Mackay-Whitsunday-Isaac Report Card Results 2025

(Reporting on data July 2023 to June 2024)

Technical Report

Mackay-Whitsunday-Isaac Healthy Rivers to Reef Partnership

July 2025

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Executive Summary

The Mackay-Whitsunday-Isaac (MWI) Healthy Rivers to Reef Partnership (the Partnership) is a collaborative initiative based in the MWI region of Queensland, Australia. It brings together a diverse network of stakeholders including industry, farmers, fishers, Traditional Owners, scientists, tourism operators, community, and all tiers of government; with the shared goal of reporting on, improving and maintaining the health of the region's waterways.

This document provides detailed results of waterway health and discusses these findings in relation to guideline values, regional climate, natural processes, and human activities. It contains data from a variety of waterway condition assessments including freshwater, estuarine, inshore, and offshore marine environments. The Report Card focuses on 18 key graded areas, reflecting results for five freshwater basins, eight estuarine areas and five marine zones. For each waterway type, a series of environmental *indicators* are aggregated into *indicator categories* and then into *indices*. Although most indicators are assessed annually, others are updated every three or four years due to differences in the time scales at which notable changes typically occur and/or logistical constraints (Table I). As the Report Card integrates data from many sources with evolving maturity and comprehensiveness, confidence levels are published following results, as are historic scores for comparison where appropriate.

Table I. Frequency of reporting and latest updates for waterway condition indicators in the 2025 MWI Report Card.

Water type	Index	Indicator Categories	Frequency of Reporting	Last Updated
Freshwater	Water Quality	Sediment	Annually	**2024**
		Nutrients	Annually	**2024**
		Pesticides	Annually	**2024**
	Habitat and Hydrology	In-stream habitat modification	4 Yearly	**2023**—Impoundment Length **2023**—Fish Barriers
		Flow	Annually	**2024**
		Riparian ground cover*	Unknown	**2014** (scores revised in 2016)
		Freshwater wetlands	4 Yearly	**2019** (2017 data)
	Fish	Fish	3 Yearly	**2024**
Estuary	Water Quality	Phys-chem	Annually	**2024**
		Nutrients	Annually	**2024**
		Chlorophyll-*a*	Annually	**2024**
		Pesticides	Annually	**2024**
	Habitat and Hydrology	Riparian Vegetation	4-Yearly	**2022** (2019 data)
		Mangrove and Saltmarsh	4-Yearly	**2022** (2019 data)
		Fish Barriers	4-Yearly	**2023**
Marine	Water Quality	Nutrients	Annually	**2024**
		Water Clarity	Annually	**2024**
		Chlorophyll-*a*	Annually	**2024**
		Pesticides	Annually	**2024**
	Coral	Coral	Annually	**2024**
	Seagrass	Seagrass	Annually	**2024**

*Due to methodology changes to riparian ground cover mapping (provided by the Department of Environment and Science), this indicator category has not been updated since 2014.

Established in October 2014, a primary focus of the Partnership is the production of an annual waterway health report card for the MWI region. The 2025 Report Card (reporting on the 2023–2024 financial year) is the Partnership's eleventh Report Card, demonstrating the MWI community's commitment to understanding and caring for the local environment. The MWI Partnership is one of five regional Queensland partnerships releasing regionally specific report cards in the wider Great Barrier Reef (GBR) World Heritage Area. The MWI Report Card collates a wide range of data from more than 36 data providers and Partners who operate in the MWI region, or who are committed to learning more about the region's waterways. The Partnership helps build and shape the community's understanding of waterway health and provides data that can be used to inform environmental management and decision-making.

I. Regional Climate

All MWI basins experienced annual average temperatures that were 'very much above average' in the 2023–24 reporting period compared to the long-term mean, with some temperature anomalies up to 1.7°C higher than the long-term mean (Section 1.4.3). There were no months where any basin recorded temperatures 'below average', and sea surface temperature has been above the long-term mean for over ten years (Appendix 8.1.6). Rainfall in the MWI region was 'average' in comparison to the long-term mean in all MWI basins – the Don, Proserpine, O'Connell and Pioneer basins (Section 1.4.4). The Proserpine Basin recorded the greatest deviation from the long-term mean rainfall at 77%, or 300 mm below the long-term average (Table 4). During the 2023-24 reporting season, rainfall in all basins except Plane had lower annual rainfall compared to the previous reporting year (Appendix 8.1).

Rainfall patterns were varied, with monthly rainfall ranging from 'very much above average' to 'below average' across the region. Rainfall was high across the region in July 2023, within the 90th percentile in all basins. 'Below average' rainfall occurred in the Don Basin in August 2023 and April 2024, and in Proserpine, O'Connell, and Pioneer basins in October 2023 (Section 1.4.4). Regional rainfall is often a key driver of the Report Card scores as reductions or increases in runoff and discharges throughout the region lead to reductions or increases of inputs into aquatic systems, in particular as it relates to agricultural land uses (Section 1.4.5).

Accumulated heat stress in marine waters (measured as elevated sea surface temperatures) in 2024 surpassed previous events and led to the fifth mass coral bleaching event on the GBR since 2016 (Section 1.4.6). Furthermore, under current climate change projections marine heatwaves as recorded in 2024, 2022 and 2020 are going to become more widespread, frequent, and intense. Historic extreme events can have long-lasting impacts on aquatic ecosystems (Section 1.4.2). Climate scientists also predict more extremely hot days and a higher intensity of short-duration heavy rainfall events. Storm events are expected to decline in frequency but increase in intensity. For these reasons, climate change remains the most significant threat affecting the health of the GBR (Waterhouse et al., 2024).

II. Freshwater Basins

Water quality index including dissolved inorganic nitrogen (DIN), filterable reactive phosphorus (FRP) and total suspended solids (TSS), fish community index including assessments on native and pest fish, and flow indicator scores were updated for freshwater basin condition assessments during this reporting period (Table II). The fish barriers, impoundment length, riparian extent, and wetlands extent indicators were based on repeat data (following multi-year reporting cycles) (Section 2).

All MWI **basin overall** grades remained the same as the previous monitoring period (Figure I) except Proserpine Basin. The Proserpine Basin dropped from 'good' to 'moderate' for the first time in seven years due to its fish community index score, which declined from 'good' to 'poor' (Section 2.3). The Don Basin was the only basin with a 'good' grade. The Don Basin generally scores higher across water quality indicators than the other basins (Section 2.1.4), potentially indicating differences in land use intensity across the region.

Table II. Condition grades of freshwater indicator categories and overall basins for the 2025 Report Card.

Freshwater Basin	2025 Report Card				
	Water Quality	Habitat and Hydrology	Fish	RC25 Results	RC24 Results
Don	72	72	58	67	76
Proserpine		54	36	45	67
O'Connell	57	41	75	57	58
Pioneer	44	34	64	47	56
Plane	36	45	72	51	51

Scoring range: ■ Very Poor = 0 to <21 | ■ Poor = 21 to <41 | ■ Moderate = 41 to <61 | ■ Good = 61 to <81 | ■ Very Good = 81 to 100 | ■ No score/data gap

Sediment indicator grades show generally stable scores (Section 2.1.1). The sediment grade in the Don Basin improved from 'good' to 'very good' and declined in the Pioneer Basin from 'good' to 'moderate'. Basins generally recorded the highest monthly median sediment concentrations between December to February corresponding with the wet season, or with 'above average' rainfall. The exception was a monthly median concentration above guideline value recorded in October in the O'Connell Basin despite rainfall being 'below average' during that month (Section 2.1.1).

Nutrients indicator category grades remained stable (Section 2.1.2) and a one-point increase improved the nutrients grade from 'moderate' to 'good'. Fluctuations in the DIN and FRP indicators were noted in the Don Basin, where DIN improved from 'poor' to moderate due to fewer high concentrations of DIN recorded, and FRP declined 38 points from 'good' to 'moderate'. DIN in the Plane Basin improved from 'poor' to 'moderate' although it is worth noting that the Sandy Creek Homebush site had the five highest monthly DIN values of all monitored sites. FRP scores in the Plane Basin declined, and monthly medians for FRP at both the Plane Creek Sucrogen Weir site and the Sandy Creek Homebush site exceeded guidelines for ten months of the 2023-24 reporting period (Section 2.1.2, Appendix 8.2.3).

Pesticide risk remained the poorest scoring indicator for basin water quality in the MWI region, with three of the region's basins – Proserpine, Plane and Pioneer – scoring 'very poor' or 'poor' for the tenth year in a row, indicating a high risk of adverse effects to the region's aquatic species due to pesticide exposure (Section 2.1.3). As with previous years, applications of imidacloprid (an insecticide) and diuron (a herbicide) due to agricultural land use were the key contributors to pesticide risk across most of the MWI region. Other contributors included metalachlor, imazapic, isoxaflutole, and atrazine. In the Don Basin pesticides were 'good', improving for the second consecutive year, influenced by decreased detection of metsulfuron-methyl. Metsulfuron-methyl, associated with urban and/or industrial use, was a key contributor to risk at Plane Creek Sucrogen Weir site specifically.

The **fish community** index (Section 2.3) recorded a decline in POISE (Proportion of Indigenous Species Expected) indicator scores in all basins. While indigenous fish that are commonly abundant were still prevalent in the survey data, less common indigenous species were not caught as often. PONI (Proportion of Non-Indigenous Fish) indicator scores declined in both the Don and Proserpine basins as there were recorded increases in alien fish species such as Mosquito Fish, Guppies, and Tilapia. A range of non-indigenous fish (including pest fish) species thrive in low-flow conditions and increased counts may be related to dry periods during sampling in October and November 2023.

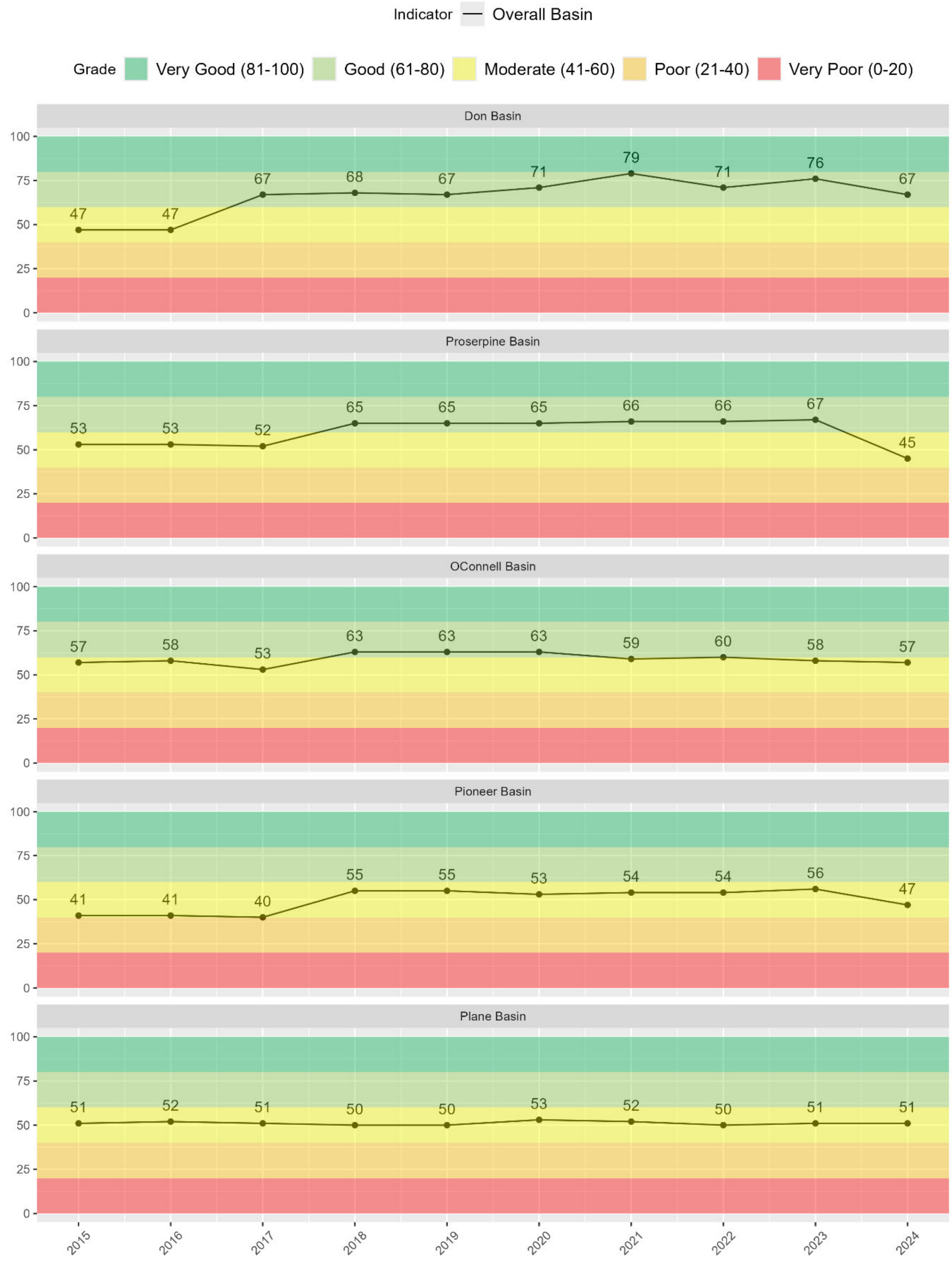

Figure I. Overall basin grades for the 2025 Report Card compared to the historic record.

III. Estuaries

The estuarine water quality index including dissolved oxygen (DO), turbidity (NTU), chlorophyll-*a*, dissolved inorganic nitrogen (DIN), and filterable reactive phosphorus (FRP) was updated during this reporting season; however habitat and hydrology was based on repeat data (Table III). Scores remained similar to the previous year, with grade decline in Vines from 'good' to 'moderate' (Figure II).

Table III. Estuary overall condition alongside indicator category scores and grades for the 2025 Report Card (2023-24 reporting period).

Estuary	2025 Report Card				
	Water Quality	Habitat and Hydrology	Fish	RC25 Results	RC24 Results
Gregory River	62	84		73	75
O'Connell River^	59	53		56	53
St Helens/Murray Creek	47	67		57	59
Vines Creek	55	60		57	61
Sandy Creek	52	52		52	58
Plane Creek	75	57		66	68
Rocky Dam Creek	54	75		64	66
Carmila Creek	73	95		85	82

Scoring range: ■ Very Poor = 0 to <21 | ■ Poor = 21 to <41 | ■ Moderate = 41 to <61 | ■ Good = 61 to <81 | ■ Very Good = 81 to 100 | ■ No score/data gap

^ Data used to evaluate the O'Connell River estuary are taken from an end-of-catchment monitoring site within the O'Connell River which is also used to monitor nutrients within freshwater basins.

The **water quality** (Section 3.1.5) grade declined in both Sandy and Vines estuaries from 'good' to 'moderate'. Sandy Creek score decline was due to both pesticides and chlorophyll-*a* indicators. In Vines Creek the change was due to decline in all indicator scores, most noticeably in FRP.

The **nutrients** grade remained the same as the previous year in all estuaries (Section 3.1.1). Across all estuaries, DIN scores were consistently lower than FRP scores; particularly in Carmila Creek, Rocky Dam Creek, and Vines Creek (Figure 31).

The **chlorophyll-*a*** score declined in most estuaries due to higher recorded chlorophyll-*a* concentrations (Section 3.1.2). The Gregory River and Murray and St Helens estuaries recorded their lowest chlorophyll-*a* score since the Report Card's inception ('poor' and 'very poor' respectively) and there was a marked decline in Sandy Creek (from 'good' to 'moderate'). No obvious reasons have been identified for decline and continued monitoring may help determine if this was due to natural variability or other causes. Carmila Creek was the only estuary that improved in chlorophyll-*a* grade (from 'poor' to 'moderate').

The **pesticides** score (Section 3.1.4) improved in O'Connell and Rocky Dam from 'poor' to 'moderate', however Sandy Creek declined from 'poor' to 'very poor'. Sandy Creek, O'Connell River, Plane Creek, and Rocky Dam Creek all recorded results that suggest risk to aquatic species. Diuron, imidacloprid, and to a lesser extent, metolachlor, imazapic, and atrazine, were key contributors to the overall Pesticide Risk Metric throughout the region. Exceptions included Plane Creek and Vines Creek, where metsulfuron-methyl (a herbicide) was a key contributor. Metsulfuron-methyl is not registered for use in sugarcane and applications may be related to clearing land for grazing, or to urban and/or industrial use (Section 3.1.4).

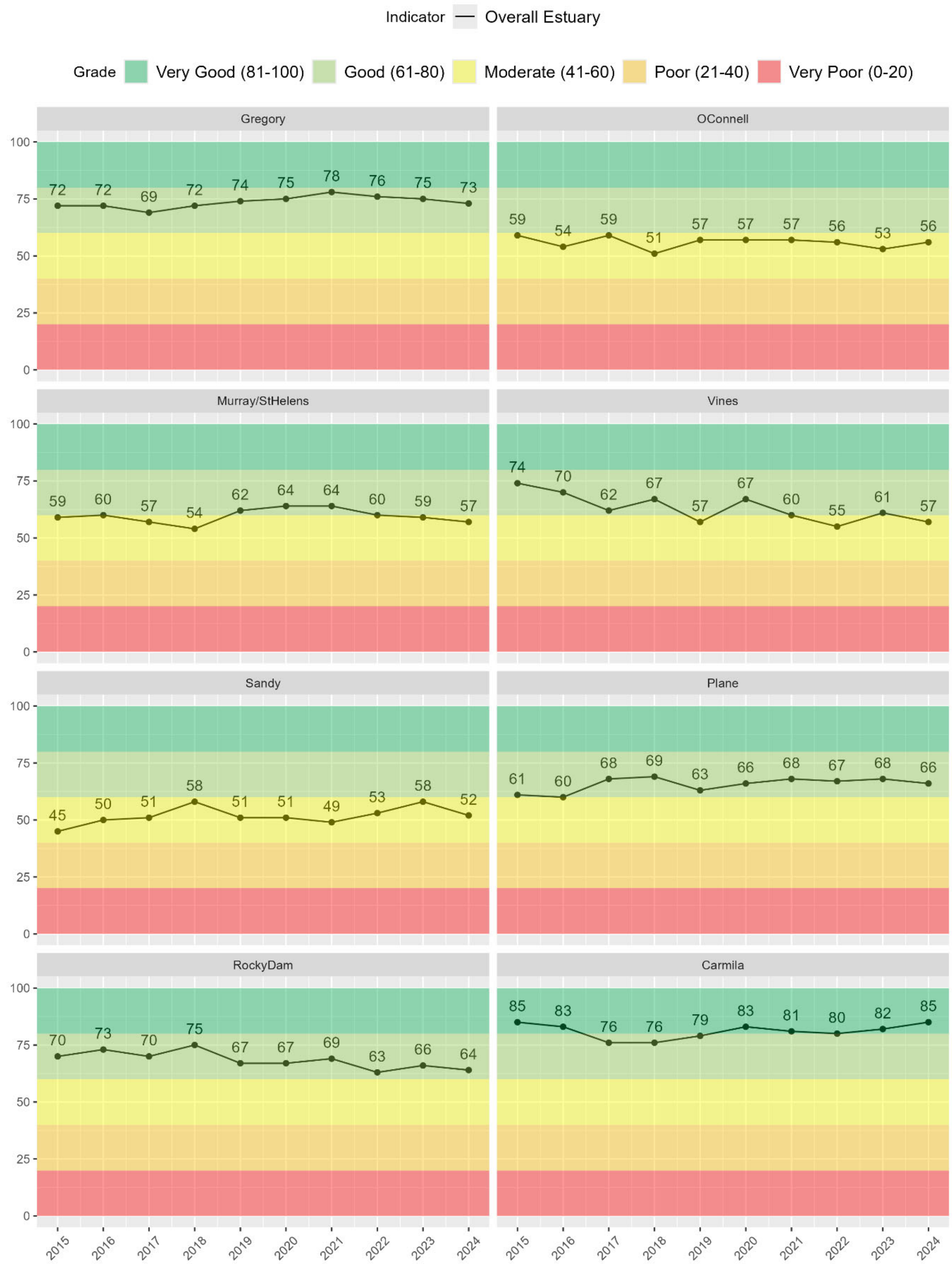

Figure II. Overall condition scores and grades of estuaries for the 2025 Report Card (2023-24 reporting cycle) in comparison to historic scores.

IV. Inshore and Offshore Marine

All inshore marine zone indicators and offshore coral were updated in the current reporting cycle (Table IV). Water quality indicators include particulate nitrogen (PN), particulate phosphorus (PP), oxidised nitrogen (NOx), chlorophyll-*a*, turbidity (NTU), Secchi disc, and total suspended solids (TSS). Offshore water quality is not currently reported as new data sources are being investigated. Overall inshore zone grades remained 'moderate' as in the previous year (Figure III).

Table IV. Overall inshore and offshore marine scores and grades for the 2025 Report Card (2023-24 data). Overall grade for Offshore Zone cannot be calculated due to minimum index requirements.

2025 Report Card						
Marine Zones	**Water Quality**	**Coral**	**Seagrass**	**Fish**	**RC25 Results**	**RC24 Results**
Northern	65	40	70		59	56
Whitsunday	59	35	31		42	40
Central	55	37	62		51	56
Southern	38	23	86		49	41
Offshore*		65				

Scoring range: ■ Very Poor = 0 to <21 | ■ Poor = 21 to <41 | ■ Moderate = 41 to <61 | ■ Good = 61 to <81 | ■ Very Good = 81 to 100 | ■ No score/data gap

* The Offshore Zone cannot be given an overall grade as only the coral index was measured during the 2023–24 reporting cycle; however, coral scores remain for reference.

Water quality index scores improved in all inshore marine zones during the current reporting cycle (Section 4.1). Improvement in the Northern Zone was influenced by decreased concentrations of nutrients, most notably PN, which improved in grade from 'poor' to 'good'. The improved grade in the Whitsunday Zone was influenced by the incorporation of Project Blueprint data, potentially due to these sample sites being further from receiving waters or regional rivers. The Southern Zone had the largest improvement in overall water quality in this reporting cycle, influenced by nutrients grades where both PN and PP improved from 'poor' to 'good'. Chl-*a* was an issue for the second consecutive year, as it was graded 'poor' or below in the Northern, Central, and Southern inshore zones.

Coral index grades (Section 4.2) remained the same as the previous year, bar Central Zone. Decline in the Central Zone from 'moderate' to 'poor' was influenced by increased macroalgae cover, most notably in the proportion of macroalgae to total algae at Round Top Island. Coral cover in the Whitsunday and Northern Zones have remained 'poor' since TC Debbie, demonstrating limited recovery of these coral communities. The Southern Zone coral grade remained 'poor', and macroalgae cover continued to be the limiting factor in further growth of coral communities in this zone. However, Southern Zone coral cover increased despite a severe, widespread, bleaching event in early 2024, where only 3% of corals were bleached in comparison to 41% in similar heat stress in 2020. A similar pattern of bleaching was seen in the Whitsunday Zone.

Seagrass index grades (Section 4.3) remained the same in all inshore marine zones, bar the Southern Zone, which improved. The Southern Zone Flock Pigeon Island meadow has continued to show signs of recovery since the declines in 2020, and this reporting cycle coincided with a return of substantial dugong feeding trails for the first time since 2019. The Northern Zone remained 'good', although benthic light monitoring indicated more frequent periods of light falling below those required for seagrass growth in comparison to previous years. Seagrass grades in the Whitsunday Zone remain 'poor' due to a range of environmental pressures. Central Zone seagrass scores declined, but the grade remained 'good'. The Hay Point offshore meadow declined for the second year, however the Mackay offshore meadow had record high biomass and area.

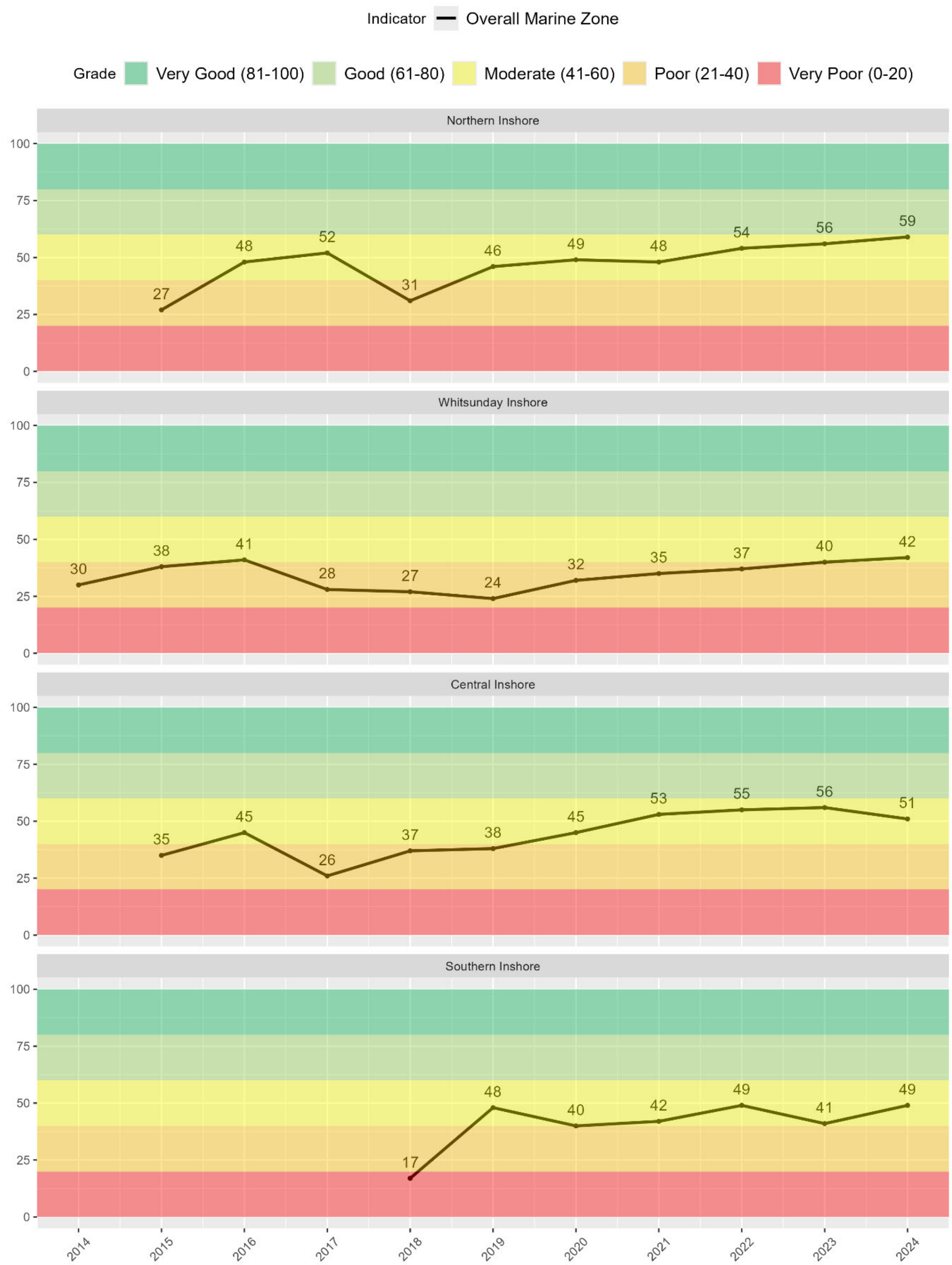

Figure III. Overall inshore marine scores for the 2025 Report Card (2023-24 data) compared to the historic record. Historic scores may differ slightly from past reporting as they have been back-calculated to reflect changes in sites and/or methods for marine indices.

Authorship Statement

The Mackay-Whitsunday-Isaac (MWI) Healthy Rivers to Reef Partnership (the Partnership) 'Mackay-Whitsunday-Isaac 2025 Report Card Results' technical report was compiled by the Partnership's Lead Technical Officer Brie Sherow.

Substantial input was received from the regional report card's Technical Working Group (TWG) members. Content was also drawn from previous MWI technical reports.

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The Partnership acknowledges the Traditional Owners from the Land and Sea Country of (or within) the region, including the Yuwibara, Koinjmal, Barada, Widi, Ngaro, Gia and Juru Peoples, and pays respect to the ancestors, the Elders both past and present, and to the people.

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Terms and Acronyms

AIMS	Australian Institute of Marine Science
AMDI	Australian Marine Debris Initiative
Average	A calculated central value of a set of numbers measured by adding up all values and dividing by the number of values included.
Basin	An area of land where surface water runs into smaller channels, creeks, or rivers and discharges into a common point and may include many sub-basins or sub-catchments. Also known as river basin or catchment.
Best management practice	Best management practices articulate a reasonable best practice level that can be expected to result in a moderate–low risk to water quality.
Biodiversity	The variability among living organisms from all sources. It includes diversity within species and between species and the diversity of ecosystems.
Biomass	The total quantity or weight of organisms over a given area or volume.
BoM	Bureau of Meteorology
Chl-*a*	Chlorophyll-*a*: A measure of overall phytoplankton biomass. It is widely considered a useful proxy for measuring nutrient availability and the productivity of a system.
Climate Normal	A 'normal' is the 30-year average of a particular variable's measurements, calculated in accordance with the World Meteorological Organisation (WMO).[1]
CTF	Cease-to-flow
CV	Coefficient of variation
DDL	Declared Downstream Limit
DEHP	Department of Environment and Heritage Protection, Queensland. Now part of DETSI.
DESI	Department of Environment, Science, and Innovation Queensland. Now part of DETSI.
DETSI	Department of the Environment, Tourism, Science, and Innovation Queensland. Formerly DEHP, DES, DESI.
DHW	Degree Heating Weeks (DHW) are an accumulated measurement of sea surface temperature (SST) that assesses the instantaneous bleaching heat stress during the prior 12-week period. 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. Source: Coral Reef Watch, National Oceanic and Atmospheric Administration (CRW, NOAA)0F[2]
DIN	Dissolved inorganic nitrogen
DO	Dissolved oxygen
Driver	An overarching cause of change in the environment.
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 syndrome' if it is stable and sustainable—that is, if it is active and maintains its organization and autonomy over time and is resilient to stress. Ecosystem health is thus closely linked to the idea of sustainability, which is seen to be a comprehensive,

[1] https://www.ncei.noaa.gov/products/land-based-station/us-climate-normals
[2] https://coralreefwatch.noaa.gov/product/50km/index.php

	multiscale, dynamic measure of system resilience, organization, and vigour." (Costanza, 1992)
EC	An enclosed coastal (EC) water body includes shallow, enclosed waters near an estuary mouth and extends seaward towards deeper, more oceanic waters further out. The seaward cut-off off an EC water body is defined by the Great Barrier Reef Marine Park Authority (GBRMPA, 2010).
Estuary	The aquatic environment at the interface between freshwater and marine ecosystems.
Fish (as an index)	The fish community index, measured by two indicators (the number of indigenous and non-indigenous fish, respectively), is evaluated and included in the ecosystem health assessment (coasters) for basins. Inclusion in the Report Card will contribute to an understanding of the local fish communities.
Fish Barriers (as an indicator)	Fish barriers relate to any man-made barriers that prevent or delay connectivity between key habitats that have 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.
FRP	Filterable reactive phosphorus
GBR	Great Barrier Reef
GBRCLMP	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—Limits that are defined by experts in their respective fields used to gauge the condition of an indicator/site. If grades/scores exceed guideline values, this signifies that changes impacting ecosystem health have occurred at a level beyond naturally occurring processes.
Impoundment (also impoundment length)	An indicator used in the 'in-stream habitat modification' indicator for freshwater basins in the region. This index reports on the proportion (%) of the linear length of the main river channel inundated at the Full Supply Level of artificial in-stream structures, such as dams and weirs.
Index	Is generated by indicator categories (e.g., water quality is an index 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., nutrients made up of particulate nitrogen and particulate phosphorus).
Inshore (as a reporting zone)	Inshore is a reporting zone in the Mackay-Whitsunday-Isaac Report Card that includes enclosed coastal, open coastal, and mid-shelf waters.
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.

ISP	Independent Science Panel established under the Reef Water Quality Protection Plan (now Reef 2050 Water Quality Improvement Plan), who have independently reviewed the methodologies involved in the report card assessments.
LOR	Limit of reporting
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. Increased macroalgae on a coral reef is often undesirable, indicating reef degradation (Diaz-Pulido & McCook, 2008).
Mean	The average or 'central' value of a set of numbers.
Measure	A measured value that contributes to an indicator score for indicators that consist of multiple measures (e.g., flow, estuary fish barriers).
Median	The middle value out of a defined list of values.
MMP	Great Barrier Reef Marine Monitoring Program. This provides water quality, coral, and seagrass data for the Central and Whitsunday inshore zones in the Report Card.
MoA	The mode of action is used to classify pesticides according to how they exert their effect on the target organism. The mode of action will be defined by its biochemical effects.
MWI	Mackay-Whitsunday-Isaac
MWQ	Marine water quality (MWQ) dashboard and data—Bureau of Meteorology.
NOx	Oxidised nitrogen (nitrate and nitrite)
NQBP	North Queensland Bulk Ports Corporation Ltd
NTU	Nephelometric Turbidity Unit. Turbidity is a measure of water clarity influenced by the scattering and absorption of light through water. Highly turbid water contains particulate matter - which could be sediment, fine organic matter, algae or other microscopic organisms. This can be a problem for organisms which need light to function, particularly impeding photosynthesis in coral and aquatic plants.
Offshore Zone	Offshore is a reporting zone in the Mackay-Whitsunday-Isaac Report Card that includes mid-shelf and offshore water bodies.
Offshore (water body)	Offshore water bodies begin 60 km from the enclosed coastal boundary and extend to 280 km in the Mackay-Whitsunday-Isaac Region (GBRMPA, 2010).
OGBR&WH	Office of the Great Barrier Reef & World Heritage
Overall Score	The overall scores for each reporting zone used in the Report Card are generated by an index or an aggregation of indices.
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 (PRM)	Refers to the methodology for estimation of ecological risk associated with pesticide pollution.
Phys–chem	The physical–chemical indicator category that includes the indicators dissolved oxygen (DO) and turbidity.
PN	Particulate nitrogen

PONSE	Proportion of native (fish) species expected
Ports	NQBP Port Authority
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 (Nelder 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 area1F[3].
PSII herbicides	Herbicides that inhibit Photosystem II, an essential component of a plant's ability to absorb and transfer light energy. These include ametryn, atrazine, diuron, hexazinone, tebuthiuron, bromacil, fluometuron, metribuzin, prometryn, propazine, simazine, terbuthylazine, and 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.
Queensland Government	The Queensland Government includes several departments that provide data sources and support for the MWI Report Card. Key departments for the MWI Report Card are the Department of Environment, Tourism, Science and Innovation Queensland (includes management of the GBRCLMP); the Department of Local Government, Water and Volunteers (includes management of water monitoring); and the Department of Natural Resources and Mines, Manufacturing, and Regional and Rural Development (includes management of Queensland Spatial).
QPSMP	Queensland Ports Seagrass Monitoring Program
RCA	Reef Check Australia
RE	Regional ecosystem
REMP	Receiving Environment Monitoring Program
Resilience (as an indicator)	A multivariate metric developed by the MMP to measure the capacity of seagrass to cope with disturbances (Collier et al., 2021). The resilience metric better accommodates differences in recovery strategies between species in comparison to previous indicators.
Riparian extent (as an indicator)	An indicator used in the assessments of both basin and estuarine zones in the MWI Report Cards. This indicator uses mapping resources to determine the extent of the vegetated interface between land and waterways in the region.
Secchi	Secchi depth (m)—a measure of water clarity determined as the depth at which an opaque disc lowered into a water column is no longer visible.
SF	Scaling factor—A value used to set scoring range limits for indicators.
SST	Sea surface temperature
Standardised condition score	The transformation of indicator scores into the MWI Report Card scoring range of 0 to 100.
TC	Tropical Cyclone
TSS	Total suspended solids
TWG	Technical Working Group
Waterway	All freshwater, estuarine, and marine bodies of water, including reefs, and storm drains, channels, and other human-made structures in the MWI Region.

[3] Queensland Government 2016. Water Plan (Wet Tropics) 2013. Water Act 2000. https://www.legislation.qld.gov.au/view/pdf/2016-12-06/sl-2013-0282

Water quality guideline	For the purposes of waterway assessment, the term water quality guideline refers to values for the condition assessment of water quality drawn from a range of sources, including water quality objectives scheduled under the Environmental Protection (Water) Policy 2009 and water quality guideline values obtained from the Queensland Water Quality Guidelines (DEHP, 2009a), the GBRMPA Guidelines (GBRMPA, 2010), and the (ANZG, 2018).
Water quality objective (WQO)	Water quality objective refers to values for the condition assessment of water quality scheduled under the Environmental Protection (Water) Policy 2009.

1 Introduction

1.1 Purpose of this Document

This document provides technical results to support the Mackay-Whitsunday-Isaac (MWI) 2025 Report Card on waterway health. The results provided in this document relate to the condition of environmental indicators across freshwater, estuarine, and marine environments (Figure 1).

Figure 1. The MWI Healthy Rivers to Reef Partnership reporting region, showing marine zones, freshwater basins, and monitored rivers.

This document presents scores and grades based on data collected between 1st July 2023 and 30th June 2024 combined with repeat data for indicators that are updated less frequently. The condition assessments for environmental indicators are presented as numerical scores and compared to historic results. Confidence levels are presented alongside results. Refer to the MWI 2025 Report Card Methods (MWI HR2RP, 2025) for sampling and scoring methodology. When appropriate, previous results back-calculated using updated methods are presented for reference. Additional information associated with Report Card results are contained in appendices.

1.2 Background

The MWI Healthy Rivers to Reef Partnership (the Partnership) was established in October 2014, with the primary focus of producing an annual report card on the health of the region's waterways. The 2025 Report Card aggregates condition assessments from sampling sites within the freshwater, estuarine, and marine ecosystems in the reporting region (Figure 2). Human Dimensions such as Urban Water Stewardship and Cultural Heritage assessments have also been included. For each index, a series of indicators grouped into indicator categories are used to provide a holistic assessment of these environmental, social, cultural, and economic factors.

The 2017–2022 Program Design[4] outlines the guiding framework for the development and scope of the 2025 Report Card. Since the publication of the Program Design in 2018, changes to the monitoring sites and methods have occurred and are highlighted where relevant. For more detail, refer to the MWI Methods Report (MWI HR2RP, 2025) and the MWI Report Card Program Design 2017 to 2022. The Program Design is currently being updated by Technical Officers in the regional report card network and members of the Technical Working Group (TWG). Anticipated outputs include:

1. consolidated methods documentation (where possible), to deliver consistency of methods between the northern three regional report cards ;
2. stream-lined technical reports providing overviews of climate, score and grade tables, trends, and key messages;
3. an outline of the framework that was established in previous report cards alongside a plan to improve the report cards over the upcoming timeframe;
4. and consolidated priority for ongoing research and development of the regional report cards.

[4] https://healthyriverstoreef.org.au/wp-content/uploads/2018/12/mackay-whitsunday-report-card-program-design-2017-2022.pdf

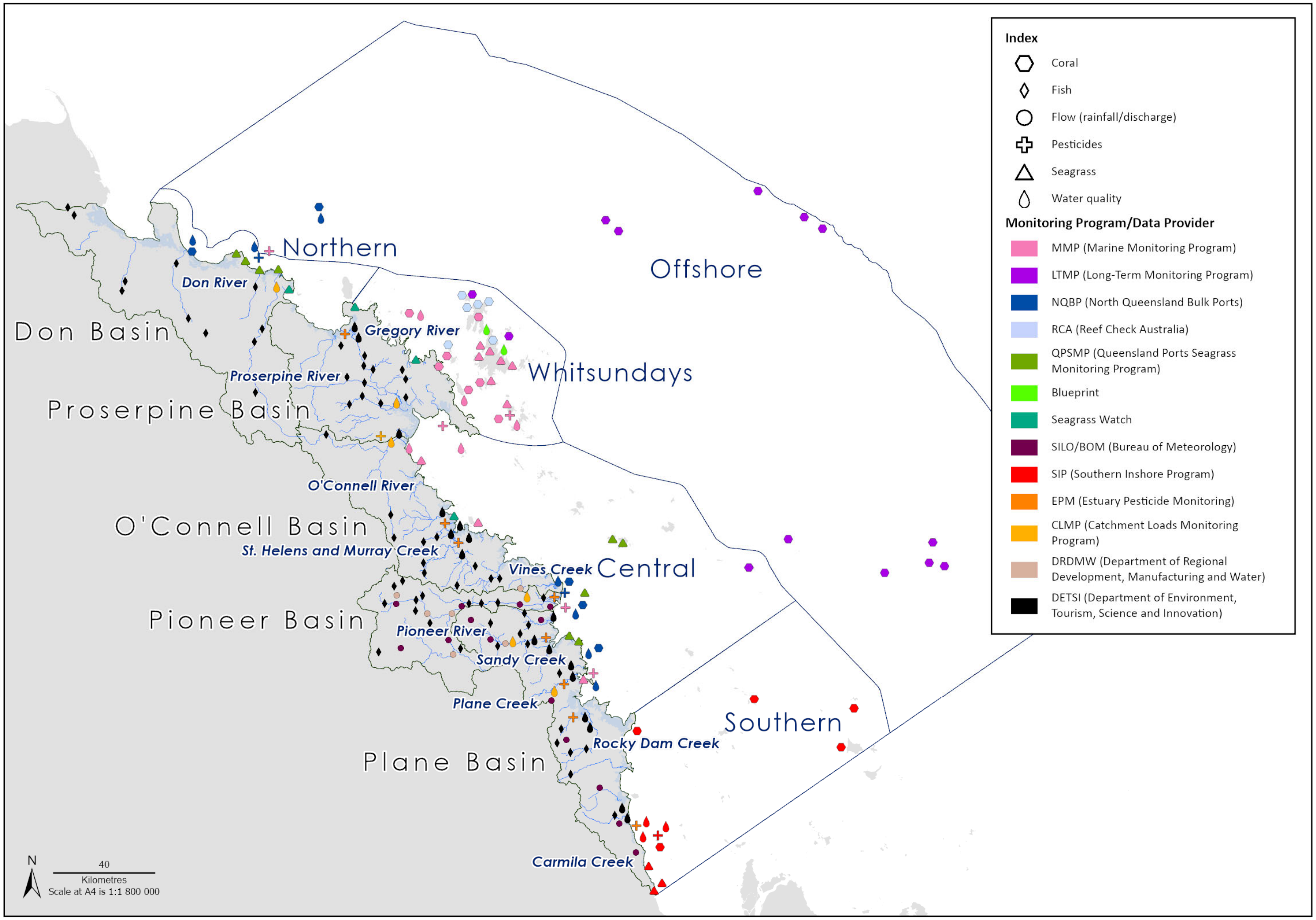

Figure 2. MWI sampling sites within freshwater basins, estuarine, inshore (designated by the local or state jurisdictional boundary), and offshore marine zones (designated by the eastern boundary of the Great Barrier Reef Marine Park).

1.3 Terminology

The Report Card assesses environmental indicators to report on the overall condition of MWI waterways. Scores for indicators are aggregated into indicator categories and typically follow three key themes: water quality, habitat, and taxa.

In the Report Card, overall scores and grades for indices are represented in the format of a coaster (Figure 3). An **indicator** is a measured value (e.g., particulate nitrogen concentration). **Indicator categories** (e.g., nutrients) are generated by one or more indicators. **Index/indices** (e.g., water quality) are generated by the aggregation of indicator categories. **Grades** are generated by the aggregation of indices or by a single index score.

Figure 3. Terminology used for defining the level of aggregation of indicators and how they are displayed in coasters in the Report Card.

Ordinal categories are used to describe the scores for condition of indicators, indicator categories and the overall score. This follows a five-point grading system from 'very good' (A) to 'very poor' (E) (Table 1). Indicators have specific scoring ranges and bandwidths, which are listed below the relevant results tables. Results for indicators that have divergent scoring ranges and bandwidths are required to be translated into a common scoring range before aggregation (based on that used by the Great Barrier Reef Water Quality Report Card (Table 1).

Table 1. Overall range of scores and grades within the Report Card

Scoring Range	Condition Grade and Colour Code
81 to 100	A = Very Good
61 to <81	B = Good
41 to <61	C = Moderate
21 to <41	D = Poor
0 to <21	E = Very Poor

1.4 Regional Setting

1.4.1 Drivers of Condition Assessments

Land management and catchment modification impair GBR water quality through degradation of vegetation, changed hydrology, increased erosion, expansion of fertilised land uses, urban centres and coastal developments (Waterhouse et al., 2024). In the MWI region, pressures that can impact marine ecosystems include ports and marinas, shipping, fishing, tourism, and recreational activities (Figure 4).[5] Terrestrial activities can put pressure on aquatic environments due to the transportation of sediments, nutrients, pesticides and other contaminants via surface water runoff. Across the GBR, pollutant loads have increased from pre-development by 1.4-5 times for fine sediments and 1.5 to 3 times for dissolved inorganic nitrogen, depending on the basin (Prosser & Wilkinson, 2024). Sugarcane areas are the largest contributor to end-of-catchment pesticide concentrations (Templeman & McDonald, 2024), and sites in the Mackay-Whitsunday region consistently record higher pesticide concentrations and higher risk than other locations (Negri et al., 2024). Increased loads of these pollutants are then received by coastal waters including wetlands, estuarine, and inshore marine habitats.

Figure 4. Conceptual diagram of the key drivers, pressures, and ecosystems in the MWI region.

[5] https://healthyriverstoreef.org.au/our-region/pressures/

The MWI reporting region includes the Don, Proserpine, O'Connell, Pioneer, and Plane basins, and is made up of 33 sub-catchments that flow into eight receiving waters, from Upstart Bay in the north to Flaggy Rock Creek in the south. The dominant land use in the region by percent cover is grazing, and between 2016 and 2021 there was a 7% change from conservation land (classed as 'conservation and natural environment - residual native cover') to grazing (classed as 'production from relatively natural environment - grazing native vegetation') (Table 2). It is unclear whether or to what extent modifications have occurred on the ground in these areas. Land use in the region is dominated by agricultural activities (including sugarcane, grazing and horticulture), and intensive use activities such as mining and urban development (Figure 5).

Table 2. Percent cover of land use types within the MWI region recorded in 2016 and 2021 shown alongside the change in time.

Land Use	2016 % Cover	2021 % Cover	Change
Grazing	47%	54%	7%
Conservation	23%	16%	-7%
Sugarcane	13%	13%	0%
Marsh / wetland	6%	6%	0%
Forestry	6%	6%	0%
Intensive use	4%	4%	0%
Water	2%	2%	0%
Horticulture / Crops	1%	1%	0%

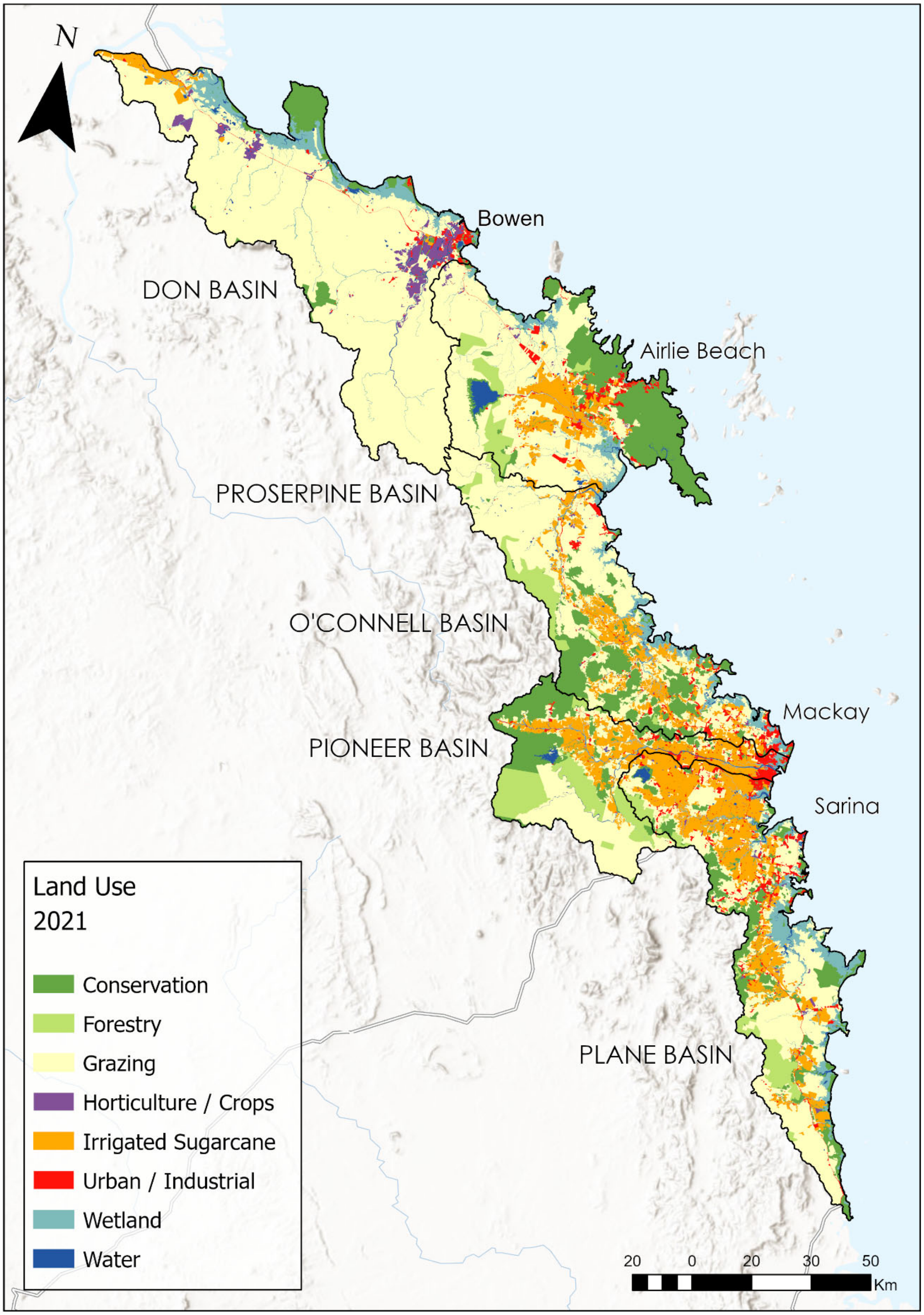

Figure 5. Land use in the MWI reporting region. Source: Australian Land Use and Management Classification V8 (2016), spatial data last updated 2021.

1.4.2 Regional Climate

Geographically the MWI region is situated in North Queensland, north of the Tropic of Capricorn and typified by a tropical to subtropical climate. Regional climate is characterised by two distinct seasons: wet (November to April) and dry (May to October). During the wet season, the region may experience elevated rainfall, tropical lows, and Tropical Cyclones (TCs). TCs may generate considerable rainfall and flooding in addition to increased sediment resuspension in the marine environment. Predominant trade winds create a similar but smaller-scale effect (particularly in the Don Basin), and dry season south easterly trade winds result in increased wave action on nearshore benthos leading to larger volumes of sediment resuspension.

Annual shifts in weather patterns influence the frequency and severity of environmental events (e.g. drought, bushfires, and floods) within natural ecosystems and modified environments. Climate variability can dictate how land management activities evolve within and between seasons, and weather events often influence scores of environmental indicators. Recent events within the MWI region include below average rainfall between 2019–2022, marine heat waves in 2020, 2022, and 2024, and the residual impacts of Severe TC Debbie in March 2017.

1.4.3 Temperature

Since records began in 1910, Australia's climate has warmed by 1.5°C (±0.2°C), with every decade since 1950 warmer than the one before. 'Very high' monthly maximum temperatures now occur six times as often as they did in 1960[6] and the 23-24 financial year was the second warmest on record.[7] This was reflected locally, with the Mackay weather station recording annual maximum temperature (°C) anomalies that have been above zero (unusually warm) almost every year since the 1980s—a stark change to the 70 years prior (Figure 6).

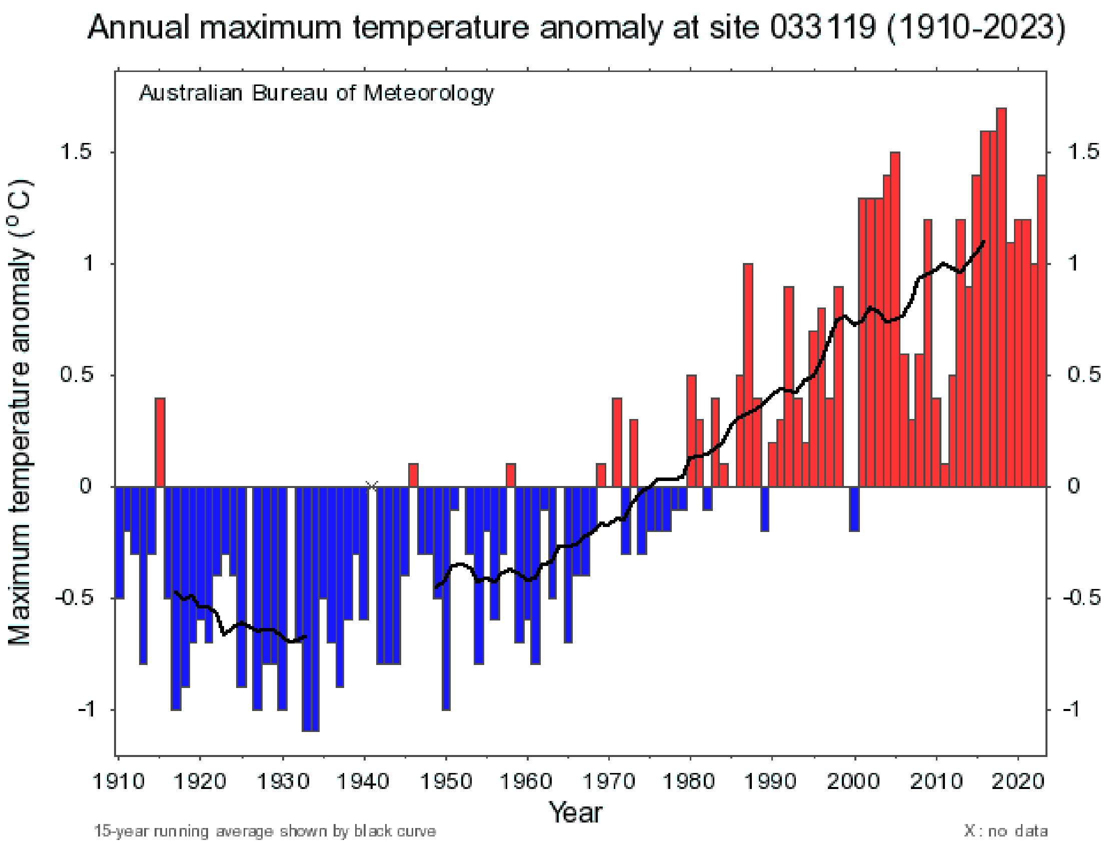

Figure 6. Annual maximum temperature (˚C) anomaly at Mackay (site 033119) from 1910 to 2023. A rolling fifteen-year average is shown by the black line. Source: BoM, Australia climate change site data (http://www.bom.gov.au/climate/change/hqsites/).

All basins in the MWI region experienced annual air temperatures that were 'very much above average', and there were no months where any basin recorded temperatures below average (Table 3). These temperature anomalies were up to 1.7 °C above the long-term mean (Figure 7).

[6] http://www.bom.gov.au/state-of-the-climate/australias-changing-climate.shtml

[7] Financial year climate and water report 2023–24

Table 3. Monthly temperature percentiles and annual average percentiles for basin areas of the MWI region for 2023–24 compared to a long-term mean based on historical temperature records from 1910 to 2024. Data source: BoM

Basin	2023						2024						Annual average
	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	
Don													
Proserpine													
O'Connell													
Pioneer													
Plane													

Air temperature percentile categories

≤ 1	> 1 – < 10	10 – < 30	30 – < 70	70 – < 90	90 – < 99	≥ 99
Lowest 1%	Very much below average	Below average	Average	Above average	Very much above average	Highest 1%

A

B

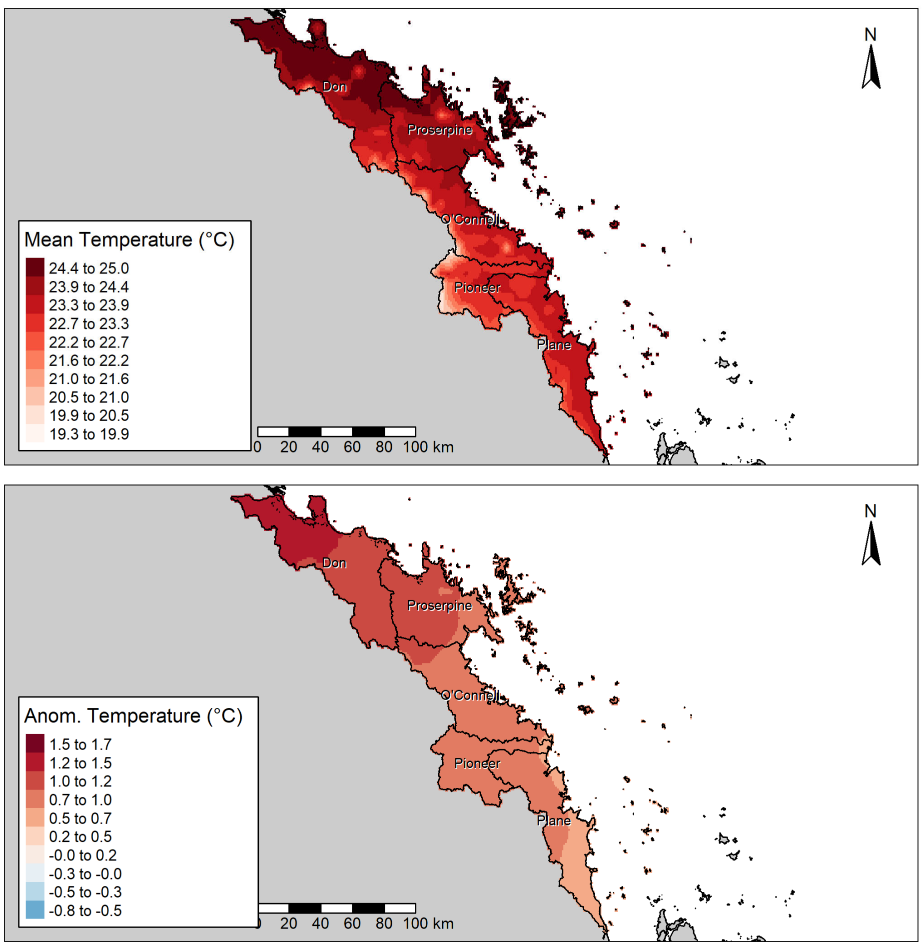

Figure 7. Air temperature in the MWI region. A) Mean annual temperature in the MWI region in 2023-24. Annual temperature was derived by taking the mean of monthly averages calculated across spatial grid subsets of each basin. The long-term mean was calculated from the oldest 30-year record (1911-1940). The scale is derived from actual air temperatures recorded across the region. B) Difference in degrees Celsius of 2023-24 temperatures from a long-term mean based on historical temperature records from 1911 to 1940. The scale is derived from the absolute min and max anomaly values recorded within the 30-year reference period. Data source: BoM.

1.4.4 Rainfall

Australian rainfall for the 2023–24 period was 14% above the 1961–90 climatological averaging period, however August to October 2023 was Australia's driest three month period on record since 1900.[8] Annual rainfall in the MWI region ranged from 640 to 1509 mm, with rainfall anomalies ranging from over 300 mm below the long-term average in the Proserpine Basin to nearly equal the long-term mean in the Plane Basin (Table 4, Figure 8).

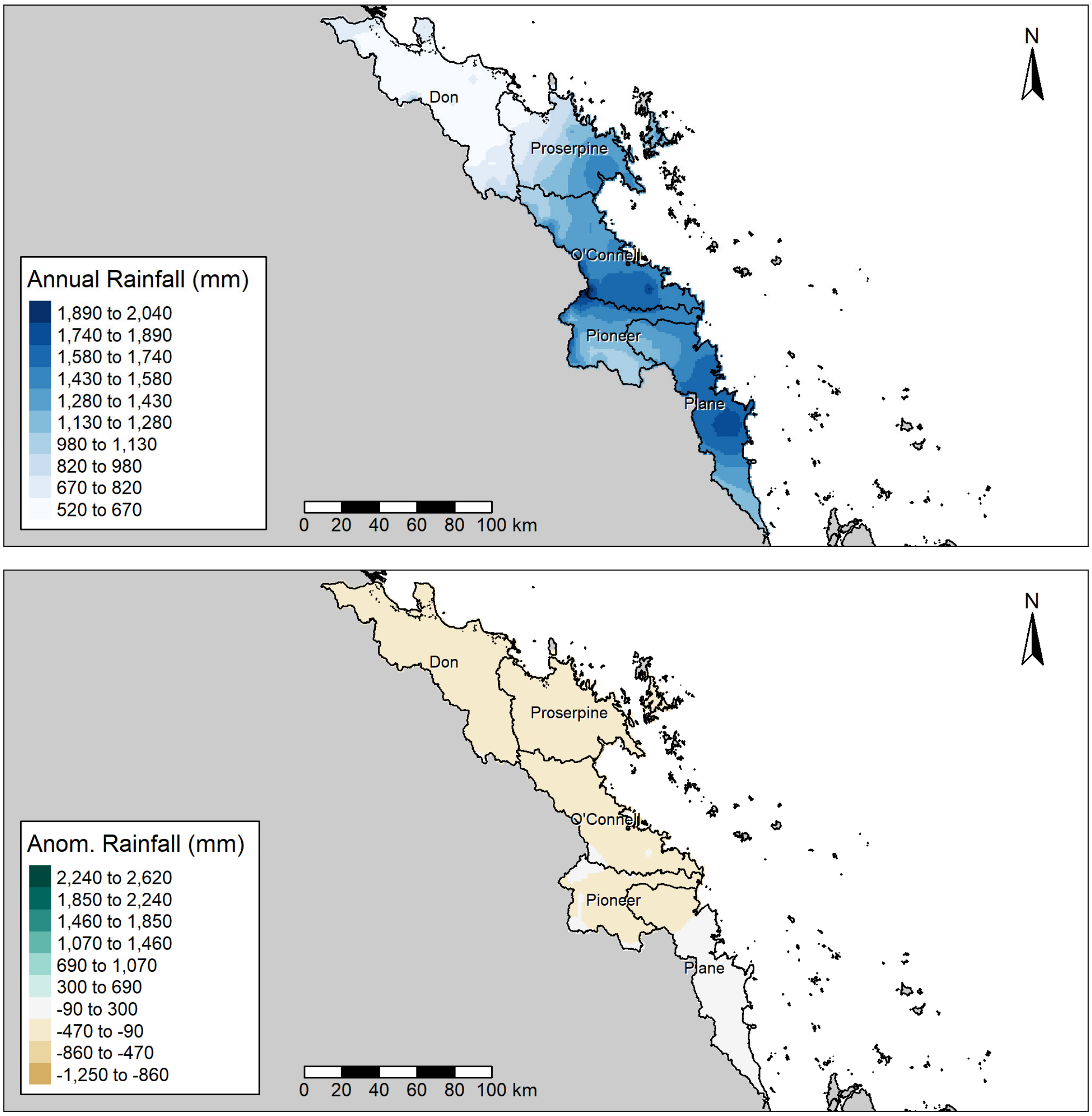

Figure 8. Rainfall in MWI. A) Annual rainfall in the MWI region in 2023-24. Annual rainfall was derived by summing monthly averages calculated across spatial grid sub-sets of each basin. The scale is based on rainfall recorded across the MWI region during the current reporting period. B) Anomaly of-annual rainfall (mm) in 2023-24 from the long-term mean (calculated from historical rainfall records from 1991 to 2020). Data source: Australian Water Outlook (https://awo.bom.gov.au/).

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[8] http://www.bom.gov.au/climate/current/financial-year/aus/summary.shtml

The Don Basin has consistently been the driest of the MWI basins since 1911, with a long-term mean of <900 mm compared to ~1500 mm for the other basins (Table 4). In the last ten years, the Pioneer and Plane basins recorded eight years of annual rainfall below their long-term means, with the other three basins recording seven out of the past ten years below the long-term mean (Appendix 8.1). All basins bar Plane had lower annual rainfall in 2023–24 than the long-term mean (Table 4) and lower annual rainfall during the 2023–24 reporting year compared to the previous year (Appendix 8.1).

Table 4. Annual rainfall statistics for basins in the Mackay-Whitsunday-Isaac region during 2023-24.

Basin	Annual mean rainfall (mm)	Long-term mean (mm)	Anomaly (mm) (+/- long-term mean	Percentage (%) of long-term mean
Don	640	819	-179	78%
Proserpine	1086	1412	-326	77%
O'Connell	1450	1594	-144	91%
Pioneer	1348	1463	-115	92%
Plane	1509	1505	4	100%

Annual rainfall patterns obscure the variation in rainfall observed throughout the year, with monthly rainfall ranging from ‘very much above average’ to ‘below average’ (Table 5). Rainfall was high across the region in July 2023, within the 90th percentile in all basins. June 2024 also recorded above average rainfall across the region. Below average rainfall occurred in the Don Basin in August 2023 and April 2024, and in Proserpine, O’Connell, and Pioneer basins in October 2023 (Table 5). This pattern was seen across Australia, as August to October 2023 was the driest three-month period recorded since 1900.[9] Overall, annual rainfall was average in all basins.

Table 5. Monthly rainfall percentiles and annual average percentiles for basin areas for the MWI region for 2023–24. Data source: Australian Water Outlook (https://awo.bom.gov.au/).

Basin	2023						2024						Annual average
	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	
Don													
Proserpine													
O’Connell													
Pioneer													
Plane													

Rainfall percentile categories

≤ 1	> 1 – < 10	10 – < 30	30 – < 70	70 – < 90	90 – < 99	≥ 99
Lowest 1%	Very much below average	Below average	Average	Above average	Very much above average	Highest 1%

[9] Financial year climate and water report 2023–24

Similar to the average rainfall across the MWI region for 2023–24, discharges measured at gauging stations across the region were generally lower than the long-term mean annual discharge, the exception being Finch Hatton Gorge in the Pioneer Basin (Figure 9). In contrast, the rainfall for the previous reporting year was higher across the MWI region, and discharges were higher than the long-term mean annual discharge. Freshwater flow can impact ecosystem condition scores across freshwater, estuarine, and marine zones. Overall trends show declines in annual streamflow across the country, with over half of Australia's reference stations showing declining trends due to the impacts of climate change.[10] In Queensland, climate change is predicted to influence increases in temperatures and intensity and frequency of rainfall events and other extreme weather conditions.[11]

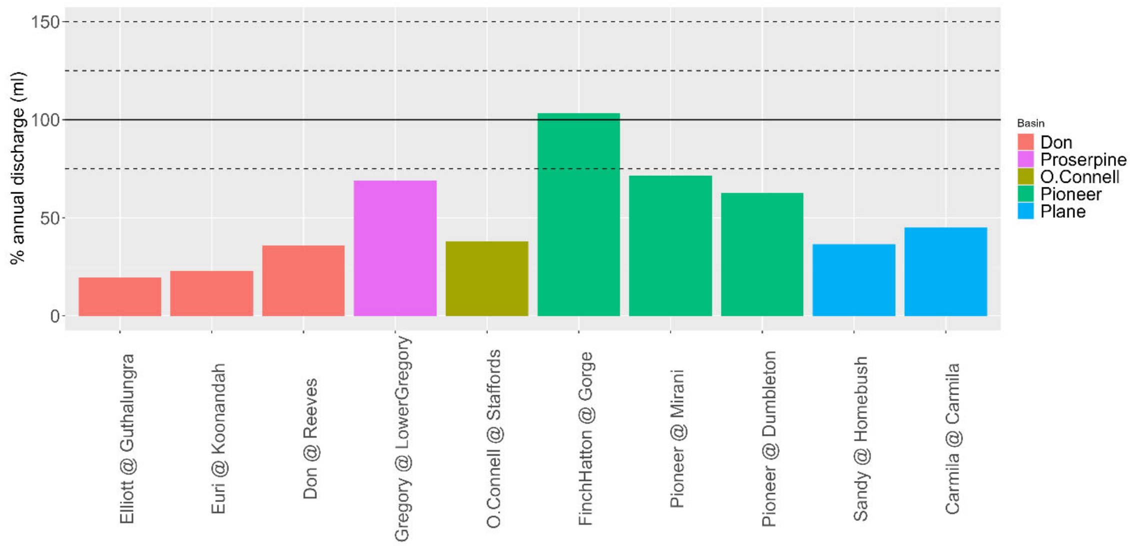

Figure 9. Proportion of 2023–24 discharge recorded from gauging stations at major river channels in the MWI region compared to the long-term mean. The x-axis represents sites where discharge is measured, the y-axis represents the percentage of the long-term mean discharge. The long-term mean is represented by a solid black horizontal line, while dashed lines represent 75%, 125%, and 150% of long-term mean. Long-term mean annual discharge is based on historical gauging station records until present; the number of years included varies according to station. Source: Queensland Government (water-monitoring.information.qld.gov.au).

1.4.5 Agricultural Context

Supplied by Phil Trendell, Department of Primary Industries

Cane harvesting for the Proserpine, O'Connell, Pioneer and Plane Basin had started for the 2023/24 season by July 2023, and spraying of ratoons had commenced. However, heavy rainfall across the region in July restricted spraying in some paddocks, allowing weeds to grow. After a wet July, dry conditions remained across August to October. Similar to the previous growing season (2022/23), there was a higher percentage than normal of plant cane going in during the August and September period, adding to the amount of area with chemical and nutrient applications from October onwards.

[10] https://www.bom.gov.au/state-of-the-climate/australias-changing-climate.shtml
[11] https://www.qld.gov.au/__data/assets/pdf_file/0023/68126/queensland-climate-change-impact-summary.pdf

On dryland farms the lack of rain restricted weed growth and spray applications were delayed until conditions improved for effective weed control. This may have required more ecotoxic herbicides such as diuron to be used to control the size and type of weeds once they were established.

Rainfall in early October led to an increase in spraying, fertiliser, and imidacloprid applications in ratoons across the region, but some areas were delayed until they received their first good rains in early November. This was similar with nutrient applications, with an increase in areas that received early rain, while other areas were delayed. In ratoons, imidacloprid is commonly applied at the same time as granular fertiliser and application increased during this period as soil conditions improved.

In November and December 2023, there was an increase in the number of ratoons being sprayed with fertiliser and imidacloprid applications across the whole region. Metolachlor detections reflected the hill-up spray applications of late plant cane. The longer crushing season meant that some growers were delayed in spraying operations each year until they were finished with harvesting.

All regions had some rainfall by the end of November with perfect conditions for weed growth in paddocks. Sandy Creek experienced two flush events in November (8th and 20th), whereas the Pioneer, O'Connell and Proserpine basins experienced first flush events in December with high rainfall recorded early in the month. Due to delays to the crushing season, herbicide and fertiliser was being applied on late plant cane much closer to the wet season than would normally occur. This was similar to what occurred in the previous growing season (2022/23). There was a reduction in the use of Imazapic and Isoxaflutole towards the end of the harvest and an increase in products like diuron even though there was a no spray window during this period.

Wet season rainfall continued across the January to March period. Spraying and fertilising of ratoons was still occurring across the region when paddock conditions allowed it, however there was a reduced nitrogen rate compared to what was normally required.

Unlike previous years, Diuron, linked to application in ratoons, was only detected above ecosystem guidelines up till February 2024 with no detections from March onwards. This could reflect an earlier finish to the harvest than the last two years and paddock conditions allowing all spraying to be finished before March.

From April through to June there were no detections above ecosystem guidelines for cane related herbicides and insecticides. Wet weather and paddock conditions meant there was limited early plant cane. The detections of metsulfuron-methyl could have been from a range of sources as it can be applied in urban and industrial situations, transport and passageway areas, on grazing properties and along riparian or native vegetations areas for woody weed control.

1.4.6 Marine Climate

In Australian waters, the average sea surface temperature (SST) has risen by more than 1° C since 1900[12] and nine of the ten warmest years on record have occurred since 2010 (Appendix 8.1.6). Consequently, marine heatwaves have increased in frequency and duration. Sea surface temperatures were above the long-term mean from December 2023 through June 2024 (Figure 10). Marine heatwaves can damage marine ecosystems by, for example; depleting seagrass meadows (Strydom et al., 2020) and causing higher occurrences of disease (Ruiz-Moreno et al., 2012) and wide-spread bleaching in corals (Eakin et al., 2022).

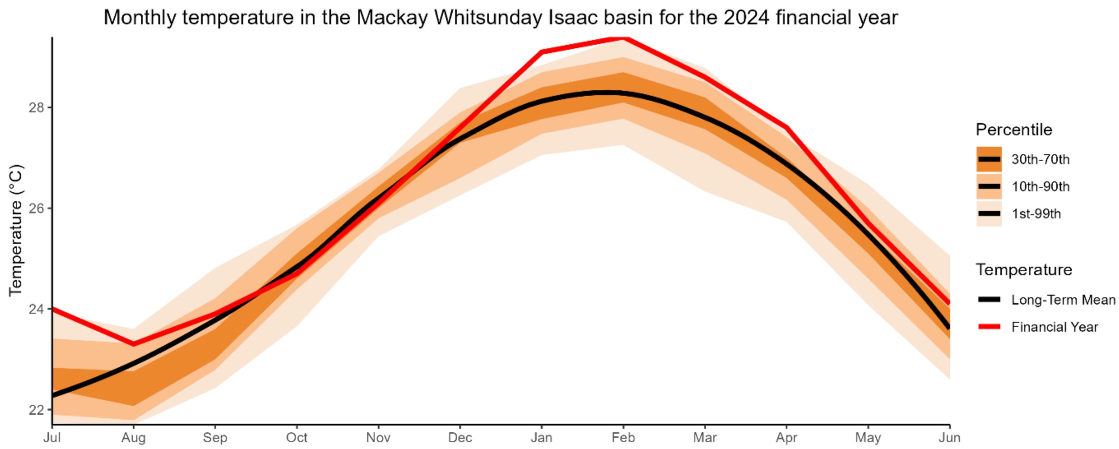

Figure 10. Current financial year (monthly) temperature (red line) compared to the long term mean (black line) for each month in the Mackay-Whitsunday-Isaac marine zones. Month on the x axis, temperature (C) on the y-axis. SST in Mackay-Whitsunday-Isaac in comparison to the long-term mean (calculated from 1991 to 2020). The red line indicates the temperature for the current financial year. The black line indicates the long-term temperature. The dark orange shading represents the 30th to 70th percentiles of the long-term mean, the medium orange shading represents the 10th to 90th percentiles of the long-term mean, and the light orange shading represents the 1st to 99th percentiles of the long-term mean. Source: NOAA

Climate change is the most significant threat affecting the health of the Great Barrier Reef (GBR), impacting this ecosystem through several cumulative impacts (GBRMPA et al., 2024; Waterhouse et al., 2024). The climate is projected to have more extremely hot days and fewer extreme cold days and there will likely be an increased frequency of high intensity, short-duration rainfall events, impacting stream flow and erosion.[13] Storm events are predicted to decline in frequency but increase in intensity, which is likely to have major consequences for coastal communities and ecosystems when combined with sea level rise. Marine heatwaves will become more frequent and intense, becoming larger in their spatial and temporal scales. Ocean acidification is also predicted to worsen with rising CO_2 levels, putting increased pressure on coral populations that are already under significant stress.[14]

1.4.6.1 Coral Bleaching

Heat stress in coral is a measure of the duration of time in which the temperature exceeds the long-term mean monthly maximum, with four Degree Heating Weeks (DHW) likely to cause significant coral

[12] http://www.bom.gov.au/state-of-the-climate/oceans.shtml
[13] http://www.bom.gov.au/state-of-the-climate/future-climate.shtml
[14] http://www.bom.gov.au/state-of-the-climate/future-climate.shtml

bleaching.[15] Accumulated heat stress in 2024 surpassed previous events and led to the fifth mass coral bleaching event on the GBR since 2016 (Figure 11), with the largest spatial extent of bleaching on the GBR, however the full impact of this event is still unknown.[16] Although surveys are undertaken several months later than the period of peak heat stress, initial indicators based on the proportion of corals bleached in coral communities in 2024 in the Southern Zone, (3%) was much lower than the 41% bleached during surveys in 2020. This pattern was similar in the Whitsunday Zone. Full recovery and future health of coral depends on continued lack of disturbances, and it is important to continue monitoring these habitats.

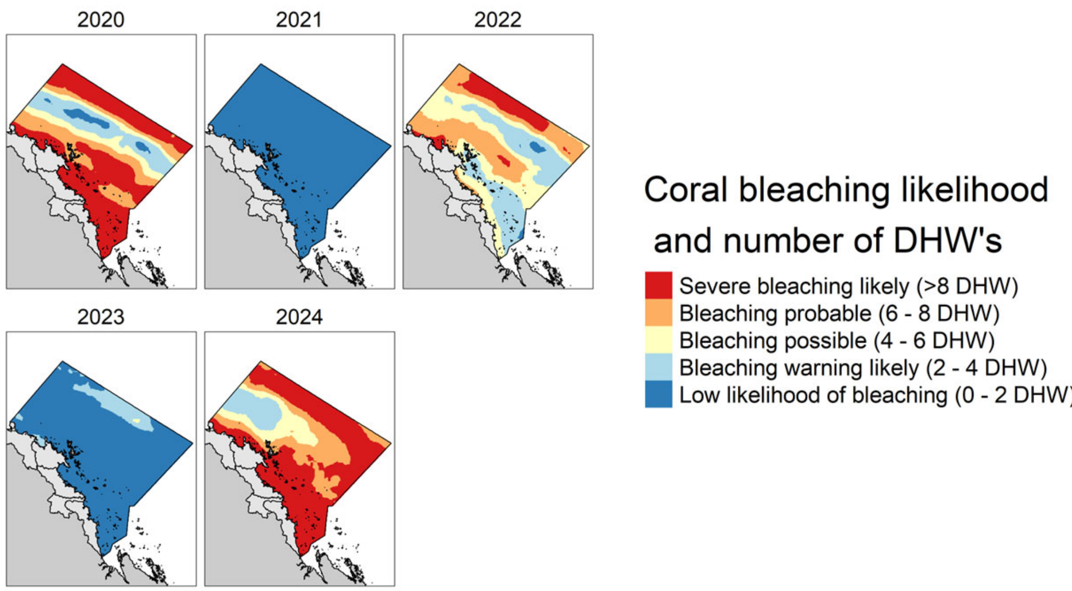

Figure 11. Degree heating weeks (DHW) for the MWI region from 2019-20 to 2023-24. This is a measure of heat stress accumulation over the past 12 weeks by summing SSTs exceeding 1°C above the long-term mean maximum temperature. Source: NOAA coral reef watch.

1.4.6.2 Tropical Cyclones

Tropical cyclone (TC) systems in the region develop from tropical lows, typically between November and April. There were no significant storm events recorded in the MWI region during 2023–2024.[17] Current climate trends show a decline in the number of TCs across Australia since 1982, however, it has been predicted that the intensity of storms will increase.[18] Severe TC Debbie made landfall near Airlie Beach on Queensland's Whitsunday Coast on Tuesday, 28th March 2017 after crossing the Whitsunday Islands as a large and powerful category 4 storm system.[19] Flow-on effects arising from TC Debbie in 2017 continue to impact some ecosystems, particularly evident in coral and seagrass condition scores in the inshore marine environment.

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[15] NOAA Coral Reef Watch Daily 5km Satellite Coral Bleaching Heat Stress Degree Heating Week Product (Version 3.1)
[16] Annual Summary Report of Coral Reef Condition 2023/24 | AIMS
[17] http://www.bom.gov.au/cyclone/tropical-cyclone-knowledge-centre/history/past-tropical-cyclones/
[18] http://www.bom.gov.au/state-of-the-climate/australias-changing-climate.shtml
[19] http://www.bom.gov.au/cyclone/history/debbie17.shtml

2 Freshwater Basin Results

The overall freshwater basin grades were derived from three indices: water quality, habitat and hydrology, and fish; each made up of a series of indicator categories and indicators (Figure 12). Some are assessed annually, while others are updated every three or four years (Table 6). The designated reporting frequency reflects a combination of the gradual nature of change associated with these indicators and the logistical feasibility of assessing them. For more information on reporting frequencies and metrics for each indicator, refer to the MWI 2025 Methods Report.

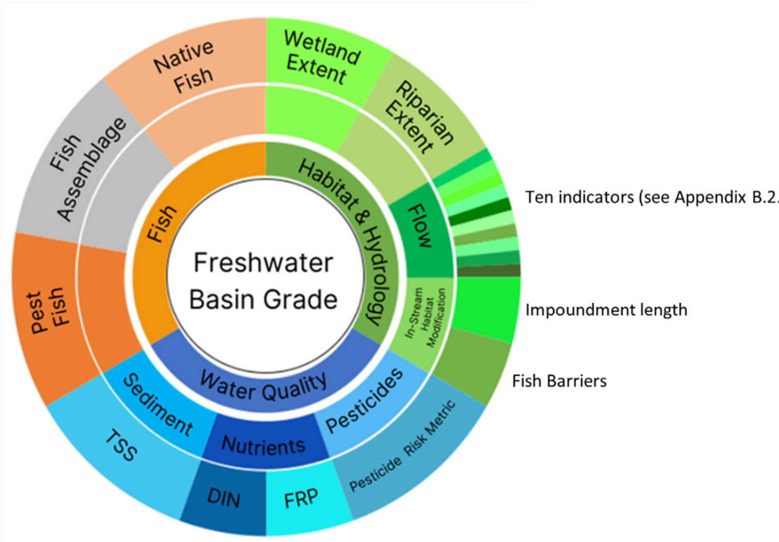

Figure 12. Freshwater basin indicators (outer ring), indicator categories (middle ring) and indices (inner ring) that contribute to overall scores.

Table 6. Freshwater frequency of reporting and update status for each indicator in the 2025 Report Card.

Index	Indicator Categories	Intended Frequency of Reporting	Last Updated (data year)
Water Quality	Sediment	Annually	**2024**
	Nutrients	Annually	**2024**
	Pesticides	Annually	**2024**
Habitat and Hydrology	In-stream habitat modification	4 Yearly	**2023**—Impoundment Length **2023**—Fish Barriers
	Flow	Annually	**2024**
	Riparian ground cover	4 Yearly*	**2014** (scores revised in 2016)
	Freshwater wetlands	4 Yearly	**2019**
Fish	Fish	3 Yearly	**2024**

*Due to methodology changes to riparian ground cover mapping (provided by DETSI), this indicator category has not been updated since 2014.

2.1 Water Quality in Freshwater Basins

Water quality condition scores for the 2025 Report Card were derived using data obtained from the Great Barrier Reef Catchment Loads Monitoring Program (CLMP). Scores were based on samples collected from end-of-catchment monitoring sites in the Don Basin (Don River mouth), Proserpine Basin (Glen Isla), O'Connell Basin (Caravan Park), and Pioneer Basin (Dumbleton Weir), with two in the Plane Basin (Sandy Creek at Homebush and Plane Creek at Sucrogen Weir) (Figure 13).

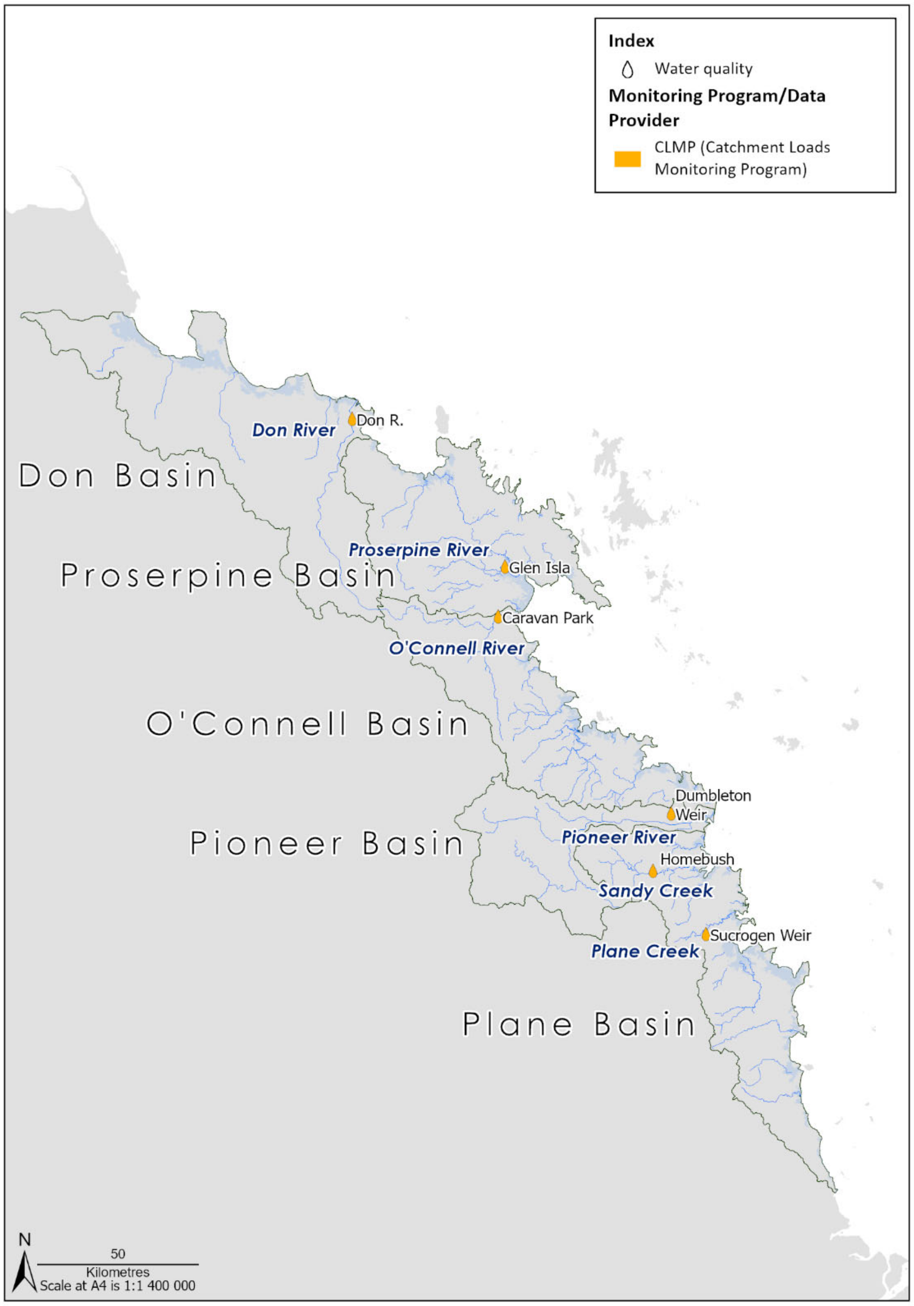

Figure 13. Sampling locations for freshwater water quality monitoring (including pesticides) in the MWI region for the 2025 Report Card (2023-24 data). Data provided by the Catchment Loads Monitoring Program (CLMP) as part of the Queensland Government.

Where multiple monitoring sites exist within a reporting zone, a weighted average of site-level scores was used to determine the relevant indicator score (Appendix 8.2.3). In each case, weightings are based upon the catchment area draining into the waterway upstream of the gauging station. Further information on site and sampling methodology is provided in the MWI 2025 Methods Report.

Water quality samples in the MWI basins are collected using two methods: manual grab sampling and automated grab sampling using refrigerated pump samplers. Intensive automated sampling (daily or every few hours) occurred during high flow events, and monthly sampling during low or base-flow (ambient) conditions.

Guideline values used for most freshwater basins are based on the QLD Water Quality Guidelines 2009 (DEHP, 2009b)and are related to the individual river or creek (Appendix 8.2.1). For the Don River, guideline values used are based on the Environmental Protection (Water and Wetland Biodiversity) Policy 2019 Don River Basin Environmental Values and Water Quality Objectives. Don River water quality data are separated into event flow and base flow periods using daily discharge data from the time nearest when the sample was taken. This allowed the separate scheduled guideline values for event flows and base flows to be applied for calculation of the water quality scores. For further details on the adopted guidelines refer to the MWI 2025 Methods Report.

Notes on data interpretation for Report Card results:

Tidal Influence in Proserpine River: Concentrations of nutrients and sediments at this site are influenced by tidal movements and are not suitable for reporting the ambient state in the freshwater ecosystem. Since 2018, nutrient and sediment indicator category results for the Proserpine Basin have not been reported in the MWI Report Card. The dilutive potential of the tidal inflow of seawater is not anticipated to decrease the relevance of the Pesticide Risk Metric score, and pesticides are still reported for the Proserpine Basin. Work is currently being undertaken to find a suitable sampling site in the Proserpine River.

Low flow in Don River: Due to a lack of surface flow in the Don River for much of the monitoring period, water quality monitoring in this basin is often restricted to periods of substantial rainfall in the area (MWI HR2RP, 2025). Scores for water quality indicators in the Don Basin were allocated based on flow conditions at the time of sampling, with more lenient guideline values during high (event) flow periods (MWI HR2RP, 2025).

2.1.1 Sediments

Sediment scores were based on the reported concentrations of total suspended solids (TSS). This indicator category is particularly vulnerable to changes in rainfall, wherein periods of high flow can mobilise large amounts of sediment in a basin. The rainfall across the 2023-24 season was average in all basins.

Results (Table 7, Figure 14)**:**

Table 7. Results for the sediment indicator category (based on a measure of total suspended solids (TSS)) for water quality in freshwater basins for the 2025 Report Card (2023–24 data).

2025 Report Card (2023-24 data)

Freshwater Basin	Sediment Score
Don (Don River)	**88**
Proserpine (Proserpine River)^	
O'Connell (O'Connell River)	**58**
Pioneer (Pioneer River)	**60**
Plane (Sandy and Plane Creeks)	**60**

■ Very Poor = 0 to <21 | ■ Poor = 21 to <41 | ■ Moderate = 41 to <61 | ■ Good = 61 to <81 | ■ Very Good = 81 to 100 | ■ No score/data gap

^Proserpine data were found to be tidal confounded and therefore excluded from these scores.

Key Message:

1) Sediment scores indicated 'moderate' to 'very good' grades in the current reporting cycle, with trends showing generally stable scores across the region.
2) Most basins recorded highest monthly median sediment concentrations between December to February, corresponding with wet season rains. Sandy Creek Homebush was the only site to record the highest monthly median concentration in the dry season (July), corresponding with above average rainfall in the region at that time (Table 5).
3) Monthly median concentrations above guideline values were recorded in October at O'Connell Caravan site despite rainfall being below average during that month (Table 5).

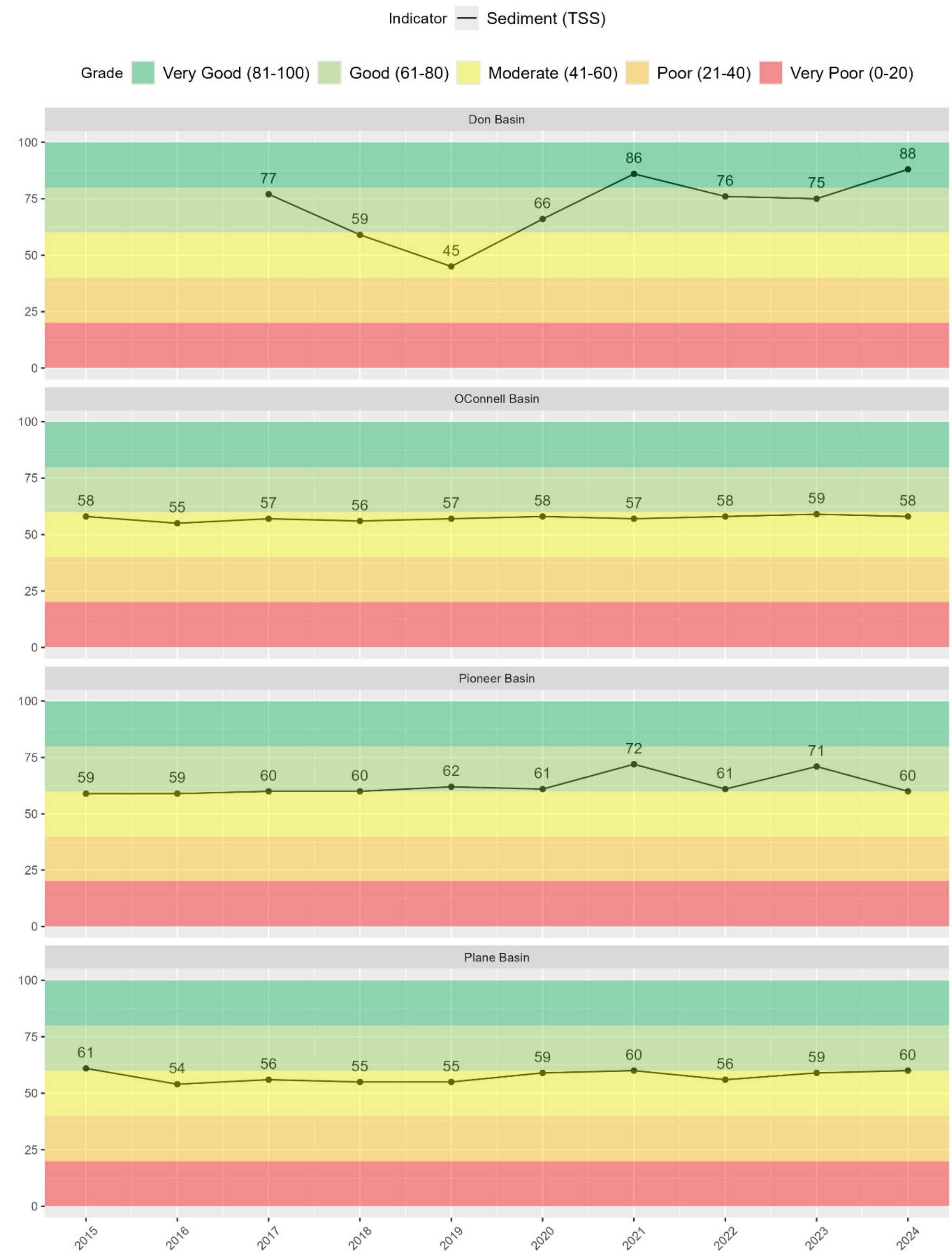

Figure 14. Results for the sediment indicator category (based on a measure of total suspended solids (TSS)) for water quality in freshwater basins for the 2025 Report Card (2023–24 data) in comparison to historic scores. Plane Basin scores incorporated two sites from 2018, while O'Connell Basin scores incorporated two sites between 2018 – 2023 reporting cycles. Historic scores in the Don Basin have been back-calculated using guideline values (GVs) updated in 2023-24 and may be different to those published previously.

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2.1.2 Nutrients

The nutrients indicator category contains dissolved inorganic nitrogen (DIN) and filterable reactive phosphorus (FRP) indicators.

Results (Table 8, Figure 15, Figure 16, Appendix 8.2.3)

Table 8. Results for dissolved inorganic nitrogen (DIN) and filterable reactive phosphorus (FRP) indicators and overall nutrients indicator category scores for water quality in freshwater basins for the 2025 Report Card (2023–24 data).

2025 Report Card (2023-24 data)

Freshwater Basin	DIN	FRP	Nutrients
Don	53	42	48
Proserpine^			
O'Connell	62	60	61
Pioneer	45	56	50
Plane	41	24	33

■ Very Poor = 0 to <21 | ■ Poor = 21 to <41 | ■ Moderate = 41 to <61 | ■ Good = 61 to <81 | ■ Very Good = assigned 90 | ■ No score/data gap

^Proserpine data were found to be tidal confounded and therefore excluded from these scores.

Key Messages:

1) Sandy Creek Homebush site (Plane Basin) had the five highest monthly DIN values of all sites and was the only site to record high values primarily in the dry season.
2) The Don Basin improved 15 points from 'poor' to 'moderate' in DIN scores due to fewer high concentrations of DIN recorded and declined 38 points from 'good' to 'moderate' in FRP scores.

2.1.2.1 Filterable Reactive Phosphorus (FRP)

FRP scores declined 38 points in the Don ('good' to 'moderate') and in the Plane Basin primarily due to a 12-point decline at Plane Creek Sucrogen Weir site ('moderate'), as the Sandy Creek Homebush site remained 'very poor'. Monthly medians for FRP at both the Sandy Creek Homebush site and the Plane Creek Sucrogen Weir site, both in the Plane Basin, exceeded the guideline value for ten of twelve months in the 2023–24 reporting period. The lower FRP grade in Sandy Creek compared to the neighbouring Plane Creek is likely reflective of land use differences within these catchments. High concentrations of FRP may be related to runoff from mill mud applications on pasture or plant cane (P. Trendell, pers. comm. 28/04/23).

2.1.2.2 Dissolved Inorganic Nitrogen (DIN)

DIN remained an indicator of concern for the MWI region. All monitored basins in the region were graded 'moderate' in the 2023–24 reporting period except the O'Connell Basin ('good'). The Don Basin improved 15 points from 'poor' to 'moderate' in DIN scores due to fewer high concentrations of DIN recorded (Figure 14).

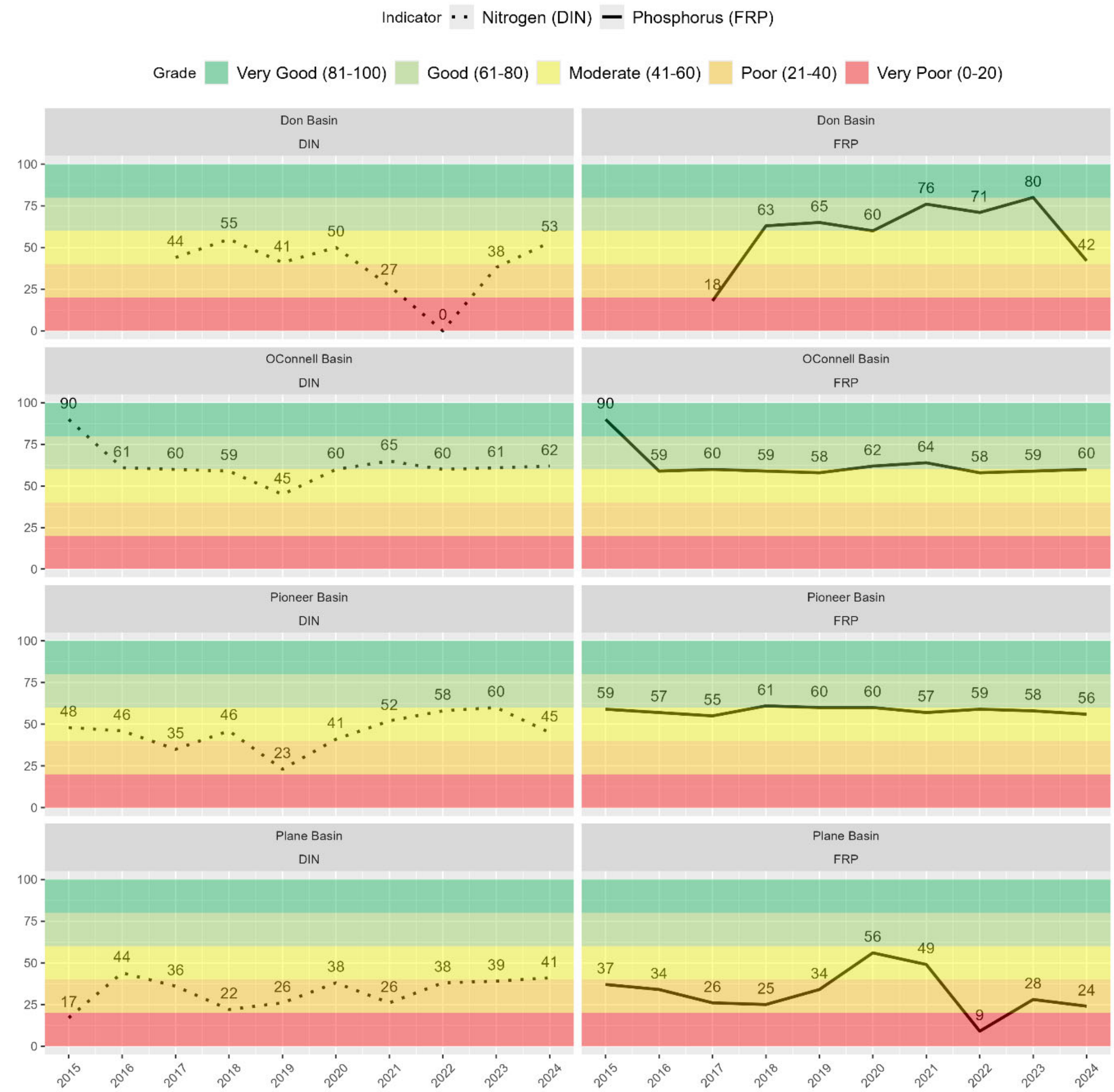

Figure 15. DIN and FRP indicator scores per basin for the 2025 Report Card (2023-24 data) and historic record. Plane Basin scores incorporated two sites from 2018, while O'Connell Basin scores incorporated two sites between 2018 – 2023 reporting cycles. As a result, these are not directly comparable to scores reported for the preceding years. Historic scores in the Don Basin have been back-calculated using guideline values (GVs) updated in 2023-24 and may be different to those previously published.

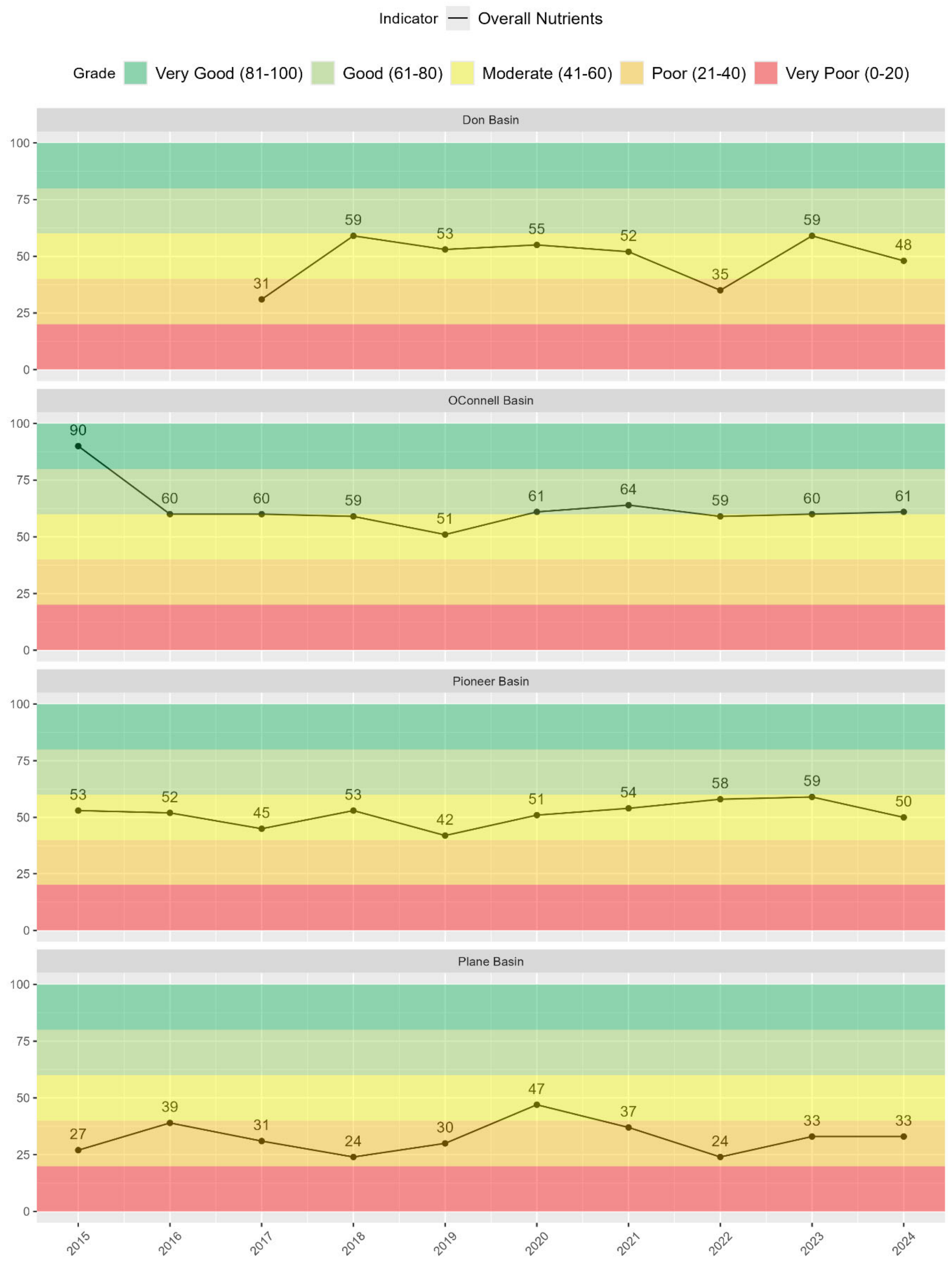

Figure 16. Results for overall nutrients indicator category scores for water quality in freshwater basins for the 2025 Report Card (2023-24 data) in comparison to historic scores. Plane Basin scores incorporated two sites from 2018, while O'Connell Basin scores incorporated two sites between 2018 – 2023 reporting cycles. As a result, these are not directly comparable to scores reported for the preceding years. Historic scores in the Don Basin have been back-calculated using guideline values (GVs) updated in 2023-24 and may be different to those published previously.

2.1.3 Pesticides

The pesticide indicator scores were developed using the Pesticide Risk Metric (PRM) (Warne et al., 2020, 2023). The PRM quantifies the ecological risk associated with exposure to a mixture of pesticides as the percent of aquatic species that may be adversely affected. For further information on the methodology adopted for the calculation of the PRM, refer to the Methods Report (MWI HR2RP, 2025).

Notes on data interpretation for Report Card results:

Long-term trends in freshwater pesticide concentrations: Analyses have demonstrated statistically significant decrease in the concentrations of diuron in water samples collected in Sandy Creek at Homebush (Plane Basin) since 2016 (Rass, 2023) and a consequent statistically significant decrease in the pesticide risk associated with photosystem II (PSII) herbicides (e.g. the group of herbicides that include diuron, atrazine, and hexazinone) (Attagad, 2024). In parallel, there has been a statistically significant long-term increase in the concentrations and associated risk from the group of chemicals referred to as Other Herbicides (e.g. the group of chemicals in the PRM that includes metolachlor, imazapic, isoxaflutole, MCPA and metsulfuron-methyl) in water samples collected from Sandy Creek at Homebush, Pioneer River at Dumbleton and the O'Connell River at Caravan Park. This shift from PSII herbicides to Other Herbicides that are known to be variously less toxic, less persistent and/or less mobile, is consistent with long-term messaging and extension provided by various Paddock to Reef programs and the GBRF or Reef Trust-funded projects (e.g. Project Bluewater; GBRF 2024). Where these extension programs have been less prevalent (e.g. Proserpine Basin), similar trends cannot be found (Attagad, 2024). In some waterways (e.g. Sandy Creek), the observed increases in Other Herbicides, although presenting a lesser risk to aquatic ecosystems, may still be present at concentrations that exceed end-of-system targets, and therefore, still represent an unacceptable risk to Reef ecosystems.

Results (Table 9, Figure 17, Figure 18)

Table 9. Results for the PRM indicator accounting for 22 pesticides, reporting aquatic species protected (%) and overall standardised pesticide score for freshwater basins for the 2025 Report Card (2023-24 data).

2025 Report Card (2023-24 data)

Freshwater Basin	PRM (% species Protected)	Standardised Pesticide Score
Don	99	81
Proserpine	72	17
O'Connell	92	52
Pioneer	83	21
Plane	67	17

Species protected scores: ■ Very Poor = <80% | ■ Poor = <90 to 80% | ■ Moderate = <95 to 90% | ■ Good = <99 to 95% | ■ Very Good = ≥99% | ■ No score/data gap
Pesticide scores: ■ Very Poor = 0 to <21 | ■ Poor = 21 to <41 | ■ Moderate = 41 to <61 | ■ Good = 61 to <81 | ■ Very Good = 81 to 100 | ■ No score/data gap

Key Messages:

1) Imidacloprid and diuron were key contributors to pesticide risk throughout the region.

2) Metsulfuron-methyl was a key contributor to risk at Plane Creek Sucrogen Weir site (Plane Basin) specifically.

3) Overall, pesticides remained the poorest scoring indicator for basin water quality in the MWI region in the 2023–24 reporting year, indicating a high risk of adverse effects to the region's aquatic species due to pesticide exposure.

The **Proserpine and Plane basins** have both scored 'very poor' for eight consecutive years for pesticides. At sites associated with agricultural land use, particularly sugarcane, the major contributors were imidacloprid (an insecticide), and diuron (a herbicide). Other contributors to pesticide risk included metolachlor, imazapic, hexazinone, MCPA, isoxaflutole, and atrazine. Variation in the pesticide risk profile across the region reflects relevant land-use applications.

The **Pioneer Basin** scores declined for the second consecutive year.

The **O'Connell and Don basins** both improved in grade to 'moderate' and 'very good' respectively. In the Don Basin this was influenced by decreased detection of metsulfuron-methyl, and in O'Connell Basin there was decreased detection of imidacloprid, diuron, and atrazine.

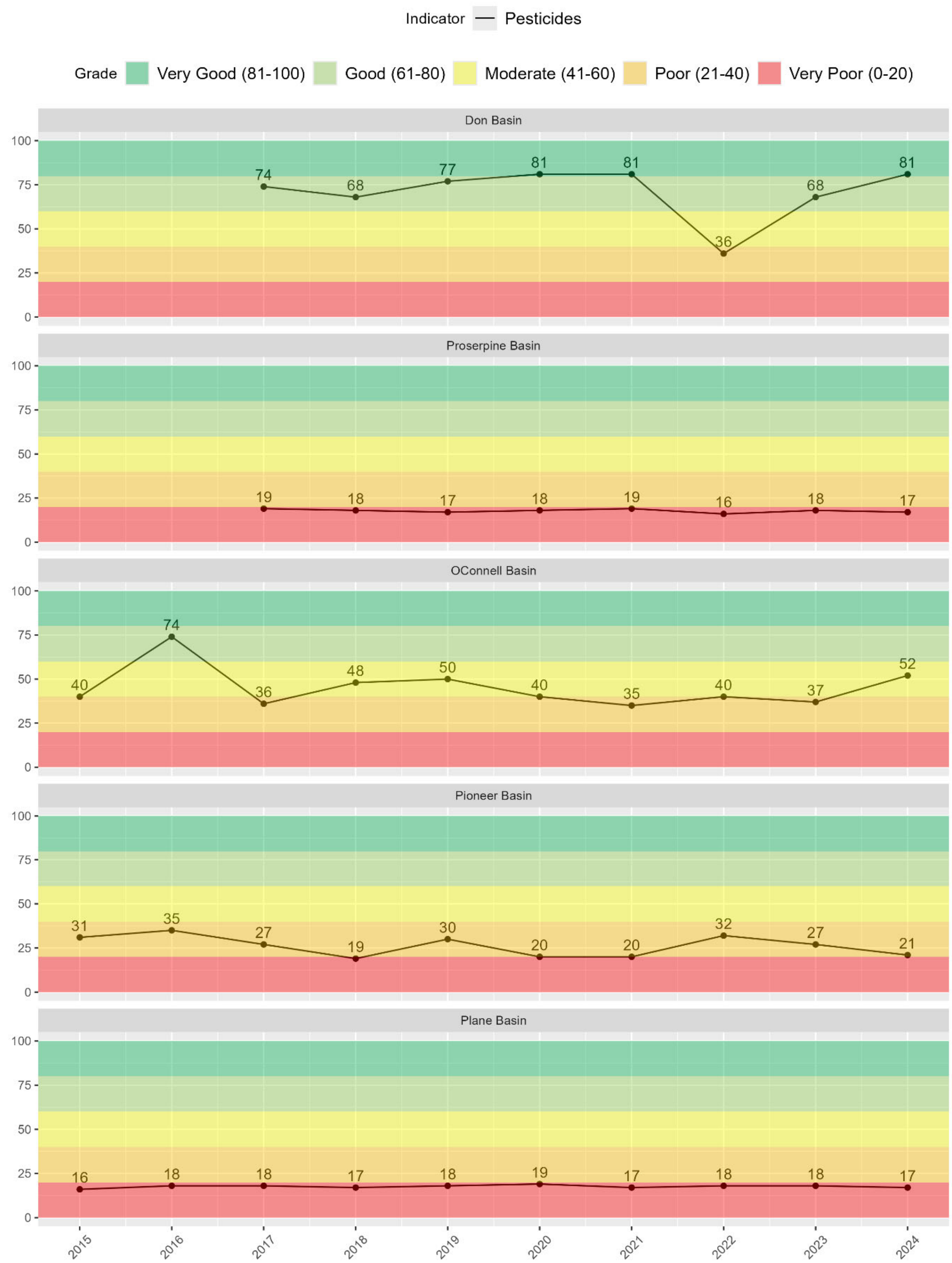

Figure 17. Results for the pesticide indicator (accounting for 22 pesticides) for freshwater basins in the 2025 Report Card (2023-24 data) compared to the historic record. Pesticides scores in 2017 have been back-calculated to incorporate changes in the methods that occurred for the first time in the 2018 Report Card. From 2017 to 2020 O'Connell Basin grades included data from a second monitoring site (Stafford's Crossing), whereas other years incorporated data from Caravan Park site only. Scores in Plane Basin prior to 2017 include only Sandy Creek Homebush site, whereas from 2017 Plane Creek Sucrogen Weir is also included.

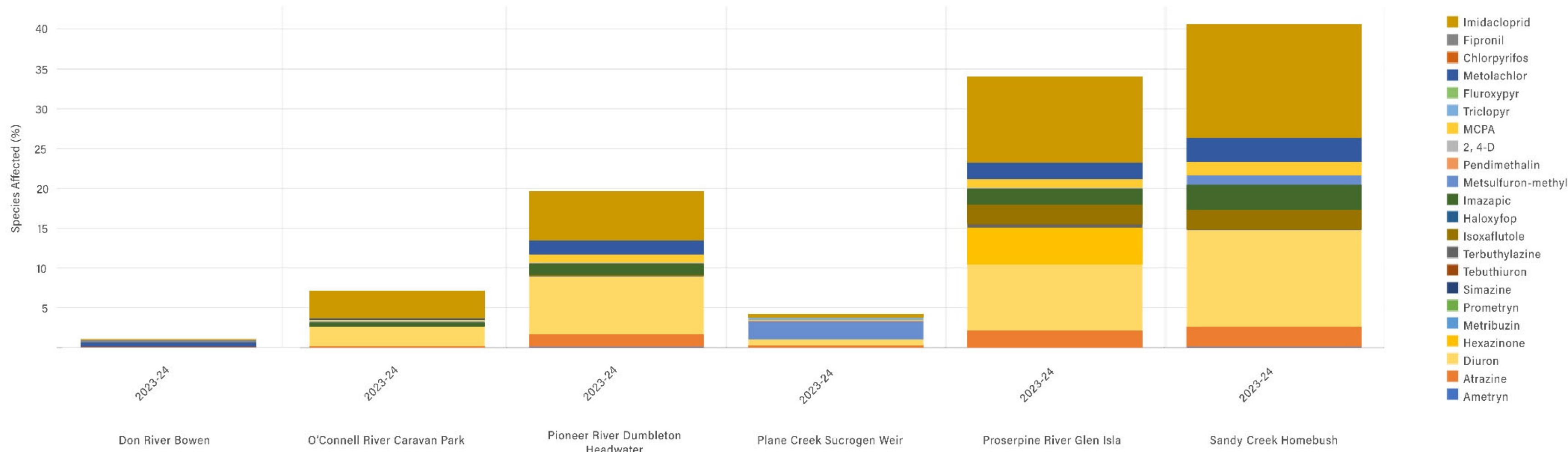

Figure 18. The proportional contribution of each chemical to the final PRM score, for the 2023–24 reporting year. In this instance, the PRM is expressed as the % species affected fraction. Source: QLD Government, GBR CLMP.

2.1.4 Water Quality Index Scores

Water quality index scores are an average of sediments, nutrients, and pesticides indicator categories (Table 10). Based on the rules for the minimum proportion of information required to generate overall scores, a final water quality score could not be calculated for the Proserpine Basin (see Section 2.1 for details).

<u>Results</u> <u>(Table 10, Figure 19)</u>

Table 10. Results for water quality indicator categories and final water quality index scores in freshwater basins for the 2025 Report Card (2023–24 data).

2025 Report Card (2023-24 data)

Freshwater Basin	Sediments	Nutrients	Pesticides	Water Quality Index
Don	88	48	81	72
Proserpine			17	
O'Connell	58	61	52	57
Pioneer	60	50	21	44
Plane	60	33	17	36

■ Very Poor = 0 to <21 | ■ Poor = 21 to <41 | ■ Moderate = 41 to <61 | ■ Good = 61 to <81 | ■ Very Good = 81 to 100 | ■ No score/data gap

Key Messages:

1) There were no water quality grade changes in freshwater basins during the 2023-24 reporting period.
2) This was the eighth consecutive year that scores for water quality have remained 'moderate' or below in the O'Connell Basin, and the tenth year in the Pioneer and Plane basins.
3) Pioneer recorded the largest decline, due to declines in score for pesticides, DIN, and sediment during this reporting period.

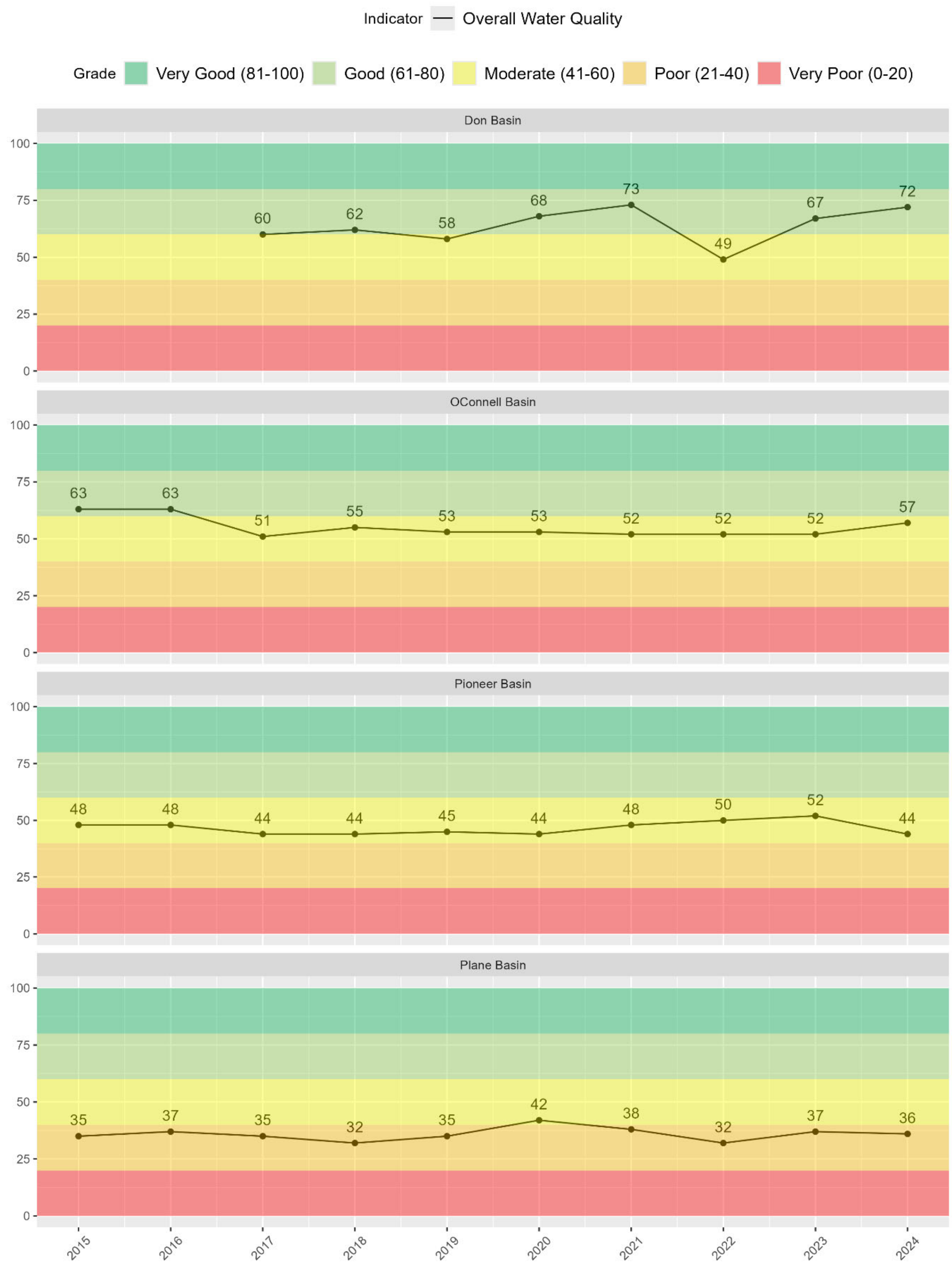

Figure 19. Results for water quality index scores in freshwater basins for the 2025 Report Card (2023-24 data) in comparison to historic scores. Scores from 2017 have been back-calculated to incorporate updates to freshwater pesticides made in the 2018 Report Card and are not directly comparable to previously reported scores. Plane Basin scores incorporated two sites from 2018, while O'Connell Basin scores incorporated two sites between 2018 – 2023 reporting cycles.

2.1.4.1 Confidence

The Report Card scores were rated in terms of the confidence and uncertainty based on methods and data used in the development of each score. A detailed summary of confidence methods and scoring is provided in the MWI Methods Report (MWI HR2RP, 2025).

Confidence in water quality scores for MWI basins varied depending on the indicator category and basin (Table 11). Most basins were given a moderate rank of confidence, primarily due to the limited spatial representativeness of the monitoring program. However, the Don Basin was given a 'low' rank for water quality monitoring periods due to a lack of surface flow over much of the year which decreased annual temporal representativeness. Scores are calculated based on data from one to two sites per basin and therefore can only be inferred as representing the entire basin with moderate confidence (MWI HR2RP, 2025).

Table 11. Confidence associated with water quality index results in freshwater basins in the MWI Report Card. Confidence criteria are scored 1–3 and then weighted by the value identified in parentheses. Final scores (4.5–13.5) are additive across weighted confidence criteria. Final scores correspond to a rank from 1 to 5 (very low–very high), which indicates the final confidence level. Where confidence in results for the Don Basin differ from the other basins, the relevant confidence score for the Don is presented in square parentheses. Unless specified, confidence in results is the same across basins.

Indicator Category	Maturity of Methodology (x0.36)	Validation (x0.71)	Representativeness (x2)	Directness (x0.71)	Measured Error (x0.71)	Final	Rank
Sediment	3	3	1 [0.5]	3	2	8.8 [7.8]	3 [2]
Nutrients	3	3	1 [0.5]	3	2	8.8 [7.8]	3 [2]
Pesticides	3	3	1 [0.5]	3	2	8.8 [7.8]	3 [2]
Water Quality Index						**8.3 [7.8]**	**3 [2]**
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.							

2.2 Habitat and Hydrology in Freshwater Basins

The habitat and hydrology index comprises four indicator categories. The flow indicator is updated annually in both Pioneer and Plane Basins, whereas the other indicators (in-stream habitat modification, riparian extent, and wetland extent), are reviewed every three to four years.

2.2.1 In-stream Habitat Modification

The in-stream habitat modification indicator category score is derived from an average of fish barriers and impoundment length indicator scores. Results for the fish barrier indicator were updated in the 2024 Report Card, based on the 2022 assessment on regional fish barrier prioritisation (Power et al., 2022) and a corresponding report in 2023 (Moore & Power, 2023). The impoundment length indicator was last updated for the 2024 Report Card (2022-23 data).

2.2.1.1 Fish Barriers

The fish barrier indicator is based on an assessment of three metrics: 'barrier density', 'proportion of stream length to the first barrier', and 'proportion of stream length to the first low passability barrier' (MWI HR2RP, 2025).

Notes on data interpretation

Updated aerial imagery: Previous reporting cycles referenced 2013 aerial imagery at 50 cm resolution[20] while the current reporting references updated 2019 aerial imagery at 20 cm resolution[21], resulting in the ability to identify additional barriers that potentially existed in previous reporting yet were unable to be distinguished.

Updated waterway spatial layer: Updates to the Queensland drainage network waterway layer has resulted in identification of increased streamlines/length, which have been incorporated into the scoring for the fish barriers metric.

[20] 2013 Imagery - "Central Qld coastal 2013, 50 cm resolution, SISP, peri-urban; Accessed via QGlobe, Qld Government".

[21] Central QLD coastal 2019 aerial imagery, 20 cm resolution, SISP, peri-urban: Sourced via Reef Catchments NRM via Spatial Imagery Subscription Plan, QLD Government, 2019

Results (Table 12, Figure 20)

Table 12. Results for fish barrier indicator metrics in freshwater basins in the 2025 Report Card (2022-23 data). Metrics were assessed on Stream Orders (SO) ≥3 or ≥4 as indicated.

2025 Report Card (2022-23 data)

	Barrier Density		Stream to the 1st Barrier		Stream to the 1st Low "Passability" Barrier		Fish Barriers	
Freshwater Basin	km per barrier on SO ≥3	Score	% of stream before first barrier on SO ≥3	Score	% of stream before first low pass barrier on SO ≥4	Score	Total Score	Fish Barriers (standardised)
Don	5	3	53	3	68	3	9	50
Proserpine	4	3	39	3	80	4	10	60
O'Connell	3	2	25	2	80	4	8	41
Pioneer	4	2	2	1	2	1	4	20
Plane	2	1	35	3	79	4	8	41

Barrier Density: ■ Very Poor = 0 to 2 km (1) | ■ Poor = >2 – 4 km (2) | ■ Moderate = >4 – 8 km (3) | ■ Good = >8 – 16 km (5) | ■ Very Good = >16km (5) | ■ No score/data gap

% of Stream Before 1st Barrier: ■ Very Poor = 0 to <10% (1) | ■ Poor = >10 – 30% (2) | ■ Moderate = >30-70% (3) | ■ Good = >70-90% (4) | ■ Very Good = >90% (5) | ■ No score/data gap

% of Stream to 1st Low Passability Barrier: ■ Very Poor = 0 to 50% (1) | ■ Poor = >50 – 60% (2) | ■ Moderate = >60-70% (3) | ■ Good = >70-95% (4) | ■ Very Good = >95% (5) | ■ No score/data gap

Total Score: ■ Very Poor = 3-4 | ■ Poor = 5-7 | ■ Moderate = 8-10 | ■ Good = 11-13 | ■ Very Good = 14-15

Standardised: ■ Very Poor = 0-20 | ■ Poor = 21-40 | ■ Moderate = 41-60 | ■ Good = 61-80 | ■ Very Good = 81-100

Key Messages (Moore & Power, 2023)**:**

1) Score decline for the barrier density metric in the Don Basin was largely due to the construction of new waterway barriers which may be tied to land clearing and development in the form of intensive horticulture. Unimpeded connection is particularly important in the Don Basin as the freshwater streams are ephemeral in nature; typified by episodic flow, channels with sandy substrates, and characterised by few permanent freshwater habitats. Therefore, the unimpeded connection between limited permanent waterholes is important to prevent fragmentation of fish populations and for sustaining aquatic ecosystem health (Moore, 2016).

2) Improved scores for the stream length to 1st barrier metric in the Plane Basin were due to the remediation of two fish barriers located on Flaggy Rock and Sandy Creeks. Both sites were remediated with rock ramp fishways at the 1st barriers upstream from the estuary, resulting in increased connected stream length.

3) In the Proserpine Basin, improved scores for the distance to 1st low passability barrier metric were due to the removal of a high head loss sand dam located near the freshwater/estuarine interface. This dam had blocked access to >90% of the waterway and had not been reinstated at the time of reporting.

4) The Pioneer Basin consistently scores poorer in the fish barrier indicator than all other basins in the region. The Pioneer Basin is home to the largest population centre in the region, (Mackay), and land use activities include both urban developments and intensive agriculture.

To support these activities, construction of transport infrastructure (e.g., roads and causeways), as well as irrigation and water supply storages (e.g., weirs) have been required, creating barriers to fish passage.

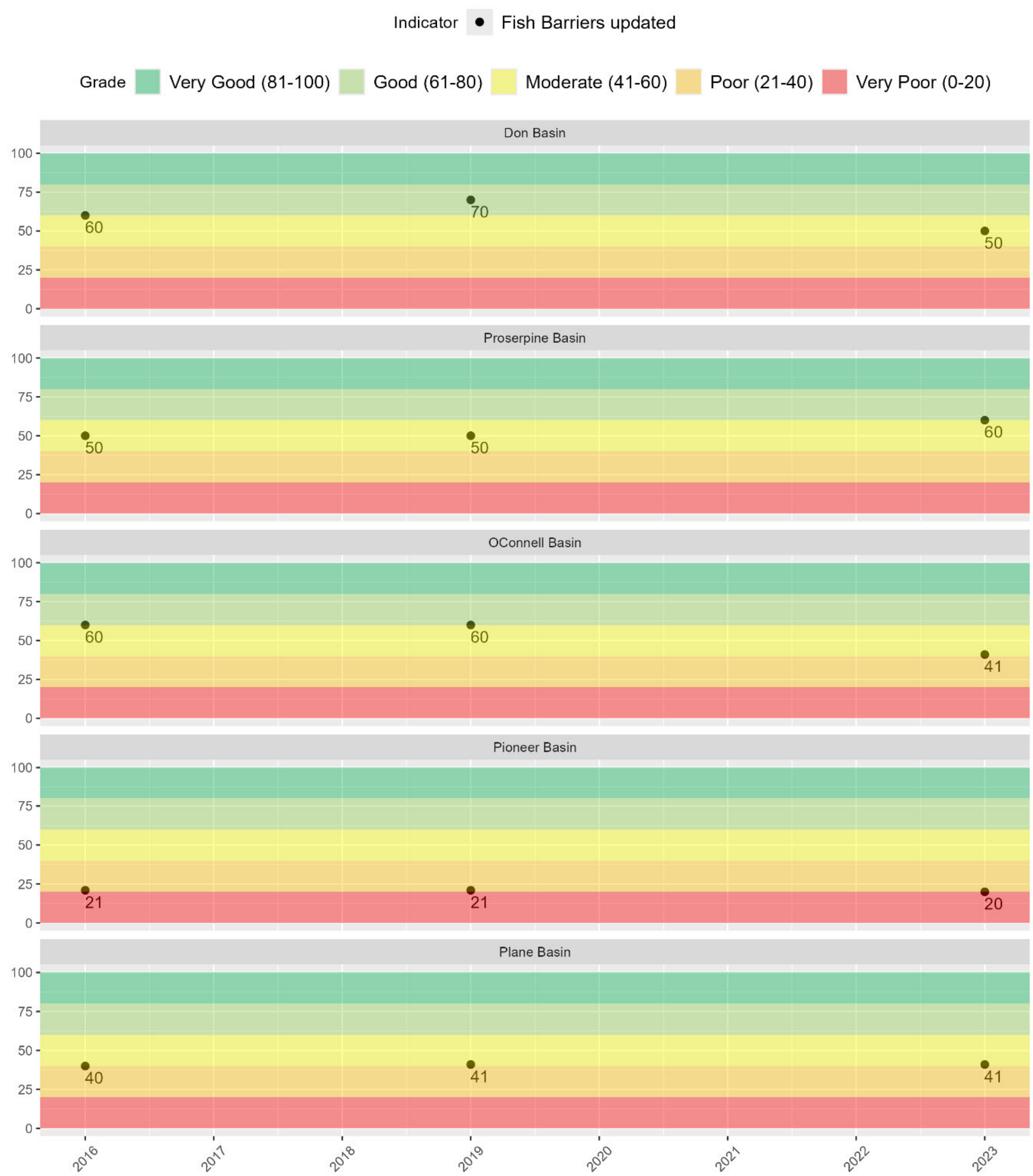

Figure 20. Results for the fish barrier indicator in freshwater basins in the 2025 Report Card (2022-23 data) compared to the historic record. Fish barrier scores are updated every four years. Updates are indicated by point and annotation, in years without assessment updates, the most recent score is incorporated into the overall freshwater basin score.

2.2.1.2 Impoundment Length

This indicator was selected to describe how much 'natural' channel habitat remained in the region compared to artificially ponded channel habitat, which has relatively little diversity in terms of depth, flow rate, and natural wetting and drying cycles. Water impoundment may result in an extended inundation of riparian vegetation, contributing to potential increased erosion if submerged vegetation dies. Impoundment may also affect the efficacy of the fishway, which enables migratory fish to travel upstream.

Results (Table 13, Figure 21)

Table 13. Results for the impounded stream indicator in freshwater basins in the 2025 Report Card (2022 23 data).

Freshwater Basin	Not Impounded (km)	Impounded (km)	Total (km)	% Total	Standardised Impoundment
Don	954	0	954	0.0	**100**
Proserpine	528	37	565	6.6	**43**
O'Connell	600	14	614	2.4	**72**
Pioneer	498	54	552	9.8	**22**
Plane	671	28	698	4.0	**60**

Impoundment (% total): ■ Very Poor = ≥10% | ■ Poor = 7 to <10% | ■ Moderate = 4 to <7% | ■ Good = <4 to 1% | ■ Very Good <1% | ■ No score/data gap

Standardised impoundment: ■ Very Poor = 0 to <21 | ■ Poor = 21 to <41 | ■ Moderate = 41 to <61 | ■ Good = 61 to <81 | ■ Very Good = 81 to 100 | ■ No score/data gap

Key Messages:

1) Removal of a sand dam on the Proserpine River that had previously impounded ~4 km of stream in the 2018 assessment led to a return to 'moderate' for this waterway in 2022-23.

2) O'Connell recorded an improved score in 2022 due to the removal of an unauthorised sand dam.

The **Pioneer Basin** was 'poor', with 9.8% of the total length of streams of order three or higher impounded by artificial structures.

There were no impoundments on streams (of order three or higher) in the **Don Basin**, giving it a grade of 'very good'.

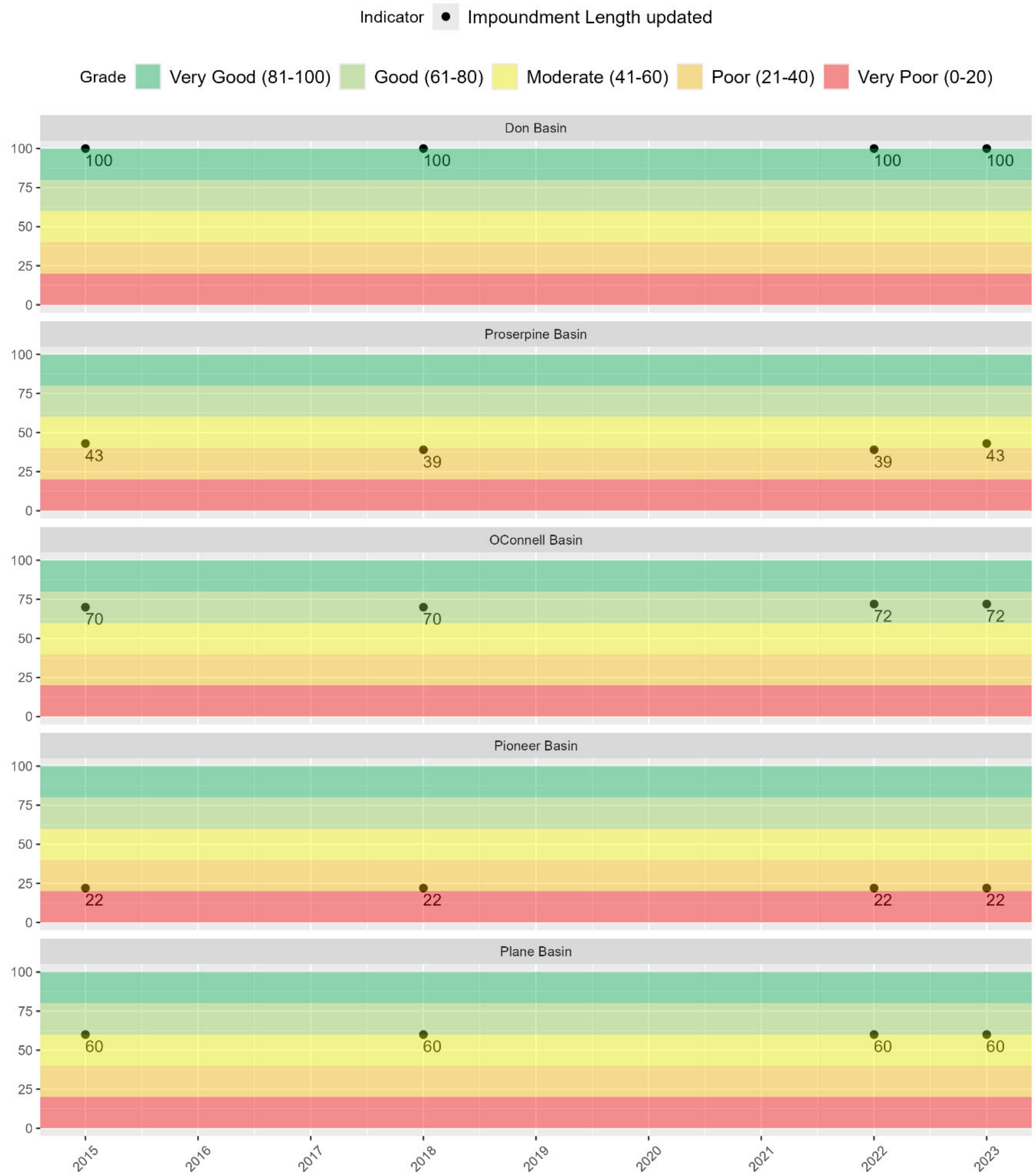

Figure 21. Results for impoundment length indicators in freshwater basins in the 2025 Report Card (2022-23 data) compared to the historic record. Impoundment length is updated every four years, updates indicated by point and annotation.

2.2.1.3 In-stream Habitat Modification Indicator Category

The impoundment and fish barrier indicators were averaged to create the in-stream habitat modification indicator category. As highlighted above, fish barrier and impoundment length scores for the 2025 Report Card are based on repeat data from 2022-23.

Results (Table 14, Figure 22)

Table 14. Results for the in-stream habitat modification indicator category in freshwater basins for the 2025 Report Card.

2025 Report Card

Freshwater Basin	Impoundment Length (2022-23 data)	Fish Barriers (2022-23 data)	In-stream Habitat Modification
Don	100	50	75
Proserpine	43	60	52
O'Connell	72	41	56
Pioneer	22	20	21
Plane	60	41	50

Scoring range: ■ Very Poor = 0 to <21 | ■ Poor = 21 to <41 | ■ Moderate = 41 to <61 | ■ Good = 61 to <81 | ■ Very Good = 81 to 100 | ■ No score/data gap

Key Messages:

1) Grade decline in the Don Basin was due largely to increased habitat modification from development.
2) Grade decline in the O'Connell Basin was largely due to improved data accuracy from ground-truthing barriers.
3) Improvement in the score for the Proserpine Basin was due to the removal of a sand dam downstream of the Myrtle Confluence.
4) Remediated barriers in the Plane Basin improved the stream length to the first barrier, however identification of additional barriers caused barrier density scores to decline, and overall scores remained the same.

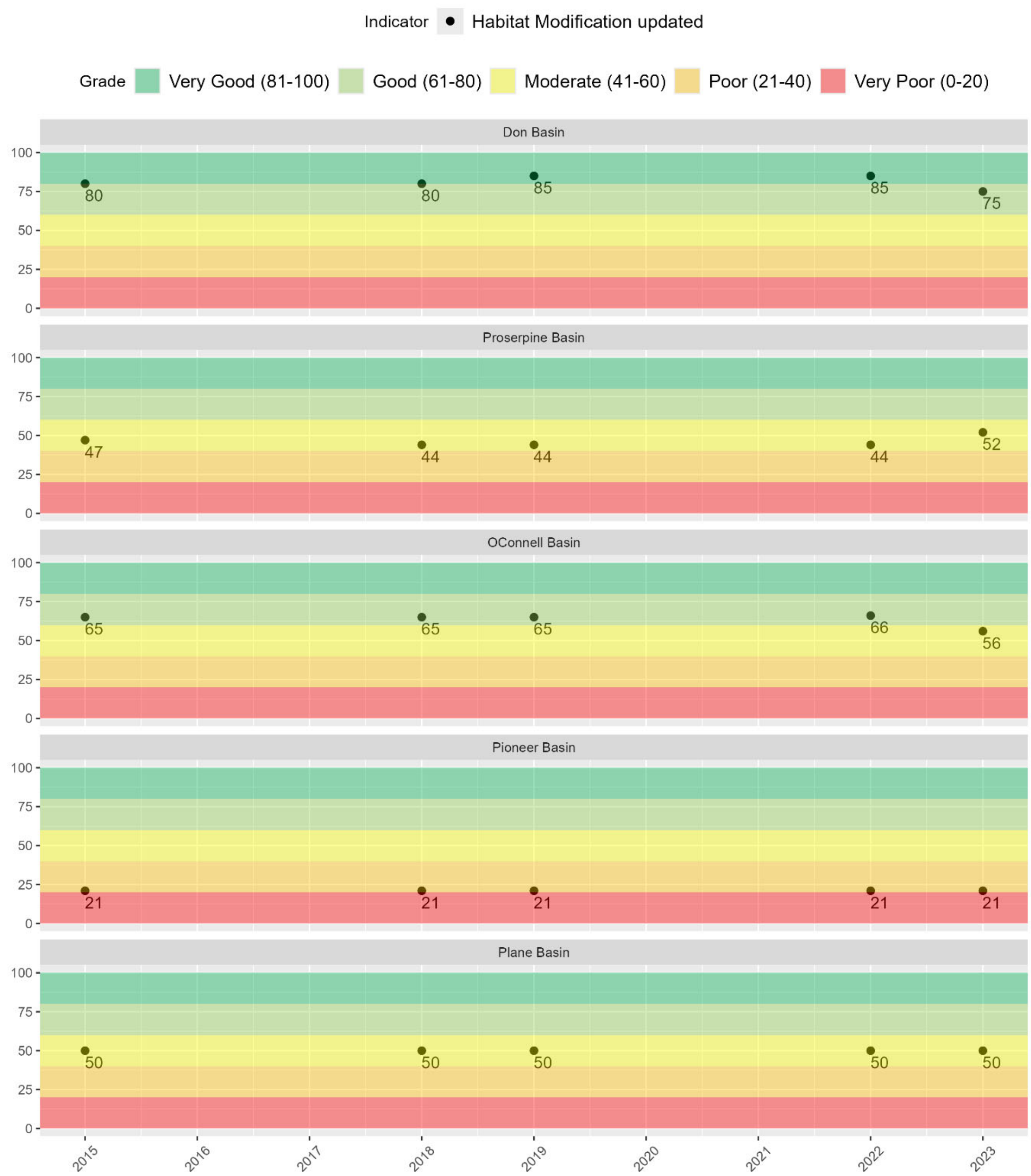

Figure 22. Results for the in-stream habitat modification indicator category in freshwater basins for the 2025 Report Card compared to historic results. Updates in data are indicated by point and annotation.

2.2.2 Riparian and Wetland Extent

2.2.2.1 Riparian Extent

Riparian extent scores were derived from 2013 Landsat foliage projective cover data that has been compared against the pre-development extent of riparian forest Regional Ecosystem (RE) mapping data (assumed to be 100% forested).

Results (2013-14 data, Table 15)

Table 15. Results showing % of riparian and wetland extent loss compared to pre-clearing conditions for the 2025 Report Card. Scores are repeated from the 2019 Report Card, in which scores were back-calculated from updated methodology as assessed using 2013-14 (riparian extent) and 2017-18 (wetland extent) data. The wetland assessment pertains to palustrine wetlands only.

2025 Report Card

Freshwater Basin	Wetland extent (2017-18 data)		Riparian extent (2013-14 data)		Standardised Wetland Extent	Standardised Riparian Extent
	Hectares lost since pre-development	% loss since pre-development	Hectares lost since pre-development	% loss since pre-development		
Don	0*	-3*		29	100	41
Proserpine	848	16		22	59	50
O'Connell	334	66		22	14	51
Pioneer	1,279	70		20	12	54
Plane	930	47		29	23	41

Riparian and Wetland extent (% loss): ■ Very Poor = >50% | ■ Poor =>30 to 50% | ■ Moderate = >15 to 30% | ■ Good = >5 to 15% | ■ Very Good ≤5% | ■ No score/data gap

Standardised riparian and wetland extent: ■ Very Poor = 0 to <21 | ■ Poor = 21 to <41 | ■ Moderate = 41 to <61 | ■ Good = 61 to <81 | ■ Very Good = 81 to 100 | ■ No score/data gap

*Negative values denote an increase in area since pre-development. In this instance, however, representation masks the losses of converted estuarine wetlands and losses of freshwater wetlands in other locations (Section 2.2.2).

Key Messages:

1) Overall, the percent loss of riparian extent since pre-clearing ranged from 20–30% within the basins assessed. As a result, all basins were graded moderate for the condition of riparian extent.
2) This assessment is based on the oldest dataset for any indicator in the current Report Card (2013–14 data), which should be noted when interpreting these results.

Riparian extent: The riparian extent indicator is updated with spatial data produced by the Remote Sensing Centre, DETSI. Consequently, the reporting frequency period was intended to be every four years. However, the data collected in 2017 was subject to considerable change (amendments to the satellite imagery and data processing which improved the resolution and accuracy of vegetation mapping) and not fit for purpose at the spatial extents required by regional report cards. Once revised mapping and methods for calculating riparian extent are produced, they will be reviewed by the Technical Working Group (TWG) to ensure that they are suitable. It is anticipated that this information will be available following the current Program Design Review process.

2.2.2.2 Wetland Extent

Updated datasets and scores based on new wetland mapping methodology (Queensland Regional Ecosystem Version 5.1 Wetland Mapping), including the most recent assessment scores, supersede all previously reported results of wetland extent.

Results (2017-18 data, Table 15)

Key Messages:

1) 'Very good' grade in the Don Basin is a somewhat false representation masking the losses of estuarine wetlands converted to freshwater wetlands through damming or bunding, and significant losses of freshwater wetlands in other locations.
2) Although no natural or modified wetlands have been lost since the previous assessment, 'poor' and 'very poor' scores in the O'Connell, Pioneer, and Plane basins reflect the significant historical loss estimated in regional wetlands. It is estimated that there has been a 44% reduction in wetland extent in the region because of development. Declines at the basin level are particularly pronounced for the O'Connell and Pioneer basins, where palustrine wetlands have lost 66% and 71% of their pre-clearing extent, respectively.

In the **Don Basin**, net increases in the extent of freshwater wetland observed were attributed to the conversion of estuarine wetlands to freshwater wetlands through damming or bunding. For example, the historical loss of 1,109 hectares of freshwater wetland in the Don catchment is masked by a gain of 1,184 hectares due to conversion from estuarine to freshwater wetland.[22] In this instance, decreases in wetlands extent driven by land modification and filling were moderated by increases associated with anthropogenically driven changes in hydrology. Whilst the ecological value of new or expanded modified wetlands is acknowledged, net increases in the extent of freshwater wetland are not necessarily an indication of a healthy riverine system. Instead, they are indicative of modification activity. The current extent is larger than the pre-clearing extent because of the inclusion of modified wetlands (e.g. the bunding of estuarine areas to become freshwater).

[22] https://www.reefplan.qld.gov.au/__data/assets/pdf_file/0020/82910/report-card-2017-2018-results-wetland-extent.pdf

2.2.3 Flow

Flow scores are only reported for Pioneer and Plane basins due to concerns that results did not accurately reflect on-ground flow observations in the O'Connell Basin (Figure 23). In the O'Connell Basin this was primarily connected to unusually prolonged periods of low or no flow relating to the dry climate conditions and effects of water extractions that occurred during this period. The resulting low to no flows interrupted important processes that support a healthy river ecosystem. This includes deterioration of important riffle habitats, decline of water quality in water holes (e.g., low dissolved oxygen and high water temperatures) and a reduced capacity for fish migration (King et al., 2015). Flow was not assessed for the Don or Proserpine basins due to the lack of either pre-development modelled data or availability of open gauging stations.

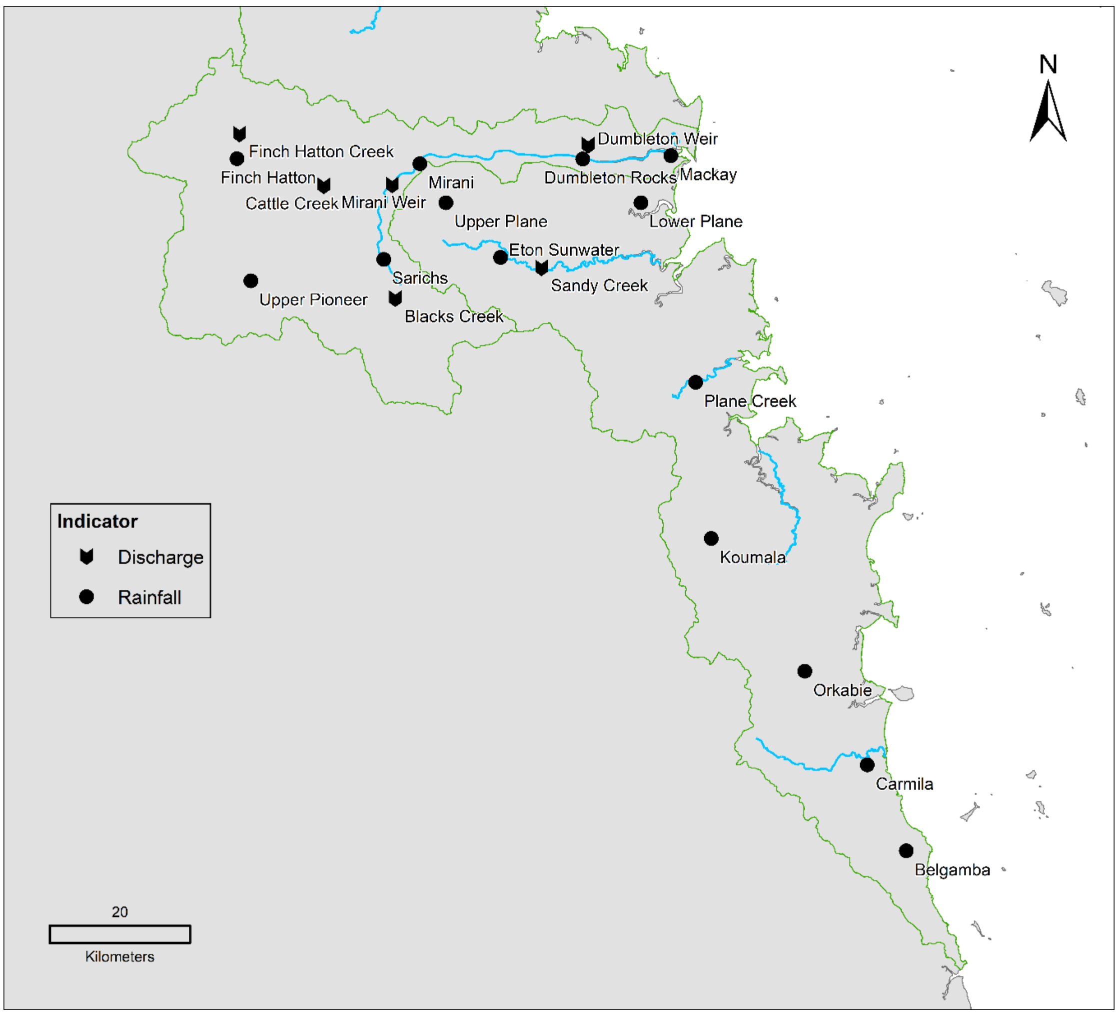

Figure 23. Locations of flow gauges and rainfall stations in the MWI region Pioneer and Plane Basins for the 2025 Report Card. Flow rainfall data provided by the Bureau of Meteorology (BoM) and the QLD SILO database. Flow discharge data provided by the Queensland Department of Local Government, Water, and Volunteers (DLGWV).

Notes on data interpretation

Data sources*:* Some differences can occur between climate type (based on rainfall) produced by the flow indicator tool and the BoM climate reporting. This is due to differences in spatial coverage and the analysis applied to assess rainfall in the flow indicator tool. The data source will be specified in each instance to minimise confusion.

Climate impact on flow indicator measurement: While rainfall does affect freshwater flows, the flow indicator tool has been designed to take this natural variability into account and produce scores that reflect anthropogenic impacts on flow (measured against the pre-development period).

Monitoring sites: The Pioneer Basin flow score was assessed from five stream gauging stations while flow in the Plane Basin was based on one monitoring location (Appendix 8.2.2).

Climate: The climate type for 2023–24 was classed as 'dry' for the Pioneer Basin and 'average' for the Plane Basin using the flow indicator tool (Table 15). Conditions were drier than average in the Plane in December 2022, and in both the Pioneer and the Plane in August 2022, February, May, and June 2023. Both basins experienced wetter than average conditions in July, September, and October 2022 and January 2023 (Table 3). The annual average was classed as 'average' in comparison to the long-term average annual rainfall for those basins, as calculated by both the flow indicator tool and according to data sourced from Australian Water Outlook (AWO) (Table 16, Table 3).

Results (Table 16. Figure 24, Appendix 8.2.2)

Table 16. Results for the flow indicator for freshwater basins for the 2025 Report Card (2023-24 data) and the climate type based on average rainfall, as compared to the historic scores. Climate type is added for reference only, as the flow indicator aims to assess waterway condition in regard to industrial and agricultural water extraction irrespective of climate.

Freshwater Basin	2023-24		2022-23		2021-22		2020-21		2019-20		2018-19	
	Score	Climate	Score	Climate	Score	Climate	Score	Climate	Score	Climate	Score	Climate
Don^												
Proserpine^												
O'Connell*												
Pioneer	49	Dry	71	Average	55	Dry	45	Drought	49	Dry	72	Average
Plane	61	Average	61	Average	61	Dry	61	Drought	43	Average	35	Average

Standardised flow scoring range: ■ Very Poor = 0 to <21 | ■ Poor = 21 to <41 | ■ Moderate = 41 to <61 | ■ Good = 61 to <81 | ■ Very Good = 81 to 100 | ■ No score/data gap

^ No pre-development reference data were available for these basins.

*The O'Connell Basin was omitted from reporting due to anomalous scores.

Key Messages:

1) The flow indicator category grade remained 'good' in the Plane Basin with no change from the previous reporting year.

2) The Pioneer Basin grade declined to 'moderate', potentially reflecting changes in agricultural water use.

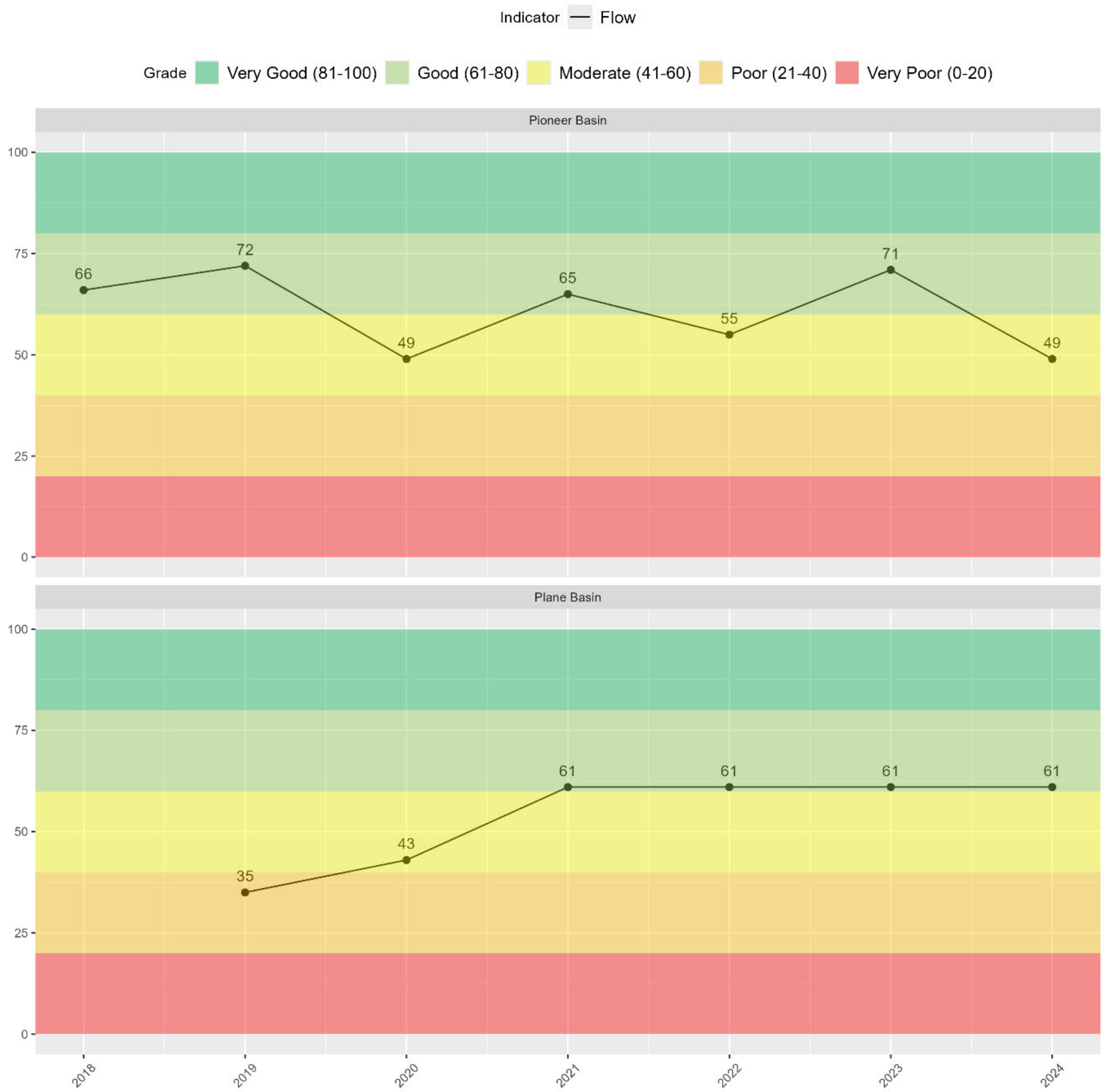

Figure 24. Results for the flow indicator for freshwater basins for the 2025 Report Card (2023-24 data) and the climate type based on average rainfall, as compared to the historic scores.

2.2.4 Habitat and Hydrology Index Scores

Overall habitat and hydrology scores include repeat data (Table 6) and changes in scores within this index are due to updates in the Flow indicator in Pioneer and Plane basins. Repeat data does not fully capture changes in conditions associated with major weather events or potential anthropogenic impacts which may have occurred since they were last updated.

Results (Table 17, Figure 25)

Table 17. Results for habitat and hydrology indicator categories and the aggregated index for the 2025 Report Card. Flow indicator refers to data from this reporting period (2023-24), all other indicators used repeat data.

2025 Report Card

Freshwater Basin	In-stream habitat modification	Flow	Riparian Extent	Wetland Extent	Habitat and Hydrology Index
Don	75		41	100	72
Proserpine	52		50	59	54
O'Connell	57		51	14	41
Pioneer	22	49	54	12	34
Plane	55	61	41	23	45

Scoring range: Very Poor = 0 to <21 | Poor = 21 to <41 | Moderate = 41 to <61 | Good = 61 to <81 | Very Good = 81 to 100 | No score/data gap

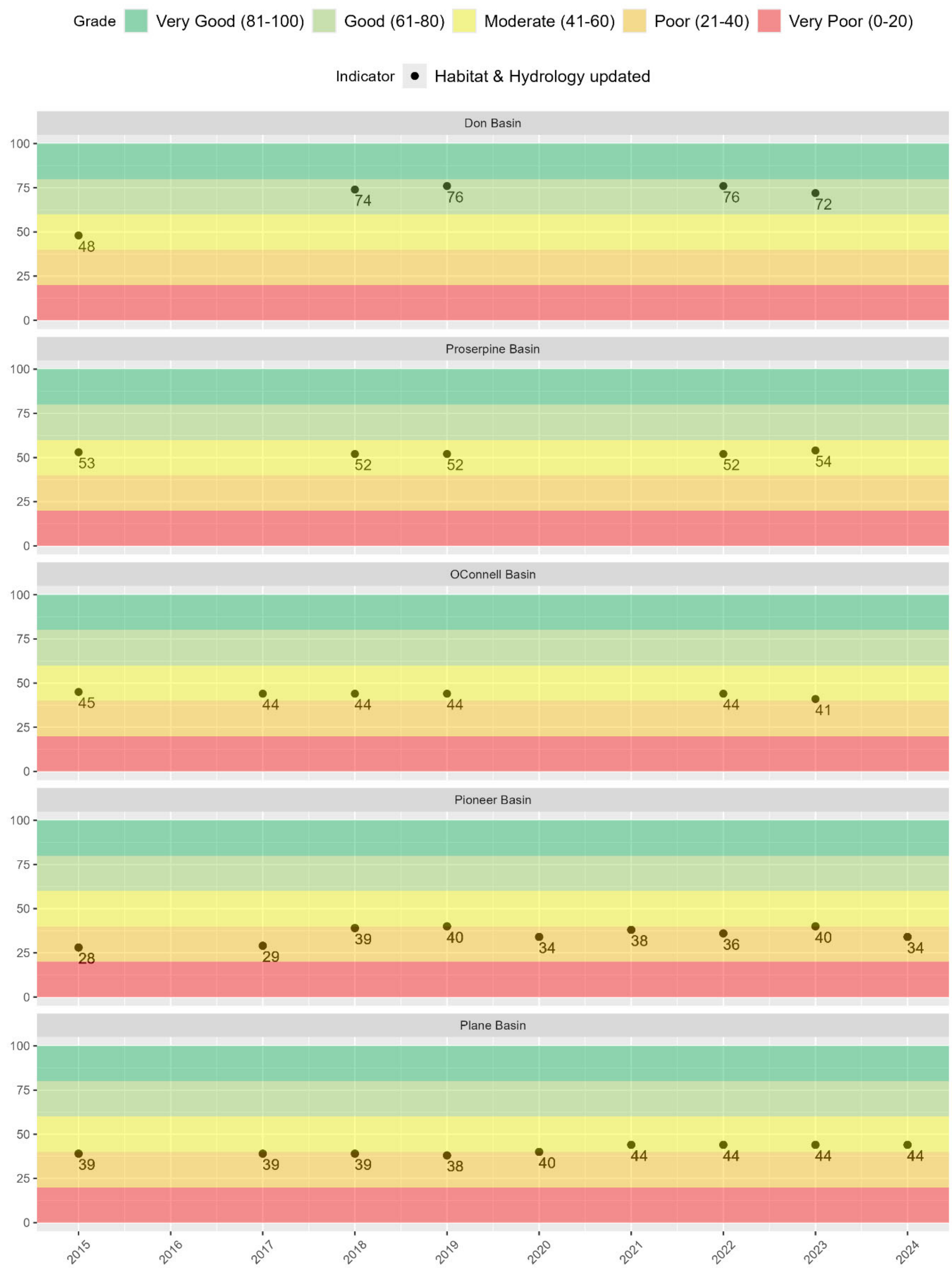

Figure 25. Results for habitat and hydrology indicator categories and the aggregated index in freshwater basins in the 2025 Report Card compared to the historic scores. Data updates are indicated by point and annotation.

2.2.4.1 Confidence

Overall confidence for the habitat and hydrology indicator category was 'moderate' (Table 18).

Table 18. Confidence associated with habitat and hydrology index results in freshwater basins for the 2025 Report Card. Confidence criteria are scored 1–3 and then weighted by the value identified in parentheses. Final scores (4.5–13.5) are additive across weighted confidence criteria. Final scores correspond to a rank from 1 to 5 (very low–very high), which indicates the final confidence level. Where confidence in the Don Basin differs from other basins the relevant confidence score for the Don is presented in brackets. Unless otherwise specified, confidence in results are the same across basins.

Indicator Category	Maturity of Methodology (x0.36)	Validation (x0.71)	Representativeness (x2)	Directness (x0.71)	Measured Error (x0.71)	Final	Rank
Impoundment	2	2	3	2	1	10.3	4
Fish Barriers	1	2 [1]	3 [1]	2	2 [1]	10.6 [5.2]	4 [1]
In-stream Habitat Modification*						**10.4 [7.7]**	**4 [2]**
Riparian Extent	2	2	2	2	2	9	3
Wetland Extent	2	2	2	2	2	9	3
Flow	1	1	2	2	1	7.2	2
Habitat and Hydrology Index						**9**	**3**

*The in-stream habitat modification rank is based on the median final score of impoundment and fish barriers indicators.
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.

2.3 Fish in Freshwater Basins

The fish community index is based on proportions of native and pest fish (alien and translocated) caught during field surveys. Fish scores have been updated in the 2025 Report Card with monitoring data from October – November 2023 (Table 6). The fish community index is assessed predominantly using backpack electrofishing techniques; with field monitoring surveys, data collection, and analysis conducted by DETSI at sites within each basin in the MWI region (Figure 26).

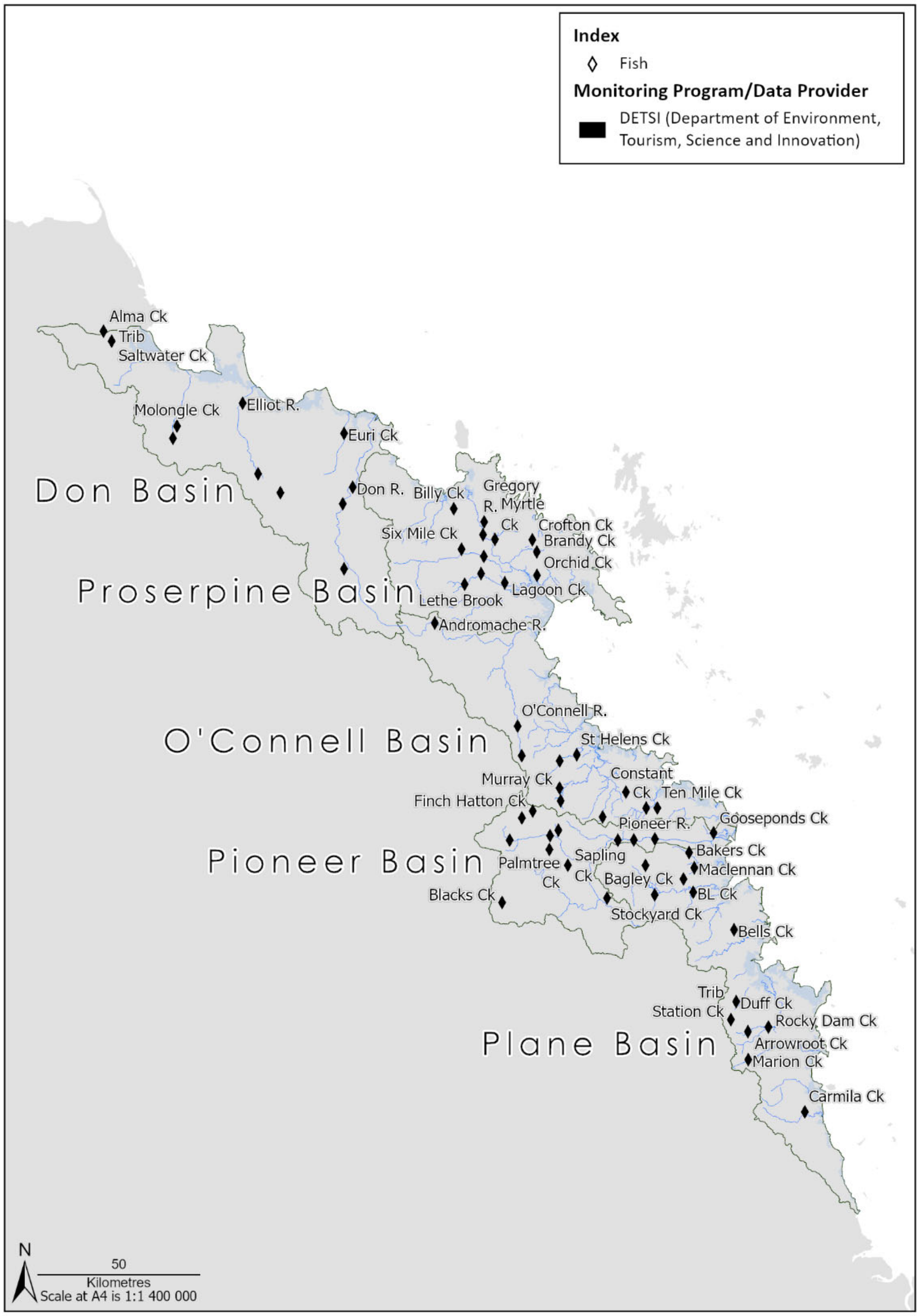

Figure 26. Sampling locations for fish monitoring in the MWI region for the 2025 Report Card (last monitored 2023-24). Fish data provided by the Department of Environment, Tourism, Science, and Innovation (DETSI).

Notes on data interpretation for Report Card results

Baseline: Species richness of sites within the MWI region was assessed using a regression line describing the relationship between the species richness of the 10% most specious samples in relation to the variables describing the natural variation of species richness across the region (D. Moffatt, pers. comm. 19/04/2022). As a pre-development baseline is not available, the results here are relative to this derived baseline to track changes over time.

Pesticide risk to fish: The fish grades appear to be inconsistent with the grades for freshwater pesticides, which are 'very poor' in three of the five basins (Section 2.1.3 Pesticides). However, fish grades represent the *species richness* (the number of different species present within a region), rather than the *abundance* or *health* of a species within each waterway.[23] Furthermore, the Pesticide Risk Metric is based on the results of toxicity tests that provide measures of the effects of pesticides upon a range of (predominantly non-fish) species. For example, herbicides are designed to target plants (weeds) and are generally 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 are generally a higher risk to aquatic insects and other arthropods (e.g. crabs, lobsters, prawns and copepods), but a lower risk to plant and other animal species. That said, many of the organisms likely effected by pesticides are components of fish habitat (e.g. aquatic algae and plants) and diet (e.g. aquatic macroinvertebrates), and there is evidence that agricultural runoff may influence species richness (Parikh et al., 2024) and health (Hook et al., 2018) of fish communities in the region.

Individual site conditions: Grades are calculated based on the median of site-level scores and the overall fish index grades do not necessarily reflect the condition of individual sites. For example, there were sites in each basin that fell into the 'poor' grading range for the POISE indicator (Figure 26).

Interpreting grades: Reference condition guideline values for each indicator are reported with discrete ranges to capture broad indicator condition trends over time. However, this means that the scoring difference between a site being assigned a certain grade (e.g., 'good' versus 'moderate') can be minimal. In the 2020 fish assessment, this should be noted when interpreting the indicator grades for some basins that have medians close to the border of a grade range, such as the Pioneer and Plane basins for the POISE indicator.

[23] https://healthyriverstoreef.org.au/news/answering-your-questions-on-freshwater-fish-pesticides-and-waterway-health/

Results (2023-24 data, Table 19, Figure 27-28):

Table 19. Results for fish indicators in freshwater basins in the 2025 Report Card (2023–24 data).

2025 Report Card (2023-2024 data)

Basin	Proportion of Indigenous Species Expected (POISE)	Proportion of Non-Indigenous Fish (PONI)	Fish Index
Don	**58**	**58**	**58**
Proserpine	**23**	**50**	**36**
O'Connell	**51**	**100**	**75**
Pioneer	**32**	**96**	**64**
Plane	**45**	**98**	**72**

Scoring range: ■ Very Poor = 0 to <21 | ■ Poor = 21 to <41 | ■ Moderate = 41 to <61 | ■ Good = 61 to <81 | ■ Very Good = 81 to 100 | ■ No score/data gap

Key Messages:

1) There was decline in POISE scores in all basins in the most recent assessment. While indigenous fish that are commonly abundant were still prevalent in the survey data, less common indigenous species were not caught as often.

2) Decline in PONI scores in both the Don and Proserpine basins was due to higher counts of mosquito fish (*Gambusia holbrooki*) in both basins, and additionally guppies (*Poecilia reticulata*) and tilapia (*Oreochromis mossambicus*) in the Don Basin. These species thrive in low-flow conditions and increased counts may be related to dry periods during sampling in October and November 2023 (Table 5, Figure 9).

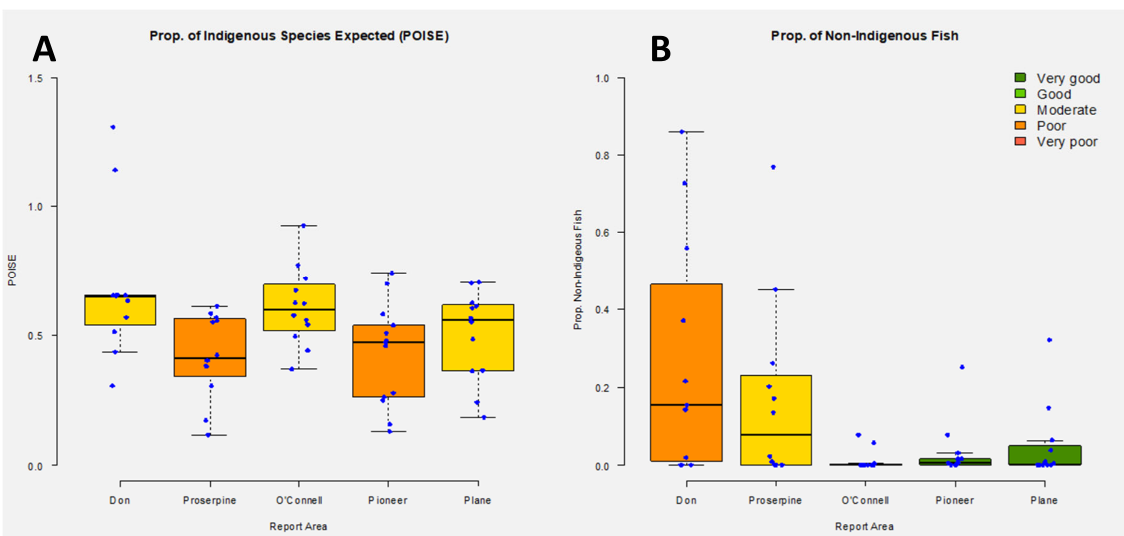

Figure 27. Distribution of the fish community sample data showing the variability amongst sites within each basin of the MWI region. Colour of the box represents the overall grade for the indicator in each basin. The median value is represented by a horizontal black line, upper and lower whiskers are 1.5 * IQR (inter-quartile range. Blue points indicate results per sample site within each basin. A) Median proportion of indigenous species expected (POISE) and B) Proportion of Non-Indigenous fish (PONI).

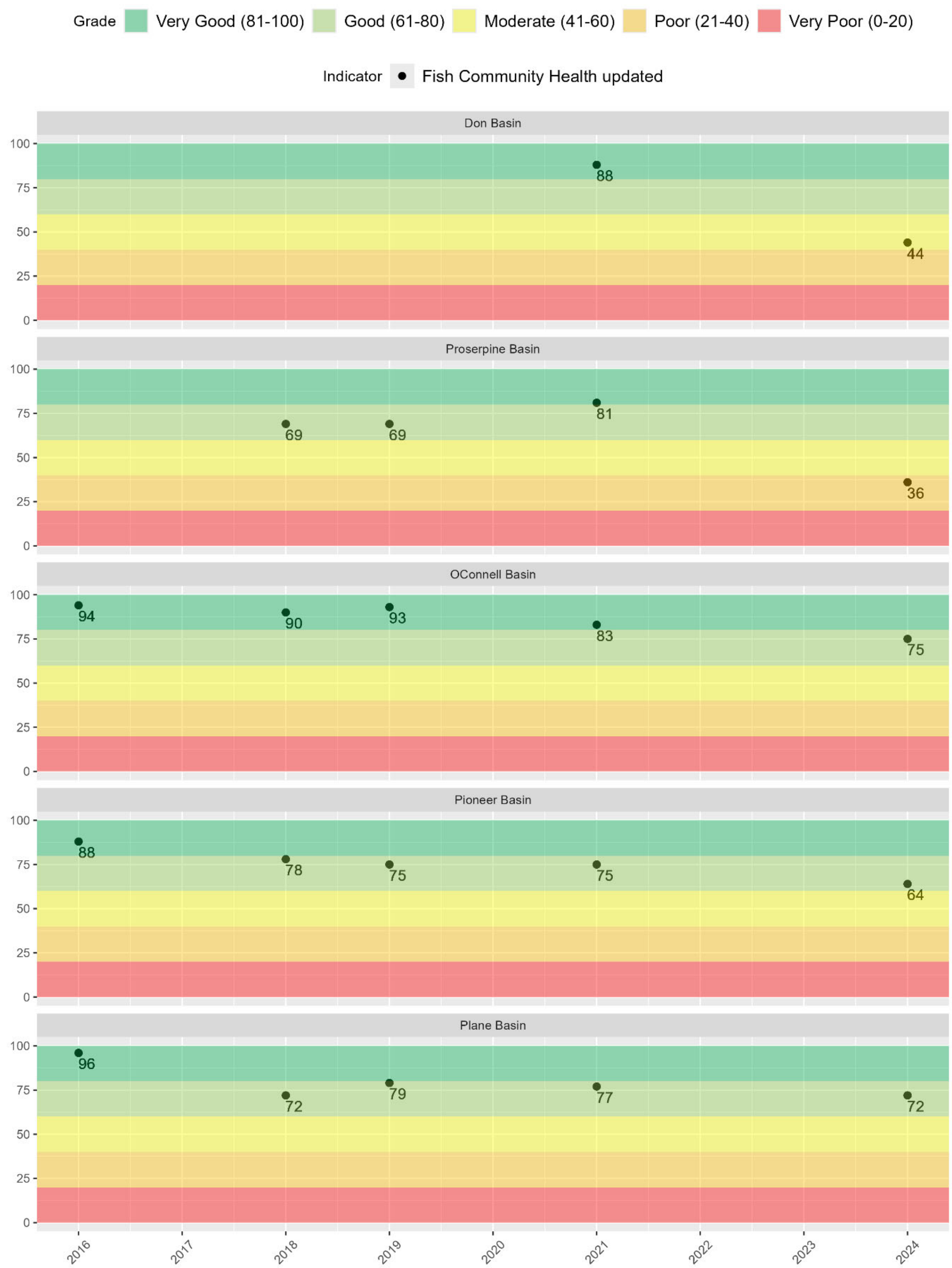

Figure 28. Results for fish indicators in freshwater basins in the 2025 Report Card (2023-24 data) compared to historic scores. Historic scores are based on a superseded methodology and are not directly comparable. Fish index is updated every three years, indicated by point and annotation.

2.3.1 Confidence

Confidence associated with freshwater fish results was ‘moderate’ (Table 20).

Table 20. Confidence associated with fish index results in freshwater basins. Confidence criteria are scored 1–3 and then weighted by the value identified in parentheses. Final scores (4.5–13.5) are additive across weighted confidence criteria. Final scores correspond to a rank from 1 to 5 (very low–very high), which indicates the final confidence level. Unless otherwise specified, confidence in results is the same across basins.

Index	Maturity of Methodology (x0.36)	Validation (x0.71)	Representativeness (x2)	Directness (x0.71)	Measured Error (x0.71)	Final	Rank
Proportion of Indigenous Fish Richness (POISE)	**2**	**2**	**2**	**3**	**1**	**9.0**	**3**
Proportion of Non-Indigenous Fish	**2**	**2**	**2**	**3**	**1**	**9.0**	**3**
Fish Index						**9.0**	**3**
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.							

2.4 Overall Basin Condition

As scores for many indicators are based on repeat data, changes to the overall basin scores in the 2025 Report Card were driven by the water quality index, fish barriers, and flow. There were no grade changes in comparison to the previous Report Card.

Results (Table 21, Figure 29)

Table 21. Condition grades and scores of freshwater basins for the 2025 Report Card.

2025 Report Card

Freshwater Basin	Water Quality	Habitat and Hydrology	Fish	Basin Score and Grade	
Don	72	72	58	67	B
Proserpine		54	36	45	C
O'Connell	57	41	75	57	C
Pioneer	44	34	64	47	C
Plane	36	45	72	51	C

Scoring range: ■ Very Poor = 0 to <21 | ■ Poor = 21 to <41 | ■ Moderate = 41 to <61 | ■ Good = 61 to <81 | ■ Very Good = 81 to 100 | ■ No score/data gap

Key Messages:

1) The Proserpine Basin recorded the largest difference in score due to a decline in the fish community index.
2) The Don Basin generally scores higher across water quality indicators than the other basins, potentially indicating differences in land use intensity across the region.

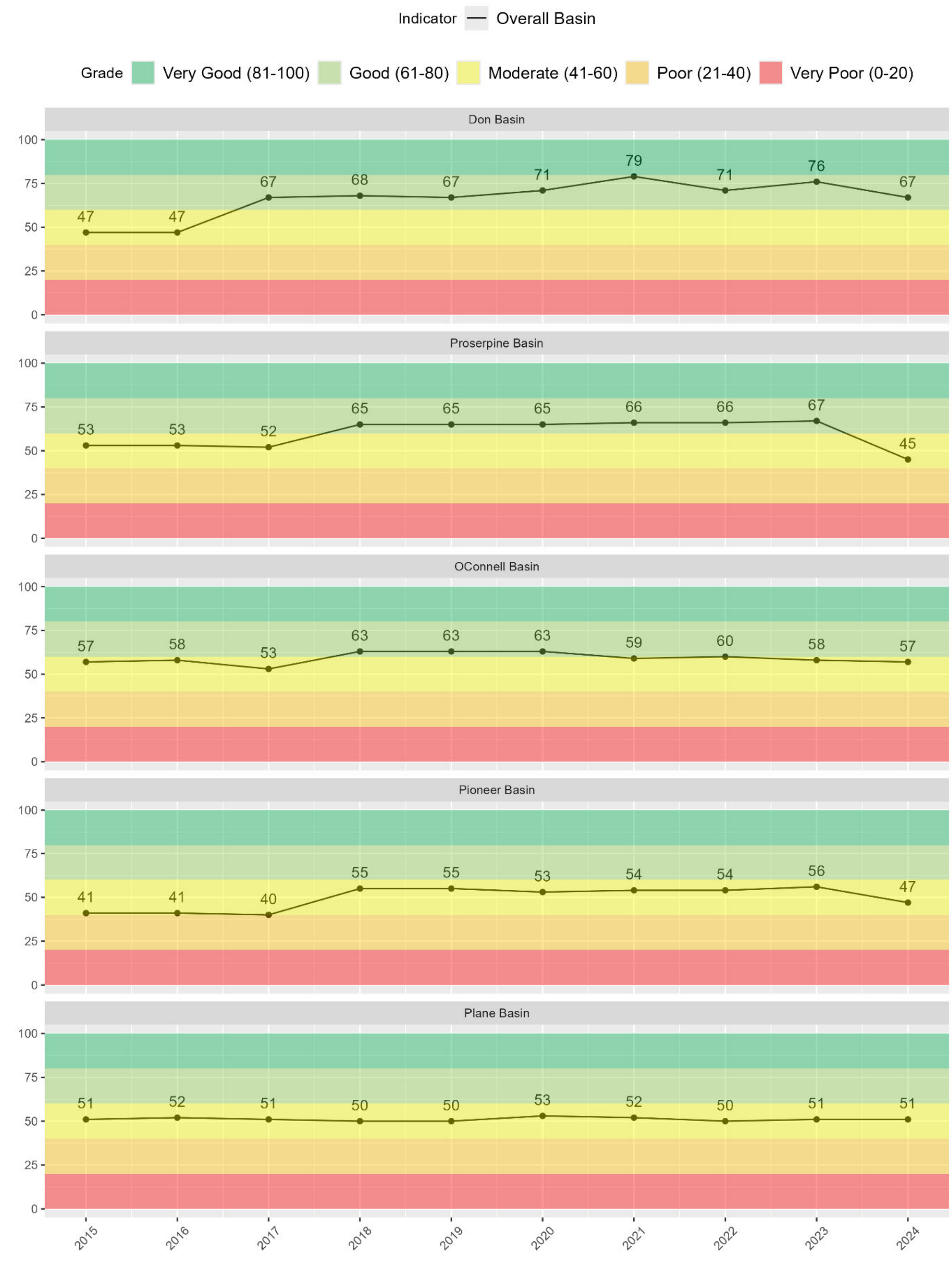

Figure 29. Condition grades and scores of freshwater basins for the 2025 Report Card compared to the historic record. Historic scores in the Don Basin have been back-calculated using guideline values (GVs) updated in 2023-24 and may be different to those published previously. Plane Basin scores incorporated two sites from 2018, while O'Connell Basin scores incorporated two sites between 2018 – 2023 reporting cycles.

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3 Estuary Results

The overall estuary grade is derived from the habitat and hydrology and water quality indices (Figure 30). There is no established methodology for the assessment of estuarine fish, therefore no score is reported for this index. Due to minimal data availability, flow is currently not reported for estuaries. Indicator categories and indicators within two indices, water quality and habitat and hydrology, are reported annually or on four-year cycles respectively (Table 22).

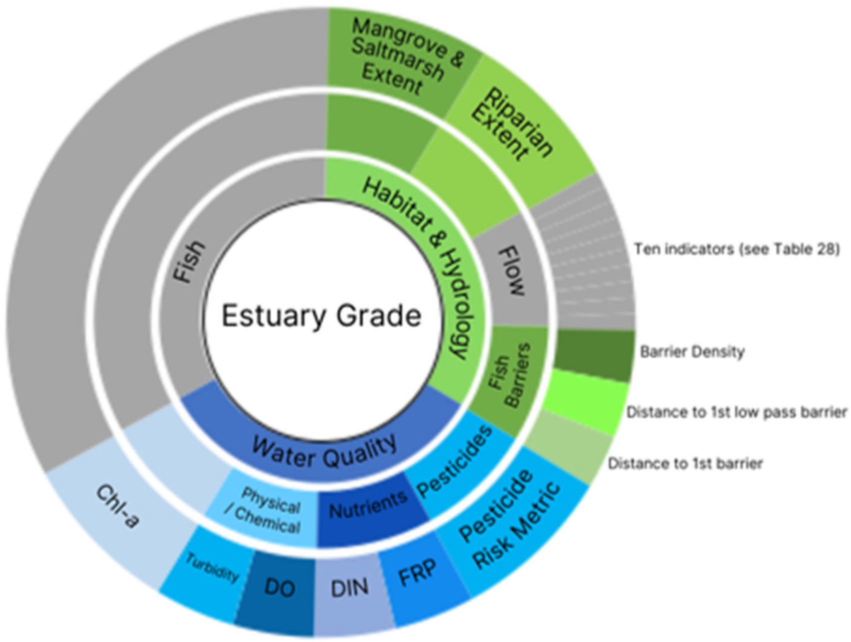

Figure 30. Estuary indicators (outer ring), indicator categories (middle ring) and indices (inner ring) that contribute to overall scores. Chl-*a* = chlorophyll-*a*, DO = dissolved oxygen, DIN = dissolved inorganic nitrogen, FRP = filterable reactive phosphorus.

Table 22. Estuary frequency of reporting for specific indicator categories and their update status for the 2025 Report Card.

Index	Indicator Categories	Intended Frequency of Reporting	Most Recent Data
Water Quality	Phys–chem	Annually	**2024**
	Nutrients	Annually	**2024**
	Chlorophyll-*a*	Annually	**2024**
	Pesticides	Annually	**2024**
Habitat and Hydrology	Flow		
	Riparian Vegetation	4 Yearly	**2022**
	Mangrove and Saltmarsh	4 Yearly	**2022**
	Fish Barriers	4 Yearly	**2023**
Fish			

3.1 Water Quality in Estuaries

Scores and grades for estuaries reported in the MWI region were based on monitoring conducted in the following tidal waterways: Gregory River, O'Connell River, St Helens Creek, Murray Creek, Vines Creek, Sandy Creek, Plane Creek, Rocky Dam Creek, and Carmila Creek (Figure 31). Indicators used to report on the water quality index in estuaries include nutrients (Dissolved Inorganic Nitrogen - DIN, Filterable Reactive Phosphorus - FRP), physical-chemical (turbidity as NTU, dissolved oxygen (DO)), Chlorophyll-*a* (Chl-*a*), and pesticides (which are reported using the Pesticide Risk Metric - PRM).

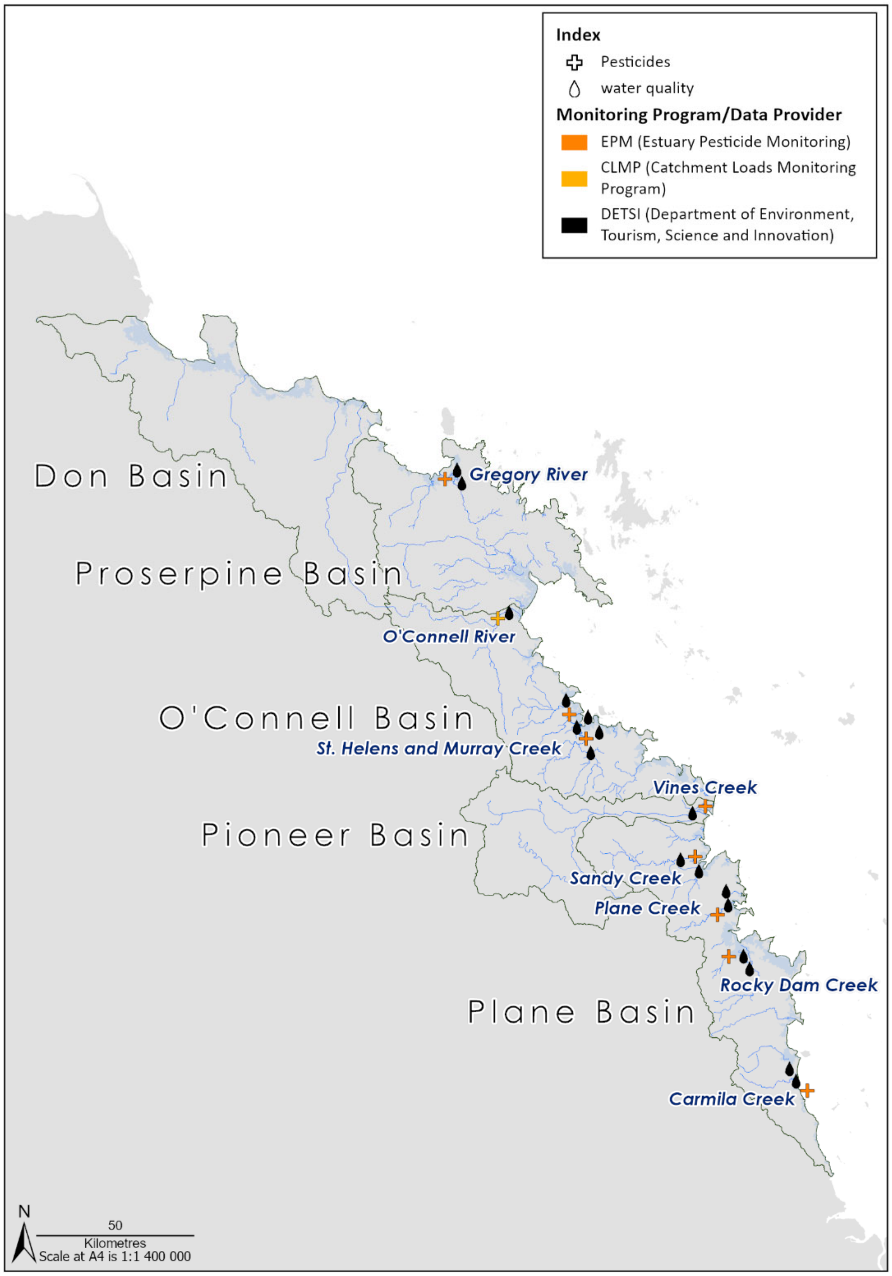

Figure 31. Sample locations for estuary water quality and pesticides monitoring for the MWI region for the 2025 Report Card. Water quality data (including pesticides) provided by DETSI; additional pesticide data provided by a Partnership-funded initiative and the CLMP.

Notes on data interpretation for Report Card results

Sampling regime and climatic variability: Estuarine water quality samples in this Report Card were collected via ambient grab sampling at a regular interval (i.e., one sample per month for most indicators) and may be influenced disproportionately by the timing of rainfall events (e.g., rainfall) relative to the sampling schedule.

3.1.1 Nutrients

Nutrient scores were based upon the reported concentrations of DIN (Oxidised nitrogen [$NO_2 + NO_3$] + ammonia [NH_3]) and FRP.

Results (Table 23, Figure 32, Figure 33, Appendix 8.3)**:**

Table 23. Results for DIN and FRP indicators and nutrients indicator category in estuaries for the 2025 Report Card (2023-24 data).

2025 Report Card (2023-24 data)

Estuary	DIN	FRP	Nutrients
Gregory River	60	77	**69**
O'Connell River^	65	90	**77**
St Helens/Murray Creek	54	55	**55**
Vines Creek	27	72	**50**
Sandy Creek	50	57	**53**
Plane Creek	60	90	**75**
Rocky Dam Creek	47	90	**68**
Carmila Creek	61	90	**75**

Scoring range: ■ Very Poor = 0 to <21 | ■ Poor = 21 to <41 | ■ Moderate = 41 to <61 | ■ Good = 61 to <81 | ■ Very Good = assigned 90 | ■ No score/data gap

^ DIN and FRP concentration data for the O'Connell River estuary are taken from the basin monitoring site.

Key Messages:

1) Vines Estuary nutrients score declined by 10 (yet remained 'moderate'). This was largely due to increased concentrations of FRP, where the score declined from 'very good' (90) to 'good' (72).
2) O'Connell Estuary nutrients score improved by 5 (yet remained 'good'). This improvement was due to decreased concentrations of FRP.
3) Plane Estuary nutrients score declined (yet remained 'good'). This was due to increased concentrations of DIN, where the grade declined from 'good' to 'moderate'.
4) DIN scores are consistently lower than FRP scores in all estuaries due to land use and the sources of these inputs; particularly in Carmila Creek, Rocky Dam Creek, and Vines Creek (Figure 31).

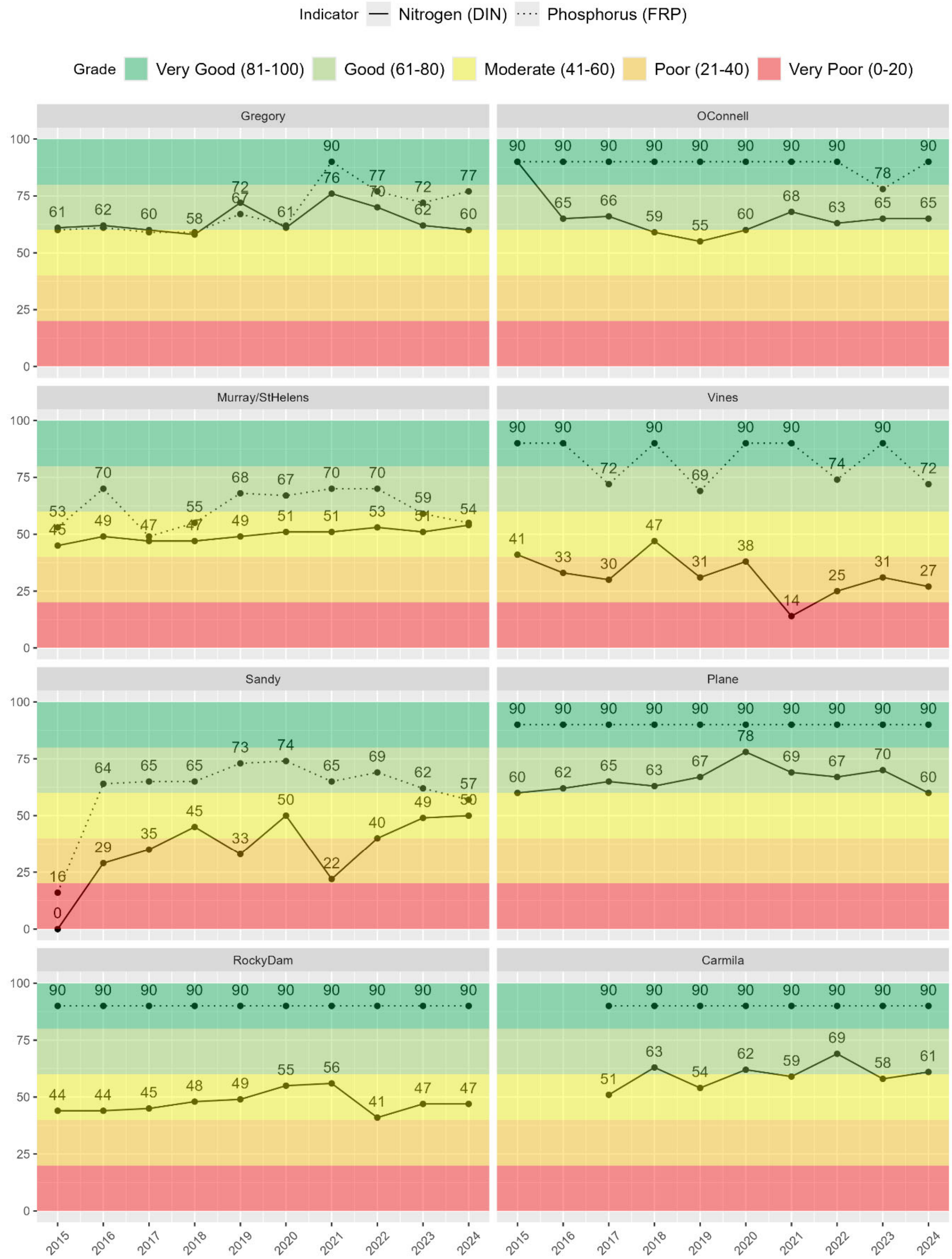

Figure 32. Results for nutrients indicators (DIN and FRP) in estuaries for the 2025 Report Card (2023-24 data) compared to the historic record. Historic scores have been back-calculated compared to guideline values (GVs) updated in 2023-24 and may be different to those published previously.

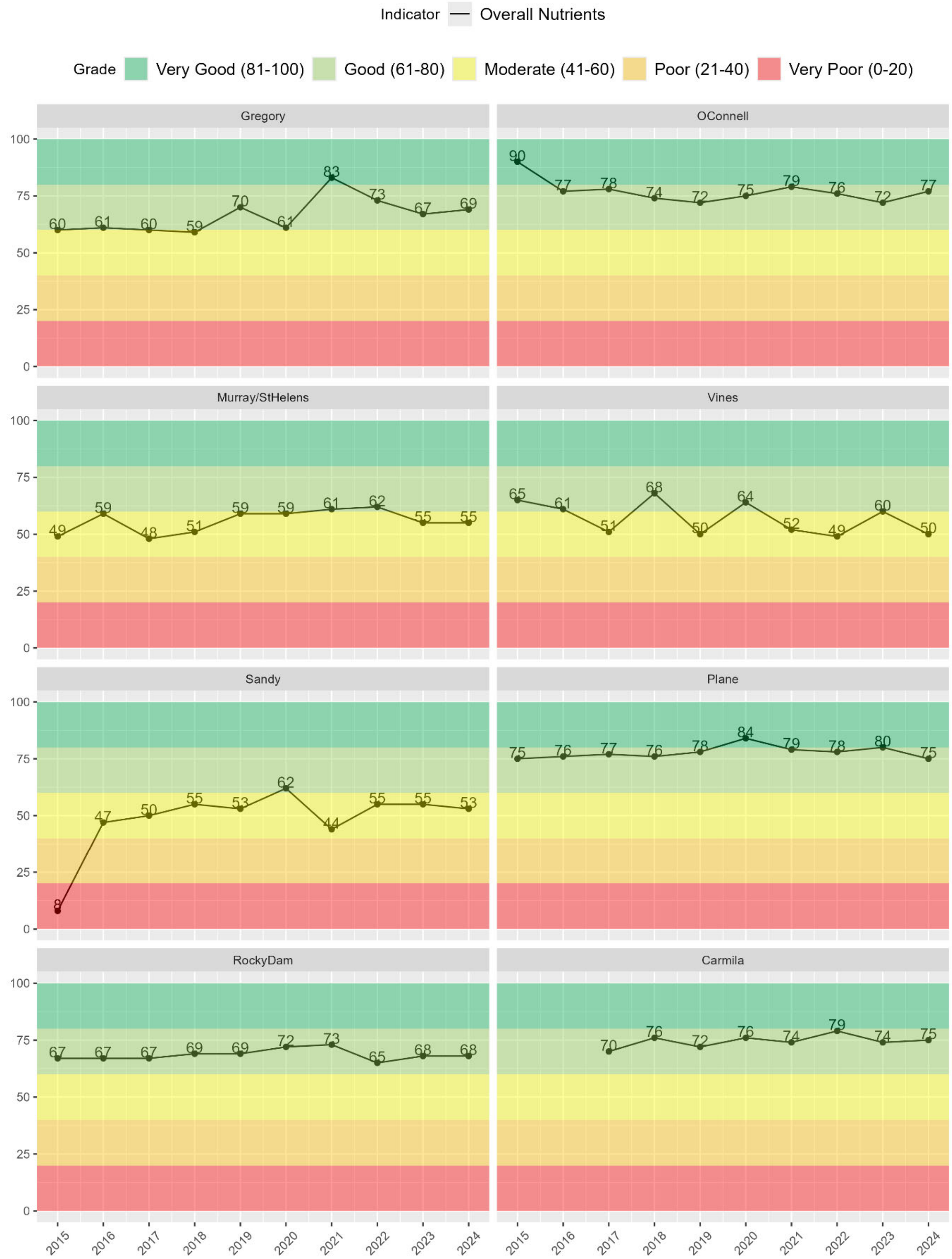

Figure 33. Results for nutrients indicator category in estuaries for the 2025 Report Card (2023-24 data) compared to the historic record. Historic scores have been back-calculated compared to guideline values (GVs) updated in 2023-24 and may be different to those published previously.

3.1.2 Chlorophyll-*a*

Results (Table 24, Figure 34, Appendix 8.3)

Table 24. Chlorophyll-*a* (Chl-*a*) indicator scores within estuaries for the 2025 Report Card (2023-24 data).

2025 Report Card (2023-24 data)

Estuary	Chl-*a*
Gregory River	39
O'Connell River^	38
St Helens/Murray Creek	15
Vines Creek	32
Sandy Creek	46
Plane Creek	71
Rocky Dam Creek	25
Carmila Creek	44

■ Very Poor = 0 to <21 | ■ Poor = 21 to <41 | ■ Moderate = 41 to <61 | ■ Good = 61 to <81 | ■ Very Good = 81 to 100 | ■ No score/data gap

^ Data used to evaluate the O'Connell River estuary are taken from an end-of-catchment monitoring site within the O'Connell River, which is also used to monitoring nutrients within freshwater basins.

Key Messages:

1) Sandy Creek had the largest estuarine scores decline in Chl-*a*, decreasing from 77 'good' to 46 'moderate'.
2) The Gregory and Murray/St Helens Estuaries recorded their worst chl-*a* scores (39, and 15, respectively) since the Report Card's inception.

Since the inception of the Report Card, there has been a **general increasing trend for chl-*a* concentrations** in the Gregory, and Murray/St Helens estuaries. Despite the noticeable trend, no obvious reasons have been identified (A. Moss, pers. comm. 24/01/2023). Continued monitoring may help to determine if this is due to natural variability or other causes.

Rocky Dam Estuary grades over the past four years have consistently been 'poor' or lower, however prior to 2021 scores were generally 'good' or above. **Carmila Creek Estuary** saw improvements during the 2023-24 reporting cycle for the second consecutive year. Chl-*a* often exceeds guideline values at Carmila Creek; however, it is usually not found at extremely high concentrations. Results of a recent Partnership-funded pilot study conducted by CQUniversity's Coastal Marine Ecosystems Research Centre suggested that the timing of sampling in relation to rainfall events is relevant to interpretation of these results. The small size of the catchment and creek and the large tidal range are likely to influence results at this site (Flint et al., 2022).

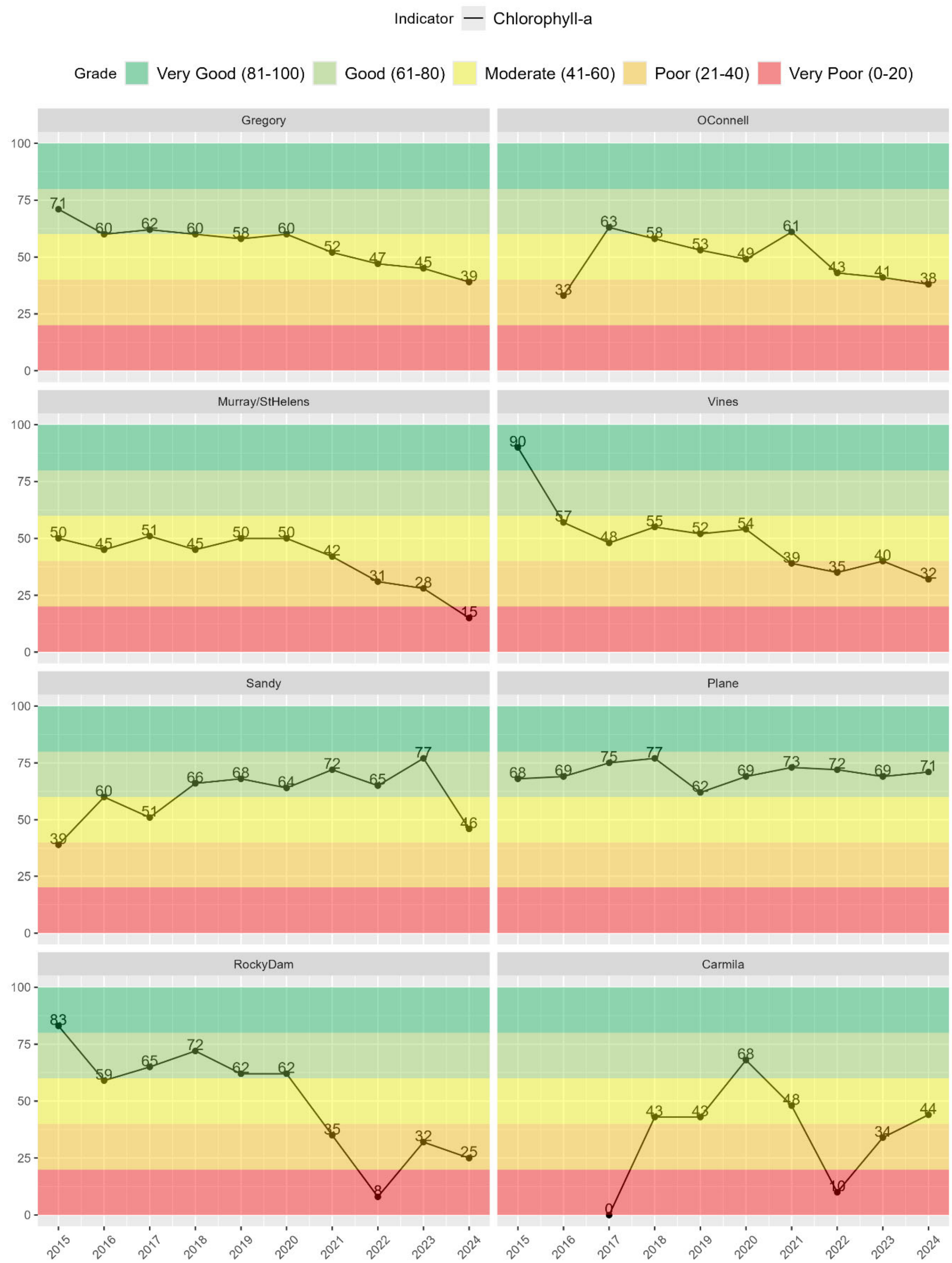

Figure 34. Chlorophyll-*a* (Chl-*a*) indicator scores within estuaries for the 2025 Report Card (2023-24 data) compared to the historic record. Historic scores in Gregory, Vines, and Murray / St Helens estuaries have been back-calculated compared to guideline values (GVs) updated in 2023-24 and may be different to those published previously.

3.1.3 Phys–chem

Notes on data interpretation for Report Card results

Phys–chem scores: The phys–chem indicator category scores were generated by the aggregation of the turbidity and DO indicators. The reported DO indicator scores were based on two metrics derived from percent oxygen saturation of each sample, with lower DO comparing saturation against lower limit guideline values, and upper DO comparing percent saturation against upper limit guideline values. To avoid over-representation of the DO indicator in the final score, the worst scoring result of the two (upper and lower DO) was adopted as the DO score for aggregation into the phys-chem indicator category.

Lack of guideline values: A turbidity score was not calculated for the four estuaries south of Mackay (Sandy, Plane, Rocky Dam, and Carmila Creek estuaries), as the draft guidelines for MWI estuaries characterised turbidity as too variable to derive a suitable guideline (Newham et al., 2017).

Results (Table 25, Figure 35, Figure 36, Appendix 8.3):

Table 25. Results for turbidity, DO, and aggregated phys–chem indicator category within estuaries for the 2025 Report Card (2023-24 data). The aggregated phys–chem score is calculated by averaging the poorer DO score with the turbidity score. In the absence of a suitable turbidity score, phys–chem results are derived from the condition of DO.

2025 Report Card (2023-24 data)

Estuary	Turbidity	Lower DO	Upper DO	Phys–chem
Gregory River	61	68	90	**65**
O'Connell River^	65	90	76	**70**
St Helens/Murray Creek	12	90	90	**51**
Vines Creek	70	69	90	**70**
Sandy Creek		90	90	**90**
Plane Creek		90	90	**90**
Rocky Dam Creek		79	90	**79**
Carmila Creek		90	90	**90**

Scoring range ■ Very Poor = 0 to <21 | ■ Poor = 21 to <41 | ■ Moderate = 41 to <61 | ■ Good = 61 to <81 | ■ No score/data gap

DO and turbidity ■ Very Good = assigned 90 | **Phys–chem** ■ Very Good = 81 to 100

^ Data used to evaluate the O'Connell River estuary are taken from an end-of-catchment monitoring site within the O'Connell River, which is also used to monitor nutrients within freshwater basins.

Key Messages:

1) Phys–chem grades improved in **Carmila Creek Estuary** due to an improved upper DO grade.
2) **Turbidity** scores declined in all estuaries where they are reported, most noticeably in Murray / St Helens where the turbidity score declined from 31 'poor' to 12 'very poor'.

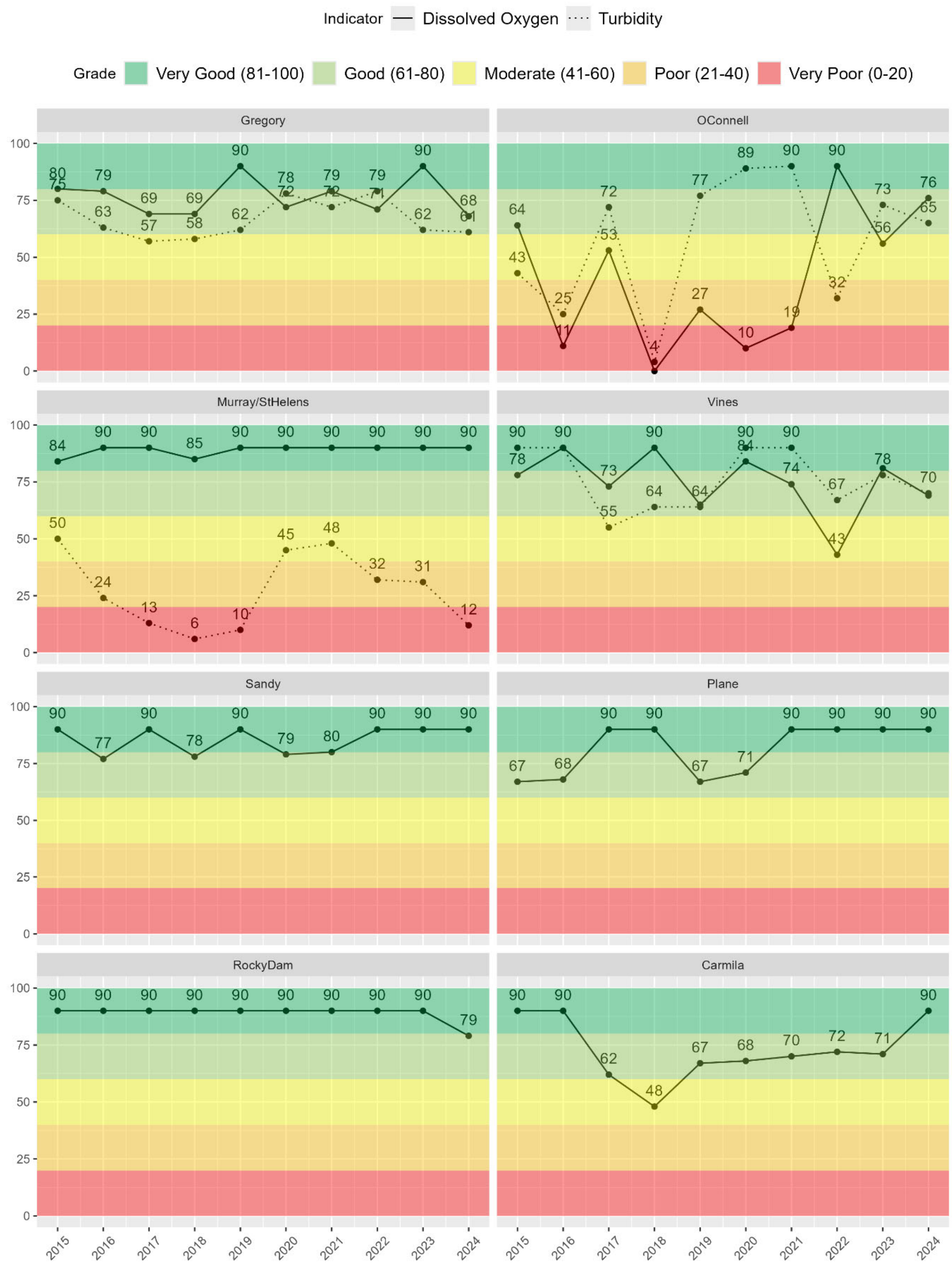

Figure 35. Results for phys-chem indicators (DO and NTU) in estuaries for the 2025 Report Card (2023-24 data) compared to the historic record. Historic scores in Gregory and Murray / St Helens estuaries have been back-calculated compared to guideline values (GVs) updated in 2023-24 and may be different to those published previously. The southern most-estuaries in the region do not record turbidity as there is no suitable GV.

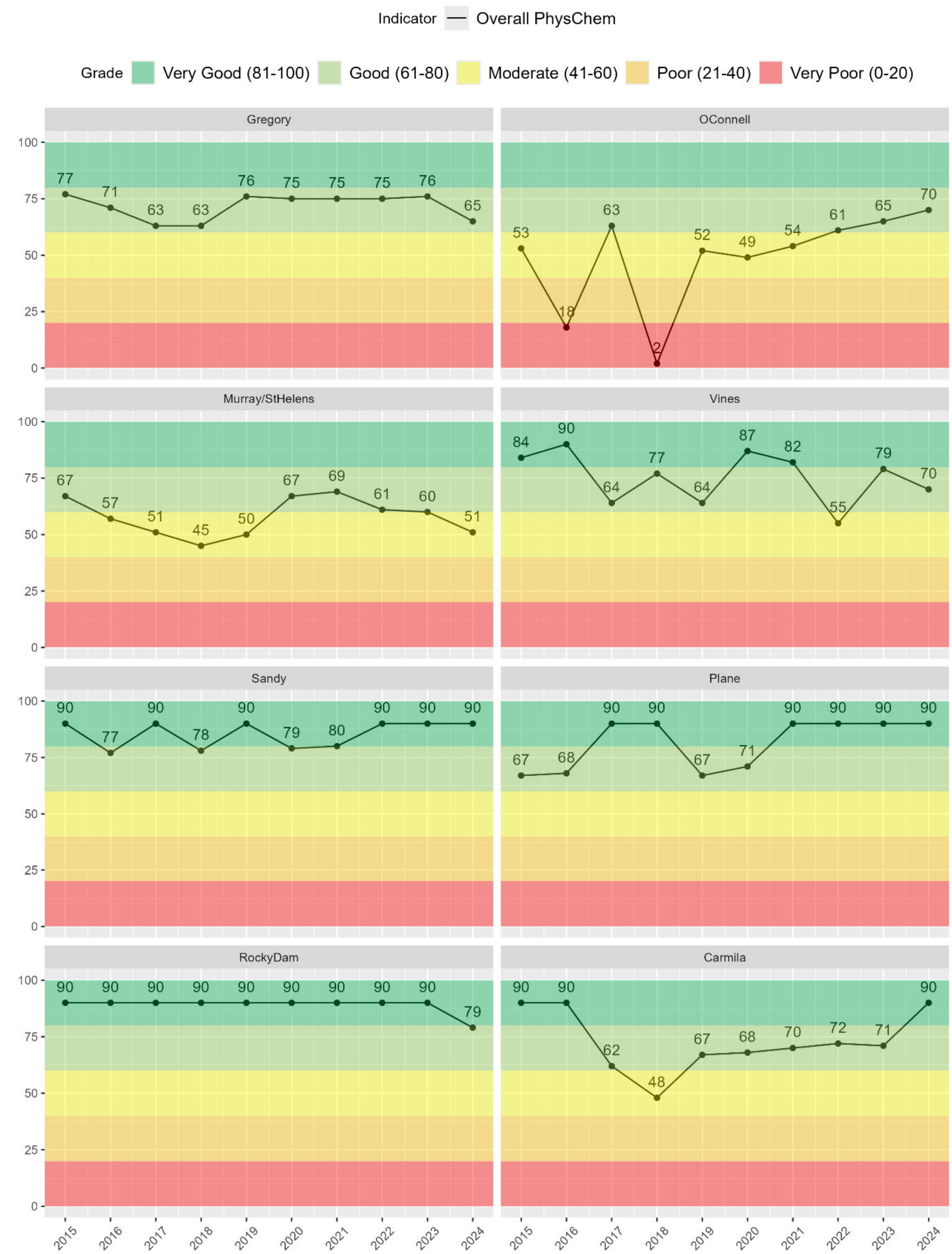

Figure 36. Results for aggregated phys–chem indicator category within estuaries for the 2025 Report Card in comparison to historic scores for phys–chem. The aggregated phys–chem score is calculated by averaging the poorer DO score with the turbidity score. In the absence of a suitable turbidity score, phys–chem results are derived from the poorer DO score. Historic scores in Gregory and Murray / St Helens estuaries have been back-calculated compared to guideline values (GVs) updated in 2023-24 and may be different to those published previously.

3.1.4 Pesticides

Reporting of pesticides in the MWI estuaries follow methods adopted for freshwater basins, where measured concentrations of up to 22 different pesticides in each sample are converted to a Pesticide Risk Metric (PRM). The PRM is expressed as a level of risk in terms of the percentage of aquatic species that may be adversely affected/protected by a mixture of pesticides (Warne et al., 2020, 2023). Further information is presented in the Methods Report (MWI HR2RP, 2025).

Results (Table 26, Figure 37, Figure 38)**:**

Table 26. Results for the Pesticide Risk Metric (PRM) indicator accounting for 22 pesticides, expressed as aquatic species protected (%) and associated standardised pesticide score, for eight estuaries in the MWI region in the 2025 Report Card (2023-24 data).

2025 Report Card (2023-24 data)

Estuary	PRM (% species protected)	Standardised Pesticide Score
Gregory River	97.9	**75**
O'Connell River^	92.8	**52**
St Helens/Murray Creek	96.3	**67**
Vines Creek	96.4	**67**
Sandy Creek	71	**18**
Plane Creek	95.4	**62**
Rocky Dam Creek	90.3	**41**
Carmila Creek	99.7	**93**

Species protected: ■ Very Poor <80% | ■ Poor 80 to <90% | ■ Moderate 90 to <95% | ■ Good 95 to <99% | ■ Very Good ≥99% | ■ No score/data gap
Pesticides grade: ■ Very Poor 0 to <21 | ■ Poor 21 to <41 | ■ Moderate 41 to <61 | ■ Good 61 to <81 | ■ Very Good 81 to 100 | ■ No score/data gap
Risk level: ■ Very high risk | ■ High risk | ■ Moderate risk | ■ Low risk | ■ Very low risk
^ Data used to evaluate the O'Connell River estuary are taken from an end-of-catchment monitoring site within the O'Connell River which is also used to monitor nutrients within freshwater basins.

Key Messages:

1) The Sandy Creek, O'Connell River, and Rocky Dam Creek estuaries recorded results that suggest estuarine species experience toxic effects due to pesticide concentrations. There is a strong need to adopt management measures to mitigate impacts to aquatic biota in the catchments where the pesticides are applied.

2) Diuron, imidacloprid, and to a lesser extent, metolachlor, imazapic, and atrazine, were key contributors to the overall PRM throughout the region. Exceptions included Plane Creek and Vines Creek, where metsulfuron-methyl (a herbicide) was a key contributor. Metsulfuron-methyl is not registered for use in sugarcane and applications may be related to urban and/or industrial use.

3) Grade improvements were seen in O'Connell River and Rocky Dam Creek (both 'poor' to 'moderate').

4) Sandy Creek declined to 'very poor', a grade it has held for all but one year that pesticides have been reported in the Report Card.

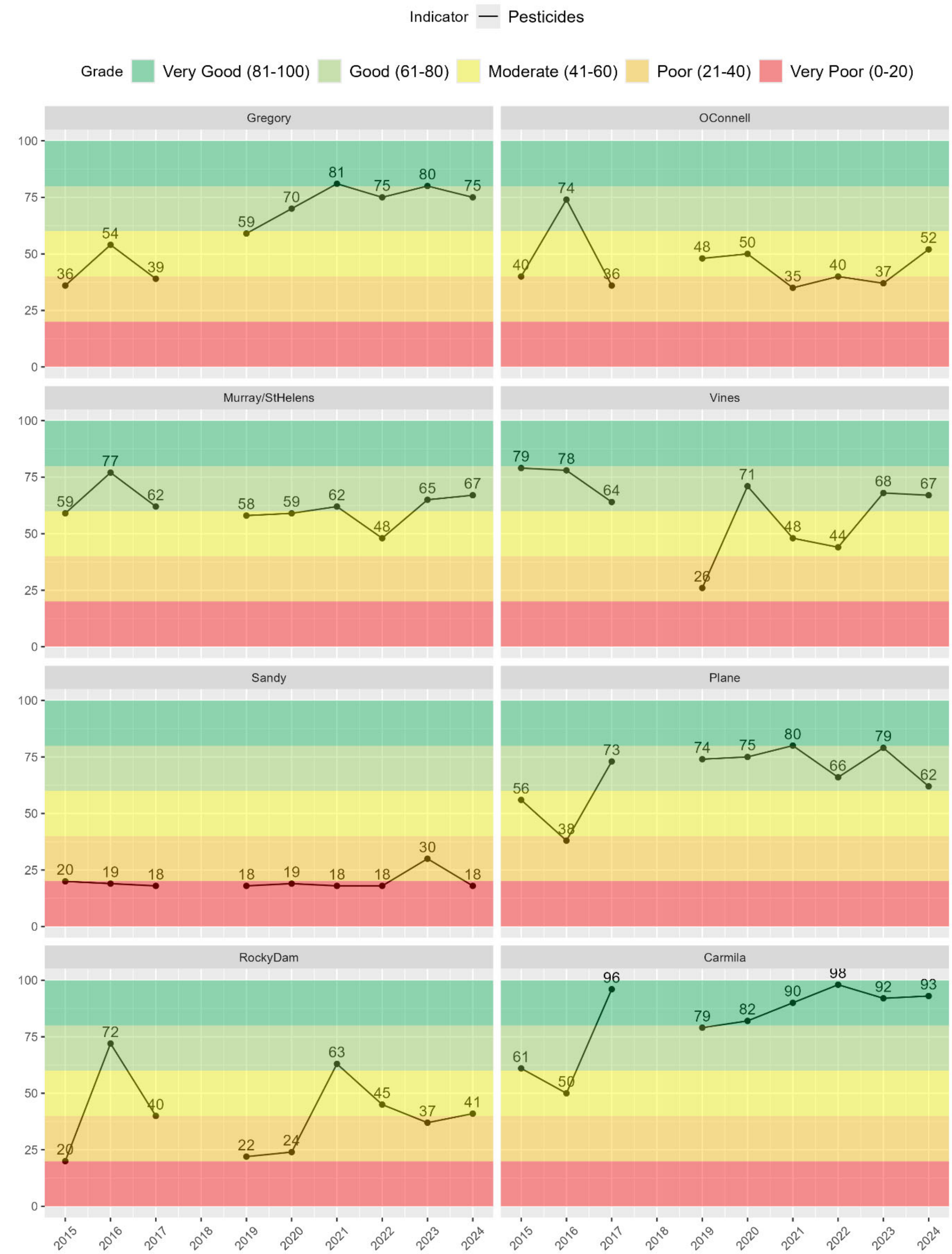

Figure 37. Results for the Pesticide Risk Metric (PRM) indicator accounting for 22 pesticides, expressed as standardised pesticide score, for eight estuaries in the MWI region in the 2025 Report Card (2023-24 data) compared to the historic record. Note that there were no estuary pesticides scores in 2018 due to a gap in funding.

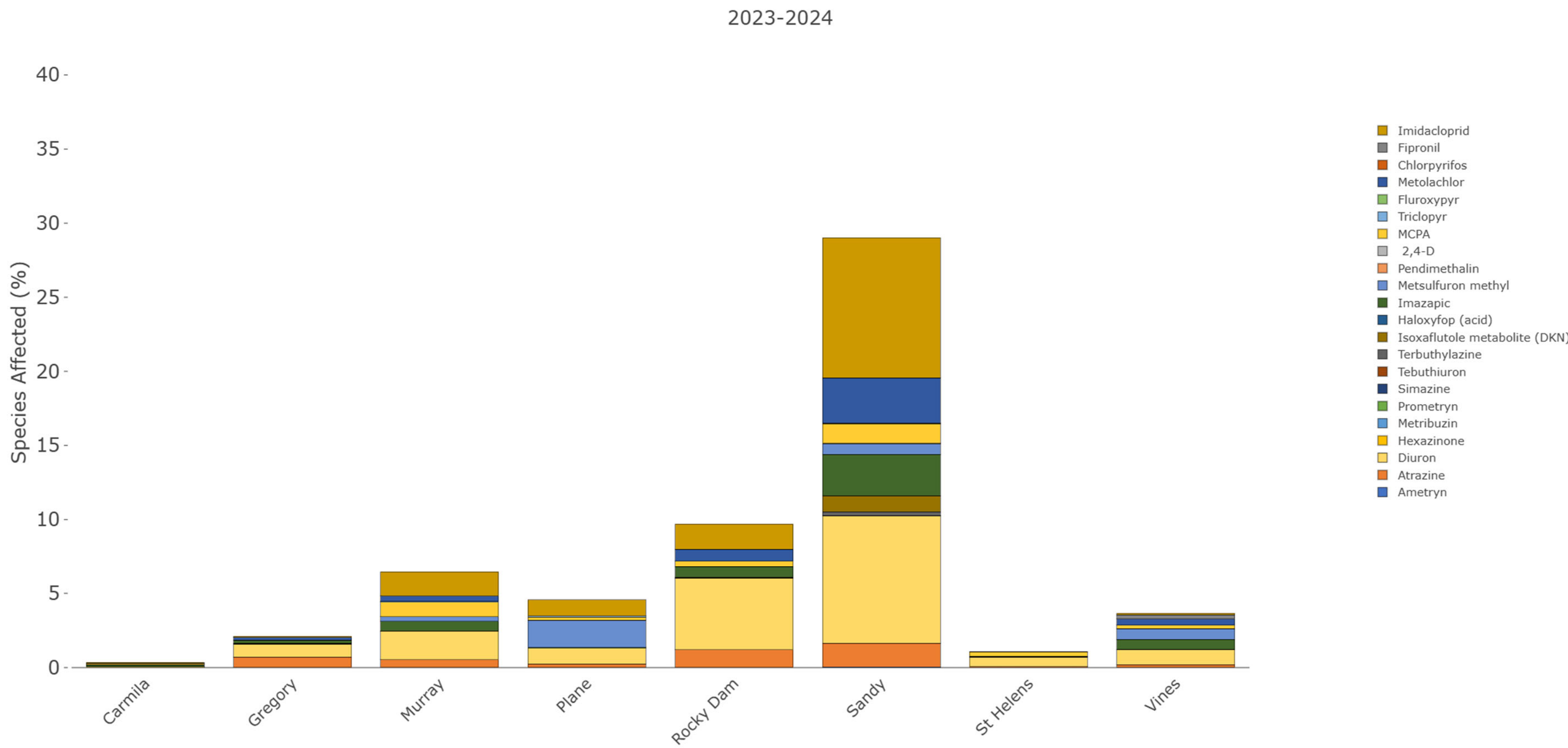

Figure 38. Proportional contribution of each pesticide to as the total percentage of species affected (PAF) as calculated using the Pesticide Risk Metric (PRM) for the 2023–24 reporting year in the MWI estuaries. Source: QLD Government, GBR CLMP.

3.1.5 Water Quality Index Scores

Notes on data interpretation for Report Card results

O'Connell data source: Data used to derive the O'Connell River Estuary water quality index are taken from an end-of-catchment monitoring site on the O'Connell River, which is also used to monitor water quality within freshwater basins.

Results (Table 27, Figure 39, and Appendix 8.3)**:**

Table 27. Results for water quality indicator categories and overall index scores in estuaries for the 2025 Report Card (2023-24 data).

2025 Report Card (2023-24 data)

Estuary	Phys–chem	Nutrients	Pesticides	Chl-*a*	Water Quality Index
Gregory River	65	69	75	39	62
O'Connell River^	70	77	52	38	59
St Helens/Murray Creek	51	55	67	15	47
Vines Creek	70	50	67	32	55
Sandy Creek	90	53	18	46	52
Plane Creek	90	75	62	71	74
Rocky Dam Creek	79	68	41	25	54
Carmila Creek	90	75	93	44	75

Scoring range: ■ Very Poor = 0 to <21 | ■ Poor = 21 to <41 | ■ Moderate = 41 to <61 | ■ Good = 61 to <81 | ■ Very Good = 81 to 100 | ■ No score/data gap

^ Data used to evaluate the O'Connell River estuary are taken from an end-of-catchment monitoring site within the O'Connell River, which is also used to monitor nutrients within freshwater basins.

*Current and historic scores were assessed against updated GVs released in EPP 2019 (Environmental Policy and Planning Division, Department of Environment and Science, 2022b, 2022a). These back-calculated results may differ from what had been previously reported.

Key Messages:

1) Both **Sandy Creek** and **Vines Creek** declined in grade from 'good' to 'moderate'.
2) In Sandy Creek decline was influenced by decline in pesticides ('poor' to 'very poor') and chl-a ('good' to 'moderate'). In Vines Creek this was due to declines in all indicator scores, most noticeably FRP in the nutrients indicator category.

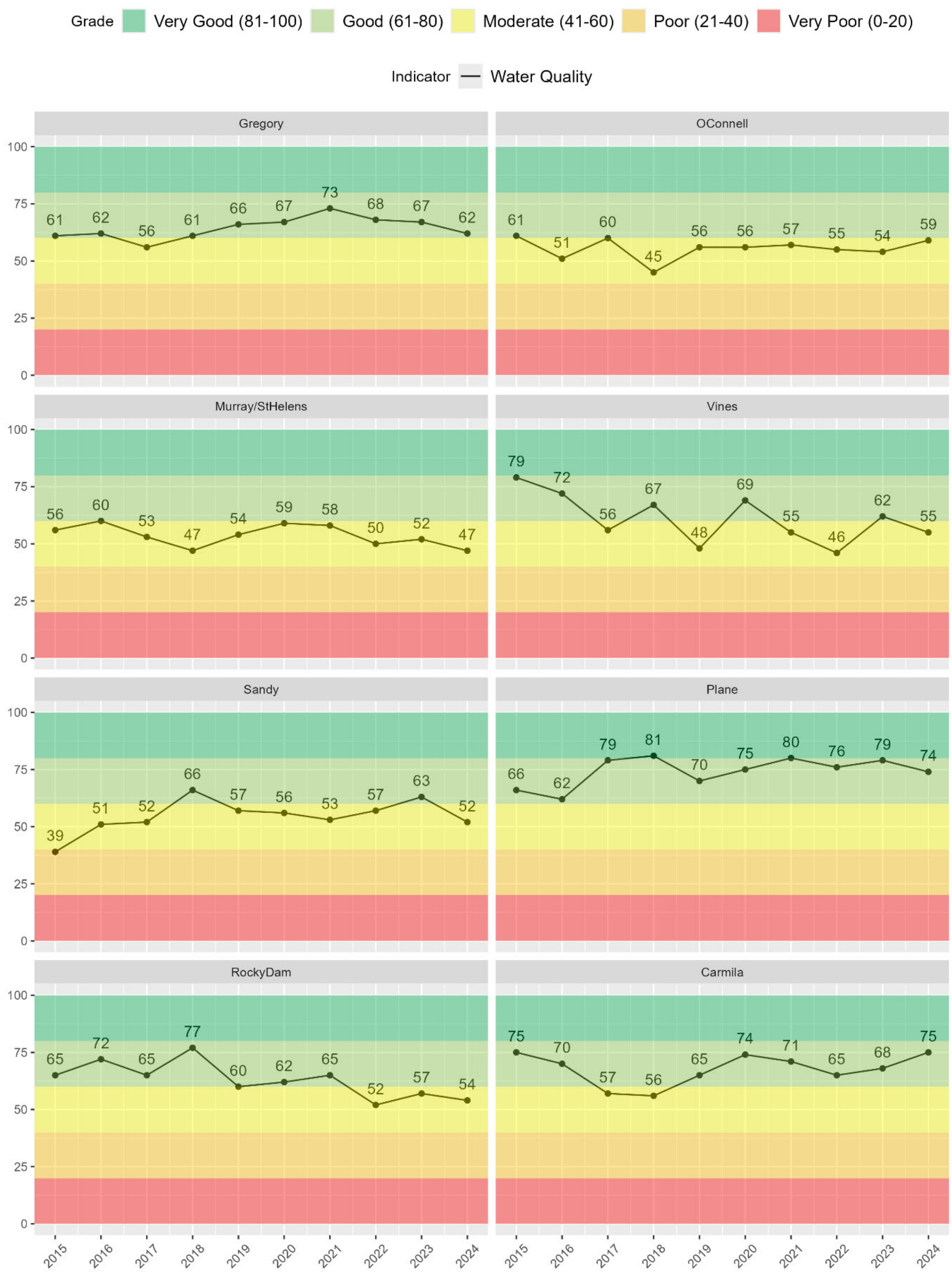

Figure 39. Results for overall water quality index scores in estuaries for the 2025 Report Card (2023-24 data) in comparison to historic Report Card scores. Historic scores have been back-calculated compared to guideline values (GVs) updated in 2023-24 and may be different to those published previously.

3.1.5.1 Confidence

Lower confidence scores in some O'Connell, Vines, and Carmila Creek estuary water quality scores (designated by brackets) are due to data collection occurring at only one sample site. Higher confidence scores in other estuaries reflects higher spatial representation (Table 28).

Table 28. Confidence associated with water quality index results in estuaries for the 2025 Report Card (2023-24 data). Confidence criteria are scored 1–3 and then weighted by the value identified in parentheses. Final scores (4.5–13.5) are additive across weighted confidence criteria. Final scores correspond to a rank from 1 to 5 (very low–very high), which indicates the final confidence level. Where confidence in results for the O'Connell River and Vines Creek and Carmila Creek estuaries differ from the other estuaries, the relevant confidence scores for these estuaries are presented in brackets. Unless otherwise specified, confidence in results is the same across estuaries.

Indicator Category	Maturity of Methodology (x0.36)	Validation (x0.71)	Representativeness (x2)	Directness (x0.71)	Measured Error (x0.71)	Final	Rank
Phys–chem	3	3	1.5 [0.5]	3	1	9.1 [7.1]	3 [2]
Nutrients	3	3	1.5	3	1	9.1 [7.1]	3 [2]
Chl-*a*	3	3	1.5	3	1	9.1 [7.1]	3 [2]
Pesticides	3	3	1	3	2	8.8	3
Water Quality Index						**10.1 [8.1]**	**3 [2]**
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.							

3.2 Habitat and Hydrology in Estuaries

Habitat and hydrology assessments in the estuaries are derived from three indicators: fish barriers, riparian extent, and mangrove/saltmarsh extent. Vegetation condition in estuaries is assessed using the same principles as in basins, where the target area begins at the estuary mouth and continues upstream to the tidal limit. Reporting cycles for the habitat and hydrology indicators are detailed in each section below and in Table 22.

3.2.1 Fish Barriers

Similar to freshwater basins, the estuary fish barriers indicator is updated every four years, most recently in the 2022-23 reporting cycle. An assessment on fish barriers for the MWI region (Power et al., 2022) provided the basis for a report on fish barrier scores (Moore & Power, 2023).

Results (2022-23 data, Table 29, Figure 40):

Table 29. Results for fish barrier indicators in estuaries in the 2025 Report Card (2022-23 data). NB = no barriers. NLPB = no low passability barriers.

2025 Report Card (2022-23 data)

Estuary	Barrier Density		Stream (%) to the First Barrier		Stream (%) to 1st Low "Passability" Barrier		Fish Barriers	
	km per barrier on SO ≥3	Score	% of stream before 1st barrier on SO ≥3	Score	% of stream before 1st low pass barrier on SO ≥4	Score	Total Score	Fish Barriers (standardised)
Gregory River	17.4	5	90.9	4	96.7	4	13	80
O'Connell River	4.7	3	81	4	97.5	4	11	61
St Helens/Murray Creek	2.3	2	65.1	3	83.5	3	8	41
Vines Creek	6.7	3	83	4	NLPB	5	12	70
Sandy Creek	2.7	2	62.1	3	90.1	4	9	50
Plane Creek	1.7	1	43.8	2	71.3	2	5	21
Rocky Dam Creek	4.7	3	68	3	NLPB	5	11	61
Carmila Creek	NB	5	NB	5	NLPB	5	15	100

Barrier Density: ■ Very Poor = 0 to 2 km (1) | ■ Poor = >2 – 4 km (2) | ■ Moderate = >4 – 8 km (3) | ■ Good = >8 – 16 km (4) | ■ Very Good = >16km (5) | ■ No score/data gap

% of Stream Before 1st Barrier: ■ Very Poor = 0 to 39.9% (1) | ■ Poor = 40 – 59.9% (2) | ■ Moderate = 60-79% (3) | ■ Good = 80-99.9% (4) | ■ Very Good = NB (5) | ■ No score/data gap

% of Stream to 1st Low Passability Barrier: ■ Very Poor = 0 to 60% (1) | ■ Poor = 60.1 – 80% (2) | ■ Moderate = 80.1-90% (3) | ■ Good = >90.1% (4) | ■ Very Good = NLPB (5) | ■ No score/data gap

Total Score: ■ Very Poor = 3-4 | ■ Poor = 5-7 | ■ Moderate = 8-10 | ■ Good = 11-13 | ■ Very Good = 14-15

Standardised: ■ Very Poor = 0-20 | ■ Poor = 21-40 | ■ Moderate = 41-60 | ■ Good = 61-80 | ■ Very Good = 81-100

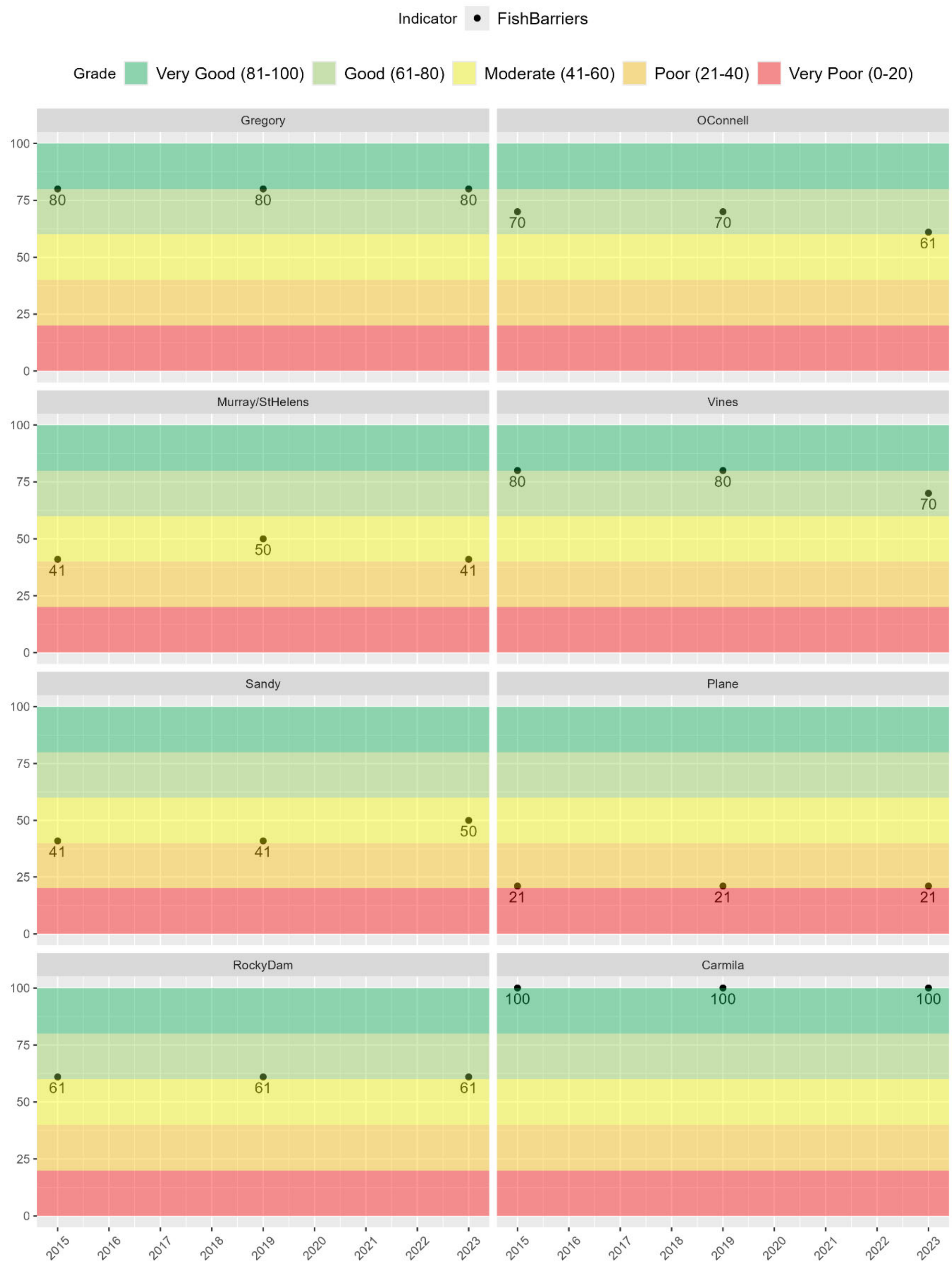

Figure 40. Results for fish barrier indicators in estuaries in the 2025 Report Card (2022-23 data) compared to historic scores. Fish barriers are updated every four years, indicated by point and annotation.

Key Messages:

1) In 2019, the first barrier upstream from the Sandy Creek Estuary (Palm Tree Road causeway) was remediated with a rock ramp fishway, resulting in an improved score for this metric.
2) Identification of an additional low passability barrier on Gibson Creek associated with the expansion of a new intensive cropping development influenced score decline in the O'Connell Estuary in the 2024 Report Card.
3) Score decline in both Vines Creek and Murray/St Helens estuaries was due to increased barrier density and may be influenced by improved aerial imagery which allowed identification of barriers that potentially existed in previous reporting yet were unable to be distinguished.
4) Carmila, Rocky Dam, and Vines estuaries recorded no 'low passability' barriers. Carmila Creek Estuary reported no barriers to fish passage, although fish barriers are located above the estuary extent.

Plane Creek Estuary recorded the lowest fish barrier grade of 'poor'. The Plane Creek catchment is largely grazing and forestry, with some sugarcane production. The creek also flows through Sarina, a population centre of 5,500 residents where a sugar mill is located adjacent to the creek. Several low passability fish barriers have been constructed in the lower reaches of Plane Creek to provide drinking water for the Sarina community, irrigation, and water supplies for the sugar mill. These low passability barriers contributed to the 'poor' score recorded for the Plane Creek Estuary.

3.2.2 Riparian and Mangrove/Saltmarsh Extent

Coastal and near-shore marine ecosystems are among the most diverse and productive in the world, providing critical habitat for a range of plants, fish, and other wildlife. Coastal wetlands such as mangrove and saltmarsh environments also provide a variety of ecosystem services, including coastal protection, erosion control, water filtration, maintenance of coastal fisheries, and carbon sequestration. Despite this, coastal river systems and vegetation have been significantly impacted by land development activity, die back, altered hydrology, and pollution (Chamberlain et al., 2020; Duke & Wolanski, 2001). To understand continuing threats to estuarine riparian vegetation extent and mangrove/saltmarsh extent, indicators are assessed regularly and were reviewed in the current reporting cycle. These scores represent changes only in the extent of vegetation since pre-clearing, not changes in the condition of the vegetation assessed.

Results (Table 30, Figure 41, Figure 42, 2018-19 data):

Table 30. Results for riparian and mangrove/saltmarsh extent loss since pre-clearing (%), hectares remaining, and standardised riparian and mangrove/saltmarsh extent in estuaries in the 2025 Report Card (2018 2019 data with methodology updated in 2022). Hectares were rounded to the nearest whole number.

2025 Report Card
(2018-19 data, methodology updated in 2022)

	Mangrove/Saltmarsh Extent		Riparian Extent			
Estuary	**Hectares lost since pre-clear**	**% loss since pre-clear**	**Hectares lost since pre-clear**	**% loss since pre-clear**	**Standardised Mangrove/ Saltmarsh Extent**	**Standardised Riparian Extent**
Gregory River	91.7	3.1	8.4	4.2	**88**	**84**
O'Connell River	192.2	6.7	47.6	48.6	**77**	**21**
Murray/St Helens Creek**	6.5	-0.2*	54.2	17.1	**100**	**58**
Vines Creek	185.5	21.1	8.6	17.5	**52**	**57**
Sandy Creek**	411	14	54.4	27.14	**63**	**44**
Plane Creek	24.1	2.0	22.7	15.2	**92**	**60**
Rocky Dam Creek	291.4	4.6	11.9	4.4	**82**	**83**
Carmila Creek	11.4	2.9	0.2	0.4	**88**	**98**

Extent (% loss) scoring range: ■ Very Poor = >50% | ■ Poor =>30 to 50% | ■ Moderate = >15 to 30% | ■ Good = >5 to 15% | ■ Very Good ≤5% | ■ No score/data gap

Standardised scoring range: ■ Very Poor = 0 to <21 | ■ Poor = 21 to <41 | ■ Moderate = 41 to <61 | ■ Good = 61 to <81 | ■ Very Good = 81 to 100 | ■ No score/data gap

* Negative values denote scenarios where there has been an increase in the total area of riparian or mangrove/saltmarsh extent since pre-clearing.

**Sandy Creek and Murray/St Helens scores use the previous methodology as the spatial extent was not available. It is expected to be updated following release of this Report Card.

Key Messages:

1) The riparian extent grades ranged from 'poor' in the O'Connell River Estuary to 'very good' in the Gregory River, Rocky Dam, and Carmila Creek Estuaries. All other estuaries were in 'moderate' condition.
2) All estuaries were within guideline values for mangrove / saltmarsh extent except for the Vines Creek Estuary, which scored 'moderate'.

The extent of riparian vegetation in the **Carmila Creek Estuary** in 2017 was equal to the pre-clearing extent. Overall, there was no change in the extent of riparian vegetation observed between the 2013 and 2017 assessments. To evaluate any change in extent between assessment years, back-calculated values were developed for 2013 (Appendix 8.3.).

In the **Sandy Creek Estuary**, approximately 2.9 ha of mangrove and saltmarsh vegetation have been lost since the 2013 assessment (Appendix 8.3.). This included approximately 2.58 ha of Regional Ecosystem (RE) 8.1.3 (*Sporobolus virginicus* tussock grassland on marine sediments) and 0.27 ha of RE 8.1.2 (Samphire open forbland on saltpans and plains adjacent to mangroves). Both REs are listed with a biodiversity status 'Of concern' and are valued, in part, for the habitat they provide to endangered and significant species, respectively. Agricultural encroachment and changes to hydrology in Sandy Creek Estuary may have caused this reduction (Chamberlain et al., 2020).

There was a net increase in the areal extent of mangrove/saltmarsh vegetation in the **St Helens/Murray Creek Estuary** since pre-clearing. Such changes may occur as a result of extensive sediment deposition in nearshore environments. This sediment provides new areas of substrate in which mangroves can colonise. This process has previously been documented in the Pioneer River to the south of St Helens/Murray Creek (Duke & Wolanski, 2001). It is important to emphasise that such increases in net mangrove/saltmarsh extent are not necessarily indicative of a healthy estuarine system; rather, they are indicative of increased muddiness (Duke & Wolanski, 2001).

O'Connell Estuary was the only waterway to record a decrease in mangrove/saltmarsh extent in the 2021-22 Report Card, although the total loss was ~1 ha of tussock (RE 8.1.3). Overall, since pre-clearing, O'Connell Estuary has recorded loss of 60 ha of this habitat and an additional 86 ha of sedgeland (RE 8.1.4). These ecosystems are listed with a biodiversity status of 'Of concern' and 'Endangered' respectively.

Although **Rocky Dam Estuary** recorded an increase in mangrove (RE 8.1.1), samphire (RE 8.1.2), and tussock (RE 8.1.3) habitat since the previous reporting cycle, the total increase was less than 1 ha, and this estuary has the most ha lost across several habitats (samphire (RE 8.1.2), tussock (RE 8.1.3), and sedgeland (RE 8.1.4)) with over 700 ha of mangrove/saltmarsh lost since pre-clearing.

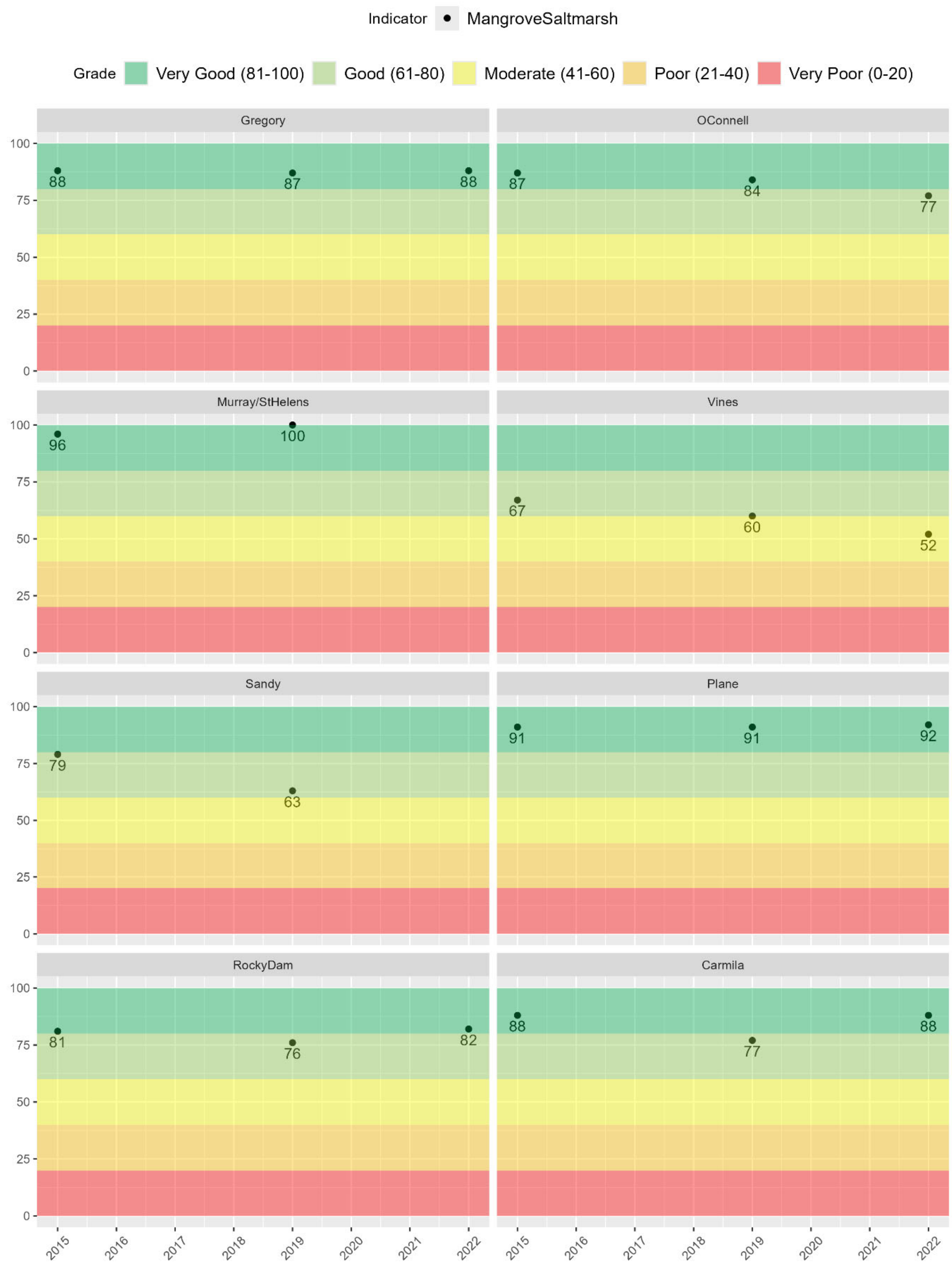

Figure 41. Results for mangrove/saltmarsh extent loss since pre-clearing 2025 Report Card (repeat data) compared to historic scores. Habitat extents are updated every four years as indicated by point and annotation.

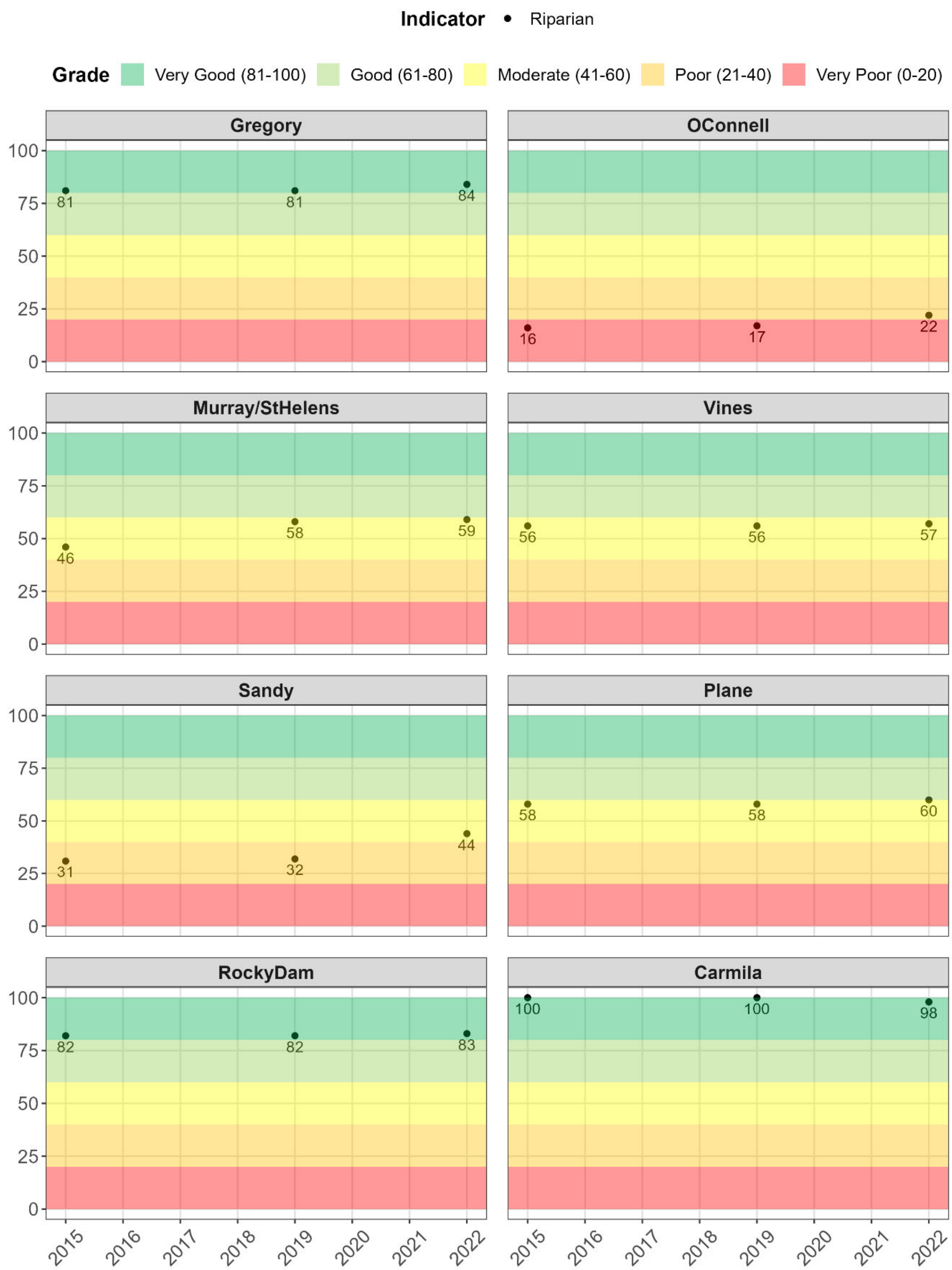

Figure 42. Results for riparian extent loss since pre-clearing 2025 Report Card (2021-22 data) compared to historic scores. Habitat extents are updated every four years as indicated by point and annotation.

3.2.3 Flow

Due to minimal data availability, scores for flow in estuaries were not able to be developed across most estuaries and have not been included in the habitat and hydrology index. A review of the flow tool to identify further refinements and updates is expected for future report cards. In addition, the Partnership has submitted a recommendation to BoM on priority sites for flow gauging stations to be implemented in MWI estuaries in the future.

3.2.4 Habitat and Hydrology Index Scores

Scores for fish barriers were updated using 2022-23 data, however riparian and mangrove/saltmarsh extent were last updated using 2021-22 data (methods back-calculated with most recent data from 2018-19). Scores for habitat extents were back-calculated using new methodologies to facilitate comparison between datasets over time.

The consistency of scores between assessments reflects the gradual or infrequent nature of change associated with these indicators. In this regard, whilst these scores highlight the positive effect of implementing management measures to mitigate threats to habitat via direct clearing, development, or changes to hydrology, it also emphasises the investment required to remediate historical impacts and ultimately drive an improvement in condition grades.

Results (Table 31, Figure 43, Appendix 8.3):

Table 31. Results for habitat and hydrology indicator categories and index in estuaries for the 2025 Report Card. No habitat and hydrology indicators were updated in the current reporting cycle.

2025 Report Card

Estuary	Mangrove/ Saltmarsh Extent	Riparian Extent	Fish Barriers	Flow	Habitat and Hydrology Index
Gregory River	88	84	80		**84**
O'Connell River	77	21	61		**53**
Murray/St Helens	100*	58	41		**66**
Vines Creek	52	57	70		**60**
Sandy Creek	63*	44	50		**52**
Plane Creek	92	60	21		**57**
Rocky Dam Creek	82	83	61		**75**
Carmila Creek	88	98	100		**95**

Scoring range: ■ Very Poor = 0 to <21 | ■ Poor = 21 to <41 | ■ Moderate = 41 to <61 | ■ Good = 61 to <81 | ■ Very Good = 81 to 100 | ■ No score/data gap

*Sandy Creek and Murray/St Helens scores use the previous methodology for mangrove/saltmarsh scores as the spatial extent was not available for the new method. It is expected to be updated after the release of this Report Card.

Key Messages:

1) The overall habitat and hydrology index grades for estuaries ranged from 'moderate' to 'very good' across the MWI region.

2) An increase in the number of fish barriers identified on Vines Estuary influenced grade decline from 'good' to 'moderate' in the most recent assessment (2022-23).

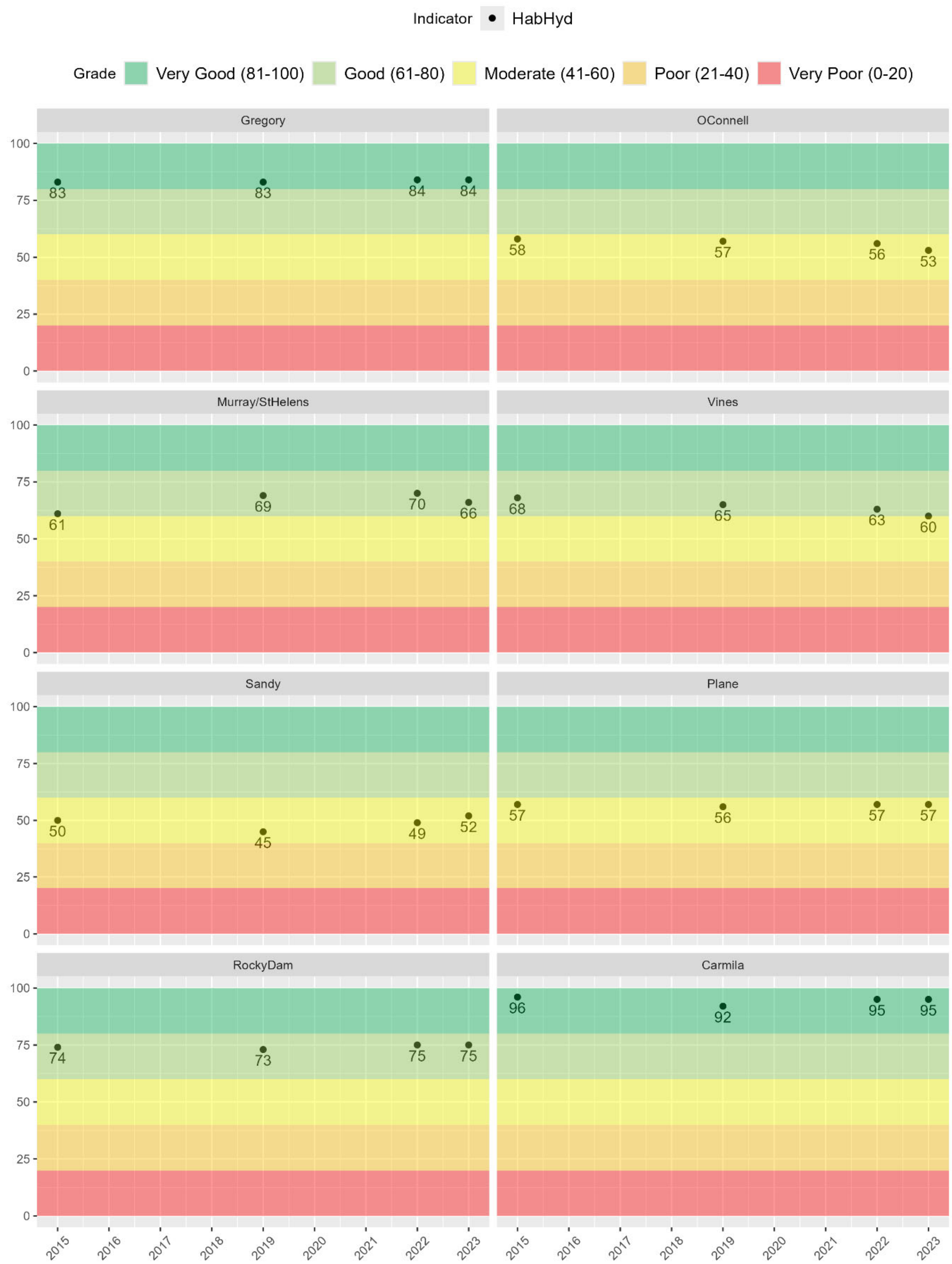

Figure 43. Results for habitat and hydrology index in estuaries for the 2025 Report Card compared to the historic scores. Points and annotation designate years where data was updated for at least one indicator.

3.2.4.1 Confidence

Overall confidence for the habitat and hydrology indicator category was ‘moderate’ (Table 32).

Table 32. Confidence associated with habitat and hydrology index results in estuaries for the 2025 Report Card. Confidence criteria are scored 1–3 and then weighted by the value identified in parentheses. Final scores (4.5–13.5) are additive across weighted confidence criteria. Final scores correspond to a rank from 1 to 5 (very low–very high), which indicates the final confidence level. Unless otherwise specified, confidence in results is the same across estuaries.

Indicator Category	Maturity of Methodology (x0.36)	Validation (x0.71)	Representativeness (x2)	Directness (x0.71)	Measured Error (x0.71)	Final	Rank
Fish Barriers	1	2	3	2	1	9.9	3
Riparian Extent	2	2	2	1	2	8.3	3
Mangrove/Saltmarsh Extent	2	2	2	1	2	8.3	3
Habitat and Hydrology Index						**8.3**	**3**
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.							

3.3 Fish in Estuaries

Identification of appropriate indicators and development of methodology are required to progress assessment of fish community condition in estuaries. Development of these indicators is anticipated to occur in collaboration with the TWG and other regional report card partnerships.

The regional report card partnerships commissioned a study regarding the validity of citizen science programs in 2021 and the potential use of the data collected for evaluating and reporting the condition of an ecosystem (Vinall, 2022). The results produced for estuaries showed limited validity due to the complexity and safety concerns of these environments. Currently, the only data collection identified is provided by local fishermen, which is spatially scattered and not suitable as an indicator for the ecosystem analysis and for report card grading metrics. Recommendations to improve the validity of these programs could include strengthening the surveys using cast nets and introducing mobile apps to collect catch rates from a selected group of fishermen to provide fish species diversity indicator.

3.4 Overall Estuary Condition

Results (Table 33, Figure 44, Appendix 8.3):

Table 33. Estuary overall condition alongside indicator category scores and grades for the 2025 Report Card (2023-24 reporting period).

2025 Report Card

Estuary	Water Quality	Habitat and Hydrology	Fish	Estuary Score and Grade	
Gregory River	62	84		73	B
O'Connell River^	59	53		56	C
St Helens/Murray Creek	47	67		57	C
Vines Creek	55	60		57	C
Sandy Creek	52	52		52	C
Plane Creek	74	57		66	B
Rocky Dam Creek	54	75		64	B
Carmila Creek	75	95		85	A

Scoring range: ■ Very Poor = 0 to <21 | ■ Poor = 21 to <41 | ■ Moderate = 41 to <61 | ■ Good = 61 to <81 | ■ Very Good = 81 to 100 | ■ No score/data gap

^ Data used to evaluate the O'Connell River estuary are taken from an end-of-catchment monitoring site within the O'Connell River which is also used to monitor nutrients within freshwater basins.

Key Messages:

1) Overall estuary grades in the 2023–24 monitoring period were the same as the previous year with the exception of **Vines Creek** which declined from 'good' 61 to 'moderate' 57. Decline in overall score was most influenced by FRP, DO, and NTU

2) The largest change in score (from 58 to 52) was at **Sandy Creek**, although the grade remained 'moderate'. Sandy Creek decline was most influenced by pesticides and chl-*a*.

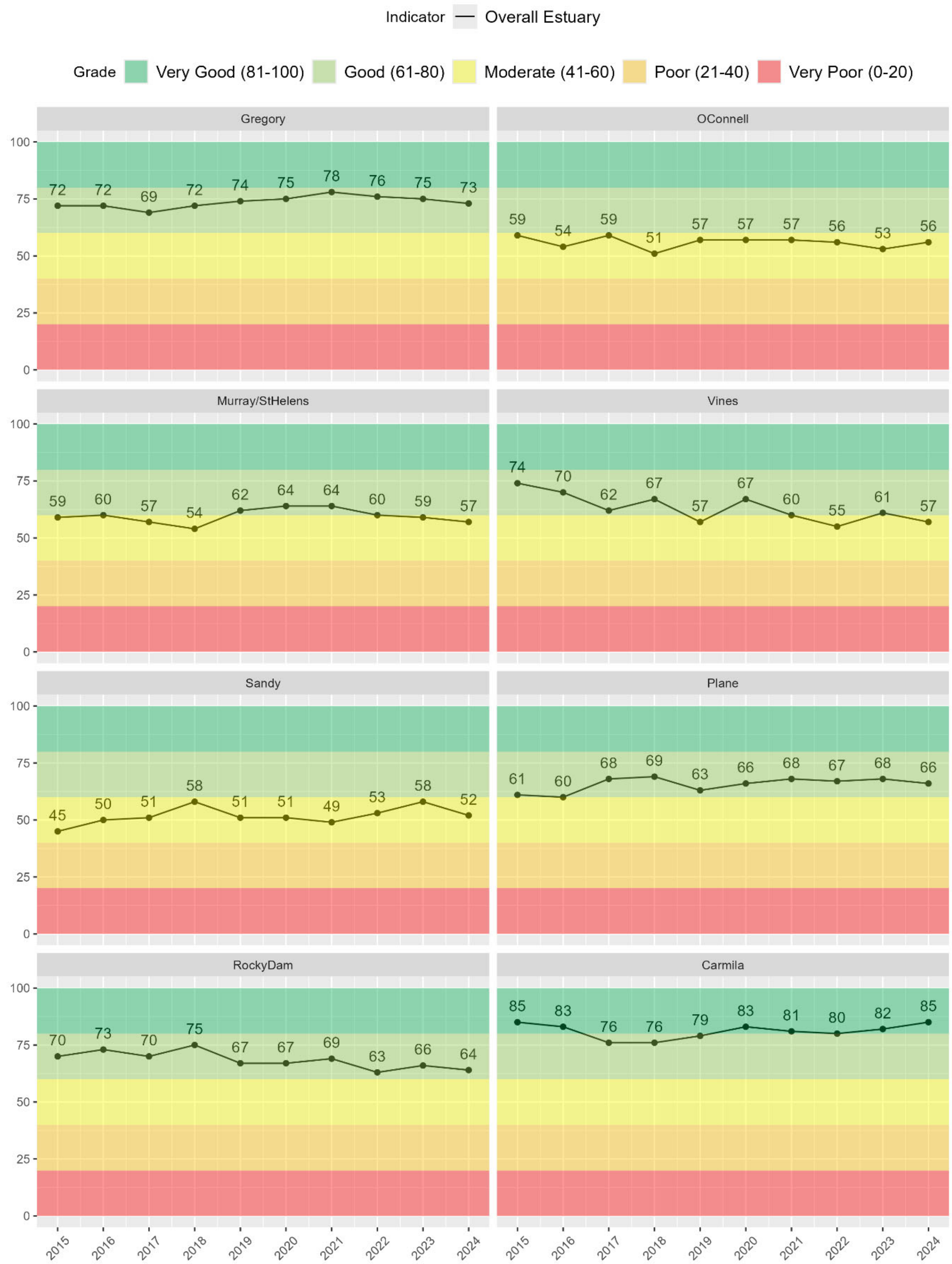

Figure 44. Overall condition scores and grades of estuaries for the 2025 Report Card (2023-24 reporting cycle) in comparison to historic scores. Historic scores have been back-calculated compared to guideline values (GVs) updated in 2023-24 and may be different to those published previously.

4 Marine Results

The inshore marine region is divided into four zones: the Northern, Whitsunday, Central, and Southern zones. The offshore region is represented by the Offshore Zone (Figure 1). Scores for each zone are calculated from a series of indices that consist of indicators under relevant indicator categories (Figure 45). All indicators reported in marine zones are updated annually.

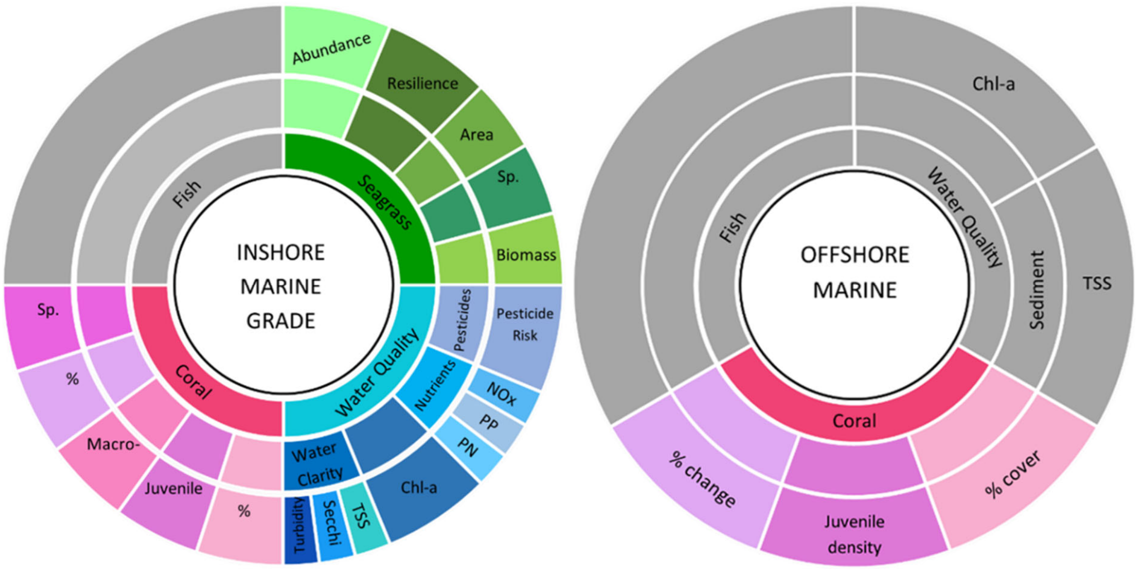

Figure 45. Marine indicators (outer ring), indicator categories (middle ring) and indices (inner ring) that contribute to overall inshore (A) and offshore (B) grades. Where no indicator category is listed, this represents that the indicator/s (e.g. juvenile density) does not fit into any category below the index level (e.g. coral). Grey shading represents no data. Note: NOx = nitrogen oxides, PP = particulate phosphorus, PN = particulate nitrogen, TSS = total suspended solids, Chl-*a* = chlorophyll-*a* concentration, and sp. comp = species composition.

The North Queensland Bulk Ports Corporation Ltd (NQBP) Marine Monitoring Programs and the GBR Marine Monitoring Program (MMP) are significant contributors to the inshore marine dataset used to calculate scores. Monitoring reports for NQBP Marine Monitoring Programs (water quality, coral, and seagrass) can be found on the NQBP website[24] while the MMP annual reports (water quality, coral, and seagrass) can be found in the GBRMPA e-library.[25] Identifying a data gap in the Southern Zone monitoring, the Partnership initiated and funded the Southern Inshore Program (SIP) [26] in 2017 which covers water quality, coral, and seagrass. Additional water quality monitoring in the Whitsundays is conducted through partnership-funded Blueprint Project.[27] Data used to calculate offshore coral scores is sourced from the Long-term Monitoring Program (LTMP), and reports can be found on the Australian Institute of Marine Science (AIMS) website.[28] Water quality data for the Offshore Zone is currently not reported following the decommissioning BoM's marine water quality dashboard and new data sources are being investigated.

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[24] https://nqbp.com.au/sustainability/research-and-reports

[25] https://elibrary.gbrmpa.gov.au/jspui/browse?type=series&value=Marine+Monitoring+Program

[26] Southern Inshore Monitoring Program | Healthy Rivers to Reef Partnership

[27] Project Blueprint | Healthy Rivers to Reef Partnership

[28] https://www.aims.gov.au/research-topics/monitoring-and-discovery/monitoring-great-barrier-reef/long-term-monitoring-program

4.1 Water Quality in Marine Zones

Inshore marine water quality in the MWI region was assessed in four marine zones (Figure 46) and is influenced by five major regional river basins, and the Fitzroy Basin further south (Fabricius et al., 2014). Under strong discharge conditions, the Pioneer River dominates waters inshore of the Whitsunday Islands while the offshore area is influenced by the Fitzroy River (Baird et al., 2019). The region may also be influenced by the Burdekin River (north of the Don Basin) during extreme events or through longer-term transport and mixing. MWI has higher variability in discharge and loads compared to surrounding regions such as the Wet Tropics (Waterhouse et al., 2018).

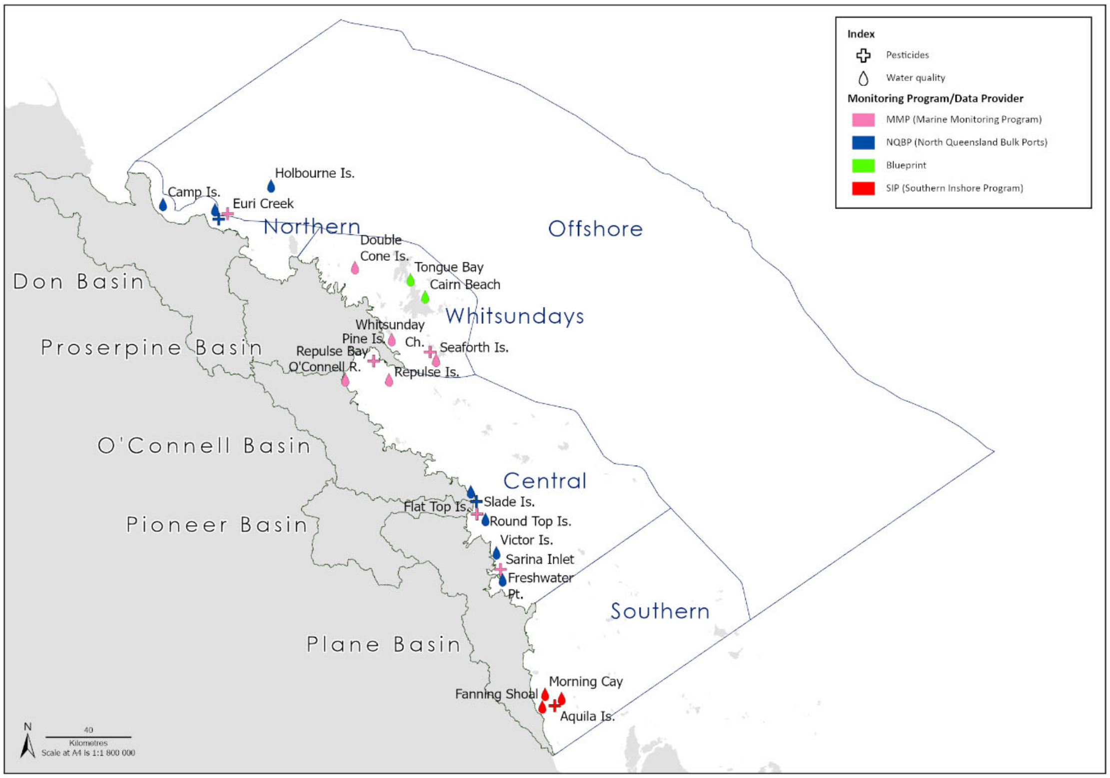

Figure 46. Water quality monitoring sites for the inshore marine zones during the 2023-24 reporting year. Sites in each zone are shown coloured according to data provider. MMP: Marine Monitoring Program; NQBP: Northern Queensland Bulk Ports, SIP: Southern Inshore Program funded by the Partnership, BP: Blueprint Project funded by the Partnership.

Condition scores are calculated by comparing annual means or medians to guideline values[29] for each indicator at each site within a zone. Preliminary scores are aggregated across sites and indicators to produce the final nutrients, chl-*a*, and water clarity indicator category scores within a zone. Offshore water quality is not currently assessed as the data sources and method are under review. See Section 4.1.6 for more detail and Appendix 8.4.1.7 for past results.

4.1.1 Nutrients

Nutrient indicator category scores for inshore zones are based upon reported concentrations of three indicators: oxidised nitrogen (NOx), particulate phosphorus (PP), and particulate nitrogen (PN). Nutrients grades in 2025 (2023-24 data) improved in the Northern, Whitsunday, and Southern zones, while the Central Zone remained moderate.

Results (Figure 47, Figure 487, Appendix 8.4.1)

Key Messages:

1) PN and PP scores improved in all monitored zones.
2) NOx scores were consistently the lowest of the three nutrients indicators, in part due to recent changes in policy[30] where stricter guideline values were assigned. This indicator is not assessed in the Northern Zone.

In the **Northern Zone**, score improvement was seen in PN and PP indicators at all sites, most noticeably at Euri Creek monitoring site where PN scores improved from 'very poor' 0 to 'very good' 88.

Improvements in nutrient scores in the **Whitsunday Zone** were largely driven by decreased concentrations of PN and PP. PN and PP scores were noticeably higher at the new Whitsunday Zone Blueprint monitoring sites Cairn Beach and Tongue Bay (scores of 'good' or higher for Blueprint sites in comparison to scores of 'moderate' or lower for MMP sites).

In the **Central Zone**, improved nutrients scores were driven by the PN indicator score at Round Top and Victor islands, where scores improved to 'very good'.

Nutrients score improvement in the **Southern Zone** was due to decreased concentrations of PN and PP at all monitored sites, most noticeably at Fanning Shoal. NOx scores remain low however this is in part due to new, stricter guideline values that were set below the current available limit of reporting (LOR). Changes in lab analysis are being investigated to enable detection of lower concentrations for future monitoring. See the MWI Methods Report for further details.

[30] Environmental Protection (Water and Wetland Biodiversity) Policy 2019 | Environment | Department of the Environment, Tourism, Science and Innovation, Queensland

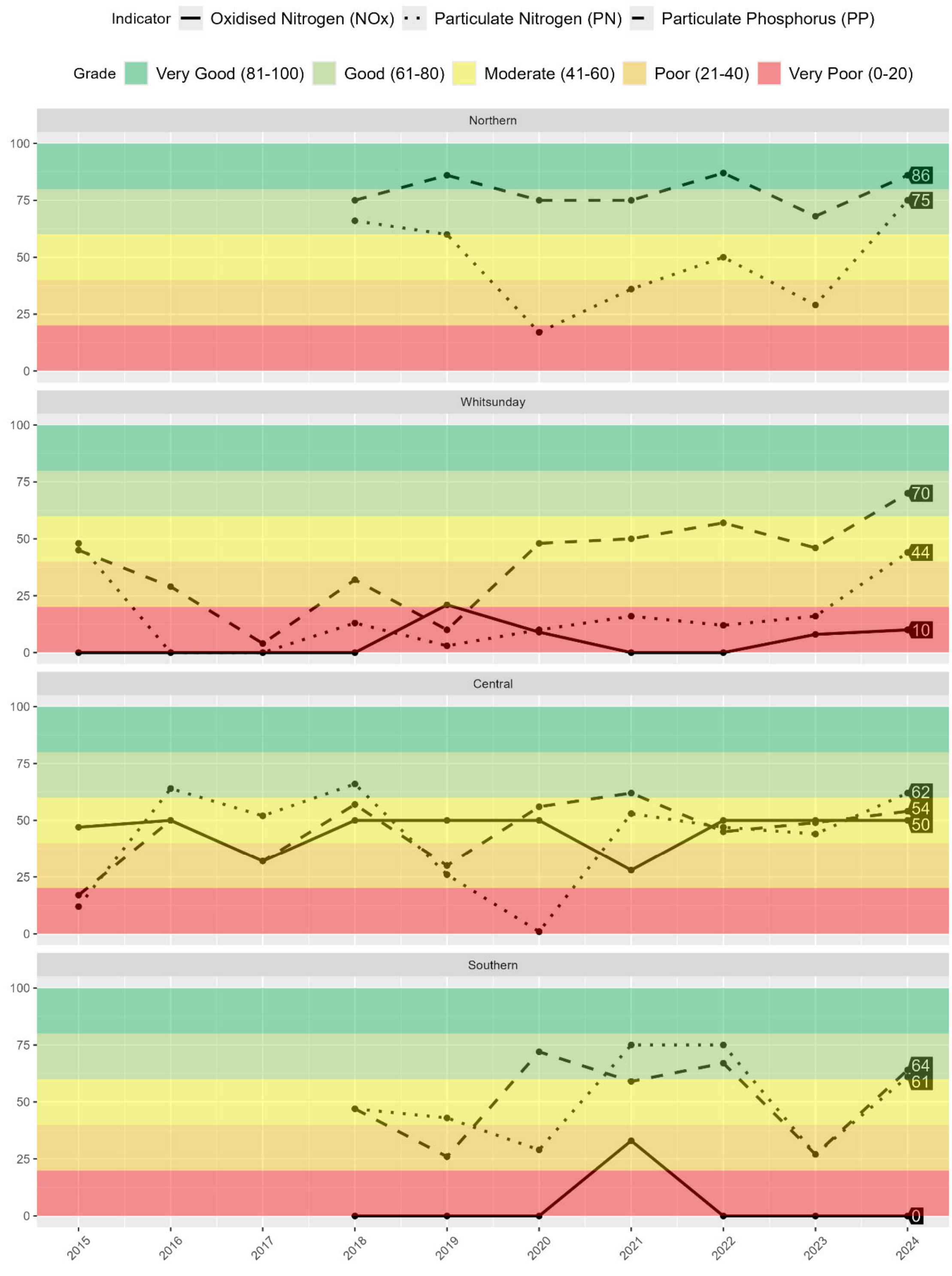

Figure 47. Marine zone nutrients indicators scores in the 2025 Report Card (2023-24 data) compared to the historic record. NOx is not recorded in NQBP monitoring, so cannot be included in Northern Zone nutrients indicator category scores. Historic scores have been back-calculated compared to guideline values (GVs) updated in 2023-24 and may be different to those published previously.

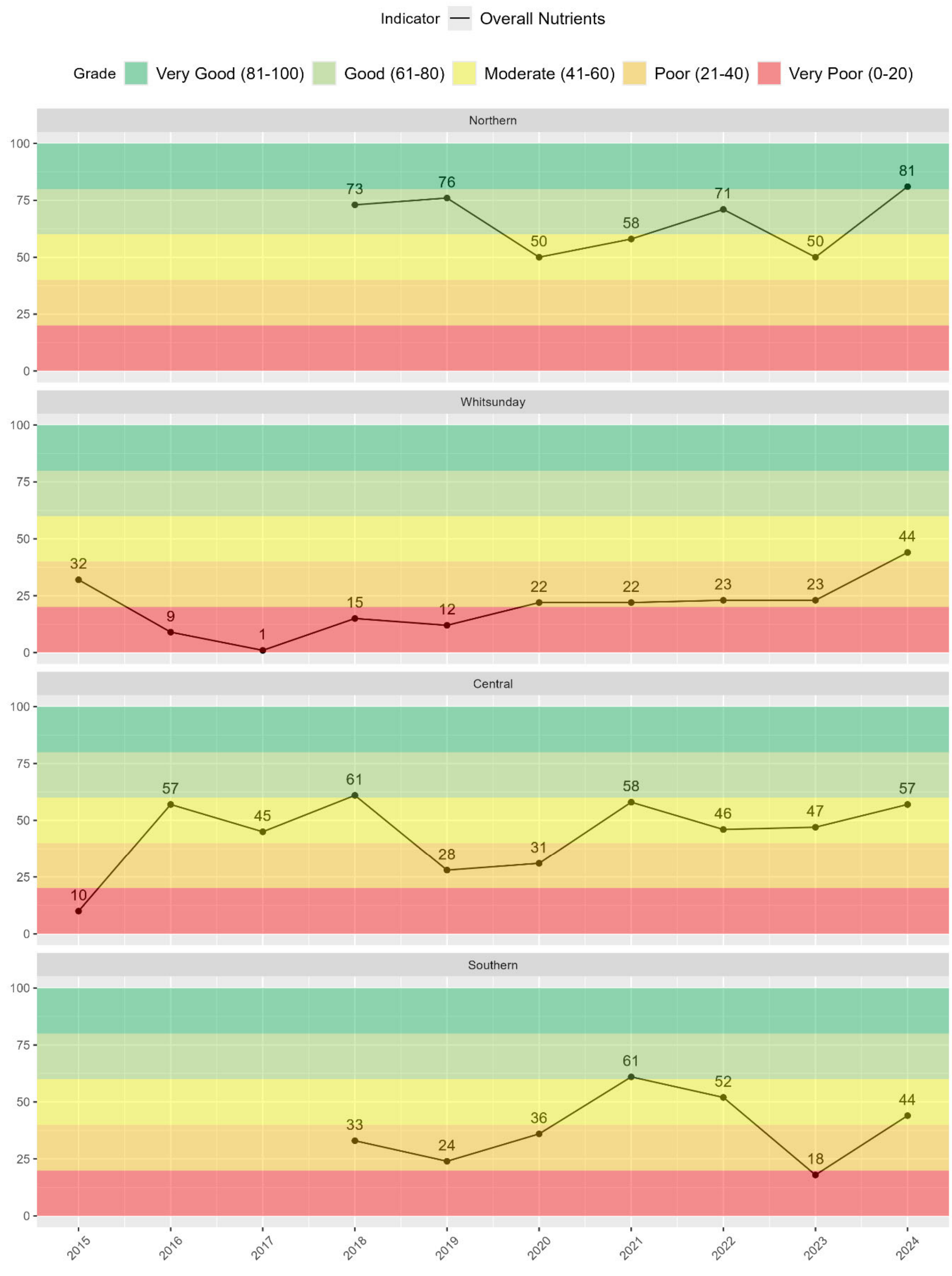

Figure 48. Marine zone nutrients scores in the 2025 Report Card (2023-24 data) compared to the historic record. The annotated solid black line (overall nutrients) is an average of the other three indicators shown in the previous figure. NOx is not recorded in NQBP monitoring, so cannot be included in Northern Zone nutrients indicator category scores. Historic scores have been back-calculated compared to guideline values (GVs) updated in 2023-24 and may be different to those published previously.

4.1.2 Chlorophyll-*a*

Increased nutrient availability (e.g. agricultural runoff, soil erosion, discharges of sewage and aquaculture waste), often leads to a rise in chlorophyll-*a* (chl-*a*) concentrations in coastal waters because of increased phytoplankton biomass. Chl-*a* is used as a parameter for monitoring phytoplankton biomass and nutrient status as an index of water quality.[31] High levels of chl-*a* often indicate poor water quality while low levels suggest good conditions. Elevated chl-*a* concentrations are not necessarily negative; however, the long-term persistence of elevated levels can indicate problems.[32]

Results (Figure 49, Appendix 8.4.1)

Key Messages:

1) Increased concentrations of chl-*a* influenced score declines in all inshore marine zones.
2) Score declines for chl-*a* were consistent across all monitored sites bar Seaforth Island in the Whitsunday Zone, which improved from 'moderate' to 'good'.

In the **Northern Zone,** both Euri Creek and Camp Island recorded scores of 0 for chl-*a*, however the overall score decline was influenced primarily by Holbourne Island dropping from 'good' 63 to 'poor' 28.

In the **Whitsunday Zone**, a decline in score at Pine Island was balanced by an improvement at Seaforth Island. The overall chl-*a* score was influenced by the inclusion of Blueprint monitoring sites at Cairn Beach and Tongue Bay, where chl-*a* concentrations were typically higher than at Marine Monitoring Program (MMP) sites.

In the **Central Zone**, chl-*a* grades remained similar to the previous reporting cycle, where most sites remained 'poor' or 'very poor'. Repulse Island remained 'moderate' for the fifth consecutive year, and O'Connell River mouth remained 'good' or above for the seventh consecutive year. It is worth noting that as an enclosed coastal site, O'Connell River mouth is analysed against more lenient guideline values than the open coastal sites.

The **Southern Zone** saw score decline to 0 for chl-*a* at all sites, most noticeably at Morning Cay ('poor' to 'very poor').

[31] https://www.aims.gov.au/docs/data-centre/chlorophyllmonitoring.html
[32] https://ozcoasts.org.au/indicators/biophysical-indicators/chlorophyll_a/

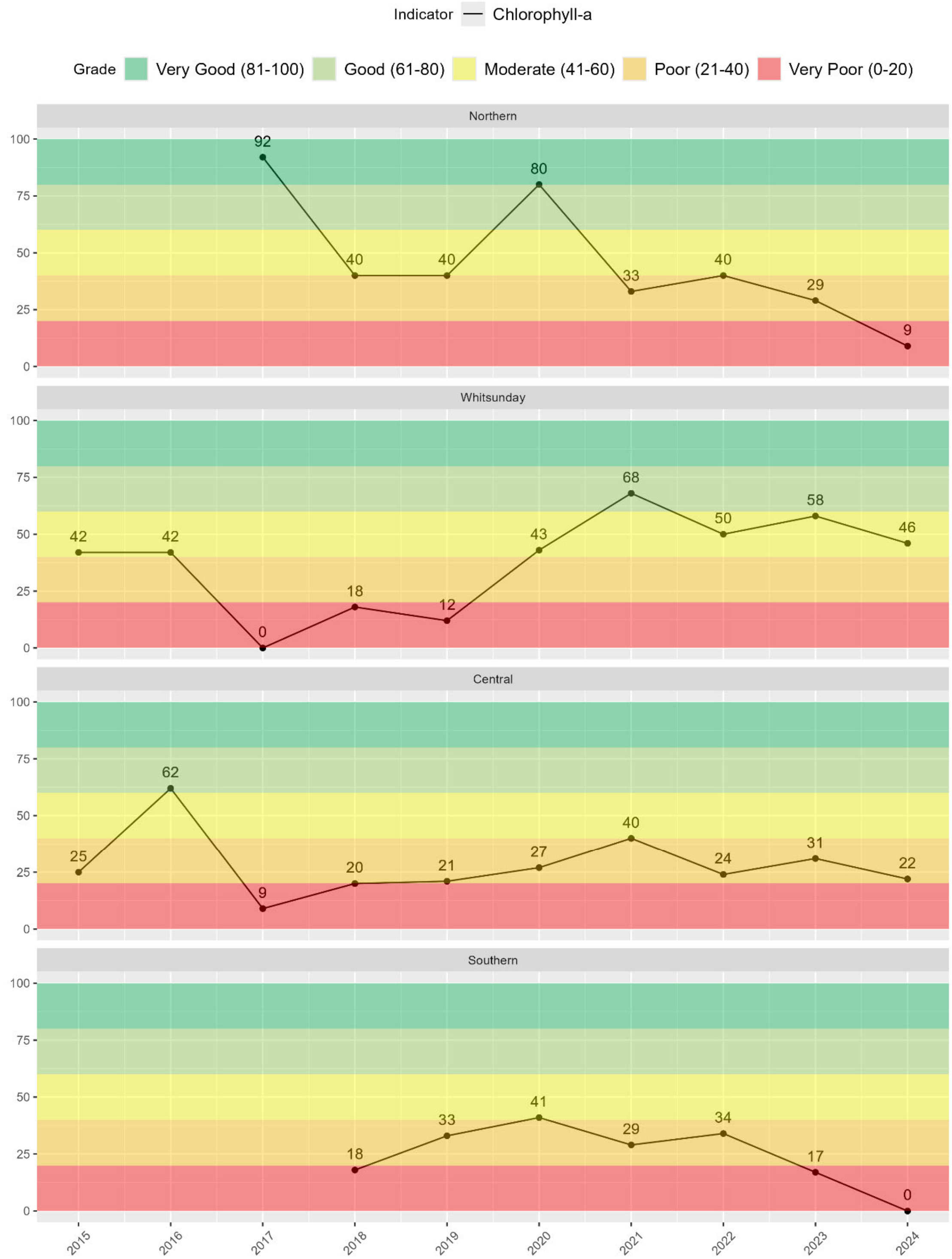

Figure 49. Marine inshore zone Chlorophyll-*a* scores in 2025 Report Card (2023-24 data) compared to the historic record. Historic scores have been back-calculated compared to guideline values (GVs) updated in 2023-24 and may be different to those published previously.

4.1.3 Water Clarity

The water clarity indicator category is informed by Secchi depth (m), total suspended solids (TSS), and turbidity (NTU) indicators. Water clarity indicators (TSS, Secchi depth, and turbidity) are related but not completely comparable. The characteristics of suspended sediments can greatly influence turbidity measurements, where darker and finer-grained sediment will result in much higher turbidity readings than lighter-coloured and coarser sediments. The former is considered the most damaging to seagrass and coral growth (Bainbridge et al., 2018; Storlazzi et al., 2015).

Results (Figure 50, Figure 51)

Key Messages:

1) Whitsunday was the only inshore zone to record a change in grade. Improvement from 'poor' (38) to 'moderate' (45) was influenced by the inclusion of Project Blueprint sites, which are located on the offshore side of the Whitsunday Island group and contribute to representation of the zone as a whole.
2) The Southern Zone has recorded a 'very poor' grade in water clarity every year since monitoring began in 2018, although some improvement has been seen in TSS scores. This may be a result of differences in sampling methods. Turbidity is influenced by strong tidal currents, wave action, and resuspension across a broader temporal scale, while TSS measurements capture suspended particulate matter at a point in time.

Water clarity indicator category scores in the **Northern Zone** were 'good' or above at all sites. Secchi indicator scores were consistently lower than other clarity indicators.

In the **Whitsunday Zone**, water clarity indicator category scores were higher at Project Blueprint sites than at Marine Monitoring Program sites. TSS is generally the highest scoring indicator while Secchi is generally the lowest.

Central Zone sites Slade Island, Round Top Island, and O'Connell River mouth typically score higher ('moderate' or above) in water clarity indicator category than sites Freshwater Point, Victor Island, and Repulse Islands dive mooring ('poor' or below).

In the **Southern Zone**, water clarity indicator scores remained 'very poor' for the seventh year in a row. This pattern has likely been driven by the geophysical differences in this zone, where the proximity to silt-laden shallows and the large tidal range and resulting strong currents often causes sediment to become resuspended in the water column. Particularly during periods of low rainfall, high turbidity is driven by re-suspension of sediment corresponding with wind/waves, currents, and tidal patterns (Cartwright et al., 2023). TSS scores remained 'poor' at the Fanning Shoal site for the second year in a row, this is the highest scoring clarity indicator in the Southern Zone.

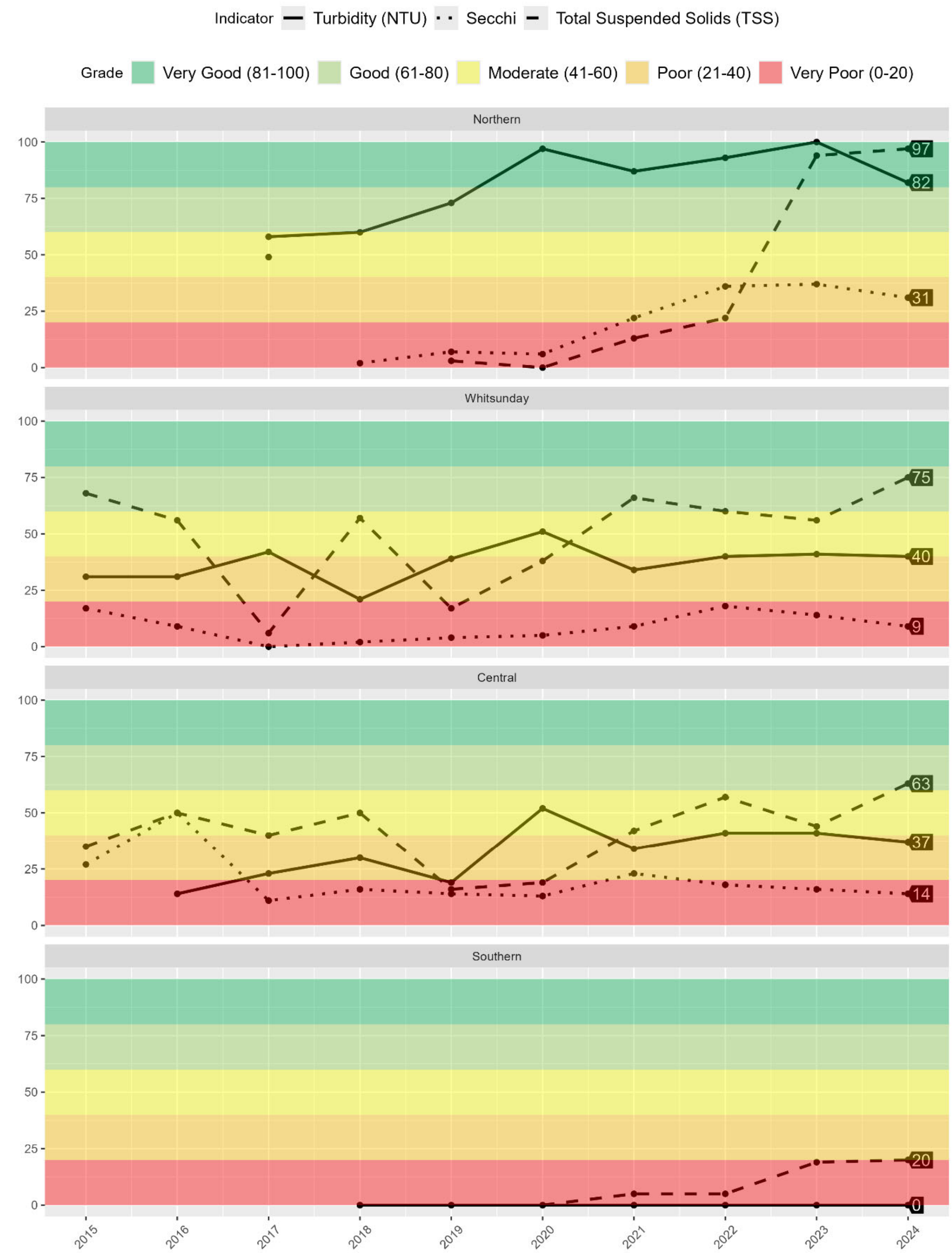

Figure 50. Marine inshore zone water clarity indicator scores in 2023-24 compared to the historic record. Historic scores have been back-calculated compared to guideline values (GVs) updated in 2023-24 and may be different to those published previously.

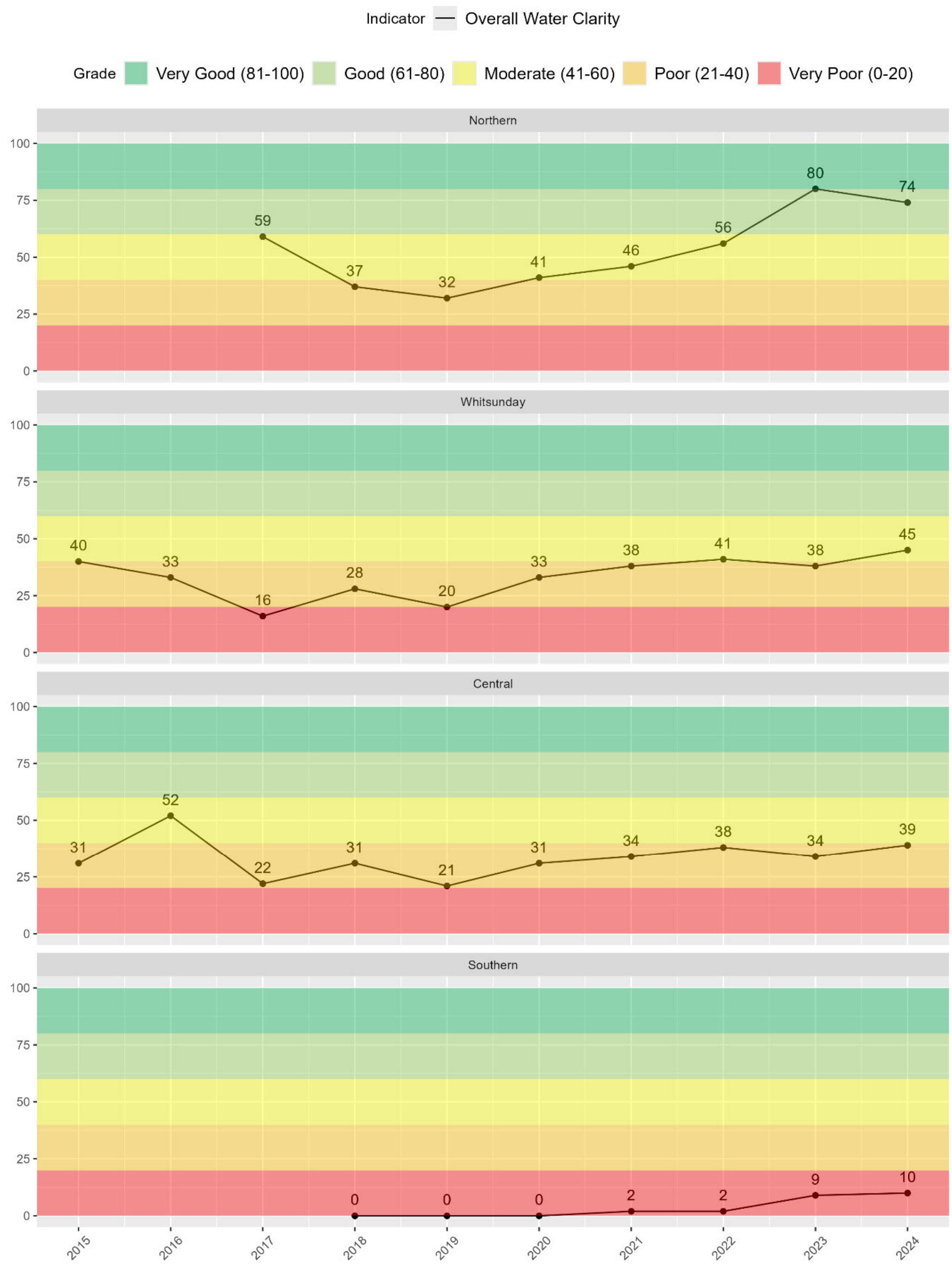

Figure 51. Marine zone water clarity scores in 2023-24 compared to the historic record. The annotated solid black line (overall water clarity) is an average of the three indicators shown in the previous figure. Historic scores have been back-calculated compared to guideline values (GVs) updated in 2023-24 and may be different to those published previously.

4.1.4 Pesticides

Pesticides in the marine inshore are reported using the Pesticide Risk Metric (PRM) (Warne et al., 2020, 2023). This approach considers pesticides with multiple Modes of Action (MoA) that exert their toxicity by different means. In the 2025 Report Card (2023-24 data), 19 pesticides were measured in the Northern and Central zones, and 17 in the Whitsunday and Southern zones.

Notes on data interpretation for Report Card results

Sampling methods: Pesticides data were collected using passive polar samples with up to five deployments at each site throughout the wet season. The specific pesticides included in the analysis have changed since previous years. Pesticide sampling relies exclusively on Empore® disks. Therefore, pesticide reporting does not include three of the analytes in the PRM (chlorpyrifos, pendimethalin, and isoxaflutole).

Reporting: Passive sampler deployments record a time-averaged estimate of pesticide concentrations, and the highest (poorest) score is used to report risk. For the purposes of reporting, the percentage species protected (the inverse of percentage species affected) is reported alongside the final PRM score.

Whitsunday Zone: Previously, pesticides were not monitored in the Whitsunday Zone as investigations by GBRMPA Marine Monitoring Program (MMP) determined that pesticide risk was low as there are no major creeks or rivers flowing into this zone. Following publication of a paper investigating long-term trends in pesticide concentrations (Taucare et al., 2022), monitoring requirements were reassessed by the Independent Science Panel (ISP) in March 2022. A site in Whitsunday Channel was selected, and the Whitsunday Zone included a score for the marine pesticides indicator category for the first time in the 2022-23 reporting season.

MMP program redesign: MMP pesticides monitoring did not occur during the 2021-2022 season as modelling results suggested uncertainty around the locations of the samplers. It was thought that sites may have been missing the plume of the first flush of the wet season and a redesign of the program was discussed, including at ISP in March 2022. Monitoring requirements were reassessed, and MMP pesticides monitoring was reinstated for the 2022-2023 wet season. This increased spatial and temporal coverage of the Central and Northern zones and included monitoring in the Whitsunday Zone for the first time. The program redesign is reflected in the confidence score for pesticides (Section 4.1.7).

Results (Table 34, Appendix 8.4.1.6)**:**

Table 34. Standardised pesticide scores for the 2025 Report Card, comparison between passive polar and grab sample results. Scores are calculated from the PRM reporting on the percentage of aquatic species protected (%) for inshore zones. NQBP = North Queensland Bulk Ports, MMP = Marine Monitoring Program, SIP = Southern Inshore Program.

2025 Report Card (2023-24 data)

Inshore Zone	Program	Pesticide Score
Northern	NQBP / MMP	99
Whitsunday	MMP	100
Central	MMP/NQBP	98
Southern	SIP	100

Pesticide scoring range: ■ Very Poor = 0 to 20 | ■ Poor = >20 to 40 | ■ Moderate = >40 to 60 | ■ Good = >60 to 80 | ■ Very Good = >80 | ■ No score/data gap

Key Message:

1) In the 2025 Report Card the pesticides grade was 'very good' for all marine zones.
2) In passive sample results, there were no pesticides found in concentrations above marine guideline values.
3) Diuron and metolachlor were found in concentrations above guideline values in grab samples at Flat Top Island and Sarina Inlet in January 2024. Grab sample results provide reference to passive polar samplers and demonstrate that although potential spikes in concentration can cause short-term risk, dilution in the marine environment is such that the annual risk to marine species is 'very low'.

Despite current scores showing 'very low' risks from pesticides in inshore zones, it is important to note that passive polar sampling results are time averaged across a deployment period and may not capture spikes in concentration. Grab samples conducted during the 2023-24 reporting year recorded higher, albeit short-term, risks associated with pesticides. Pesticide management and load reduction plans may reduce the flow of pesticides into the marine environment at a site level, however chemicals such as diuron can attach to sediments (Mercurio et al., 2016). Long-term trends in the region suggest that concentrations of several PSII herbicides are increasing at monitoring sites within the Great Barrier Reef Marine Park, potentially due to the long half-lives of PSII herbicides in the marine environment (Taucare et al., 2022).

4.1.5 Overall Marine Water Quality Index

In the 2025 Report Card (2023-24 data), grades improved in the Northen Zone, and remained the same in Whitsunday, Central, and Southern zones. Appendix 8.4.1. presents boxplots along with site-level and historic scores for individual indicators.

Results (Table 35, Figure 52, and Appendix 8.4.1)

Table 35. Water quality indicator category and overall scores and grades for the 2025 Report Card (2023-24 data) for marine inshore zones.

2025 Report Card (2023-24 data)

Inshore Zone	Nutrients	Chl-*a*	Water Clarity	Pesticides	Water Quality
Northern	81	9	74	99	**65**
Whitsunday	46	46	45	100	**59**
Central	57	22	39	98	**55**
Southern	44	0	10	100	**38**

Scoring range: ■ Very Poor = 0 to <21 | ■ Poor = 21 to <41 | ■ Moderate = 41 to <61 | ■ Good = 61 to <81 | ■ Very Good = 81 to 100 | ■ No score/data gap

Key Messages:

1) Chlorophyll-*a* was an issue for the second year in a row, as it scored 'poor' or below in Northern, Central, and Southern zones.
2) Overall water quality scores improved in all inshore marine zones in the current reporting year.
3) The grade change in the Northern Zone from 'moderate' (60) to 'good' (65) was influenced by improvements in nutrients, where PN which improved from 'poor' to 'good' and PP improved from 'good' to 'very good'.
4) The Southern Zone had the biggest improvement in overall water quality in this reporting cycle although it remained poor. This improvement was influenced by nutrients scores, where both PN and PP improved from 'poor' to 'good'.
5) Project Blueprint data was included in the Report Card for the first time. This led to improved scores in the Whitsunday Zone, potentially due to the larger representative sample within the zone.

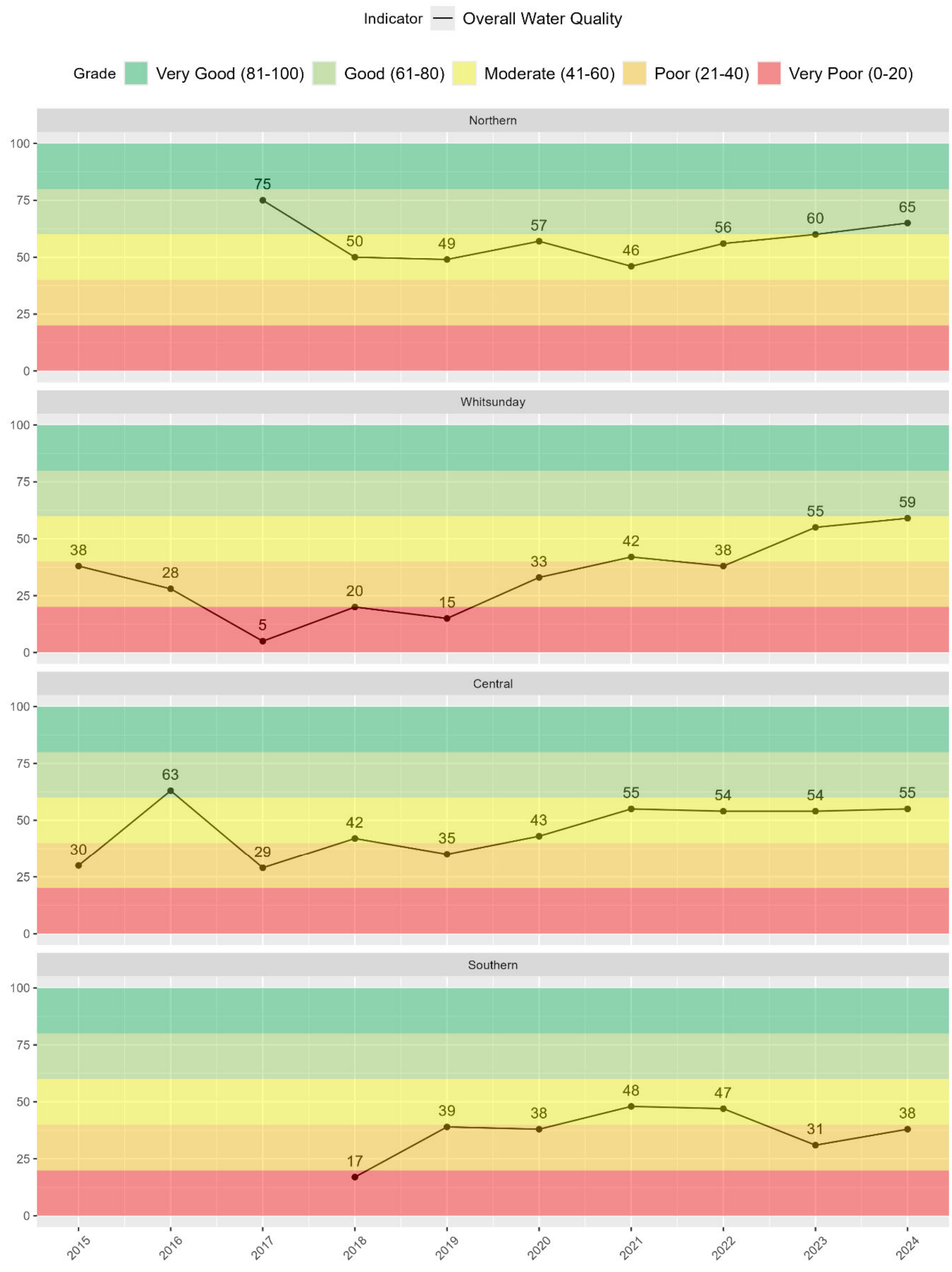

Figure 52. Water quality scores and grades for the 2025 Report Card (2023-24 data) for marine inshore zones compared to the historic record. Scores from the 2015 Report Card have been back-calculated to exclude pesticide scores in the Whitsunday Zone so that they are directly comparable to 2016 and 2017 scores. Scores from the 2025 Report Card include pesticide monitoring in the Whitsunday Zone and Northern Zone for the first time and are not directly comparable to previous scores. Historic scores have been back-calculated compared to guideline values (GVs) updated in 2023-24 and may be different to those published previously.

4.1.6 Offshore Marine Zone

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 was to be discontinued. Since 2022, the Technical Working Group (TWG) and the Independent Science Panel recommended that products produced by CSIRO for eReefs be used for offshore water quality reporting, and progress towards this has been made. The TWG recommended in early 2025 that a contextual approach would be more appropriate than a scoring approach for offshore water quality reporting, with the rationale as follows:

- The offshore area for each report card is an extremely large water body in comparison to the other reporting zones.
- Offshore water quality under normal conditions is not affected by catchment influences.
- Applying a score and grade implies that the condition of offshore water quality can be affected by management actions.
- Average conditions across an offshore zone are expected to consistently score and grade highly with very minimal change over time.

Proposed inclusions 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 is intended to be implemented as part of the 2027 Program Design update for regional report cards. 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.

4.1.7 Confidence

Confidence in water quality index scores in the inshore zones is presented in Table 36.

Table 36. Confidence associated with water quality index results in marine zones for the 2025 Report Card (2023-24 data). Confidence criteria are scored 1–3 and then weighted by the value identified in the parentheses. Final scores (4.5–13.5) are additive across weighted confidence criteria. Final scores correspond to a rank from 1 to 5 (very low–very high), which indicates the final confidence level. Confidence in results for the Central Zone differs from the other marine zones due to the increased spatial and temporal representation from two monitoring programs and the relevant confidence scores are presented in brackets. Unless otherwise specified, confidence in results is the same across marine zones.

Indicator	Maturity of Methodology (x0.36)	Validation (x0.71)	Representativeness (x2)	Directness (x0.71)	Measured Error (x0.71)	Final Score	Rank
Nutrients	3	3	1.5 [2]	3	3	9.76 [10.76]	3 [4]
Chl-*a*	3	3	1.5 [2]	3	3	9.76 [10.76]	3 [4]
Water Clarity	3	3	1.5 [2]	3	3	9.76 [10.76]	3 [4]
Pesticides	3	2	2 [2.5]	2	1	8.63 [9.63]	3
Inshore Water Quality Index						**9.5 [10.4]**	**3 [4]**
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							

4.2 Coral Index

Coral reef assessments are undertaken with the understanding that healthy and resilient coral communities exist in a dynamic equilibrium between acute disturbances and reef recovery. Disturbance events may include storm events, thermal bleaching, and outbreaks of crown-of-thorns starfish (COTS) (Thompson et al., 2018). Coral recovery is influenced by water quality, and reefs exposed to poor water quality recover more slowly from disturbances and are more susceptible to disease outbreaks (MacNeil et al., 2019). Reefs are assessed across four inshore and one offshore reporting zone (Figure 53) using metrics that respond to both acute stressors, and the recovery capability of reef ecosystems (Thompson et al., 2020).

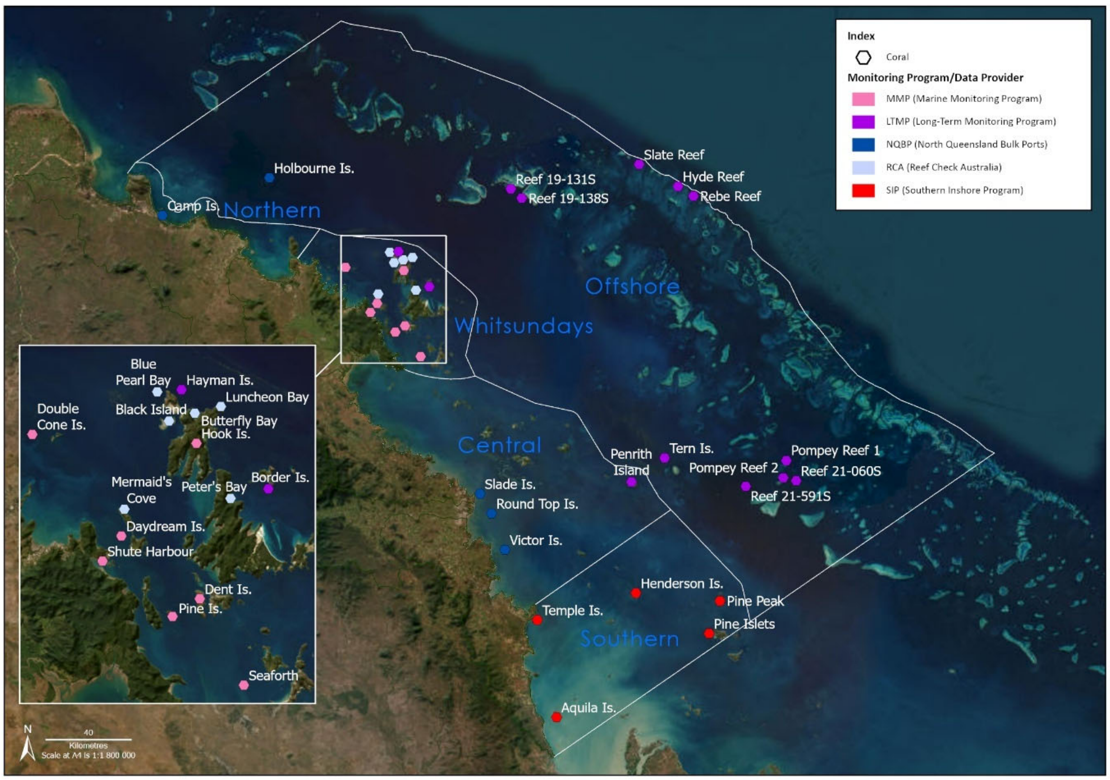

Figure 53. Coral monitoring sites for inshore and offshore zones during the 2025 Report Card (2023-24 data). Sites in each zone are colour symbolised according to data provider.

4.2.1 Inshore Marine Zone

Notes on data interpretation for Report Card results

Influence of Macroalgae: Abundance of macroalgae increases in areas exposed to high nutrient availability, including inshore zones impacted by river discharge. Macroalgae compete with corals by limiting available space and light, physically damaging corals by abrasion, interfering with recruitment, or promoting bacterial communities pathogenic to corals. In addition to these limiting factors, extensive macroalgae cover can influence scores of other indicators due to the sampling method. Macroalgae can obscure underlying corals which make them difficult to count as juveniles or be recorded on photo transects that can result in negative bias to both the coral cover and cover change indicator scores. Variation in macroalgae cover impacts coral scores throughout the inshore marine zones, however is particularly relevant in the Southern Zone where macroalgae cover can be particularly high (Davidson et al., 2023; Thompson et al., 2024).

Results (Table 37, Figure 54, Figure 55, Appendix 8.4.2)**:**

Table 37. Inshore and Offshore coral scores and grades for the 2025 Report Card (2023-24 data).

2025 Report Card (2023-24 data)

Marine Zones	Cover	Macroalgae	Juvenile	Cover Change	Composition	Coral Index
Northern	28	50	52	30		**40**
Whitsunday	34	32	51	34	25	**35**
Central	40	0	73	35		**37**
Southern	42	0	13	36		**23**
Offshore	48		95	52		**65**

Coral index scoring range: Very Poor = 0 to 20 | Poor = >20 to 40 | Moderate = >40 to 60 | Good = >60 to 80 | Very Good = >80 | No score/data gap

Key Messages:

1) Coral scores in the Whitsunday Zone remained similar to recent years, reflecting the challenges coral communities face in the recovery from TC Debbie in 2017 (Thompson et al., 2022, 2024). (Appendix 8.4.2).
2) Recovery in the Whitsunday Zone since Tropical Cyclone (TC) Debbie has been slow, although juvenile coral recruitment is occurring at some reefs, notably where macroalgae cover is low. Coral species tolerant of turbid conditions tend to be slower growing, and poor water quality favours macroalgae that make it difficult for juvenile corals to establish themselves, both factors that lead to slow recovery at highly impacted reefs (Thompson et al., 2022, 2024).
3) Macroalgae cover was the limiting factor in further growth of coral communities in the Southern Zone and influenced grade decline in the Central Zone.
4) Recovery in the Southern Zone from the 2020 bleaching event was evident at Henderson Island, where macroalgae cover is less prevalent, although all reefs showed resistance to heat pressures in 2024 (Davidson et al., 2024).

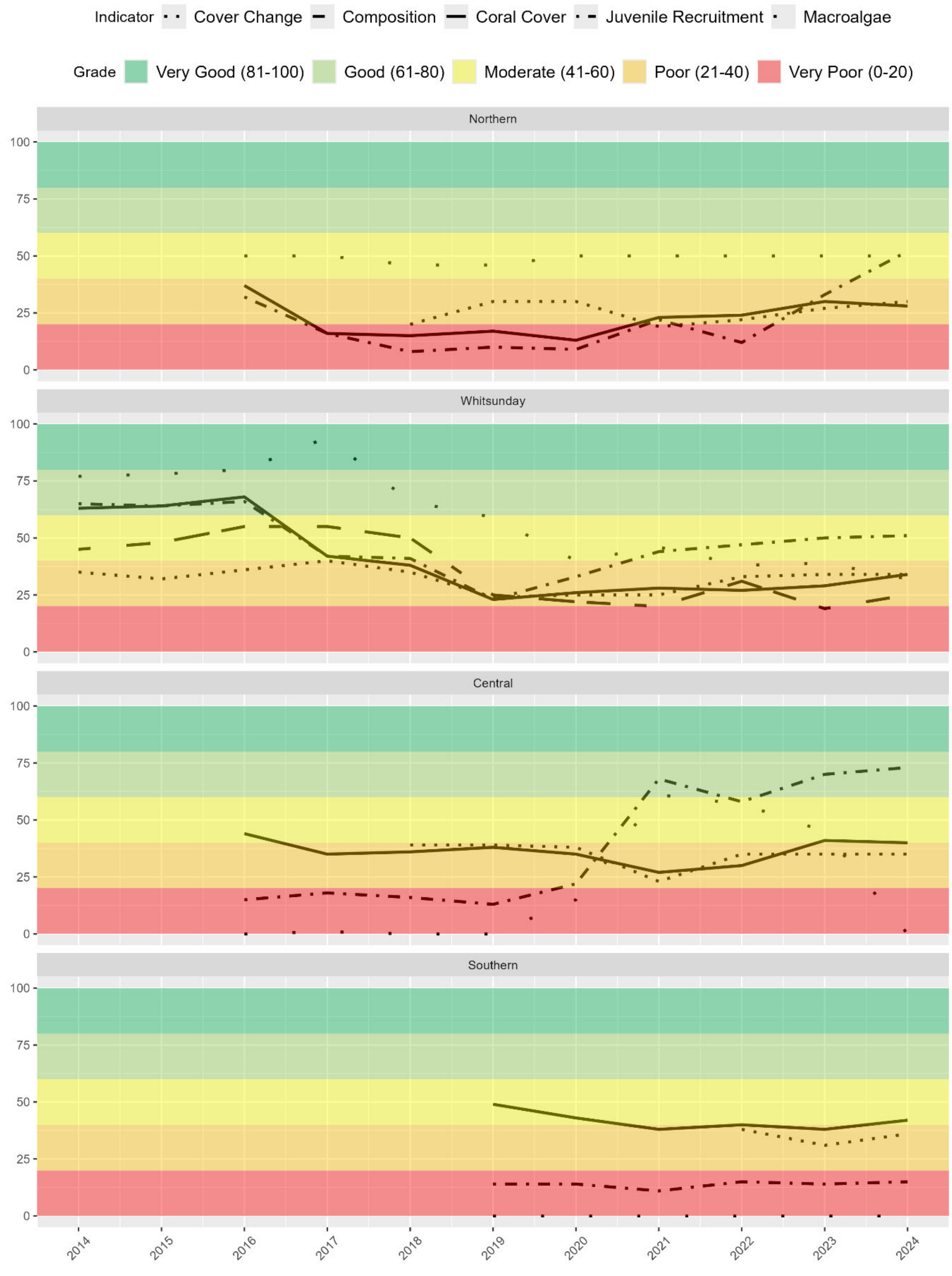

Figure 54. Inshore coral indicator scores and grades for the 2024 Report Card (reporting on 2022-23 data) compared to the historic record. Scores in the Northern Zone before 2020 have been adjusted due to changes in reef aggregation level.

Improvements in the **Northern Zone** were driven largely by increased juvenile recruitment at both sites, yet the overall score for the zone remained 'poor'.

Coral scores in the **Whitsunday Zone** remained 'poor' and recovery of coral communities has been slow since the severe impacts of TC Debbie. At a reef level, grade improvement at Hayman Island (from 'moderate' 58 to 'good' 71) was influenced by improvements in the Composition and Macroalgae indicators, while grade decline at Shute Harbour (from 'good' 67 to 'moderate' 53) was influenced by increased macroalgae cover and decreased juvenile recruitment.

The **Central Zone** declined from 'moderate' to 'poor'. The decline was influenced by increased macroalgae cover, most notably increases in the proportion of macroalgae to total algae at Round Top Island.

Coral scores in the **Southern Zone** improved overall yet remained 'poor'. Coral cover increased despite a severe bleaching event in early 2024, where only 3% of corals were bleached at the time of surveys compared to 41% following similar heat stress in 2020. This may indicate that the coral that survived previous bleaching events represent a hardier population more tolerant to heat waves. Resilience of these ecologically isolated coral communities continues to be challenged by high cover of macroalgae and low density of juvenile hard corals (Davidson et al., 2024).

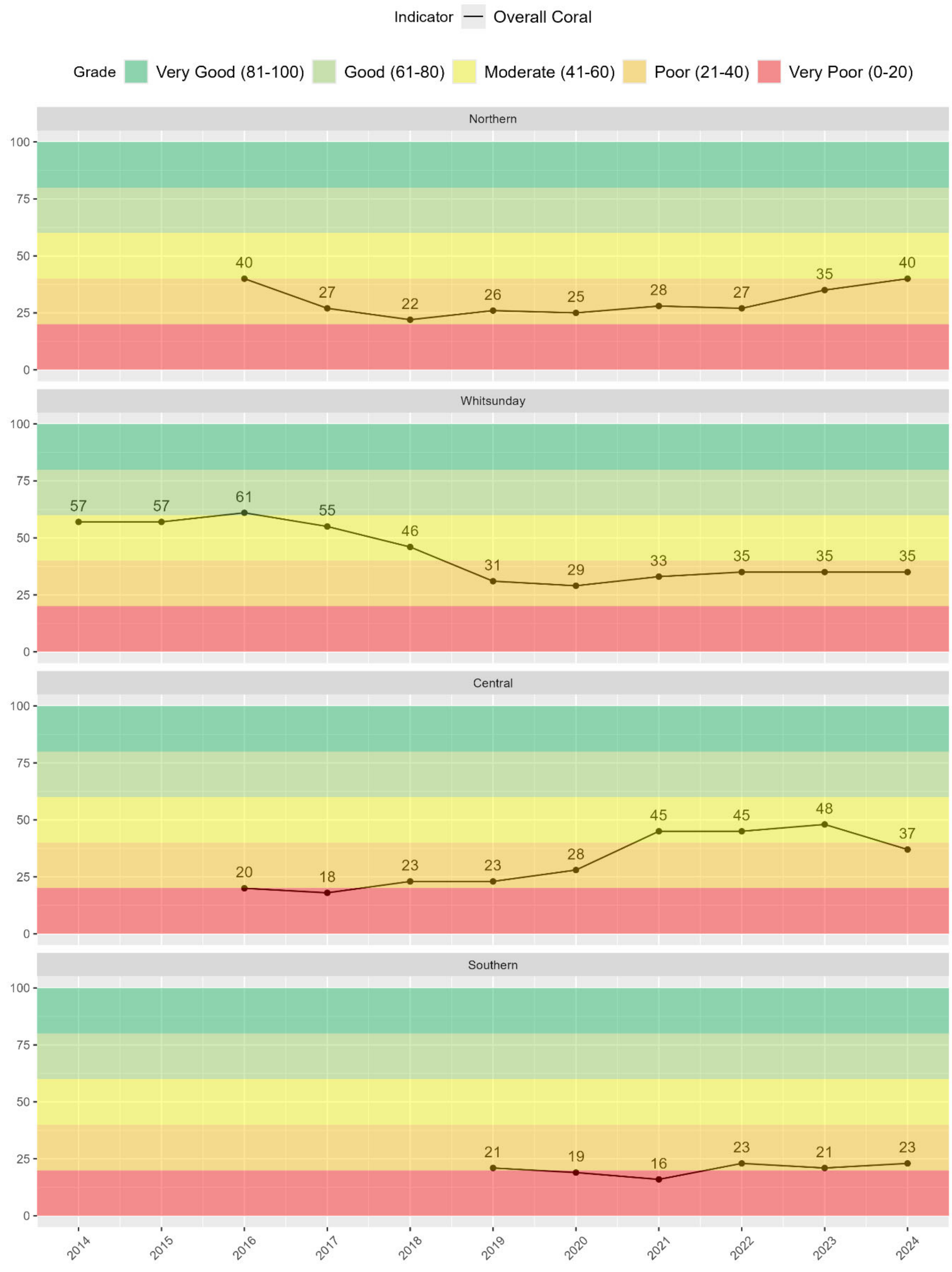

Figure 55. Inshore overall coral index scores and grades for the 2025 Report Card (2023-24 data) compared to the historic record. Scores in the Northern Zone before 2020 have been adjusted due to changes in reef aggregation level.

4.2.2 Offshore Marine Zone

The Offshore Zone was less impacted by TC Debbie in 2017 and since then most reefs have shown improvement in coral cover.

<u>Notes on data interpretation for Report Card results</u>

LTMP program redesign: In 2020, AIMS revised its monitoring program and decommissioned several of the southern reefs previously reported in the Offshore Zone. The improvement in coral score compared to previous reporting reflects ongoing recovery of most reefs but has also been influenced by the change in the AIMS sampling design, as historic scores have been back-calculated to include only those reefs currently monitored.

<u>**Results** (Table 37, Figure 56, Figure 57, and Appendix 8.4.2)**:**</u>

Key Messages:

1) Overall scores for the Offshore Zone were near their highest in the past 10 years of monitoring. Scores were driven by ongoing 'very good' grades for juvenile coral densities and maintained 'moderate' grades for coral cover and cover change.

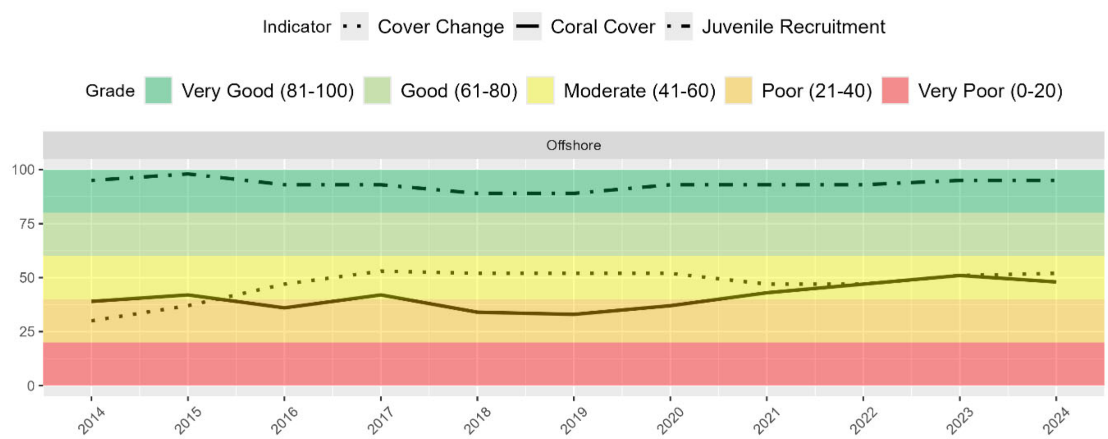

Figure 56. Offshore coral indicator scores and grades for the 2025 Report Card (2023-24 data) compared to the historic record. Offshore coral scores have been back-calculated before 2022 to account for the decommission of several sites.

Juvenile coral density was 'very good' at every monitored reef in the Offshore Zone except Penrith Island ('moderate'). This score suggests that recent environmental conditions have not imposed substantive limitations to hard coral recruitment, indicating ongoing resilience of coral communities in this zone. The lower score for juvenile coral density at Penrith Island may be influenced by the reef's spatial remoteness (Figure 52), resulting in reduced larval supply relative to the more offshore reefs (A. Thompson, pers. comm. 14/04/21).

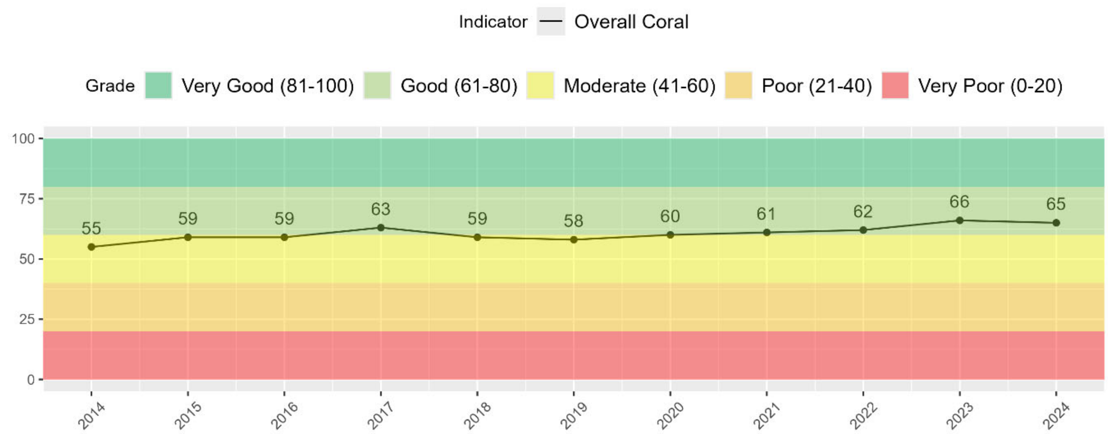

Figure 57. Offshore overall coral index scores and grades for the 2024 Report Card (2022-23 data) compared to the historic record. Scores have been back-calculated before 2022 to account for several sites decommissioned since 2021-22.

4.2.3 Confidence

Confidence in scores is 'high' for inshore coral indicators and 'moderate' for offshore coral indicators (Table 38).

Table 38. Confidence associated with coral index results in marine zones for the 2025 Report Card. Confidence criteria are scored 1–3 and then weighted by the value identified in parentheses. Final scores (4.5–13.5) are additive across weighted confidence criteria. Final scores correspond to a rank from 1 to 5 (very low–very high), which indicates the final confidence level. Unless otherwise specified, confidence in results is the same across marine zones where relevant.

Indicator	Maturity of Methodology (x0.36)	Validation (x0.71)	Representativeness (x2)	Directness (x0.71)	Measured Error (x0.71)	Final Score	Rank
Cover	3	3	2	3	2	10.8	4
Change	3	3	2	3	2	10.8	4
Juvenile	3	3	2	3	2	10.8	4
Macroalgae	3	3	2	3	2	10.8	4
Composition	3	3	2	3	2	10.8	4
Inshore Coral Index						**10.8**	**4**
Cover	3	3	1	3	2	8.8	3
Change	3	3	1	3	2	8.8	3
Juvenile	3	3	1	3	2	8.8	3
Offshore Coral Index						**8.8**	**3**

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 Seagrass Index

Seagrass data were sourced from the Reef Authority's Great Barrier Reef Marine Monitoring Program (MMP), Seagrass Watch citizen science data, the Queensland Ports Seagrass Monitoring Program (QPSMP), and the Partnership-funded Southern Inshore Program (SIP) (Figure 58). All of these seagrass monitoring programs are conducted by TropWATER, James Cook University. The MMP measures abundance (percent cover) and resilience, while the QPSMP and SIP condition indicators are area, biomass, and species composition.

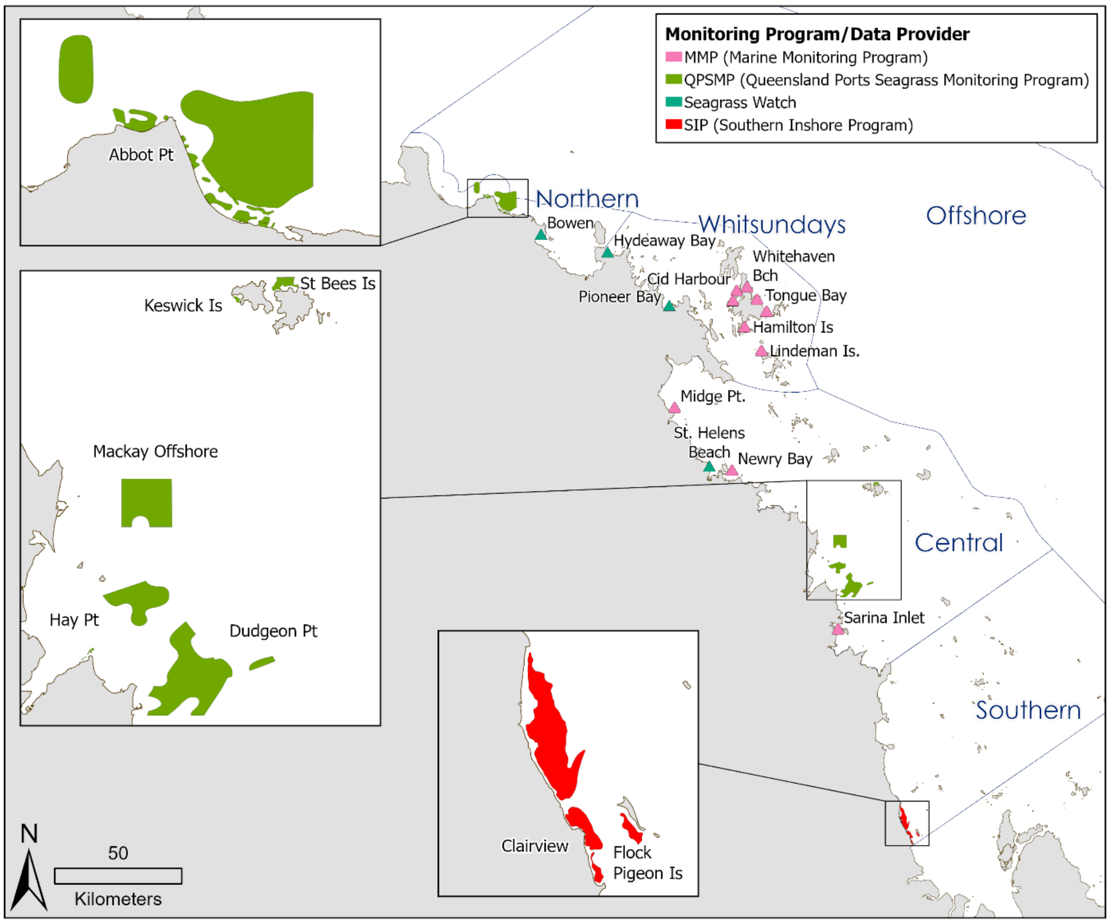

Figure 58. Seagrass monitoring sites for marine inshore zones. Colours represent each data provider with MMP data shown as pink, QPSMP data as green, Seagrass Watch citizen science data as teal, and Partnership-funded data from the SIP as red. Sites following the QPSMP methodology are shown as polygon extents of the survey area, while sites following the MMP methodology are shown as a triangle point feature. Seagrass is not currently reported in the Offshore Zone.

Notes on data interpretation for Report Card results

Natural Variability: The first five years of monitoring in the Southern Zone demonstrated that seagrass meadows can be highly dynamic in terms of spatial and temporal variability even without major climatic or anthropogenic impacts. This is due in part to high levels of herbivory which influence the location of biomass hotspots (van de Wetering & Rasheed, 2024).

Results (Table 39, Figure 59, and Appendix 8.4.3.)**:**

Table 39. Results for seagrass indicators for inshore zones for the 2025 Report Card (2023-24 data). Indicators are based on data collected from the MMP, QPSMP, and the SIP. The seagrass index is derived via calculation rather than average of site/meadow scores, which can be found in Appendix 8.4.3.

2025 Report Card (2023-24 data)

Zones	MMP			QPSMP/SIP			Seagrass Index^
	Abundance	Resilience		Biomass	Area	Species Comp.	
Northern	100			65	81	84	**70**
Whitsunday	31	34					**31**
Central	59	71		68	67	89	**62**
Southern				90	92	92	**86**

Scoring range: ■ Very Poor = 0 to <21 | ■ Poor = 21 to <41 | ■ Moderate = 41 to <61 | ■ Good = 61 to <81 | ■ Very Good = 81 to 100 | ■ No score/data gap

^Refer to Appendix 8.4.3 for individual site scores used to calculate the seagrass index. For QPSMP/SIP, each meadow/site score is defined as the lowest grade/score of the three indicators within that meadow where this is driven by biomass or area. Where species composition is the lowest score, it contributes 50% of the overall meadow score, with the next lowest indicator (area or biomass) contributing the remaining 50%. For the MMP, each site score is the average of both indicators.

Key Messages:

1) In the Northern Zone, the Bowen meadow had 100% cover, while there was a decline in area at Abbott Point. Benthic light monitoring at Abbott Point indicated more frequent periods of light falling below those required for seagrass growth compared to previous years.

2) In the Whitsunday Zone, overall meadow improvement was seen at Lindeman Island coastal site ('poor' to 'good'), although seagrass grades in the marine zone overall have been poor for six consecutive years. Elevated sea surface temperatures and reduced light availability have hindered recovery in this zone since TC Debbie. Furthermore, low seagrass abundances have resulted in sediment destabilisation which increased sand movement across meadows, further impeding recovery. Vegetative shoots and seed banks, although sparse, continue to persist, indicating that natural recovery remains feasible provided favourable conditions for seagrass return (Personal communication, Len McKenzie, 12/05/2025).

3) The Central Zone score declined but grade remained good. The Hay Point offshore meadow declined for the second year and the grade was moderate, however the Mackay offshore meadow had record high biomass and area. Benthic light monitoring between Mackay and Hay Point indicated above average light conditions for the second year.

4) The Southern Zone Flock Pigeon Island seagrass meadow has continued to show signs of recovery since the substantive declines in biomass and area in 2020. Coinciding with the recovery of seagrass in 2023-24 was a return of substantial dugong feeding trails to the meadow for the first time since 2018-19 (van de Wetering & Rasheed, 2024).

Figure 59. Results for seagrass index for inshore zones for the 2025 Report Card (2023-24 data), compared to historic scores. Indicators are based on data collected from the MMP, QPSMP, and the SIP. Scores prior to 2019-20 may differ slightly from past reporting as they have been back-calculated to exclude sites that have since been decommissioned. Scores prior to 2018-19 have not been back-calculated with the MMP Resilience metric and are therefore not directly comparable to current scores.

4.3.1 Confidence

Confidence ranks for seagrass condition indicators associated with the MMP, QPSMP, and SIP were equal, resulting in 'moderate' confidence in the overall seagrass index (Table 40).

Table 40. Confidence associated with seagrass index results in inshore zones. Confidence criteria are scored 1–3 and then weighted by the value identified in parentheses. Final scores (4.5–13.5) are additive across weighted confidence criteria. Final scores correspond to a rank from 1 to 5 (very low–very high), which indicates the final confidence level.

Indicator	Maturity of Methodology (x0.36)	Validation (x0.71)	Representativeness (x2)	Directness (x0.71)	Measured Error (x0.71)	Final Score	Rank
Abundance	3	3	1	3	2	8.8	3
Resilience	2	3	1	3	2	8.4	3
Biomass	3	3	1	3	2	8.8	3
Area	3	3	1	3	2	8.8	3
Species Composition	3	3	1	3	2	8.8	3
Seagrass Index						**8.7**	**3**
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 Fish Index

There is currently no score for marine fish in the Report Card. Identification of appropriate indicators and methodology development is currently under investigation in inshore and offshore zones. The suitability of citizen science and/or engagement of recreational fishers was investigated by regional report card partnerships, however, was ultimately found unsuitable due to the complexities of merging datasets with differing methods, and representativeness (spatial and temporal) that was not sufficient for report card indicator development. See full report online (Vinall, 2023).[33]

4.5 Overall Marine Zone Condition

Results (Table 41, Figure 60)**:**

Table 41. Overall inshore and offshore marine scores and grades for the 2025 Report Card (2023-24 data). Overall grade for Offshore Zone cannot be calculated due to minimum index requirements.

2025 Report Card

Marine Zones	Water Quality	Coral	Seagrass	Fish	Total Score and Grade	
Northern	65	40	70		59	C
Whitsunday	59	35	31		42	C
Central	55	37	62		51	C
Southern	38	23	86		49	C
Offshore*		65				

Scoring range: ■ Very Poor = 0 to <21 | ■ Poor = 21 to <41 | ■ Moderate = 41 to <61 | ■ Good = 61 to <81 | ■ Very Good = 81 to 100 | ■ No score/data gap

* The Offshore Zone cannot be given an overall grade as only the coral index was measured during the 2022–23 reporting cycle; however, coral scores remain for reference.

Key Messages:

1) The **Whitsunday Zone** improved for the fifth consecutive year, this demonstrates continued but incremental improvement since TC Debbie as well as changes in methodology with the previous year's inclusion of pesticide scores and this year's inclusion of two new monitoring sites linked to the Partnership-led Project Blueprint.
2) While scores remained 'moderate' in the **Northern Zone**, score improvement was influenced by improved nutrients scores for PN and PP, and improved juvenile recruitment in coral.
3) The **Central Zone** score decline was influenced by increased macroalgae, which influenced coral score decline.
4) The Partnership-funded Southern Inshore Program is now well-established, with all indices now assessed across multiple years. The **Southern Zone** is an important area for seagrass meadows, and overall score improvement in this zone was influenced by seagrass grade improvement to 'very good'. Southern Zone seagrass meadows are particularly relevant for dugong protection in the region (van de Wetering & Rasheed, 2024).

[33] https://healthyriverstoreef.org.au/projects/reef-fish-citizen-science-data-assessment/

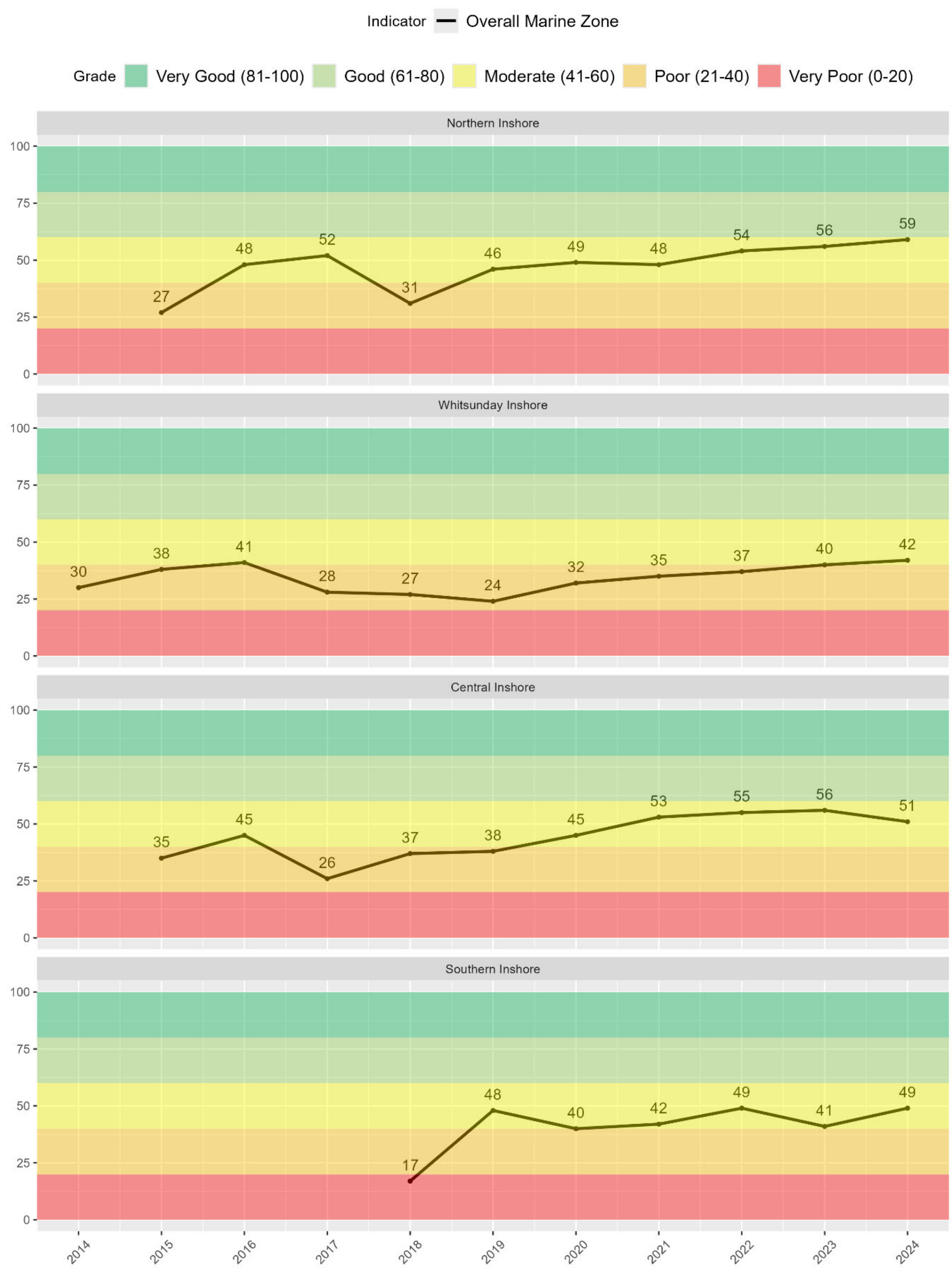

Figure 60. Overall inshore marine scores for the 2025 Report Card (2023-24 data) compared to the historic record. Historic scores may differ slightly from past reporting as they have been back-calculated to reflect changes in sites and/or methods for marine indices.

5 Urban Water Stewardship Framework

The Urban Water Stewardship Framework (UWSF) is a tool for assessing and reporting on the level of practice applied by local government and industry to manage sediment and nutrient loads, including erosion during the construction phase (categorised as developing urban), stormwater run-off during the post-construction phase (established urban), and sewage wastewater treatment plant releases (point source). UWSF assessments are implemented every two years via a facilitated workshop and consensus opinion rating process (DES, 2022). Results below represent the most recent data available facilitated by Water by Design consulting in 2024-25. For de-identified results for each council and comparisons to previous years scores, see report online.[34]

<u>**Results** (Figure 61):</u>

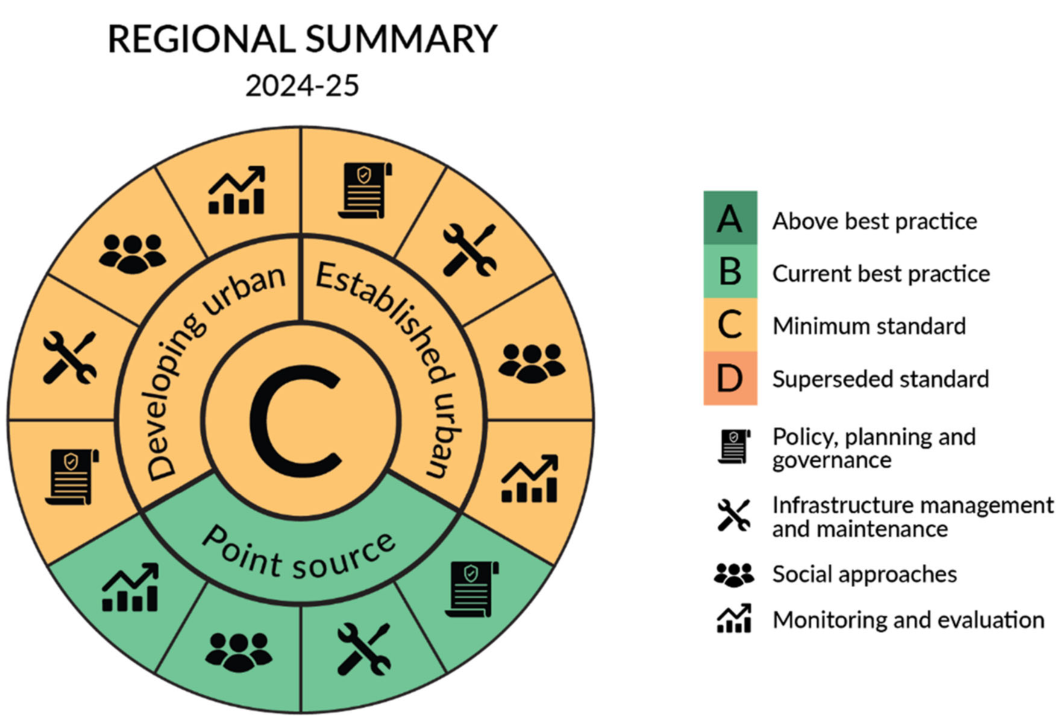

Figure 61. UWSF indicator categories (outer ring), indicators (middle ring), and overall index grade (inner ring) that contribute to the overall score. The indicator categories (clockwise) for each indicator are 'policy, planning, and governance' symbolised by a scroll, 'infrastructure, management, and maintenance' symbolised by tools, 'social approaches' symbolised by people, and 'monitoring and evaluation' symbolised by a graph.

Key Messages:

1) The overall urban water management practice level for the MWI region was rated as C, which equates to a level of practice that meets minimum industry standards and a moderate level of risk to water quality.
2) The Policy, Planning and Governance element for Established Urban showed improvement, increasing from a grade of D in both 2020-21 and 2022-23 to a C in 2024-25. This change

[34] https://healthyriverstoreef.org.au/report-card/stewardship/

suggests that management activities have strengthened, and that additional support was provided to the corresponding MAGs to help drive this improvement.

3) The Point Source component received an overall rating of B which represents a level of management considered to be current industry best management practice.

5.1 Confidence

Overall confidence for the Urban Water Stewardship indicator was 'low' (Table 42).

Table 42. Confidence associated with Urban Water Stewardship results for the 2025 Report Card. Confidence criteria are scored 1 to 3 and then weighted by the value identified in parentheses as per the UWSF implementation manual (DES, 2022). Final scores (6–18) are additive across weighted confidence criteria. Summary rationales are given below each criterion.

	Maturity of methodology (x0.4)	Validation (x0.7)	Representativeness (x4.0)	Directness (x0.7)	Measured error (x0.7)	Final	Rank
UWSF 2024-25 rating	1.2	0.7	8.0	0.7	0.7	**11.3**	**2 (low)**
Rationale	UWSF ratings based on ISP-endorsed method repeated over three assessment rounds and applied to > 13 LGAs. Also applied to three LGAs in South East Queensland in 2024. Hence, pre-weighted score of 3 applies.	Limited reference to use of primary data for UWSF activity ratings. Hence, pre-weighted score of 1 applies.	All 3 LGAs in RRC region are included, third complete assessment following pilot in 2019. Based on changes at the region level, results are likely to be reflective of actual practice levels. However, variation of LG level practices for the different management elements do not always follow a consistent temporal trend and this may be related partly to artefacts of data collection. Hence, pre-weighted score of 2 applies..	Assessment was applied at the LGA urban footprint scale (i.e. not to particular areas within the LGA) and based on the most common scenario (i.e. not to a particular case). Hence, pre-weighted score of 1 applies.	No measure of error quantified, albeit rating ranges for each activities were recorded in 2022/23 and 2024/25, but are not reported here. Hence, pre-weighted score of 1 applies.		
Rank based on final score: 1 (very low): 6.5 – 7.5; 2 (low): >7.5 – 12.3; 3 (moderate): >12.3 – 13.7; 4 (high): >13.7 – 18.1; 5 (very high): >18.1 – 19.5.							

6 Cultural Heritage

Cultural heritage surveys in the MWI region were reported by the Partnership periodically, with results included in the 2015, 2018 and 2021 Report Cards. The aim of the assessments was to monitor the state of culturally important places and highlight areas requiring maintenance and preservation.

The most recent cultural heritage scores (2020-21 data) were based on assessments of 17 sites from four zones: Islands of the Whitsundays, Proserpine and Airlie Beach, St Lawrence, and Lake Elphinstone and Mt Britton) (Figure 62). The sites assessed for the report card fall within the country of the Juru, Ngaro, Gia, Koinjmal, Barada, and Widi Peoples in October 2020. The Partnership acknowledges the Yuwi People's native title determination on 25 February 2020. As the Yuwi Aboriginal Corporation was newly formed at the time of the cultural heritage assessments, it was decided not to include Yuwi sites, out of respect for the Native Title Act and to allow for further consultation with the traditional owners of Yuwi Country. Further information about the indicators and grades are available in our Cultural Heritage Executive Summary.[35]

Figure 62. Cultural Heritage zones assessed in the 2020-21 surveys. Islands of the Whitsundays (4 sites), Airle Beach & Proserpine (4 sites), Lake Elphinstone & Mt Britton (7 sites), St Lawrence (2 sites).

[35] https://healthyriverstoreef.org.au/wp-content/uploads/2022/07/hr2rp-cultural-heritage-exec-summary-2021.pdf

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8 Appendices

8.1 Climate

8.1.1 Don Basin

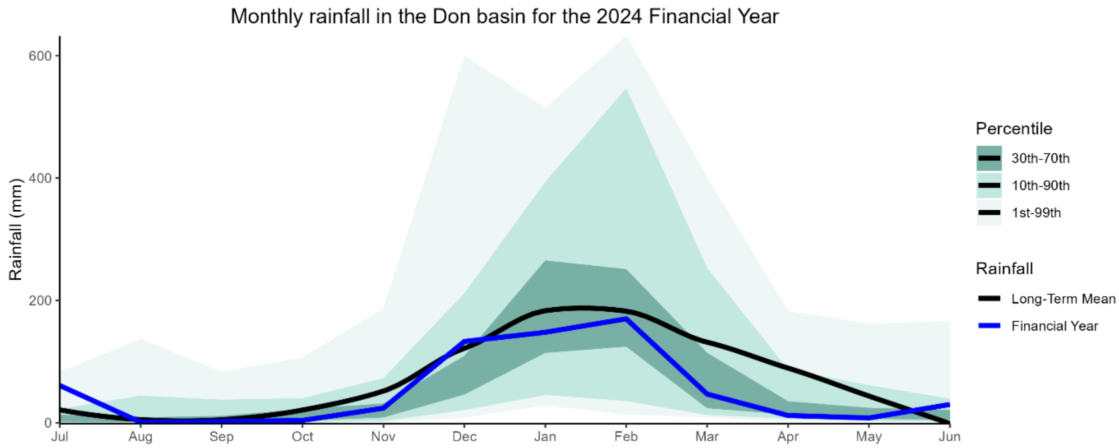

Figure 63. Current financial year (monthly) rainfall (blue line) compared to the long term mean (black line) for each month in the Don Basin. Month on the x axis, rainfall (mm) on the y-axis. Source: Australian Water Outlook

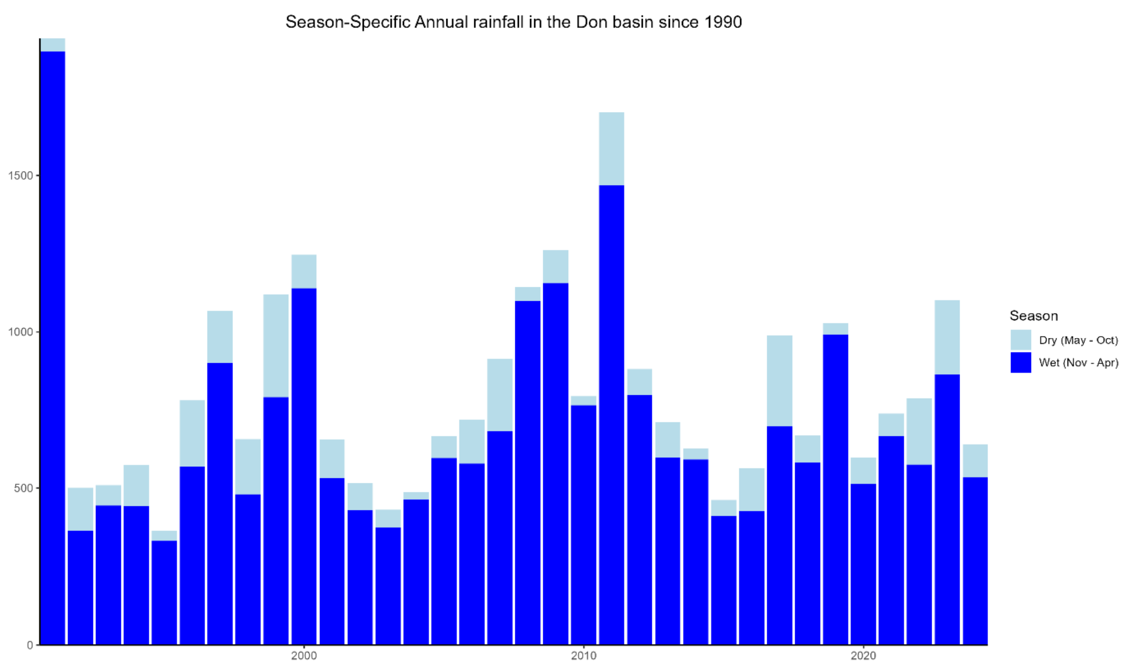

Figure 64. Annual seasonal rainfall in the Don Basin since 1990. Wet season rainfall (Nov - Apr) is depicted in dark blue and dry season rainfall (May - Oct) is depicted in light blue. Long-term mean rainfall in the Don Basin was 819 mm and has been calculated using the most recent 30-year climate normal (1991-2020).

8.1.2 Proserpine Basin

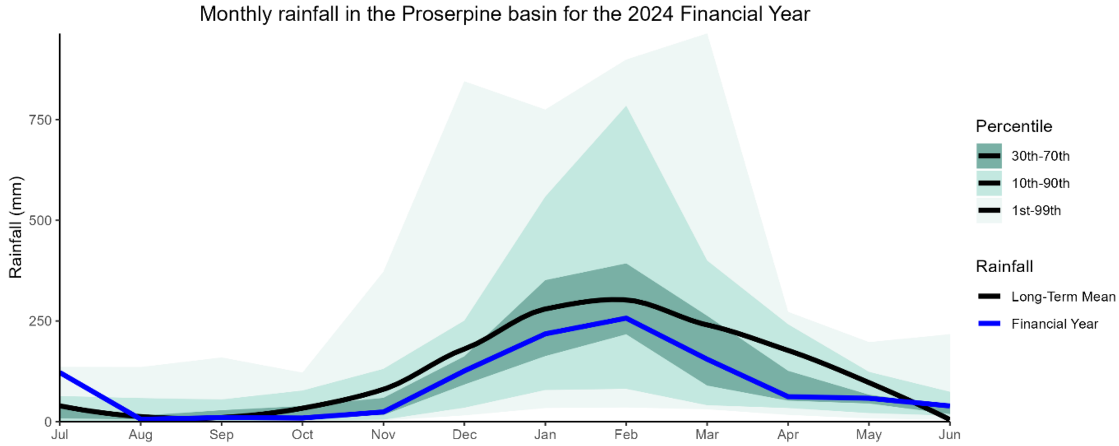

Figure 65. Current financial year (monthly) rainfall (blue line) compared to the long term mean (black line) for each month in the Proserpine Basin. Month on the x axis, rainfall (mm) on the y-axis. Source: Australian Water Outlook

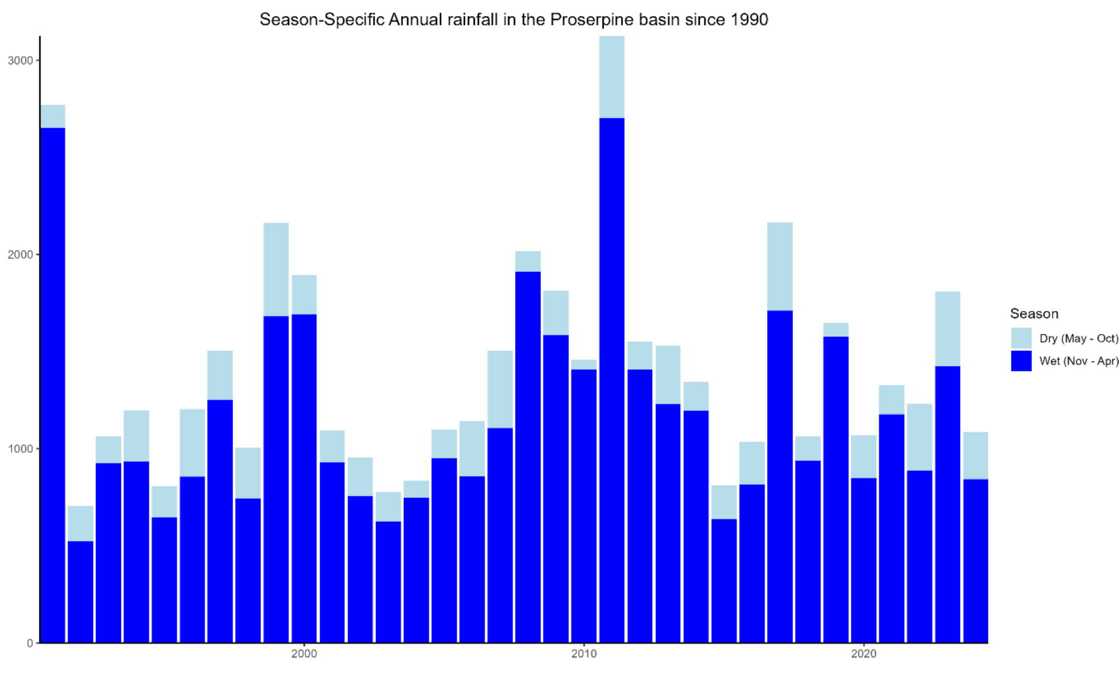

Figure 66. Annual seasonal rainfall in the Proserpine Basin since 1990. Wet season rainfall (Nov - Apr) is depicted in dark blue and dry season rainfall (May - Oct) is depicted in light blue. Long-term mean rainfall in the Proserpine Basin was 1412 mm and has been calculated using the most recent 30-year climate normal (1991-2020).

8.1.3 O'Connell Basin

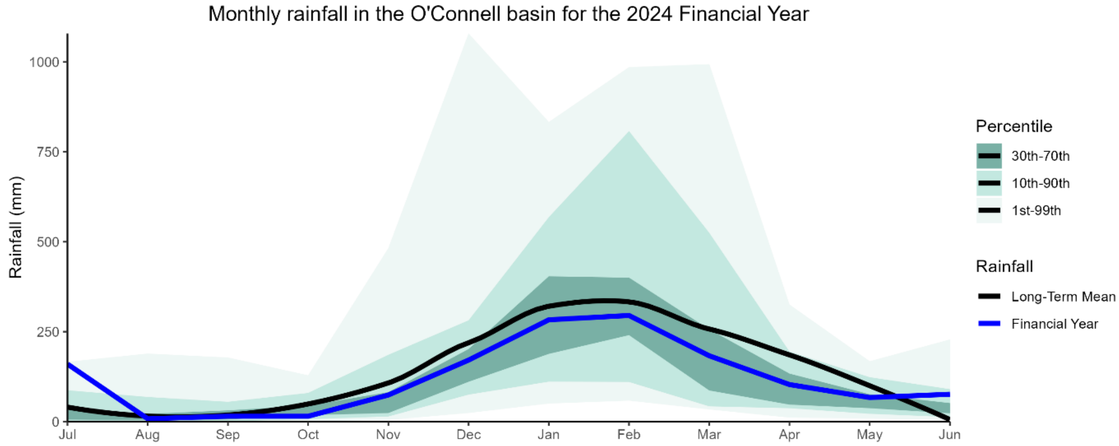

Figure 67. Current financial year (monthly) rainfall (blue line) compared to the long term mean (black line) for each month in the O'Connell Basin. Month on the x axis, rainfall (mm) on the y-axis. Source: Australian Water Outlook

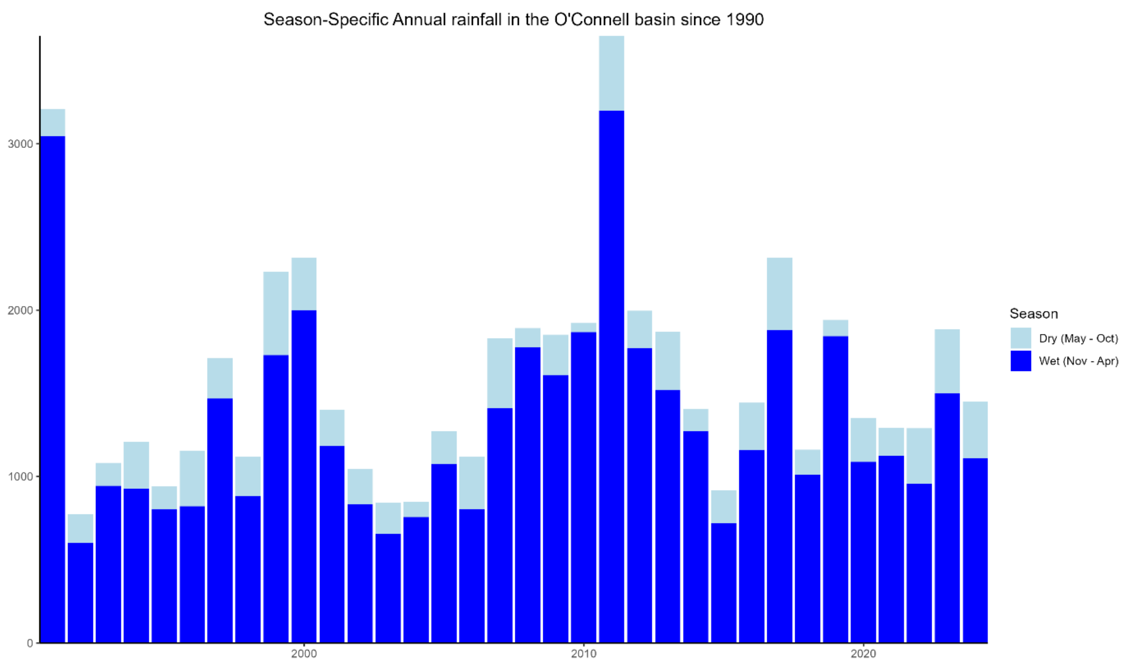

Figure 68. Annual seasonal rainfall in the O'Connell Basin since 1990. Wet season rainfall (Nov - Apr) is depicted in dark blue and dry season rainfall (May - Oct) is depicted in light blue. Long-term mean rainfall in the O'Connell Basin was 1594 mm and has been calculated using the most recent 30-year climate normal (1991-2020).

8.1.4 Pioneer Basin

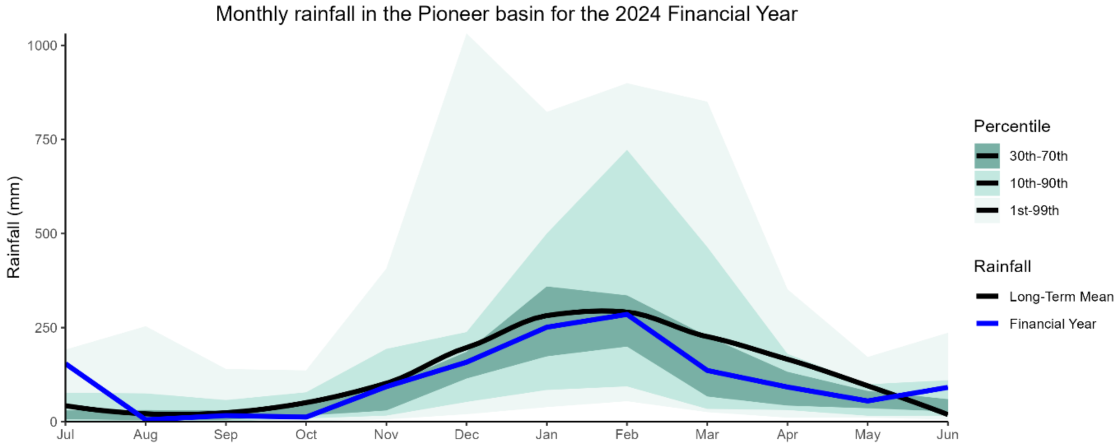

Figure 69. Current financial year (monthly) rainfall (blue line) compared to the long term mean (black line) for each month in the Pioneer Basin. Month on the x axis, rainfall (mm) on the y-axis. Source: Australian Water Outlook

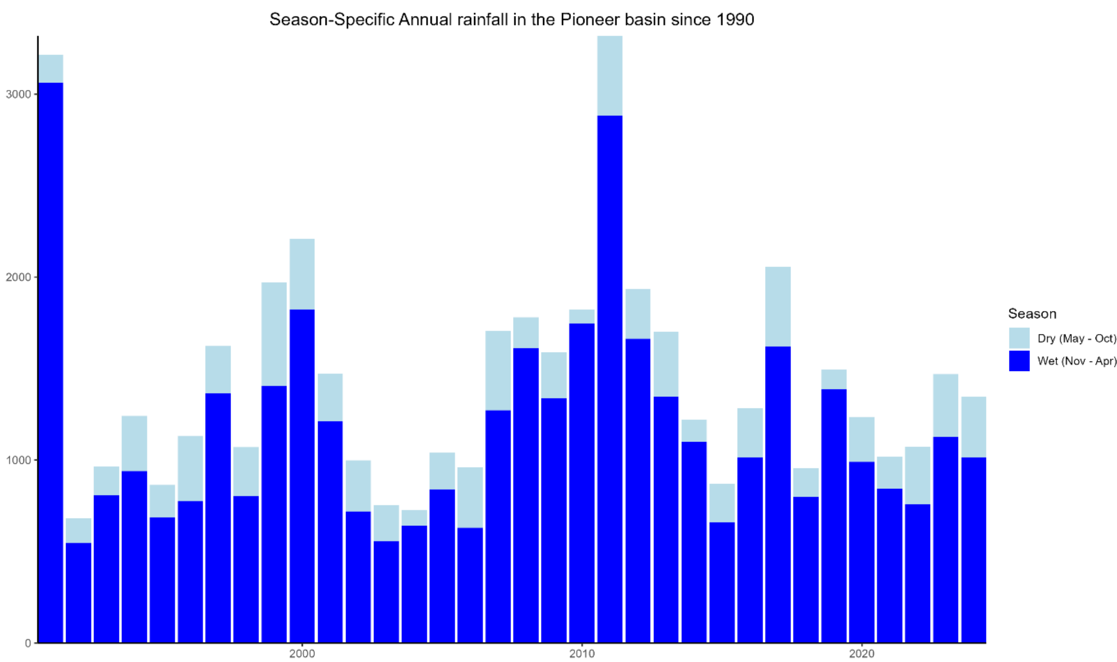

Figure 70. Annual seasonal rainfall in the Pioneer Basin since 1990. Wet season rainfall (Nov - Apr) is depicted in dark blue and dry season rainfall (May - Oct) is depicted in light blue. Long-term mean rainfall in the Pioneer Basin was 1463 mm and has been calculated using the most recent 30-year climate normal (1991-2020).

8.1.5 Plane Basin

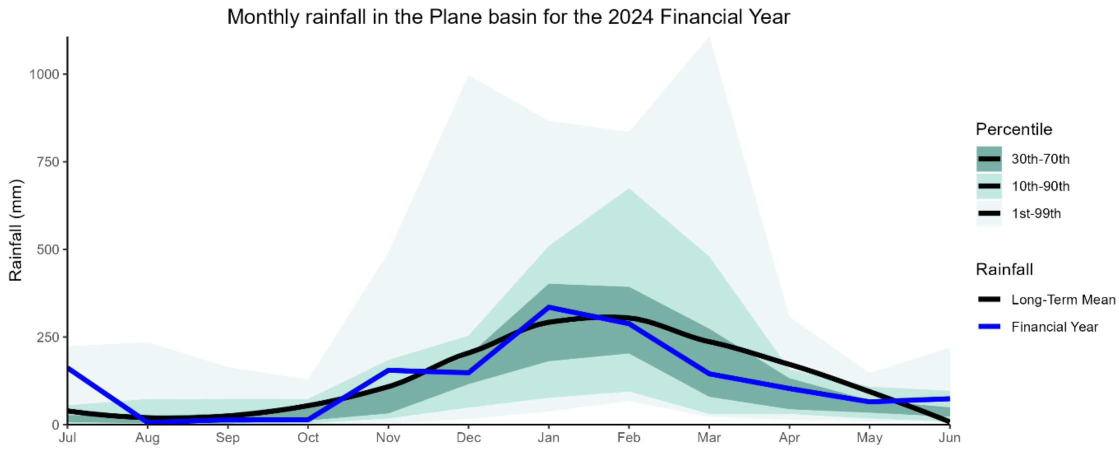

Figure 71. Current financial year (monthly) rainfall (blue line) compared to the long term mean (black line) for each month in the Pioneerl Basin. Month on the x axis, rainfall (mm) on the y-axis. Source: Australian Water Outlook

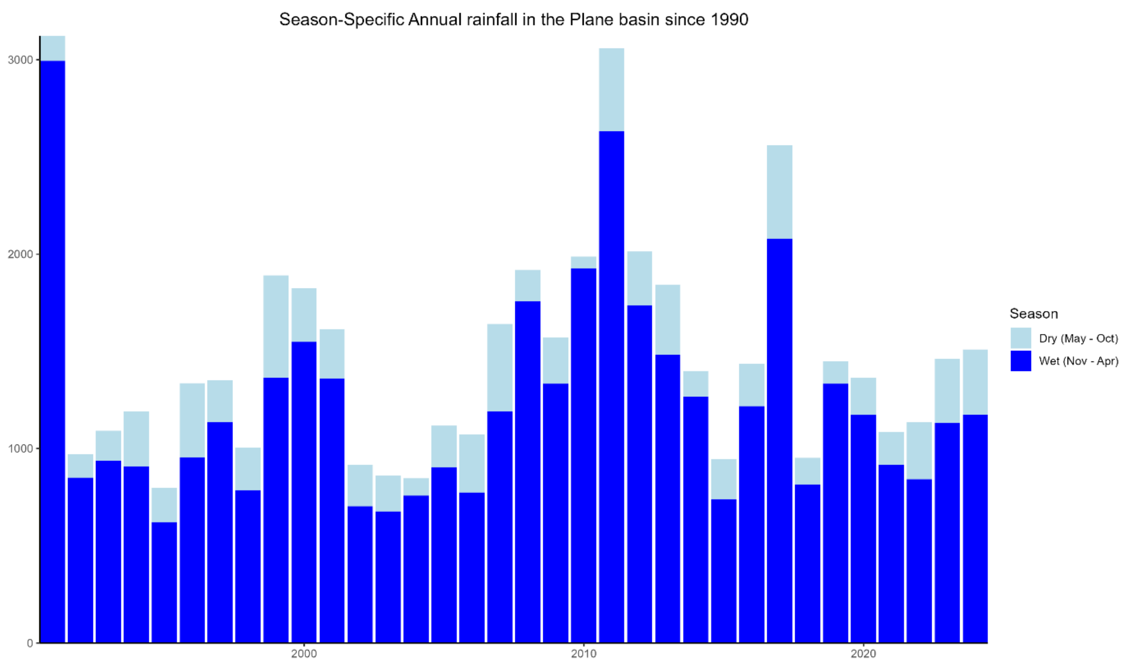

Figure 72. Annual seasonal rainfall in the Plane Basin since 1990. Wet season rainfall (Nov - Apr) is depicted in dark blue and dry season rainfall (May - Oct) is depicted in light blue. Long-term mean rainfall in the Plane Basin was 1505 mm and has been calculated using the most recent 30-year climate normal (1991-2020).

8.1.6 Sea Surface Temperature

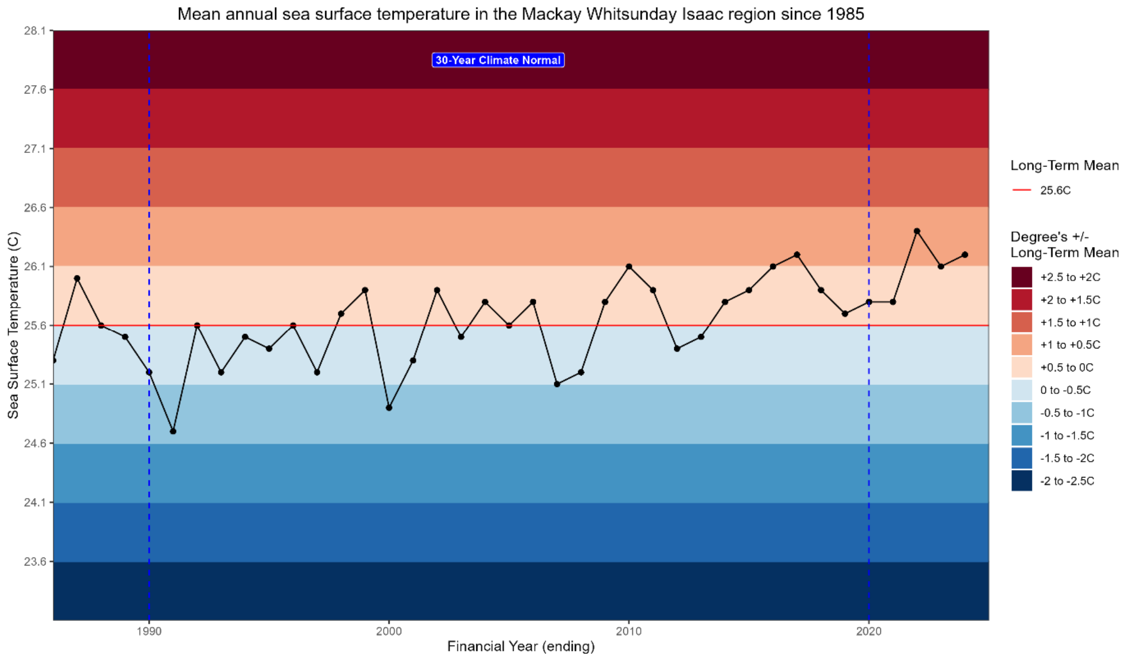

Figure 73. Long-term sea surface temperature (SST) in Mackay-Whitsunday-Isaac. SST values for each year, shown as a black point, were derived by taking the mean of monthly averages calculated across spatial grid sub-sets of each basin. Annual means were compared to a long-term mean shown as a red horizontal line and calculated from the climate normal, the most recent 30-yr block (1991-2020). Data source: National Oceanic and Atmospheric Association (NOAA)

8.2 Freshwater Basins

8.2.1 Basin Summary Stats and Boxplots

Table 43. Freshwater summary statistics for monitored water quality in the MWI basin reporting areas, from July 2023 to June 2024. Summary statistics are presented to three significant figures. Presented alongside summary statistics are relevant guideline values and the adopted statistic for comparison. Significant figures are shown to the same level as given in the relevant guideline value. Values highlighted yellow signify updates this reporting period.

Site	Indicator	n	Mean	Minimum	20th %ile	Median	80th %ile	Maximum	Guidelines	
									Comparison Statistic	Guideline Values (mg/L)
Don River at Bowen – Low Flow	TSS	3	3	2	2.4	3	3.6	4	Median	4
	DIN	3	0.673	0.024	0.041	0.066	0.094	0.112	Median	0.024
	FRP	3	0.025	0.01	0.018	0.029	0.034	0.037	Median	0.025
Don River at Bowen – HighFlow	TSS	28	91.786	2	11.6	36	101.6	643	Median	65
	DIN	28	0.373	0.149	0.236	0.385	0.476	0.839	Median	0.14
	FRP	26	0.19	0.046	0.126	0.181	0.277	0.328	Median	0.095
Proserpine River at Glen Isla*	TSS	44	160.636	7	29.2	117	267.2	868	Median	5
	DIN	44	0.446	0.062	0.094	0.183	0.354	3.912	Median	0.03
	FRP	43	0.117	0.047	0.09	0.114	0.14	0.203	Median	0.025
O'Connell River at Caravan Park	TSS	66	40.303	1	8	15	37	520	Median	2
	DIN	66	0.258	0.0015	0.033	0.088	0.389	2.13	Median	0.03
	FRP	65	0.0404	0.0005	0.0146	0.025	0.0322	0.697	Median	0.006
Pioneer River at Dumbleton Weir	TSS	84	9.518	0.5	4	6.5	14	88	Median	5
	DIN	87	0.158	0.0015	0.0792	0.139	0.2256	0.468	Median	0.008
	FRP	84	0.0434	0.0005	0.0146	0.039	0.065	0.217	Median	0.005
Plane Creek at Sucrogen Weir	TSS	63	34.206	1	6	11	32	274	Median	3
	DIN	63	0.148	0.002	0.0564	0.137	0.2002	0.516	Median	0.008
	FRP	63	0.0807	0.0005	0.032	0.07	0.1102	0.262	Median	0.008
Sandy Creek at Homebush	TSS	50	41.44	1	3	21	44.8	259	Median	5
	DIN	50	0.3956	0.0015	0.1502	0.256	0.6144	2.108	Median	0.03
	FRP	50	0.1631	0.002	0.0828	0.1705	0.2268	0.354	Median	0.015
*These data are not incorporated into freshwater scores or grades due to tidal influence.										

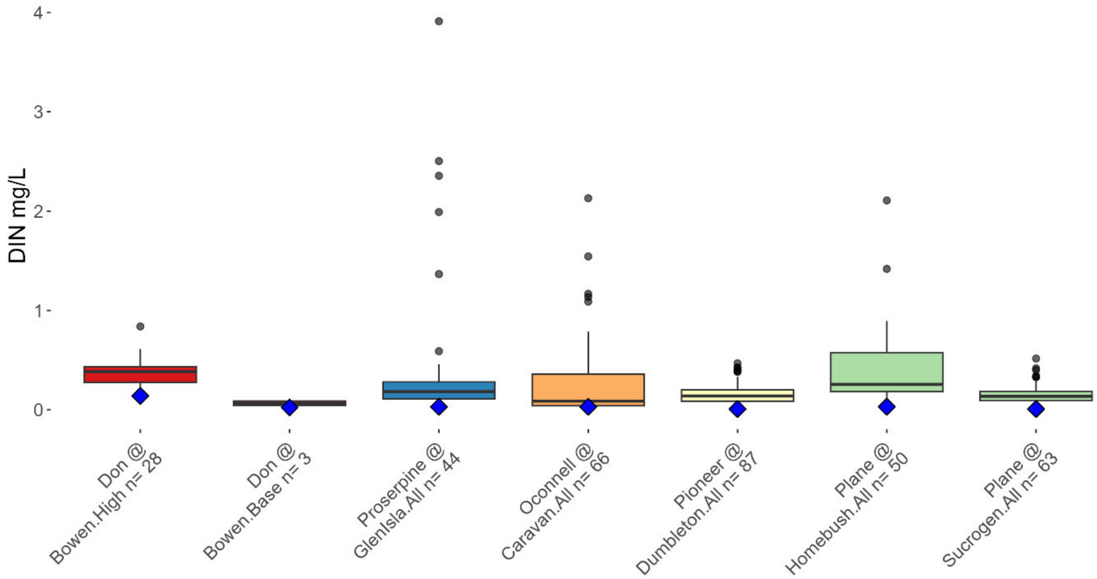

Figure 74. DIN Box and whisker plot (box showing 25th, 50th and 75th percentiles, whiskers 1.5 x interquartile range [IQR]) of monthly median DIN concentrations in the MWI basins. Guideline values are represented by a blue diamond. Outliers (>1.5 x IQR) are represented as black points. Basins are represented by colour.

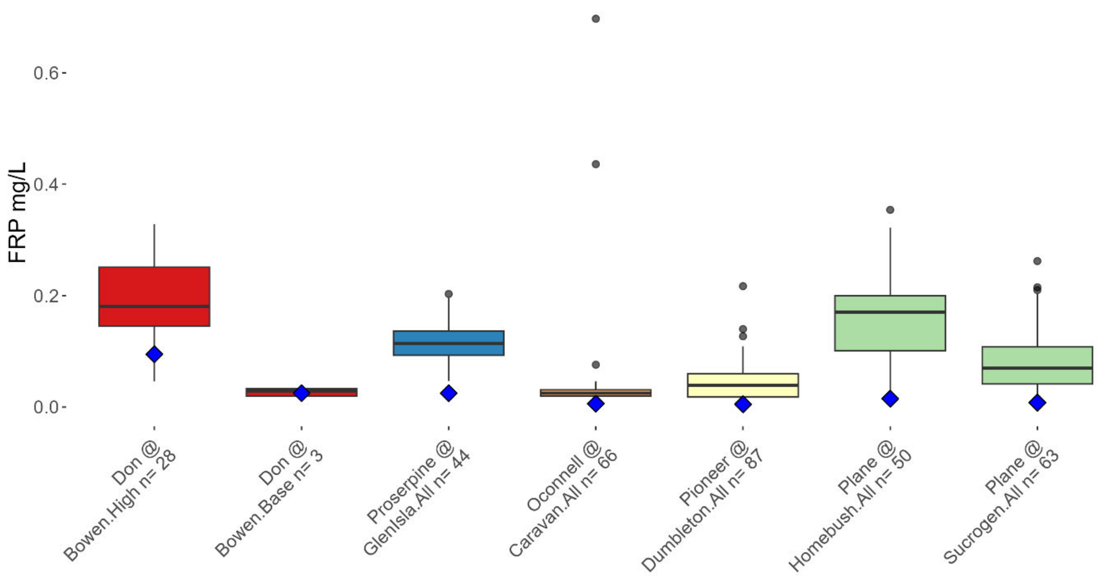

Figure 75. FRP Box and whisker plot (box showing 25th, 50th and 75th percentiles, whiskers 1.5 x interquartile range [IQR]) of monthly median FRP concentrations in the MWI basins. Guideline values are represented by a blue diamond. Outliers (>1.5 x IQR) are represented as black points. Basins are represented by colour.

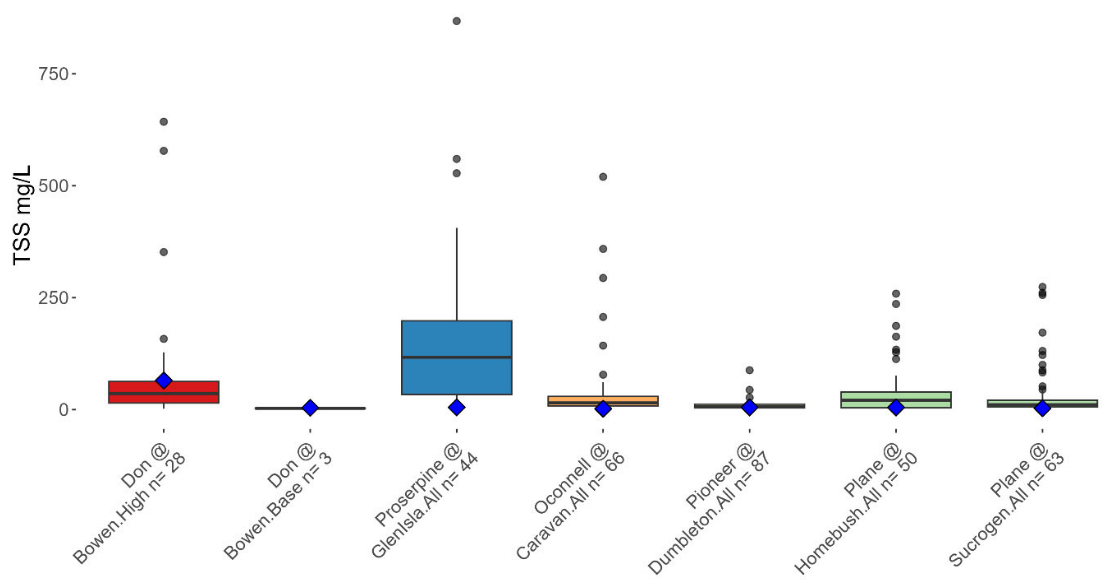

Figure 76. TSS Box and whisker plot (box showing 25th, 50th and 75th percentiles, whiskers 1.5 x interquartile range [IQR]) of monthly median TSS concentrations in the MWI basins. Guideline values are represented by a blue diamond. Outliers (>1.5 x IQR) are represented as black points. Basins are represented by colour.

8.2.2 Freshwater Flow Indicator Tool Scores and Hydrographs

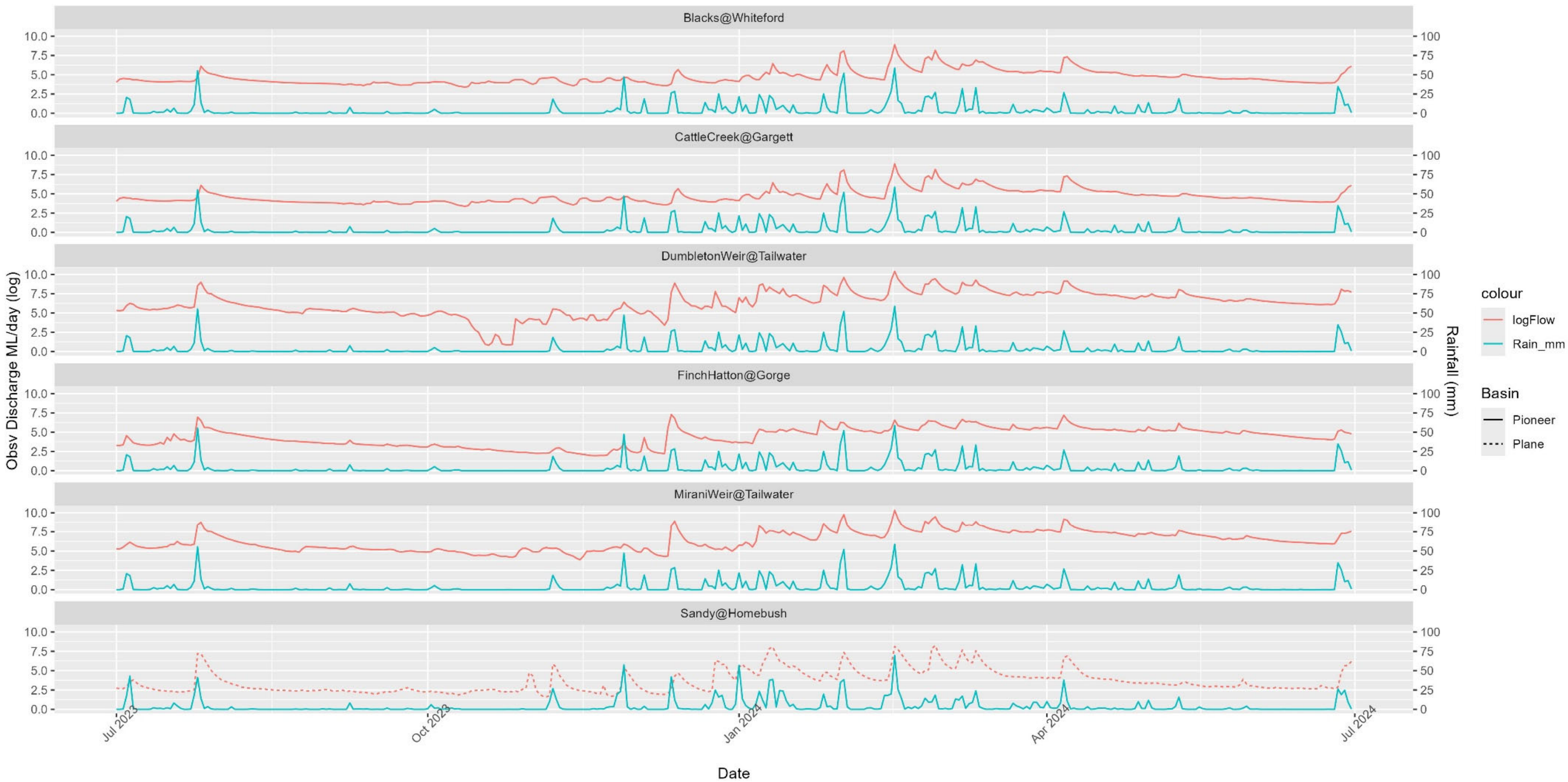

Figure 77. Hydrographs for gauging stations in the Pioneer and Plane basins. Observed discharge (ML/day) is plotted on a log scale against rainfall (mm) over the 2023–24 reporting year.

Table 44. Flow measure scores and summary scores for freshwater flow across the MWI Region, weighted by catchment area for the 2023–24 reporting year. Flow measures are scored between 1 to 5 and the 30th percentile is used as a summary score. Scores are then converted from a 1–5 scale to the standardised 0–100 for weighted aggregation. Climate type is based on annual rainfall across the basin.

Site	Gauging Station #	MDF: %Benchmark	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 Site Score	Gauge Catchment Area (km²)	Adjusted Catchment Area (km²)	Proportion (based on using gauged catchment area)	Standardised score x proportion	Aggregated Basin Score	Climate Type
Pioneer Basin																			49	Dry
CattleCk@Gargett	125004B	0.36	5	5	4	4	4	4	4	5	1	1	4	61	326	326	15%	8.9		
BlacksCk@Whitefords	125005A	0.80	2	2	5	5	4	1	5	5	5	5	3	49	509	702	32%	15.5		
FinchHattonCk@GorgeRd	125006A	2.14	4	4	5	5	5	4	1	4	1	3	3	55	35	35	2%	0.9		
PioneerR@MiraniWeirTW	125007A	1.14	4	4	5	5	5	5	4	5	4	4	4	61	1211	885	40%	24.3		
PioneerR@DumbletonWeirTW	125016A	1.14	1	1	5	5	5	5	3	5	1	1	1	0	1488	277	12%	0.0		
Plane Basin																			61	Average
SandyCreek@Homebush	126001A	0.35	5	5	3	4	1	5	5	5	5	4	4	61	326	326	1.00	61		

Scoring range: ■ Very Poor = 0 to <21 | ■ Poor = 21 to <41 | ■ Moderate = 41 to <61 | ■ Good = 61 to <81 | ■ Very Good = 81 to 100 | ■ No score/data gap

8.2.3 Assessing Multiple Sites per Catchment and Individual Indicators

Based on the recommendation provided by the TWG in March 2019, data collected from multiple independent monitoring sites were aggregated using a weighted average based on the relative catchment area upstream of each sampling site (MWI HR2RP, 2025). In the MWI Region this occurs in the Plane Basin. Results for each sub-catchment are shown below for Plane Basin (Figure 78, Figure 79, Figure 80).

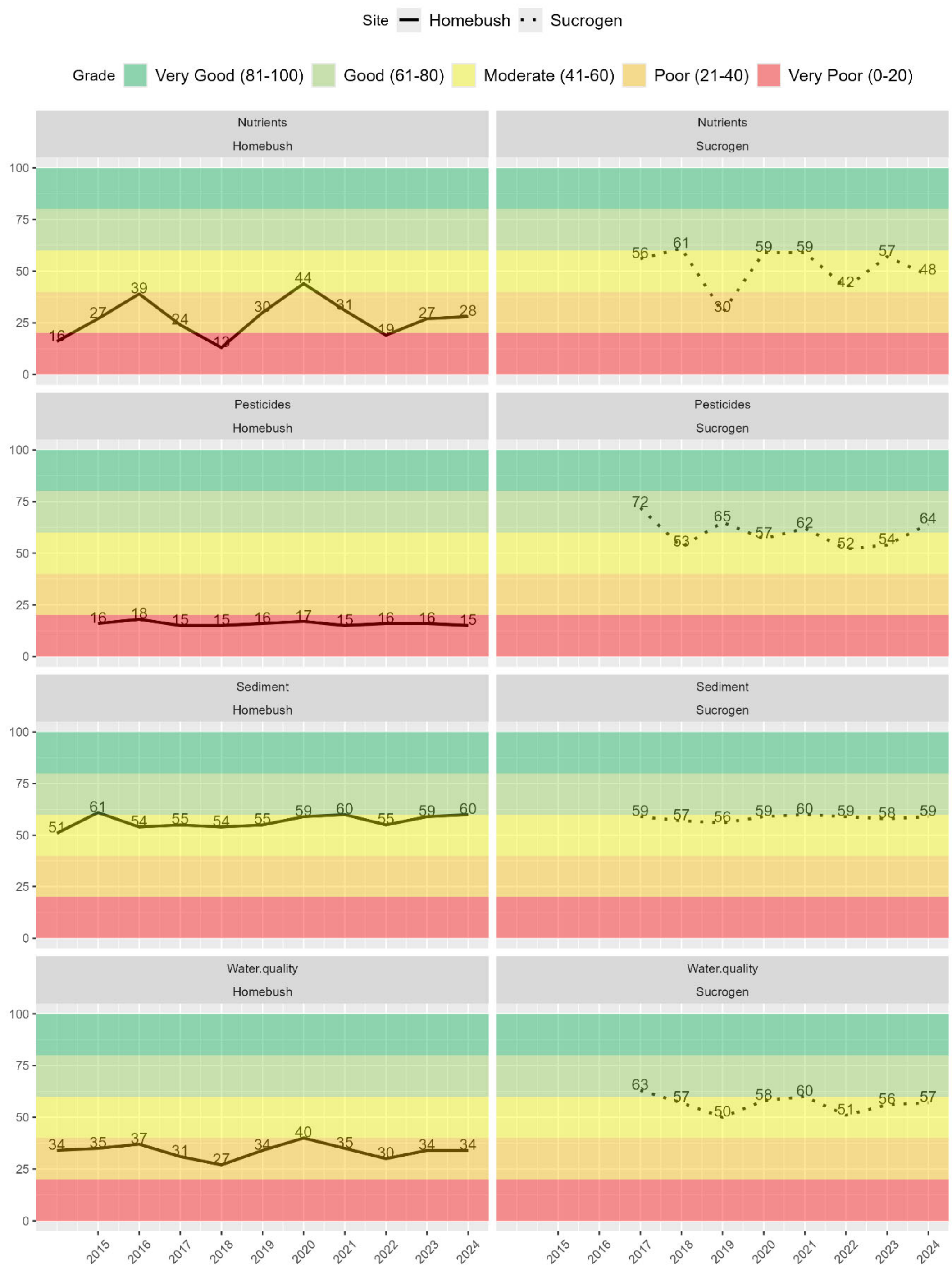

Figure 78. Plane Basin site results for water quality indicator categories for the 2023 24 Report Card compared to the historic record.

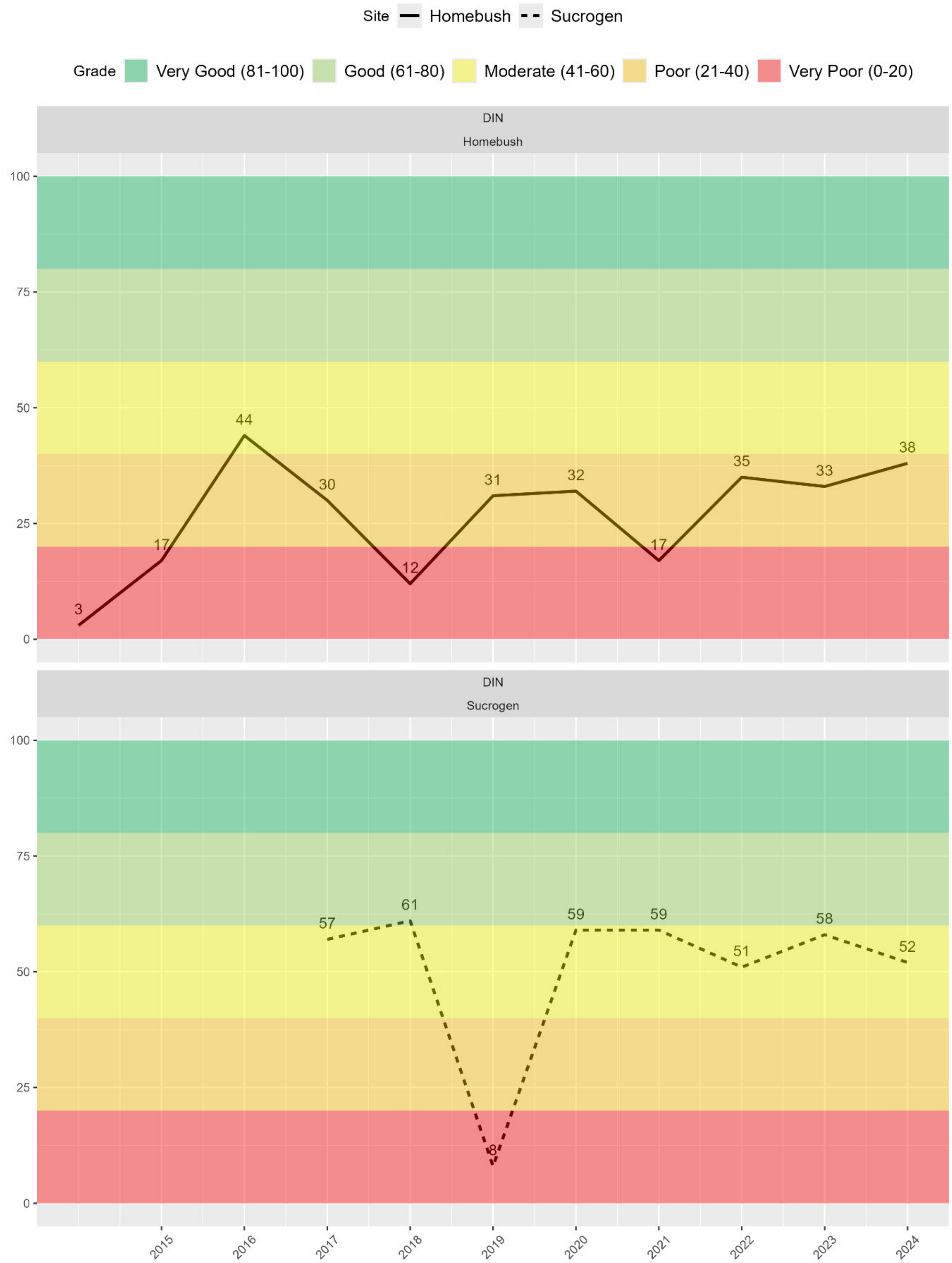

Figure 79. Plane Basin site results for dissolved inorganic nitrogen (DIN) for the 2023 24 Report Card compared to the historic record.

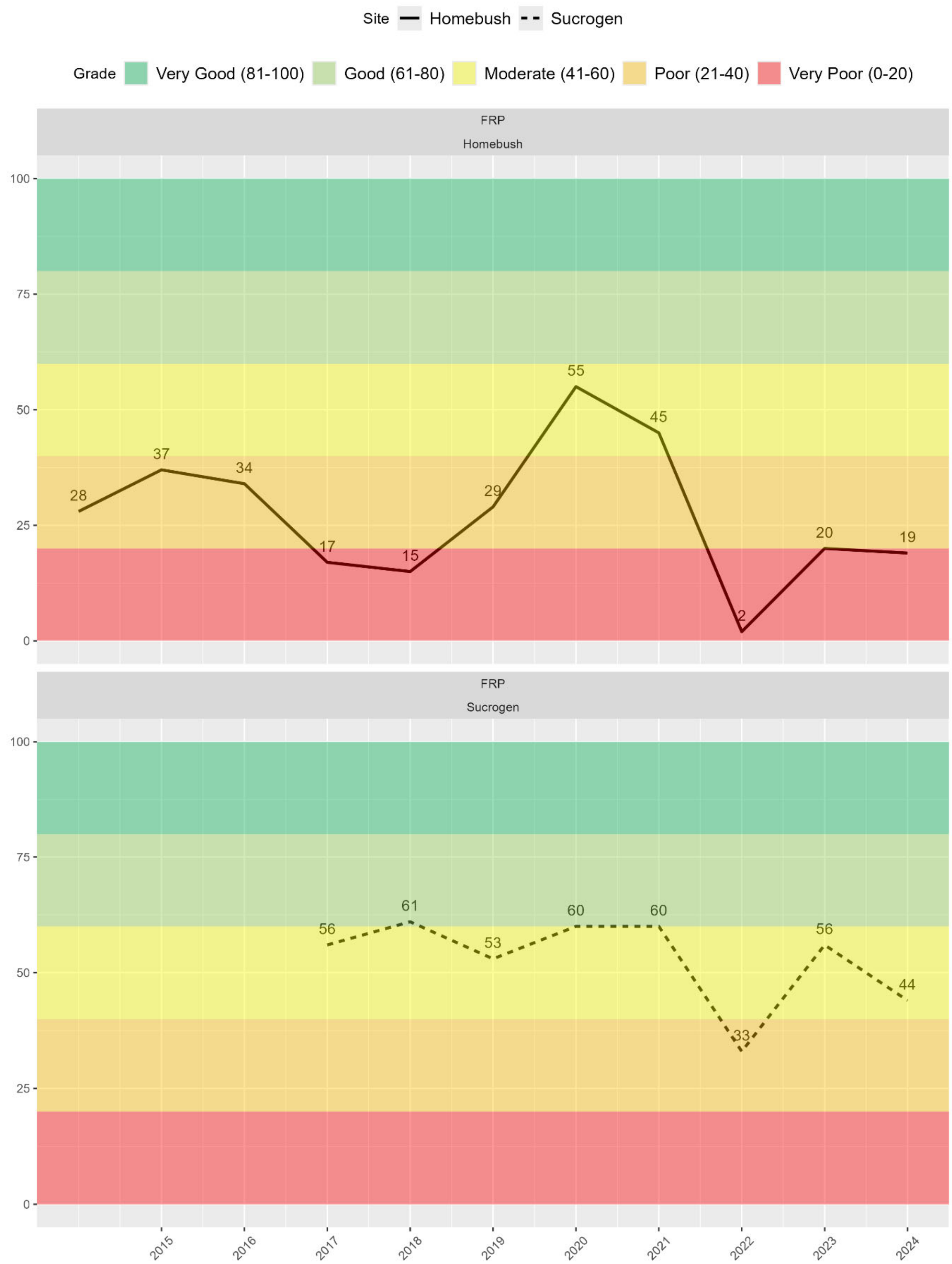

Figure 80. Plane Basin site results for filterable reactive phosphorus (FRP) for the 2023 24 Report Card compared to the historic record.

8.2.4 Fish Temporal Boxplots

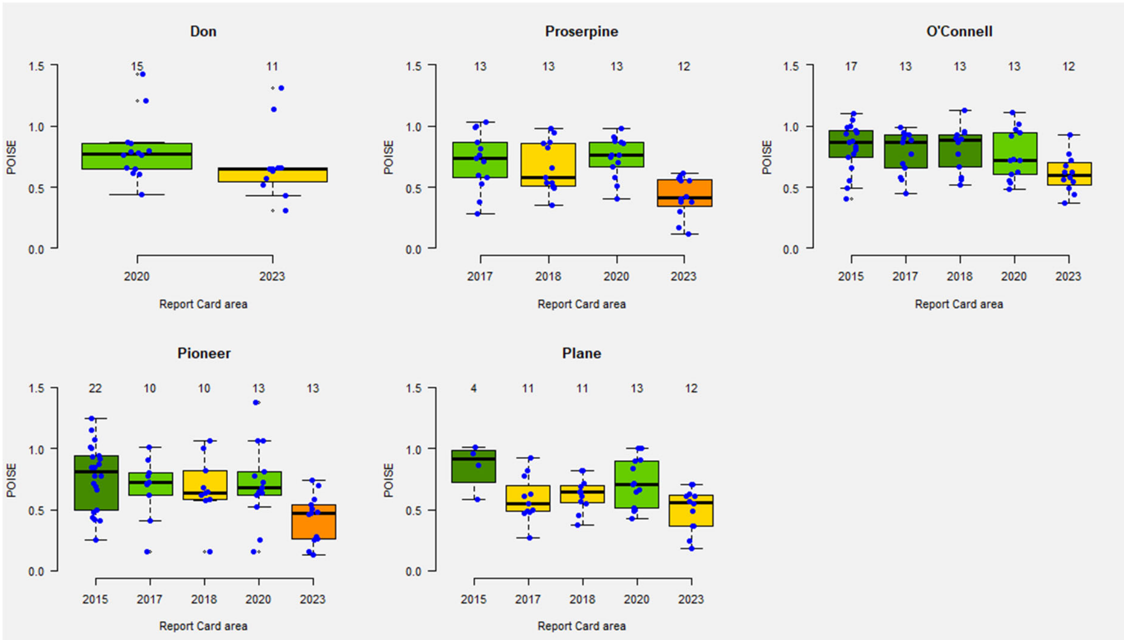

Figure 81. Distribution of the fish community sample data for the proportion of indigenous species expected (POISE) showing the variability amongst sites within each basin of the MWI region. Colour of the box represents the overall grade for the indicator in each basin per year. The median value is represented by a horizontal black line, upper and lower whiskers are 1.5 * IQR (inter-quartile range). Blue points indicate results per sample site within each basin.

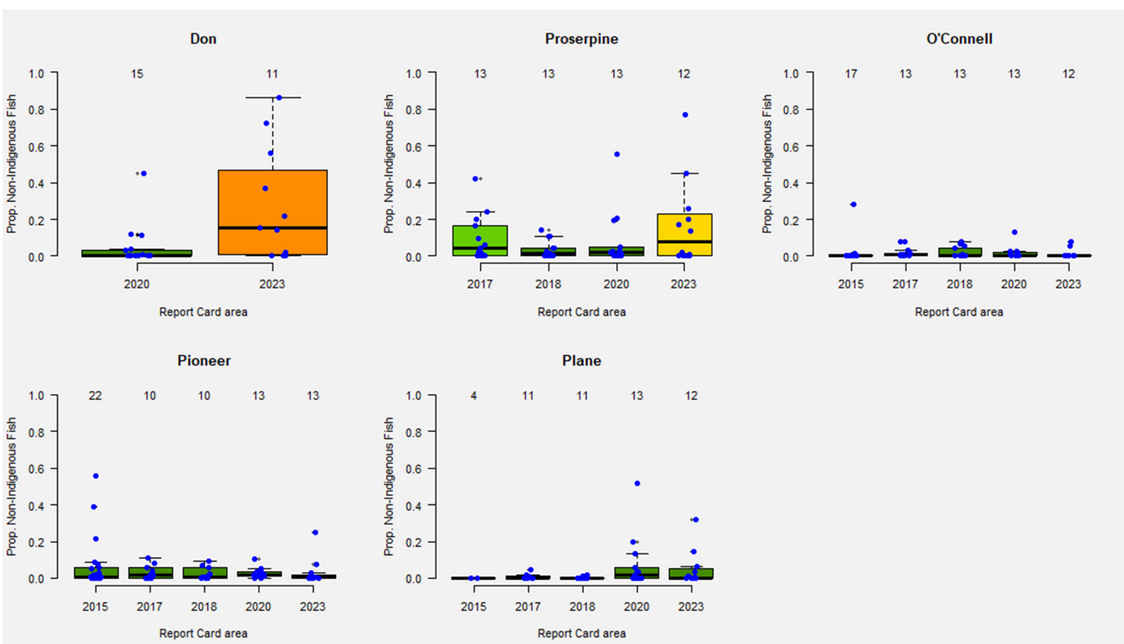

Figure 82. Distribution of the fish community sample data for the proportion of non-indigenous fish (PONI) showing the variability amongst sites within each basin of the MWI region. Colour of the box represents the overall grade for the indicator in each basin per year. The median value is represented by a horizontal black line, upper and lower whiskers are 1.5 * IQR (inter-quartile range). Blue points indicate results per sample site within each basin.

8.3 Estuarine Waterways

8.3.1 Estuary Summary Stats and Boxplots

Table 45. Estuary summary statistics for monitored water quality in the MWI estuary reporting areas from July 2023 to June 2024. Summary statistics are presented alongside guideline values, which represented the adopted statistic for comparison. In the estuaries, the median concentration value should be compared against the applicable water quality guideline. Significant figures are shown to the same level as given in the relevant guideline value. Values highlighted yellow signify updates this reporting period.

Site	Indicator	n	Mean	Minimum	20th %ile	Median	80th %ile	Maximum	Guidelines	
									Comparison Statistic	Guideline Values
Gregory River	Chl-*a*	22	4.313	1.336	2.735	3.578	5.850	9.720	Median	1.1 µg/L
	DIN	22	0.018	0.002	0.007	0.014	0.024	0.054	Median	0.012 mg/L
	FRP	22	0.012	0.002	0.007	0.01	0.016	0.026	Median	0.015 mg/L
	Turbidity	22	6.996	0.64	2.411	4.696	11.683	20.165	Median	5 NTU
	DO	22	72.651	50.95	66.386	72.375	80.89	86.55	Median	70-105 %
O'Connell River	Chl-*a*	10	4.642	2.045	2.849	4.196	5.755	8.963	Median	2 µg/L
	DIN	12	0.074	0.001	0.003	0.024	0.095	0.370	Median	0.04 mg/L
	FRP	12	0.011	0.0005	0.002	0.007	0.025	0.027	Median	0.03 mg/L
	Turbidity	12	13.474	0.4	5.256	8.885	11.84	61.89	Median	10 NTU
	DO	12	95.061	70.2	76.892	96.6	107.68	119.9	Median	70-105 %
St Helens Creek	Chl-*a*	11	5.755	2.639	3.473	5.486	8.673	9.940	Median	1.1 µg/L
	DIN	11	0.042	0.004	0.03	0.039	0.048	0.103	Median	0.012 mg/L
	FRP	11	0.012	0.007	0.009	0.013	0.017	0.018	Median	0.015 mg/L

Site	Indicator	n	Mean	Minimum	20th %ile	Median	80th %ile	Maximum	Guidelines	
									Comparison Statistic	Guideline Values
	Turbidity	22	13.970	4.876	8.678	11.482	21.778	29.596	Median	5 NTU
	DO	22	86.288	76.85	81.02	87.425	91.266	92.8	Median	70-105 %
Murray Creek	Chl-*a*	24	6.593	0.854	3.638	6.988	9.344	16.097	Median	1.1 µg/L
	DIN	24	0.125	0.004	0.044	0.122	0.181	0.322	Median	0.012 mg/L
	FRP	24	0.033	0.006	0.020	0.036	0.043	0.067	Median	0.015 mg/L
	Turbidity	36	31.100	1.855	6	22.325	56.37	86.417	Median	5 NTU
	DO	36	82.053	55.5	74.833	83.1	91.166	103.266	Median	70-105 %
Vines Creek	Chl-*a*	12	3.931	1.075	2.631	4.326	4.857	7.030	Median	1.1 µg/L
	DIN	12	0.354	0.059	0.293	0.373	0.446	0.56	Median	0.04 mg/L
	FRP	12	0.025	0.007	0.009	0.015	0.040	0.079	Median	0.03 mg/L
	Turbidity	12	8.664	2.66	3.278	6.11	13.944	20.43	Median	10 NTU
	DO	12	73.925	40.8	57.36	79.1	87.18	94.2	Median	70-105 %
Sandy Creek	Chl-*a*	24	5.413	1.379	2.538	5.709	7.982	10.02	Median	5 µg/L
	DIN	24	0.316	0.004	0.045	0.147	0.635	1.018	Median	0.04 mg/L
	FRP	24	0.074	0.015	0.027	0.061	0.1	0.22	Median	0.06 mg/L
	Turbidity	24	21.053	4.45	9.324	16.89	30.712	74.62	Median	NA
	DO	24	87.143	48	73.74	92.5	99.4	109.6	Median	70-105%

Site	Indicator	n	Mean	Minimum	20th %ile	Median	80th %ile	Maximum	Guidelines	
									Comparison Statistic	Guideline Values
Plane Creek	Chl-*a*	23	4.339	1.170	2.270	3.809	6.033	13.026	Median	5 µg/L
	DIN	23	0.052	0.002	0.004	0.044	0.094	0.157	Median	0.04 mg/L
	FRP	23	0.028	0.004	0.008	0.034	0.04	0.063	Median	0.06 mg/L
	Turbidity	24	7.933	1.245	3.954	6.192	9.284	33.15	Median	NA
	DO	24	89.662	48	85.84	91.6	95.78	107.6	Median	70-105%
Rocky Dam Creek	Chl-*a*	24	7.049	2.226	4.943	6.720	8.647	16.7	Median	5 µg/L
	DIN	24	0.161	0.005	0.168	0.168	0.231	0.526	Median	0.04 mg/L
	FRP	24	0.035	0.017	0.022	0.036	0.046	0.058	Median	0.06 mg/L
	Turbidity	24	158.345	30.41	51.94	65.507	272.268	532.61	Median	NA
	DO	24	83.040	57.9	69.1	88.9	92.74	99.5	Median	70-105%
Carmila Creek	Chl-*a*	24	5.903	2.505	4.086	5.815	7.508	9.215	Median	5 µg/L
	DIN	12	0.050	0.003	0.011	0.038	0.095	0.138	Median	0.04 mg/L
	FRP	12	0.033	0.004	0.027	0.034	0.040	0.061	Median	0.06 mg/L
	Turbidity	24	20.585	6.773	12.091	16.999	29.842	44.975	Median	NA
	DO	24	92.907	70.4	84.58	92.908	100.85	114.333	Median	70-105%

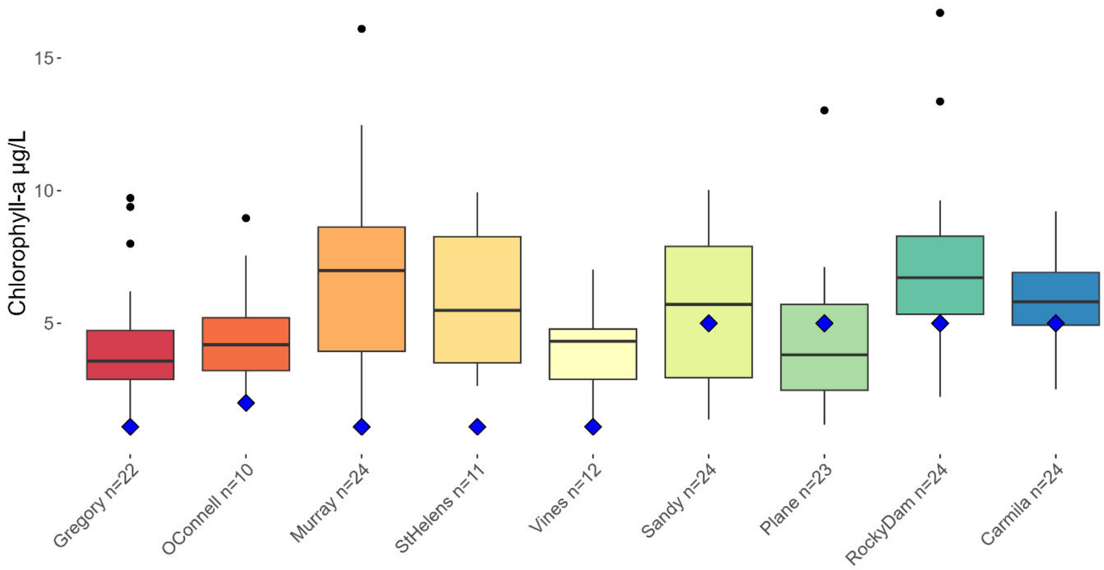

Figure 83. Chl-*a* Box and whisker plot (box showing 25th, 50th and 75th percentiles, whiskers 1.5 x interquartile range [IQR]) of monthly median Chlorophyll-*a* concentrations in the MWI estuaries. Guideline values are represented by a blue diamond. Outliers (>1.5 x IQR) are represented as black points. Sample size per estuary is shown with the x axis labels.

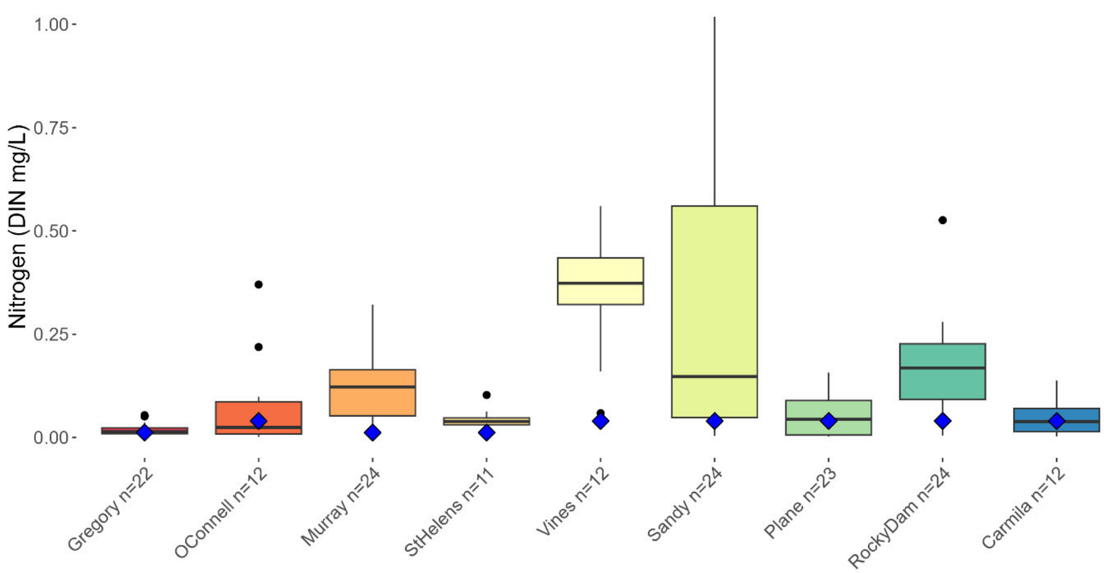

Figure 84. DIN Box and whisker plot (box showing 25th, 50th and 75th percentiles, whiskers 1.5 x interquartile range [IQR]) of monthly median DIN concentrations in the MWI estuaries. Guideline values are represented by a blue diamond. Outliers (>1.5 x IQR) are represented as black points. Sample size per estuary is shown with the x axis labels.

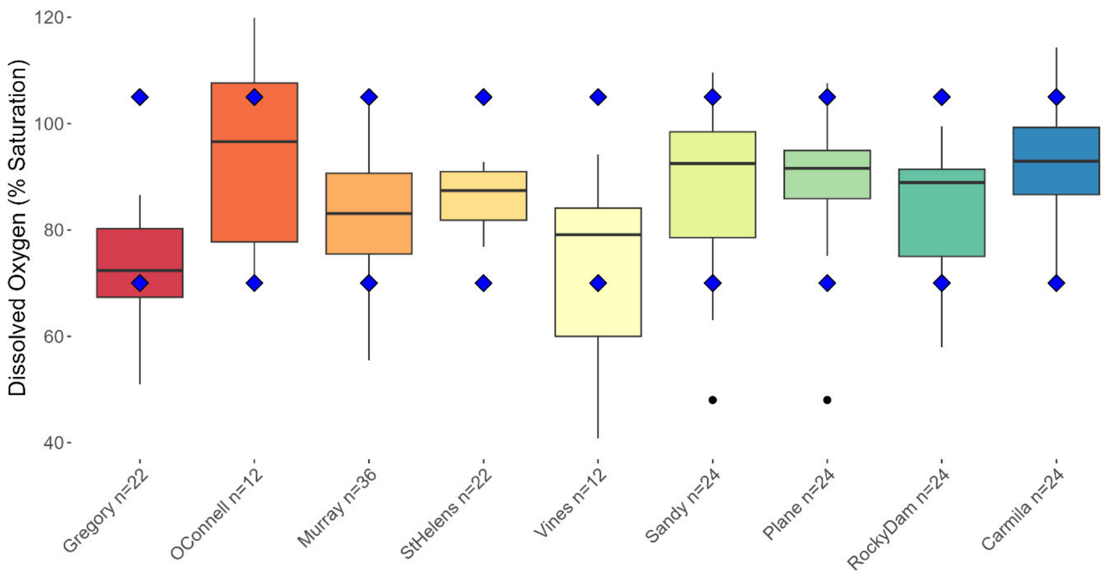

Figure 85. DO Box and whisker plot (box showing 25th, 50th and 75th percentiles, whiskers 1.5 x interquartile range [IQR]) of monthly median Dissolved Oxygen (DO) concentrations in the MWI estuaries. Guideline values are represented by a blue diamond, and both lower and upper DO guideline values are presented. Outliers (>1.5 x IQR) are represented as black points. Sample size per estuary is shown with the x axis labels.

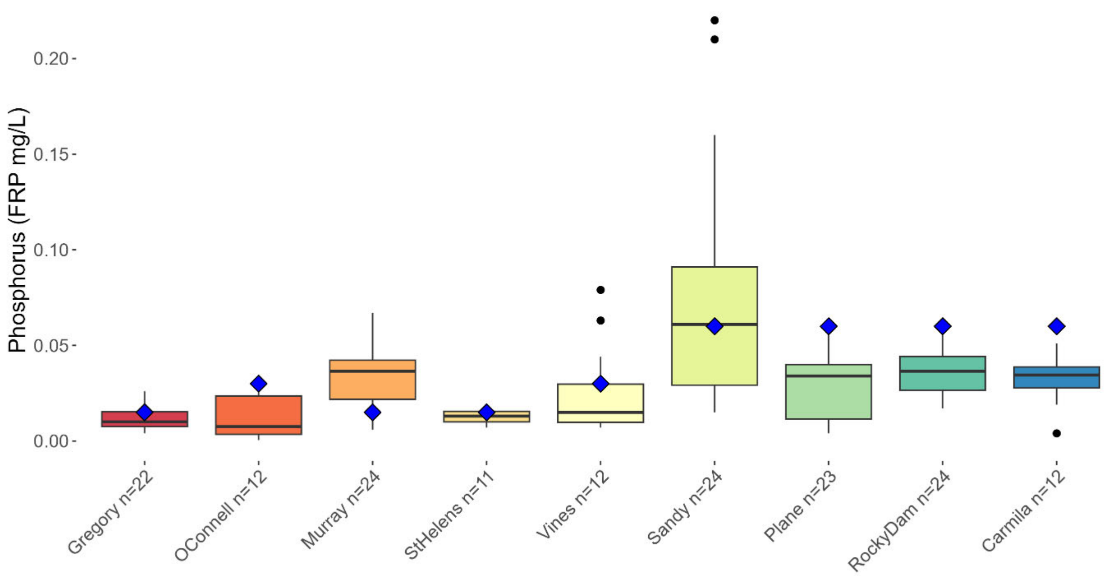

Figure 86. FRP Box and whisker plot (box showing 25th, 50th and 75th percentiles, whiskers 1.5 x interquartile range [IQR]) of monthly median FRP concentrations in the MWI estuaries. Guideline values are represented by a blue diamond. Outliers (>1.5 x IQR) are represented as black points. Sample size per estuary is shown with the x axis labels.

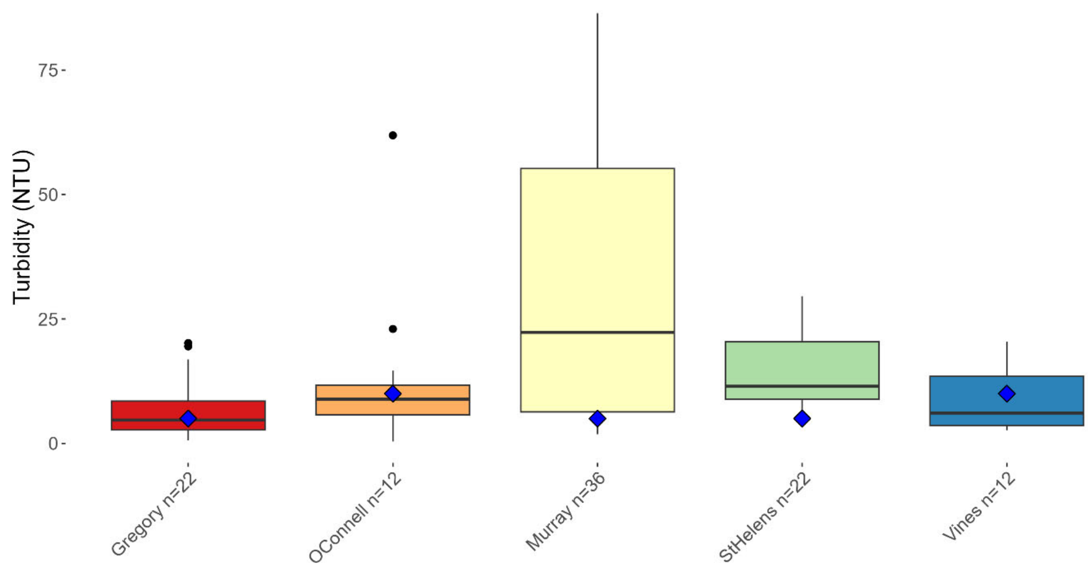

Figure 87. NTU Box and whisker plot (box showing 25th, 50th and 75th percentiles, whiskers 1.5 x interquartile range [IQR]) of monthly median NTU in the MWI estuaries. Guideline values are represented by a blue diamond. Outliers (>1.5 x IQR) are represented as black points. Sample size per estuary is shown with the x axis labels.

8.4 Marine Environments

The scores and graphs presented below are for the inshore and offshore zones for the 2025 Report Card (2023-24 data). Boxplots are presented for inshore water quality indicators and summary statistics are tabulated for individual sites. Site-level scores are also presented where applicable.

8.4.1 Marine Water Quality

8.4.1.1 Indicator Boxplots

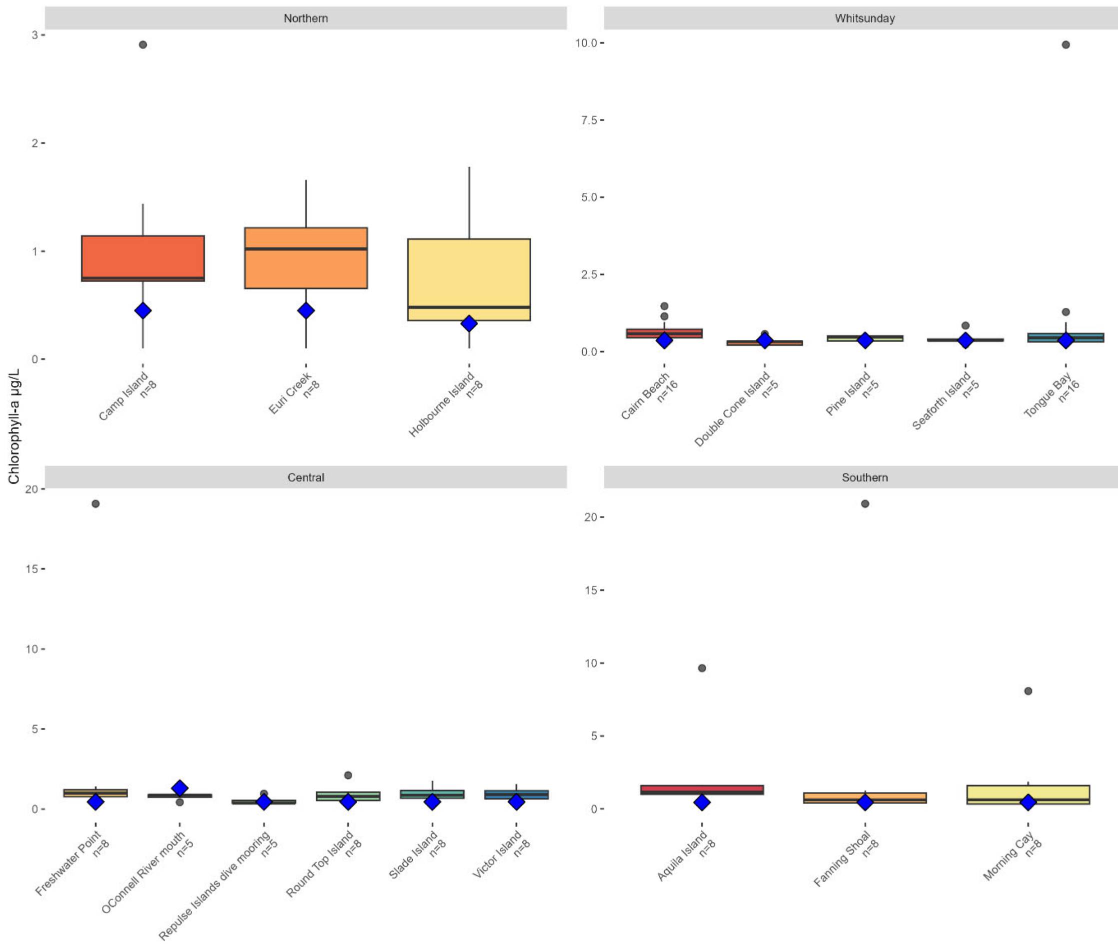

Figure 88. Chl-*a* box and whisker plot (box showing 25th, 50th and 75th percentiles, whiskers 1.5 x interquartile range [IQR]) of Chlorophyll-*a* concentrations in the MWI inshore zones and sampling sites. Guideline values are represented by a blue diamond. Outliers (>1.5 x IQR) are represented as black points. Sample size per site is shown with the x axis labels. Note the free scale on the y axis.

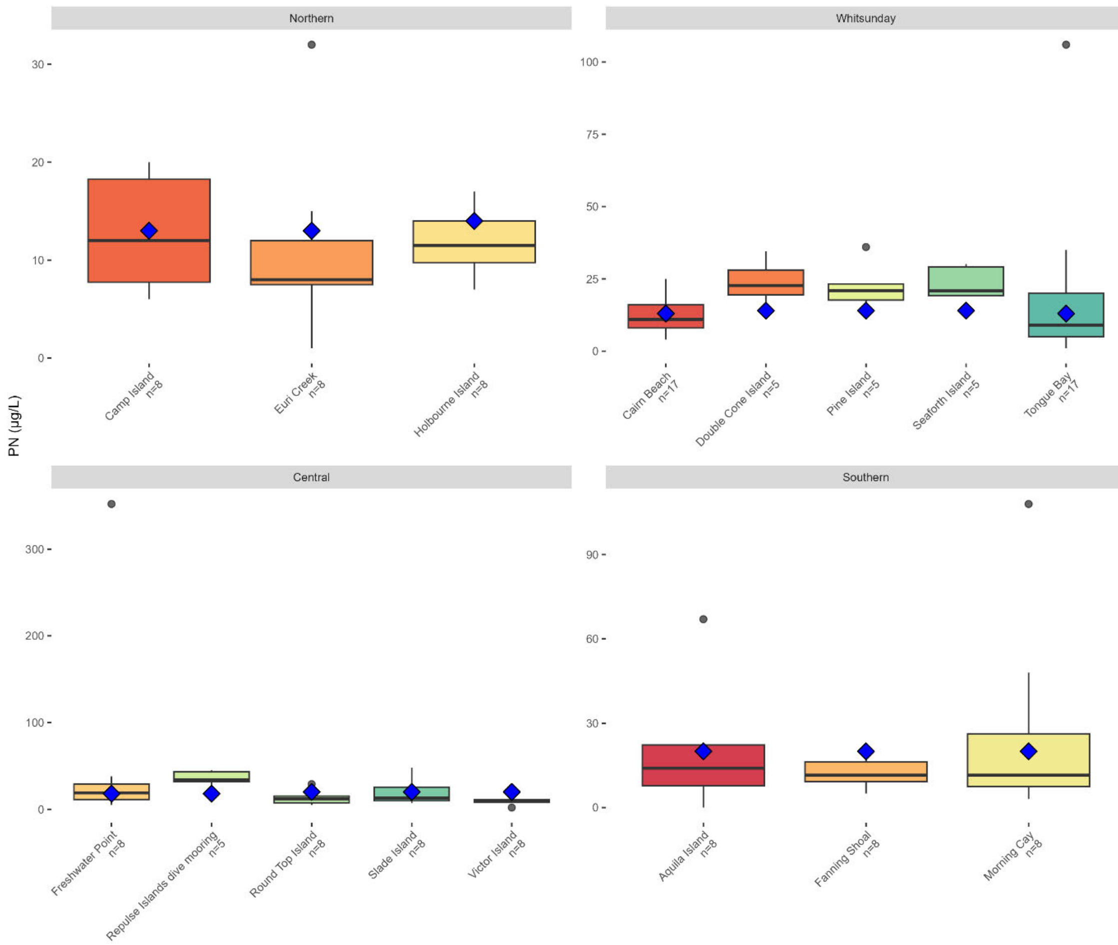

Figure 89. PN Box and whisker plot (box showing 25th, 50th and 75th percentiles, whiskers 1.5 x interquartile range [IQR]) of PN concentrations in the MWI inshore zones and sampling sites. Guideline values are represented by a blue diamond. Outliers (>1.5 x IQR) are represented as black points. Sample size per site is shown with the x axis labels. Note the free scale on the y axis.

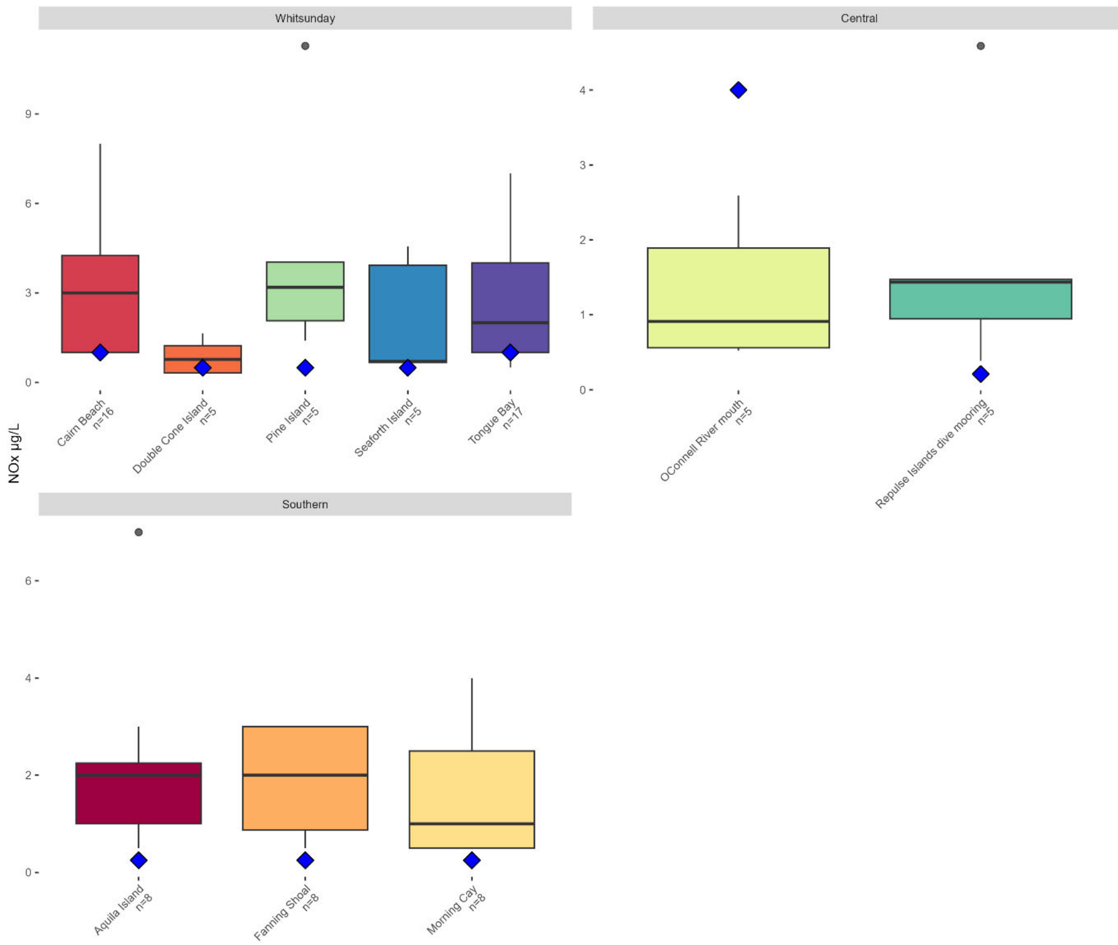

Figure 90. NOx Box and whisker plot (box showing 25th, 50th and 75th percentiles, whiskers 1.5 x interquartile range [IQR]) of NOx concentrations in the MWI inshore zones and sampling sites. Guideline values are represented by a blue diamond. Outliers (>1.5 x IQR) are represented as black points. Sample size per site is shown with the x axis labels. Note the free scale on the y axis.

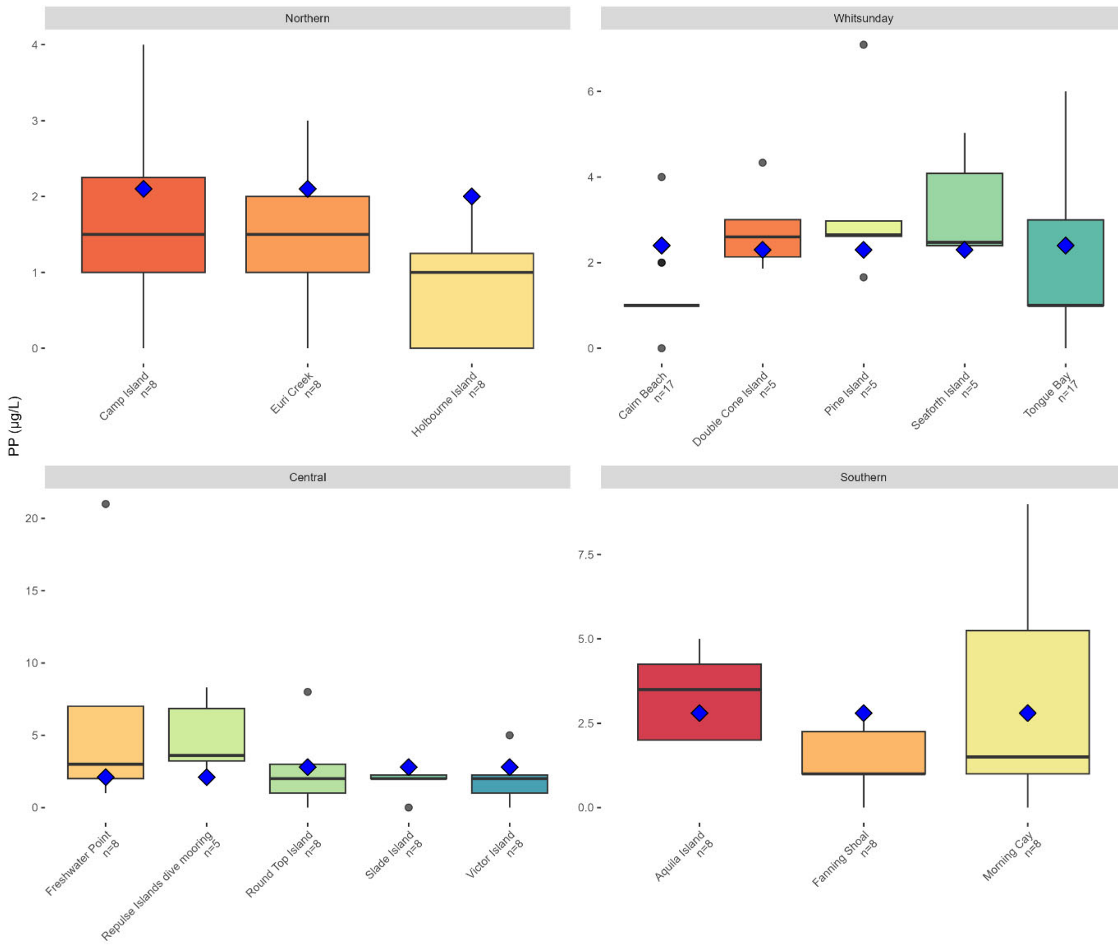

Figure 91. PP Box and whisker plot (box showing 25th, 50th and 75th percentiles, whiskers 1.5 x interquartile range [IQR]) of PP concentrations in the MWI inshore zones and sampling sites. Guideline values are represented by a blue diamond. Outliers (>1.5 x IQR) are represented as black points. Sample size per site is shown with the x axis labels. Note the free scale on the y axis.

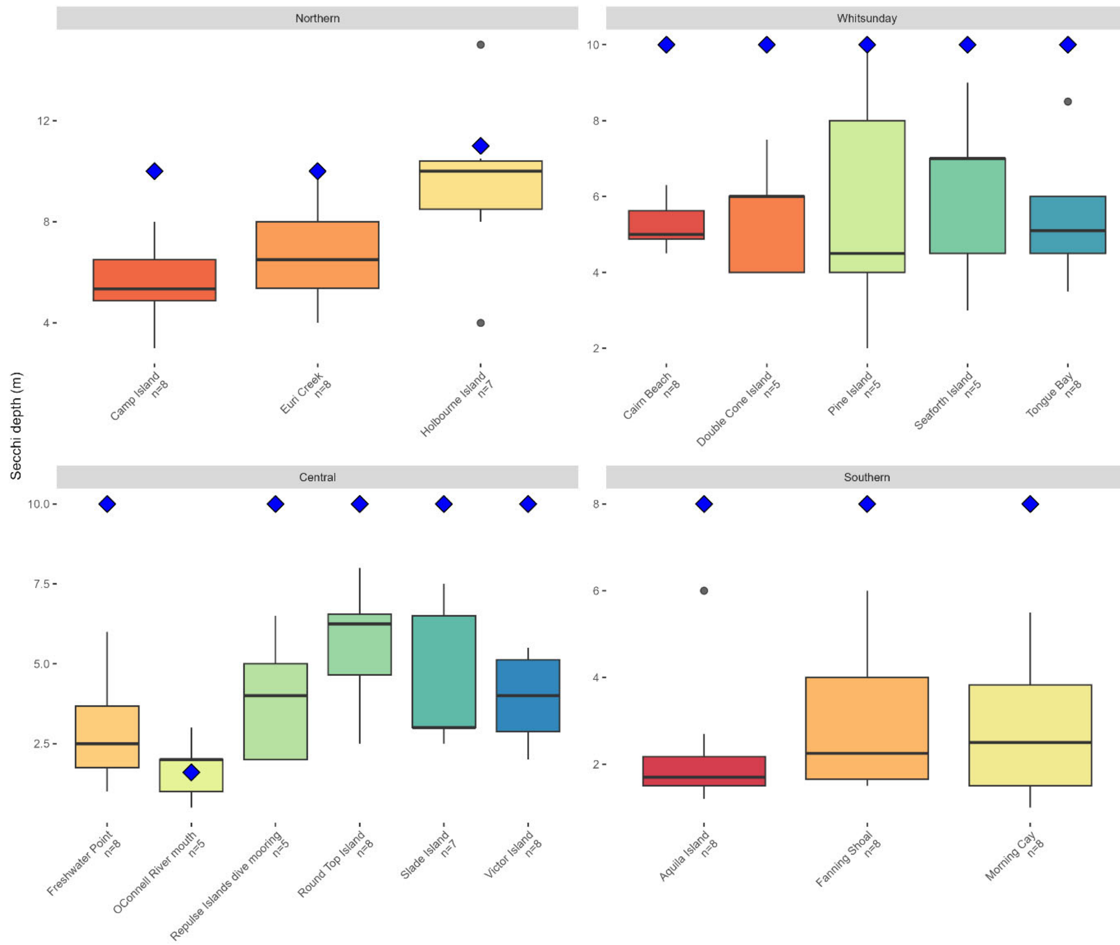

Figure 92. Secchi Box and whisker plot (box showing 25th, 50th and 75th percentiles, whiskers 1.5 x interquartile range [IQR]) of Secchi depth (m) in the MWI inshore zones and sampling sites. Guideline values are represented by a blue diamond. Outliers (>1.5 x IQR) are represented as black points. Sample size per site is shown with the x axis labels. Note the free scale on the y axis.

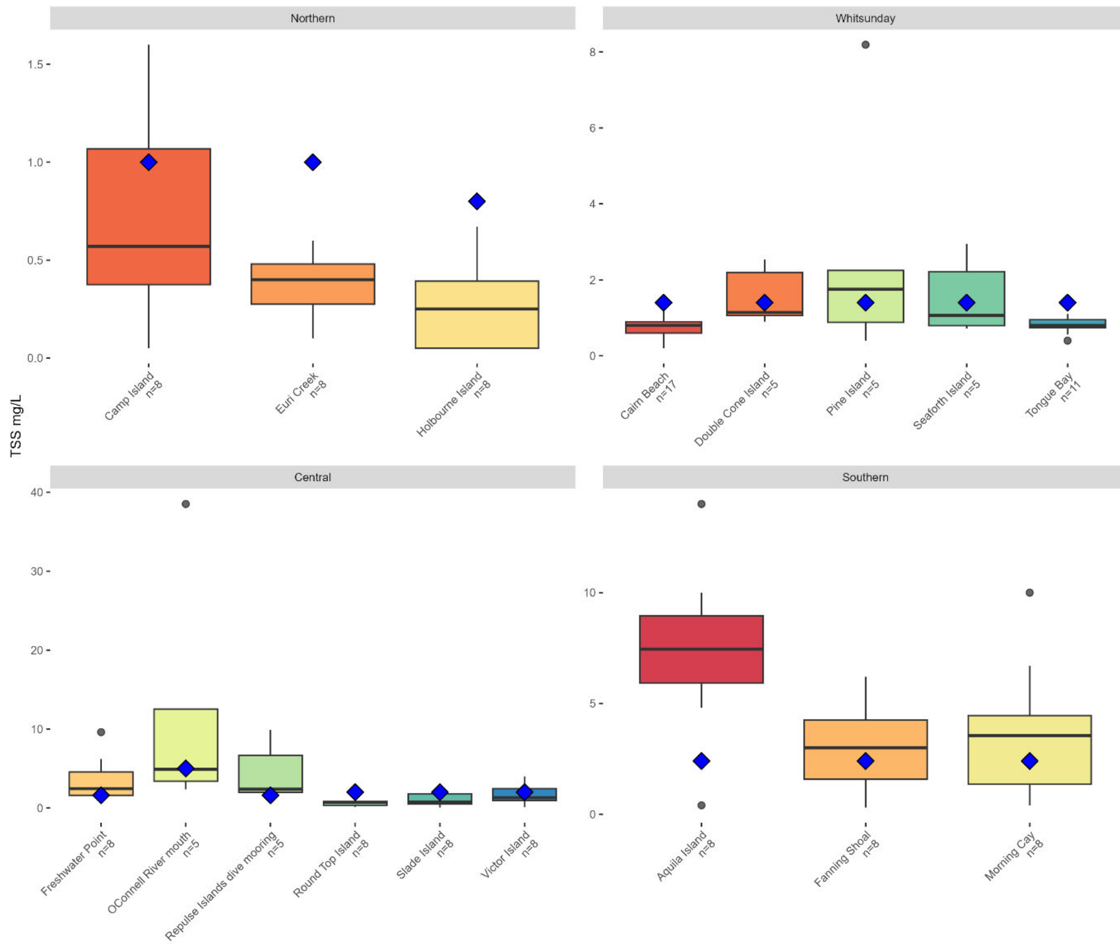

Figure 93. TSS Box and whisker plot (box showing 25th, 50th and 75th percentiles, whiskers 1.5 x interquartile range [IQR]) of TSS concentrations in the MWI inshore zones and sampling sites. Guideline values are represented by a blue diamond. Outliers (>1.5 x IQR) are represented as black points. Sample size per site is shown with the x axis labels. Note the free scale on the y axis.

8.4.1.2 Northern Inshore Zone

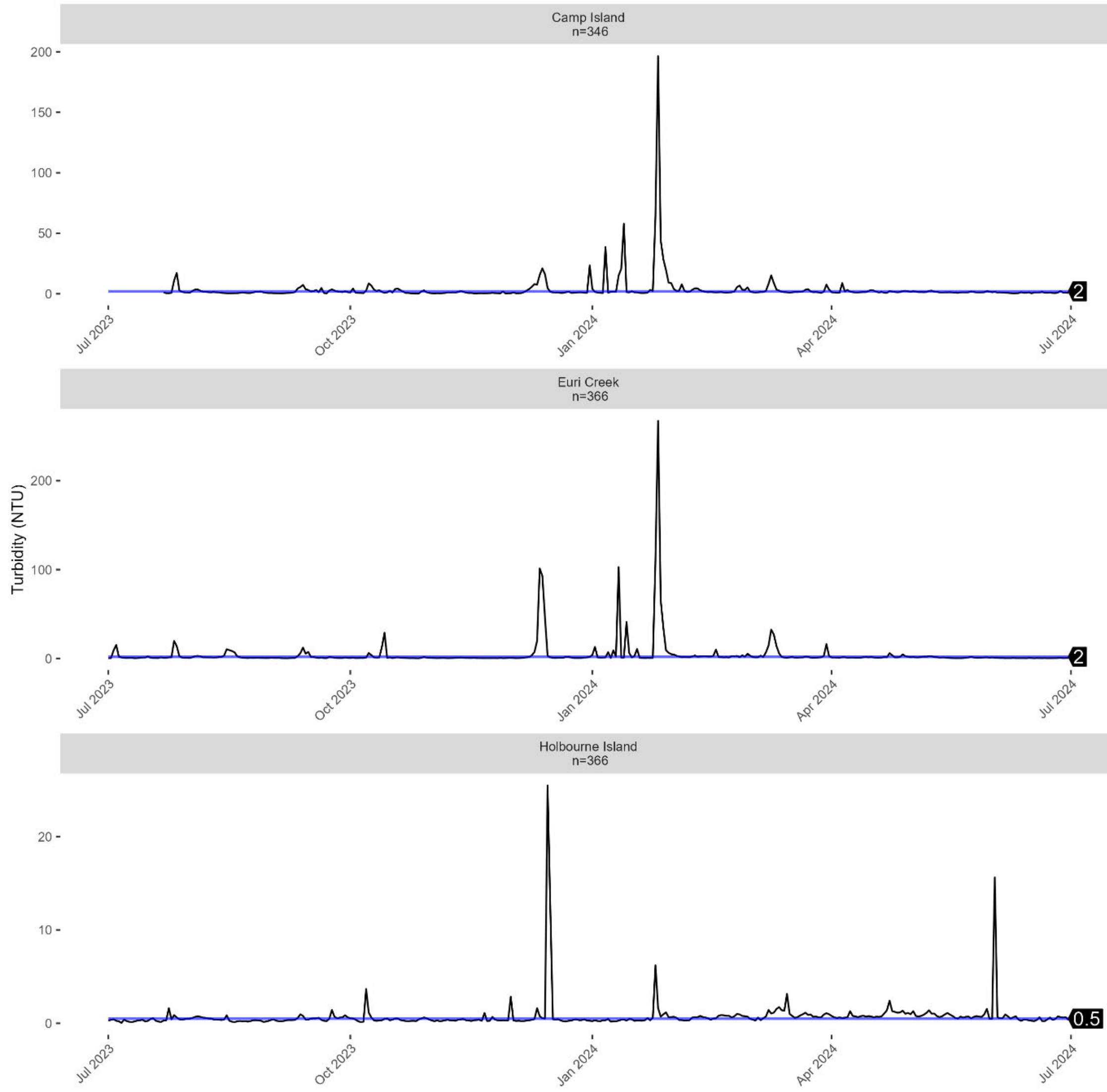

Figure 94. Northern Zone Linegraphs representing daily mean turbidity (NTU) at the sampling sites in the NQBP Abbot Point monitoring program in.. Missing data removed due to spikes and/or fouling. Guideline value represented by a blue line. Note the free scales on the y-axis. Sample size is described in title and relates to the number of daily mean turbidity values in the reporting year.

Figure 95. Northern Zone site level nutrients scores, current reporting compared to the historic record. The annotated solid black line (overall nutrients) is an average of the other indicators.

Figure 96. Northern Zone site level Chlorophyll-*a* scores, current reporting compared to the historic record.

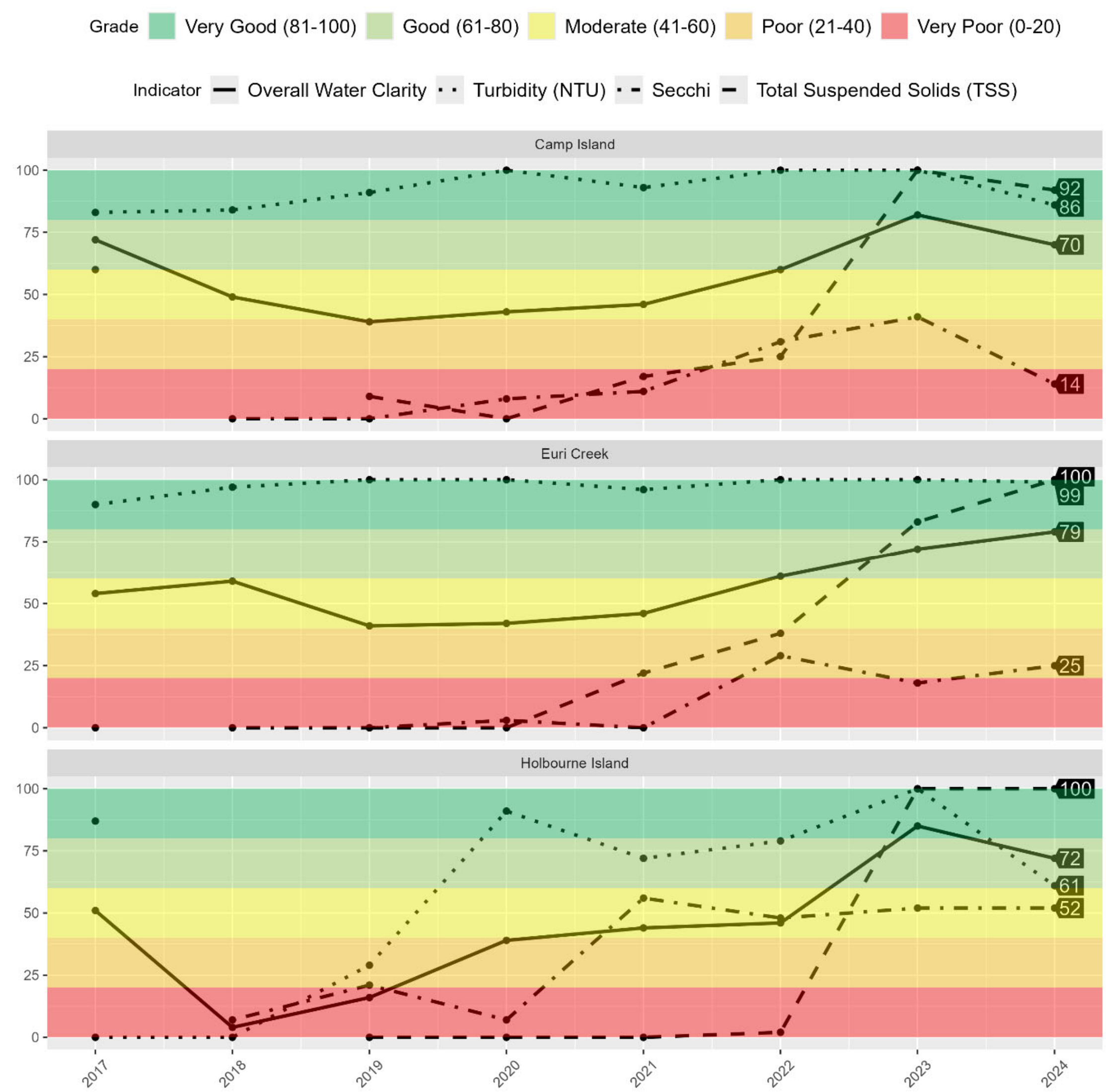

Figure 97. Northern Zone site level water clarity scores, current reporting compared to the historic record. The annotated solid black line (overall nutrients) is an average of the other indicators.

Figure 98. Northern Zone site level overall water quality scores, current reporting compared to the historic record.

Table 46. Northern Inshore Zone summary statistics for water quality indicators from July 2023 to June 2024. Presented alongside statistics that were compared to guideline values. For all indicators except secchi, to meet the guideline, the relevant statistic must be lower compared to the guideline (secchi must be higher than the guideline). Significant figures are shown to the same level as given in the relevant guideline value. Values highlighted yellow signify updates this reporting period.

Site	Indicator	n	Mean	Minimum	25th %tile	Median	75th %tile	Maximum	Guidelines	
									Comparison Statistic	Guideline Value
AP_AMB1 (Euri Ck)	PN (µg/L)	8	11.13	1	7.5	8	12	32	Median	13
	PP (µg/L)	8	1.5	0	1	1.5	2	3	Median	2.1
	Chl-*a* (µg/L)	8	0.94	0.1	0.66	1.02	1.22	1.66	Mean	0.45
	TSS (mg/L)	8	0.42	0.1	0.28	0.4	0.48	1	Median	1
	Secchi (m)	8	6.69	4	5.38	6.5	8	10	Mean	10
	Turb (NTU)	366*	4.49	0.32	0.66	1.01	1.88	267.39	Median	2
AP_AMB4 (Camp Is.)	PN (µg/L)	8	12.5	6	7.75	12	18.25	20	Median	13
	PP (µg/L)	8	1.75	0	1	1.5	2.25	4	Median	2.1
	Chl-*a* (µg/L)	8	1.05	0.1	0.72	0.75	1.14	.2.91	Mean	0.45
	TSS (mg/L)	8	0.75	0.05	0.38	0.57	1.07	1.6	Median	1
	Secchi (m)	8	5.9	3	4.88	5.35	6.5	10	Mean	10
	Turb (NTU)	346*	3.42	0.19	0.83	1.27	2.27	196.45	Median	2
AP_AMB5 (Holbourne Is.)	PN (µg/L)	8	11.75	7	9.75	11.5	14	17	Median	14
	PP (µg/L)	8	0.88	0	0	1	1.25	2	Median	2
	Chl-*a* (µg/L)	8	0.72	0.1	0.36	0.48	1.11	1.78	Median	0.33
	TSS (mg/L)	8	0.29	0.05	0.05	0.25	0.39	0.67	Median	0.08
	Secchi (m)	7	9.54	4	8.5	10	10.4	15	Median	11
	Turb (NTU)	366*	0.73	0.04	0.31	0.49	0.73	25.48	Median	0.05

*While turbidity loggers were deployed for the entire 2023-24 reporting period, sample size is based on daily averages from validated data recovered from this period. Some data points were lost due to device malfunction or damage.

8.4.1.3 Whitsunday Inshore Zone

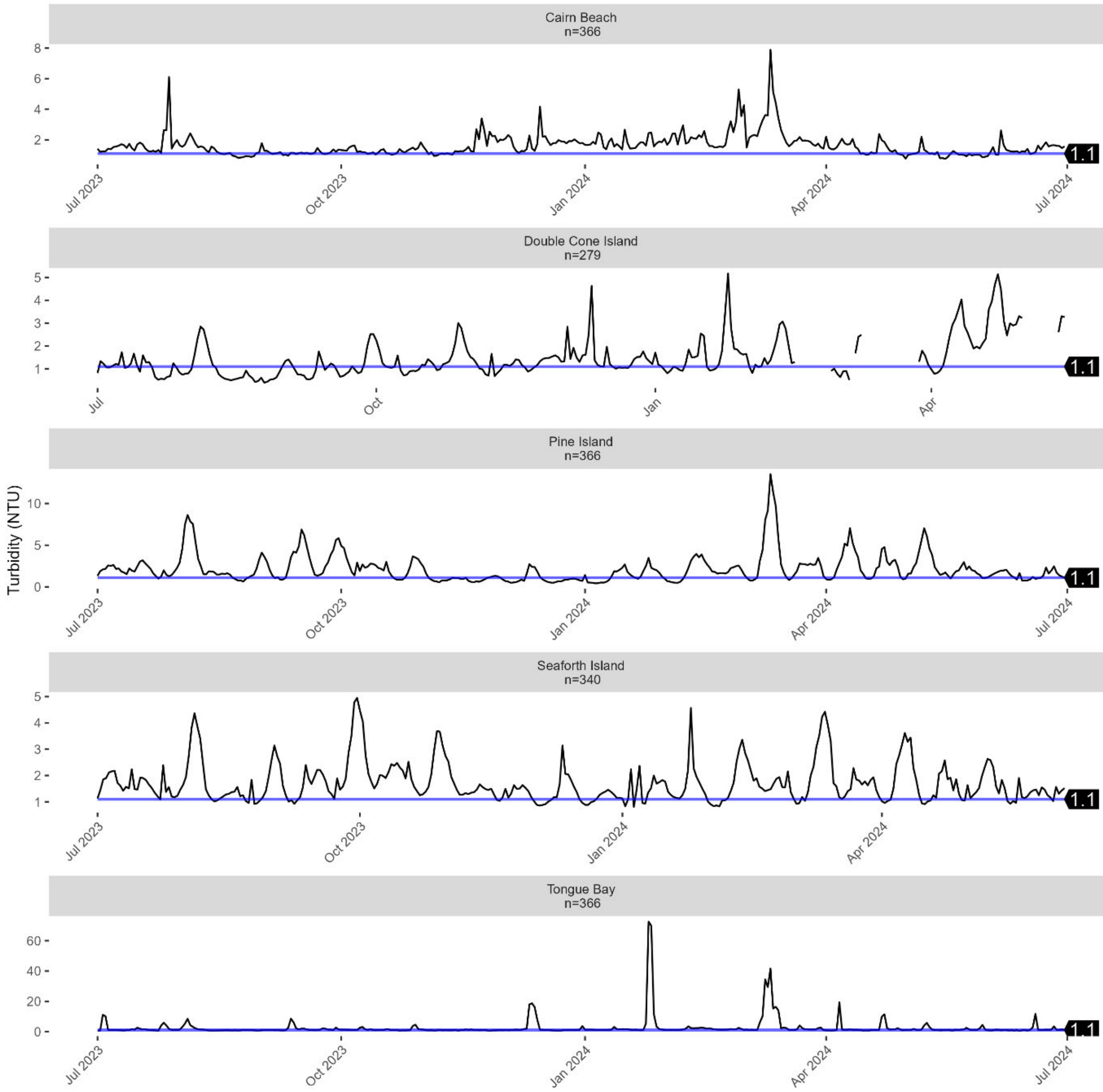

Figure 99. Whitsunday Zone Linegraphs representing daily mean turbidity (NTU) at the sampling sites in the MMP monitoring program in the current reporting year. Missing data removed due to spikes and/or fouling. Guideline value represented by a blue line. Note the free scales on the y-axis. Sample size is described in title and relates to the number of daily mean turbidity values in the reporting year.

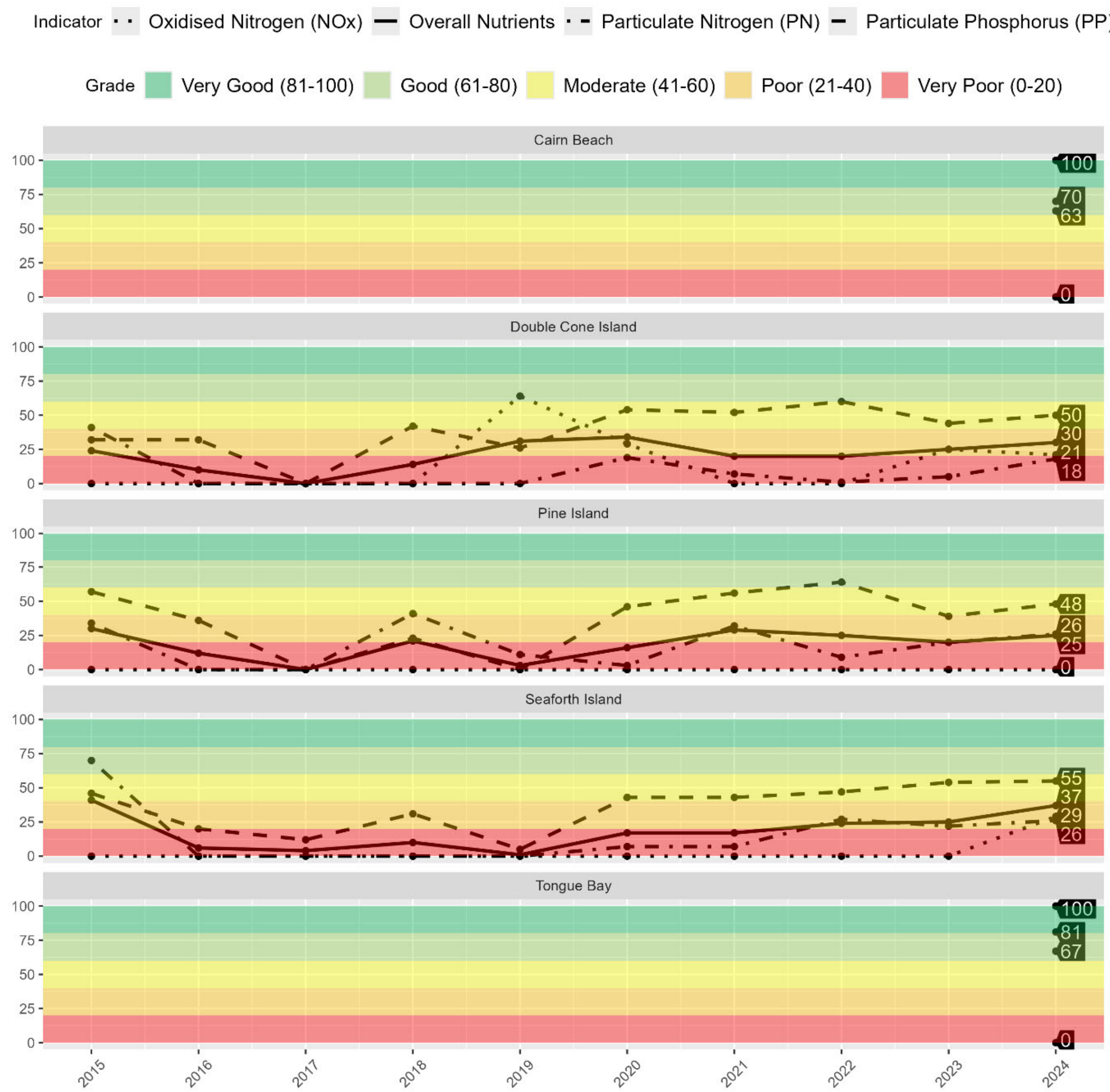

Figure 100. Whitsunday Zone site level nutrients scores, current reporting compared to the historic record. The annotated solid black line (overall nutrients) is an average of the other indicators.

Figure 101. Whitsunday Zone site level chl-*a* scores, current reporting compared to the historic record.

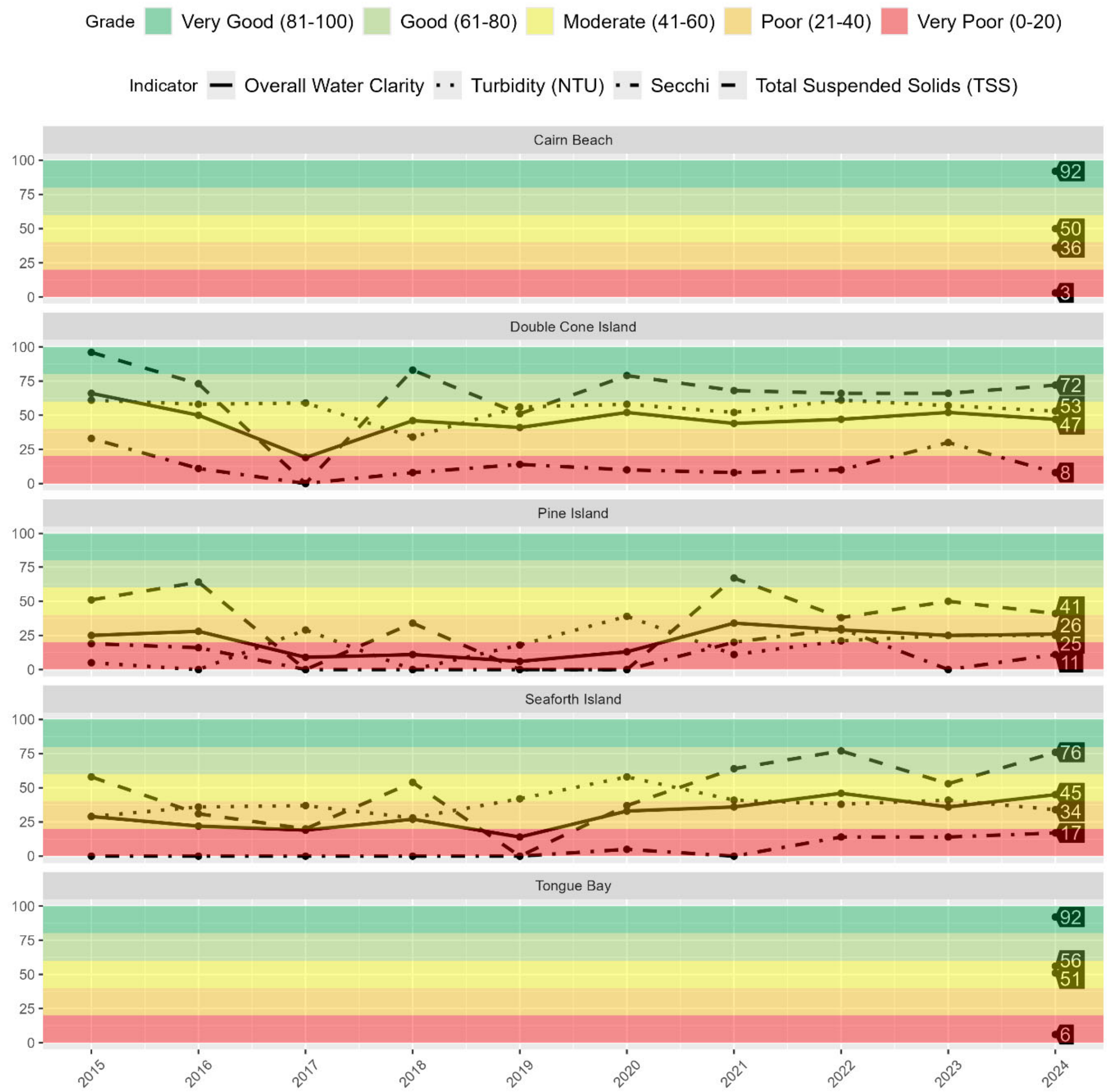

Figure 102. Whitsunday Zone site level water clarity scores, current reporting compared to the historic record. The solid black line (overall nutrients) is an average of the other indicators.

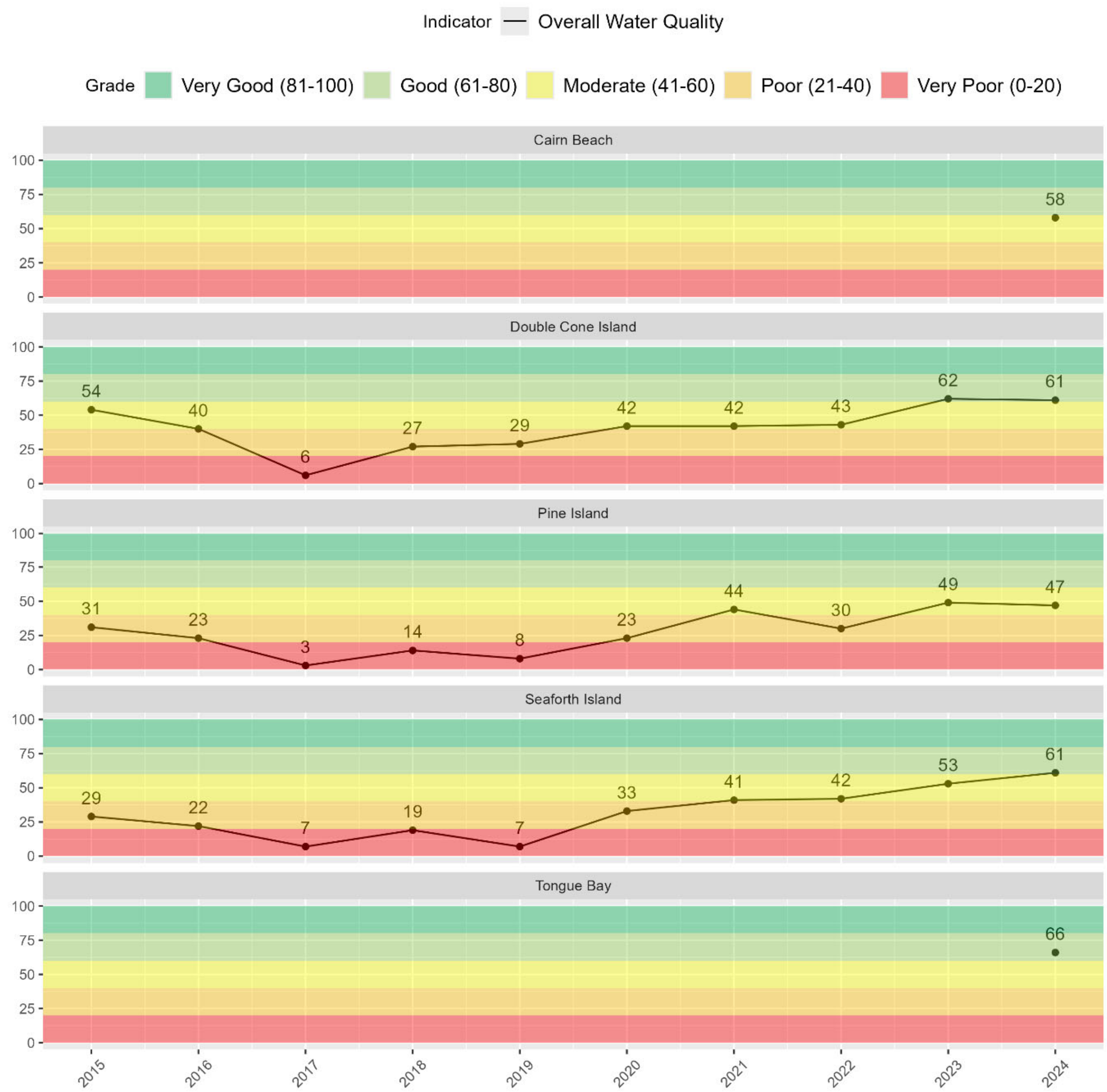

Figure 103. Whitsunday Zone site level overall water quality scores, current reporting compared to the historic record.

Table 47. Whitsunday Inshore Zone summary statistics for water quality indicators in the Whitsunday Zone sites from July 2022 to June 2023. Presented alongside statistics are guideline values, including the statistic that was compared to the guideline. For all indicators except secchi, to meet the guideline the relevant statistic must be lower compared to the guideline (secchi must be higher than the guideline). Significant figures are shown to the same level as given in the relevant guideline value. Values highlighted yellow signify updates this reporting period.

Site	Indicator	n	Mean	Minimum	25th %tile	Median	75th %tile	Maximum	Guidelines	
									Comparison Statistic	Guideline Value
WHI1 (Double Cone Is.)	NOx (µg/L)	5	0.85	0.28	0.32	0.77	1.23	1.65	Median	0.49
	PN (µg/L)	5	24.22	16.39	19.47	22.7	28.06	34.5	Median	14
	PP (µg/L)	5	2.79	1.86	2.14	2.6	3	4.34	Median	2.3
	Chl-*a* (µg/L)	5	0.33	0.21	0.21	0.32	0.33	0.57	Median	0.36
	TSS (mg/L)	5	1.57	0.9	1.06	1.14	2.2	2.53	Median	1.4
	Secchi (m)	5	5.5	4	4	6	6	7.5	Mean	10
	Turb (NTU)	279*	1.47	0.4	0.93	1.2	1.7	5.17	Median	1.1
WHI4 (Pine Island)	NOx (µg/L)	5	4.39	1.4	2.07	3.19	4.03	11.28	Median	0.49
	PN (µg/L)	5	22.15	12.92	17.65	20.91	23.26	36.01	Median	14
	PP (µg/L)	5	3.4	1.66	2.62	2.65	2.97	7.09	Median	2.3
	Chl-*a* (µg/L)	5	0.43	0.24	0.34	0.46	0.51	0.61	Median	0.36
	TSS (mg/L)	5	2.69	0.4	0.88	1.75	2.25	8.19	Median	1.4
	Secchi (m)	5	5.7	2	4	4.5	8	10	Mean	10
	Turb (NTU)	366*	2.14	0.43	1.03	1.66	2.59	13.52	Median	1.1
WHI5 (Seaforth Island)	NOx (µg/L)	5	2.07	0.53	0.67	0.7	3.92	4.55	Median	0.49
	PN (µg/L)	5	23.64	18.91	29.14	20.84	29.14	30.12	Median	14
	PP (µg/L)	5	3.25	2.26	2.39	2.47	4.09	5.03	Median	2.3
	Chl-*a* (µg/L)	5	0.44	0.23	0.35	0.36	0.41	0.84	Median	0.36
	TSS (mg/L)	5	1.55	0.72	0.8	1.07	2.22	2.95	Median	1.4
	Secchi (m)	5	6.1	3	4.5	7	7	9	Mean	10
	Turb (NTU)	340*	1.72	0.8	1.19	1.5	1.95	4.95	Median	1.1
Cairn Beach	NOx (µg/L)	16	3.25	1	1	3	4.25	8	Median	0.49
	PN (µg/L)	17	12.41	4	8	11	16	25	Median	14
	PP (µg/L)	17	1.24	0	1	1	1	4	Median	2.3
	Chl-*a* (µg/L)	16	0.64	0.1	0.45	0.58	0.72	1.47	Median	0.36
	TSS (mg/L)	17	0.74	0.2	0.6	0.8	0.9	1.3	Median	1.4

Site	Indicator	n	Mean	Minimum	25th %tile	Median	75th %tile	Maximum	Guidelines	
									Comparison Statistic	Guideline Value
	Secchi (m)	8	5.23	4.5	4.88	5	5.63	6.3	Mean	10
	Turb (NTU)	366*	1.63	0.75	1.16	1.47	1.85	7.89	Median	1.1
Tongue Bay	NOx (µg/L)	17	2.56	0.5	1	2	4	7	Median	0.49
	PN (µg/L)	17	17.65	1	5	9	20	106	Median	14
	PP (µg/L)	17	2	0	1	1	3	6	Median	2.3
	Chl-*a* (µg/L)	16	1.06	0.1	0.32	0.45	0.58	9.94	Median	0.36
	TSS (mg/L)	11	0.85	0.4	0.74	0.8	0.95	1.4	Median	1.4
	Secchi (m)	8	5.4	3.5	4.5	5.1	6	8.5	Mean	10
	Turb (NTU)	366*	2.65	0.62	1	1.22	1.63	72.59	Median	1.1

*While turbidity loggers were deployed for the entire 2023-24 reporting period, sample size is based on daily averages from validated data recovered from this period. Some data points were lost due to device malfunction or damage.

8.4.1.4 Central Zone

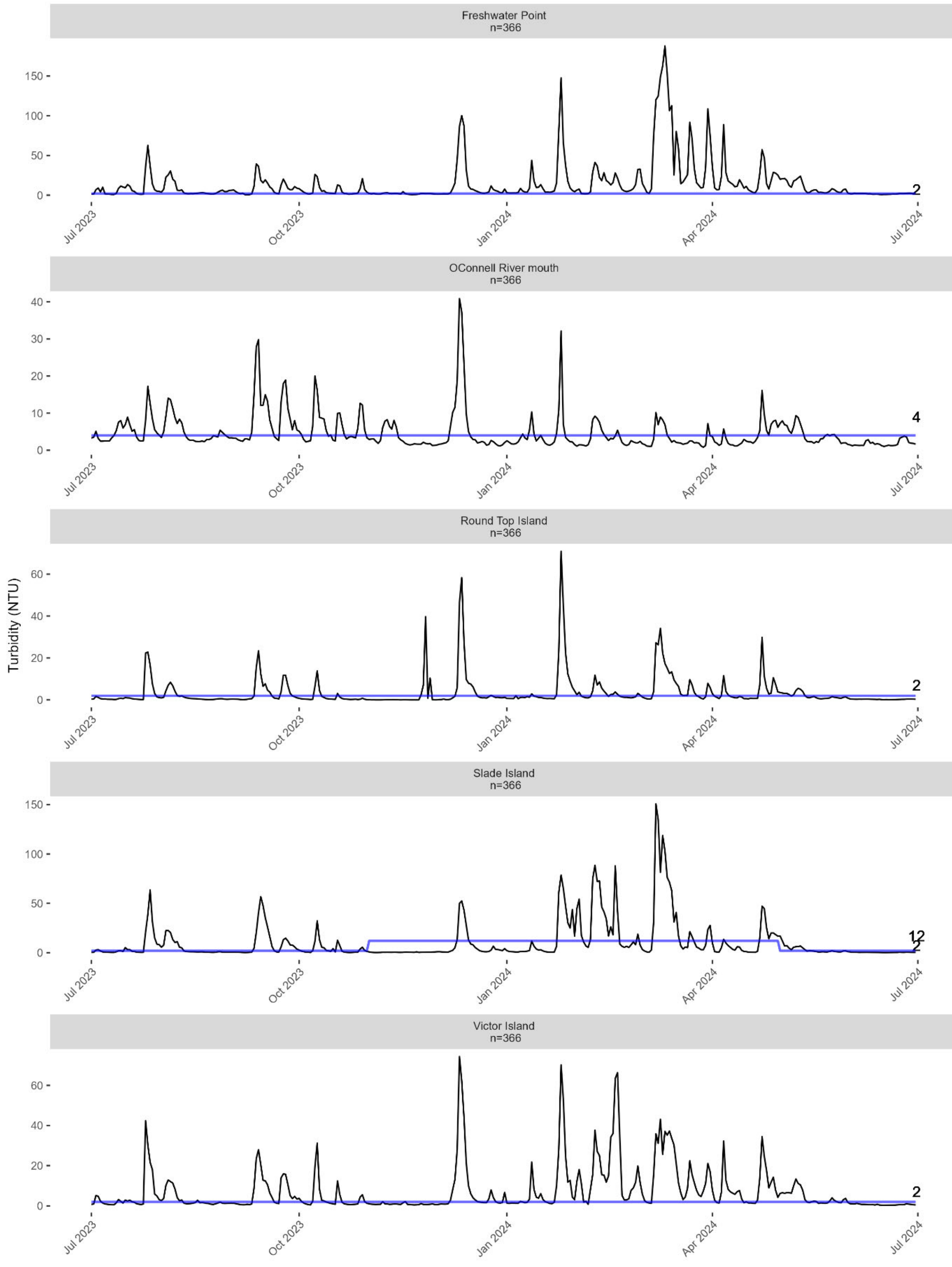

Figure 104. Central Zone linegraphs representing daily mean turbidity (NTU) at the sampling sites in the NQBP Hay Point monitoring program and AIMS MMP in current reporting. Missing data removed due to spikes and/or fouling. Guideline value represented by a blue line, note the wet season / dry season GVs for the Slade Island monitoring site. Sample size is described in title and relates to the number of daily mean turbidity values in the reporting year.

Figure 105. Central Zone site level nutrients scores, current reporting compared to the historic record. The annotated solid black line (overall nutrients) is an average of the other indicators. Scores for NOx at the NQBP monitoring sites cannot be calculated as there is no associated guideline value.

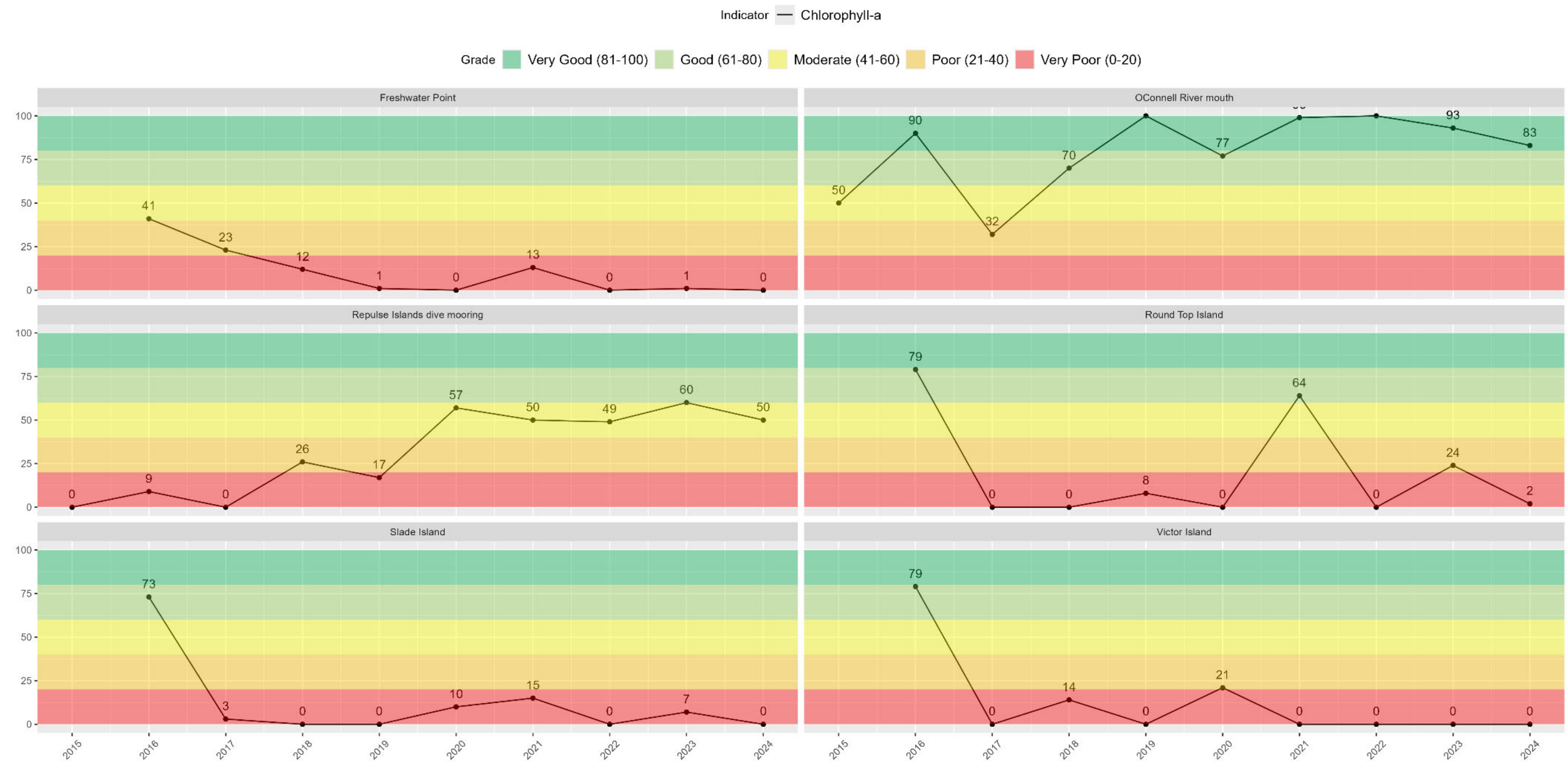

Figure 106. Central Zone site level Chlorophyll-*a* scores, current reporting compared to the historic record.

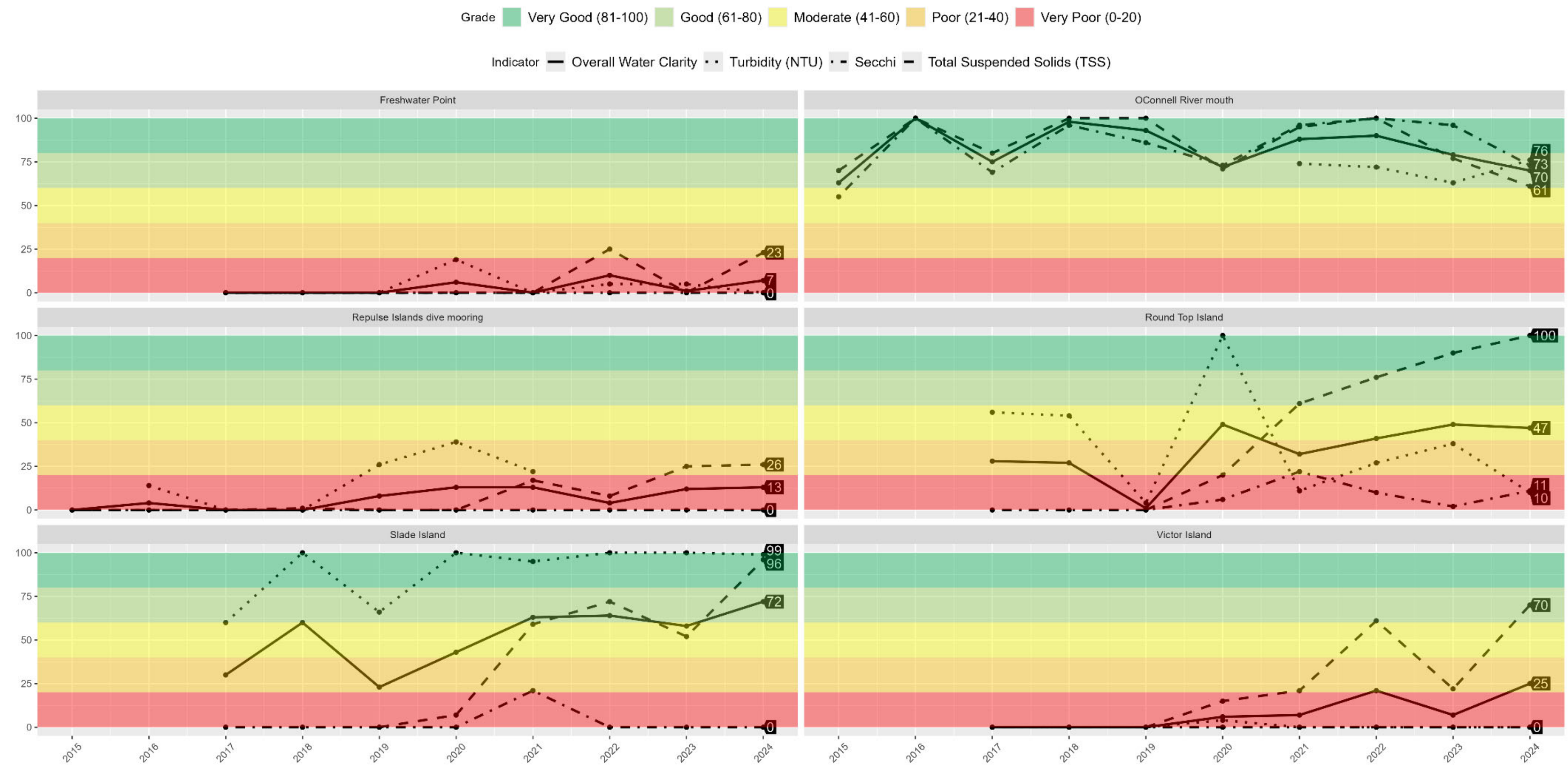

Figure 107. Central Zone site level water clarity scores, current reporting compared to the historic record. The annotated solid black line (overall clarity) is an average of the other indicators.

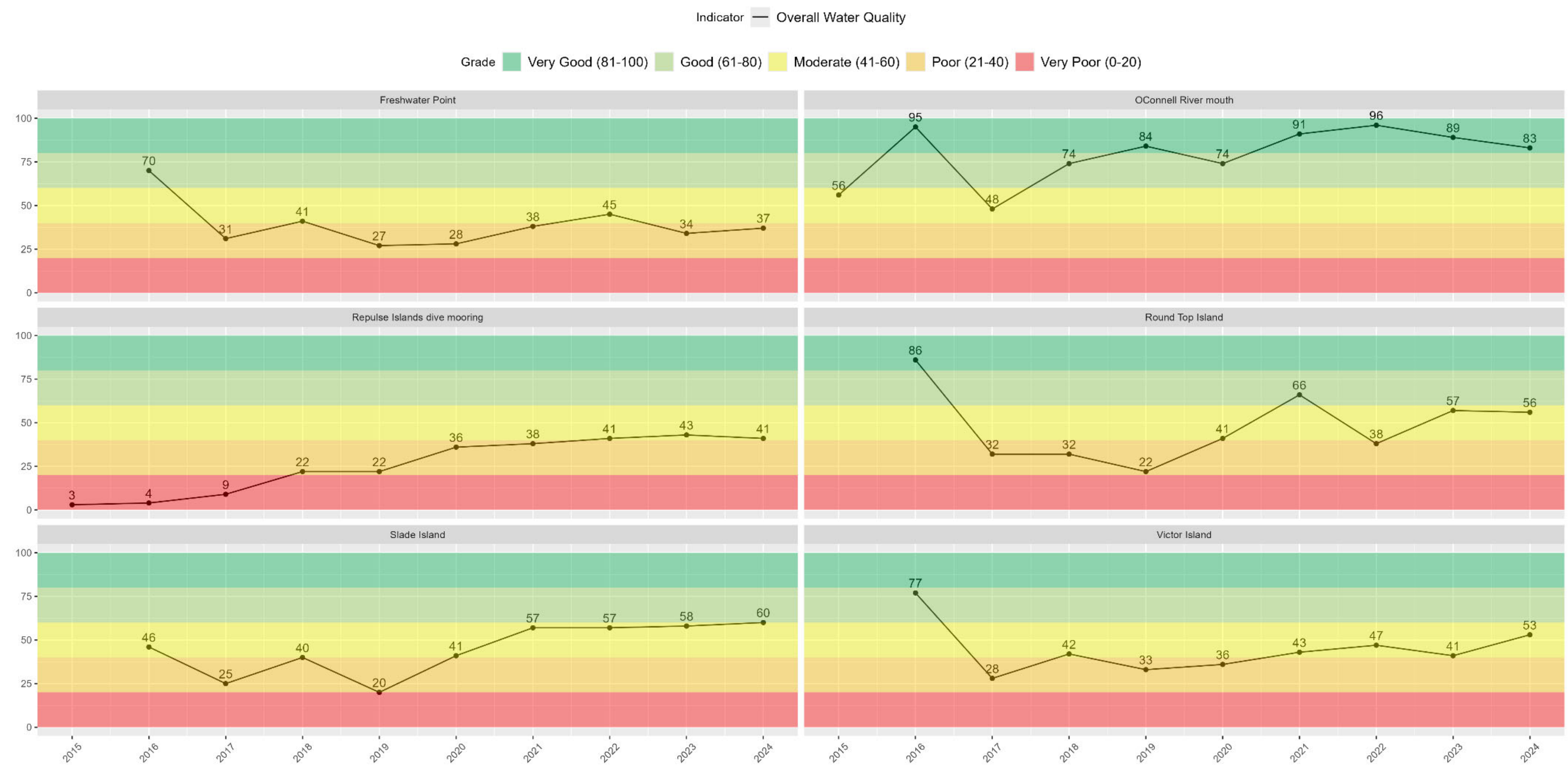

Figure 108. Central Zone site level overall water quality scores, current reporting compared to the historic record.

Table 48. Central Inshore Zone summary statistics for water quality indicators in the Central Zone sites from July 2022 to June 2023. Presented alongside statistics are guideline values, including the statistic that was compared to the guideline. For all indicators except secchi, to meet the guideline the relevant statistic must be lower compared to the guideline (secchi must be higher than the guideline). Significant figures are shown to the same level as given in the relevant guideline value. Values highlighted yellow signify updates this reporting period.

Site	Indicator	n	Mean	Minimum	25th %ile	Median	75th %ile	Maximum	Guidelines: Comparison Statistic	Guidelines: Guideline Value
WHI6 (O'Connell River mouth)	NOx (µg/L)	5	1.3	0.53	0.56	0.91	1.89	2.59	Median	4
	Chl-*a* (µg/L)	5	0.79	0.43	0.74	0.88	0.88	0.01	Median	1.3
	TSS (mg/L)	5	12.34	2.36	3.39	4.9	12.53	38.51	Median	5
	Secchi (m)	5	1.7	0.5	1	2	2	3	Median	1.6
	Turb (NTU)	366	4.72	0.8	1.99	3.04	5.52	40.88	Median	4
WHI7 (Repulse Islands dive mooring)	NOx (µg/L)	5	1.77	0.39	0.95	1.44	1.47	4.59	Median	0.21
	PN (µg/L)	5	34.82	19.93	31.87	34.08	43.33	44.9	Median	18
	PP (µg/L)	5	4.94	2.72	3.23	3.6	6.84	8.31	Median	2.1
	Chl-*a* (µg/L)	5	0.51	0.3	0.37	0.37	0.54	0.96	Mean	0.45
	TSS (mg/L)	5	4.5	1.59	1.99	2.38	6.65	9.88	Median	1.6
	Secchi (m)	5	3.9	2	2	4	5	6.5	Mean	10
MKY_AMB1 (FW Point)	PN (µg/L)	8	60	5	11.25	19	29	352	Median	18
	PP (µg/L)	8	5.75	1	2	3	7	21	Median	2.1
	Chl-*a* (µg/L)	8	3.2	0.52	0.77	1	1.2	19.07	Mean	0.45
	TSS (mg/L)	8	3.55	0.67	1.6	2.45	4.55	9.6	Median	1.6
	Secchi (m)	8	2.84	1	1.75	2.5	3.68	6	Mean	10
	Turb (NTU)	366*	3.55	0.67	1.6	2.45	4.55	9.6	Median	1.6
MKY_AMB3B (Round Top Is.)	PN (µg/L)	8	12.88	5	7.5	12	15.25	29	Mean	20
	PP (µg/L)	8	2.5	0	1	2	3	8	Mean	2.8
	Chl-*a* (µg/L)	8	0.88	0.29	0.53	0.79	1.05	2.11	Mean	0.45
	TSS (mg/L)	8	0.73	0.11	0.35	0.7	0.82	2	Mean	2
	Secchi (m)	8	5.68	2.5	4.65	6.25	6.55	8	Mean	10
	Turb (NTU)	366*	3.57	0	0.35	1.01	2.96	70.92	Mean	2
MKY_AMB5 (Slade Is.)	PN (µg/L)	8	19.25	7	9.75	13	25.5	48	Mean	20
	PP (µg/L)	8	2	0	2	2	2.25	3	Mean	2.8
	Chl-*a* (µg/L)	8	0.92	0.1	0.67	0.87	1.16	1.77	Mean	0.45
	TSS (mg/L)	8	1.07	0.05	0.5	0.75	1.8	2.4	Mean	2
	Secchi (m)	7	4.57	2.5	3	3	6.5	7.5	Mean	10
	Turb (NTU) Dry season	184*	5.07	0.16	0.44	1.01	5.27	63.5	Median	Dry = 2

	Turb (NTU) Wet season	182*	16.16	0.17	0.82	4.37	17.35	150.73	Median	Wet = 12
MKY_AMB10 (Victor Is.)	PN (µg/L)	8	9.75	2	8	9.5	11	19	Mean	20
	PP (µg/L)	8	2	0	1	2	2.25	5	Mean	2.8
	Chl-*a* (µg/L)	8	0.91	0.22	0.65	0.91	1.14	1.55	Mean	0.45
	TSS (mg/L)	8	1.68	0.1	0.93	1.3	2.45	4	Mean	2
	Secchi (m)	8	3.94	2	2.88	4	5.13	5.5	Mean	10
	Turb (NTU)	366*	7.37	0.33	1.08	2.22	8.26	74.34	Mean	2

*While turbidity loggers were deployed for the entire 2023-24 reporting period, sample size is based on daily averages from validated data recovered from this period. Some data points were lost due to unforeseen device malfunction or damage.

8.4.1.5 Southern Zone

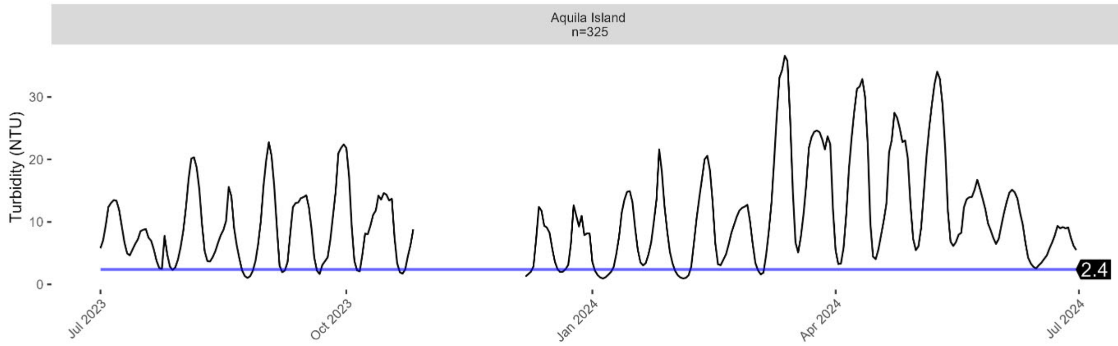

Figure 109. Southern Zone linegraphs representing daily mean turbidity (NTU) at the Aquila Island Southern Inshore monitoring program in current reporting. Missing data removed due to spikes and/or fouling. Guideline value represented by a blue line. Sample size is described in title and relates to the number of daily mean turbidity values recorded in the reporting year.

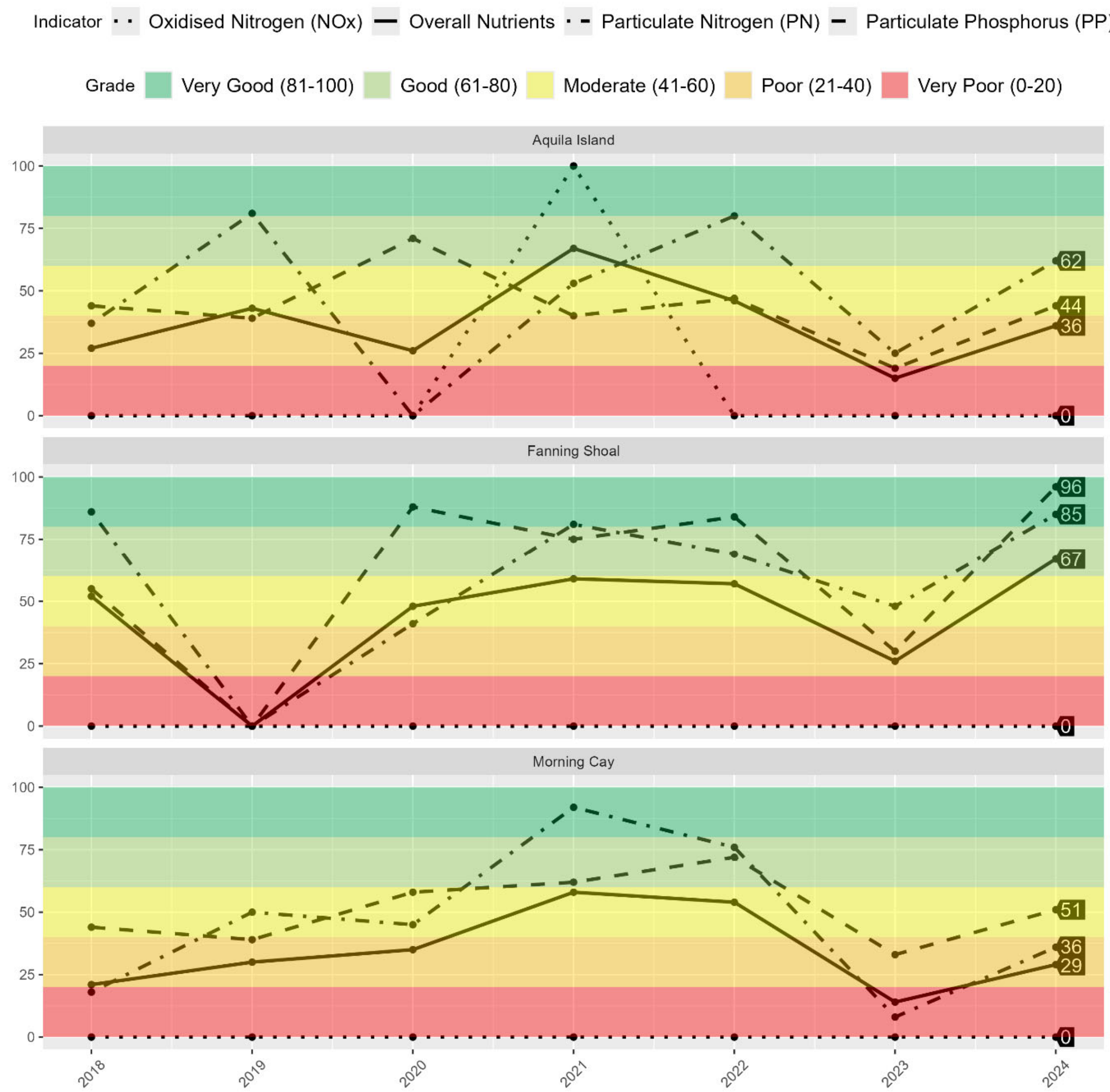

Figure 110. Southern Zone site level nutrients scores, current reporting compared to the historic record. The annotated solid black line (overall nutrients) is an average of the other indicators.

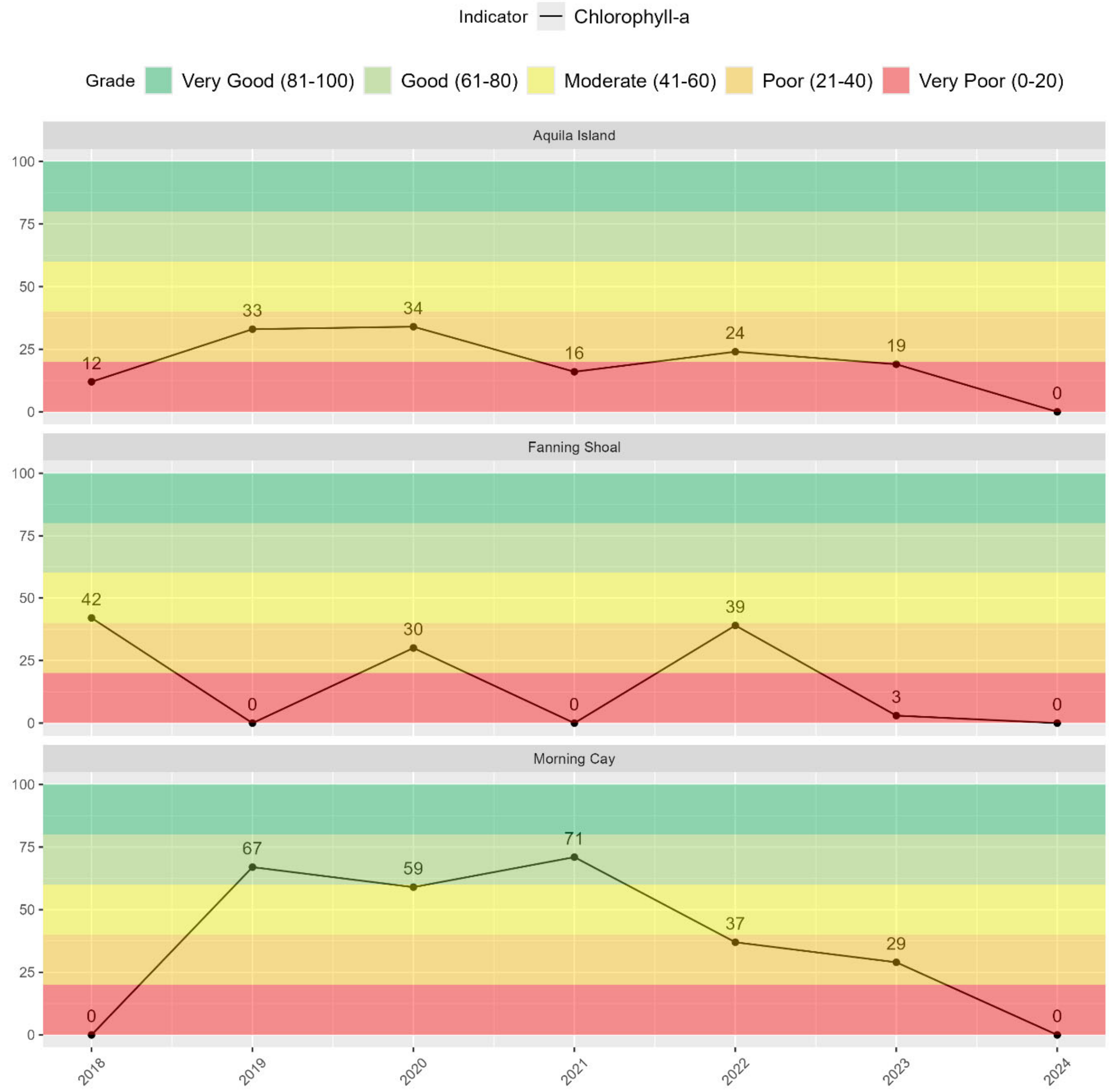

Figure 111. Southern Zone site level Chl-*a* scores, current reporting compared to the historic record.

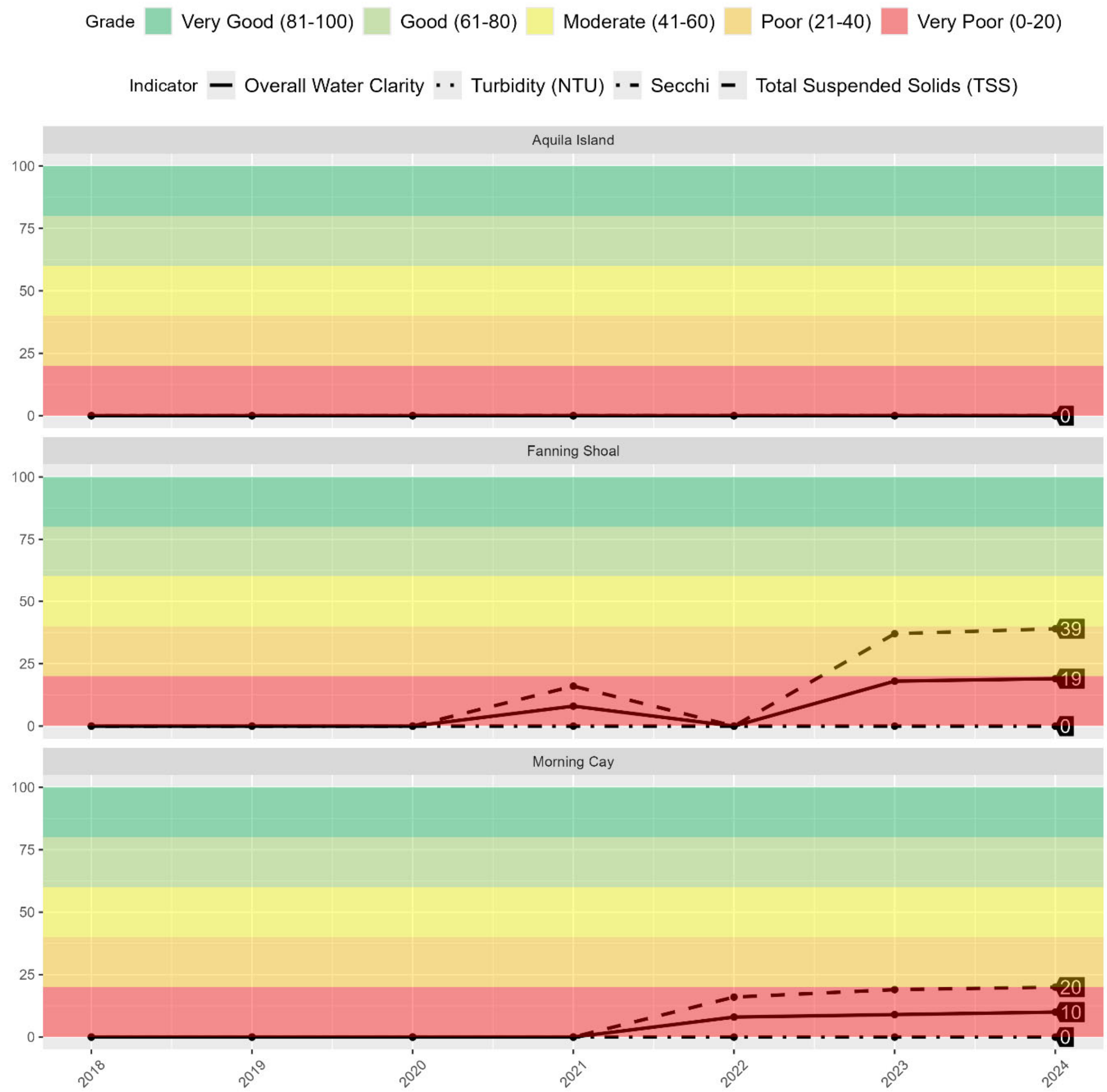

Figure 112. Southern Zone site level water clarity scores, current reporting compared to the historic record. The annotated solid black line (overall clarity) is an average of the other indicators.

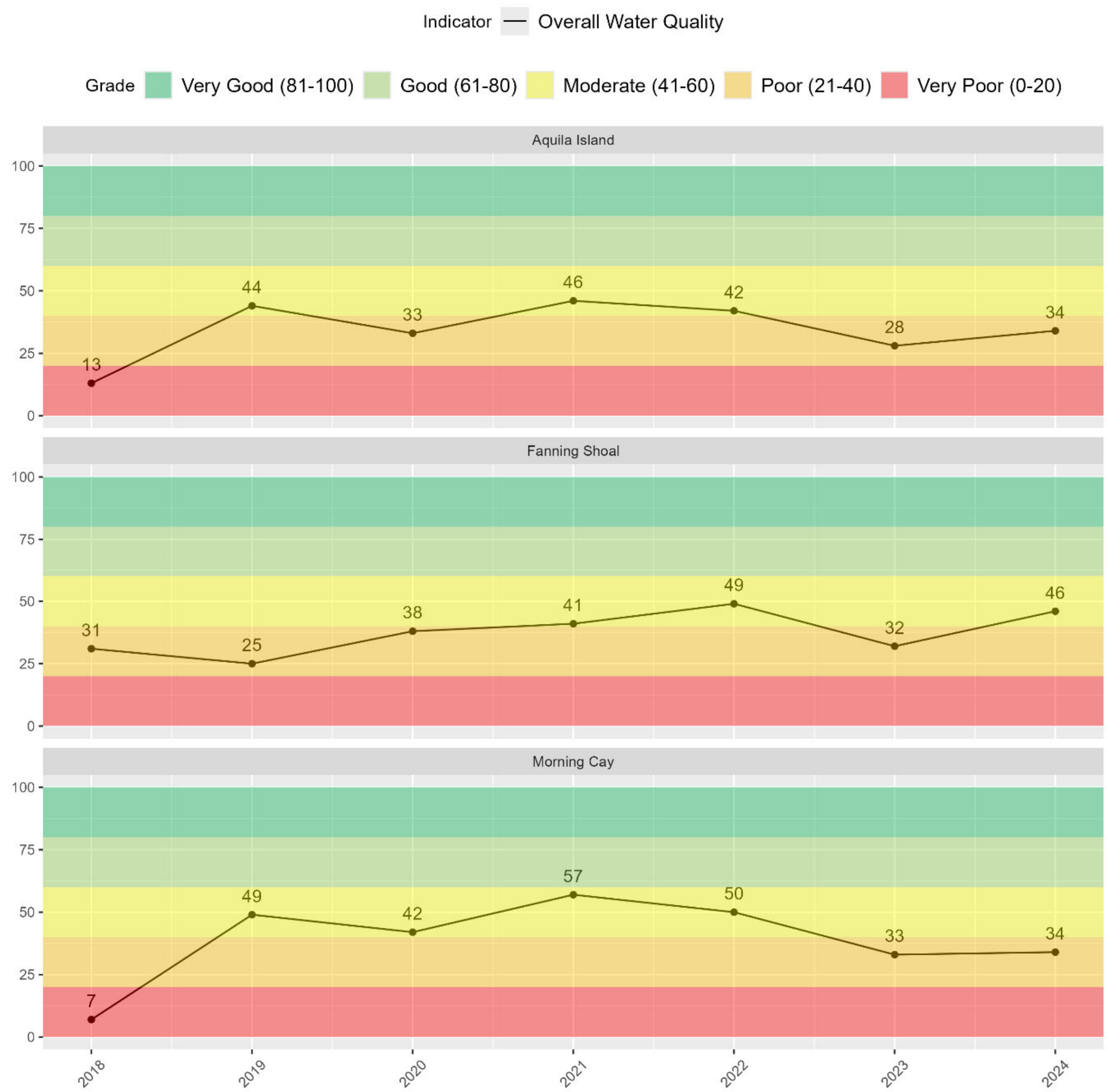

Figure 113. Southern Zone site level overall water quality scores, current reporting compared to the historic record.

Table 49. Southern Inshore Zone summary statistics for water quality indicators in the Southern Zone for marine sites from July 2022 to June 2023. Presented alongside statistics are guideline values, including the statistic that was compared to the guideline. For all indicators except secchi, to meet the guideline the relevant statistic must be lower compared to the guideline (secchi must be higher than the guideline). Significant figures are shown to the same level as given in the relevant guideline value. Values highlighted yellow signify updates this reporting period.

Site	Indicator	n	Mean	Minimum	25th %ile	Median	75th %ile	Maximum	Guidelines	
									Comparison Statistic	Guideline Value
MKY_CAM1 (Aquila Island)	NOx (µg/L)	8	2.31	0.5	1	2	2.25	7	Median	0.25
	PN (µg/L)	8	19.35	0	7.75	14	22.25	67	Mean	20
	PP (µg/L)	8	3.38	2	2	3.5	4.25	5	Mean	2.8
	Chl-*a* (µg/L)	8	2.18	0.45	1	1.15	1.59	9.65	Mean	0.45
	TSS (mg/L)	8	7.38	0.4	5.92	7.45	8.95	14	Mean	2.4
	Secchi (m)	8	2.29	1.2	1.5	1.7	2.18	6	Mean	8
	Turb (NTU)	325*	10.58	0.95	4.45	8.75	13.95	36.59	Median	2.4
MKY_CAM2 (Morning Cay)	NOx (µg/L)	8	1.69	0.5	0.5	1	2.5	4	Median	0.25
	PN (µg/L)	8	26.63	3	7.5	11.5	26.25	108	Mean	20
	PP (µg/L)	8	3.1	0	1	1.5	5.25	9	Mean	2.8
	Chl-*a* (µg/L)	8	1.67	0.1	0.34	0.62	1.6	8.08	Mean	0.45
	TSS (mg/L)	8	3.81	0.4	1.35	3.55	4.45	10	Mean	2.4
	Secchi (m)	8	2.85	1	1.5	2.5	3.82	5.5	Mean	8
MKY_CAM3 (Fanning Shoal)	NOx (µg/L)	8	1.88	0.5	0.88	2	3	3	Median	0.25
	PN (µg/L)	8	12.88	5	9.25	11.5	16.25	23	Mean	20
	PP (µg/L)	8	1.5	0	1	1	2.25	3	Mean	2.8
	Chl-*a* (µg/L)	8	3.15	0.1	0.41	0.62	1.09	20.92	Mean	0.45
	TSS (mg/L)	8	3.08	0.3	1.58	3	4.25	6.2	Mean	2.4
	Secchi (m)	8	2.9	1.5	1.65	2.25	4	6	Mean	8

*While turbidity loggers were deployed for the entire 2023-24 reporting period, sample size is based on daily averages from validated data recovered from this period. Some data points may have been lost due to unforeseen device malfunction or damage.

8.4.1.6 Pesticides

Table 50. Results and deployment periods for marine pesticides. The Pesticide Risk Metric (PRM) indicator accounting for up to 22 pesticides, reporting aquatic species protected (%) and overall standardised pesticide score for inshore zones for the 2025 Report Card (2023-24 data).

Zone	Program	Sites	Value Reported	Passive Polar Samples		
				Deployments	PRM	Score
Northern	NQBP/MMP	Euri Creek	Max	25/10/2023 –27/02/2024 4 continuous deployments	**99.9**	**99**
Whitsunday	MMP	Whitsunday Channel	Max	8/11/2023 – 3/12/2023, 13/12/2023 – 3/03/2024 (4 deployments)	**100**	**100**
Central	MMP	Repulse Bay	Max	8/11/2023 – 3/12/2023, 13/12/2023 -5/02/2024 (3 deployments)	**99.9**	**98**
		Flat Top Island	Max	5/11/2023 – 3/12/2023, 13/12/2023 – 3/04/2024 (5 deployments)	**99.8**	**96**
		Sarina Inlet	Max	5/11/2023 – 3/12/2023, 13/12/2023 – 3/04/2024 (4 deployments)	**99.8**	**97**
	NQBP	Slade Island	Max	27/10/2023 – 7/12/2023, 29/02/2024 – 16/04/2024 (2 deployments)	**100**	**99**
Southern	SIP	Aquila Island	Max	26/10/2023 – 17/04/2024 4 continuous deployments	**100**	**100**

PRM (% species protected) risk categories: ■ Very High = <80 | ■ High = 80 to <90 | ■ Moderate = 90 to <95 | ■ Low = 95 to <99 | ■ Very Low = ≥99 | ■ No score/data gap
Pesticide scoring range: ■ Very Poor = 0 to 20 | ■ Poor = >20 to 40 | ■ Moderate = >40 to 60 | ■ Good = >60 to 80 | ■ Very Good = >80 | ■ No score/data gap

8.4.2 Coral

8.4.2.1 Reef level indicator scores

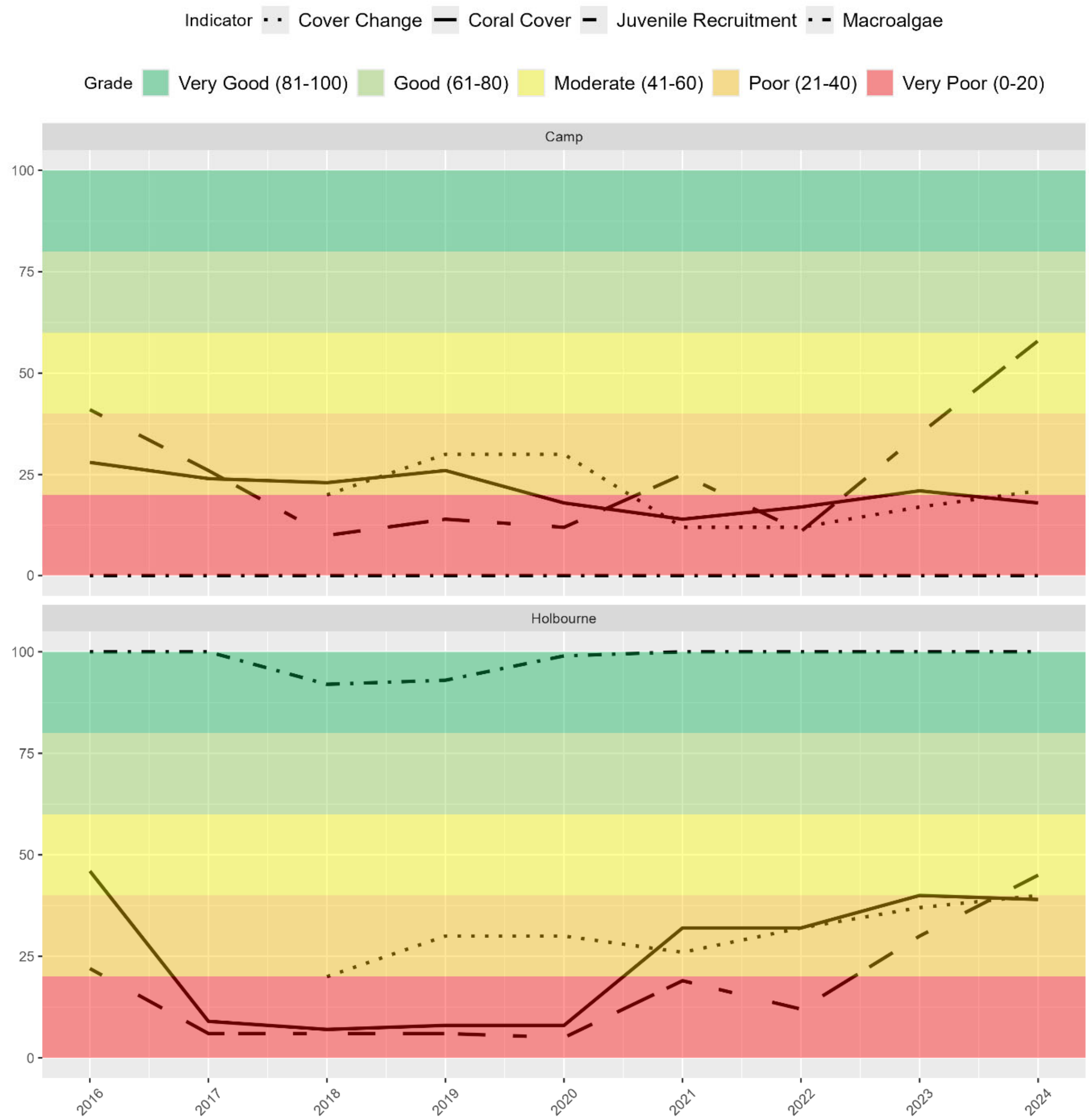

Figure 114. Northern Zone reef-level coral indicator scores and grades for the current Report Card compared to the historic record. Scores in the Northern Zone before 2021 are not directly comparable to previous years due to changes in sampling design and before 2020 due to changes in reef aggregation level.

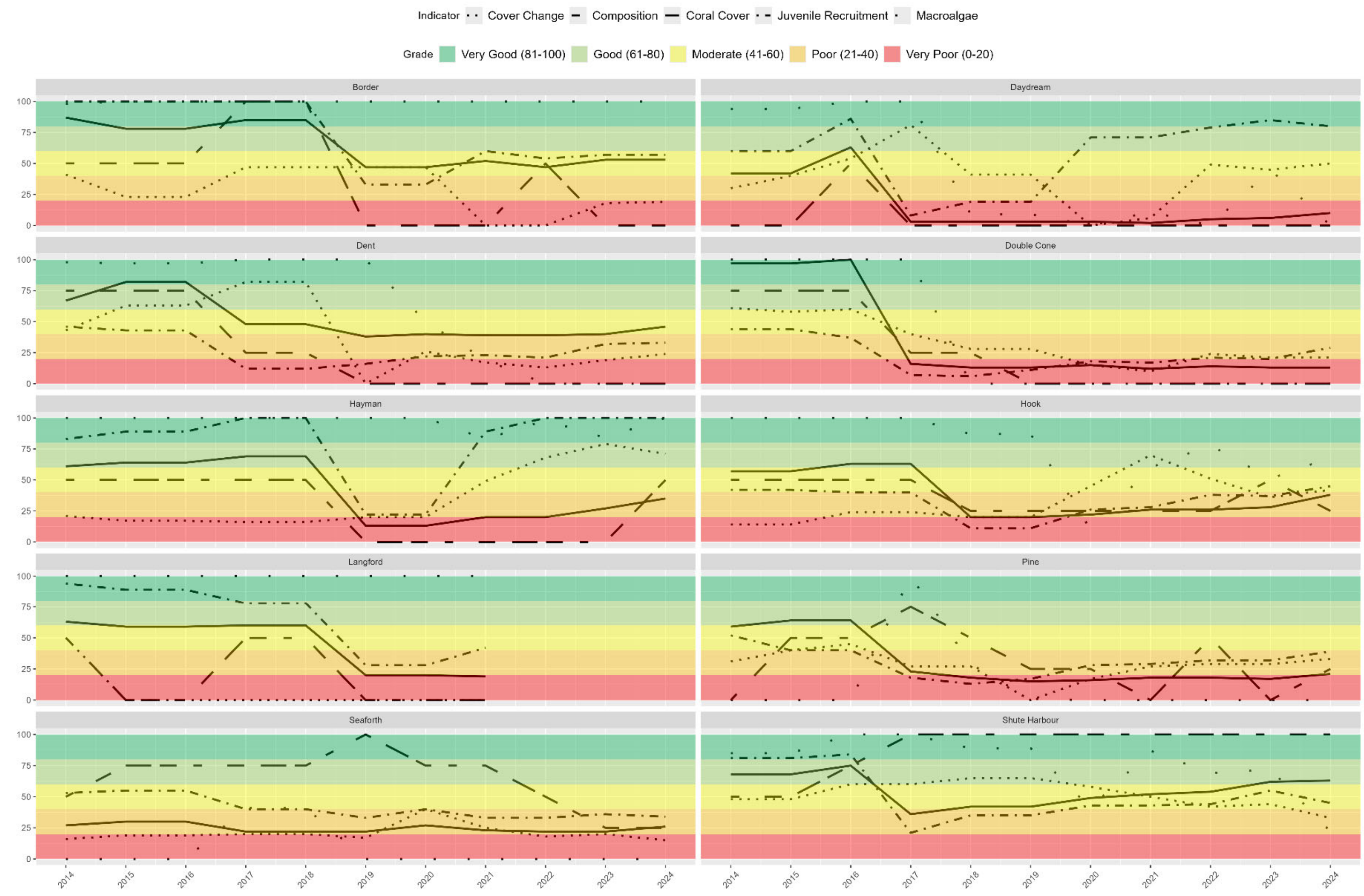

Figure 115. Whitsunday Zone reef-level coral indicator scores and grades for the current Report Card compared to the historic record.

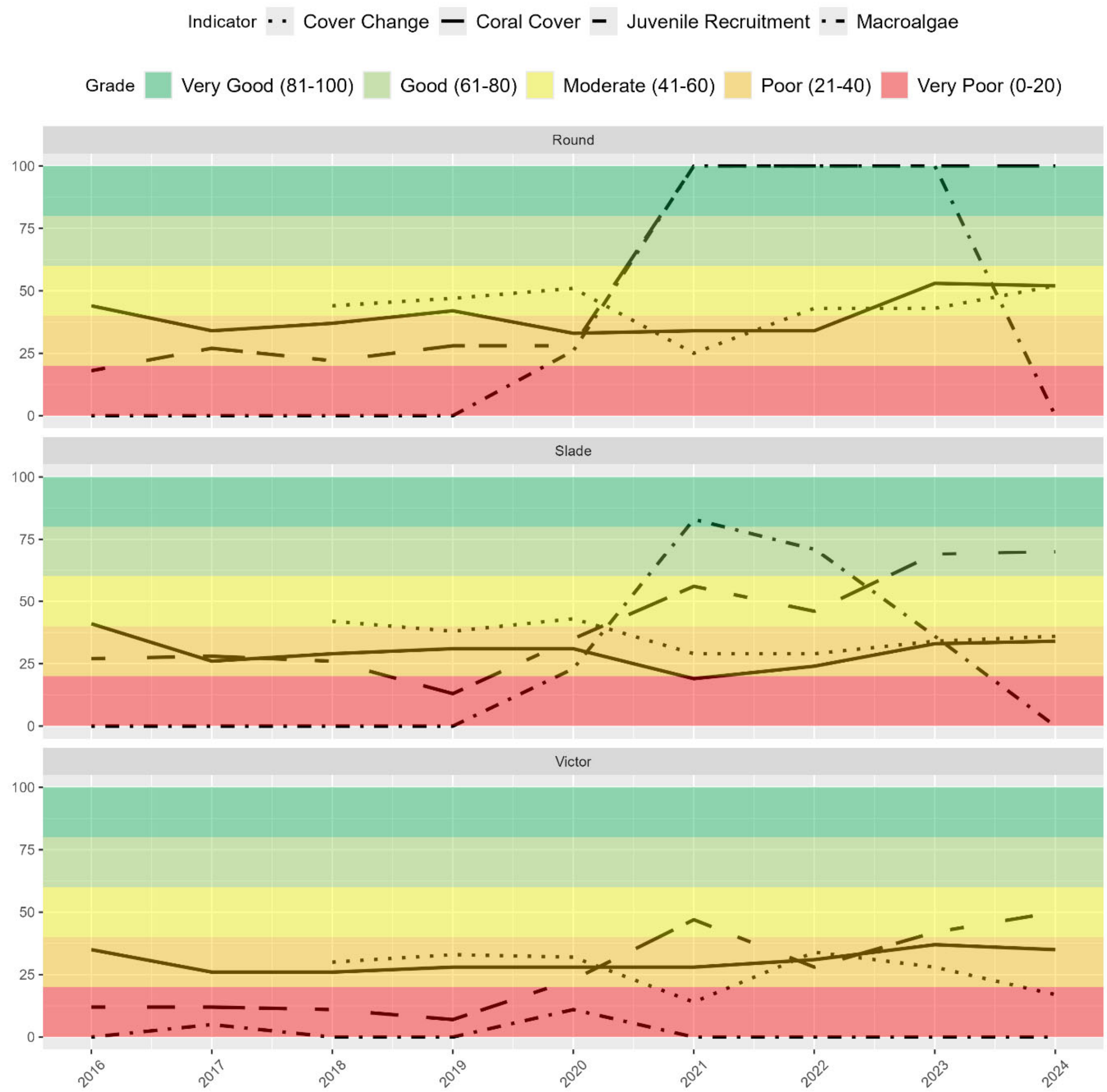

Figure 116. Central Zone reef-level coral indicator scores and grades for the current Report Card compared to the historic record.

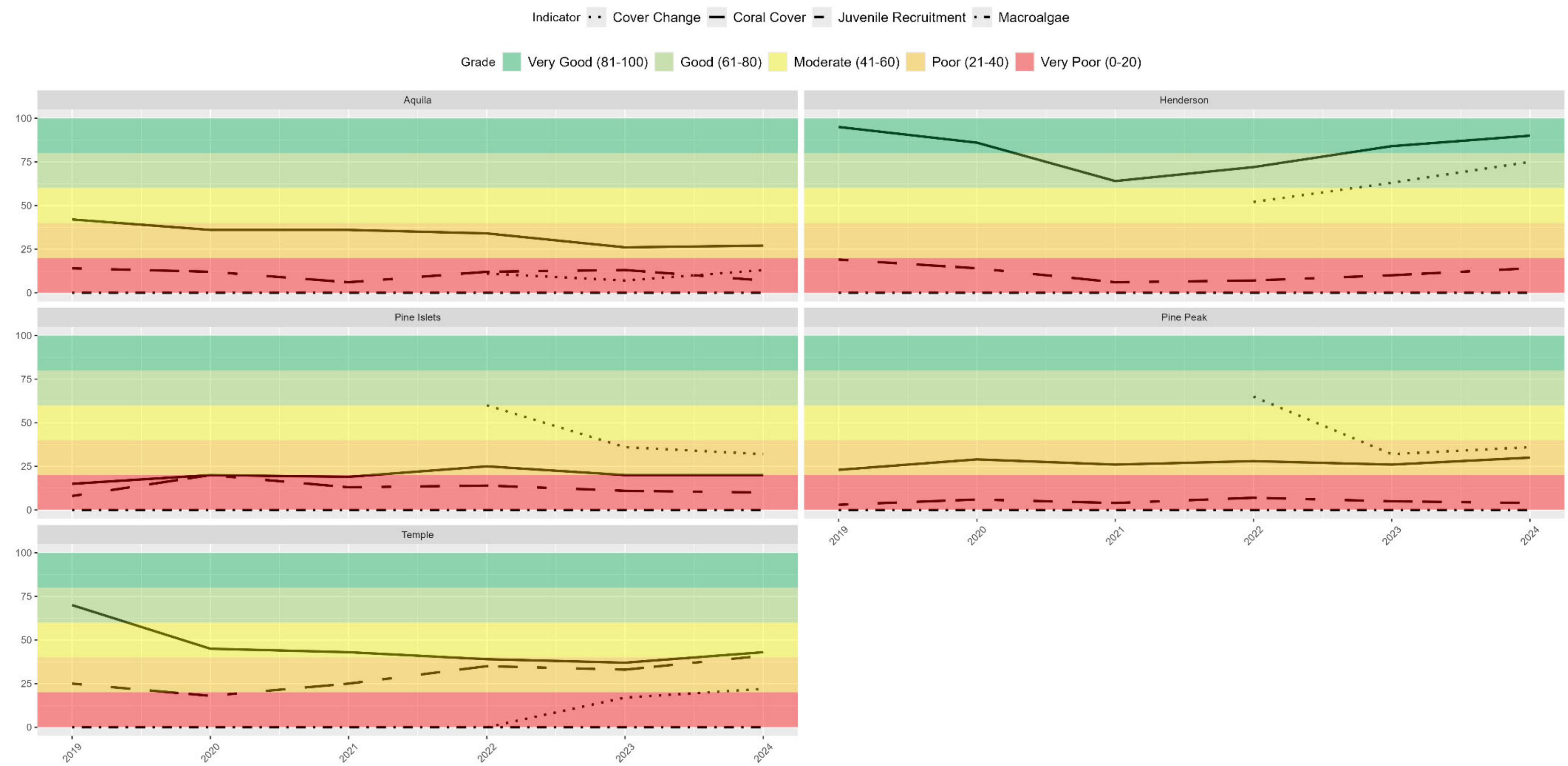

Figure 117. Southern Zone reef-level coral indicator scores and grades for the current Report Card compared to the historic record.

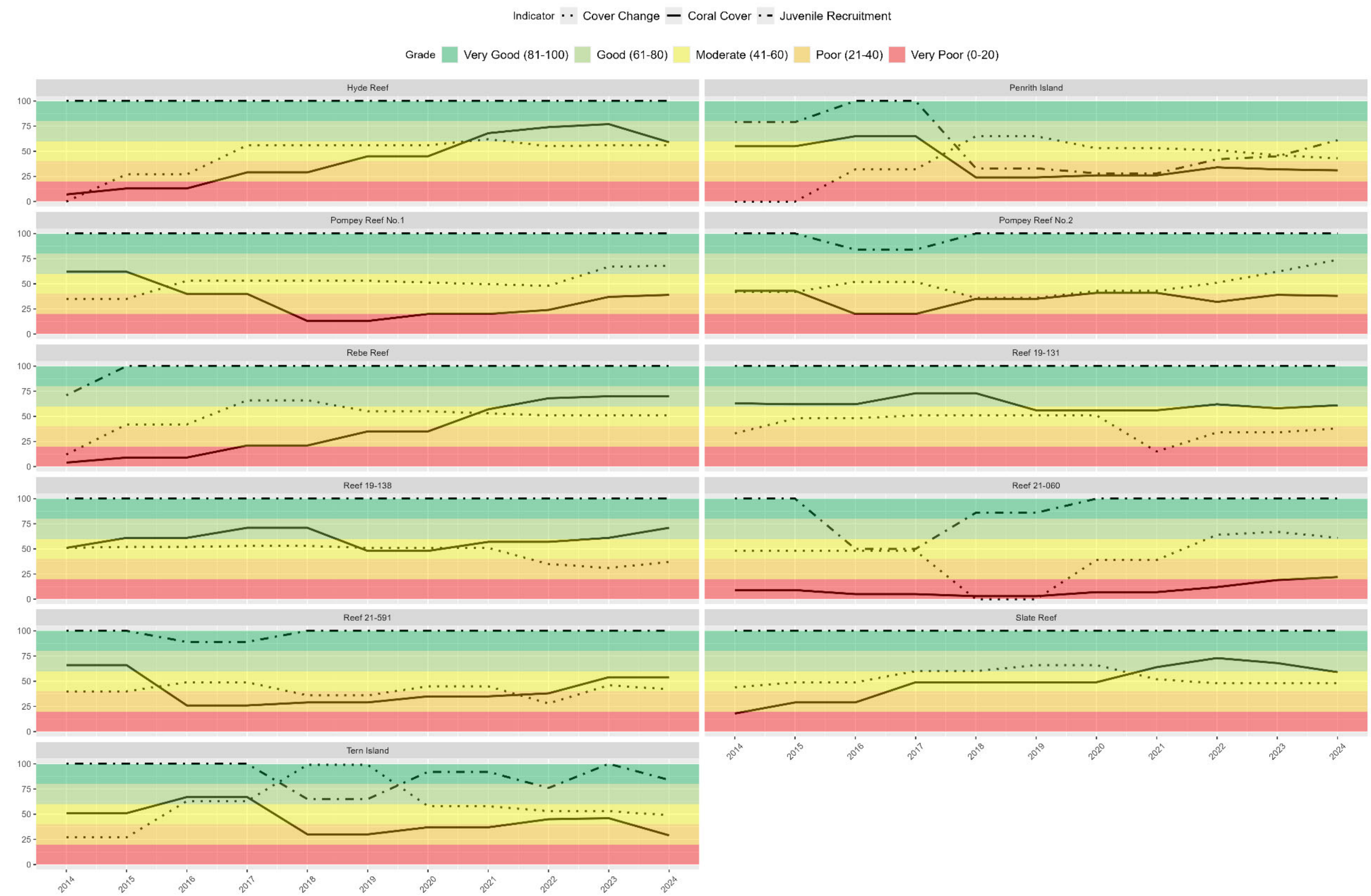

Figure 118. Offshore Zone reef-level coral indicator scores and grades for the current Report Card compared to the historic record.

8.4.2.2 Reef level overall scores

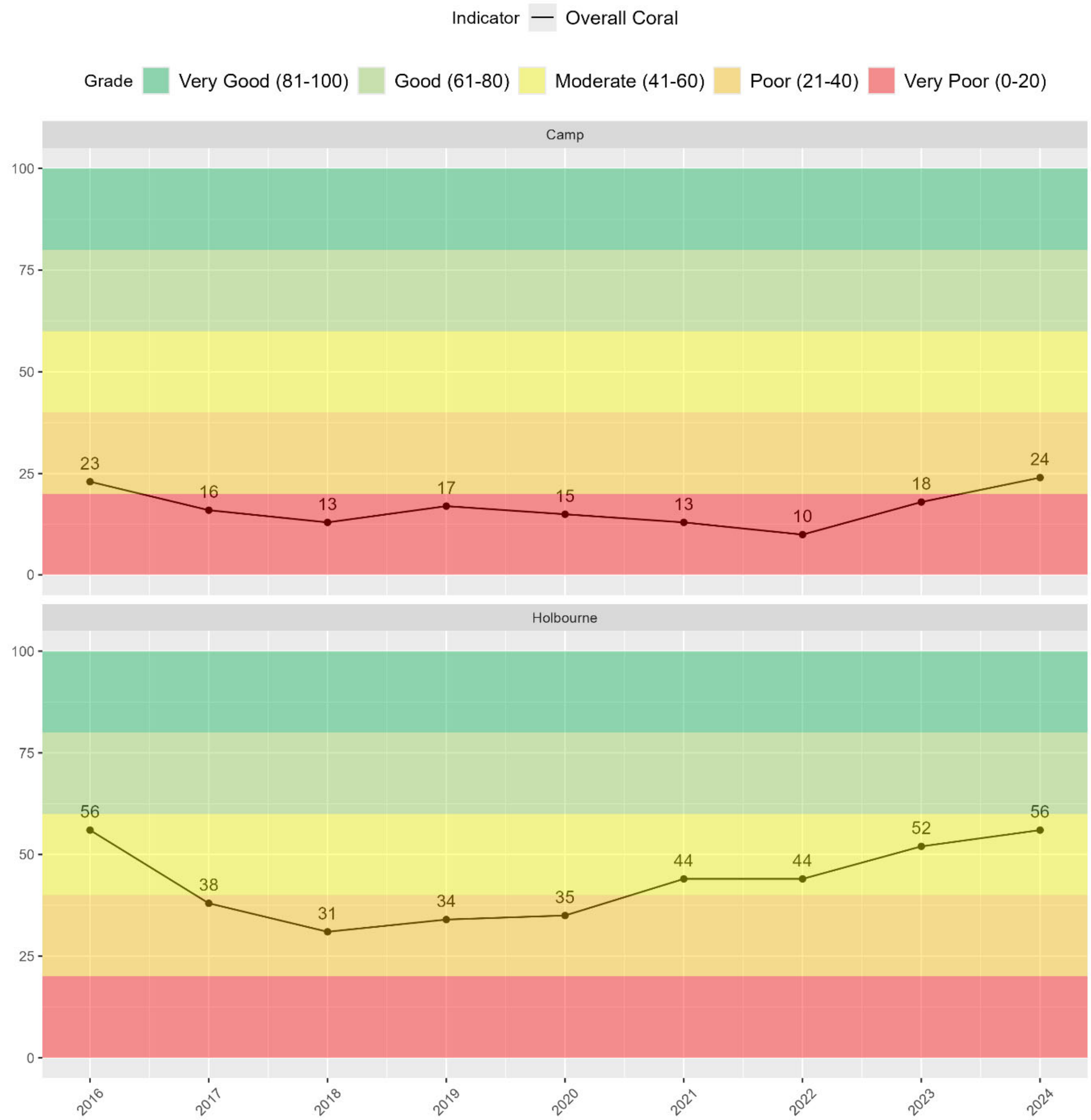

Figure 119. Northern Zone reef-level overall coral scores and grades for the current Report Card compared to the historic record. Scores in the Northern Zone before 2021 are not directly comparable to previous years due to changes in sampling design and before 2020 due to changes in reef aggregation level.

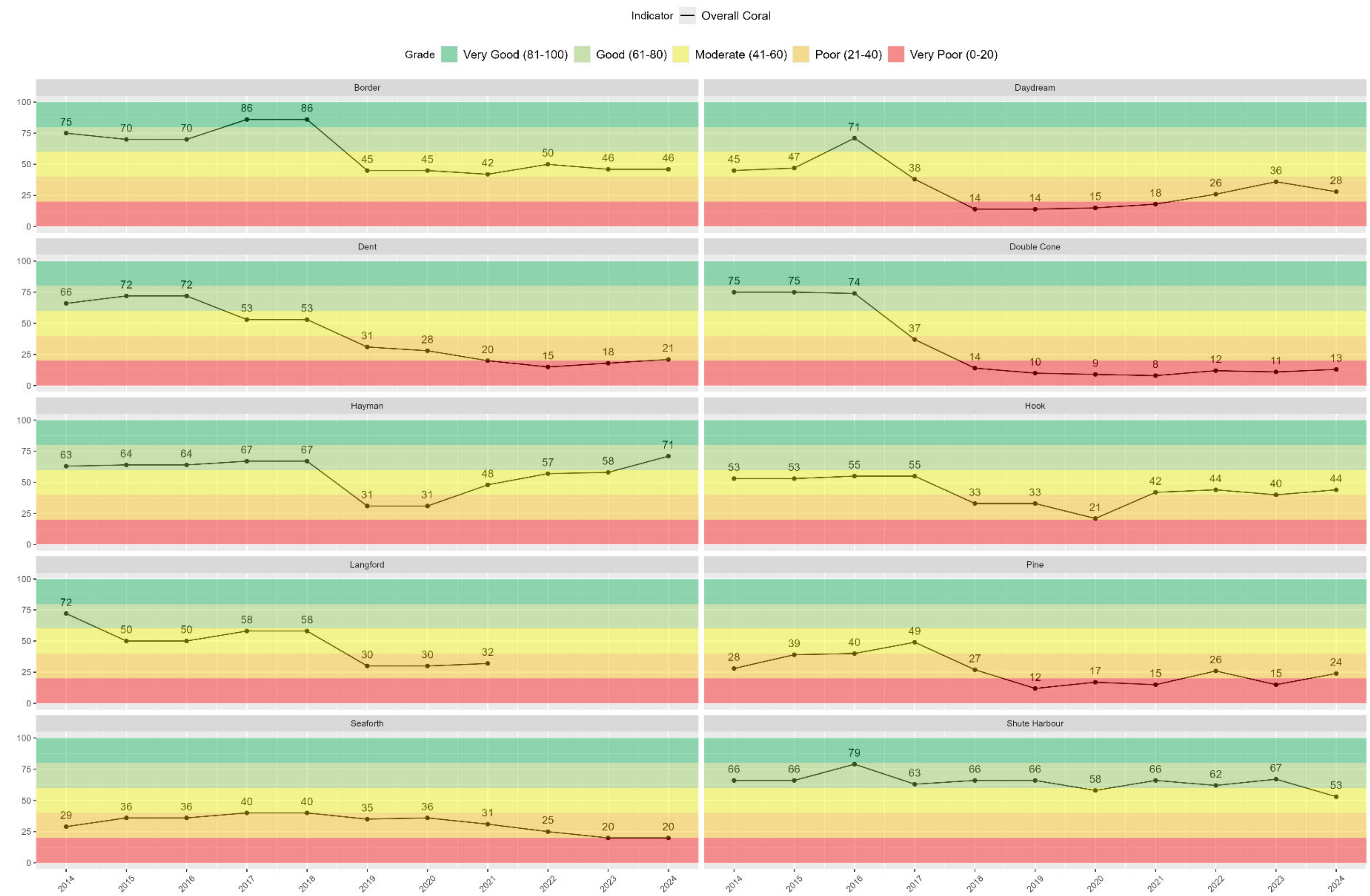

Figure 120. Whitsunday Zone reef-level overall coral scores and grades for the current Report Card compared to the historic record.

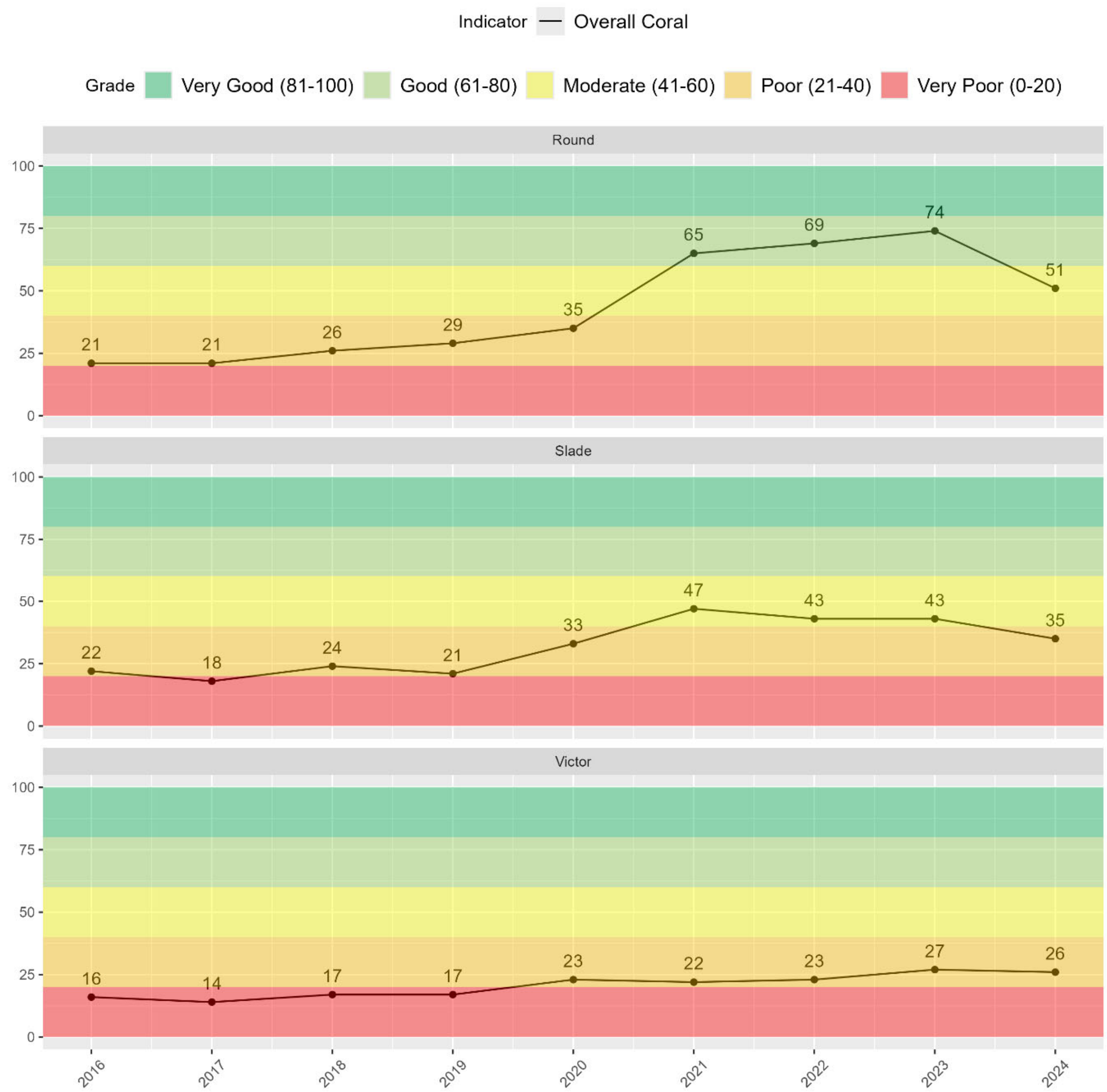

Figure 121. Central Zone reef-level overall coral scores and grades for the current Report Card compared to the historic record.

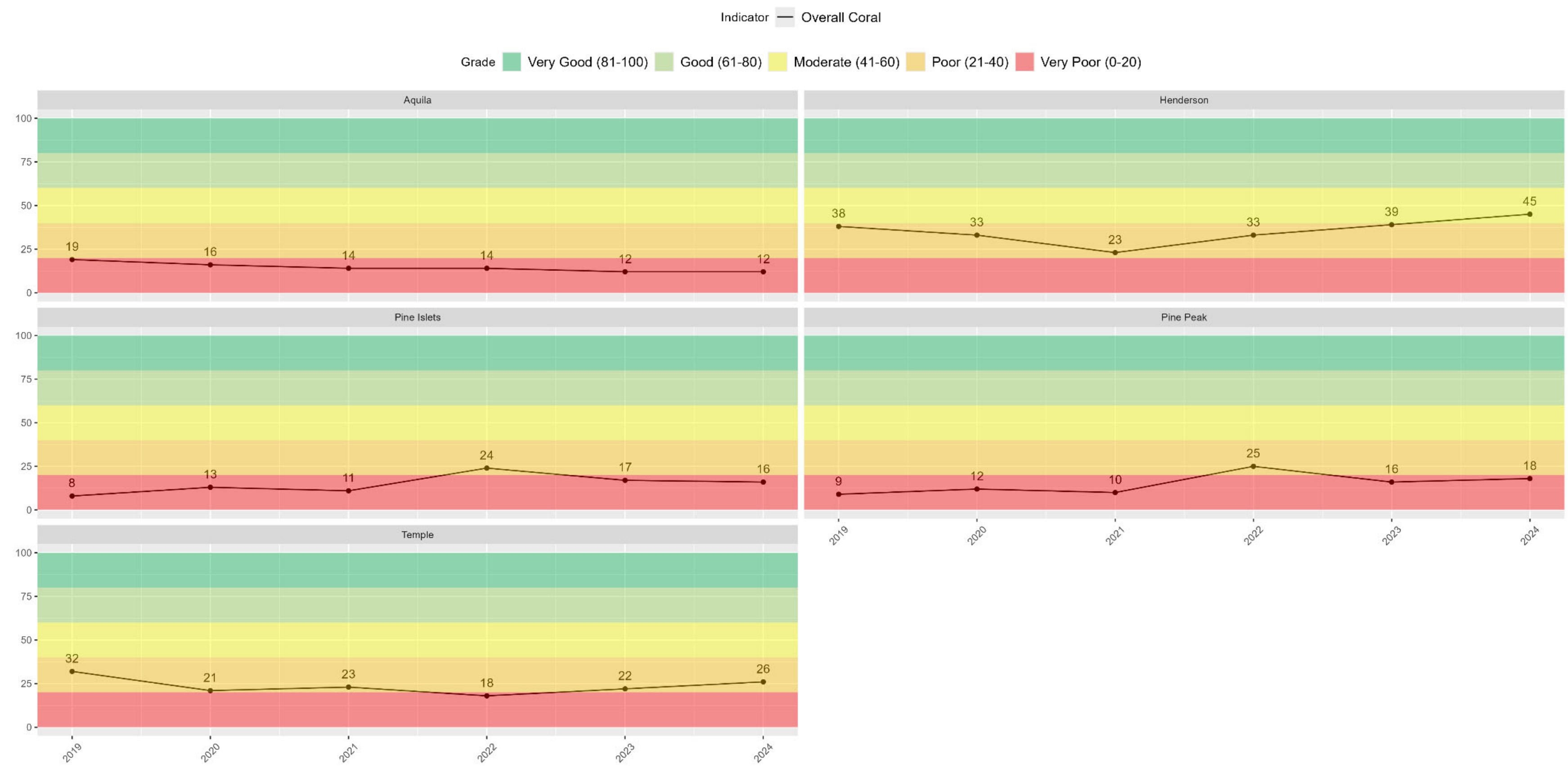

Figure 122. Southern Zone reef-level overall coral scores and grades for the current Report Card compared to the historic record.

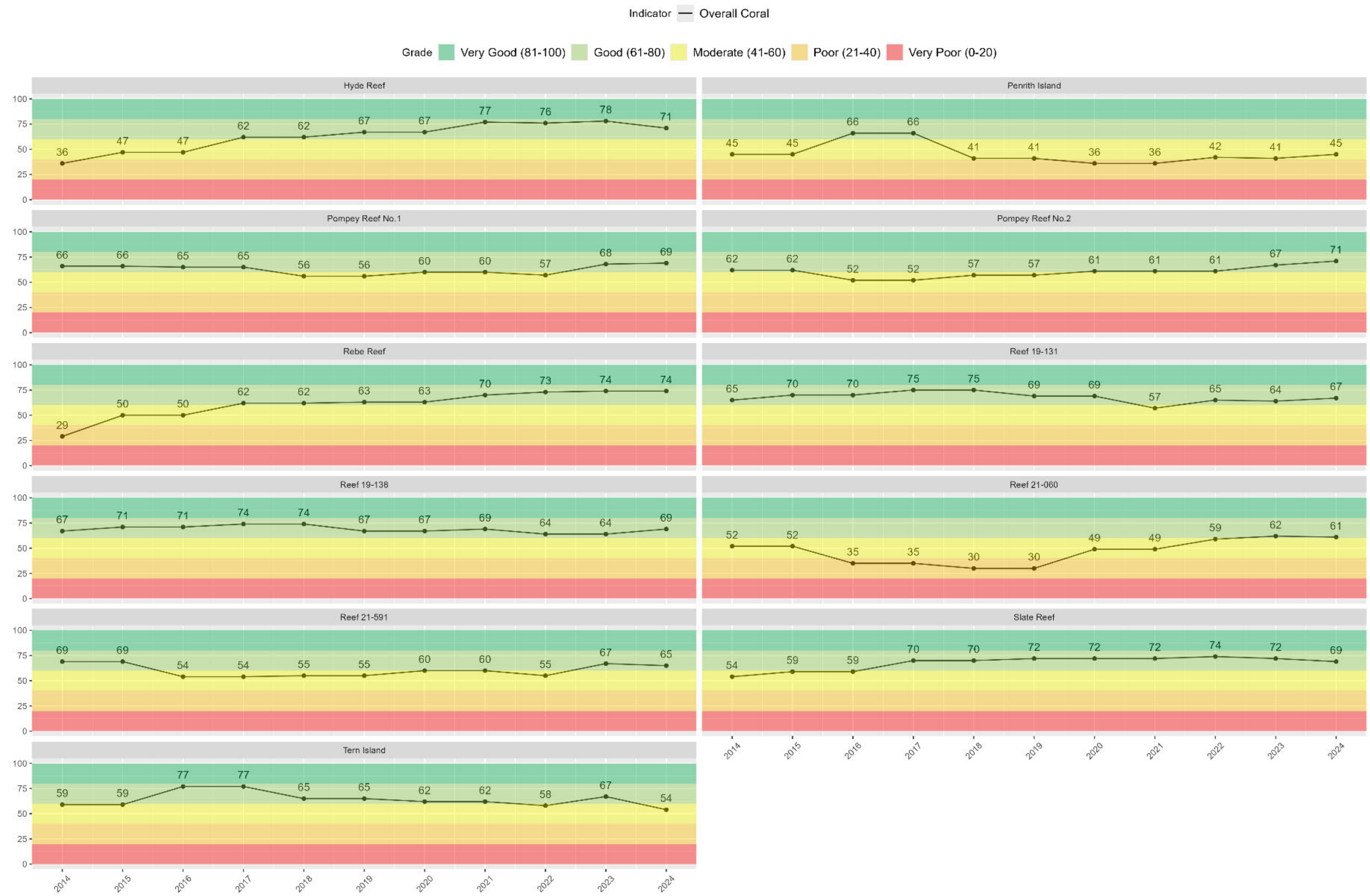

Figure 123. Offshore Zone reef-level overall coral scores and grades for the current Report Card compared to the historic record.

8.4.3 Seagrass

Table 51. Inshore seagrass sampling design and site-level indicator results for the 2025 Report Card (2023-24 data). Indicators are based on data collected from the Reef Authority's Marine Monitoring Program (MMP), North Queensland Bulk Ports' Queensland Ports Seagrass Monitoring Program (QPSMP), and the Partnership-funded Southern Inshore Program (SIP). MMP sites may include surveys completed by SeagrassWatch citizen science efforts or Queensland Parks and Wildlife Service (QPWS) drop-camera.

Zone	Habitat	Depth	Location/Meadow	Meadow/Site	MMP		QPSMP / SIP				Zone Score
					Abundance	Resilience	Biomass	Area	Sp. Composition	Meadow score	
Inshore Marine Northern	Coastal	Inshore	Abbot Pt.	API3			62	74	63	62	70
				API5			66	100	89	66	
				API9			61	89	94	61	
		Subtidal		APD1-4			70	60	89	60	
		Intertidal	Bowen	BW2–3*	100					100	
Inshore Marine Whitsunday	Reef	Intertidal	Hydeaway Bay	HB1 and 2*	81					81	31
			Hamilton Is. 1	HM1	13	30				21	
			Hamilton Is. 3	HM3	13	7				10	
			Lindeman Island	LN3	100	50				75	
		Subtidal	Tongue Bay	TO1 and 2^	38					38	
			Lindeman Island	LN1	13	50				31	
			Cid Harbour	CH4^	25					25	
				CH5^	25					25	
			Whitehaven Beach	WB1^	0					0	
				WB3^	0					0	
	Coastal	Intertidal	Pioneer Bay	PI2 and 3*	38					38	
Inshore Marine Central	Coastal	Intertidal	Midge Point	MP2 and 3	100	70				85	62
			St Helens Beach	SH1*#	50					50	
		Subtidal	Newry Bay	NB1 and 2^	63					63	
	Estuarine	Intertidal	Sarina Inlet	SI1 and 2	25	72				48	
	Coastal	Intertidal / Subtidal	Dudgeon Pt	DP1			76	56	96	56	
		Subtidal	St Bees Island	SB10			40	57	60	40	
			Keswick Island	KW14			62	69	90	62	
			Hay Point	HPD1			62	57	100	57	
			Mackay Offshore	MO5			100	97	100	97	
Inshore Marine Southern	Coastal	Intertidal	Clairview	CVH2			75	83	100	75	86
				CVH6			96	94	95	94	
				CVH7			99	100	80	90	

Scoring range: Very Poor = 0 to 20 | Poor = >20 to 40 | Moderate = >40 to 60 | Good = >60 to 80 | Very Good = >80 | No score/data gap

*Data provided by Seagrass Watch via MMP; # = Not used in GBR-wide for MMP reporting; ^QPWS drop-camera