Ngarrangarra-li Walaaybaa Rangers Water Quality Sampling

DHARRIWAA ELDERS GROUP

This report is a simplified summary of the report *Water Quality Sampling in the Ngamaay and Baawan Rivers: Draft Report*, written for Dharriwaa Elders Group by Katie Doyle, Zac Rolfe, Martin Mallen-Cooper and Lee J. Baumgartner. This report was produced by the Gulbali Institute at Charles Sturt University.

1. Introduction

Walgett is a town in northwest NSW, located on the junction of two river systems: the Ngamaay (Namoi) and the Baawan (Barwon). The local community has raised many concerns about the health of the two rivers, but to date there have been limited regular water monitoring resources provided by government agencies and academic institutions. Charles Sturt University developed a program aimed at:

1. Determining whether local community members could collect water samples covering a range of water quality parameters and ensure their delivery to a NATA-accredited laboratory where the samples could be processed within an agree-upon timeframe, and
2. Conducting an initial water quality assessment that aligns with established ANZECC guidelines and sampling protocols, while addressing community concerns regarding river quality.

This report summarises the results of this program, which were taken at six sites in January 2025 and July 2025.

2. Sampling Methodology

2.1. Sampling process

1) Different water quality parameters were identified so that the right information could be collected to determine the health of the rivers.
2) The NATA-accredited laboratory determined the holding times of the water samples and preserving agent for sampling bottles. This helped to decide the water quality samples to be taken:
    a) Chemical oxygen demand (COD)
    b) Nutrients (Total Nitrogen (TN), Phosphorus (P), Ammonia, Nitrate, Nitrate, Oxides of nitrogen (NOx))
    c) Metals
    d) Pesticides (in water and in sediment)
    e) Algae
    f) Biological Oxygen Demand (BOD) and E. coli – these could not be collected as they must be analysed within a 24-48 hr timeframe which could not be achieved
3) Lab staff added preservation materials to the bottles to make sure the samples could be kept longer.

4) Field sampling was taken at six sites (Baawan Site 1-3 and Ngamaay Site 1-3) in November 2023, January 2025 and July 2025 by the Dharriwaa Elders Group Ngarrangarra-li Walaaybaa Rangers (Look After Home Country Rangers) Walgett River Rangers. These samples were put on ice and sent to Victoria with a courier.
5) After the results from November 2023 and January 2025 were tested, an additional sampling round was added to test for pesticides in soils and sent to ALS in Sydney.
6) All samples were tested at ALS laboratories.

ANZECC Guidelines

Australian and New Zealand Guidelines for Fresh and Marine Water Quality are a tool for assessing water quality and determining objectives that protect and support the designated environmental values of water resources.

Water quality parameters can be divided into

- Results that indirectly hurt ecosystems and cause a problem for specific environmental values (e.g. nutrients, enrichment with organic matter), and
- Results with direct negative impacts on plants and animals (pesticides, heavy metals)

The guidelines include concentration limits, known as 'guideline trigger values', which indicate that there *may* be environmental problems if the results are higher than the trigger value. This may cause a management response such as another investigation or better understandings of the values when investigated in local conditions. This report uses guideline trigger values of 95%, although 90%, 90% and 99% values are included for reference.

Explanation of table results

- The green cells indicate that the results for that test are below the recommended ANZECC guidelines for slightly-moderately disturbed ecosystems. This means that the levels of substances found are unlikely to cause harm to the ecosystem.
- The yellow cells indicate that the results for that test are equal to the ANZECC guidelines for slightly-moderately disturbed ecosystems.
- The red cells indicate that the results for that test are higher than the recommended ANZECC guidelines for slightly-moderately disturbed ecosystems. This means that the levels of substances found are too high and could cause potential harm to humans, animals, plants and organisms, and disturb the health of the environment.
- The unshaded cells indicate that there are no ANZECC guidelines for the substance. This means that there is often not enough information to make an

informed decision on whether the level of substances is high enough to disturb the environment. This does not necessarily mean that they will not be harmful.

3. Results

3.1 Nutrients and Chemical Oxygen Demand in water

Background

Nutrients such as nitrogen and total phosphorus are important parts of the ecosystem, creating growth and productivity within river systems. However, high concentrations can be harmful, causing problems like algal blooms. Sources of nutrients can include runoff from farmland and waste from sewage treatment plants.

Chemical oxygen demand (COD) means the amount of oxygen needed to chemically oxidize natural and man-made matter in water. This is a measure of overall water pollution and organic content.

Results

Table 1. Raw water quality results including Chemical Oxygen Demand (COD) and nutrients including Total Kjeldahl Nitrogen (TKN), Total Phosphorus (Total P), Total Nitrogen (TN), ammonia (NH3+), nitrite (NO2), nitrate (NO3) and NOx and comparisons of results with ANZECC guidelines for lowland rivers. All values are in mg/L.

January 2025

Sampling site	COD	TKN	TOTAL P	TN	Ammonia (NH_3^+)	Nitrite (NO_2)	Nitrate (NO_3)	NOX
Namoi Site 1	37	0.9	0.26	0.9	<0.1	<0.01	<0.01	0.01
Namoi Site 2	35	1.1	0.25	1.1	<0.1	0.01	<0.01	0.01
Namoi Site 3	36	1.2	0.29	1.2	<0.1	<0.01	<0.01	<0.01
Barwon Site 1	64	1.7	0.42	1.8	<0.1	<0.01	0.05	0.06
Barwon Site 2	55	1.6	0.60	1.8	<0.1	<0.01	0.19	0.19
Barwon Site 3	50	1.2	0.78	1.4	<0.1	<0.01	0.14	0.14
Default ANZECC trigger values for physical and chemical stressors for south-east Australia for slightly disturbed ecosystems (mg/L)								
Lowland River	-	-	0.05	0.5	0.9	-	0.7	0.04

July 2025

Sampling site	COD	TKN	TOTAL P	TN	Ammonia (NH_3^+)	Nitrite (NO_2)	Nitrate (NO_3)	NOX
Namoi Site 1	21	0.5	0.21	1.2	<0.1	<0.01	0.75	0.76
Namoi Site 2	21	0.5	0.32	1.2	<0.1	0.01	0.75	0.71
Namoi Site 3	22	0.6	0.23	1.3	<0.1	0.01	0.7	0.71
Barwon Site 1	17	0.6	0.12	0.7	<0.1	0.01	0.07	0.08
Barwon Site 2	31	0.5	0.14	0.6	<0.1	<0.01	0.06	0.07
Barwon Site 3	15	0.7	0.25	1.1	0.2	0.01	0.4	0.41
Default ANZECC trigger values for physical and chemical stressors for south-east Australia for slightly disturbed ecosystems (mg/L)								
Lowland River	-	-	0.05	0.5	0.9	-	0.7	0.04

Interpretation

The raw data represents a single snapshot of nutrient levels taken at three different times in the Baawan and Ngamaay Rivers: in November 2023, January 2025 and July 2025.

January 2025: Nutrients, including total phosphorus and total nitrogen, were higher than the ANZECC 95% Guideline Trigger Values for slightly-to-moderately disturbed ecosystems at all six sampling sites, and for NOX at Baawan Sites 1,2 and 3. All other parameters are lower than the guideline values, or there are no guideline values for those parameters.

July 2025: Nutrients, including total phosphorus, total nitrogen and NOX were higher than the ANZECC 95% Guideline Trigger Values for slightly-to-moderately disturbed ecosystems at all six sampling sites, and for nitrate (NO3) at Namoi Sites 1, 2 and 3. All other parameters are lower than the guideline values, or there are no guideline values for those parameters.

COD and nutrients had the highest values during the July 2025 sampling trip, compared to the November and January results, especially at the three Baawan River sites.

3.2 Metals in water

Background

Some metals, such as manganese, copper, iron and zinc are very important micronutrients, required by life in the right amounts. However, when too much of these metals are present, high concentrations can be toxic. At the same time, long-term low exposures to heavy metals can have serious health effects over time.

In some cases, no guideline values will be given for a toxicant, which means that there is probably not enough data to give values for that toxicant.

Results

Table 2. Raw water quality results for 24 metals in water, and comparison of results with ANZECC guidelines for slightly to moderately disturbed ecosystems. All values are in mg/L.

January 2025

Metal	*River site samples (mg/L)*						*ANZECC Trigger Values (converted to mg/L) Level of protection (%species)*			
	Namoi 1	Namoi 2	Namoi 3	Barwon 1	Barwon 2	Barwon 3	99%	95%	90%	80%
Aluminium	**4.6**	**5.4**	**5.8**	**19**	**20**	**14**	0.027	0.055	0.08	0.15
Antimony	0.002	<0.001	<0.001	<0.001	<0.001	<0.001	-	-	-	-
Arsenic	**0.004**	**0.004**	**0.005**	**0.007**	**0.008**	**0.006**	0.001	0.024	0.094	0.36
Barium	**0.11**	**0.1**	**0.1**	**0.15**	**0.14**	**0.12**	-	-	-	-
Beryllium	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	-	-	-	-
Boron	**0.06**	**0.05**	**0.06**	**0.04**	**0.05**	**0.04**	0.09 (0.34*)	0.37 (0.94*)	0.68 (1.5*)	1.3 (1.5*)
Cadmium	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	0.00006	0.0002	0.0004	0.0008
Chromium	**0.003**	**0.004**	**0.004**	**0.018**	**0.019**	**0.013**	-	-	-	-
Cobalt	**0.002**	**0.002**	**0.002**	**0.006**	**0.006**	**0.004**	-	-	-	-
Copper	**0.006**	**0.005**	**0.005**	**0.01**	**0.01**	**0.008**	0.001	0.0014	0.0018	0.0025
Iron	**4.3**	**5**	**5.5**	**18**	**19**	**13**	-	-	-	-
Lead	**0.001**	**0.001**	**0.002**	**0.008**	**0.007**	**0.005**	0.001	0.0034	0.0056	0.0094
Manganese	**0.17**	**0.15**	**0.17**	**0.3**	**0.27**	**0.23**	1.2	1.9	2.5	3.6
Mercury	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	0.00006	0.0006	0.0019	0.0054
Molybdenum	**0.001**	**0.001**	**0.002**	<0.001	**0.001**	<0.001	-	-	-	-
Nickel	**0.006**	**0.007**	**0.008**	**0.015**	**0.015**	**0.012**	0.008	0.011	0.013	0.017
Selenium	**0.008**	**0.008**	**0.007**	**0.007**	**0.007**	**0.006**	0.005	0.0011	0.018	0.034
Silver	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	0.00002	0.00005	0.0002	0.0002
Strontium	**0.49**	**0.41**	**0.4**	**0.18**	**0.19**	**0.2**	-	-	-	-
Thallium	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	-	-	-	-
Tin	<0.001	<0.001	<0.001	0.005	<0.001	<0.001	-	-	-	-
Titanium	**0.082**	**0.087**	**0.09**	**0.11**	**0.13**	**0.1**	-	-	-	-
Vanadium	**0.022**	**0.02**	**0.02**	**0.038**	**0.038**	**0.027**	-	-	-	-
Zinc	**0.035**	**0.033**	**0.024**	**0.048**	**0.042**	**0.032**	0.0024	0.008	0.025	0.031

July 2025

Metal	*River site samples (mg/L)*						*ANZECC Trigger Values (converted to mg/L) Level of protection (%species)*			
	Namoi 1	Namoi 2	Namoi 3	Barwon 1	Barwon 2	Barwon 3	99%	95%	90%	80%
Aluminium	2.9	4.3	4.6	4	93	4.2	0.027	0.055	0.08	0.15
Antimony	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	-	-	-	-
Arsenic	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	0.001	0.024	0.094	0.36
Barium	0.06	0.07	0.06	0.06	0.06	0.06	-	-	-	-
Beryllium	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	-	-	-	-
Boron	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	0.09 (0.34*)	0.37 (0.94*)	0.68 (1.5*)	1.3 (1.5*)
Cadmium	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	0.00006	0.0002	0.0004	0.0008
Chromium	<0.01	<0.01	<0.01	<0.01	0.02	<0.01	-	-	-	-
Cobalt	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	-	-	-	-
Copper	<0.01	<0.01	<0.01	<0.01	0.003	<0.01	0.001	0.0014	0.0018	0.0025
Iron	3.6	4.8	5.1	4.2	15	4.5	-	-	-	-
Lead	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	0.001	0.0034	0.0056	0.0094
Manganese	0.09	0.12	0.12	0.09	0.22	0.1	1.2	1.9	2.5	3.6
Mercury	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	0.00006	0.0006	0.0019	0.0054
Molybdenum	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	-	-	-	-
Nickel	<0.01	<0.01	<0.01	<0.01	**0.01**	<0.01	0.008	0.011	0.013	0.017
Selenium	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	0.005	0.0011	0.018	0.034
Silver	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	0.00002	0.00005	0.0002	0.0002
Strontium	**0.34**	**0.39**	**0.36**	**0.11**	**0.03**	**0.25**	-	-	-	-
Thallium	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	-	-	-	-
Tin	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	-	-	-	-
Titanium	**0.07**	**0.09**	**0.2**	**0.03**	**0.1**	**0.07**	-	-	-	-
Vanadium	**0.01**	**0.02**	**0.02**	**0.01**	**0.03**	**0.01**	-	-	-	-
Zinc	**0.02**	**0.02**	**0.02**	**0.02**	**0.05**	**0.02**	0.0024	0.008	0.025	0.031
Lanthanum	**0.002**	**0.002**	**0.002**	**0.003**	**0.009**	**0.002**	-	-	-	-

Interpretation

Raw data for metals in water for November 2023, January 2025 and July 2025 and the related ANZECC trigger values for freshwater are shown in Table 2.

January 2025: Aluminium, copper and zinc were detected at all sites, and lead and nickel at Baawan Sites 1, 2 and 3 above the ANZECC 95% Guideline Trigger Values. Arsenic, boron, lead (at Namoi Sites 1, 2 and 3), manganese, selenium and nickel (at Namoi Sites 1, 2 and 3) were detected but were lower than the ANZECC 95% Guideline Trigger Values. Barium, chromium, cobalt, iron, molybdenum (Ngamaay Site's 1,2 and 3 and Baawan Site 2), strontium, tin, titanium and vanadium were also detected but no guideline values were specified.

July 2025: Aluminium and zinc were found at all sites above the ANZECC 95% Guideline Trigger Values. Manganese and zinc were found at all sites, and copper and nickel at

Baawan Site 2 only, but were below the ANZECC 95% Guideline Trigger Values. Barium, chromium (Baawan Site 2), iron, strontium, titanium, vanadium and lanthanum were also found but no guideline values were given.

The most metals were found on the January 2025 sampling trip (compared to the November and July results), especially for the three Baawan River sites.

3.3 Pesticides in water

Background

Pesticides are a large and complicated group of organic toxicants because they include insecticides, acaricides, herbicides, algicides and fungicides (chemicals to kill insects, mites and ticks, plants, algae and fungi). The behaviour and toxicity of pesticides can be very different, which makes it difficult to describe risks as they can cover a wide range of issues. Pesticides usually enter the water from sources in the primary industry sector, mainly farming (ANZECC 2000).

Results

Table 3. Summary of raw water quality results for pesticides detected in water and comparisons of results with ANZECC guidelines for slightly to moderately disturbed ecosystems. All values are in ug/L.

January 2025

Pesticide	*River site samples (ug/L)*						*ANZECC Trigger Values (ug/L) Level of protection (% species)*			
	Namoi 1	Namoi 2	Namoi 3	Barwon 1	Barwon 2	Barwon 3	99%	95%	90%	80%
Hexazinone (*Triazinone Herbicide)*	<0.02	<0.02	<0.02	**0.03**	**0.03**	<0.02	-	-	-	-
Terbuconazole *(Fungicide)*	**0.02**	**0.02**	**0.03**	**0.12**	**0.13**	**0.14**	-	-	-	-
Diuron *(Sulfonlurea Herb)*	**0.17**	**0.61**	**0.72**	**0.33**	**0.32**	**0.46**	-	-	-	-
Metolachlor (*Chloraceteanilides)*	**0.54**	**2.3**	**3.5**	**1**	**1.1**	**2.2**	0.0084[1]	0.46	2.6	15
Atrazine *(Triazine Herbicide)*	**0.16**	**2**	**2.8**	**0.13**	**0.12**	**0.51**	0.7	13	45	150
Propazine *(Triaxine Herbicide)*	<0.01	**0.02**	**0.03**	<0.01	<0.01	<0.01				
Simazine *(Triazine Herbicide)*	<0.02	<0.02	<0.02	**0.06**	**0.06**	**0.06**	6.1	12	18	29
Terbuthylazine *(Triazine Herbicide)*	**0.19**	**0.54**	**0.6**	**0.49**	**0.53**	**0.44**	-	-	-	-
Dicamba *(Phenoxy AA)*	<0.05	**0.07**	**0.06**	<0.05	<0.05	<0.05	-	-	-	-
Fluroxypyr *(Phenoxy AA)*	<0.05	**0.47**	**0.8**	**0.11**	**0.11**	**0.16**	-	-	-	-
Picloram *(Phenoxy AA)*	<0.5	<0.5	**0.8**	<0.5	<0.5	<0.5	6.3	87	270	850

July 2025

Pesticide	*River site samples (ug/L)*						*ANZECC Trigger Values (ug/L) Level of protection (% species)*			
	Namoi 1	Namoi 2	Namoi 3	Barwon 1	Barwon 2	Barwon 3	99%	95%	90%	80%
Metolachlor (*Chloraceteanilides)*	**0.02**	**0.03**	**0.03**	**0.01**	**0.01**	**0.02**	0.0084[1]	0.46	2.6	15
Diuron *(Sulfonlurea Herb)*	<0.02	<0.02	<0.02	<0.02	**0.03**	<0.02	-	-	-	-
Terbuthylazine *(Triazine Herbicide)*	**0.12**	**0.14**	**0.14**	<0.01	<0.01	**0.09**	-	-	-	-
Fluroxypyr *(Phenoxy AA)*	**0.04**	**0.05**	**0.05**	**0.05**	**0.06**	**0.04**	-	-	-	-

[1]DGV may be lower than routine analytical limits of reporting. Dashes indicates no guideline value. **Bold text indicates that the pesticide has been detected**. Grey shading shows the 95% protection level trigger value that is used for the Ngamaay and Baawan Rivers, based on slightly to moderately disturbed ecosystems.

Pesticides in sediment

July 2025: Terbuthylazine *(Triazine Herbicide)* was found at 0.0004 mg/kg at Ngamaay Site 1 in a sediment sample.

Interpretation

January 2025: A total of 11 pesticides (mainly herbicides) were detected in the January 2025 sampling trip (see accompanying lab result for all results) (Table 3). At all six sites, metolachlor was detected above the ANZECC guideline recommended 95% protection level.

July 2025: Four pesticides (mainly herbicides) including metolachlor, terbuthylazine, diuron and fluroxypyr were found at the six sampling sites (see accompanying lab result for all results). Also, the first round of sediment sampling for pesticides found that terbuthylazine was found at a low amount (0.004 mg/kg) at Ngamaay Site 1.

Metolachlor, terbuthylazine and diuron were always detected across all three sampling times (November 2023, January 2025 and July 2025). These chemicals are used for agriculture and farming and their levels should be monitored in future, especially when there has been spraying or after heavy rainfall events.

3.4 Algae in water

Background

Algae are natural, normal parts of ecosystems, and most species are safe and non-toxic. Some species, like blue-green algae (cyanobacteria) can make harmful toxins or chemicals that can be damaging to humans, domestic animals and livestock that drink or come into contact with the water, and also creatures or organisms living in the water. Not all blue-green algae are toxic, and even toxic species do not always make toxins.

Though microscopic (too small to be seen with the naked eye), they can sometimes be seen with the naked eye, either seen as green scum on the surface of the water, or when they turn the water green. Source: https://www.waternsw.com.au/education/keeping-waterways-healthy/algae

Results

Table 4. Summary of raw water quality results for algae samples. All values are in total cell count, cells/mL.

January 2025

Algae	*River site samples (total cell count: cells/mL*					
	Namoi 1	Namoi 2	Namoi 3	Barwon 1	Barwon 2	Barwon 3
Total Algae	28455	40827	46806	5144	6478	6544
Total blue-green algae (BGA)	15131	30250	32491	737	0	769
Total *potentially toxic BGA*[1]	501	61	27	0	0	0
Total *toxigenic* BGA	0	0	0	0	0	0

July 2025

Algae	*River site samples (total cell count: cells/mL*					
	Namoi 1	Namoi 2	Namoi 3	Barwon 1	Barwon 2	Barwon 3
Total Algae	7476	5500	6924	6054	4552	7200
Total blue-green algae (BGA)	3400	1900	1474	2100	1050	1200
Total *potentially toxic BGA*[1]	0	0	24	0	0	0
Total *toxigenic* BGA	0	0	0	0	0	0

[1]Potentially toxic BGA includes *Cyanophyceae* (see accompanying lab report for more details). These cyanobacteria/blue-green algae (BGA) are associated with toxin production in Australian waters.

Interpretation

A wide range of algal species and taxa were observed for all river samples (see accompanying laboratory report for all results). High levels of fine amorphous (no defined shape) were also found in the samples in November 2023. Total algae was highest across the Ngamaay River Sites (1, 2 and 3) in January 2025, compared to November 2023 and November 2025.

4. Conclusion

This report looked at two aims. First, to find out whether water samples covering a range of water quality parameters could be collected by local community members (and guided by CSU), delivered to a NATA accredited laboratory where the samples are analysed there and processed within the time that the samples can be held. Second, to do a preliminary water quality assessment that aligns with guidelines and sampling

rules, while at the same time aiming to answer the community's concerns about the quality and health of their rivers.

DEG and the River Rangers successfully collected water samples and could send them to the laboratory within the holding time that was needed to analyse the samples. Most relevant water quality parameters, including Chemical Oxygen Demand (COD), Nutrients (TN, P, Ammonia, Nitrate, Nitrate, NOx), Metals, Pesticides and Algae could be collected by the DEG and River Rangers, sent to a NATA accredited laboratory and could be analysed within the designated sample holding timeframe. They were not able to collect Biological Oxygen Demand (BOD) and E.coli samples as they need to be analysed within a 24-48 hr timeframe, and this could not be done. However, most of the water quality parameters that were tested and collected could provide information that could give an explanation of the health of the river. The community was especially interested in pesticides.

The water quality results are summarised in Table 5.

Table 5: Summary of water quality interpreted results for the Ngamaay (Site 1-3) and Baawan (Site 1-3) Rivers.

Parameter	Summary of results
COD, Nutrients	In November 2023, nutrients including total phosphorus (TP) and total nitrogen (TN) were higher than the ANZECC 95% Guideline Trigger Values for slightly to moderately disturbed ecosystems at all six sampling sites, except at Baawan Sites 2 and 3 for TP. In January 2025, TP and TN were higher than the guideline values at all sites, with NOX also being higher than the guidelines at Baawan Sites 1, 2 and 3. in July 2025, TP, TN and NOX were higher than the guidelines at all sites, with nitrate (NO3) levels being high at Ngamaay Sites 1, 2 and 3. COD and nutrients were highest on the July 2025 sampling trip (compared to the November and January results), especially at the three Baawan sites.
Metals	Aluminium, zinc and copper were consistently found at all sites and all sampling times, often above the ANZECC 95% Guideline Trigger Values. Other metals, including arsenic, barium, boron, chromium, cobalt, iron, lanthanum, lead, manganese, molybdenum, nickel, selenium, strontium, tin, titanium and vanadium were also found across the three sampling trips. The presence of metals was highest in the January 2025 sampling trip (compared to the November and July results), especially for the three Baawan sites.
Pesticides	In November 2023, six pesticides (mainly herbicides) including metolachlor, atrazine, terbuthylazine, 2,4-D, diuron and MCPA were found at the six sampling sites but were below the recommended 95% protection levels. In January 2025, 11 pesticides (mainly herbicides) were found and at all six sites, metolachlor was higher than the ANZECC guideline recommended 95% protection level. In July 2025, four pesticides (mainly herbicides) including metolachlor, terbuthylazine, diuron and fluroxypyr were found at

	the six sampling sites in July 2025. Additionally, the first round of sediment sampling for pesticides found that terbuthylazine was detected at low levels (0.004 mg/kg) at Ngamaay Site 1. Metolachlor, terbuthylazine and diuron were consistently found across all three sampling periods (November 2023, January 2025 and July 2025). These chemicals are often used in farming practices and their levels should be monitored in future, especially during times of spraying or after heavy rain.
Algae	A wide range of algal species were found in all river samples, but the current levels are not likely to be harmful to the water quality. High levels of fine amorphous (no defined shape) debris were also found in the samples. Total algae was highest in the Ngamaay River (1, 2 and 3) in January 2025, compared to November 2023 and July 2025.

The results in this report (particularly the finding of mid-level amounts of nutrients and pesticides) are often associated with agricultural land use. For several of the pesticide chemicals, there are no concentration guidelines for Australia, which means that health or environmental risks are not able to be assessed.

Recommendations

1. Record and monitor observations of the river sites (e.g. green water for algal blooms, signs of fish death events, low flow events).
2. Monitor water quality (including dissolved oxygen, pH, temperature, salinity (conductivity) and turbidity) regularly, using a water quality meter (currently used by DEG and the River Rangers), while at the same time regularly taking water samples that measure nutrients in water, COD, metals and pesticides to be analysed in the lab.
3. Record levels of pesticides in water and in the soil before, during and after spraying seasons.

This report shares a water sampling strategy which has been made so that the community in Walgett can be given an idea of their water quality in the Ngamaay and Baawan Rivers. The plan and results provide baseline data and a practical sampling method that can be repeated or changed for future water quality assessments, with long-term monitoring recommended so that longer-term trends can be found and the development of future water quality management plans can be supported.

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