

Draft Water Quality Objectives for Queensland Murray-Darling Basin – Nebine, Mungallala and Wallam Creeks Basin

Water area/type (Sources: s1–s5)	Management intent /Level of protection	NEBINE, MUNGALLALA and WALLAM CREEKS BASIN: aquatic ecosystem water quality objectives ¹⁻⁵											
		<p>Note: WQOs for indicators are primarily shown as single values to be achieved as the 50th percentile (median) of test data. WQOs may also be shown as a range of 20th, 50th and 80th percentiles to be achieved (e.g. 3–4–5) or as lower and upper limits (e.g. pH: 7.2–8.2).</p> <p>HEV: high ecological value; SD: slightly disturbed; MD: moderately disturbed – refer accompany maps for details Sources: S1: HWMP; S2: MDB Plan targets; S3: Local datasets/reporting (e.g. DSITI); S4: ANZECC/ARMCANZ (2000) AWQG; S5: other sources</p>											
		Ammonium N (µg-N/L)	Oxidised N (µg-N/L)	Total N (µg/L)	Filterable Reactive P (µg-P/L)	Total P (µg/L)	Chlorophyll-a (µg/L)	Dissolved Oxygen (% saturation); (mg/L)	Turbidity ⁵ (NTU)	Suspended Solids (mg/L)	pH	Conductivity (µS/cm)	Sulfate (mg/L) Alkalinity (mg/L CaCO ₃) SAR
HEV and SD waters	HEV	Maintain/achieve effectively unmodified water quality (20th, 50th and 80th percentiles of HEV waters), habitat, biota, flow and riparian areas. Note: there is insufficient information available to establish effectively unmodified water quality for these waters. Refer to QWQG for details on how to establish a minimum water quality data set for deriving local 20th, 50th and 80th percentiles.											
Upper Mungallala/ Wallam creeks catchment waters (s1, s2)	MD	Insufficient discharge data to characterise flow condition											
		9 (s1)	2 (s1)	830 (s1)	1 (s1)	50 (s1)	7 (s1)	60–110%; N/A (s1, s2)	50 (s1)	10 (s1)	6.5–8.0 (s1)	130 (s1)	SO ₄ : 0.5 A: 94 SAR: ID (s1)
	HEV	8-9-10 (s1)	2-2-3 (s1)	740-830-900 (s1)	1-1-1 (s1)	40-50-65 (s1)	ID	60-110% (s2)	10-50-300 (s1)	9-10-11 (s1)	7.3-7.4-7.5 (s1)	80-130-215 (s1)	SO ₄ : 0.5-0.5-0.5 A: 85-94-100 SAR: ID (s1)
Lower Mungallala/ Wallam creeks catchment waters (s1, s2)	MD	Insufficient discharge data to characterise flow condition											
		9 (s1)	2 (s1)	830 (s1)	1 (s1)	50 (s1)	7 (s1)	60–110%; >5mg/L (s1, s2)	50 (s1)	10 (s1)	6.5–8.0 (s1, s2)	130 (s1)	SO ₄ : 0.5 A: 94 SAR: ID (s1)
	HEV	8-9-10 (s1)	2-2-3 (s1)	740-830-900 (s1)	1-1-1 (s1)	40-50-65 (s1)	ID	60-110% (s2)	10-50-300 (s1)	9-10-11 (s1)	7.3-7.4-7.5 (s1)	80-130-215 (s1)	SO ₄ : 0.5-0.5-0.5 A: 85-94-100 SAR: ID (s1)
Upper Nebine Creek catchment waters (s1, s2)	MD	Insufficient discharge data to characterise flow condition											
		12 (s1)	83 (s1)	1020 (s1)	8 (s1)	390 (s1)	5 (s1, s4)	60–110%; N/A (s1, s2)	660 (s1)	60 (s1)	6.5–8.0 (s1)	70 (s1)	SO ₄ : 3.0 A: 37 SAR: ID (s1)

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	HEV	12-12-30 (s1)	50-83-155 (s1)	785-1020-1500 (s1)	7-8-11 (s1)	325-390-535 (s1)	ID	60-110 (s2)	390-655-1105 (s1)	45-60-75 (s1)	6.8-7.1-7.3 (s1)	60-70-110 (s1)	SO ₄ : 2-3-4 A: 35-35-45 SAR: ID (s1)
Lower Nebine Creek catchment waters (s1, s2)	MD	Insufficient discharge data to characterise flow condition											
		12 (s1)	83 (s1)	1020 (s1)	8 (s1)	390 (s1)	5 (s1, s4)	60–110%; >5mg/L (s1, s2)	660 (s1)	60 (s1)	6.5–8.0 (s1, s2)	70 (s1)	SO ₄ : 3.0 A: 37 SAR: ID (s1)
	HEV	12-12-30 (s1)	50-83-155 (s1)	785-1020-1500 (s1)	7-8-11 (s1)	325-390-535 (s1)	ID	60-110 >5mg/L (s2)	390-660-1105 (s1)	45-60-75 (s1)	6.8-7.1-7.3 (s1)	60-70-110 (s1)	SO ₄ : 2-3-4 A: 35-37-45 SAR: ID (s1)

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		TOXICANTS, PESTICIDES										
HEV and SD waters: Toxicants (s4)	HEV and SD	<p>WQGs for all toxicants and pesticides in these waters as per ANZECC/ARMCANZ (2000) AWQG, to protect species at the HEV level of protection.</p> <ul style="list-style-type: none"> Toxicants in water: refer to AWQG volume 1 section 3.4—‘water quality guidelines for toxicants’ (including tables 3.4.1, 3.4.2, and Figure 3.4.1), and AWQG volume 2 (section 8). AWQG values for the HEV level of protection typically correspond to protection of 99% of species. Toxicants in sediments: refer to AWQG volume 1 section 3.5—‘sediment quality guidelines’ (including Table 3.5.1, Figure 3.5.1), and AWQG volume 2 (section 8) 										
Other waters: Toxicants (s4)	MD	<p>WQGs for all toxicants and pesticides in these waters as per ANZECC/ARMCANZ (2000) AWQG, to protect species at the MD level of protection.</p> <ul style="list-style-type: none"> Toxicants in water: refer to AWQG volume 1 section 3.4—‘water quality guidelines for toxicants’ (including tables 3.4.1, 3.4.2, and Figure 3.4.1), and AWQG volume 2 (section 8). AWQG values for the MD level of protection typically correspond to protection of 95% species (in a small number of cases where bioaccumulation may occur, the AWQG recommends 99% species protection level). Toxicants in sediments: refer to AWQG volume 1 section 3.5—‘sediment quality guidelines’ (including Table 3.5.1, Figure 3.5.1), and AWQG volume 2 (section 8) 										
		TEMPERATURE³ (s2)										
Fresh waters	All	<p align="center">Between the 20th percentile and the 80th percentile of natural monthly water temperature. (Based on Basin Plan schedule 11 target value for A1 (Condamine, Paroo and Warrego valleys; lowland zone) and B1 (Condamine and Warrego valleys; upland zone)– Other water-dependent ecosystems)</p>										

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		MACROINVERTEBRATES⁴ (s1, s3)										
		Salinity index		Taxa richness		PET richness		Average SIGNAL grade		% sensitive taxa		% tolerant taxa
Edge (s3)	HEV	ID		ID		ID		ID		ID		ID
Edge (s3)	MD	3.86–4.31		15–27		ID		3.14–3.38		ID		42.86–60.00
		FISH										
Fresh waters	All	Insufficient data to derive water quality guidelines. Will be updated if information becomes available.										
		RIPARIAN, WETLANDS, SPP										
Riparian	All	Refer to section 14.1 of this report.										
Wetlands	All	Refer to section 14 of this report (Also note Section 17.2).										
State Planning Policy	All	Refer to section 17.3.										

Abbreviations: ID: Insufficient data to develop a guideline value

Notes to support Table (where applicable):

1. Nutrients:

Oxidised N = NO₂ + NO₃. Dissolved inorganic N (DIN) = Amm N + oxidised N.

Except where specified for event conditions, nutrient guidelines do not apply during high flow events in freshwaters. During periods of low flow and particularly in smaller creeks, build-up of organic matter derived from natural sources (e.g. leaf litter) can result in increased organic N levels (generally in the range of 400 to 800µg/L). This may lead to total N values exceeding the WQGs. Provided that levels of dissolved inorganic N remain low, then the elevated levels of organic N should not be seen as a breach of the WQGs, provided this is due to natural causes. See QWQG (section 5 and Appendix D) for more information on applying guidelines under high flow conditions.

2. Dissolved oxygen (DO): DO guidelines apply to daytime conditions. Lower values will occur at night in most waters. In freshwaters, night-time reductions are more variable. Following significant rainfall events, reduced DO values may occur due to the influx of organic material. In freshwaters, post-event DO reductions are again more variable. In general, DO values consistently less than 50 per cent are likely to impact on the ongoing ability of fish to persist in a water body while short term DO values less than 30 per cent saturation are toxic to some fish species. Very high DO (supersaturation) values can be toxic to some fish as they cause gas bubble disease. DO values for fresh waters should only be applied to flowing waters. Stagnant pools in intermittent streams naturally experience values of DO below 50 per cent saturation.

3. Temperature: Temperature varies both daily and seasonally, it is depth dependent and is also highly site specific. It is therefore not possible to provide simple generic WQGs for this indicator for freshwaters. The recommended approach is that local WQGs be developed. Thus, WQGs for potentially impacted streams should be based on measurements from nearby streams that have similar morphology and which are thought not to be impacted by anthropogenic thermal influences. From an ecological effects perspective, the most important aspects of temperature are the daily maximum temperature and the daily variation in temperature. Therefore measurements of temperature should be designed to collect information on these indicators of temperature and, similarly, local WQGs should be expressed in terms of these indicators. There will be an annual cycle in the values of these indicators and therefore a full seasonal cycle of measurements is required to develop guideline values.

4. Macroinvertebrates: The values for these macroinvertebrate biological indicators are based on the reporting by DSITI. For the Paroo drainage basin, a limited number of samples were used to develop the guideline values and they should be considered as interim values until further data is available. They apply to support waters at a moderately disturbed level of protection. Values are provided for 20th and 80th percentiles. The median value of biological indicators at test sites is to be compared and assessed against these values. More details on indicators and derivation of values are in the DSITI report (Negus et al., 2013).

Values are provided for edge habitat type. Taxa richness refers to the number of macroinvertebrate taxa collected in a sample. PET taxa richness refers to the total number of families from three orders of aquatic insects considered to be sensitive to changes in their environment (Plecoptera, Ephemeroptera, Trichoptera). SIGNAL index (stream invertebrate grade number—average level) gives an indication of water quality in the river from which the sample was collected, based on the sensitivity of taxa to water quality change. A higher number indicates greater sensitivity. The % tolerant taxa index was developed to assist in identifying taxa sensitivity to pollution. If a site is experiencing an impact from pollution it is expected that there would be a reduction in the percentage of sensitive taxa collected, and an increase in the percentage of tolerant taxa collected.

5. In South West QMDB drainage basins, turbidity is naturally high (range = 200 to over 1000 NTU) when electrical conductivity measurements are <200µS/cm. Turbidity is typically <30NTU when conductivity is >200µS/cm, except during major flow events.

References:

ANZECC & ARMCANZ (2000) *Australian and New Zealand Guidelines for Fresh and Marine Water Quality (AWQG)*.

Basin Plan (2012) *Schedule 11 – Target values for target application zones: A1 (Condamine, Paroo and Warrego valleys; lowland zone)–Other water-dependent ecosystems*

Basin Plan (2012) *Schedule 11 – Target values for target application zones: B1 (Condamine and Warrego valleys; upland zone)–Other water-dependent ecosystems*

Negus P., Steward A. & Blessing J. (2013). *Queensland draft macroinvertebrate guidelines: Murray–Darling and Bulloo catchments*, November 2013 – Draft for Comment. Brisbane: Department of Science, Information Technology, Innovation and the Arts, Queensland Government.

Queensland Government (EHP; 2009, as amended) *Queensland Water Quality Guidelines*. (Refer to section 5 and Appendix D of the QWQG for more detail on compliance assessment protocols.)