RiverWatch Pine Rivers Results:

A Year In Flow 2024-2025

Portfolio: Active Grants

Program: Community Bank Samford

Project: RiverWatch Pine Rivers

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We respectfully acknowledge the Traditional Country across our region. We also acknowledge and pay our respects to the Kabi Kabi, Jinibara and Turrbal Traditional Custodians, and their elders past, present, and emerging.

Bendigo Bank Community Bank Samford

PINE RIVERS Catchment Association

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ACKNOWLEDGEMENTS

The Pine Rivers Catchment Association (PRCA) would like to extend our gratitude to Community Bank Samford for funding the RiverWatch Pine Rivers program through their inaugural major grant round in 2024. The important data collected, and community engagement facilitated by this project would not be possible without their generous support. PRCA are looking forward to continuing our partnership with Community Bank Samford in delivering powerful outcomes for the Pine Rivers community now and in the future.

We would also like to thank the enormous involvement of community volunteers and citizen scientists in this project so far. Over the first 18 months of the program, volunteers have dedicated over 430 hours to RiverWatch Pine Rivers – an incredible result for our waterways and our community. We are particularly grateful to the Samford Eco-Corridor, REF environmental volunteers, and Griffith University placement students for their consistent involvement with the program, we cannot thank you enough for your support.

Acknowledgements and gratitude also go to PRCA staff for developing, initiating and implementing the project over the first 12 months of the RiverWatch program. This program is nothing like any project we have ever delivered before. Despite the challenges, our staff have risen to the occasion.

Lastly and most importantly, the Pine Rivers Catchment Association acknowledges and pays our deepest respects to the Traditional Custodians of the Pine Rivers area: the Jinibara, Kabi Kabi and Turrbal peoples. For millennia First Nations peoples have been caring for Country and our waterways, and the RiverWatch program is simply a humble extension of this custodianship.

ABOUT PRCA

PRCA was formed following a public meeting in Strathpine, Queensland, and registered as a charity with Australian Charities and Not-for-Profits Commission in December 1995. The association has been continuously operating since then and enjoys an excellent reputation and brand as a powerful advocate for the environment and sustainable management of the Pine Rivers catchment.

The association's operations benefit from a Board with 8 volunteer members, 7 staff, and volunteers assisting with a diverse range of on-ground activities and community events.

The association has enshrined in the constitution and is working towards the following objectives:

- Promote community and government understanding of the interrelationships between natural resources and the value of a coordinated catchment wide approach for management.
- Identify and prioritise natural resource management issues and identify possible solutions.
- Foster collaborative action between community, industry, business, and governments to mitigate adverse impacts on natural resources.
- Promote actions to the community, industry, business, and governments that are conducive to mitigating the effects of rapid climate change.
- Inspire, lead, and facilitate collaboration at all levels of society to enhance the environmental health and ecological sustainability of Pine Rivers and Hays Inlet Catchments, neighbouring catchments and areas of importance such as Moreton Bay

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- Provide a forum for community environment groups and interested community business, industry and government representatives seeking to improve natural resource management activities.

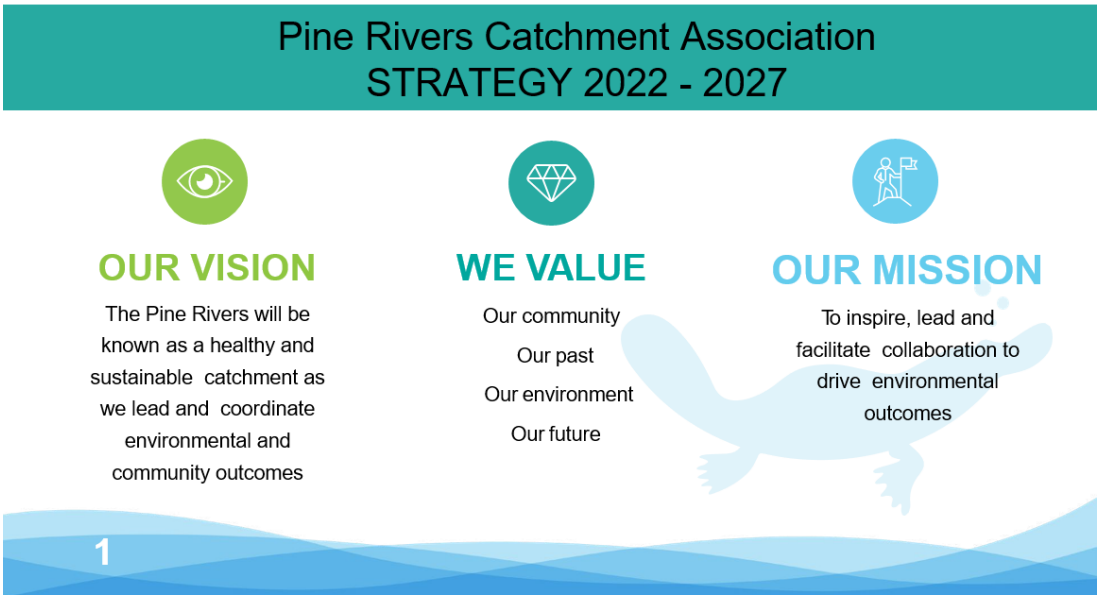

Figure 1 - PRCA Strategy 2022 — 2027

EXECUTIVE SUMMARY

The RiverWatch Pine Rivers program, delivered by the Pine Rivers Catchment Association with support from Community Bank Samford, completed its first six months of monitoring from January to June 2025. The initiative was created to strengthen understanding of waterway health across the Pine Rivers catchment. By combining habitat assessments, in-situ water quality testing, laboratory analysis and macroinvertebrate surveys across 23 monitoring sites, the program provides data with much greater spatial and temporal coverage than existing monitoring efforts. Community involvement has been a key feature, with more than 430 volunteer hours contributed to the project.

Habitat condition results indicate that upper-catchment rural areas remain comparatively healthy, with three sites rated in Excellent condition and several others in Good condition. In contrast, lower, more urbanised parts of the catchment displayed moderate habitat condition, reflecting higher disturbance, reduced riparian cover and altered channel form.

Water quality monitoring revealed consistent exceedances of nutrient, turbidity and dissolved oxygen guidelines across many sites, particularly in lower freshwater and estuarine environments. Upper-catchment sites showed emerging nutrient pressures, with repeated exceedances of nitrogen and phosphorus guidelines. Lower-catchment sites exhibited more frequent and persistent issues, including high turbidity, variable pH, and dissolved oxygen levels often below guideline thresholds. Estuarine areas also showed widespread turbidity and nutrient exceedances, likely reflecting the combined influence of urban runoff, sedimentation from upstream waterways, particularly high rainfall during the wet season and tidal dynamics.

Macroinvertebrate communities aligned closely with water and habitat results. Upper-catchment sites supported more diverse assemblages, including sensitive taxa such as mayflies, stoneflies and caddisflies, while lower-catchment and urbanised sites were dominated by more tolerant species that can withstand more disturbance. Overall, these first six months of data establish a useful baseline for assessing long-term changes in catchment condition and will help guide targeted restoration, management investment and community engagement across the Pine Rivers and Hays Inlet systems in years to come.

1 INTRODUCTION

1.1 PINE RIVERS CATCHMENT

The Pine Catchment is located approximately 30km north of Brisbane, in South-East Queensland, beginning in the D'Aguilar Ranges and draining in an easterly direction towards the coastal areas between Redcliffe and Brighton. It is comprised of the North and South Pine rivers and their tributaries, which join to form the Pine River in the tidal reach approximately 7km from the estuary mouth. Also included in the Pine Catchment is the sub-catchment of Hays Inlet, which consists of Saltwater Creek and Freshwater Creek before draining just north of the Pine River estuary.

The North Pine River rises near Mount Pleasant in the upper catchment, before being joined by Laceys Creek and several ephemeral creeks, and draining into Lake Samsonvale, formed by the North Pine Dam. South of the North Pine River, the major stream of Kobble Creek rises in the D'Aguilar Range and also drains into Lake Samsonvale. Beginning in the foothills of the D'Aguilar Range, the land use upstream of Lake Samsonvale is primarily cattle grazing and other agricultural land uses. In addition to Lake Samsonvale, the smaller reservoir of Lake Kurwongbah is formed by the Sideling Creek Dam in the catchment's north-east. The tidal reach of the North Pine River commences shortly downstream from the two reservoirs, flowing through the suburban areas of Petrie, Lawnton and Murrumba Downs, where mangrove communities begin to dominate the edges.

The South Pine River rises on the slopes of Mount Nebo, before draining through the peri-urban communities of Highvale and Samford. It is joined by the major tributary of Cedar Creek, before forming an extensive floodplain through the suburban areas of Strathpine, Albany Creek, Brendale and Bald Hills. Immediately before the confluence of the South Pine River with the North Pine, it is joined by the second major tributary of Four Mile Creek, which rises in the hills of Cashmere.

The Hays Inlet Catchment is primarily formed by Saltwater Creek and Freshwater Creek, which arise in Narangba and Dakabin, respectively. The riparian vegetation initially consists of mostly paperbark tea-tree (Melaleuca quinquenervia) swampland and alluvial eucalypt forest, before forming significant mangrove, saltmarsh and tidal wetland ecosystems towards the estuaries. Overall, this sub-catchment has the greatest proportion of suburban land uses.

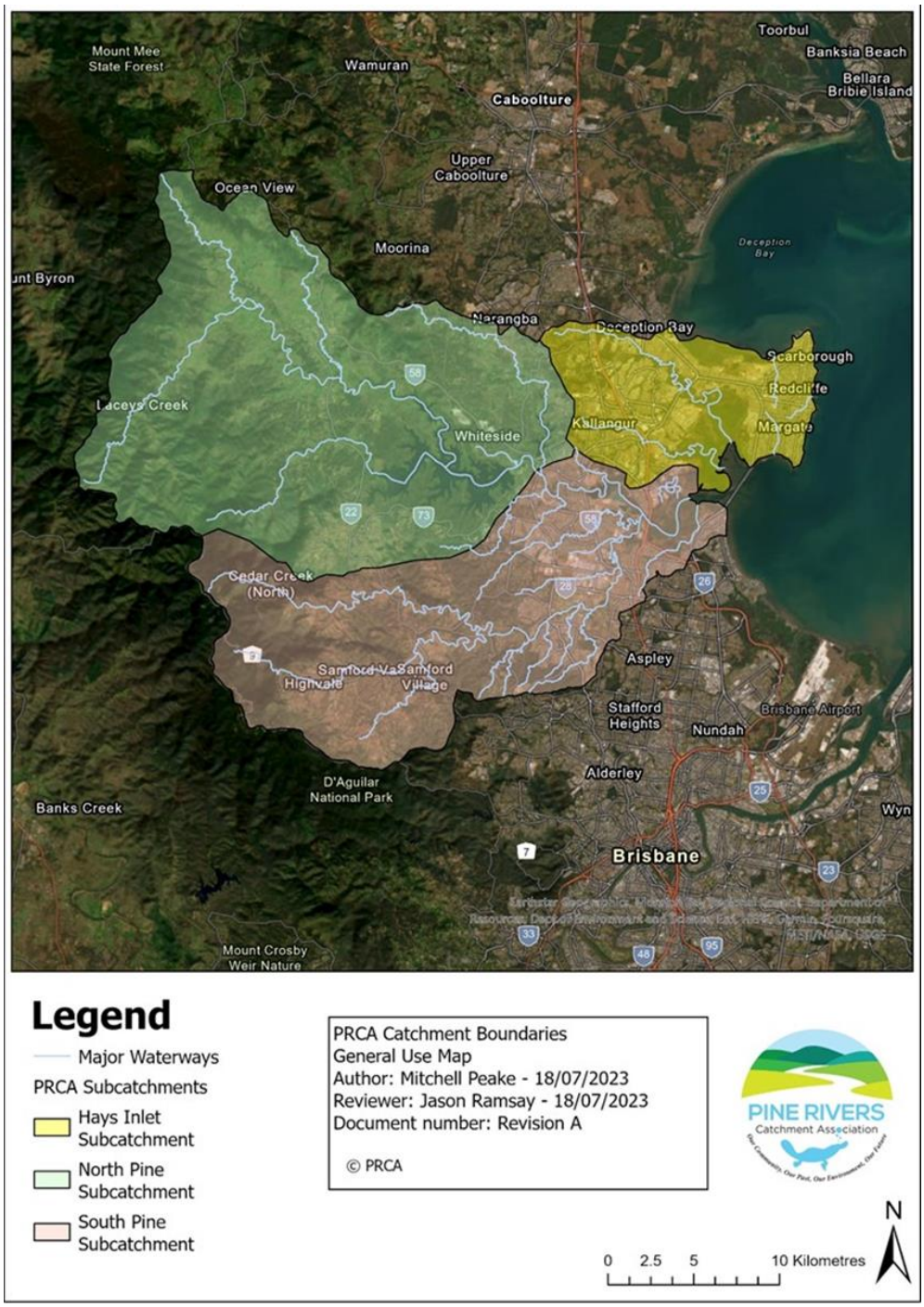

Figure 2: The Pine Catchment

2 OBJECTIVES

The broad aims of the RiverWatch Pine Rivers program are as follows:

1. To inform management of the catchment's streams, through the collection and analysis of water quality and general ecosystem health data.

2. To assess the condition of the catchment's riverine ecosystems.

3. To supplement the existing water quality monitoring programs in the catchment by providing greater spatial and temporal resolution than would otherwise be available.

4. To encourage greater community education and participation in citizen science.

More specifically, the purposes of this report are to present the results of the first 6 months of surveys for the RiverWatch Pine Rivers program (January 2025 – June 2025, hereafter referred to as the reporting period). The results presented in this report are clearly limited in their temporal scope and should be interpreted with this in mind. Future reports will provide more detailed analyses and discussion once we have sufficient data to draw more meaningful conclusions.

3 METHODOLOGY

3.1 DATA COLLECTION

3.1.1 Habitat Assessment

Rapid habitat assessments were conducted during each survey to provide site-specific context and support interpretation of biological data. For freshwater sites, the Queensland Government's *Habitat Assessment Field Sheet* was used to evaluate macroinvertebrate habitat quality and overall site condition. Site photographs (upstream, downstream, and riparian zone) and observational notes were recorded using the Survey123 app.

3.1.2 Physiochemical Parameters – Surface Water Quality

Surface water quality was assessed through in-situ and ex-situ sampling. In-situ measurements were taken three times during the reporting period using a Horiba U-52 Multiparameter Water Quality Meter, recording parameters such as pH, DO, EC and turbidity, all of which are reported on below. The meter was calibrated bi-monthly and between freshwater and estuarine sampling, following manufacturer guidelines and the *Monitoring and Sampling Manual: Environmental Protection (Water) Policy* (DES 2018).

Sampling was conducted as close to the mid-channel as possible, with the probe lowered to approximately 30 cm depth until readings stabilized. Data were logged directly into the meter.

3.1.3 Grab Sampling (Ex-situ) – Surface Water Quality

Grab samples were collected twice during the reporting period—once during the wet season (January 2025) and once during the late wet season (May–July)—immediately after in-situ measurements. The 2024-2025 summer saw above average rainfall, and the timing of our comprehensive field surveys were heavily dictated by short periods of baseline flow. Sampling containers were pre-labelled with site codes and dates. Samples were collected ~30 cm below the water surface, upstream and into the flow, to minimize contamination. Preserved samples were transferred from a clean jar into containers with preservatives. Samples were registered in the ALS Compass app and analysed ex-situ by ALS Environmental at Stafford. The parameters sampled through grab sampling and reported on in this report are:

- Total Nitrogen
- Total Phosphorus
- Reactive phosphorus (biologically available phosphorus)

QAQC procedures followed DES (2018) guidelines. Powder-free gloves were worn during sampling. One field blank and one field replicate were collected per round to assess contamination and consistency.

3.1.4 Aquatic Macroinvertebrates

Macroinvertebrate sampling was conducted to assess stream ecological health, following the AUSRIVAS methodology (DNRM 2001) with PRCA adaptations. Sampling occurred twice within the reporting period at freshwater sites with sufficient water, timed at least 4 weeks post-flooding. Estuarine sites were excluded from macroinvertebrate sampling.

Each survey site spanned 50 m (25 m upstream and downstream). Macroinvertebrates were collected using a 250 µm dip net over a 10 m stretch of each habitat type. The kick-sweep method was used in bed and riffle habitats; edge habitats were sampled using targeted sweeps.

Specimens were preserved in 70% methylated spirits and returned to the laboratory. Samples were sieved, washed, and sorted. Macroinvertebrates were collected with forceps and preserved. At least 10% of samples were rechecked by a second operator, with <10% variation in taxa richness considered acceptable from a QAQC perspective.

Specimens were identified to the lowest practical taxonomic level, preferably family, using taxonomic keys. Identification data were recorded and entered into a spreadsheet. A voucher collection was developed to support future verification.

3.2 Site Details

Twenty-three sites were selected via desktop analysis and field inspection (Figure 2). All were publicly accessible except one with landholder permission. Of these, 15 sites were used for grab sampling, 23 for in-situ sampling, and 17 for macroinvertebrate surveys. Table 1 identifies the location and collection types for each site, in addition to the Environmental Value (EV) Zones for the determination of water quality objectives (WQOs) according to the *Environmental Protection (Water and Wetland Biodiversity) Policy 2019* (DES 2022). A detailed description of each site can be found in Appendix A.

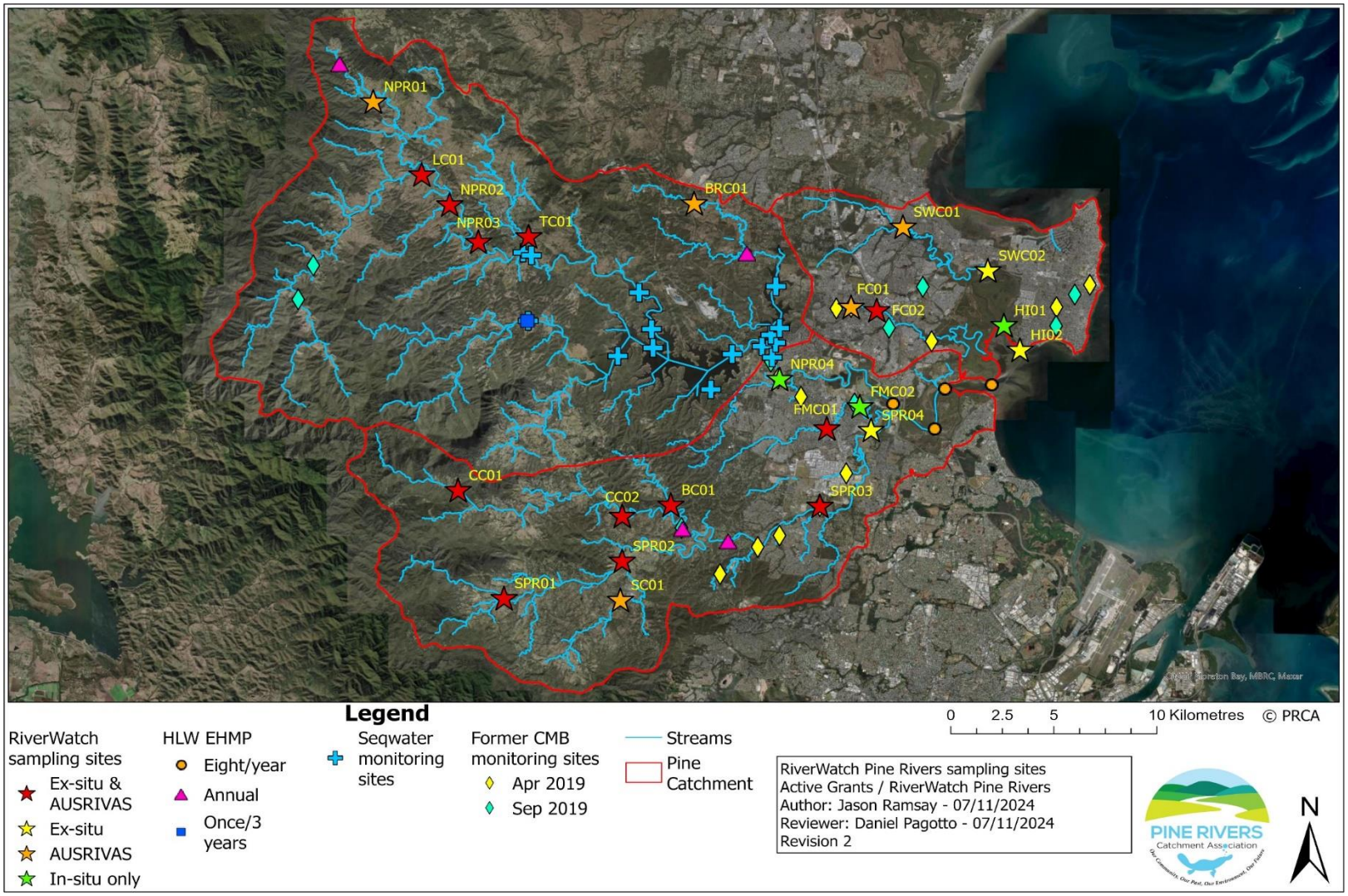

Figure 3: The RiverWatch sampling sites in the context of the existing water quality monitoring programs in the Pine Catchment

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Table 1 Survey site names, locations, sample types, Environmental Value Zones and biological WQO water types for the determination of WQOs as prescribed by the Environmental Protection (Water and Wetland Biodiversity) Policy 2019 (DES 2022)

Sub-catchment	Site	Stream	Latitude	Longitude	Ex-situ	In-situ	AUSRIVAS	Water type	EV Zone	Management intent/Level of protection	Biological WQO water type
South Pine Catchment	SPR01	South Pine River	-27.3773	152.8242	Y	Y	Y	Lowland fresh waters	Upper South Pine River Fresh Waters	Moderately disturbed	Lowland freshwater
South Pine Catchment	SPR02	South Pine River	-27.359926	152.882239	Y	Y	Y	Lowland fresh waters	Upper South Pine River Fresh Waters	Moderately disturbed	Lowland freshwater
South Pine Catchment	SPR03	South Pine River	-27.334291	152.979261	Y	Y	Y	Lowland fresh waters	Lower South Pine River Fresh Waters	Moderately disturbed	Lowland freshwater
South Pine Catchment	SPR04	South Pine River	-27.29882	153.004401	Y	Y	N	Middle estuary	South Pine River Middle Estuary	Moderately disturbed	N/A
South Pine Catchment	CC01	Cedar Creek	-27.332168,	152.807273	Y	Y	Y	Lowland fresh waters	Cedar Creek	Moderately disturbed	Lowland freshwater
South Pine Catchment	CC02	Cedar Creek	-27.32781,	152.86459	Y	Y	Y	Lowland fresh waters	Cedar Creek	Moderately disturbed	Lowland freshwater
South Pine Catchment	BC01	Branch Creek	-27.333833	152.906061	Y	Y	Y	Lowland fresh waters	Cedar Creek	Moderately disturbed	Lowland freshwater
South Pine Catchment	FMC01	Four Mile Creek	-27.298069,	152.982662	Y	Y	Y	Lowland fresh waters	Lower North Pine River Fresh Waters	Moderately disturbed	Lowland freshwater

Sub-catchment	Site	Stream	Latitude	Longitude	Ex-situ	In-situ	AUSRIVAS	Water type	EV Zone	Management intent/Level of protection	Biological WQO water type
South Pine Catchment	FMC02	Four Mile Creek	-27.286327	152.996624	N	Y	N	Middle estuary	South Pine River Upper Estuary	Moderately disturbed	N/A
North Pine Catchment	NPR02	North Pine River	-27.193297	152.797755	Y	Y	Y	Lowland fresh waters	Upper North Pine River Fresh Waters	Moderately disturbed	Lowland freshwater
North Pine Catchment	NPR03	North Pine River	-27.210741	152.811899	Y	Y	Y	Lowland fresh waters	Upper North Pine River Fresh Waters	Moderately disturbed	Lowland freshwater
North Pine Catchment	NPR04	North Pine River	-27.27473	152.95932	N	Y	N	Upper estuary	North Pine River Upper Estuary	Moderately disturbed	N/A
North Pine Catchment	LC01	Laceys Creek	-27.17926	152.7842	Y	Y	Y	Lowland fresh waters	Upper North Pine River Fresh Waters	Moderately disturbed	Lowland freshwater
North Pine Catchment	TC01	Terrors Creek	-27.208259	152.836531	Y	Y	Y	Lowland fresh waters	Upper North Pine River Fresh Waters	Moderately disturbed	Lowland freshwater
North Pine Catchment	BRC01	Browns Creek	-27.192859	152.91768	N	Y	Y	Lowland fresh waters	Kurwongbah Creek	Moderately disturbed	Lowland freshwater
Hays Inlet Catchment	FC01	Freshwater Creek	-27.241526	152.994221	N	Y	Y	Lowland fresh waters	Saltwater Creek and Fresh Water	Moderately disturbed	Lowland freshwater

Sub-catchment	Site	Stream	Latitude	Longitude	Ex-situ	In-situ	AUSRIVAS	Water type	EV Zone	Management intent/Level of protection	Biological WQO water type
									Creek Fresh Waters		
Hays Inlet Catchment	FC02	Freshwater Creek	-27.242818	153.007154	Y	Y	Y	Lowland fresh waters	Saltwater Creek and Fresh Water Creek Fresh Waters	Moderately disturbed	Lowland freshwater
Hays Inlet Catchment	SWC01	Saltwater Creek	-27.203852	153.019999	N	Y	Y	Lowland fresh waters	Saltwater Creek and Fresh Water Creek Fresh Waters	Moderately disturbed	Lowland freshwater
Hays Inlet Catchment	SWC02	Saltwater Creek	-27.224252	153.061622	Y	Y	N	Lower estuary	Pine River Middle Estuary	Moderately disturbed	N/A
Hays Inlet Catchment	HI01	Hays Inlet	-27.249709	153.069525	N	Y	N	Lower estuary	All Lower Estuary and Enclosed Coastal Waters	Moderately disturbed	N/A
Hays Inlet Catchment	HI02	Hays Inlet	-27.261335	153.077376	Y	Y	N	Lower estuary / enclosed coastal waters	All Lower Estuary and Enclosed Coastal Waters	Slightly disturbed	N/A

3.3 DATA ANALYSIS

3.3.1 In-situ and ex-situ water quality

In-situ and ex-situ water quality data is presented in tabular format for each parameter due to the lack of data points available during the reporting period for any further detailed analysis. This data was compared to the relevant water quality objectives (WQOs) outlined in the *Environmental Protection (Water and Wetland Biodiversity) Policy 2019* (DES 2022) for the relevant environmental values for each site. Parameters that did not meet the relevant WQO's are shaded in each table for efficient interpretation of results.

3.3.2 Macroinvertebrate indices

The following macroinvertebrate indices were calculated and presented in bar graphs for both the wet season and late-wet season surveys to assess macroinvertebrate communities:

- **Taxonomic richness.** A total count of the number of taxa identified for each site and habitat type was recorded.
- **PET (Plecoptera, Ephemeroptera and Trichoptera) taxa richness.** The PET index counts the richness of taxa belonging to these specific orders, which tend to be particularly sensitive to habitat degradation. A low score does not necessarily indicate that the stream is degraded, as these taxa are often uncommon in ephemeral streams — plecopterans are generally rare in Queensland streams, and the other two orders are often tolerant of a range of conditions.
- **Stream Invertebrate Grade Number – Average Level (SIGNAL) 2.** This index is based on the tolerance of specific macroinvertebrate taxa to disturbance. Most macroinvertebrate taxa are assigned sensitivity grade scores, which were weighted so that both taxa abundance and presence were considered. Taxa without sensitivity grades were not included in the calculation. A low SIGNAL score indicated that the taxa present were tolerant of a range of conditions, suggesting potential habitat degradation, while a high score indicates the presence of more specialist species typical of a healthy ecosystem.

3.3.3 QAQC

Quality assurance / quality control (QA/QC) measures for water quality sampling and analyses were in accordance with the *Monitoring and Sampling Manual: Environmental Protection (Water) Policy* (DES 2018) and the most current versions of other appropriate Australian Standards. This included the use of powder-free nitrile gloves, which were worn during sample container handling, to reduce the risk of sample contamination during collection.

A duplicate field sample (i.e. sample split into two) and field method blank were collected from one site during each survey, to determine the variability in results associated with field sampling. A relative percent difference (RPD) of <20% between field replicates was deemed acceptable (where the values were more than five to ten times the laboratory limit of reporting) (DES 2018). The laboratory also completed quality control measures including analysis of blanks, spikes and duplicates.

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4 RESULTS

4.1 HABITAT BIO CONDITION RESULTS

The average Habitat Bio Condition score for each site was determined (Figure 2) and categorised as Poor (0-38), Moderate (39-74), Good (75-110) or Excellent (111-135). No sites were found to be in poor condition. Three sites (FC01, SWC01, TC01) were found to be in moderate condition. Of these, sites FC01 and SWC01 are both located in urbanised environments at the lower end of the catchment. Nine sites were found to be in good condition (FC02, FMC01, SPR03, BC01, SPR02, BRC01, LC01, NPR02, CC02). Three sites were found to be in Excellent condition (CC01, SPR01, NPR03). These sites are located at the top of the catchment in rural environments.

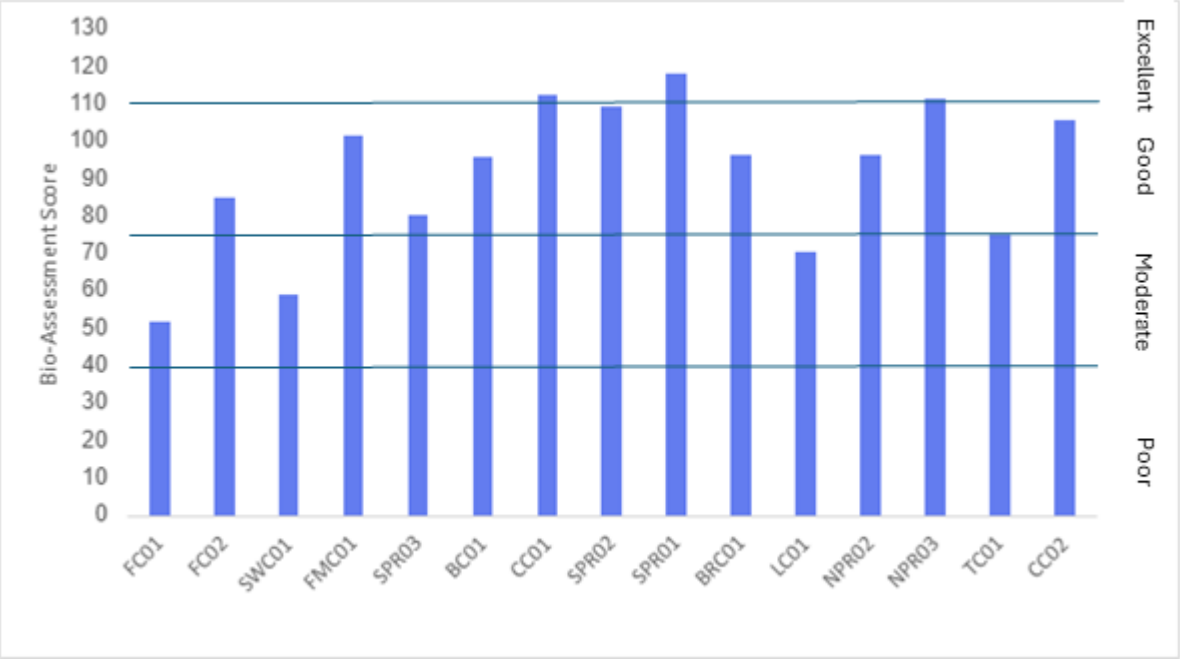

Figure 4. The average Habitat Bio Condition Results by survey site. Each site's average condition score is categorised as Poor (0-38), Moderate (39-74), Good (75-110) or Excellent (111-135).

4.2 WATER QUALITY

4.2.1 Upper North Pine River Fresh Waters; Upper South Pine River Fresh Waters; Cedar Creek

4.2.1.1 Nitrogen

Total Nitrogen results across the nine sites and two monitoring periods are presented in Table 2.

Total Nitrogen in January 2025 ranged from 0.005 mg/L to 0.1 mg/L across the nine sites. Five of the sites were above the WQO of 0.22 mg/L (CC02, SPR01, SPR02, TC01, BC01). June readings ranged from 0.1 mg/L to 0.6 mg/L with seven sites higher than the WQO

(CC01, LC01, NPR02, NPR03, SPR02, TC01, BC01). Sites found to be above the WQO in both January and June were SPR02, TC01 and BC01.

Table 2. Total Nitrogen results for Upper Freshwater Sites

Monitoring Period	Units	WQO	CC01	CC02	LC01	NPR02	NPR03	SPR01	SPR02	TC01	BC01
January	mg/L	0.22	0.1	0.5	0.1	0.005	0.005	0.3	0.6	0.3	0.5
June	mg/L	0.22	0.4	0.2	0.3	0.4	0.3	0.1	0.3	0.6	0.5

Grey shading denotes values that are above the relevant WQO / WQO range; blue shading denotes values that are below the relevant WQO / WQO range.

4.2.1.2 Phosphorus

Total Phosphorus results across the nine sites and two monitoring periods is presented in Table 3.

Total Phosphorous in January ranged from 0.005 mg/L to 0.7 mg/L across the 9 sites. Six sites were above the WQO of 0.016 mg/L (CC01, CC02, SPR01, SPR02, TC01, BC01). June readings ranged from 0.005 mg/L to 0.02 mg/L with 8 sites recording higher than the WQO (CC01, CC02, LC01, NPR02, NPR03, SPR01, SPR02, TC01). Sites that recorded above WQO results in both January and June were CC01, CC02, SPR01, SPR02 and TC01.

Table 3. Total Phosphorous results for Upper Freshwater Sites 2025

Monitoring Period	Units	WQO	CC01	CC02	LC01	NPR02	NPR03	SPR01	SPR02	TC01	BC01
Total Phosphorus	mg/L	0.016	0.03	0.05	0.005	0.005	0.005	0.04	0.7	0.06	0.04
Total Phosphorus	mg/L	0.016	0.04	0.03	0.04	0.04	0.02	0.04	0.04	0.06	0.005

Grey shading denotes values that are above the relevant WQO / WQO range; blue shading denotes values that are below the relevant WQO / WQO range.

4.2.1.3 Reactive Phosphorous

Reactive Phosphorus results across nine sites and two monitoring periods are presented in Table 4.

Reactive Phosphorous in January ranged from 0.005 mg/L to 0.03 mg/L. Across the nine sites, five sites (CC01, CC02, SPR01, SPR02, TC01) exceeded the WQO of 0.007 mg/L. June readings ranged between 0.005 mg/L and 0.02mg/L. Sites NPR03 and TC01 recorded above the WQO of 0.007 mg/L. Across both readings, TC01 consistently exceeded the WQO.

Table 4. Reactive Phosphorus results for Upper Freshwater Sites 2025

Monitoring Period	Units	WQO	CC01	CC02	LC01	NPR02	NPR03	SPR01	SPR02	TC01	BC01
January	mg/L	0.007	0.01	0.01	0.005	0.005	0.005	0.01	0.02	0.03	0.005
June	mg/L	0.007	0.005	0.005	0.005	0.005	0.02	0.005	0.005	0.02	0.005

Grey shading denotes values that are above the relevant WQO / WQO range; blue shading denotes values that are below the relevant WQO / WQO range.

4.2.1.4 Turbidity

Turbidity results across the nine sites and three monitoring periods are presented in Table 5.

Turbidity in January ranged from 0 NTU to 7.6 NTU across the nine sites. Only one site was higher than the WQO of 5 NTU (CC02). LCO1 April readings ranged from 4NTU to 14.2 NTU across the 9 sites with five sites recording above the WQO (CC02, NPR02, NPR03, SPR02, TC01). While June readings ranged from 0.6 NTU to 13.5 NTU with two sites recording above the WQO (NPR02, SPR02). No sites recorded above the WQO in across all three months. However, site CC02 recorded above WQO in January and April, and below the WQO in June. Additionally, Site NPR02 recorded below the WQO in January but above the WQO in April and June.

Table 5. Turbidity results for Upper Freshwater Sites 2025

Monitoring Period	Units	WQO	CC01	CC02	LC01	NPR02	NPR03	SPR01	SPR02	TC01	BC01
January	NTU	5	1.4	7.6	**0**	2.8	1	0.5	3.7	1.8	3.3
April	NTU	5	4	7	4.8	7.4	6.1	4	14.2	10.8	4.7
June	NTU	5	0.7	4.4	0.9	7.9	1.4	2.9	13.5	4	0.6

Grey shading denotes values that are above the relevant WQO / WQO range; blue shading denotes values that are below the relevant WQO / WQO range.

4.2.1.5 PH

pH results across the nine sites and three monitoring periods are presented in Table 6.

January pH results ranged from 6.8 to 7.94 across the nine sites. All sites were within the WQO's. April readings ranged from 7.11 to 8.1 with only site NPR02 above the WQO. June readings ranged from 6.94 to 7.92 with all sites within the WQO's.

Table 6. pH results for Upper Freshwater Sites 2025

Monitoring Period	Units	WQO	CC01	CC02	LC01	NPR02	NPR03	SPR01	SPR02	TC01	BC01
January	pH units	6.5 – 8	7.7	7.43	6.8	7.43	7.63	7.94	7.57	7.36	7.4
April	pH units	6.5 – 8	7.65	7.57	7.11	8.01	7.51	7.63	7.36	7.61	7.34
June	pH units	6.5 – 8	7.86	7.39	6.94	7.51	7.72	7.84	7.3	7.92	7.34

Grey shading denotes values that are above the relevant WQO / WQO range; blue shading denotes values that are below the relevant WQO / WQO range.

4.2.1.6 Electrical conductivity

Electrical Conductivity results across the nine sites and three monitoring periods is presented in Table 7.

January EC ranged from 138 µS/cm to 530 µS/cm. Across the nine sites only one site (TC01) was found to be above the WQO of 290 µS/cm. April readings ranged from 139 µS/cm to 433 µS/cm with only one site (TC01) exceeding the WQO's. While June readings ranged from 160 µS/cm to 550 µS/cm with four sites above the WQO's (SPR01, SPR02, TC01, BC01). Site TC01 recorded above the WQO target across all 3 readings.

Table 7. Electrical conductivity results for Upper Freshwater Sites 2025

Monitoring Period	Units	WQO	CC01	CC02	LC01	NPR02	NPR03	SPR01	SPR02	TC01	BC01
January	µS/cm	290	138	204	235	246	245	248	269	530	227
April	µS/cm	290	139	196	209	204	189	235	245	433	227
June	µS/cm	290	160	249	249	246	233	316	348	550	392

Grey shading denotes values that are above the relevant WQO / WQO range; blue shading denotes values that are below the relevant WQO / WQO range.

4.2.1.7 Dissolved oxygen

Dissolved Oxygen results across the nine sites and three monitoring periods is presented in Table 8.

Dissolved Oxygen in January ranged from 66.6 % Sat to114.4 % Sat. Across the nine sites only one site (NPR03) was within the accepted WQO range. Three sites (CC01, SPR01, SPR02) exceeded the maximum WQO limit of 110 % Sat, while five sites (CC02, LC01, NPR02, TC01, BC01) were under the WQO minimum of 85 % Sat. April readings ranged from 76.8 % Sat to 130 % Sat. One site exceeded the maximum value of 110 % Sat (NPR02) while five sites were below the minimum value of 85 % Sat (CC01, CC02, LC01, TC01, BC01). June results ranged from 60.1 % Sat to 100.9 % Sat with three sites (CC01, CC02, LC01) recording below the minimum WQO range. Across the three months only one site (NPR03) was consistently within the accepted WQO range, while sites CC02 and LC01 were consistently below the WQO.

Significant variation in % Sat was observed in Sites CC01 and NPR02. Sites TC01 and BC01 were below the minimum WQO for both January and April and within range for June. While Site CC01 exceeded the maximum range in January, it was below the minimum range in April and June.

Table 8. Dissolved Oxygen results for Upper Freshwater Sites 2025

Monitoring Period	Units	WQO	CC01	CC02	LC01	NPR02	NPR03	SPR01	SPR02	TC01	BC01
January	% sat.	85 – 110	112.6	66.6	72.7	83.3	106.7	114.4	113.3	49.7	61.2
April	% sat.	85 – 110	82.8	81.1	80.4	130.5	95.5	94.1	87.5	76.8	78.6
June	% sat.	85 – 110	84.6	84.1	60.1	97.9	100.9	90.1	84.4	85.5	93.5

Grey shading denotes values that are above the relevant WQO / WQO range; blue shading denotes values that are below the relevant WQO / WQO range.

4.2.2 Lower North Pine River Fresh Waters; Lower South Pine River Fresh Waters; Saltwater Creek and Fresh Water Creek Fresh Waters

4.2.2.1 Nitrogen

Total Nitrogen results for the five sites and two monitoring periods are presented in Table 9. It is important to note that no results were recorded for two Sites (FC01, SWC01) in January and June.

In January, Total Nitrogen varied from 0.6 mg/L to 1.5 mg/L while June readings ranged from 0.6 mg/L to 0.8 mg/L. All sites with data were above the accepted WQO of 0.3 mg/L in January and June.

Table 9. Total Nitrogen results in the Lower Fresh Waters Sites 2025

Monitoring Period	Units	WQO	FC01	FC02	SWC01	FMC01	SPR03
January	mg/L	0.3	Na	1.5	Na	1	0.6
June	mg/L	0.3	NA	0.6	NA	0.8	0.7

Grey shading denotes values that are above the relevant WQO / WQO range; blue shading denotes values that are below the relevant WQO / WQO range.

4.2.2.2 Phosphorus

Total Phosphorus results are presented in Table 10. Across the five monitoring sites, no results were recorded for two Sites (FC01, SWC01) in January and June.

In January, Total Phosphorus varied from 0.04 mg/L to 0.1 mg/L. All sites with data recorded above the accepted WQO of 0.025 mg/L. June readings ranged from 0.02 mg/L to 0.04mg/L with one site (SPR03) above the WQO threshold. Across both monitoring periods, site SPR03 was consistently above the WQO.

Table 10. Total Phosphorus results in the Lower Fresh Waters Sites 2025

Monitoring Period	Units	WQO	FC01	FC02	SWC01	FMC01	SPR03
January	mg/L	0.025	NA	0.04	NA	0.07	0.1
June	mg/L	0.025	NA	0.02	NA	0.02	0.04

Grey shading denotes values that are above the relevant WQO / WQO range; blue shading denotes values that are below the relevant WQO / WQO range.

4.2.2.3 Reactive Phosphorus

Reactive Phosphorus results are presented in Table 11. Across the five monitoring sites, no results were recorded for two Sites (FC01, SWC01) in January and June.

Reactive phosphorus varied from 0.005 mg/L to 0.1 mg/L in January and 0.005 mg/L to 0.01 mg/L in June. Site FMC01 was below the accepted WQO in January of 0.006 mg/L but within the threshold in June, while Site SPR03 was consistently above the accepted threshold.

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Table 11. Reactive Phosphorus results in the Lower Fresh Water Sites 2025

Monitoring Period	Units	WQO	FC01	FC02	SWC01	FMC01	SPR03
January	mg/L	0.006	NA	0.005	NA	0.01	0.1
June	mg/L	0.006	NA	0.005	NA	0.005	0.01

Grey shading denotes values that are above the relevant WQO / WQO range; blue shading denotes values that are below the relevant WQO / WQO range.

4.2.2.4 Turbidity

Turbidity results for the five sites and three monitoring periods are presented in Table 12.

Turbidity readings in January ranged from 5 NTU to 28 NTU. Of the five monitoring sites four were above the WQO of 5 NTU (FC01, FC02, SWC01, SPR03). April readings ranged from 4.2 NTU to 260 NTU. Three sites were above the WQO's (FC01, SWC01, SPR03) of 5 NTU. Sites SWC01 and SPR03 were found to be significantly above the WQO with readings of 23.4 NTU and 260 NTU respectively. June results ranged from 3.2 NTU to 23.7 NTU with four sites out of the five above the WQO (FC01, SWC01, FMC01, SPR03).

Across all monitoring periods, sites FC01, SWC01 and SPR03 were consistently above the WQO, with sites SWC01 and SPR03 significantly higher than the accepted threshold.

Table 12. Turbidity results in the Lower Fresh Water sites 2025

Monitoring Period	Units	WQO	FC01	FC02	SWC01	FMC01	SPR03
January	NTU	5	19.1	12.7	28	5	17.1
April	NTU	5	5.1	4.6	23.4	4.2	260
June	NTU	5	10	3.2	23.7	8.4	7.3

Grey shading denotes values that are above the relevant WQO / WQO range; blue shading denotes values that are below the relevant WQO / WQO range.

4.2.2.5 pH

Water pH results for the five sites and three monitoring periods are presented in Table 13.

January pH ranged from 6.2 to 7.06 with three sites (FC01, FC02, SWC01) below the WQO range of 6.5 to 8. April pH ranged from 6.76 to 7.09 with all sites within the accepted WQO range. June pH ranged from 5.65 to 6.94 with two sites (FC01, FMC01) below the accepted WQO range. Variability was observed across all monitoring periods however only SPR03 was within the accepted WQO range for all monitoring periods.

Table 13. pH results for Lower Fresh Water Sites 2025

Monitoring Period	Units	WQO	FC01	FC02	SWC01	FMC01	SPR03
January	pH units	6.5 – 8	6.4	6.2	6.39	6.61	7.06
April	pH units	6.5 – 8	7.1	6.87	6.83	6.76	7.09
June	pH units	6.5 – 8	6.36	6.7	6.76	5.65	6.94

Grey shading denotes values that are above the relevant WQO / WQO range; blue shading denotes values that are below the relevant WQO / WQO range.

4.2.2.6 Electrical conductivity

Electrical Conductivity results for the five sites and three monitoring periods are presented in Table 14. January results ranged from 187µS/cm to 330µS/cm. April readings ranged from 1µS/cm to 461 µS/cm. June readings ranged from 348 µS/cm to 57 µS/cm. Sites FC01 and FC02 were above the accepted range of 390 µS/cm in April and June.

Table 14. Electrical Conductivity results for Lower Fresh Water sites 2025

Monitoring Period	Units	WQO	FC01	FC02	SWC01	FMC01	SPR03
January	µS/cm	390	330	297	187	260	244
April	µS/cm	390	461	398	272	310	1
June	µS/cm	390	570	494	351	348	363

Grey shading denotes values that are above the relevant WQO / WQO range.

4.2.2.7 Dissolved oxygen

Dissolved Oxygen (DO) results for the five sites and three monitoring periods are presented in Table 15.

January readings for DO range from 77.8 % Sat to 119.3 % Sat. Site SPR03 was below the accepted WQO range, while Sites FC01, FC02 and FMC01 were above the accepted WQO of 85 to 110 % Sat.

DO in April ranged from 53.8 % Sat to 115.6 %Sat. Two sites were below the WQO (FC01, FMC01) and one site above the WQO (SWC01).

June readings ranged from 48.3 % Sat to 110.6 % Sat with three sites below the WQO (FC02, SWC01, FMC01).

Variability above and below the accepted WQO for Dissolved oxygen was observed across all sites and monitoring periods with no sites consistently recording within the WQO range across the monitoring periods. Site FMC01 was found to be either above (January) or below (April, June) the accepted range.

Table 15. Dissolved Oxygen results in the Lower Fresh Water sites 2025

Monitoring Period	Units	WQO	FC01	FC02	SWC01	FMC01	SPR03
January	% sat.	85 – 110	113.1	119.3	108.1	113.7	77.8
April	% sat.	85 – 110	53.8	106.3	115.6	74.1	96.9
June	% sat.	85 – 110	110.6	48.3	56.4	70.2	92.8

Grey shading denotes values that are above the relevant WQO / WQO range; blue shading denotes values that are below the relevant WQO / WQO range.

4.2.3 Kurwongbah Creek

4.2.3.1 Turbidity

Turbidity results for the three monitoring periods are presented in Table 16. Turbidity was higher than the WQO of 5 NTU across the three monitoring periods with the highest reading in June (34.7 NTU) followed by January (15.7 NTU).

Table 16. Turbidity results in the Kurwongbah Creek site 2025

Monitoring period	Units	WQO	BRC01
January	NTU	5	15.7
April	NTU	5	5.6
June	NTU	5	34.7

Grey shading denotes values that are above the relevant WQO / WQO range; blue shading denotes values that are below the relevant WQO / WQO range.

4.2.3.2 PH

Water pH results for the three monitoring periods are presented in Table 17. The pH ranged from 6.9 to 7.28 and was within the WQO for all three monitoring periods.

Table 17. PH results in the Kurwongbah Creek Site 2025

Monitoring period	Units	WQO	BRC01
January	pH units	6.5 – 8	7.28
April	pH units	6.5 – 8	6.9
June	pH units	6.5 – 8	7.25

Grey shading denotes values that are above the relevant WQO / WQO range; blue shading denotes values that are below the relevant WQO / WQO range.

4.2.3.3 Electrical conductivity

Electrical Conductivity (EC) results for the three monitoring periods are presented in Table 18. EC ranged from 263 µS/cm to 506 µS/cm with April and June readings significantly above the accepted WQO.

Table 18. Electrical Conductivity results in the Kurwongbah Creek Site 2025

Monitoring period	Units	WQO	BRC01
January	µS/cm	330	263
April	µS/cm	330	463
June	µS/cm	330	506

Grey shading denotes values that are above the relevant WQO / WQO range.

4.2.3.4 Dissolved oxygen

Dissolved Oxygen (DO) results are presented in Table 19. DO ranged from 63.7 %Sat to 83.6 %Sat. All readings were below the accepted range for the WQO.

Table 19. Dissolved oxygen results for the Kurwongbah Creek site 2025

Monitoring period	Units	WQO	BRC01
January	% sat.	85 – 110	65.5
April	% sat.	85 – 110	83.6
June	% sat.	85 – 110	63.7

Grey shading denotes values that are above the relevant WQO / WQO range; blue shading denotes values that are below the relevant WQO / WQO range

4.2.4 North Pine River Upper Estuary

4.2.4.1 Turbidity

Turbidity results for the North Pine River Upper Estuary are presented in Table 20. Turbidity ranged from 20.4 NTU to 8 NTU. While turbidity decreased from January to June all recordings were above the WQO.

Table 20. Turbidity results for the North Pine River Upper Estuary site 2025

Monitoring period	**Units**	**WQO**	**NPR04**
January	NTU	6	20.4
April	NTU	6	8.3
June	NTU	6	8

Grey shading denotes values that are above the relevant WQO / WQO range; blue shading denotes values that are below the relevant WQO / WQO range.

4.2.4.2 PH

North Pine River Upper Estuary pH results are presented in Table 21. The pH ranged from 7.38 to 7.51 with all three readings within the WQO range of 7 to 8.4.

Table 21. pH results for the North Pine River Upper Estuary site 2025

Monitoring period	Units	WQO	NPR04
January	pH units	7-8.4	7.43
April	pH units	7-8.4	7.38
June	pH units	7-8.4	7.51

Grey shading denotes values that are above the relevant WQO / WQO range; blue shading denotes values that are below the relevant WQO / WQO range

4.2.4.3 Electrical conductivity

Electrical Conductivity results are presented in Table 22.

Electrical Conductivity ranged from 253µS/cm to 452µS/cm. There were no WQO identified for this parameter in the North Pine River Estuary.

Table 22. Electrical conductivity in the North Pine River Upper Estuary site 2025

Monitoring period	Units	WQO	NPR04
January	µS/cm	NA	253
April	µS/cm	NA	294
June	µS/cm	NA	452

Grey shading denotes values that are above the relevant WQO / WQO range; blue shading denotes values that are below the relevant WQO / WQO range

4.2.4.4 Dissolved oxygen

Dissolved Oxygen results for the North Pine River Upper Estuary results are presented in Table 23.

Dissolved Oxygen ranged from 77.5 % sat to 109.1 % Sat. An increasing trend was observed across the three monitoring periods with January recording below the WQO and June recording above the WQO.

Table 23. Dissolved Oxygen results for the North Pine River Upper Estuary site 2025

Monitoring period	Units	WQO	NPR04
January	% sat.	85 – 105	77.5
April	% sat.	85 – 105	97.5
June	% sat.	85 – 105	109.1

Grey shading denotes values that are above the relevant WQO / WQO range; blue shading denotes values that are below the relevant WQO / WQO range

4.2.5 South Pine River Upper Estuary

4.2.5.1 Turbidity

Turbidity results for the South Pine River Upper Estuary are presented in Table 24.

Turbidity ranged from 17.8 NTU to 51 NTU with an increasing trend across the three monitoring periods. All three recordings were above the WQO for this site.

Table 24. Turbidity in the South Pine River Upper Estuary site 2025

Monitoring period	Units	WQO	FMC02
January	NTU	5	17.8
April	NTU	5	18.8
June	NTU	5	51

Grey shading denotes values that are above the relevant WQO / WQO range; blue shading denotes values that are below the relevant WQO / WQO range

4.2.5.2 PH

The pH results in the South Pine River Upper Estuary site are presented in Table 25.

The pH ranged from 6.35 to 6.79 with an increasing trend across the three monitoring periods and all three recordings below the WQO range.

Table 25. PH in the South Pine River Upper Estuary site 2025

Monitoring period	Units	WQO	FMC02
January	pH units	7-8.4	6.35
April	pH units	7-8.4	6.45
June	pH units	7-8.4	6.79

Grey shading denotes values that are above the relevant WQO / WQO range; blue shading denotes values that are below the relevant WQO / WQO range.

4.2.5.3 Electrical conductivity

Electrical Conductivity results in the South Pine River Upper Estuary site are presented in Table 26.

Electrical conductivity ranged from 278 µS/cm to 489 µS/cm with an increasing trend across all three monitoring periods. There were no WQO's for this site.

Table 26. Electrical Conductivity in the South Pine River Upper Estuary site 2025

Monitoring period	Units	WQO	FMC02
January	µS/cm	NA	278
April	µS/cm	NA	317

June	µS/cm	NA	489

Grey shading denotes values that are above the relevant WQO / WQO range; blue shading denotes values that are below the relevant WQO / WQO range.

4.2.5.4 Dissolved oxygen

Dissolved Oxygen results in the South Pine River Upper Estuary site are presented in Table 27.

Dissolved oxygen ranged from 43 % Sat (April) to 59.4 % Sat (January). All three recordings were below the WQO range for this site of 85 to 105 % Sat.

Table 27. Dissolved Oxygen in the South Pine River Upper Estuary site 2025

Monitoring period	Units	WQO	FMC02
January	% sat.	85 – 105	59.4
April	% sat.	85 – 105	43
June	% sat.	85 – 105	49.6

Grey shading denotes values that are above the relevant WQO / WQO range; blue shading denotes values that are below the relevant WQO / WQO range.

4.2.6 South Pine River Middle Estuary

4.2.6.1 Nitrogen

Total Nitrogen results for the South Pine River Middle Estuary are presented in Table 28.

Total Nitrogen was found to be 0.8 mg/L for both monitoring periods and above the WQO of 0.3mg/L for this site.

Table 28. Nitrogen in the South Pine River Middle Estuary site 2025

Monitoring period	Units	WQO	SPR04
January	mg/L	0.3	0.8
June	mg/L	0.3	0.8

Grey shading denotes values that are above the relevant WQO / WQO range; blue shading denotes values that are below the relevant WQO / WQO range

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4.2.6.2 Phosphorus

Total Phosphorus results for the South Pine River Middle Estuary are presented in Table 29.

Total Phosphorus varied from 0.11 mg/L and 0.06 mg/L with both recordings above the WQO of 0.025mg/L for this site.

Table 29. Total Phosphorus in the South Pine River Middle Estuary site 2025

Monitoring period	Units	WQO	SPR04

January	mg/L	0.025	0.11
June	mg/L	0.025	0.06

Grey shading denotes values that are above the relevant WQO / WQO range; blue shading denotes values that are below the relevant WQO / WQO range.

4.2.6.3 Reactive Phosphorus

Reactive phosphorus results for the South Pine River Middle Estuary are presented in Table 30.

Reactive phosphorus varied from 0.04 mg/l (January) to 0.005 mg/L (June). January recorded above the WQO of 0.006 mg/L, however the RP had declined to within the WQO by June.

Table 30. Reactive phosphorus in the South Pine River Middle Estuary site 2025

Monitoring period	Units	WQO	SPR04
January	mg/L	0.006	0.04
June	mg/L	0.006	0.005

Grey shading denotes values that are above the relevant WQO / WQO range; blue shading denotes values that are below the relevant WQO / WQO range.

4.2.6.4 Turbidity

Turbidity results for the South Pine River Middle Estuary are presented in Table 31.

Turbidity ranged from 16.7 NTU (April) to 168 NTU (June). All three recordings were above the WQO for this site of 4 NTU.

Table 31. Turbidity in the South Pine River Middle Estuary site 2025

Monitoring period	Units	WQO	SPR04
January	NTU	4	21.8
April	NTU	4	16.7
June	NTU	4	168

Grey shading denotes values that are above the relevant WQO / WQO range; blue shading denotes values that are below the relevant WQO / WQO range.

4.2.6.5 PH

PH results for the South Pine River Middle Estuary are presented in Table 32.

The pH ranged from 7.06 (April) to 7.76 (June) with all three recordings within the WQO range for this site of 7 to 8.4.

Table 32. PH in the South Pine River Middle Estuary site 2025

Monitoring period	Units	WQO	SPR04

January	pH units	7-8.4	7.41
April	pH units	7-8.4	7.06
June	pH units	7-8.4	7.76

Grey shading denotes values that are above the relevant WQO / WQO range; blue shading denotes values that are below the relevant WQO / WQO range.

4.2.6.6 Electrical conductivity

Electrical Conductivity results for the South Pine River Middle Estuary are presented in Table 33.

Electrical Conductivity ranged from 1940 µS/cm to 2700 µS/cm. There were no WQO identified for this site.

Table 33. Electrical Conductivity in the South Pine River Middle Estuary site 2025

Monitoring period	Units	WQO	SPR04
January	µS/cm	NA	1940
April	µS/cm	NA	1570
June	µS/cm	NA	2700

Grey shading denotes values that are above the relevant WQO / WQO range; blue shading denotes values that are below the relevant WQO / WQO range.

4.2.6.7 Dissolved oxygen

Dissolved Oxygen results for the South Pine River Middle Estuary are presented in Table 34.

Dissolved Oxygen ranged from 72.7 % Sat to 76 %Sat with an increasing trend from January to June. All three recordings were below the WQO range for this site of 85 % Sat to 110 % Sat.

Table 34. Dissolved Oxygen in the South Pine River Middle Estuary site 2025

Monitoring period	Units	WQO	SPR04
January	% sat.	85 – 105	72.7
April	% sat.	85 – 105	77
June	% sat.	85 – 105	76

Grey shading denotes values that are above the relevant WQO / WQO range; blue shading denotes values that are below the relevant WQO / WQO range.

4.2.7 Pine River Middle Estuary

4.2.7.1 Nitrogen

Total Nitrogen results for the Pine River Middle Estuary are presented in Table 35.

Total Nitrogen varied from 0.25 mg/L to 1.3 mg/L. January recorded above the WQO for this site of 0.26 mg/L; however, this the TN level declined by June to be below the WQO.

Table 35. Total Nitrogen in the Pine River Middle Estuary Site 2025

Monitoring period	Units	WQO	SWC02
January	mg/L	0.26	1.3
June	mg/L	0.26	0.25

Grey shading denotes values that are above the relevant WQO / WQO range; blue shading denotes values that are below the relevant WQO / WQO range.

4.2.7.2 Phosphorus

Total Phosphorus results for the Pine River Middle Estuary are presented in Table 36.

Total Phosphorus in June met the WQO for this site of 0.025mg/L.

Table 36. Total Phosphorus in the Pine River Middle Estuary Site 2025

Monitoring period	Units	WQO	SWC02
January	mg/L	0.025	NA
June	mg/L	0.025	0.025

Grey shading denotes values that are above the relevant WQO / WQO range; blue shading denotes values that are below the relevant WQO / WQO range.

4.2.7.3 Reactive phosphorus

Reactive phosphorus results for the Pine River Middle Estuary are presented in Table 37.

Reactive phosphorus varied from 0.01 mg/L (June) to 0.02 mg/L (January) and was above the WQO for this site of 0.006 mg/L.

Table 37. Reactive phosphorus in the Pine River Middle Estuary Site 2025

Monitoring period	Units	WQO	SWC02
January	mg/L	0.006	0.02
June	mg/L	0.006	0.01

Grey shading denotes values that are above the relevant WQO / WQO range; blue shading denotes values that are below the relevant WQO / WQO range.

4.2.7.4 Turbidity

Turbidity results for the Pine River Middle Estuary are presented in Table 38.

Turbidity ranged from 21.7 NTU (January) to 29.9 NTU (June) with an increasing trend across the three monitoring periods. All three results were above the WQO for this site of 5 NTU.

Table 38. Turbidity in the Pine River Middle Estuary Site 2025

Monitoring period	Units	WQO	SWC02
January	NTU	5	21.7
April	NTU	5	25.3
June	NTU	5	29.9

Grey shading denotes values that are above the relevant WQO / WQO range; blue shading denotes values that are below the relevant WQO / WQO range.

4.2.7.5 PH

PH results for the Pine River Middle Estuary are presented in Table 39.

PH ranged from 7.52 in January to 6.78 in June with a reducing trend across all three monitoring periods. January was within the WQO range with April and June below the WQO range.

Table 39. PH in the Pine River Middle Estuary Site 2025

Monitoring period	Units	WQO	SWC02
January	pH units	7 – 8.4	7.52
April	pH units	7 – 8.4	6.8
June	pH units	7 – 8.4	6.78

Grey shading denotes values that are above the relevant WQO / WQO range; blue shading denotes values that are below the relevant WQO / WQO range.

4.2.7.6 Electrical conductivity

Electrical conductivity results for the Pine River Middle Estuary are presented in Table 40.

Electrical Conductivity ranged from 17100 µ S/cm to 24700 µS/cm. There were no determined WQO's for this site.

Table 40. Electrical Conductivity in the Pine River Middle Estuary Site 2025

Monitoring period	Units	WQO	SWC02
January	µS/cm	NA	17100
April	µS/cm	NA	19300
June	µS/cm	NA	24700

Grey shading denotes values that are above the relevant WQO / WQO range; blue shading denotes values that are below the relevant WQO / WQO range.

4.2.7.7 Dissolved oxygen

Dissolved Oxygen results for the Pine River Middle Estuary are presented in Table 41.

Dissolved Oxygen ranged from 55.3 % Sat (January) to 71.2 % Sat (April). All recordings were below the WQO range for this site of 85 % Sat to 110 % Sat.

Table 41. Dissolved Oxygen in the Pine River Middle Estuary Site 2025

Monitoring period	Units	WQO	SWC02
January	% sat.	85 - 105	55.3
April	% sat.	85 - 105	71.2
June	% sat.	85 - 105	62.7

Grey shading denotes values that are above the relevant WQO / WQO range; blue shading denotes values that are below the relevant WQO / WQO range.

4.2.8 All Lower Estuary and Enclosed Coastal Waters

4.2.8.1 Nitrogen

Total Nitrogen results for All Lower Estuary and Enclosed Waters sites are presented in Table 42.

Total Nitrogen varied from 0.8 mg/L (January) to 0.25 mg/L (June) in Site HI02 and was above the WQO for this site of 0.2mg/L. No Data (NA) was recorded for Site HI01.

Table 42. Total Nitrogen in All Lower Estuary and Enclosed Waters sites 2025

Monitoring period	Units	WQO	HI01	HI02
January	mg/L	0.2	NA	0.8
June	mg/L	0.2	NA	0.25

Grey shading denotes values that are above the relevant WQO / WQO range; blue shading denotes values that are below the relevant WQO / WQO range

4.2.8.2 Phosphorus

Total Phosphorus results for All Lower Estuary and Enclosed Waters sites are presented in Table 43.

Total phosphorus for site HI02 varied from 0.16 mg/L (January) to 0.025 mg/L (June) with June results above the WQO for this site of 0.02 mg/L. No data (NA) was recorded for Site HI01.

Table 43. Total Phosphorus in All Lower Estuary and Enclosed Waters sites 2025

Monitoring period	Units	WQO	HI01	HI02
January	mg/L	0.02	NA	0.16
June	mg/L	0.02	NA	0.025

Grey shading denotes values that are above the relevant WQO / WQO range; blue shading denotes values that are below the relevant WQO / WQO range

4.2.8.3 Reactive Phosphorus

Reactive phosphorus results for All Lower Estuary and Enclosed Waters sites are presented in Table 44.

Reactive phosphorus varied from 0.03 mg/L (January) to 0.02 mg/l (June) with both monitoring periods above the WQO for this EV Zone of 0.006mg/L. No data (NA) was recorded for Site HI01.

Table 44. Reactive Phosphorus in All Lower Estuary and Enclosed Waters sites 2025

Monitoring period	Units	WQO	HI01	HI02
January	mg/L	0.006	NA	0.03
June	mg/L	0.006	NA	0.02

Grey shading denotes values that are above the relevant WQO / WQO range; blue shading denotes values that are below the relevant WQO / WQO range

4.2.8.4 Turbidity

Turbidity results for All Lower Estuary and Enclosed Waters sites are presented in Table 45.

Turbidity varied from 9 NTU to 60.1 NTU in Site HI01 and ranged from 14.1 NTU to 26.5 NTU in Site HI02. No data (NA) was recorded for June in Site HI01. All recordings for both Sites were above the WQO for this EV Zone of 4 NTU.

Table 45. Turbidity in All Lower Estuary and Enclosed Waters sites 2025

Monitoring period	Units	WQO	HI01	HI02
January	NTU	4	9	23.2
April	NTU	4	60.1	26.5
June	NTU	4	NA	14.1

Grey shading denotes values that are above the relevant WQO / WQO range; blue shading denotes values that are below the relevant WQO / WQO range

4.2.8.5 PH

PH results for All Lower Estuary and Enclosed Waters sites are presented in Table 46.

In Site HI01 the pH ranged from 7.27 to 7.72, while Site HI02 ranged from 8.06 to 8.23. All results were within the accepted WQO range for this EV Zone of 6.5 to 8.5.

Table 46. PH in All Lower Estuary and Enclosed Waters sites 2025

Monitoring period	Units	WQO	HI01	HI02
January	pH units	6.5 – 8.5	7.45	8.23
April	pH units	6.5 – 8.5	7.72	8.06
June	pH units	6.5 – 8.5	7.27	8.15

Grey shading denotes values that are above the relevant WQO / WQO range; blue shading denotes values that are below the relevant WQO / WQO range

4.2.8.6 Electrical conductivity

Electrical Conductivity results for All Lower Estuary and Enclosed Waters sites are presented in Table 47.

Electrical conductivity ranged from 18200 µS/cm to 37000 µS/cm in Site HI01 and 36900 µS/cm to 45900 µS/cm in Site HI02. Site HI01 increase in EC from January to April and

dropped in June, while HI02 showed an increasing trend in EC across the three monitoring periods. No EC WQO was determined for this EV Zone.

Table 47. Electrical conductivity in All Lower Estuary and Enclosed Waters sites 2025

Monitoring period	Units	WQO	HI01	HI02
January	µS/cm	NA	18200	36900
April	µS/cm	NA	37000	37700
June	µS/cm	NA	18200	45900

Grey shading denotes values that are above the relevant WQO / WQO range; blue shading denotes values that are below the relevant WQO / WQO range

4.2.8.7 Dissolved oxygen

Dissolved Oxygen results for All Lower Estuary and Enclosed Waters sites are presented in Table 48.

Dissolved oxygen ranged from 68 % Sat to 90.6 % Sat in Site HI01 and 95.3 %Sat to 130.6 % Sat in HI02. Site HI01 was within the WQO in January but showed a decreasing trend over April and June with results below the WQO. Site HI02 was within the WQO range in January and June but exceeded the WQO maximum in April.

Table 48. Dissolved Oxygen in All Lower Estuary and Enclosed Waters sites 2025

Monitoring period	Units	WQO	HI01	HI02
January	% sat.	90 - 105	90.6	95.3
April	% sat.	90 - 105	76.4	130.6
June	% sat.	90 - 105	68	98

Grey shading denotes values that are above the relevant WQO / WQO range; blue shading denotes values that are below the relevant WQO / WQO range

4.3 MACROINVERTEBRATES

4.3.1 Macroinvertebrate communities in the catchment

Macroinvertebrates within the Study Area were generally diverse and species rich, and as expected were dictated by site-based habitat quality and condition. In the upper sections of the catchment where in-stream habitat quality was structurally diverse and minimal disturbance was observed; macroinvertebrate communities were diverse and healthy. In the lower, more urbanised sections of the catchment, macroinvertebrate communities represented the moderate disturbance of survey sites by being lower in diversity and the presence of more tolerant species.

Community assemblages in both bed and edge habitats showed minimal contrast, with the most common and widespread taxa comprising non-biting midges and bloodworms, (Chironominae, and/or Tanypodinae), along with various families of snails (Gastropoda) and shrimps and prawns (Atyidae and Paleamonidae) These taxa are typically associated with habitats characterised by poor dissolved oxygen levels. Additionally, other dominant taxa within both habitats include segmented worms (Oligochaeta), microcrustaceans (Copepoda), mayflies (Baetidae and Leptophlebiidae), caddisflies (Hydropsychidae and Leptoceridae) and beetles (Elmidae). Riffle habitats were typically diverse, with various caddisflies, mayflies and even stoneflies (Gripopterygidae) found at some sites upstream in the catchment.

4.3.2 Taxonomic Richness

Macroinvertebrate monitoring was conducted in January (Wet season) and June (Late Wet season) across three habitats: stream bed, stream edge, and riffles. Taxonomic richness varied between sites, monitoring periods and habitats. Taxonomic richness was below the guideline values in all three habitats. Stream bed Taxonomic Richness ranged from 4 to 13 in the Early wet and 3 to 12 in the late Wet (Figure 3a). Stream Edge values ranged from 2 to 13 in the Early wet and 2 to 13 in the Late Wet (Figure 3b). Riffle values ranged from 5 to 16 in the Early Wet and 8 to 19 in the Late Wet (Figure 3c). Taxonomic richness does not consider the relative abundance of each taxon, so rare and common taxa are considered equally.

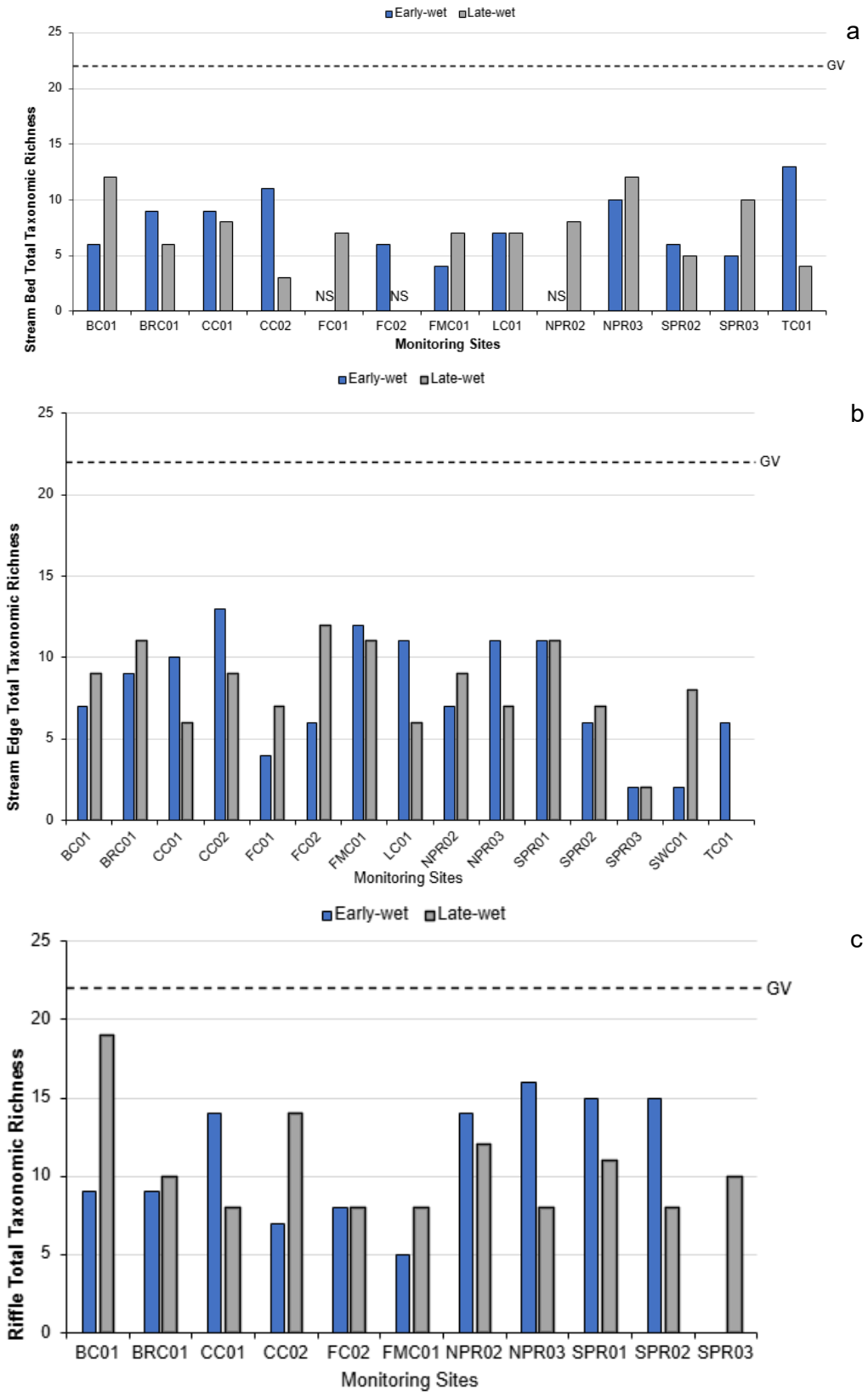


Figure 3. Taxonomic Richness for Stream Bed **(a)**, Stream Edge **(b)** and Riffle **(c)**. Monitoring periods are indicated by blue (Early Wet) and Grey (Late wet). The accepted Taxonomic guideline value indicated by GV.

4.3.3 PET Richness

Variability in PET Richness was observed between sites, monitoring periods and habitats. Low PET scores generally indicate poor habitat condition, and high PET scores generally indicate good habitat condition. Stream bed Total PET Richness ranged from 1 to 6 in the Early Wet and 1 to 5 in the Late Wet (Figure 4a). Out of the 12 monitoring sites 5 were below the GV for both monitoring periods. Stream Edge values ranged from 1 to 5 in the early Wet and 1 to 4 in the Late Wet (Figure 4b). Out of the 15 monitoring sites 9 were below the GV for both monitoring periods. Riffle values Ranged from 5 to 7 in the Early Wet and 2 to 7 in the Late Wet (Figure 4c). Out of the 11 monitoring sites, 10 sites met or exceeded the GV for at least one monitoring period. However, site SPR03 was only monitored in the Late Wet period and did not meet the GV. PET richness is the number of macroinvertebrate taxa at a site that belong to the orders Plecoptera, Ephemeroptera and Trichoptera (i.e. PET taxa). These taxa are particularly sensitive to changes in their environment and are therefore good indicators of habitat degradation and water quality. However, it is important to note that significant rain events prior to Late wet period monitoring could explain the reduction in site richness scores.

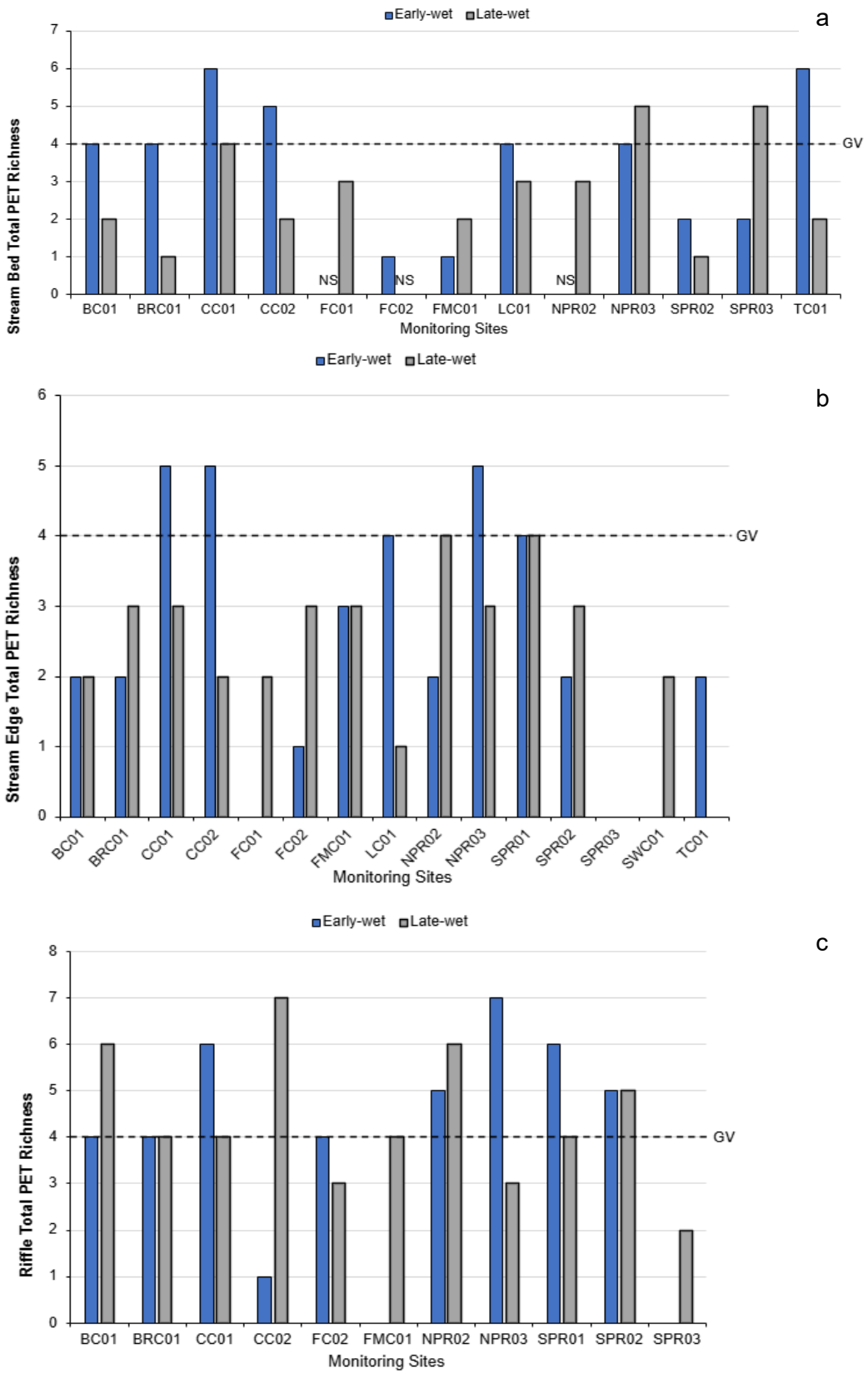


Figure 4. Total PET Richness for Stream Bed **(a)**, Stream Edge **(b)** and Riffle **(c)**. Monitoring periods are indicated by blue (Early Wet) and Grey (Late wet). The accepted Taxonomic guideline value indicated by GV.

4.3.4 SIGNAL 2 Score

Stream Invertebrate Grade Number – Average Level (SIGNAL) 2 scores are based on the sensitivity of each macroinvertebrate taxa to pollution or habitat degradation. Different macroinvertebrate taxa have been allocated a sensitivity grade number based on their sensitivity to various pollutants, and this number is weighted for abundance (so that the relative abundance of tolerant or sensitive taxa can be considered, and not just the presence / absence of taxa). A low SIGNAL score indicates that taxa are tolerant to a range of environmental conditions, and a high score indicates that taxa are more sensitive to such conditions.

Variability in Signal 2 scores was observed between sites, monitoring periods, and habitats. Stream Bed Signal 2 scores ranged from 3.7 to 6.2 in the Early-wet and 3.4 to 6 in the Late-wet (Figure 5a). Of the 13 monitoring sites 11 sites scored higher than the GV in both monitoring periods. Sites below the GV were FMC01, which was below the GV in both monitoring periods, and FC02 which was only monitored in the Early-wet period. It is interesting to note that water quality (DO, Turbidity, pH) for site FMC02 was generally found to be poor. This may be a reflection of the urbanised landscape surrounding this lower catchment monitoring and may contribute to this site not meeting the Signal 2 score GV. Stream Edge signal scores varied from 1 to 7.8 in the Early-wet and 3 to 4.5 in the Late-wet (Figure 5b). Out of the 15 sites, five were consistently below the GV (CC02, FC02, LC01, SPR03, TC01). Riffle Signal 2 scores ranged from 3.8 to 6.3 in the Early-wet and 4.2 to 6.2 in the Late-wet (Figure 5c). Of the 11 monitoring sites, only one site (CC02) scored below the GV in any monitoring period (Early-wet).

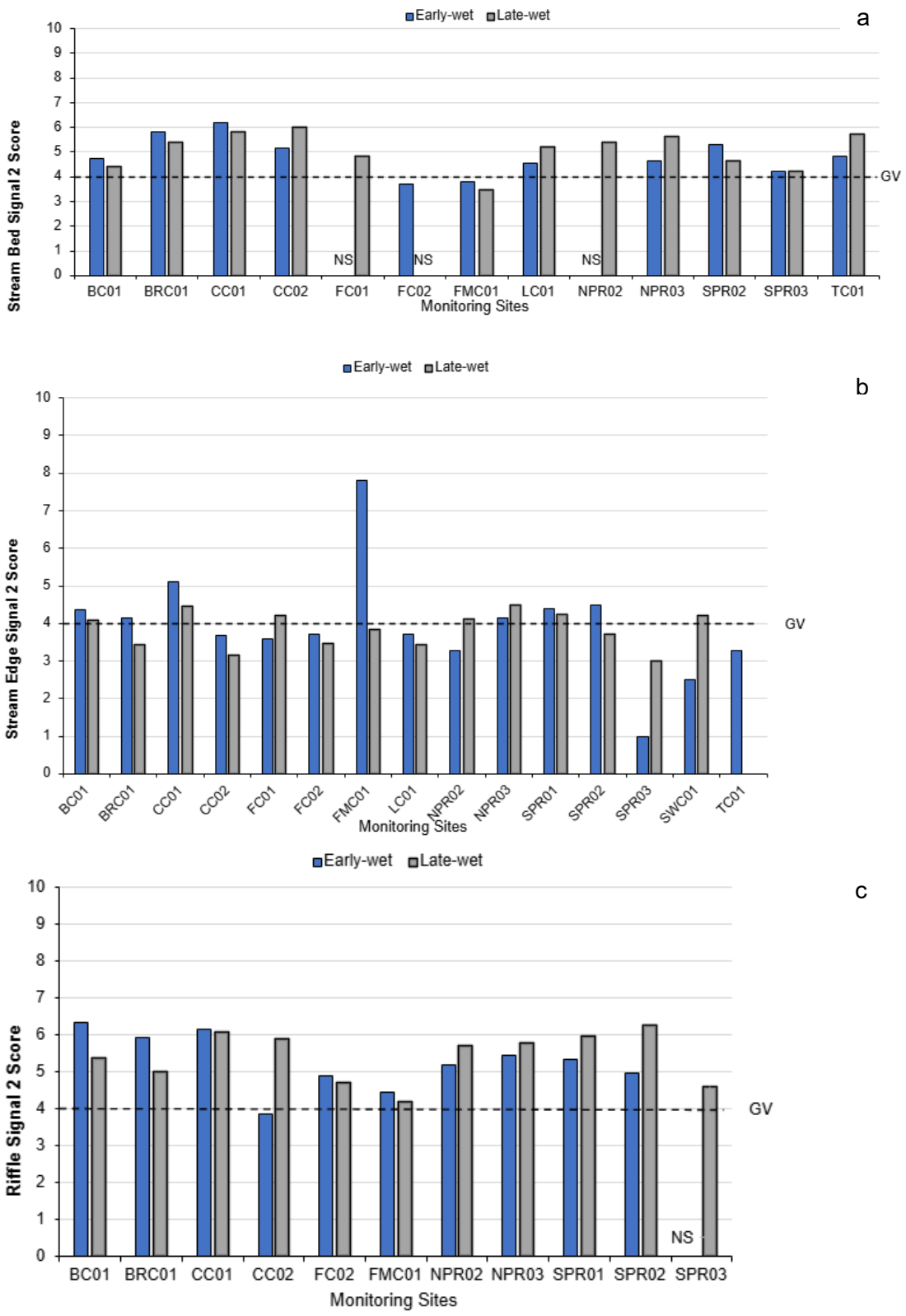


Figure 5. Signal 2 score for Stream Bed **(a)**, Stream Edge **(b)** and Riffle **(c)**. Monitoring periods are indicated by blue (Early Wet) and Grey (Late wet). The accepted Taxonomic guideline value indicated by GV.

5 REFERENCES

DES 2018, *Monitoring and Sampling Manual: Environmental Protection (Water) Policy*, Queensland Department of Environment and Science, Brisbane

DES 2022, *Pine River and Redcliffe Creeks Environmental Values and Water Quality Objectives – Environmental Protection (Water and Wetland Biodiversity) Policy 2019*, Queensland Department of Environment and Science, Brisbane

DNRM 2001, *Queensland Australian River Assessment System (AusRivAS) Sampling and Processing Manual*, Queensland Department of Natural Resources and Mines, Rocklea

Nolte, U 2011, *Streams of high biodiversity value in the Moreton Bay Region*, viewed 5 November 2024, https://www.moretonbay.qld.gov.au/files/assets/public/v/1/services/building-development/mbrc-plan/background-studies/streams-of-high-biodiversity.pdf

APPENDIX A: SITE DESCRIPTIONS

Photographs
SPR01 – Showgrounds Drive, Highvale

Upstream May 2025

Downstream May 2025

Site description
Located on the upper South Pine River, this site is accessed from the roadside of Showgrounds Drive, Highvale.

The riparian vegetation was in excellent condition, with very few weed species present and good canopy cover. Very little bank erosion was observed, as there was excellent cover of low-lying shrubs such as *Lomandra*.

Aquatic macroinvertebrate habitat was extensive, given a network of riffles, rocky pools and abundant edge vegetation. The sediment consisted of silt, sand and larger pebbles and stones.

Surrounding land uses were mainly peri-urban residential, although these only persist for a few kilometres upstream until the South Pine River reaches D'Aguilar National Park.

Given the good condition of the site, and lack of intensive surrounding land uses, this could be considered a good baseline reference site for the area.

SPR02 – Samford Eco-Corridor, Samford Valley

Upstream October 2025

Downstream October 2025

This site is located on the South Pine River within the Samford Eco-Corridor, which has been revegetated since 2014 to restore the vegetation community above the bank.

The riparian vegetation was in good condition, with good structural complexity across every vegetation stratum. There was a mixture of gallery rainforest trees with shrubs, sedges and other forbs. Minor bank erosion was evident in some places. Intact native vegetation extended for about 80m to the north and 50m to the south.

There was good aquatic macroinvertebrate habitat, with a small rocky riffle, fallen wooden debris and macrophytes lining the bank edges. The sediment consisted of fine sediments (mainly silt).

The surrounding land uses were mainly peri-urban residential.

This site was in overall good condition but may be impacted by erosion and non-point source pollution from upstream land uses. The confluence of the South Pine River with Samford Creek is immediately upstream of the site.

The intention is for in-situ and macroinvertebrate surveys of this site to be mainly carried out by volunteers from Samford Progress, which is responsible for the Samford Eco-Corridor, although the site is publicly accessible.

SPR03 – Leitchs Crossing, Brendale

Upstream May 2025

Downstream May 2025

This site is located on the South Pine River, on a public road reserve.

The riparian zone was in very poor condition. The banks were mostly vegetated only by pasture grasses, with the exception of some *Casuarina cunninghamiana* and some juvenile trees upstream and downstream. Vertical bank erosion (up to ~3m high) was observed.

The site is characterised by a fish passage in the centre, which provides riffle habitat for aquatic macroinvertebrates. There are also deep pools, including a small backwater section just before the fish passage. The sediment was primarily silt and coarser fractions.

The property is leased out for horse agistment, which likely provides a source of nutrient pollution and bank erosion. A horse owner was observed crossing the stream on horseback, which probably occurs regularly. Besides the horse agistment, the surrounding land uses consist of high-density industrial to the north and suburban residential to the south. There are significant suburban residential land uses upstream.

SPR04 - Grahams Road Environmental Reserve, Strathpine

Upstream May 2025

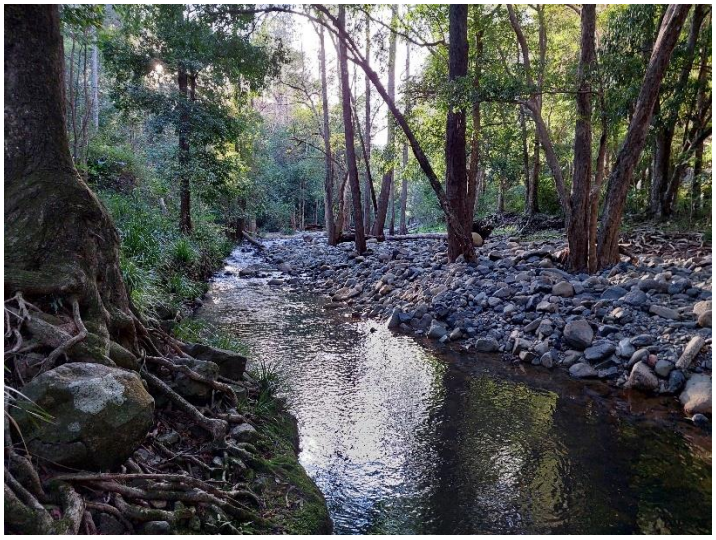
Downstream May 2025

The site is located in the lower estuary of the South Pine River, near the confluence with the North Pine River.

The riparian zone on the left bank (looking downstream) was in poor condition and showed signs of significant erosion (silt plumes visible in the photo on the left).

Surrounding land uses are primarily residential, however on the other side of the river (across from the sampling location) there are relatively vast areas of mangroves and saltmarsh in good condition.

CC01 - Andy Williams Park, Cedar Creek



Upstream May 2025

Downstream May 2025

The site is located in a Council reserve along Cedar Creek, easily accessible from a picnic area.

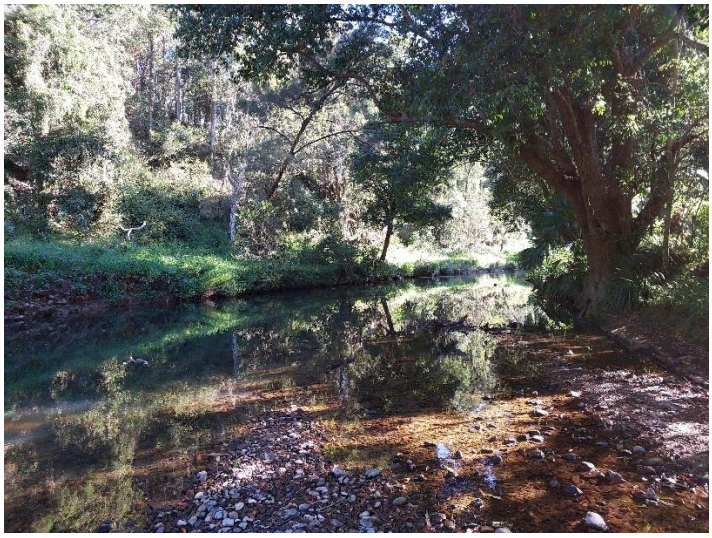
The riparian zone was in excellent condition, with good structural complexity of gallery rainforest trees, shrubs and forbs. On the northern bank, the riparian vegetation extended for about 20-40m, while the riparian zone on the southern bank featured intact remnant vegetation for its entire extent. Minor erosion on the northern bank was observed.

Aquatic macroinvertebrate habitat was comprehensive, with a large riffle system due to the numerous in-stream boulders. Other macroinvertebrate habitat included both in-stream and edge macrophytes and a substrate of mainly coarse fractions (e.g. gravel).

On the northern side of the stream, land uses are mainly rural residential, with significant remnant vegetation on the hillslopes. On the southern side is D'Aguilar National Park.

This site can be considered an excellent reference for the optimal condition of upper freshwater streams in the catchment.

CC02 – Hansen Road, Closeburn



Upstream June 2025

Downstream June 2025

This site is centred on a bridge crossing over the lower reach of Cedar Creek.

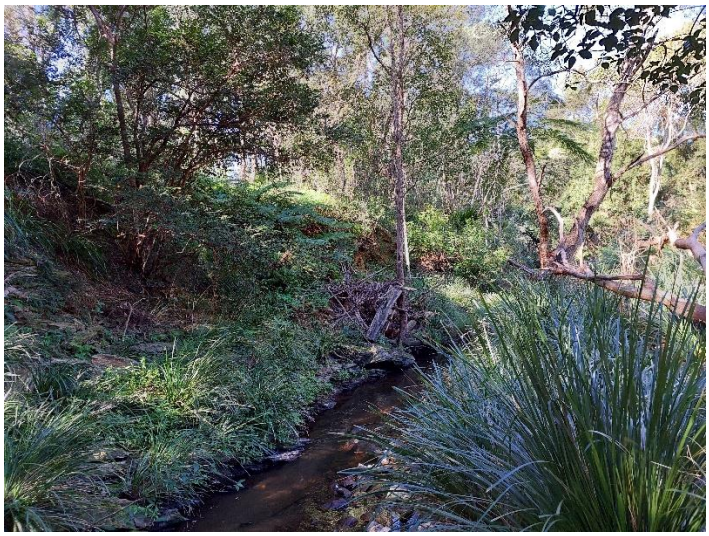
The riparian zone was in decent condition, although the upstream section was infested with pasture grasses, with the southern bank mostly bare of canopy trees and stabilising shrubs and forbs. The upper slopes of the southern bank had moderate cat's claw (*Dolichandra unguis-cati*) infestations. The downstream riparian zone was in better condition (about 20-60m wide).

The bridge culvert forms a small riffle system, which is potential macroinvertebrate habitat. The channel also forms several deep pools with a rocky and silty substrate.

Land uses in the area are a mixture of rural residential and cattle grazing.

BC01 - Henry Clench Park, Clear Mountain

Upstream June 2025



This site is located within a Council recreational park on Branch Creek, near the confluence with Cedar Creek.

The riparian zone had an overall good coverage of *Lomandra* in the ground layer but had a much simpler canopy structure. On the southern bank, there were very few trees, with the lawn extending almost to the stream. The northern bank had a more complex canopy structure along the slope.

Macroinvertebrate habitat consisted of a small riffle system, in-stream woody debris, macrophytes and a backwater. The substrate consisted of mostly silt, coarse fractions and decomposing organic material. Notably, the cryptic North Pine River Freshwater Snail (*Fluvidona anodonta*), which is listed as 'vulnerable' by the International Union for Conservation of Nature, was recorded in Branch Creek near the site (Nolte 2011). Sampling for this species will be a priority here.

The reserve is used for recreational purposes, with a mowed lawn maintained on the southern bank. Land uses in the area consist mainly of peri-urban residential, with horse rearing and occasional cattle grazing.

Downstream June 2025

FMC01 - John Bray Park, Bray Park

Upstream July 2025

The site is centred on a bridge crossing Four Mile Creek in a Council reserve.

The riparian zone was overall well-vegetated but had a minimal ground layer. The canopy was dominated mostly by weed species, such as camphor laurel (*Cinnamomum camphora*) and Chinese celtis (*Celtis sinensis*), with piccabeen palms (*Archontophoenix cunninghamiana*) in the mid-story. Some bank erosion was evident due to the minimal ground cover (up to 1.5m high).

Macroinvertebrate habitat consisted of several small riffles, as well as in-stream woody debris and root systems. The substrate was mostly silty and sandy fractions.

The surrounding land uses were mostly suburban residential. Most of Four Mile Creek upstream of the site consists of Council recreational parks.

Downstream July 2025
FMC02 - Rob Akers Reserve, Strathpine

Upstream July 2025

This site is accessible via a Council recreational reserve.

The riparian zone was in moderate condition. On the southern bank, the riparian edge is thin (about 10m), extending to the grassed lawn of the recreational reserve. On the northern bank, there were no large trees within 10m of the bank toe, as it is dominated by aquatic weeds. Steep erosion was evident (about 2m tall).

This site represents the upstream edge of the tidal influence into Four Mile Creek, so macroinvertebrates will not be sampled here.

Immediately upstream of the reserve, there were two cattle farms and one property providing horse agistment. The banks of these properties experience significant erosion on account of a very minimal riparian edge, although two of these properties were recently revegetated as part of a PRCA project. Besides this, there are significant industrial and suburban residential land uses upstream.

Downstream July 2025

NPR02 - Cruices Crossing, Laceys Creek Road, Dayboro

Upstream May 2025

Downstream May 2025

The riparian zone was in moderate condition, with a relatively thin corridor of mature vegetation which has resulted in minor bank erosion. Riparian communities are dominated by regrowth casuarinas (Casuarina cunninghamiana) with black tea-tree (Melaleuca bracteata) and several forbs retaining the soil in-stream.

Aquatic macroinvertebrate habitat consisted of a riffle network, in addition to a stony substrate and a backwater adjacent to the bridge.

Surrounding land uses were mainly cattle grazing, which is a source of nutrient pollution. There is severe bank erosion on some properties upstream, for which PRCA has administered several bank revegetation projects.

NPR03 - Lees Crossing Reserve East, Dayboro

Upstream May 2025

Downstream May 2025

This site is easily accessed from a Council carpark adjacent to the reserve.

The riparian zone was in good condition, although the upstream section is very thin in places (10-30m), which has resulted in minor bank erosion (~1m tall and steep). Gallery rainforest characterised the riparian area, with black tea-tree (*Melaleuca bracteata*) and several forbs retaining the soil in-stream as the channel splits downstream.

Aquatic macroinvertebrate habitat consisted of a riffle network, in addition to a stony substrate and a backwater adjacent to the bridge.

Surrounding land uses were mainly cattle grazing, which is a source of nutrient pollution. There is severe bank erosion on some properties upstream, for which PRCA has administered several bank revegetation projects.

NPR04 - Mungarra Reserve, Petrie

Upstream June 2025

Downstream June 2025

The site is located on the North Pine River within a Council reserve.

The riparian zone was moderate condition. The riparian vegetation is mostly continuous on both banks, but the southern side features a bar dominated by Singapore daisy (*Sphagneticola trilobata*) and pasture grasses for a 100m stretch. The riparian edge on the northern bank was intact but reduced (about 20m wide). The riparian community was composed of a mixture of gallery rainforest on the upper banks, with mangroves on the lower banks.

As this site is tidal, macroinvertebrates will not be sampled.

Besides the recreational park, nearby land uses were mostly suburban residential. A new development is planned immediately adjacent to the site. The site is also immediately downstream of the confluence with One Mile Creek.

LC01 - Baker Road, Laceys Creek

Upstream May 2025

Downstream May 2025

This site is located on a public road crossing Laceys Creek, near the confluence with the North Pine River.

The riparian zone was in poor condition. The banks were dominated by aquatic weeds across most of the site, with some canopy vegetation on the edges, although this is reduced in width on account of land clearing (~10m wide).

Macroinvertebrate habitat consisted of a riffle and edge macrophytes upstream, where there are several large pieces of woody debris downstream. The substrate mostly consisted of coarse rocks and gravel.

Land uses nearby were mainly cattle grazing. There is significant bank erosion on nearby properties.

TC01 - Strong Road, Dayboro

Upstream May 2025

Downstream May 2025

This site is centred on a bridge crossing Terrors Creek.

The riparian zone was in moderate condition. It was structurally complex, consisting of gallery rainforest with a well-formed canopy and ground layer, although it has been reduced for surrounding land uses. It was only about 10m wide on either bank.

Macroinvertebrate habitat consisted of in-stream woody debris, edge macrophytes and the silty substrate.

Land uses nearby were mostly cattle grazing, giving way to suburban residential in the town of Dayboro.

BRC01 - Browns Creek Road, Narangba

Upstream July 2025

Downstream July 2025

This site is centred on a bridge crossing Browns Creek.

This riparian edge in this site was continuous and in generally good condition, although the canopy was dominated by camphor laurel (*Cinnamomum camphora*), and is generally thin (~10m wide). Some minor bank erosion was evident downstream.

Macroinvertebrate habitat includes woody debris, edge macrophytes, and the sandy substrate.

Land uses immediately adjacent to the site are mainly cattle grazing, although there is a stretch just upstream of about 1km of intact remnant vegetation. There is also a quarry upstream.

FC01 - School Road, Kallangur

Upstream July 2025

Downstream July 2025

This site is located in Freshwater Creek, at the end of School Road, Kallangur.

The riparian edge was in poor condition. This is primarily due to the urban development just upstream and dominance of aquatic weeds. The lawn of the adjacent park also extended almost to the bank edge. The northern bank featured few canopy trees. The overall vegetation community was characterised by *Melaleuca quinquenervia* forest.

Macroinvertebrate habitat consisted mainly of macrophytes, with a sandy substrate.

Nearby land uses are mainly suburban residential and parkland. About 1km upstream, Freshwater Creek is channelised by a concrete drain.

It is expected that this site will be primarily surveyed by volunteers from the Redcliffe Environmental Forum.

FC02 - John W Mott Reserve, Kallangur

Upstream July 2025

Downstream July 2025

This site is located in a Council recreational park on Freshwater Creek.

The riparian zone was in moderate condition. The vegetation community was characterised by mixed *Melaleuca quinquenervia* forest and gallery rainforest. The riparian edge was continuous, although reduced in places (at least 5m wide), and had a high density of aquatic weeds.

Macroinvertebrate habitat consisted mainly of in-stream macrophytes and woody debris.

Land uses nearby are mostly suburban residential and parkland.

It is expected that this site will be primarily surveyed by volunteers from the Redcliffe Environmental Forum, with the exception of ex-situ grab samples.

SWC01 - Jimna Court, Deception Bay

Upstream July 2025

Downstream July 2025

The site is located in a Council reserve in Saltwater Creek. It is accessible via a footpath running parallel to the stream.

Overall, the riparian zone was in poor condition due to a dense infestation of para grass (*Urochloa mutica*) and other aquatic weeds upstream and along the banks downstream. Vegetation along the riparian edge was continuous, other than a small section that has been cleared where the stream was accessed. Upstream, the vegetation community was consistent with a *Melaleuca quinquenervia* palustrine wetland, with the downstream section more consistent with an alluvial eucalypt forest as the channel became more defined.

Macroinvertebrate habitat consisted of macrophytes, most notably the aforementioned para grass.

Upstream land uses were mainly suburban residential and industrial.

It is expected that this site will be primarily surveyed by volunteers from the Redcliffe Environmental Forum.

SWC02 - Bremner Road, Rothwell

Upstream July 2025

Downstream July 2025

This site is located in the tidal section of Saltwater Creek. It was accessed via Bremner Road, Rothwell, via a public access track under the Redcliffe Peninsula train line.

The riparian zone was in good condition. The vegetation community was characterised by mangroves on the southern side of the channel, extending for about 300m. While the bank of the northern channel was much more sparsely vegetated with mangroves (about 5m wide), this is more likely due to the saltmarsh community present on that side than anthropogenic disturbance.

Since this site is tidal, macroinvertebrates will not be sampled here as per the AUSRIVAS methodology.

Nearby land uses were mainly suburban residential.

It is expected that this site will be primarily surveyed by volunteers from the Redcliffe Environmental Forum, with the exception of ex-situ grab samples.

HI01 - Silcock Street, Clontarf

Upstream May 2025

Downstream May 2025

This site is located within Hays Inlet, about 1.5km downstream of the Saltwater Creek estuary. It can be accessed via an access trail in a Council reserve.

It is expected that this site will be primarily surveyed by volunteers from the Redcliffe Environmental Forum. The site is regularly accessed by their volunteers.

HI02 - Haysmouth Parade, Clontarf

Towards the inlet November 2025

Away from the inlet November 2025

This site is located within Hays Inlet, about 400m from open coastal waters. It is accessed via a public boat ramp.

The riparian vegetation was in poor condition on account of land clearing associated with the adjacent land uses. The vegetation was consistent with a mangrove ecosystem.

As this site is tidal, aquatic macroinvertebrates will not be sampled here.

Adjacent land uses consisted of suburban residential, a golf course and industrial further upstream. The site is also downstream of a sewage outlet.

It is expected that this site will be primarily surveyed by volunteers from the Redcliffe Environmental Forum, with the exception of ex-situ grab samples.

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