson Inlet	**85**	58	61	**59**	90	54	90	**72**	**nd**	**72**
Barron	**62**	23	4	**14**	58	61	90	**60**	**nd**	**45**
Trinity Inlet	**76**	69	72	**70**	90	30	90	**60**	**nd**	**69**
Russell-Mulgrave	**82**	35	64	**49**	90	58	90	**74**	**76**	**70**
Johnstone	**90**	25	48	**37**	73	62	90	**67**	**77**	**68**
Moresby	**52**	72	90	**81**	90	70	90	**80**	**nd**	**71**
Hinchinbrook Channel	**46**	90	90	**90**	90	76	90	**83**	**nd**	**73**

Scoring range: ■ Very Poor = 0 to <21 | ■ Poor = 21 to <41 | ■ Moderate = 41 to <61 | ■ Good = 61 to <81 | ■ Very Good = 81 – 100. Risk metric scores for pesticide are from GBR CLMP sites as per freshwater basins. nd indicates no data available. For each estuary DIN and FRP indicator values are averaged to provide the Nutrient indicator category score (presented in bold) and that the turbidity and DO indicator scores (using the lowest of the two DO values) are averaged to provide the Phys/Chem indicator score (presented in bold). The indicator categories (Chl *a*, nutrients, Phys/Chem and Pesticides) are averaged to provide the WQ score (all presented in bold). **Note:** Pesticides are from GBR CLMP high flow data as per freshwater basins.

Table 120 Estuary water quality indicator, indicator category and index scores and grades for 2021- 22.

Estuary	Chl *a*	Nutrients			Phys/Chem				Pest-icides	Water quality
	Chl *a*	DIN	FRP	**Nut-rients**	Turb-idity	DO Low	DO High	**Phys/ Chem**	Pest-icides	
Daintree	**55**	71	90	**80**	90	90	90	**90**	**93**	**79**
Dickson Inlet	**66**	65	80	**72**	90	59	90	**74**	**nd**	**71**
Barron	**30**	37	48	**43**	75	59	90	**67**	**nd**	**46**
Trinity Inlet	**64**	90	90	**90**	90	42	90	**66**	**nd**	**73**
Russell-Mulgrave	**90**	31	56	**44**	90	71	90	**80**	**73**	**72**
Johnstone	**90**	22	48	**35**	90	73	90	**73**	**69**	**67**
Moresby	**51**	66	90	**78**	90	56	90	**73**	**nd**	**67**
Hinchinbrook Channel	**47**	90	90	**90**	90	76	90	**83**	**nd**	**73**

Scoring range: ■ Very Poor = 0 to <21 | ■ Poor = 21 to <41 | ■ Moderate = 41 to <61 | ■ Good = 61 to <81 | ■ Very Good = 81 – 100. Risk metric scores for pesticide are from GBR CLMP sites as per freshwater basins. nd indicates no data available. For each estuary DIN and FRP indicator values are averaged to provide the Nutrient indicator category score (presented in bold) and that the turbidity and DO indicator scores (using the lowest of the two DO values) are averaged to provide the Phys/Chem indicator score (presented in bold). The indicator categories (Chl *a*, Nutrients, Phys/Chem and Pesticides) are averaged to provide the WQ score (all presented in bold). **Note:** Pesticides are from GBR CLMP high flow data as per freshwater basins.

Table 121 Estuary water quality indicator, indicator category and index scores and grades for 2020- 21.

Estuary	Chl *a*	Nutrients			Phys/Chem				Pest-icides	Water quality
	Chl *a*	DIN	FRP	**Nut-rients**	Turb-idity	DO Low	DO High	**Phys/ Chem**	Pest-icides	
Daintree	**86**	81	90	**85**	90	81	90	**85**	**94**	**88**
Dickson Inlet	**84**	71	nd	**71**	90	90	90	**90**	**nd**	**82**
Barron	**74**	46	73	**59**	90	65	90	**77**	**nd**	**70**
Trinity Inlet	**70**	90	90	**90**	90	31	90	**60**	**nd**	**73**
Russell-Mulgrave	**90**	52	90	**71**	90	69	90	**79**	**75**	**79**
Johnstone	**90**	37	70	**54**	nd	90	90	**90**	**75**	**77**
Moresby	**69**	70	90	**80**	90	68	90	**79**	**nd**	**76**
Hinchinbrook Channel	**64**	90	90	**90**	90	78	90	**84**	**nd**	**79**

Scoring range: ■ Very Poor = 0 to <21 | ■ Poor = 21 to <41 | ■ Moderate = 41 to <61 | ■ Good = 61 to <81 | ■ Very Good = 81 – 100. Risk metric scores for pesticide are from GBR CLMP sites as per freshwater basins. nd indicates no data available. For each estuary DIN and FRP indicator values are averaged to provide the Nutrient indicator category score (presented in bold) and that the turbidity and DO indicator scores (using the lowest of the two DO values) are averaged to provide the Phys/Chem indicator score (presented in bold). The indicator categories (Chl *a*, Nutrients, Phys/Chem and Pesticides) are averaged to provide the WQ score (all presented in bold). **Note:** Pesticides are from GBR CLMP high flow data as per freshwater basins.

Table 122 Estuary water quality indicator, indicator category and index scores and grades for 2019- 20.

	Chl *a*	Nutrients			Phys/Chem				Pest-icides	Water quality
Estuary	Chl *a*	DIN	FRP	**Nut-rients**	Turb-idity	DO Low	DO High	**Phys/ Chem**	Pest-icides	
Daintree	**90**	90	90	**90**	90	90	90	**90**	**98**	**92**
Dickson Inlet	**81**	76	90	**77**	90	69	90	**79**	**nd**	**81**
Barron	**46**	39	80	**60**	85	64	90	**74**	**nd**	**60**
Trinity Inlet	**66**	90	90	**90**	90	20	90	**55**	**nd**	**70**
Russell-Mulgrave	**90**	67	90	**78**	90	68	90	**79**	**74**	**80**
Johnstone	**90**	34	90	**62**	nd	nd	nd	**nd**	**76**	**76**
Moresby	**90**	69	90	**79**	90	69	90	**79**	**nd**	**83**
Hinchinbrook Channel	**77**	90	90	**90**	90	90	90	**90**	**nd**	**85**

Scoring range: ■ Very Poor = 0 to <21 | ■ Poor = 21 to <41 | ■ Moderate = 41 to <61 | ■ Good = 61 to <81 | ■ Very Good = 81 – 100. Risk metric scores for pesticide are from GBR CLMP sites as per freshwater basins. nd indicates no data available. For each estuary DIN and FRP indicator values are averaged to provide the Nutrient indicator category score (presented in bold) and that the turbidity and DO indicator scores (using the lowest of the two DO values) are averaged to provide the Phys/Chem indicator score (presented in bold). The indicator categories (Chl *a*, Nutrients, Phys/Chem and Pesticides) are averaged to provide the WQ score (all presented in bold). **Note:** Pesticides are from GBR CLMP high flow data as per freshwater basins.

Table 123 Estuary water quality indicator, indicator category and index scores and grades for 2018- 19.

	Chl *a*	Nutrients			Phys/Chem				Pest-icides	Water quality
	Chl *a*	DIN	FRP	**Nut-rients**	Turb-idity	DO Low	DO High	**Phys/ Chem**	Pest-icides	
Daintree	**80**	72	90	**81**	67	90	90	**78**	**85**	**81**
Dickson Inlet	**90**	78	72	**75**	90	81	90	**85**	nd	**83**
Barron	**37**	41	57	**49**	73	64	90	**69**	**90**	**61**
Trinity Inlet	**45**	68	74	**71**	77	35	90	**56**	nd	**58**
Russell-Mulgrave	**90**	27	90	**59**	90	51	90	**70**	**70**	**72**
Johnstone	**90**	51	79	**65**	90	65	90	**77**	**74**	**76**
Moresby	**90**	65	90	**77**	79	66	90	**73**	nd	**80**
Hinchinbrook Channel	**65**	90	90	**90**	75	77	90	**76**	nd	**77**

Scoring range: ■ Very Poor = 0 to <21 | ■ Poor = 21 to <41 | ■ Moderate = 41 to <61 | ■ Good = 61 to <81 | ■ Very Good = 81 – 100. Risk metric scores for pesticide are from GBR CLMP sites as per freshwater basins. nd indicates no data available. For each estuary DIN and FRP indicator values are averaged to provide the Nutrient indicator category score (presented in bold) and that the turbidity and DO indicator scores (using the lowest of the two DO values) are averaged to provide the Phys/Chem indicator score (presented in bold). The indicator categories (Chl *a*, Nutrients, Phys/Chem and Pesticides) are averaged to provide the WQ score (all presented in bold). **Note:** Pesticides are from GBR CLMP high flow data as per freshwater basins.

Table 124 Estuary water quality indicator, indicator category and index scores and grades for 2017- 18.

	Chl *a*	Nutrients			Phys/Chem				Pest-icides	Water quality
	Chl *a*	DIN	FRP	**Nut-rients**	Turb-idity	DO Low	DO High	**Phys/ Chem**	Pest-icides	
Daintree	**87**	76	90	**83**	71	90	90	**80**	**90**	**85**
Dickson Inlet	**90**	80	68	**74**	90	63	90	**76**	nd	**80**
Barron	**38**	48	57	**52**	85	90	90	**87**	**87**	**66**
Trinity Inlet	**57**	67	79	**73**	90	37	90	**63**	nd	**65**
Russell-Mulgrave	**90**	29	59	**44**	90	61	90	**75**	**55**	**66**
Johnstone	**90**	28	48	**38**	nd	78	90	**78**	**61**	**67**
Moresby	**90**	65	90	**77**	69	69	90	**69**	nd	**79**
Hinchinbrook Channel	**90**	90	90	**90**	61	73	90	**67**	nd	**82**

Scoring range: ■ Very Poor = 0 to <21 | ■ Poor = 21 to <41 | ■ Moderate = 41 to <61 | ■ Good = 61 to <81 | ■ Very Good = 81 – 100. Pesticide risk metric scores are from GBR CLMP sites as per freshwater basins. nd indicates no data available. For each estuary DIN and FRP indicator values are averaged to provide the Nutrient indicator category score (presented in bold) and that the turbidity and DO indicator scores (using the lowest of the two DO values) are averaged to provide the Phys/Chem indicator score (presented in bold). The indicator categories (Chl *a*, Nutrients, Phys/Chem and Pesticides) are averaged to provide the WQ score (all presented in bold). **Note:** Pesticides are from GBR CLMP high flow data as per freshwater basins.

Table 125 Estuary water quality indicator, indicator category and index scores and grades for 2016- 17 using the previous method for pesticide assessment.

	Chl *a*	Nutrients			Phys/Chem				Pest-icides	Water quality
	Chl *a*	DIN	FRP	**Nut-rients**	Turb-idity	DO Low	DO High	**Phys/ Chem**	Pest-icides	
Daintree	**90**	65	55	**60**	90	90	90	**90**	nd	**80**
Dickson Inlet	**77**	77	nd	**77**	nd	39	90	**39**	nd	**64**
Barron	**60**	48	57	**52**	86	76	90	**81**	nd	**64**
Trinity Inlet	**90**	69	90	**79**	90	41	90	**65**	nd	**78**
Russell-Mulgrave	**90**	51	76	**64**	81	83	90	**82**	**66**	**75**
Johnstone	**90**	48	65	**56**	nd	nd	nd	nd	**71**	**72**
Moresby	**90**	61	90	**75**	90	66	90	**78**	nd	**81**
Hinchinbrook Channel	**90**	90	90	**90**	90	90	90	**90**	nd	**90**

Scoring range: ■ Very Poor = 0 to <21 | ■ Poor = 21 to <41 | ■ Moderate = 41 to <61 | ■ Good = 61 to <81 | ■ Very Good = 81 – 100. Pesticide risk metric scores are from GBR CLMP sites as per freshwater basins. nd indicates no data available. For each estuary DIN and FRP indicator values are averaged to provide the Nutrient indicator category score (presented in bold) and that the turbidity and DO indicator scores (using the lowest of the two DO values) are averaged to provide the Phys/Chem indicator score (presented in bold). The indicator categories (Chl *a*, Nutrients, Phys/Chem and Pesticides) are averaged to provide the WQ score (all presented in bold). **Note:** Pesticides are from GBR CLMP high flow data as per freshwater basins.

Table 126 Estuary water quality indicator, indicator category and index scores and grades for 2015- 16 using the previous method for pesticide assessment.

	Chl *a*	Nutrients			Phys/Chem				Pest-icides	Water quality
	Chl *a*	DIN	FRP	**Nut-rients**	Turb-idity	DO Low	DO High	**Phys/ Chem**	**Pest-icides**	
Daintree	**90**	63	72	**67**	90	74	90	**82**	nd	**79**
Dickson Inlet	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
Barron	**8**	53	54	**54**	90	90	90	**90**	nd	**50**
Trinity Inlet	**90**	90	90	**90**	90	52	90	**71**	nd	**83**
Russell-Mulgrave	**90**	53	69	**61**	90	90	90	**90**	**71**	**78**
Johnstone	**90**	50	68	**59**	nd	29	90	**29**	**76**	**63**
Moresby	**90**	61	90	**75**	90	48	90	**69**	nd	**78**
Hinchinbrook Channel	**90**	90	90	**90**	74	76	90	**75**	nd	**85**

Scoring range: ■ Very Poor = 0 to <21 | ■ Poor = 21 to <41 | ■ Moderate = 41 to <61 | ■ Good = 61 to <81 | ■ Very Good = 81 – 100. nd indicates no data available. For each estuary DIN and FRP indicator values are averaged to provide the Nutrient indicator category score (presented in bold) and that the turbidity and DO indicator scores (using the lowest of the two DO values) are averaged to provide the Phys/Chem indicator score (presented in bold). The indicator categories (Chl *a*, Nutrients, Phys/Chem and Pesticides) are averaged to provide the WQ score (all presented in bold). **Note:** Pesticides are from GBR CLMP high flow data as per freshwater basins.

Habitat and hydrology

Table 127 Results for habitat and hydrology index (H&H) and indicator categories for the 2023-24 reporting period.

Estuary	Mangrove & saltmarsh	Riparian extent	Flow	Fish barriers	Seagrass	H&H index
Daintree	87	28	nd	61	-~	59
Dickson Inlet	67	49	nd	80	nd	65
Barron	55	22	39	60	-	44
Trinity Inlet	60	58	nd	61	25	51
Russell-Mulgrave	87	24	50	81	-	60
Johnstone	68	9	61	81	-	54
Moresby	87	66	nd	61	9	56
Hinchinbrook Channel	83	53	nd	80	nd	72

Scoring range: ■ Very Poor = 0 to <21 | ■ Poor = 21 to <41 | ■ Moderate = 41 to <61 | ■ Good = 61 to <81 | ■ Very Good = 81 – 100. ˜ - indicates that it does not occur at the location. nd indicates no data available. ^ indicates the estuaries that include the shoreline mangrove habitat condition indicator introduced in 2020-21.

Table 128 Results for habitat and hydrology index (H&H) and indicator categories for the 2022-23 reporting period.

Estuary	Mangrove & saltmarsh	Riparian extent	Flow	Fish barriers	Seagrass	H&H
Daintree	87^	28	nd	61	-~	59
Dickson Inlet	67^	49	nd	80	nd	65
Barron	57^	22	79	60	-	55
Trinity Inlet	60^	58	nd	61	58	59
Russell-Mulgrave	84^	24	79	81	-	67
Johnstone	63	9	71	81	-	56
Moresby	83^	66	nd	61	14	56
Hinchinbrook Channel	83^	53	nd	80	nd	72

Scoring range: ■ Very Poor = 0 to <21 | ■ Poor = 21 to <41 | ■ Moderate = 41 to <61 | ■ Good = 61 to <81 | ■ Very Good = 81 – 100. ˜ - indicates that it does not occur at the location. nd indicates no data available. ^ indicates the estuaries that include the shoreline mangrove habitat condition indicator introduced in 2020-21.

Table 129 Results for habitat and hydrology index (H&H) and indicator categories for the 2021-22 reporting period.

Estuary	Mangrove & saltmarsh	Riparian extent	Flow	Fish barriers	Seagrass	H&H
Daintree	87^	28	nd	61	-~	59
Dickson Inlet	67^	49	nd	80	nd	65
Barron	57^	22	79	60	-	55
Trinity Inlet	60^	58	nd	61	38	54
Russell-Mulgrave	84^	24	81	81	-	67
Johnstone	63	9	71	81	-	56
Moresby	83^	66	nd	61	0	52
Hinchinbrook Channel	83^	53	nd	**60**	nd	65

Scoring range: ■ Very Poor = 0 to <21 | ■ Poor = 21 to <41 | ■ Moderate = 41 to <61 | ■ Good = 61 to <81 | ■ Very Good = 81 – 100. *nd indicates no data available. - indicates that it does not occur at the location. nd indicates no data available. ^ indicates the estuaries that include the new shoreline mangrove habitat condition indicator introduced in 2020-21.

Table 130 Results for habitat and hydrology index (H&H) and indicator categories for the 2020-21 reporting period.

Estuary	Mangrove extent	Riparian extent	Flow	Fish barriers	Sea-grass	H&H
Daintree	88^	28	nd	61	-	59
Dickson Inlet	69^	47	nd	100	nd	72
Barron	57^	23	75	61	-	54
Trinity Inlet	57^	59	nd	61	42	54
Russell-Mulgrave	81^	24	84	81	-	67
Johnstone	63	9	98	81	-	63
Moresby	79	68	nd	61	18	56
Hinchinbrook Channel	84	51	nd	**60**	nd	65

Scoring range: ■ Very Poor = 0 to <21 | ■ Poor = 21 to <41 | ■ Moderate = 41 to <61 | ■ Good = 61 to <81 | ■ Very Good = 81 – 100. *nd indicates no data available. - indicates that it does not occur at the location. nd indicates no data available. ^ indicates the estuaries that include the new shoreline mangrove habitat condition indicator introduced in 2020-21.

Table 131 Results for habitat and hydrology index (H&H) and indicator categories for the 2019-20 reporting period.

Estuary	Mangrove extent	Riparian extent	Flow	Fish barriers	Sea-grass	H&H
Daintree	93	28	nd	61	-	60
Dickson Inlet	75	47	nd	100	nd	74
Barron	39	23	93	61	-	54
Trinity Inlet	53	59	nd	61	54	57
Russell-Mulgrave	98	24	75	81	-	69
Johnstone	63	9	95	81	-	62
Moresby	79	68	nd	61	25	58
Hinchinbrook Channel	84	51	nd	80	nd	71

Scoring range: ■ Very Poor = 0 to <21 | ■ Poor = 21 to <41 | ■ Moderate = 41 to <61 | ■ Good = 61 to <81 | ■ Very Good = 81 – 100. *nd indicates no data available. - indicates that it does not occur at the location.

Table 132 Results for habitat and hydrology index (H&H) and indicator categories for the 2018-19 reporting period.

Estuary	Mangrove extent	Riparian extent	Flow	Fish barriers	Seagrass	H&H
Daintree	93	28	nd*	61	-	60
Dickson Inlet	75	47	nd	100	nd	74
Barron	39	23	57	61	-	45
Trinity Inlet	53	59	nd	61	46	55
Russell-Mulgrave	98	24	57	81	-	65
Johnstone	63	9	65	81	-	54
Moresby	79	68	nd	61	8	54
Hinchinbrook Channel	84	51	nd	80	nd	71

Scoring range: ■ Very Poor = 0 to <21 | ■ Poor = 21 to <41 | ■ Moderate = 41 to <61 | ■ Good = 61 to <81 | ■ Very Good = 81 – 100. *nd indicates no data available. - indicates that it does not occur at the location.

Table 133 Results for habitat and hydrology index (H&H) and indicator categories for the 2017-18 reporting period.

Estuary	Mangrove extent	Riparian extent	Flow	Fish barriers	Seagrass	H&H
Daintree	93	25	nd*	61	-	60
Dickson Inlet	75	47	nd	100	nd	74
Barron	39	22	49	61	-	43
Trinity Inlet	53	57	nd	61	31	50
Russell-Mulgrave	98	24	98	81	-	75
Johnstone	63	9	98	81	-	63
Moresby	79	64	nd	61	0	51
Hinchinbrook Channel	84	51	nd	80	nd	72

Scoring range: ■ Very Poor = 0 to <21 | ■ Poor = 21 to <41 | ■ Moderate = 41 to <61 | ■ Good = 61 to <81 | ■ Very Good = 81 – 100. *nd indicates no data available. - indicates that it does not occur at the location.

Table 134 Results for habitat and hydrology index (H&H) and indicator categories for the 2016-17 reporting period.

Estuary	Mangrove extent	Riparian extent	Flow	Fish barriers	Seagrass	H&H
Daintree	93	25	nd*	61	-	60
Dickson Inlet	75	47	nd	100	nd	74
Barron	39	22	59	61	-	45
Trinity Inlet	53	57	nd	61	30	50
Russell-Mulgrave	98	24	74	81	-	69
Johnstone	63	9	81	81	-	58
Moresby	79	64	nd	61	7	53
Hinchinbrook Channel	84	51	nd	80	nd	72

Scoring range: ■ Very Poor = 0 to <21 | ■ Poor = 21 to <41 | ■ Moderate = 41 to <61 | ■ Good = 61 to <81 | ■ Very Good = 81 – 100. nd indicates no data available. - indicates that it does not occur at this location.

Table 135 Results for habitat and hydrology index (H&H) and indicator categories for the 2015-16 reporting period using the updated scoring methods.

Estuary	Mangrove extent	Riparian extent	Flow	Fish barriers	Seagrass	H&H
Daintree	93	25	nd	61	-	60
Dickson Inlet	75	47	nd	100	nd	74
Barron	39	22	nd	61	-	41
Trinity Inlet	53	57	nd	61	21	48
Russell-Mulgrave	98	24	nd	81	-	67
Johnstone	63	9	nd	81	-	51
Moresby	79	64	nd	61	13	54
Hinchinbrook Channel	84	51	nd	80	nd	72

Scoring range: ■ Very Poor = 0 to <21 | ■ Poor = 21 to <41 | ■ Moderate = 41 to <61 | ■ Good = 61 to <81 | ■ Very Good = 81 – 100. nd indicates no data available. ^Decisions rules require ≥ 60% indicator categories (I.C.) for aggregation to index. - indicates that it does not occur at this location.

Inshore marine

Water quality

Table 136 Results for water quality indicators, indicator categories and index for inshore marine zones 2023-24

Zone	Water clarity			Chl *a*	Nutrients				Pest-icides	Water quality
	TSS	Tur-bidity	**Water clarity**	Chl *a*	NOx	PN	PP	**Nutrients**	Risk metric	
North	93	nd	**92**	**80**	87	41	63	**66**	**94**	**83**
Central	67	64	**65**	**61**	18	16	45	**27**	**90**	**61**
South	36	55	**47**	**71**	64	17	40	**45**	**88**	**63**
Palm Island	84	75	**80**	**39**	88	32	68	**66**	**92**	**69**

Scoring range: ■ Very Poor = 0 to <21 | ■ Poor = 21 to <41 | ■ Moderate = 41 to <61 | ■ Good = 61 to <81 | ■ Very Good = 81 – 100. Nd indicates no data available. Note that the water clarity and nutrient indicator scores and indicator category scores (presented in bold) are calculated from the annual data for each site first and then site values are averaged to give the indicator or indicator category zone scores. For each zone the indicator category scores are averaged to provide the WQ score (also presented in bold).

Table 137 Results for water quality indicators, indicator categories and index for inshore marine zones 2022-23

Zone	Water clarity			Chl *a*	Nutrients				Pest-icides	Water quality
	TSS	Tur-bidity	**Water clarity**	Chl *a*	NOx	PN	PP	**Nutrients**	Risk metric	
North	78	nd	**78**	**76**	98	60	62	**74**	**100**	**82**
Central	84	71	**80**	**52**	65	30	65	**55**	**98**	**71**
South	66	63	**68**	**75**	69	23	61	**59**	**98**	**75**
Palm Island	93	83	**87**	**52**	84	29	67	**63**	**100**	**75**

Scoring range: ■ Very Poor = 0 to <21 | ■ Poor = 21 to <41 | ■ Moderate = 41 to <61 | ■ Good = 61 to <81 | ■ Very Good = 81 – 100. Nd indicates no data available. Note that the water clarity and nutrient indicator scores and indicator category scores (presented in bold) are calculated from the annual data for each site first and then site values are averaged to give the indicator or indicator category zone scores. For each zone the indicator category scores are averaged to provide the WQ score (also presented in bold).

Table 138 Results for water quality indicators, indicator categories and index for inshore marine zones 2021-22

Zone	Water clarity			Chl *a*	Nutrients				Pest-icides	Water quality
	TSS	Tur-bidity	**Water clarity**	Chl *a*	NOx	PN	PP	**Nutrients**	Risk metric	
North	84		**84**	**83**	87	71	68	**75**	nd	**81**
Central	80	69	**76**	**65**	29	36	67	**45**	nd	**62**
South	61	65	**65**	**75**	41	18	63	**39**	nd	**60**
Palm Island	74	80	**77**	**65**	62	38	79	**61**	nd	**68**

Scoring range: ■ Very Poor = 0 to <21 | ■ Poor = 21 to <41 | ■ Moderate = 41 to <61 | ■ Good = 61 to <81 | ■ Very Good = 81 – 100. nd indicates no data available. The indicator values are averaged to provide the water clarity and nutrient indicator category scores (presented in bold) and that the four indicator categories are averaged to provide the water quality index score (also presented in bold).

Table 139 Results for water quality indicators, indicator categories and index for inshore marine zones 2020-21

Zone	Water clarity			Chl *a*	Nutrients				Pest-icides	Water quality
	TSS	Tur-bidity	**Water clarity**	Chl *a*	NOx	PN	PP	**Nut-rients**	Risk metric	**20- 21**
North	69	nd	69	86	57	65	57	60	nd	72
Central	81	59	75	69	22	26	62	37	nd	60
South	58	60	62	75	5	18	48	21	nd	52
Palm Island	76	67	71	64	44	44	61	50	nd	62

Scoring range: ■ Very Poor = 0 to <21 | ■ Poor = 21 to <41 | ■ Moderate = 41 to <61 | ■ Good = 61 to <81 | ■ Very Good = 81 – 100. nd indicates no data available. The indicator values are averaged to provide the water clarity and nutrient indicator category scores (presented in bold) and that the four indicator categories are averaged to provide the water quality index score (also presented in bold).

Table 140 Results for water quality indicators, indicator categories and index for inshore marine zones 2019-20.

Zone	Water clarity			Chl *a*	Nutrients				Pest-icides	Water quality
	TSS	Tur-bidity	**Water clarity**	Chl *a*	NOx	PN	PP	**Nutrients**	Risk metric	
North	96	nd	**96**	**91**	100	79	80	**86**	nd	**91**
Central	92	72	**89**	**75**	11	55	62	**43**	**89**	**74**
South	83	67	**82**	**71**	21	26	57	**42**	**91**	**72**
Palm Island	94	88	**91**	**68**	39	0	66	**37**	nd	**65**

Scoring range: ■ Very Poor = 0 to <21 | ■ Poor = 21 to <41 | ■ Moderate = 41 to <61 | ■ Good = 61 to <81 | ■ Very Good = 81 – 100. nd indicates no data available. The indicator values are averaged to provide the water clarity and nutrient indicator category scores (presented in bold) and that the four indicator categories are averaged to provide the water quality index score (also presented in bold).

Table 141 Results for water quality indicators, indicator categories and index for inshore marine zones 2018-19.

Zone	Water clarity			Chl *a*	Nutrients				Pest-icides	Water quality
	TSS	Tur-bidity	**Water clarity**	Chl *a*	NOx	PN	PP	**Nutrients**	Pest-icides	
North	88		**88**	**75**	92	76	69	**80**	**96**	**85**
Central	71	64	**70**	**52**	12	19	33	**21**	**89**	**58**
South	47	60	**54**	**24**	3	6	8	**7**	**91**	**44**
Palm Island	86	73	**80**	**66**	0	0	8	**2**	**91**	**60**

Scoring range: ■ Very Poor = 0 to <21 | ■ Poor = 21 to <41 | ■ Moderate = 41 to <61 | ■ Good = 61 to <81 | ■ Very Good = 81 – 100. nd indicates no data available. The indicator values are averaged to provide the water clarity and nutrient indicator category scores (presented in bold) and that the four indicator categories are averaged to provide the water quality index score (also presented in bold).

Table 142 Results for water quality indicators, indicator categories and index for inshore marine zones 2017-18.

Zone	Water clarity			Chl *a*	Nutrients				Pest-icides	Water quality
	TSS	Tur-bidity	**Water clarity**	Chl *a*	NOx	PN	PP	**Nutrients**	Pest-icides	
North	52	nd	**52**	**49**	95	69	36	**70**	**92**	**66**
Central	41	60	**41**	**36**	21	64	68	**53**	**84**	**53**
South	20	60	**31**	**36**	1	50	68	**34**	**88**	**47**
Palm Island	39	68	**57**	**46**	21	27	73	**42**	**86**	**53**

Scoring range: ■ Very Poor = 0 to <21 | ■ Poor = 21 to <41 | ■ Moderate = 41 to <61 | ■ Good = 61 to <81 | ■ Very Good = 81 – 100. nd indicates no data available. The indicator values are averaged to provide the water clarity and nutrient indicator category scores (presented in bold) and that the four indicator categories are averaged to provide the water quality index score (also presented in bold).

Table 143 Results for water quality indicators, indicator categories and index for inshore marine zones 2016-17.

Zone	Water clarity			Chl *a*	Nutrients				Pest-icides	Water quality
	TSS	Tur-bidity	**Water clarity**	Chl *a*	NOx	PN	PP	**Nutrients**	Pest-icides	
North	69	nd	**69**	**47**	95	50	51	**68**	**93**	**69**
Central	48	63	**51**	**52**	4	57	78	**50**	**80**	**58**
South	10	62	**23**	**54**	0	23	70	**26**	**86**	**47**
Palm Island	5	87	**54**	**67**	12	59	67	**47**	**87**	**64**

Scoring range: ■ Very Poor = 0 to <21 | ■ Poor = 21 to <41 | ■ Moderate = 41 to <61 | ■ Good = 61 to <81 | ■ Very Good = 81 – 100. nd indicates no data available. The indicator values are averaged to provide the water clarity and nutrient indicator category scores (presented in bold) and that the four indicator categories are averaged to provide the water quality index score (also presented in bold).

Table 144 Results for water quality indicators, indicator categories and index for inshore marine zones 2015-16.

Zone	Water clarity			Chl *a*	Nutrients				Pest-icides	Water quality
	TSS	Tur-bidity	**Water clarity**	Chl *a*	NOx	PN	PP	**Nutrients**	Pest-icides	
North	75	nd	75	**71**	100	72	52	**76**	**96**	**79**
Central	41	63	40	**64**	18	72	79	**61**	**93**	**64**
South	23	68	33	**64**	11	61	75	**47**	**96**	**60**
Palm Island	64	77	70	**62**	18	32	83	**49**	**93**	**69**

Scoring range: Very Poor = 0 to <21 | Poor = 21 to <41 | Moderate = 41 to <61 | Good = 61 to <81 | Very Good = 81 – 100. The indicator values are averaged to provide the water clarity and nutrient indicator category scores (presented in bold) and that the four indicator categories are averaged to provide the water quality index score (also presented in bold).

Coral

The MMP Inshore coral calculation method for scoring the composition indicator has been updated as from the 2024-25 reporting year. The composition indicator value is now set to zero for reefs at which there is zero cover of hard corals. This change has been applied to historical indicator and index scores and reduces the composition indicator and coral condition index for the Norh zone in 2024.

In the South zone no composition scores were estimated between 2015-16 and 2019-20 at Bedarra as the composition score requires comparison to a baseline of at least 5 prior observations. This lack of score for the composition indicator for those early years continued until 2024 despite the availability of a baseline. The omission of these scores was noted and back calculated in 2025.

Table 145 compares the previous and updated scores for the composition indicator and the coral condition index for all years with updated results. The scores for previous years prior to the composition indicator updates are provided in Table 148 to Table 154.

Table 145 Inshore marine coral scores and grades for the previous and updated composition indicator and Coral condition index.

		Composition indicator		Coral index	
Zone	Year	Previous score	Updated score	Previous score	Updated score
North Zone	2024	30	20	42	40
South Zone	2015	33	38	48	49
South Zone	2016	50	44	56	55
South Zone	2017	58	56	59	59
South Zone	2018	58	50	55	54
South Zone	2019	75	69	62	62
South Zone	2020	75	69	63	63

Standardised scoring range: Very Poor = 0 to <21 | Poor = 21 to <41 | Moderate = 41 to <61 | Good = 61 to <81 | Very Good = 81 – 100.

Table 146 Inshore marine coral indicators and index scores and grades for 2023-24.

Inshore Zone	Juvenile	Macroalgae	Cover	Change	Composition	Coral index
North	18	69	28	67	30	42
Central	34	33	62	59	50	48
South	61	36	54	41	56	50
Palm Island	33	45	48	40	58	45

Standardised scoring range: Very Poor = 0 to <21 | Poor = 21 to <41 | Moderate = 41 to <61 | Good = 61 to <81 | Very Good = 81 – 100.

Table 147 Inshore marine coral indicators and index scores and grades for 2022-23.

Inshore Zone	Juvenile	Macroalgae	Cover	Change	Composition	Coral index
North	37	47	68	69	50	54
Central	39	44	73	60	58	55
South	61	41	55	49	75	56
Palm Island	41	40	51	42	63	47

Standardised scoring range: ■ Very Poor = 0 to <21 | ■ Poor = 21 to <41 | ■ Moderate = 41 to <61 | ■ Good = 61 to <81 | ■ Very Good = 81 – 100.

Table 148 Inshore marine coral indicators and index scores and grades for 2021-22.

Inshore Zone	Juvenile	Macroalgae	Cover	Change	Composition	Coral index
North	38	55	65	70	30	51
Central	38	59	73	64	58	58
South	67	40	54	64	75	60
Palm Island	37	38	47	47	58	45

Standardised scoring range: ■ Very Poor = 0 to <21 | ■ Poor = 21 to <41 | ■ Moderate = 41 to <61 | ■ Good = 61 to <81 | ■ Very Good = 81 – 100.

Table 149 Inshore marine coral indicators and index scores and grades for 2020-21.

Inshore Zone	Juvenile	Macroalgae	Cover	Change	Composition	Coral index
North	41	45	49	58	25	44
Central	36	74	70	68	65	63
South	72	34	49	68	81	61
Palm Island	44	45	45	48	63	49

Standardised scoring range: ■ Very Poor = 0 to <21 | ■ Poor = 21 to <41 | ■ Moderate = 41 to <61 | ■ Good = 61 to <81 | ■ Very Good = 81 – 100.

Table 150 Inshore marine coral indicators and index scores and grades for 2019-20.

Inshore Zone	Juvenile	Macroalgae	Cover	Change	Composition	Coral index
North	33	42	44	70	33	44
Central	40	65	74	64	61	61
South	78	44	46	74	75	62
Palm Island	51	55	43	50	66	53

Standardised scoring range: ■ Very Poor = 0 to <21 | ■ Poor = 21 to <41 | ■ Moderate = 41 to <61 | ■ Good = 61 to <81 | ■ Very Good = 81 – 100.

Table 151 Inshore marine coral indicators and index scores and grades for 2018-19.

Inshore Zone	Juvenile	Macroalgae	Cover	Change	Composition	Coral index
North	32	44	41	69	33	44
Central	41	64	66	73	58	60
South	87	41	43	72	75	62
Palm Island	45	45	44	61	67	52

Standardised scoring range: ■ Very Poor = 0 to <21 | ■ Poor = 21 to <41 | ■ Moderate = 41 to <61 | ■ Good = 61 to <81 | ■ Very Good = 81 – 100.

Table 152 Inshore marine coral indicators and index scores and grades for 2017-18.

Inshore Zone	Juvenile	Macroalgae	Cover	Change	Composition	Coral index
North	40	49	45	70	50	51
Central	38	73	62	74	58	61
South	81	40	34	66	58	55
Palm Island	51	32	37	60	63	49

Standardised scoring range: ■ Very Poor = 0 to <21 | ■ Poor = 21 to <41 | ■ Moderate = 41 to <61 | ■ Good = 61 to <81 | ■ Very Good = 81 – 100.

Table 153 Inshore marine coral indicators and index scores and grades for 2016-17.

Inshore Zone	Juvenile	Macroalgae	Cover	Change	Composition	Coral index
North	40	40	42	67	42	46
Central	30	76	58	80	42	57
South	89	46	32	74	58	60
Palm Island	55	32	33	59	67	49

Standardised scoring range: ■ Very Poor = 0 to <21 | ■ Poor = 21 to <41 | ■ Moderate = 41 to <61 | ■ Good = 61 to <81 | ■ Very Good = 81 – 100.

Table 154 Inshore marine coral indicators and index scores and grades for 2015-16.

Inshore Zone	Juvenile	Macroalgae	Cover	Change	Composition	Coral index
North	37	56	42	62	33	46
Central	40	67	72	70	53	60
South	95	35	31	66	50	55
Palm Island	59	31	36	50	70	49

Standardised scoring range: ■ Very Poor = 0 to <21 | ■ Poor = 21 to <41 | ■ Moderate = 41 to <61 | ■ Good = 61 to <81 | ■ Very Good = 81 – 100.

Seagrass

The tables below present the average score for each indicator from all sites within a zone. However, for purposes of scoring condition, the QPSMP seagrass site score is the minimum of the indicator values (biomass, area and species composition) unless species composition is the lowest, in which case it is the average of species composition and the next lowest scoring indicator (not shown in the tables), meaning it is not always calculated as an average of these indicator scores shown in the tables. For the MMP the seagrass site score is the average of the indicator values (percent cover and resilience). The condition score for an inshore zone is the average of the site scores.

Table 155 Inshore marine seagrass results for 2023-24.

Inshore zone	Biomass	Area	Species compo -sition	Percent cover	Resilience	Seagrass condition
North	80	85	94	37	34	52
Central	nd	nd	nd	nd	nd	nd
South	nd	nd	nd	17	40	30
Palm Island	nd	nd	nd	nd	nd	nd

Scoring range: ■ Very Poor = 0 to <21 | ■ Poor = 21 to <41 | ■ Moderate = 41 to <61 | ■ Good = 61 to <81 | ■ Very Good = 81 – 100.

Table 156 Inshore marine seagrass results for 2022-23.

Inshore zone	Biomass	Area	Species compo -sition	Percent cover	Resilience	Seagrass condition
North	80	89	95	59	50	64
Central	nd	nd	nd	nd	nd	nd
South	nd	nd	nd	22	46	36
Palm Island	nd	nd	nd	nd	nd	nd

Scoring range: ■ Very Poor = 0 to <21 | ■ Poor = 21 to <41 | ■ Moderate = 41 to <61 | ■ Good = 61 to <81 | ■ Very Good = 81 – 100.

Table 157 Inshore marine seagrass results for 2021-22.

Inshore zone	Biomass	Area	Species compo -sition	Percent cover	Resilience	Seagrass condition
North	74	85	95	64	41	60
Central	nd	nd	nd	nd	nd	nd
South	nd	nd	nd	28	48	40
Palm Island	nd	nd	nd	nd	nd	nd

Scoring range: ■ Very Poor = 0 to <21 | ■ Poor = 21 to <41 | ■ Moderate = 41 to <61 | ■ Good = 61 to <81 | ■ Very Good = 81 – 100.

Table 158 Inshore marine seagrass results for 2020-21.

Inshore zone	Biomass	Area	Species compo-sition	Percent cover	Resilience	Seagrass condition
North	77	85	93	43	47	57
Central	nd	nd	nd	nd	nd	nd
South	nd	nd	nd	31	32	40
Palm Island	nd	nd	nd	nd	nd	nd

Scoring range: Very Poor = 0 to <21 | Poor = 21 to <41 | Moderate = 41 to <61 | Good = 61 to <81 | Very Good = 81 – 100.

Table 159 Inshore marine seagrass results for 2019-20

Inshore zone	Bio-mass	Area	Species compo-sition	Percent cover	Tissue nut-rients	Repro-ductive effort	Seagrass condition
North	70	84	85	36	38	20	46
Central	nd	nd	nd	nd	nd	nd	nd
South	nd	nd	nd	19	36	38	35
Palm Island	nd	nd	nd	nd	nd	nd	nd

Scoring range: Very Poor = 0 to <21 | Poor = 21 to <41 | Moderate = 41 to <61 | Good = 61 to <81 | Very Good = 81 – 100.

Table 160 Inshore marine seagrass results for 2018-19.

Inshore zone	Biomass	Area	Species compo-sition	Percent cover	Tissue nutrients	Repro-ductive effort	Seagrass condition
North	62	92	71	43	37	63	53
Central	nd	nd	nd	nd	nd	nd	nd
South	nd	nd	nd	28	27	17	35
Palm Island	nd	nd	nd	nd	nd	nd	nd

Scoring range: Very Poor = 0 to <21 | Poor = 21 to <41 | Moderate = 41 to <61 | Good = 61 to <81 | Very Good = 81 – 100.

Table 161 Inshore marine seagrass results for 2017-18.

Inshore zone	Biomass	Area	Species composition	Percent cover	Tissue nutrients	Repro-ductive effort	Seagrass condition
North	54	75	76	48	35	38	46
Central	nd	nd	nd	nd	nd	nd	nd
South	nd	nd	nd	19	39	0	23
Palm Island	nd	nd	nd	nd	nd	nd	nd

Scoring range: Very Poor = 0 to <21 | Poor = 21 to <41 | Moderate = 41 to <61 | Good = 61 to <81 | Very Good = 81 – 100.

Table 162 Seagrass results for 2016-17.

Inshore zone	Biomass	Area	Species composition	Percent cover	Tissue nutrients	Repro-ductive effort	Seagrass condition
North	52	70	48	52	35	0	30
Central	nd	nd	nd	nd	nd	nd	nd
South	nd	nd	nd	0	43	8	6
Palm Island	nd	nd	nd	nd	nd	nd	nd

Scoring range: Very Poor = 0 to <21 | Poor = 21 to <41 | Moderate = 41 to <61 | Good = 61 to <81 | Very Good = 81 – 100.

Table 163 Seagrass results for the 2015-16.

Inshore zone	Biomass	Area	Species Composition	Abundance	Tissue nutrients	Repro-ductive effort	Seagrass condition
North	40	48	71	40	31	25	30
Central	nd	nd	nd	nd	nd	nd	nd
South	nd	nd	nd	14	41	0	18
Palm Island	nd	nd	nd	nd	nd	nd	nd

Scoring range: Very Poor = 0 to <21 | Poor = 21 to <41 | Moderate = 41 to <61 | Good = 61 to <81 | Very Good = 81 – 100.

Offshore marine

Water quality

Table 164 Results for water quality indicators and water quality index for the offshore marine environment 2018-19.

Chlorophyll-*a*	Water clarity (TSS)	Water quality
100	98.2	99.1

Scoring range: ■ Very Poor = 0 to <21 | ■ Poor = 21 to <41 | ■ Moderate = 41 to <61 | ■ Good = 61 to <81 | ■ Very Good = 81 – 100.

Table 165 Results for water quality indicators and water quality index for the offshore marine environment 2017-18.

Chlorophyll-*a*	Water clarity (TSS)	Water quality
99.9	98.1	99.0

Scoring range: ■ Very Poor = 0 to <21 | ■ Poor = 21 to <41 | ■ Moderate = 41 to <61 | ■ Good = 61 to <81 | ■ Very Good = 81 – 100.

Table 166 Results for water quality indicators and water quality index for the offshore marine environment 2016-17.

Chlorophyll-*a*	Water clarity (TSS)	Water quality
99.6	99.3	99.5

Scoring range: ■ Very Poor = 0 to <21 | ■ Poor = 21 to <41 | ■ Moderate = 41 to <61 | ■ Good = 61 to <81 | ■ Very Good = 81 – 100.

Table 167 Results for water quality indicators and water quality index for the offshore marine environment 2015-16.

Chlorophyll-*a*	Water clarity (TSS)	Water quality
99.7	99.1	99.4

Scoring range: ■ Very Poor = 0 to <21 | ■ Poor = 21 to <41 | ■ Moderate = 41 to <61 | ■ Good = 61 to <81 | ■ Very Good = 81 – 100.

Coral

Offshore coral sampling design 2021-22 update

Report card update
The LTMP updated the sampling design for 2021-22 onwards. For the Wet Tropics region, the LTMP previously included 15 reefs with a subset monitored in alternating years. The updated sampling design has reduced the number of surveyed reefs to nine and conducts surveys at all reefs every year. Details of the changes to the reefs that are surveyed are presented in the methods technical report (WTW 2026).

Whilst this change reduces the number of reefs monitored it has the distinct advantage of increasing the frequency of sampling from a two-year to one-year cycle. The previous design involved rolling scores forward for reefs not sampled in a given year, and meant that there was a lag in the condition assessment for reefs not surveyed for the reporting year.

The updated LTMP sampling design has meant that offshore coral scores produced for 2021-22 onwards are not directly comparable to the scores using the previous design as presented in the report cards up to 2020-21. The indicators and index scores and grades for offshore coral are presented in Table 168 for the previous sampling design, and for the updated sampling design, for which the scores and grades have been back-calculated for the previous reporting years. This allows the condition of reefs to be assessed over time for the updated sampling design.

Differences between the indicator and index scores and grades are evident for the two sampling designs. The updated sampling design has typically produced higher indicator scores, and consistently higher index scores, since 2017-18 compared to the previous sampling design.

Table 168 Offshore coral scores and grades from the previous and the updated LTMP sampling design.

	Previous sampling design				Updated sampling design			
Year	Juveniles	Coral Cover	Coral Change	**Coral**	Juveniles	Coral Cover	Coral Change	**Coral**
2024-25	nd	nd	nd	nd	92	42	51	**62**
2023-24	nd	nd	nd	nd	92	46	56	**65**
2022-23	nd	nd	nd	nd	84	43	53	**61**
2021-22	nd	nd	nd	nd	92	39	52	**61**
2020-21	65	32	52*	**50**	74	34	43	**54**
2019-20	62	29	37	**42**	73	29	51	**51**
2018-19	68	26	51	**48**	80	27	70	**59**
2017-18	71	28	53	**51**	77	25	67	**56**
2016-17	95	51	56	**67**	99	52	67	**73**
2015-16	96	60	54	**70**	97	61	66	**75**

Standardised scoring range: ■ Very Poor = 0 to <21 | ■ Poor = 21 to <41 | ■ Moderate = 41 to <61 | ■ Good = 61 to <81 | ■ Very Good = 81 – 100. The coral index is shown in bold and is the average of the three contributing indicators.
* indicated scores are not directly comparable to previous years. The Coral Change indicator is only estimated during years free from acute disturbances, such as cyclones, marine heat waves and outbreaks of crown-of-thorns starfish. Internal revision of disturbance categorisation at AIMS has led to more disturbances being categorised and this resulted in increased scores for the coral change indicator. nd indicates no data available.

Appendix H. Estuary fish barrier remediation

The sites of the remediation works on waterways in the Hinchinbrook Channel zone assessed for the fish barrier indicator are presented in Figure 27. The photos show sites before and after remediation works which constructed fish passage structures to facilitate longitudinal connectivity for fish and other aquatic fauna. The sites were prioritised for remediation as part of the Fish Homes and Highways project (Terrain NRM 2024).

Figure 27. Photos of before and after remediation works of fish barriers on waterways assessed for the Hinchinbrook estuary zone.

Waterway: Five Mile Ck	Site code	Barrier Type: Rock weir with pipes
Basin: Murray		Remediation: Rock fishway
Before 		After 
Waterway: Herbert River	Site code	Barrier Type: Rock weir
Basin: Herbert		Remediation: Rock fishway
Before 		After 

Waterway: Lagoon Ck	Site code	Barrier Type: Rock weir with pipes
Basin: Herbert		Remediation: Rock ramp fishway
Before 		After 

Waterway: Lannercost Ck	Site code	Barrier Type: Causeway/weir (drop barrier)
Basin: Herbert		Remediation: Rock ramp fishway
Before 		After 

Waterway: Lannercost Ck	Site code	Barrier Type: Causeway
Basin: Herbert		Remediation: Bed level crossing
Before 		After 

References

(Terrain NRM 2024). Fish barrier remediation works in the Herbert and Murray Catchments Reef. Trust VII 2021-2023 Summary Report. Terrain NRM, Innisfail, Queensland.

Appendix I. Seagrass monitoring recommendations and project updates.

Recommendations for seagrass (Centre for Tropical Water & Aquatic Ecosystem Research (TropWATER), James Cook University)

Additional meadow scale monitoring in some zones recommended. Monitoring at this larger scale shows a clearer picture of seagrass condition at scales appropriate to the regional report card. Specific monitoring recommendations include the following.

- Northern estuaries to complement Trinity Inlet monitoring (Dickson Inlet)
- Central zone inshore waters.
- Hinchinbrook estuary and South zone inshore water bodies. The Hinchinbrook region is a particular priority.
    - Baseline mapping by Girringun Aboriginal Corporation and TropWATER in the past 2 years has identified potential monitoring locations across the Girringun TUMRA (Traditional Use Marine Resource Agreement).
    - Drone-based intertidal monitoring was conducted at 6 locations in the Girringun TUMRA with TropWATER in 2024, and several of these sites will be monitored with NESP funding in 2025.
- Long-term funding is required to maintain consistent long-term monitoring and expand to subtidal sites.

The following projects may provide opportunities for additional long-term meadow scale monitoring of seagrass for the South zone.

Girringun projects

Two GBRF-funded Girringun projects were delivered by Girringun Aboriginal Corporation in collaboration with TropWATER JCU, Charles Darwin University, and University of Queensland. The Healing Country project (2022–2024) integrated Indigenous knowledge and western science to assess dugong populations and seagrass habitat in the northern Hinchinbrook area. The Blue Carbon project (2024–2025) used drones to establish intertidal seagrass monitoring across five sea countries in the Girringun TUMRA, and estimated blue carbon stocks. The NESP 5.2 Ranger Led Toolkit project enabled a further monitoring round at Lucinda, Cardwell, and Meunga Creek in 2025.

Gunggandji-Mandingalbay Yidinji (GMY) / TropWATER partnership

In 2024/2025, GMY Rangers and JCU TropWATER continued surveys across GMY Sea Country, including seagrass meadow mapping and expanded findings in deepwater inter-reef areas. Reef monitoring using Great Reef Census methods extended to new reef areas and validated changes at previously surveyed locations. GMY successfully delivered a first-of-its-kind food web study using stable isotope analysis to map trophic connections linked to seagrass habitats with new partners Biopixel Oceans Foundation and tagged 15 sharks and rays to explore the megafauna using these inshore habitats. This GMY-led research is now informing similar work across other regional Traditional Owner programs.

Mandubarra projects

Mandubarra Land and Sea Rangers have partnered with TropWATER, James Cook University through a Healing Country Project, a Queensland Indigenous Land and Sea Ranger Program and a Helping

Country Project to map and monitor seagrass in their Sea Country. As a result of seagrass mapping along King Reef and Cowley Beach in 2022, an annual monitoring program was established to assess change in seagrass distribution and condition at key coastal meadows north of King Reef, south of Liverpool Creek and inshore from the South Barnard Islands. These meadows, dominated by *Halodule uninervis* and *Halophila ovalis* and including *Halophila decipiens, Halophila spinulosa* and *Cymodocea serrulata,* contained 1033 ha in 2022 with a mean percent cover of 15%. The same area mapped again in November 2023 had the same five species, an increase in seagrass area to 1356 ha but a decline in mean percent cover to 7%. Following Cyclone Jasper in December 2023 and further flooding in March 2024 the area was monitored again in October-November 2024. Only 4 seagrass species were recorded with *H. spinulosa* absent and more than a 50% decline in meadow area to 615 ha and a further decline in mean percent cover to 4%.

Cyclone Jasper NESP project

This project aims to evaluate the effects of Tropical Cyclone Jasper and associated flooding on inshore coastal habitats between Cairns and Cooktown, working with Traditional Owner groups in the region. Helicopter surveys were carried out in October 2024 and boat surveys in December 2024 – January 2025 to survey mangrove, coral and seagrass habitats. Data from these surveys showed significant damage to mangrove habitats in the Bloomfield and Daintree rivers and there was evidence of mud smothering inshore reefs causing losses of coral. Seagrasses were mapped as part of these surveys, however there was limited data from much of this region prior to the cyclone, so we are compiling available data to understand how TC Jasper has impacted seagrasses throughout the region. These surveys took place in 2025 and data will be used to inform recommendations for restoration, rehabilitation, accelerated recovery and strategies to reduce further habitat loss.

Appendix J. Log of updates 2024-25

The table below lists section, page and caption number, and summary of updates for the 2024-25 results technical report to assist reviewers.

Section number and title	Page/caption number	Summary of update
1. Executive Summary	p. ii-ix	2024-25 Indicators reported table, score summary tables and key messages.
3. Climatic influences in the region	p. 9- 13	Text, figures, tables and key messages.
	Appendix A p.84	Long term rainfall figure.
4. Freshwater basins		
4.1.Water Quality	p. 16-23	Text, tables, figures and key messages.
	Appendix B p. 90-103	Detailed results: text, tables and figures (box plots) for reference
	Appendix B p. 104-106	Basin pesticide sites contributing chemicals: text and figures.
4.2.Habitat and Hydrology		
Habitat extent (Wetland)	p.26hectares.28	Results text, tables and key messages
Flow	p. 29-31	Results text, tables and key messages.
	Appendix C p. 123-128	Detailed results: table for reference.
Habitat and hydrology index	p. 31	Text, scoring and grading tables.
4.4.Overall basin scores and grades	p. 38	Text and table update.
5. Estuaries		
5.1.Water Quality	p. 40-46	Text, tables, figures and key messaging.
	Appendix B p. 107-114	Detailed results: tables for reference.
	p.45	Chemical spill into Trinity Inlet.
5.2.Habitat and Hydrology		
Mangrove and saltmarsh extent	p. 48-49. Table 28, Table 29, Table 31	Results text, table and key messaging
Mangrove habitat condition	p.49-Table 3151	Results text, table and key messaging
Estuary riparian extent	p. 52-52, Table 32	Results text, table and key messaging.
Flow	p. 56 - 58	Results text, table and key messaging.
	Appendix C p. 123-128	Detailed results: tables for reference.
Seagrass	p. 58-60	Results text, table, key messaging and recommendations (messaging provided by Alex Carter).
Habitat and hydrology index	p. 60	Results text, and tables

Section number and title	Page/caption number	Summary of update
5.3.Overall estuary scores and grades	p. 61-62	Text and table update.
6. Inshore Marine		
6.1.Water Quality	p. 64-69	Results text, table, figures and key messaging.
	Appendix B p. 115-119	Detailed results: tables for reference.
6.2.Coral	p. 69-73, Appendix G Table 145	Report card update on method, results text, table and key messaging (messaging provided based on MMP report).
	Appendix F p. 148	Inshore coral site list with indicator and condition index scores.
6.3.Seagrass	p. 74-76	Results text, table, key messaging and recommendations (messaging provided by Alex Carter).
6.5.Overall inshore marine scores and grades	p. 77	Results text and table.
7 Offshore Marine		
7.1.Water Quality	p. 78	No water quality reporting for 2024-25. Proposed to be discontinued.
7.2.Coral	p. 78-80	Results text, tables and key messaging (messaging from LTMP monitoring results published online).
	Appendix F p. 149, Table 97	Offshore coral site list with indicator and condition index scores
7.3.Overall offshore marine score and grade	p.80	Results text and table.
Appendix G. Index, indicator category and indicator scores and grade tables for 2015-16 to 2022-23.	p.150 -182	Results tables for 2023-24 added to all previous years.
Appendix I. Seagrass monitoring recommendations and project updates	Appendix I. p. 185	Appendix I added to include recommendations for expanding seagrass monitoring and information about current seagrass monitoring projects that could assist expansion and was provided by the James Cook University TropWATER Seagrass Team.