Hydrobiology

CALLIDE POWER STATION

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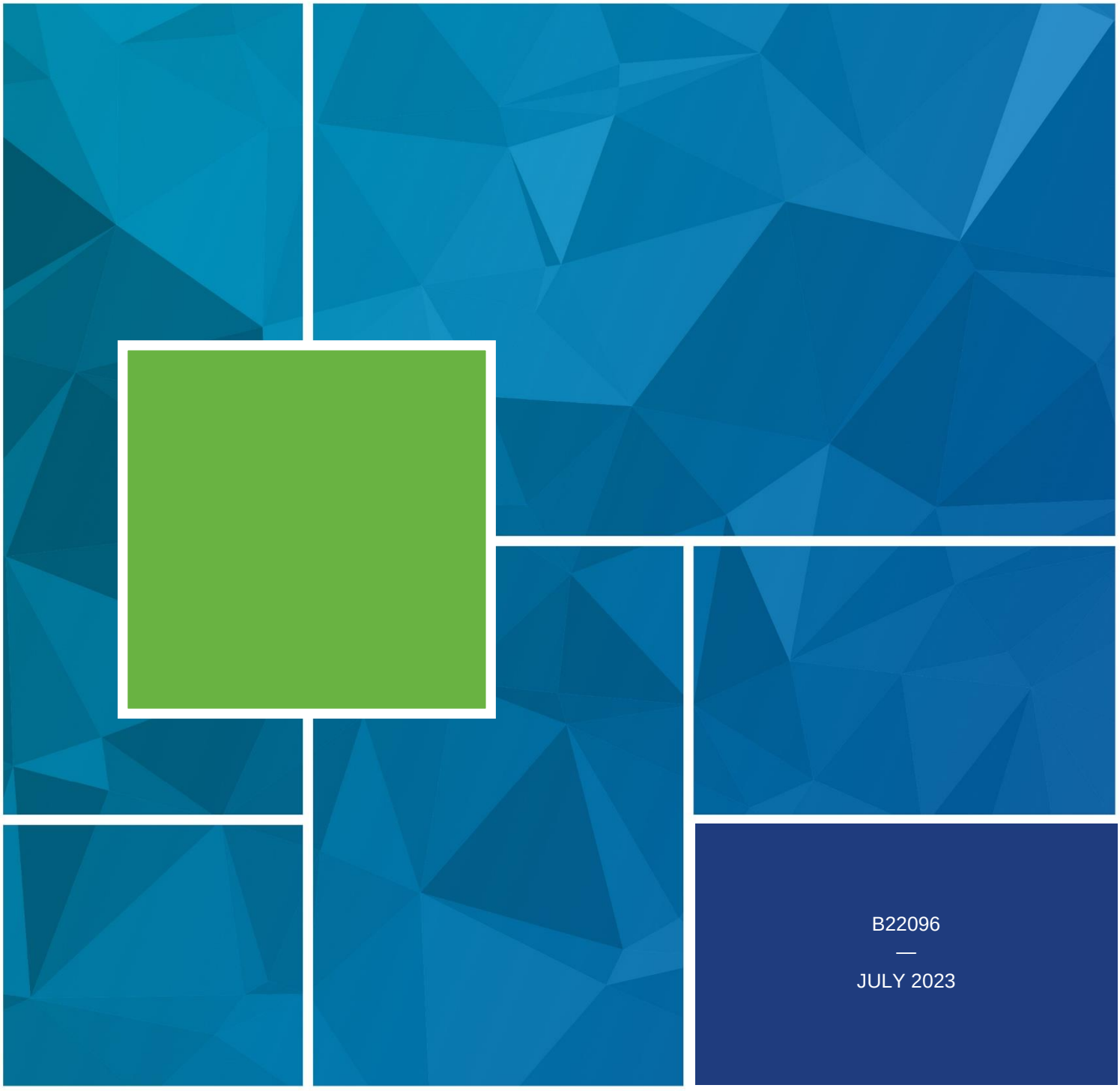
ECOLOGICAL AND CONTAMINANTS REPORT



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B22096_Callide Power Station Ecological Report Primary_V4-0	Ecological Assessment of Callide Creek Catchment	LA	JC

EXECUTIVE SUMMARY

This report presented the finding of the aquatic ecological assessment of the Callide Creek catchment upstream and downstream of Callide Power Station (CPS). The survey involved the collection of aquatic fauna and analysis of biota tissue to inform human and ecological health risk assessments regarding per and poly fluorinated alkyl substance (PFAS) compounds and other chemicals (metals/metalloids and fluoride). The survey also aimed to determine the aquatic values of the assessed waterbodies. Aquatic values are defined as the intrinsic values of aquatic ecosystems, habitat and wildlife in waterways and riparian areas, for example, biodiversity, ecological interactions, plants, animals, key species (such as turtles, platypus, seagrass and dugongs) and their habitat, food and drinking water (DEHP, 2011).

key species (such as turtles, platypus, seagrass and dugongs) and their habitat, food and drinking water.

The survey was conducted in early February 2023, and assessed the biota tissue contaminants, habitat condition, macroinvertebrate community and aquatic biota (macrocrustaceans, fish and aquatic reptiles), of each site. Results were compared between sites and against relevant guidelines.

The habitat condition, aquatic biota, and macroinvertebrate communities varied between control/reference sites and test sites. Upstream of Callide Dam within Callide Creek habitat condition was excellent and aquatic biota and macroinvertebrates were abundant and diverse for this system. Downstream some disturbance was evident based on the state of the habitat, water quality, and macroinvertebrate assemblages. Habitat quality overall was in good to excellent condition, with most sites limited due to lower water depth, availability of micro and macrohabitats and by high fine sediment content. Lake Callide, a larger water body with sections of sheltered habitat was able to support similar, and in some cases more diverse aquatic biota and macroinvertebrates communities

than the comparable reference site Lake Kroombit. Available water quality data was scarce, however showed that site AB11 had high conductivity (2,631µS/cm) and that dissolved oxygen (%saturation) was relatively low across all sites, in particular downstream of Lake Callide.

PFOS was detected in biota samples at sites on Callide Creek both upstream and downstream of the CPS with most concentrations being above human and ecological health guidelines levels. No PFOS was detected in biota samples from Lake Callide or within Lake Kroombit. PFOS concentrations appear to increase with increasing distance downstream of CPS, with the highest concentrations recorded at the furthest downstream site. Concentration of metals and fluoride in biota samples did not show an obvious trend between control/reference and test sites. Where guidelines (generally expected levels) were available most metals/metalloids concentrations were below respective guidelines, except for zinc. However, zinc concentrations were above guideline levels regardless of species and site.

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1. INTRODUCTION

1.1 BACKGROUND

In December 2021, CS Energy Limited (CS Energy) was issued with a notice to conduct or commission an Environmental Evaluation (EE) to investigate and assess the source, cause and extent of any actual or potential environmental harm resulting from the historical use of Aqueous Film Forming Foam (AFFF) at the Callide Power Station (hereafter referred to as CPS). A Sampling Analysis and Quality Plan (SAQP) was prepared by Epic Environmental on 28 February 2022 (Epic Environmental, 2022) to address Requirement 3 of the EE.

The SAQP outlined the need to conduct a desktop review to facilitate the design of an appropriate aquatic biota sampling that would adequately address the requirements of the EE pertaining to human and/or ecological health risks arising from human consumption of aquatic biota as well as bioaccumulation within the food chain.

Epic completed the desktop review in accordance with the SAQP and as an outcome of this review designed a biota sampling strategy which was then implemented by Hydrobiology in 2023.

1.2 SCOPE

Hydrobiology was contracted to conduct the fieldwork and reporting as stipulated by the SAQP, including:

- Habitat assessments;
- Macroinvertebrate sampling; and

- Collection of aquatic biota to inform the human and ecological health risk assessments. The original scope of works included the assessment of PFAS; however Hydrobiology were requested to subsequently include the assessment of the following parameters, including:
  - Metals and metalloids.
    - arsenic, barium, boron, chromium, copper, lithium, molybdenum, selenium, strontium, thorium, uranium, vanadium, zinc.
    - Fluoride.

1.3 LOCATION AND HISTORY

CPS is located within the Callide Basin in the Banana Shire region of Queensland, approximately 10 km east of the Biloela township and approximately 110 km south of Rockhampton. CPS comprises three coal-fired power plants supplied by the nearby Callide mine (Figure 1-2). The first, Callide A, was opened in 1965 but was decommissioned in 2001, except for a single unit which was used to demonstrate carbon capture technology and was decommissioned in 2016. The other two power stations, Callide B and Callide C, remain active. Callide B was commissioned in 1988 and is owned by CS Energy, whereas Callide C was commissioned in 2001 and is owned in a 50/50 venture between CS Energy and IG Power (formerly known as InterGen).

1.4 CATCHMENTS AND WATECOURSES

The study area is located within the Callide Creek catchment within the Dawson River sub-basin. With the exception of one site, all sites are located within Callide Creek, upstream, downstream and within Callide Dam. The remaining site is located within Kroombit Dam on Kroombit Creek.

A map of the project location and site positions are provided in Section 2.2.

1.5 LOCAL CLIMATE

The climate for the area is typical of the region, with high daytime summer temperatures and mild winters (Figure 1-1). Rainfall is variable, with most rain falling during the warmer months from mid-October to mid-March. Above average rainfall occurred in the months preceding monitoring in February 2023. In the weeks leading up to the survey, a total of 31 mm was recorded, while a total of 19 mm of rain was recorded within the survey period (30th January to 3rd February 2023).

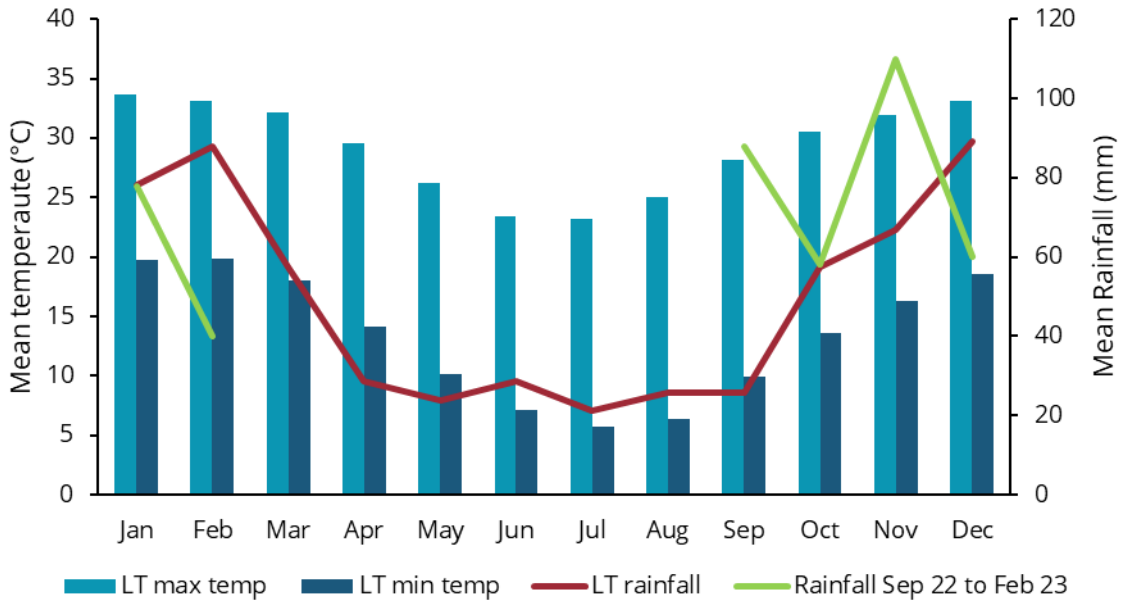


Figure 1-1 Long term (LT) monthly mean rainfall, maximum and minimum temperature statistics from the Biloela climate station 039290 (BOM, 2023).

Figure 1-2 CPS with infrastructure and other points of interest

1.6 ENVIRONMENTAL VALUES

EVs are the qualities of waterways that need to be protected from the effects of pollution, waste discharges and other threats (such as runoff from agricultural lands) to ensure aquatic ecosystems are healthy and the waterways continue to provide essential ecosystem services. There are a range of EVs applicable to waterways in Queensland. These include the value of the waterways to aquatic ecosystems, primary industries, recreation and aesthetics, drinking water, industrial uses as well as cultural and spiritual values. DEHP (2011) defines EVs for the Callide Creek Catchment within the Dawson River Sub-Basin in which CPS is located. DEHP (2011) sets out a framework for EVs which are defined for tributaries and regulated and unregulated waters of Callide Creek Catchment. Those most relevant to the survey sites are the Callide Creek tributaries (developed) and Upper Kroombit Creek and tributaries (Table 1-1).

Table 1-1 Prescribed environmental values of Callide Creek and tributaries (developed).

Label	Environmental Value	Description	Callide Creek and tributaries—developed areas	Upper Kroombit Creek and tributaries
	Aquatic ecosystem	The intrinsic value of aquatic ecosystems, habitat and wildlife in waterways, waterholes and riparian areas, for example, biodiversity, ecological interactions, plants, animals, key species and their habitat, food and drinking water. EV were designed for the protection of moderately disturbed systems (i.e. 95% biota protection trigger).	✓	✓
	Irrigation	Suitability of water supply for irrigation, for example, irrigation of crops, pastures, parks, gardens and recreational areas.	✓	✓
	Farm supply	Suitability of domestic farm water supply, other than drinking water. For example, water used for laundry and produce preparation.	✓	✓
	Stock watering	Suitability of water supply for production of healthy livestock.	✓	✓
	Aquaculture	Health of aquaculture species and humans consuming aquatic foods (such as fish and prawns) from commercial ventures.		✓
	Human consumption	Health of humans consuming aquatic foods, such as fish and prawns, from natural waterways.	✓	✓

Label	Environmental Value	Description	Callide Creek and tributaries—developed areas	Upper Kroombit Creek and tributaries
	Primary recreation	Health of humans during recreation which involves direct contact and a high probability of water being swallowed, for example, swimming, diving and water-skiing.	✓	✓
	Secondary recreation	Health of humans during recreation which involves indirect contact and a low probability of water being swallowed, for example, wading, boating, rowing and fishing.	✓	✓
	Visual appreciation	Amenity of waterways for recreation which does not involve contact with water. For example, walking and picnicking adjacent to a waterway.	✓	✓
	Drinking water	Suitability of raw drinking water supply. This assumes minimal treatment of water is required, for example, coarse screening and/or disinfection.	✓	✓
	Industrial	Suitability of water supply for industrial use, for example, food, beverage, paper, petroleum and power industries, mining and minerals refining/processing. Industries usually treat water supplies to meet their needs.	✓	
	Cultural and spiritual values	Cultural, spiritual and ceremonial values of water means its aesthetic, historical, scientific, social or other significance, to the past, present or future generations.	✓	✓

2. METHODS

2.1 MONITORING ASPECTS

Sampling was conducted at nine sites following the methods specified in the Sampling Analysis and Quality Plan (SAQP) (Epic Environmental, 2022) and under the following codes of practice and State or Commonwealth guidelines:

- DES (2018) – *Deciding aquatic ecosystems indicators and local water quality guidelines;*
- DES (2018) – *Monitoring and Sampling Manual;*
- DES (2014) - *Receiving Environment Monitoring Program guideline - For use with Environmental Relevant Activities under the Environmental Protection Act (1994);*
- Department of Natural Resources and Mines (DNRM) (2001). *Queensland, Australian River Assessment System (AUSRIVAS) Sampling and Processing Manual;*
- DEHP (2011) - *Environmental Protection (Water) Policy (2009) Callide Creek Catchment Environmental Values and Water Quality Objectives Relevant state and national standards*; and
- (Queensland Health, n.d.) - *Guideline for sampling and analysis of seafood suitable for human health risk assessments of PFAS contamination*.

Details regarding sample collection methods, analysis and QA/QC approaches for each monitoring aspect are discussed in Appendix B. Relevant guideline values and explanations of macroinvertebrate analysis (including definitions of indices and AUSRIVAS scores) are also discussed in Appendix A. The results of implemented QA/QC are discussed in Appendix B.

2.2 SURVEY LOCATIONS

As part of the scope of works (Epic Environmental, 2022), nine sites within and adjacent to the CPS were surveyed during the 30th January to 3rd February 2023 period (see Table 2-1 and Figure 2-1).

Sites were positioned spatially over a longitudinal grade and separated by treatments (test, control, and reference sites). Test sites were positioned downstream of CP, therefore potentially impacted. Control sites were positioned upstream from CP within the Callide Creek, away from potential impacts. Reference sites were positioned in the same basin as control and test sites but in a separate catchment, therefore providing context of PFAS levels withing the wider region.

Table 2-1 Site names, treatments and locations. Coordinates provided in Geodetic Datum of Australia (GDA) 2020.

Site	Waterway/region	Treatment	Habitat	Coordinates	
				Latitude	Longitude
AB9	Lake Kroombit	Reference	Lacustrine	-24.4156	150.773
AB1	Upstream Callide Creek	Control	Riverine	-24.3271	150.6762
AB2	Lake Callide	Test	Lacustrine	-24.3580	150.6258
AB3	Lake Callide	Test	Lacustrine	-24.3687	150.6161
AB4	Downstream Callide Creek	Test	Riverine	-24.3641	150.6072
AB5	Downstream Callide Creek	Test	Riverine	-24.3793	150.5604
AB6	Downstream Callide Creek	Test	Riverine	-24.3702	150.5307
AB7	Downstream Callide Creek	Test	Riverine	-24.3593	150.4987
AB8	Downstream Callide Creek	Test	Riverine	-24.3462	150.4761

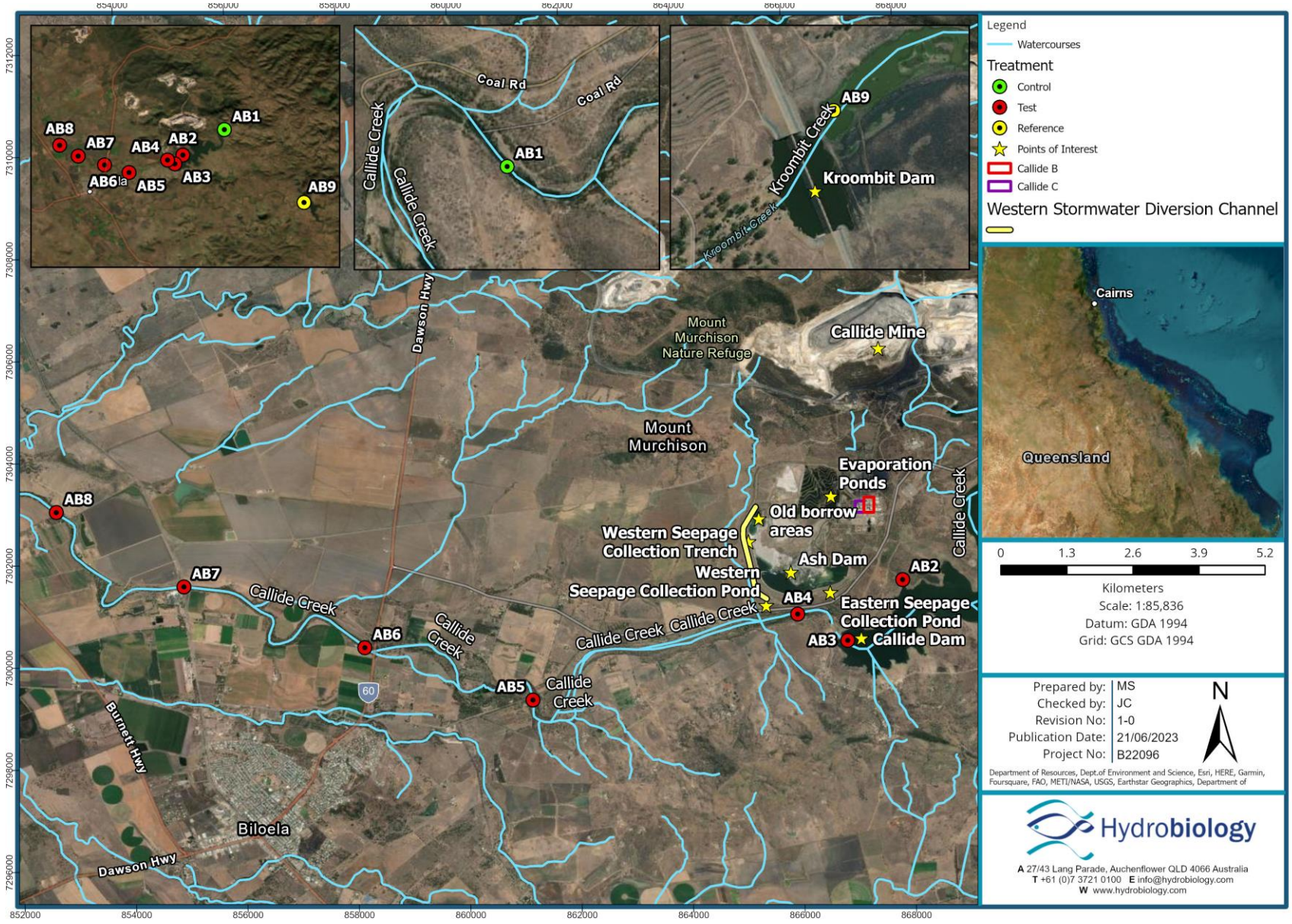


Figure 2-1 Monitoring sites with watercourses, infrastructure and other points of interest

3. RESULTS AND DISCUSSION

Field datasheets are displayed in Appendix C.

3.1 HABITAT

Site photos and descriptions can be found in Table 3-1. Results are presented spatially over a longitudinal gradient.

3.1.1 HABITAT CONDITION

The study area contained a mix of lacustrine and riverine habitats, which required a mix of traditional and adjusted habitat assessments. Most sites were riverine sites and could be assessed using the traditional habitat assessment defined by AUSRIVAS, however AB2, AB3 and AB9 were assessed under a different metric. Regardless of how the scores were classified, all sites were graded as being in poor, fair, good or excellent condition, however the required scores for each band varied between sites (see Appendix A for more details).

Habitat condition of all riverine sites ranged from good to excellent (Figure 3-1). The habitat condition of the control site AB1 was scored “excellent” whereas all sites downstream of Lake Callide were scored as “good”. In comparison to AB1 sites downstream were largely limited by decreased bottom

substrate variability (greater proportion of fines content), high embeddedness (i.e., minimal interstitial spacing), the limited depth and variability of macrohabitat (i.e. restricted to pools while riffles and runs were absent) and the coverage of streamside vegetation due to clearing.

Wetland sites AB9 and AB2 were in good condition, however site AB3 was classified as fair. All sites were hindered by lack of substrate variability, macrohabitat availability and the dominance of grasses as the primary riparian vegetation.

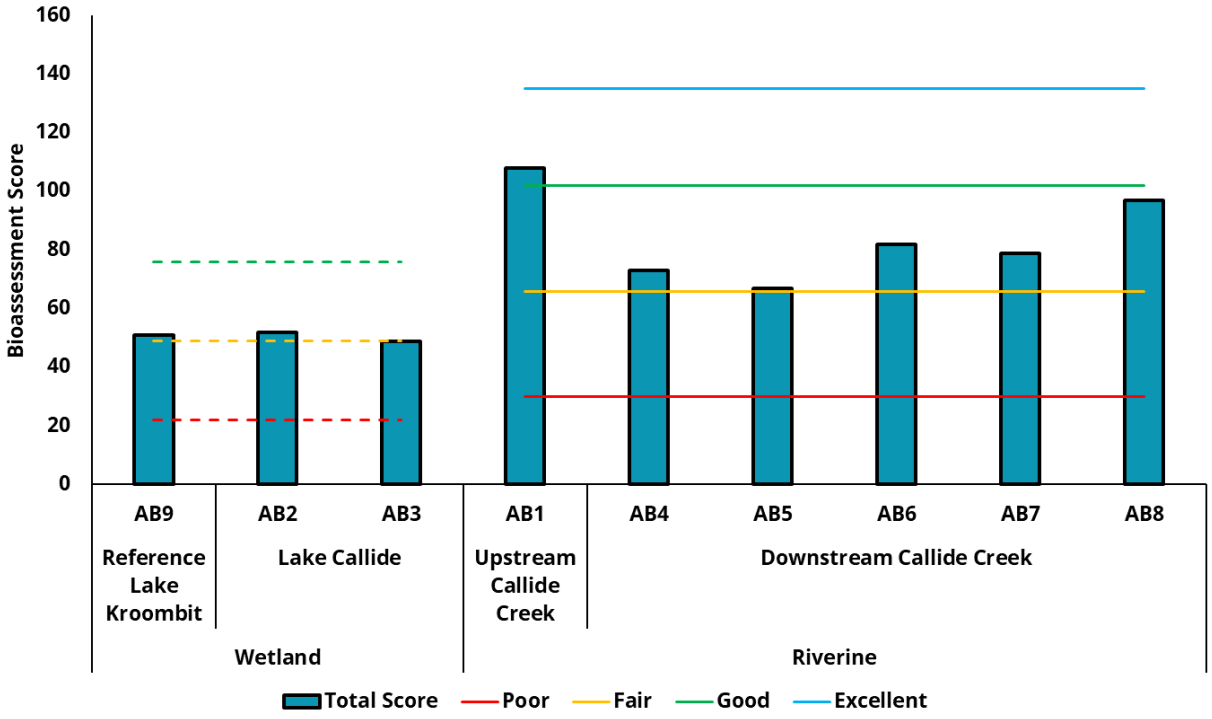


Figure 3-1 Habitat assessment scores of wetland (left) and non-wetland (right) sites with bands indicating the upper limit of each condition grade. Solid lines indicative of River Bioassesmment Program grades, dashed lines indicative of adapted scores for wetland sites.

3.1.2 BANKS STABILITY

The bank stability of all sites were classified as good to excellent. Most banks were stable or moderately stable, with little evidence of erosion. Some sites however had reduced streambank cover. The streambank surfaces of all sites were at least 50% covered in vegetation, gravel or larger material.

3.1.3 BED STABILITY

Overall, bed stability of all sites ranged from good to excellent, with little evidence of scouring and some deposition of fine sediment. Most test sites had low to loose compaction of the bed material, with little to no grading, packing, structure or overlapping of substrate particles meaning it could be easily dislodged, except for test site AB8 which had moderate bed compaction. Control site AB1 was the only site to record tight compaction of the bed material.

For most sites, bed stability could be linked to the substrate composition which was overall dominated by silt/clay sediments (Figure 3-2). In contrast, AB1 which contained tight compaction of the bed material contained larger particles of sand, pebbles and cobble, exposed bedrock as well as silt/clay sediment. While silt/clay was less prevalent at site AB8, larger sediments were more abundant, making it more similar to upstream conditions at AB1.

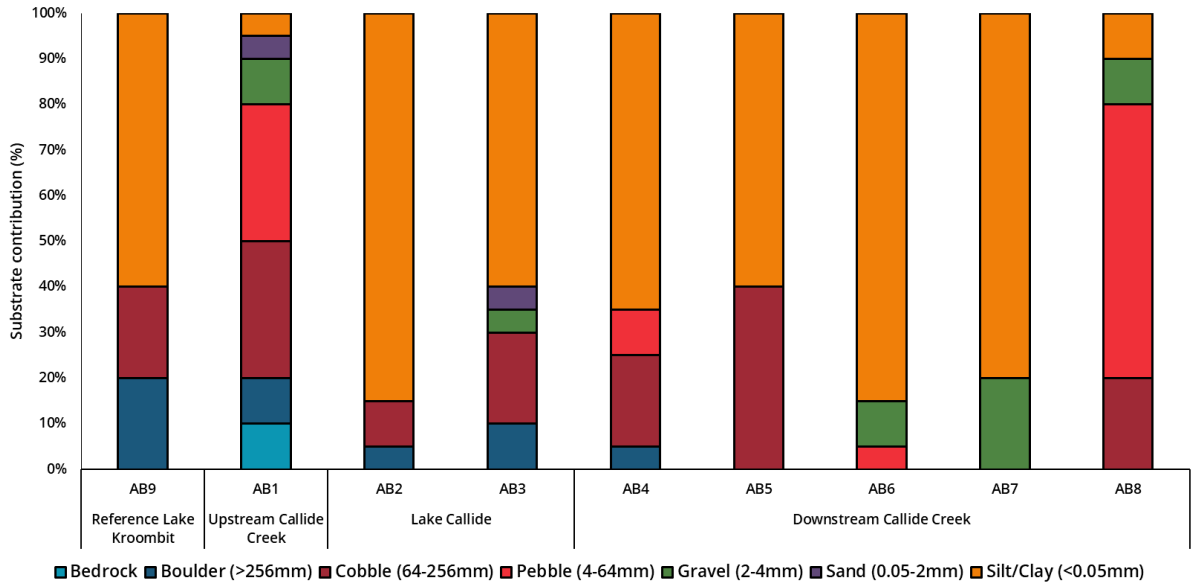


Figure 3-2 Particles size contribution to overall substrate.

3.1.4 RIPARIAN VEGETATION

The riparian vegetation associated with lake habitats was largely cleared, with trees often scarce and the banks dominated by grasses and/or bare ground (Figure 3-3). Exotics grass and pasture species were present at most sites to some degree. At Callide Creek sites, clearing was reduced and the riparian vegetation still contained patches of trees interspersed by grasses and shrubs.

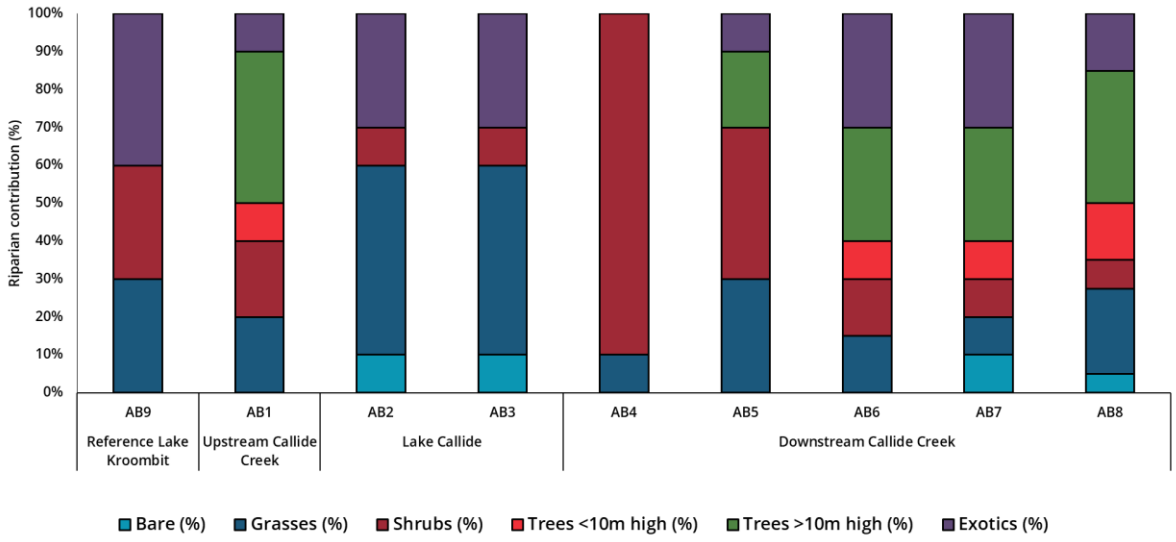


Figure 3-3 Riparian vegetation contribution (%).

3.1.5 MACROHABITAT

Macrohabitat lacked diversity across each site, with most sites comprised of only one macrohabitat (Figure 3-4). Downstream sites AB7 and AB8 were most like the control site as rocky pool habitat was present. All other sites were comprised of sandy/silt pools.

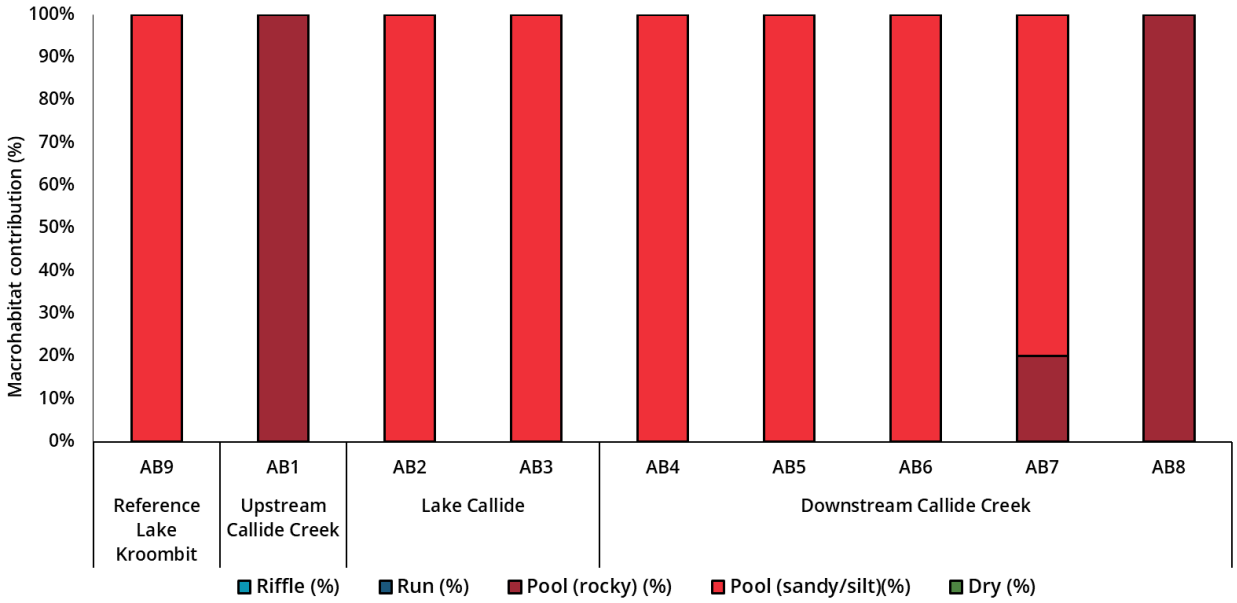


Figure 3-4 Macrohabitat contribution.

3.1.6 MICROHABITAT

Microhabitat was predominantly provided by small woody debris (SWD) and detritus. Periphyton and large woody debris (LWD) were each present in smaller quantities but also commonly present (Figure 3-5). Undercut banks were present at three sites (AB1, AB6 and AB8). Some microhabitat was also provided by the macrophytes, and algae present to varying degrees.

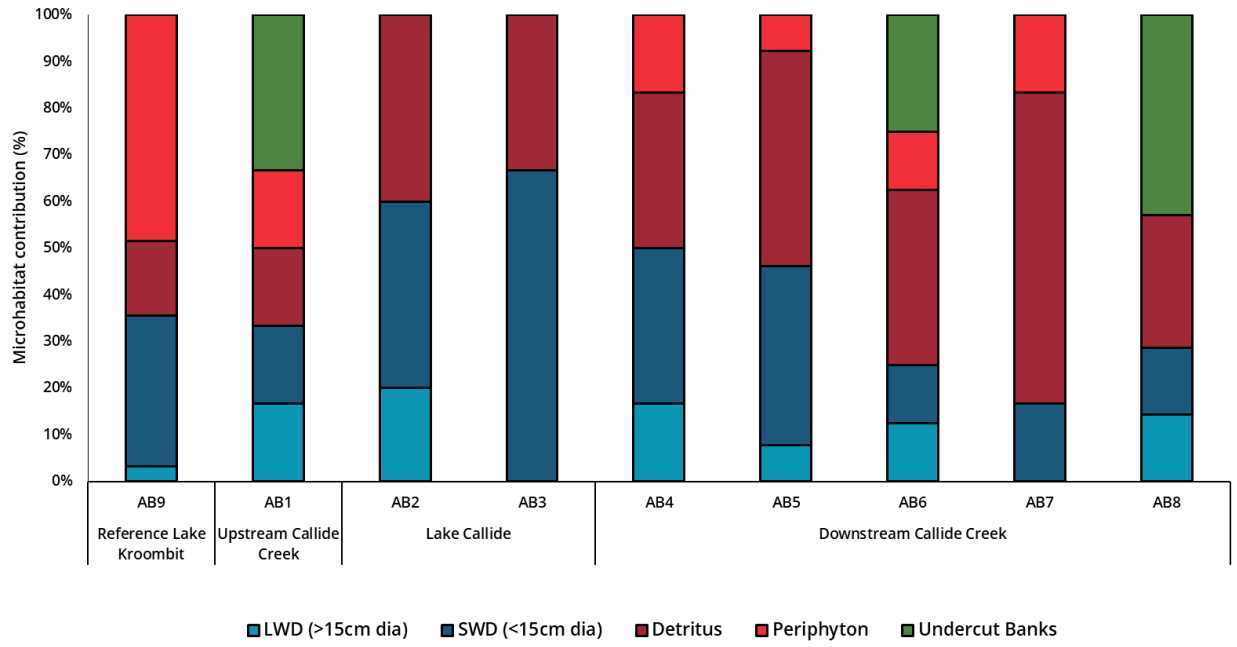


Figure 3-5 Microhabitat contribution

3.1.7 MACROPHYTES

Macrophytes were present at all sites, and they were largely found along edge habitats; however some macrophytes were also present within the pool habitat (Figure 3-6). Several downstream creek sites were dominated by either *Hydrilla* sp. or *Typha* sp. but typically also had other species present. The reference site at Lake Kroombit was dominated by *Persicaria sp.* whereas within Lake Callide taxa such as charophytic algae were more common. The most diversity and species evenness was observed at the upstream Callide Creek control site AB1 where most taxa found at across the rest of the study area were present. Taxa absent from this site were *Persicaria* sp., *Nymphoides* sp., and *Ceratophyllum* sp.

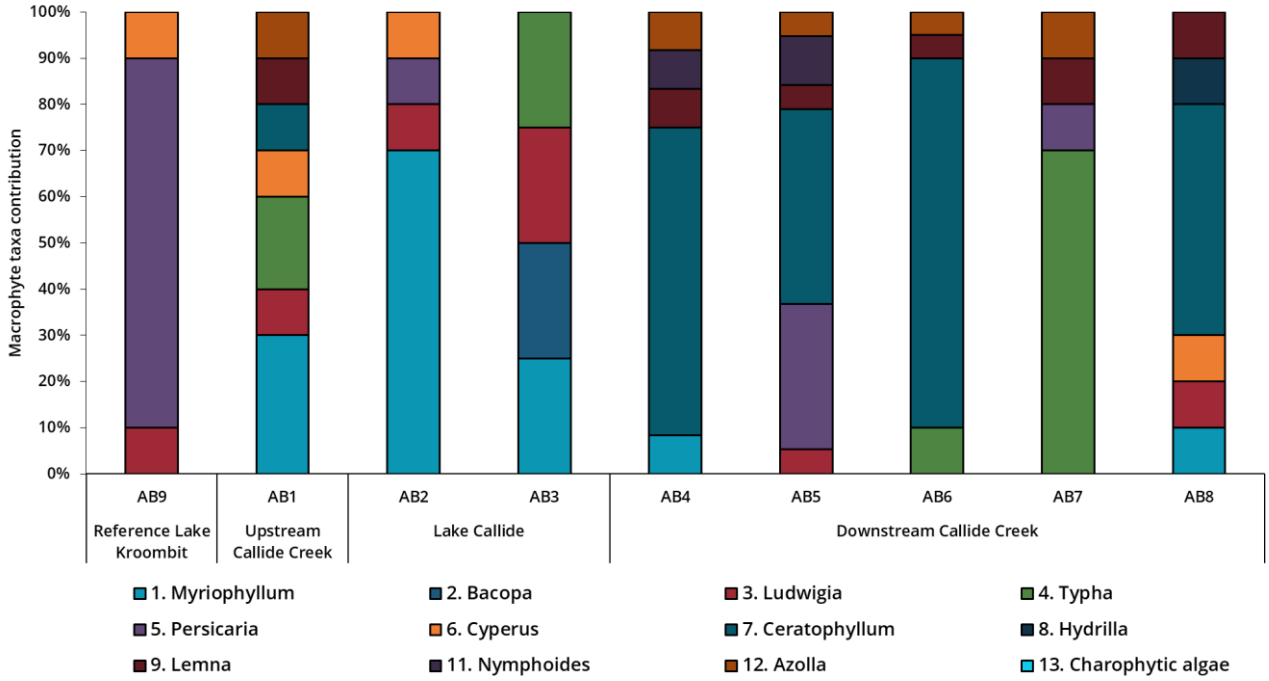


Figure 3-6 Contribution of macrophytes to overall assemblage

Table 3-1 Site descriptions and habitat assessment

Site	Feature	Upstream	Downstream
AB9	**Watercourse:** Lake Kroombit Dam **Local landuse:** Reservoir, native vegetation **Bed erosion and sedimentation**: Less than 5% of the bottom impact by sedimentation or scouring, no sediment deposition evident. **Banks:** Circular pond. Banks convex shaped with slight (10-30°) side slope. Banks are stable, with no evidence of erosion or bank failure. Little potential for future problem. At least 80% of banks covered by vegetation or large particles. **Bed substrate:** Dominated by silt/clay (60%) with smaller, equal coverage of cobble and boulder (20. Low compaction of bed material, poor grading, some packing and structure but little overlap and can be dislodged easily. Habitat provided by boulders/cobbles at edge. **Macrohabitat:** Entirely sandy/silty pool. **Microhabitat**: Detritus (5%), and SWD (10%) present. Macrophytes prevalent (60%) and algae present (15%), both limited to the bank edges. **Riparian vegetation:** Isolated shrubs (30%) among grasses (30%) and exotics (40%), no trees. **Habitat bioassessment score**: 51, good condition		
AB1	**Watercourse:** Upstream Callide Creek **Local landuse:** Native vegetation and roads **Bed erosion and sedimentation**: Less than 5% of the bottom impact by sedimentation or scouring, no sediment deposition evident. **Banks:** Convex shaped banks with steep (60-90°) left side slope and flat to low (0-30%) right side slope. Banks are stable, with no evidence of erosion or bank failure. Little potential for future problem. At least 80% of banks covered by vegetation or large particles. **Bed substrate:** Mixture of mostly cobble and pebble (30%) with some small, equal presence of bedrock, boulder and gravel (10%). Slight, equal presence of sand and silt/clay (5%). Tightly packed, armoured – array of sizes, tightly packed, overlapping and hard to dislodge. **Macrohabitat:** Entirely rocky pool. **Microhabitat**: Some undercut banks (20%), with small, equal coverage from LWD, SWD, detritus and periphyton (10%) Macrophytes (40% total - 50% edge, 50% pool) and filamentous algae (20% total – 50% edge, 50% pool) also present. **Riparian vegetation:** Contiguous riparian vegetation. Dominant vegetation of tree form (40%), with understory of shrubs (20%) and grasses (20%). Some presence of exotics (10%). **Habitat bioassessment score**: 108, excellent condition		

Site	Feature	Upstream	Downstream
AB2	**Watercourse:** Lake Callide **Local landuse:** Reservoir, native vegetation (cleared), road, residential and farm infrastructure **Bed erosion and sedimentation**: Less than 5% of the bottom impact by sedimentation or scouring, no sediment deposition evident. **Banks:** Convex shaped banks slight (10-30°) side slopes. Banks are stable, with no evidence of erosion or bank failure. Little potential for future problem. At least 80% of banks covered by vegetation or large particles. **Bed substrate:** Dominated by silt/clay (90%) with some areas of cobble (10%) and boulder (5%). Loose compaction of bed, loose array of particles with no packing or structure or overlap and is easily moved. **Macrohabitat:** Entirely sandy/silt pool. **Microhabitat**: Limited. Small, equal presence of small woody debris and detritus (10%) and slight presence of large woody debris (5%). Macrophytes (35%) present at edge and algae (50%) mostly present at edge (90%) with some present within the pool (10%). **Riparian vegetation:** Occasional shrubs (10%) among native (50%) and exotic grasses and pastures (30%). **Habitat bioassessment score**: 49, fair condition		
AB3	**Watercourse:** Lake Callide **Local landuse:** Native vegetation (cleared), reservoir, residential and farming infrastructure. **Bed erosion and sedimentation**: Less than 5% of the bottom impact by sedimentation or scouring, no sediment deposition evident. **Banks:** Convex shaped banks with low (10-30°) side slopes. Banks are stable, with no evidence of erosion or bank failure. Little potential for future problem. At least 90% of banks covered by vegetation or large particles. **Bed substrate:** Dominated by silt/clay (60%), with some cobble (20%), some boulder (10%) and small, equal presence of gravel and sand particles (5%). Loose compaction of bed, loose array of particles with no packing or structure or overlap and is easily moved. **Macrohabitat:** Entirely sandy/silt pool. **Microhabitat**: Limited. Small presence of small woody debris (10%) and slight presence of detritus (5%). Macrophytes (20%) present at edge and algae (30%) mostly present at edge (90%) with some present within the pool (10%). **Riparian vegetation:** Mostly cleared habitat with occasional shrubs (10%) among native (50%) and exotic grasses and pastures (30%). **Habitat bioassessment score**: 52, good condition		

Site	Feature	Upstream	Downstream
AB4	**Watercourse:** Callide Creek, below dam spillway. **Local landuse:** Native vegetation, wetland and road/access tracks. **Bed erosion and sedimentation**: Less than 5% of the bottom impact by sedimentation or scouring, no sediment deposition evident. **Banks:** Convex shaped, flat (0-10°) banks. Banks are stable, with no evidence of erosion or bank failure. Little potential for future problem. At least 80% of banks covered by vegetation or large particles. **Bed substrate:** Dominated by silt/clay (65%). Some cobble (20%), small presence of pebble (10%) and slight presence of boulder (5%0. Loose compaction of bed material – loose array of poorly packed or structured particles with little overlap and can be moved easily. **Macrohabitat:** Entirely sandy/silt pool **Microhabitat**: Some blanketing silt, some small, equal presence of SWD and (10%) and some slight, equal presence of LWD and periphyton (5%). Copious, equal amounts of filamentous algae and macrophytes (90%) within the pool (50%) and edge (50%). **Riparian vegetation:** Dominated by shrubs (90%) with isolated patches of native grasses (10%), essentially a wetland. **Habitat bioassessment score**: 73, good condition		
AB5	**Watercourse:** Downstream Callide Creek. **Local landuse:** Native vegetation, wetland and farm/residential infrastructure. **Bed erosion and sedimentation**: Less than 5% of the bottom impact by sedimentation or scouring, no sediment deposition evident. **Banks:** Convex shaped, flat (0-10°) banks. Banks are stable, with no evidence of erosion or bank failure. Little potential for future problem. At least 80% of banks covered by vegetation or large particles. **Bed substrate:** Dominated by silt/clay (60%), some cobble (40%). Loose compaction of bed material – loose array of poorly packed or structured particles with little overlap and can be moved easily. **Macrohabitat:** Entirely sandy/silt pool **Microhabitat**: Abundant detritus (30%) and SWD (25%) with equal, small presence of LWD and periphyton (5%). Blanketing silt present. Copious, equal amounts of filamentous algae and macrophytes (90%) within the pool (50%) and edge (50%). **Riparian vegetation:** Isolated/scattered trees (20%) amongst native grasses (30%) and exotic pasture grasses (10%) and shrubs (40%). **Habitat bioassessment score**: 67, good condition		

Site	Feature	Upstream	Downstream
AB6	**Watercourse:** Downstream Callide Creek **Local landuse:** Native vegetation (cleared), irrigated cropping, wetland and road, and farm/residential infrastructure. **Bed erosion and sedimentation**: Less than 5% of the bottom impact by sedimentation or scouring, no sediment deposition evident. **Banks:** Convex shaped banks with low (10-30°) side slopes. Banks are stable, with no evidence of erosion or bank failure. Little potential for future problem. At least 90% of banks covered by vegetation or large particles. **Bed substrate:** Dominated by silt/clay (85%) with some gravel (10%) and slight presence of pebble (5%). Loose compaction of bed material – loose array of poorly packed or structured particles with little overlap and can be moved easily. Lack of habitat provide by substrate obvious. **Macrohabitat:** Entirely sandy/silt pool **Microhabitat**: Some undercut banks (10%) and detritus (15%) with equal, small presence of SWD, LWD and periphyton (5%). Abundant macrophytes (75%) mostly within pool (70%) and some edge (30%). Some algae (20%) within the pool (100%). **Riparian vegetation:** Cleared patches of trees (40%) amongst exotic pasture grasses (30%), and small, equal patches of native grasses and shrubs (15%). **Habitat bioassessment score**: 82, good condition		
AB7	**Watercourse:** Downstream Callide Creek. **Local landuse:** Wetland and native vegetation partially cleared for road infrastructure. Irrigated cropping upstream and piggery downstream. **Bed erosion and sedimentation**: Less than 5% of the bottom impact by sedimentation or scouring, no sediment deposition evident. **Banks:** Convex shaped, flat (0-10°) banks. Banks are stable, with no evidence of erosion or bank failure. Little potential for future problem. At least 80% of banks covered by vegetation or large particles. **Bed substrate:** Entirely silt/clay. Loose compaction of bed material – loose array of poorly packed or structured particles with little overlap and can be moved easily. Lack of habitat provide by substrate obvious. **Macrohabitat:** Mostly sandy/silt pool (80%) with some rocky pool (20%). **Microhabitat**: Some detritus (20%) with equal, small presence of SWD and periphyton (5%). Blanketing silt present. Small presence of macrophytes (10%) predominantly at edge (90%) and some within pool (10%). Algae present (10%) at edge (100%). **Riparian vegetation:** Cleared patches of trees (40%) amongst exotic pasture grasses (30%), and small, equal patches of native grasses shrubs and areas of bare earth (10%). **Habitat bioassessment score**: 79, good condition		

Site	Feature	Upstream	Downstream
AB8	**Watercourse:** Downstream Callide Creek/ Callide Weir **Local landuse:** Native vegetation and wetland area with grazing and farm infrastructure. **Bed erosion and sedimentation**: 5-30% of the bed affected by deposition of silt within the pool. **Banks:** Convex shaped, steep (60-80°, left) left bank and convex low (10-30°) right bank. Banks moderately stable. Infrequent, small areas of erosion (5%, right bank), 95% of the streambank surface covered by vegetation. **Bed substrate:** Dominated by pebble (60%) with some cobble (20%) and small, equal presence of gravel (10%) and silt/clay (10%). Moderate compaction of bed material – array of sizes, some packing with little overlap and can be dislodged. **Macrohabitat:** Entirely rocky pool **Microhabitat**: Presence of undercut banks (15%) and some presence of detritus (10%) with equally presence of SWD and LWD (5%). Copious amounts of filamentous algae (80%) within the pool (50%) and edge (50%). Dense and diverse assemblage of macrophytes both within the pool (50%) and edge (50%). **Riparian vegetation:** Cleared patches of trees (70% left, 30% right) amongst exotic pasture grasses (25%) and native grasses (5% left, 40% right) and shrubs (7.5%). **Habitat bioassessment score**: 97, good condition		

3.2 WATER QUALITY

In-situ physiochemical data was provided by CS Energy and is tabulated in Appendix C. Samples were collected below the surface (approximately 0.5 m depth). No water quality data was provided for site AB6. Data was compared between sites and against relevant sub-regional guideline values (DEHP, 2011) for relevant habitat types (i.e., watercourse or lake). Note that this data was provided for background/general consideration and not part of Hydrobiology's scope.

Due to absence of an existing WQO for electrical conductivity (EC) in freshwater lakes and reservoirs, EC levels were compared to the Fitzroy Basin conductivity guideline value published by Prasad et al (2012) of 2000 µS/cm. This represents a toxicity trigger for the protection of 95% of species, consistent with the moderately disturbed management classification detailed in DEHP (2011).

The following observations were made:

- The dissolved oxygen (DO) (% saturation) of all sites fell below the relevant WQO except at AB5 where no oxygen saturation data was available (Figure 3-8). The low oxygen saturation can largely be attributed to an absence of flow at all sites and abundant algal growth at the downstream Callide Creek sites;
- The EC of site AB4 was 2,631 µS/cm, exceeding the relevant WQO (Figure 3-9). It is worth noting that WQO are not indicative of toxicity, however the EC of site AB4 also exceeded the the Fitzroy Basin conductivity guideline value published by Prasad et al (2012) of 2,000 µS/cm which represents a toxicity trigger for the protection of 95% of species. All other sites remained below the Callide Creek WQO and Fitzroy Basin conductivity guideline values; and
- pH levels at all downstream Callide Creek test sites with available data were within the range of WQO values (Figure 3-7). The pH levels within the test and reference lake sites were higher than the WQO but similar to each other. The pH levels upstream of the dam at control site AB1 were also higher than the WQO and similar to levels within the Dam.

It is worth noting that data provided was collected up to seven months prior to the Hydrobiology field survey, therefore the water quality results displayed below may have differed from actual conditions during sampling.

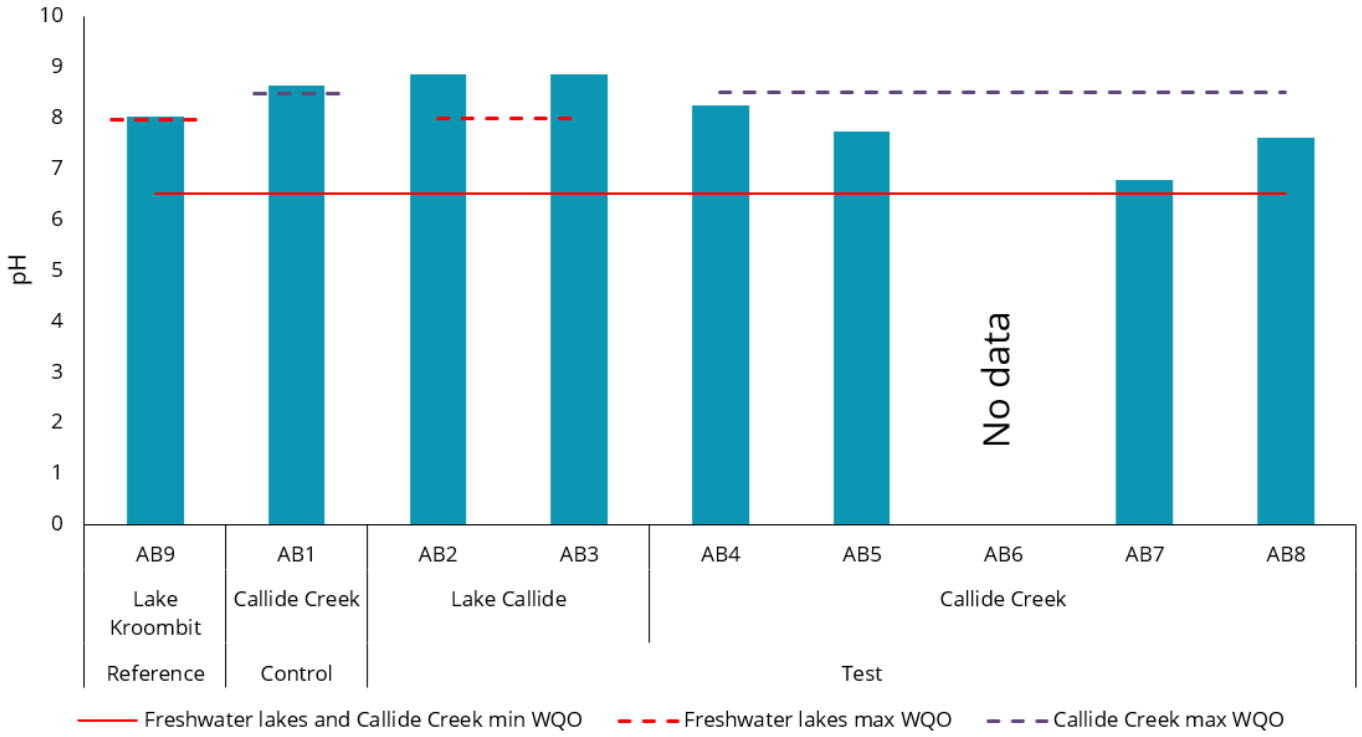


Figure 3-7 pH levels at study sites with dotted lines indicating WQO maximums and straight lines indicating WQO minimums.

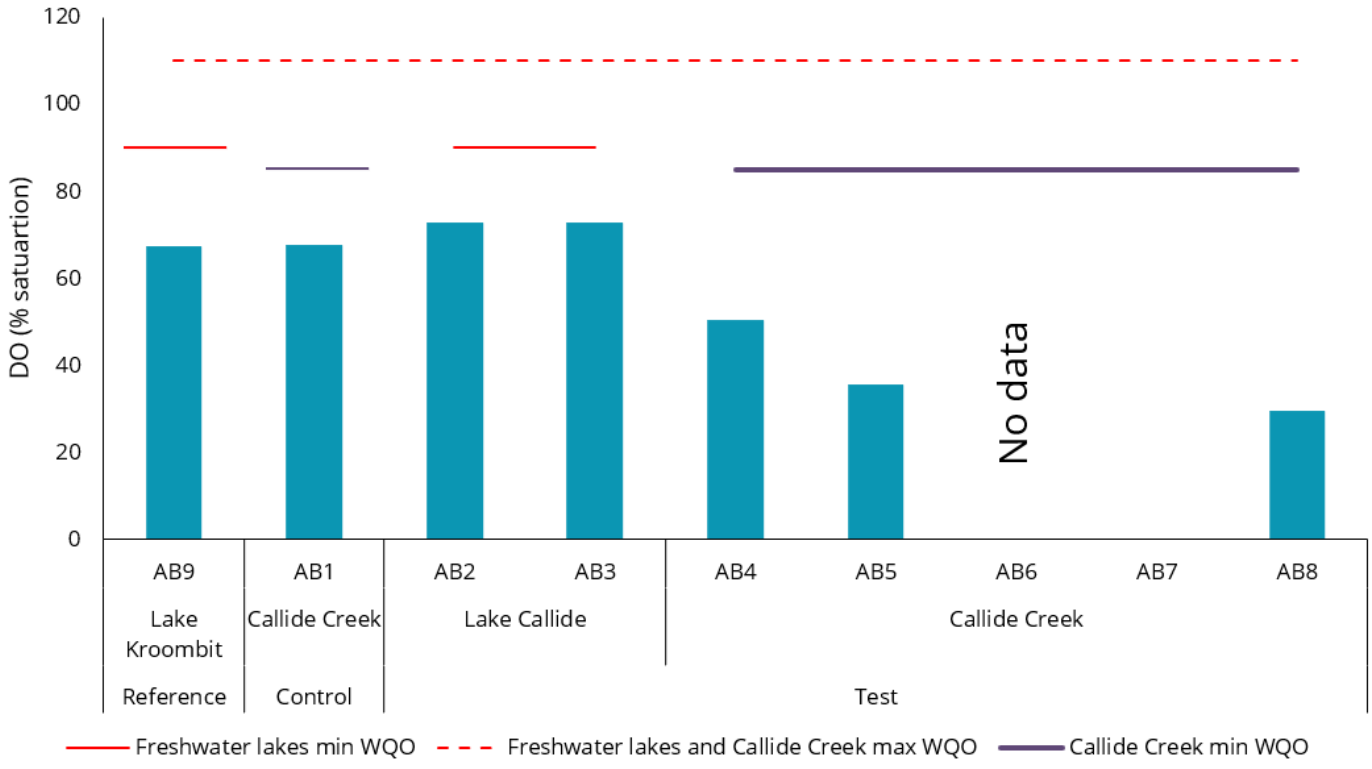


Figure 3-8 Dissolved oxygen (% saturation) levels at study sites with dotted lines indicating WQO maximums and straight lines indicating WQO minimums.

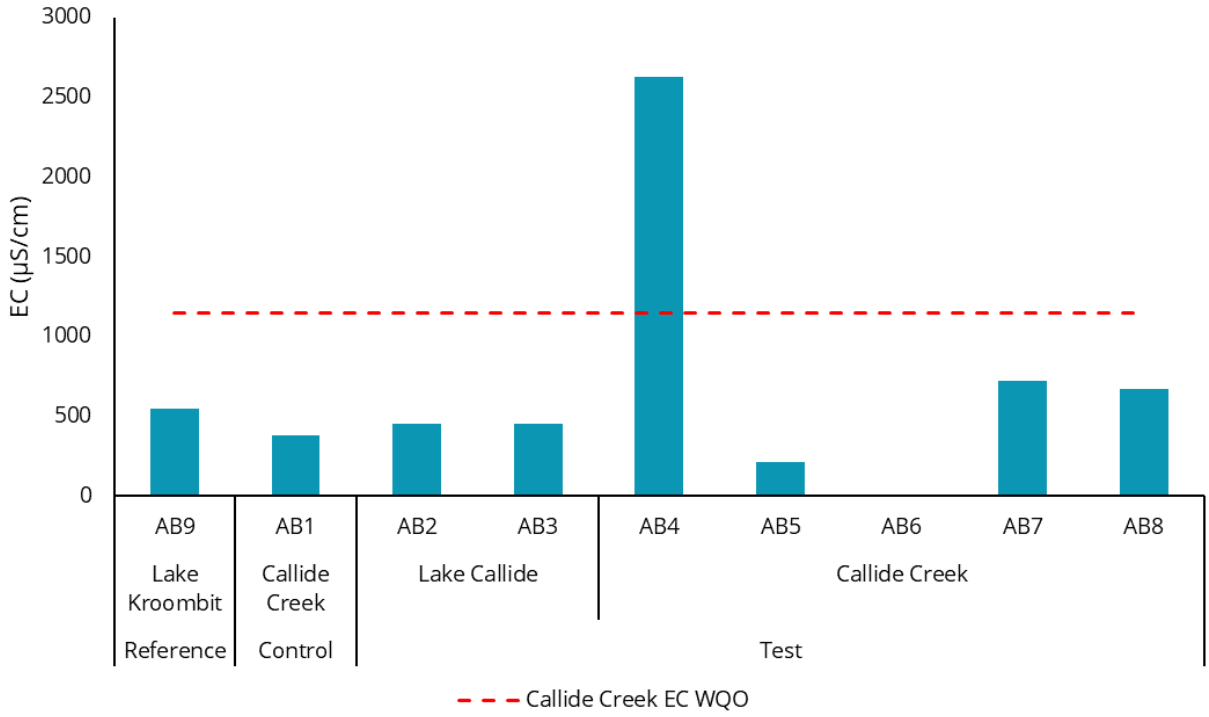


Figure 3-9 Electrical conductivity (EC, µS/cm) levels at study sites with dotted lines indicating maximum EC defined under the Callide Creek catchment WQOs. WQO only applicable for water courses, therefore not applicable to sites AB2, AB3 and AB9.

3.3 MACROINVERTEBRATES

Analysis and interpretation of diversity indices, community assemblages, AUSRIVAS modelling and functional feeding guides of all sites which contained sampleable habitat (i.e. present water) are explored below.

3.3.1 DIVERSITY INDICES

Biological quality objectives (BQOs) are defined by DEHP (2011) for Callide Creek catchment watercourses, with no BQOs defined for lacustrine habitats such as those at site AB2, AB3 and AB9. While no BQOs have been set for lacustrine habitats, sites AB2, AB3 and AB9 were included for comparison purposes.

BED

Macroinvertebrate communities were similar between habitat types (watercourse compared to lacustrine sites) and reference and non-reference sites however varied slightly between test and control sites. Overall, most sites failed to meet the defined BQO's. The following observations were made:

- No BQO has been defined for macroinvertebrate abundances. However, abundances were notably higher at reference site AB9 than any other site and there was no discernible difference between test and control sites (Figure 3-10);
- All sites fell below the BQO for taxa richness (Figure 3-11);
- Plecoptera, Ephemoptera and Trichoptera (PET) Richness BQOs were met only by control site AB1 and Lake Callide test sites AB2 and AB3. With the exception of reference site AB9, no other site recorded any PET taxa (Figure 3-12);

- Test sites AB2 and AB8 were the only sites to fall within the BQO SIGNAL2 range. Control site AB1 and test site AB4 both recorded SIGNAL2 scores that exceeded the BQO, meaning they contained higher than expected sensitive taxa. All other sites fell below the defined BQO for SIGNAL2 scores (Figure 3-13); and;
- Test sites AB2, AB3 and AB4 were the only sites to not exceed the maximum value of the BQO for % tolerant taxa BQO (Figure 3-14).

With bed habitats, test sites typically contained more tolerant taxa and few sensitive taxa in comparison to the control site. This difference is attributed to the increased substrate and habitat complexity available at AB1 in comparison to test sites downstream of Callide Dam where siltation has reduced interstitial space.

EDGE

The macroinvertebrate biodiversity indices results of control site AB1 and the Lacustrine sites AB9 (reference), AB2 (test) and AB3 (test) were similar to one another and consistently better than those recorded by test sites downstream of Callide Dam. In regard to the BQO's, the following observations were made:

- No BQO has been defined for macroinvertebrate abundances. However, abundances were notably higher at reference site AB9 than any other site and there was no discernible difference between test and control sites (Figure 3-10);
- All sites except test site AB6 fell below the BQO for taxa richness (Figure 3-11);
- PET Richness BQOs were met only by the reference site AB9 and test site AB2. All other sites fell below the BQO. PET richness, like SIGNAL2 score, is a measure of sensitive taxa present within the system, therefore it is unsurprising that the results are similar between BQOs (Figure 3-12);
- Reference site AB9 and test site AB2 were the only sites to meet the BQO for SIGNAL2 score. All other sites fell below the BQO, however sites downstream of Callide dam were consistently below other sites (Figure 3-13); and
- Control site AB1 and test sites AB2 and AB3 were the only sites to meet or fall below the % tolerant taxa BQO. All other sites exceeded the BQO for % tolerant taxa (Figure 3-14).

SUMMARY

Overall, the results would suggest that the macroinvertebrate community of downstream of lake Callide (test sites AB4 to AB8), were typically dominated by tolerant taxa when compared to the upstream control site AB1 and Lacustrine sites AB9 (reference), AB2 (test) and AB3 (test). This improved community of the control and lacustrine sites is expected to be a result of water permanence at these sites, the increased macro and microhabitat availability and reduced frequency of disturbances in comparison to the somewhat ephemeral nature of downstream Callide Creek. It is worth noting that riffles and runs were understandably absent at lacustrine sites, theoretically reducing available habitat. However, these sites contained Ephemeroptera species, which are known to inhabit lakes and reservoirs in sheltered areas such as those that were sampled.

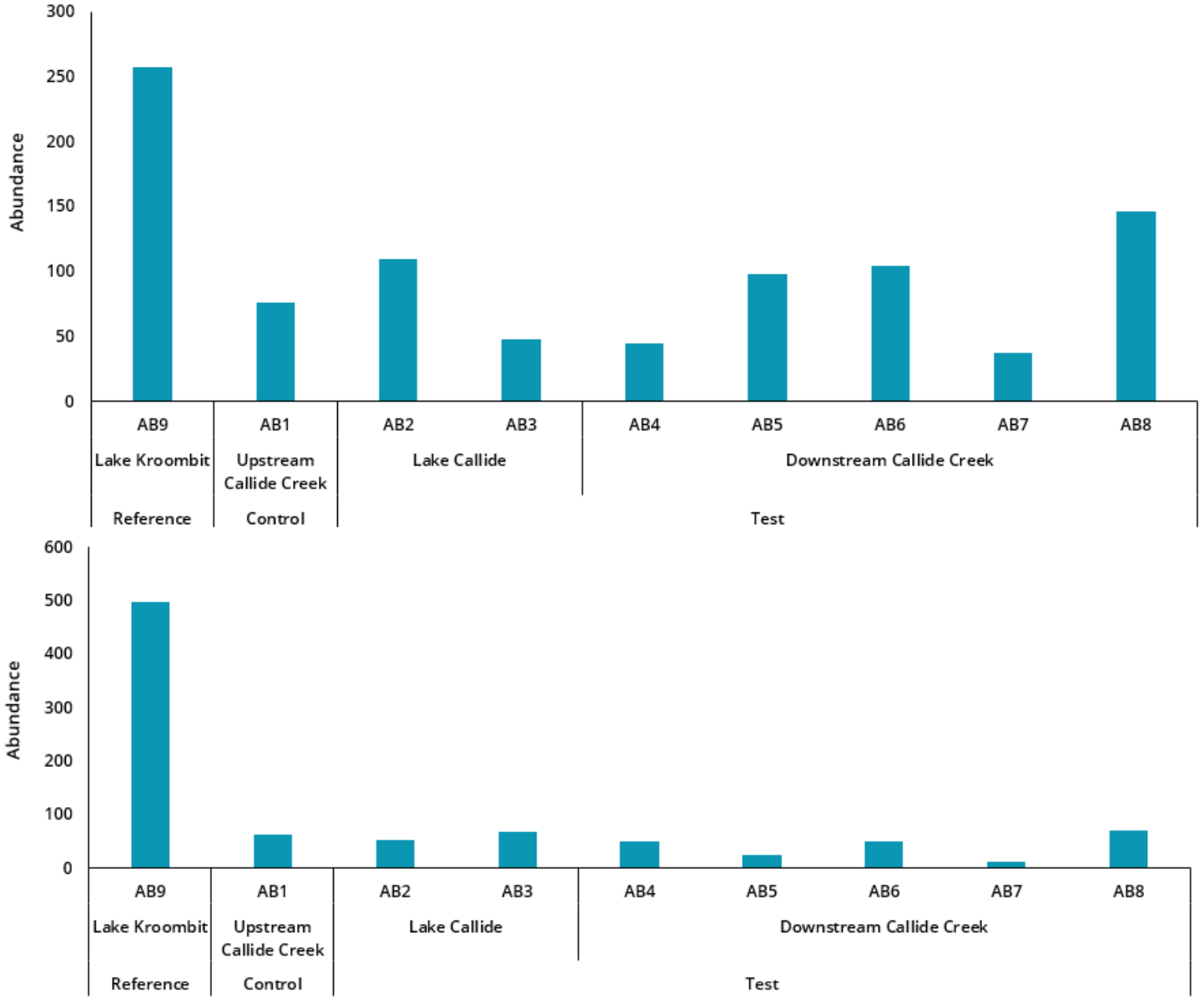


Figure 3-10 Macroinvertebrate abundance at edge habitats (top) and bed habitats (bottom)

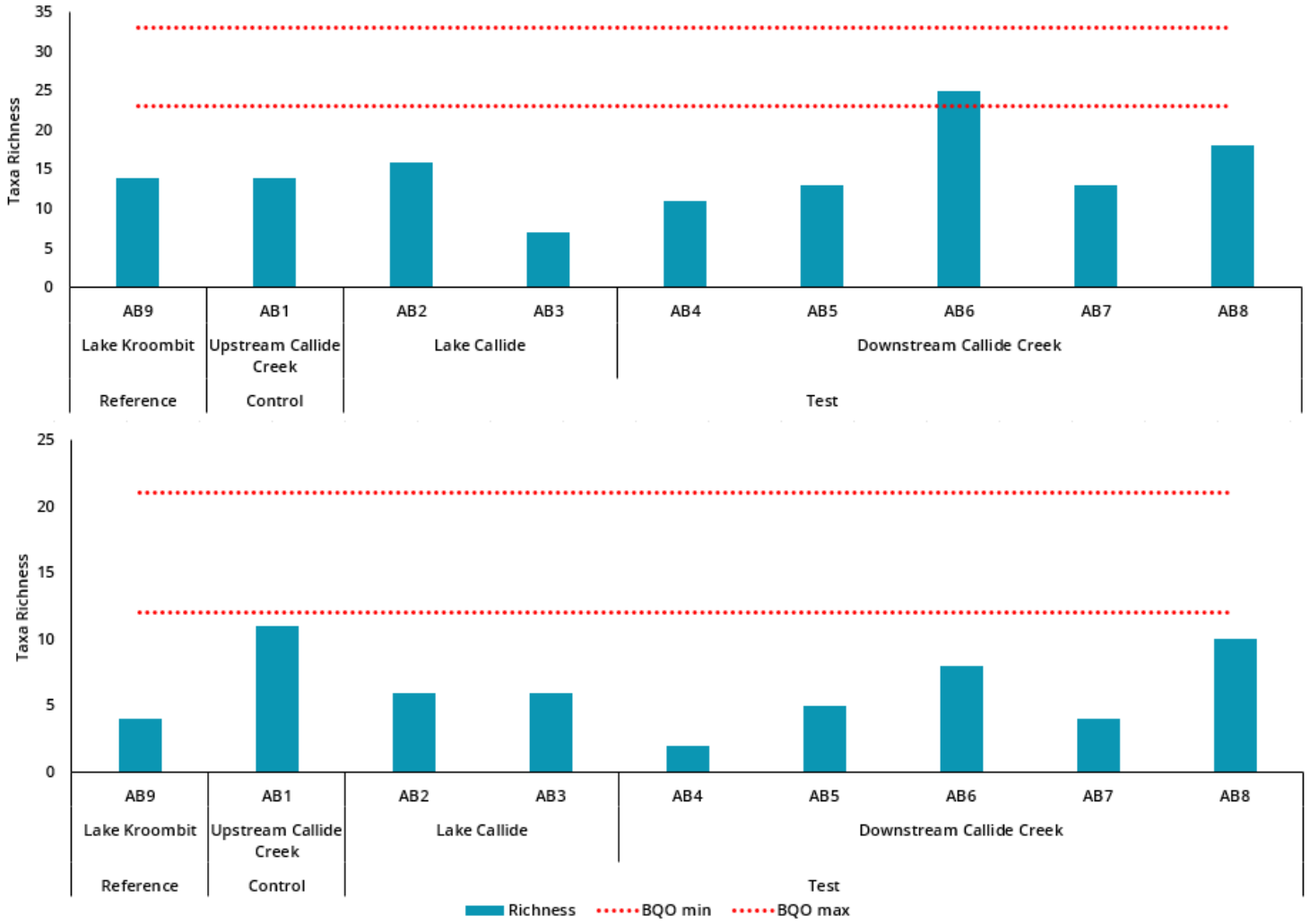


Figure 3-11 Macroinvertebrate taxa richness at edge habitats (top) and bed habitats (bottom).

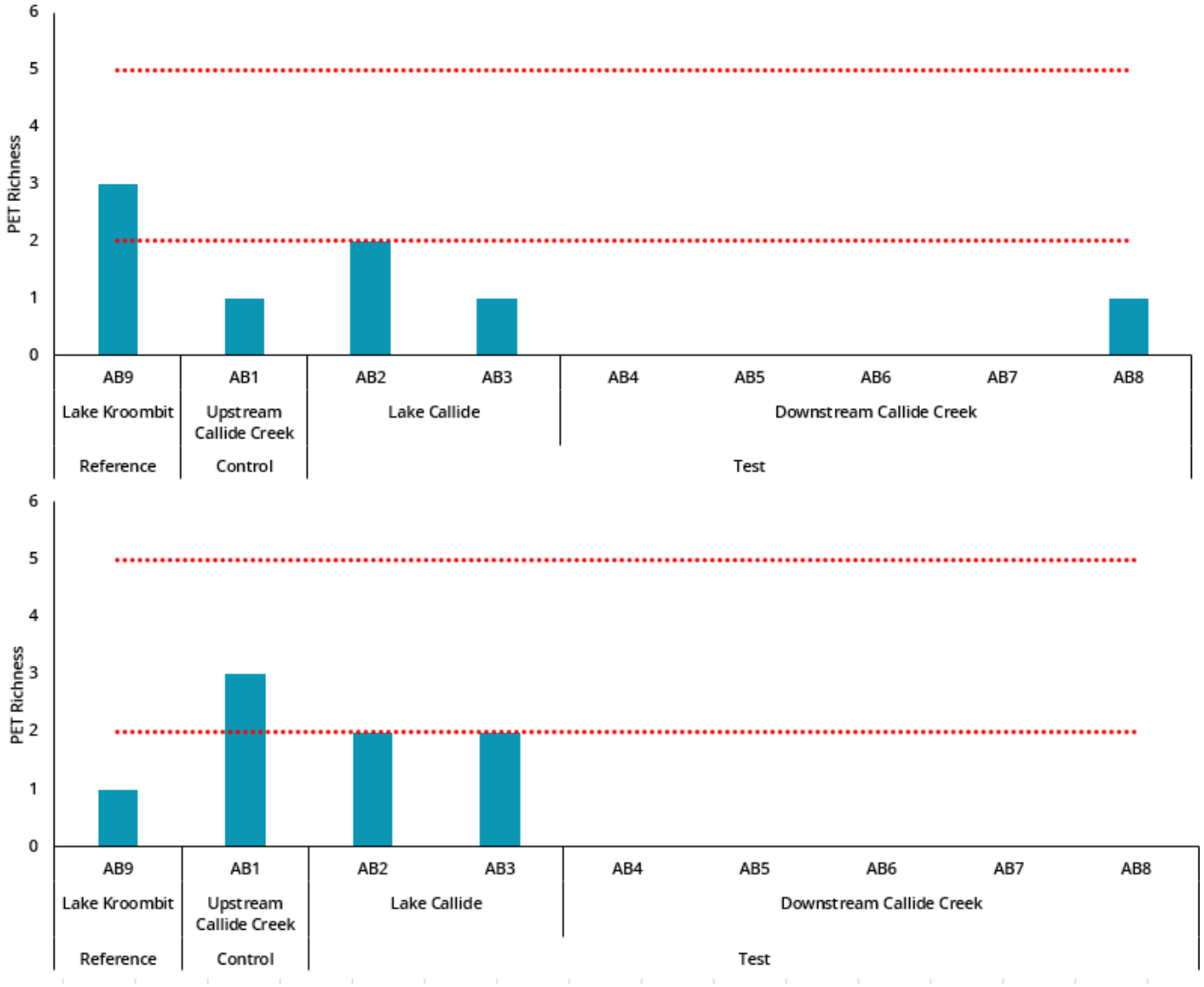


Figure 3-12 Macroinvertebrate PET taxa richness at edge habitats (top) and bed habitats (bottom).

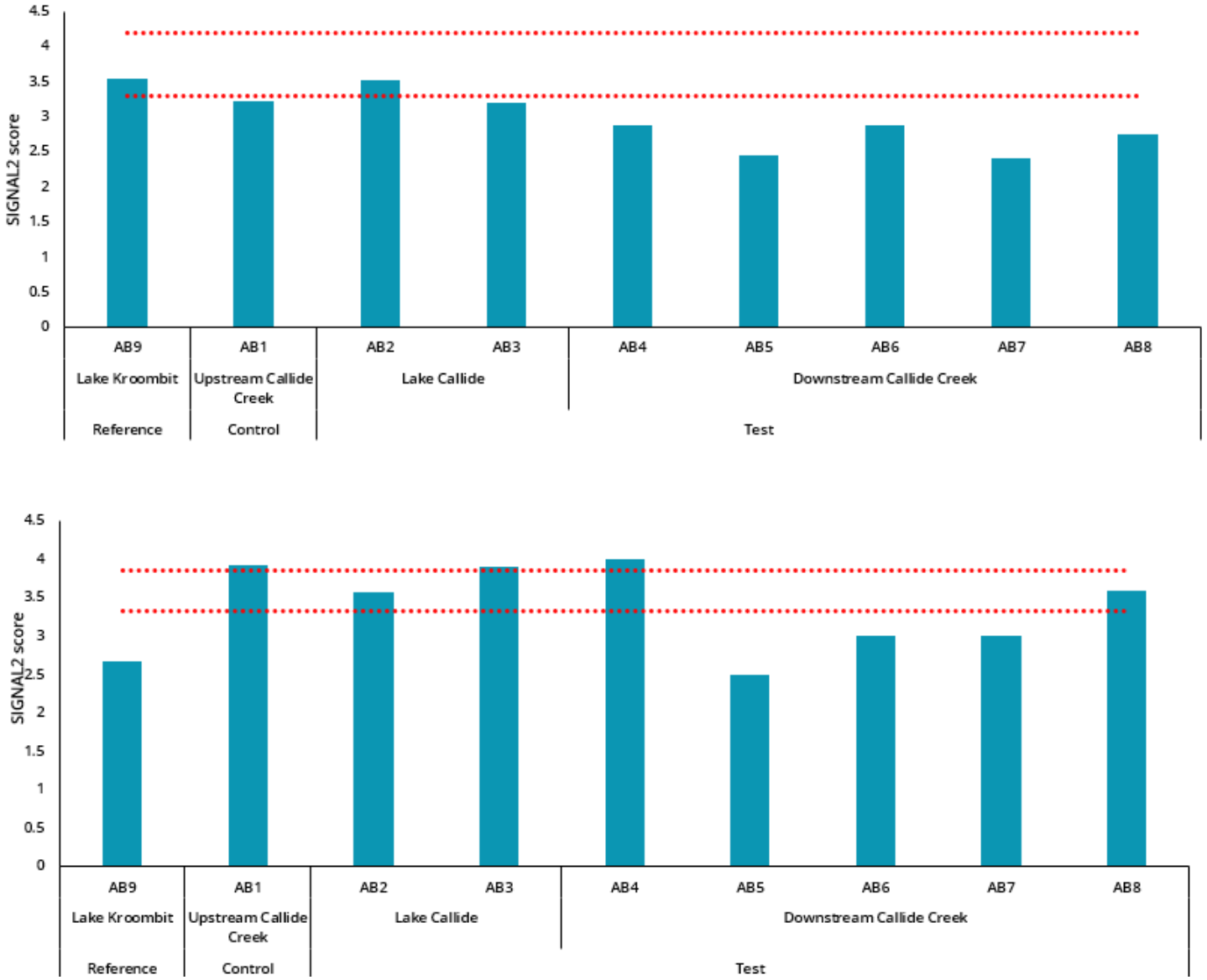


Figure 3-13 Macroinvertebrate SIGNAL2 score at edge habitats (top) and bed habitats (bottom

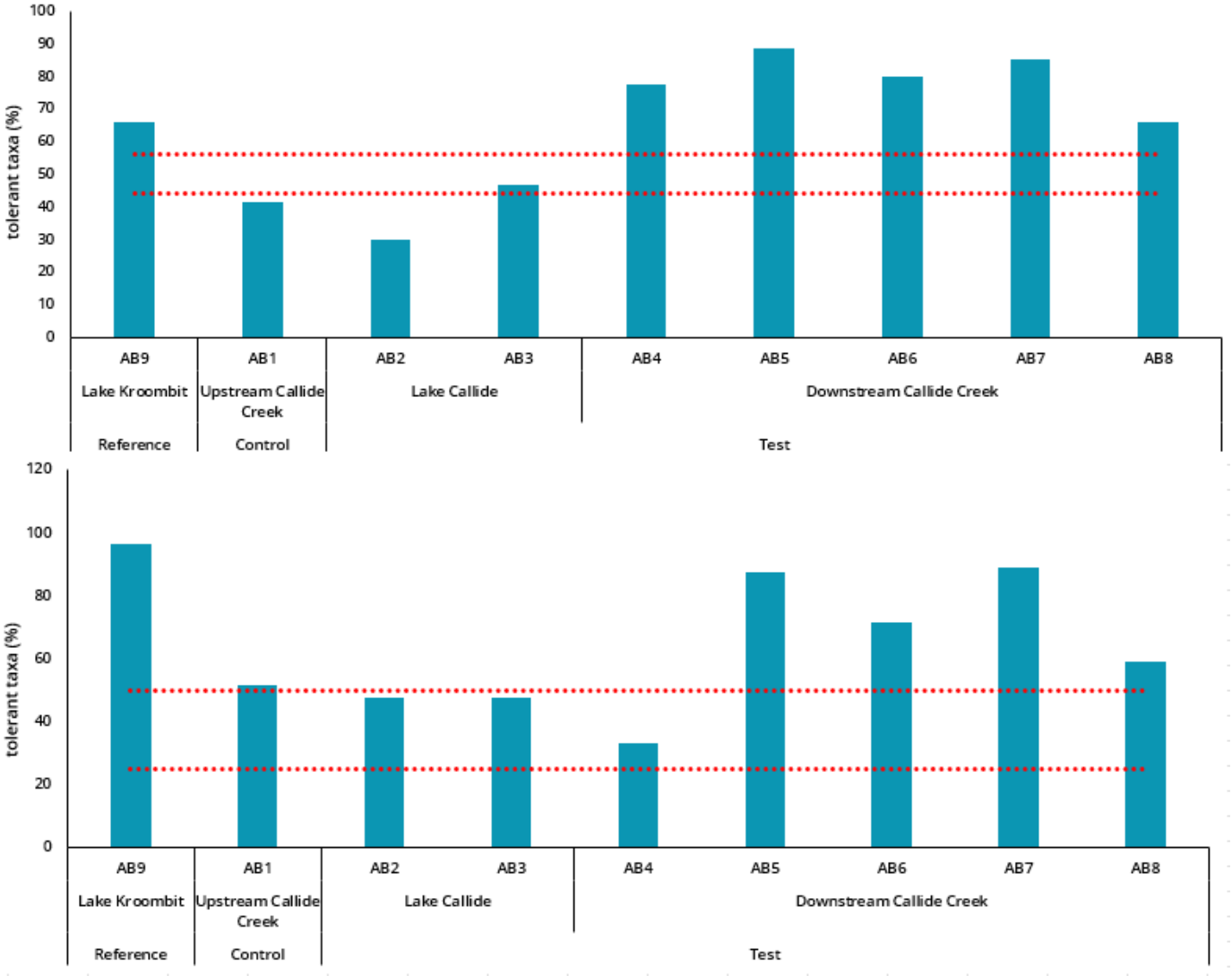


Figure 3-14 Macroinvertebrate percentage contribution of tolerant taxa at edge habitats (top) and bed habitats (bottom).

3.3.2 COMMUNITY ASSEMBLAGE

Within edge habitats, the taxa present at the greatest number of sites were Copepoda, Ostracoda, Acarina and Atyidae; however their abundances varied between test and control sites. Overall, there were no taxa that were dominant across all sites. The macroinvertebrate assemblages found within edge habitats at downstream Callide Creek sites had greater taxa evenness than the upstream Callide Creek site and the wetland sites which were dominated by one or two taxa. Cladocera were present in high numbers within the Lake Kroombit reference site but did not contribute considerably to the Lake Callide assemblages. Instead within Lake Callide site AB3, Ostracods, a different taxon of microcrustacean dominated. Another notable difference was the contribution of the family Caenidae to the Lake Callide sites AB2 (22%) and AB3 (15%) compared to their absence within Lake Kroombit. Upstream Callide Creek the family Acarina dominated the control site and was present in test site assemblages to a lesser degree. Acarina within the edge habitat of AB1 were present in high abundances due to the availability of shelter in the form of interstitial spaces as a result of reduced embeddedness, debris and macrophytes. Downstream instead contained greater abundances and a higher taxa diversity of beetles (Coleoptera) and bugs (Hemiptera). For example, as well as the families present at the control site AB1 the Coleoptera families Hydraenidae, Hydrophilidae, Hydrochidae and Hemiptera families Pleidae, Hebridae, Belostomatidae were considerable contributors to multiple test sites.

In comparison to communities found within the edge habitats, the macroinvertebrate communities within bed habitats were limited at all sites. The most widespread taxa (i.e. present at highest number of sites) within bed habitats were Copepoda and Ostracoda and these two taxa dominated most sites. Sites AB9 and AB4 showed lower diversity than other sites and were dominated by microcrustaceans (i.e. Cladocera, Copepoda and Ostracoda). Cladocera and Ostracoda species are most commonly found in sites similar to AB9 and AB4 where there is still to slow flowing waters with macrophytes and algae present. Sites AB1, AB2 and AB8 had higher taxa diversity and had greater abundances of Copepoda. Also indicative of deeper water, copepods were present in more sheltered aquatic habitats. Sites AB9 and AB3 which also had deeper pools were more exposed than sites where copepods dominated. Sites AB5, AB6, AB7 had moderate diversity and taxa evenness as copepod dominance was absent (AB5 and AB7) or reduced.

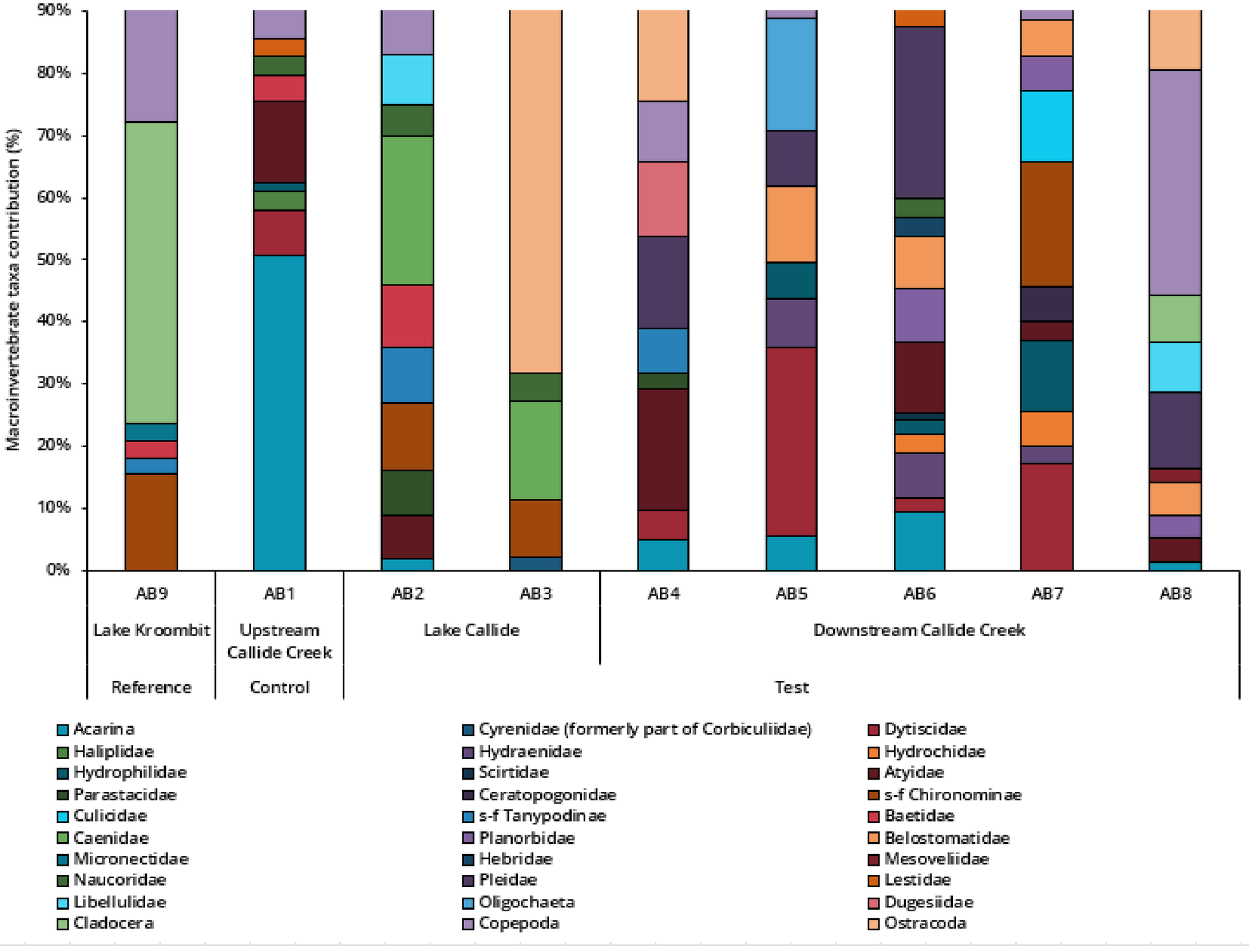


Figure 3-15 Contribution to overall macroinvertebrate assemblage from dominant taxa (dominant 90%) within edge habitat

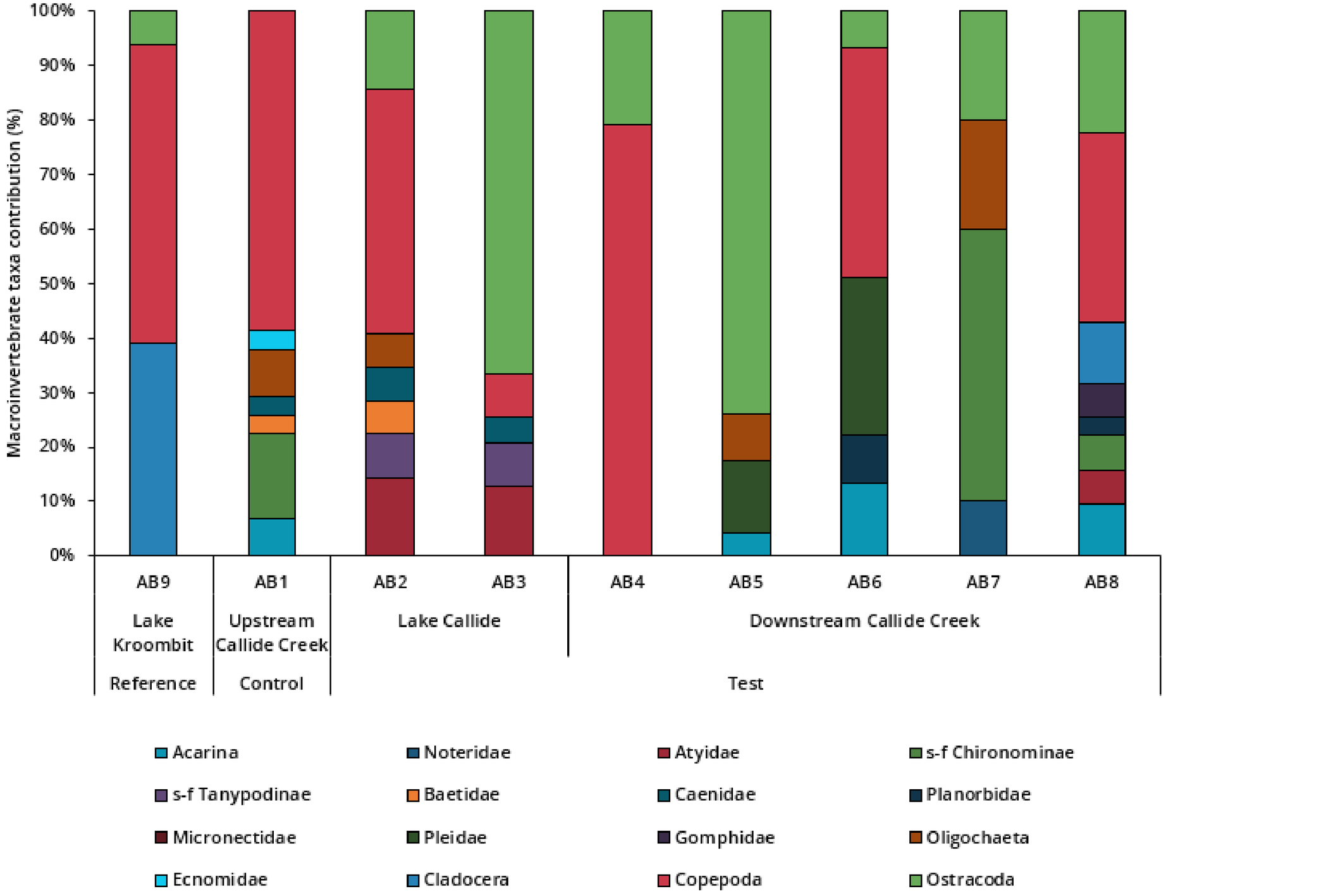


Figure 3-16 Contribution to overall macroinvertebrate assemblage from dominant taxa (dominant 90%) within bed habitat

3.3.3 FUNCTIONAL FEEDING GUIDES

Macroinvertebrate communities are often divided into functional feeding groups (FFGs) for analysis as a diverse range of taxa can be represented by a small number of FFGs which are typically indicative of food availability within a system and, more broadly, the inputs and disturbances of the system as a whole. Common divisions include filtering collectors, gathering collectors, predators, scrapers and shredders.

BED

Filtering and gathering collectors represented the majority of the macroinvertebrates present within the bed habitats of most sites. Collectors (filtering and gathering) contributed 44-90% of the total macroinvertebrate assemblage of sites, dominating at reference site AB9 and test site AB4. All other sites contained a more diverse assemblage of FFGs, with predators, scavengers, scrapers and macrophyte piercers representing small contributions to the remaining sites. There were no clear distinctions between test and control sites.

Collectors are often dominant in environments where fine particulate organic matter (FPOM) is far more abundant than coarse particulate matter, due to increased input from upstream due to biological (shredder) and mechanical processes, and autochthonous primary production. Within the surveyed sites, the macroinvertebrate assemblage within Lake Callide contained more FFG than Lake Kroombit, likely due to higher woody debris and detritus in the microhabitat of Lake Callide in comparison to periphyton.

EDGE

In comparison to bed habitats, the FFGs present within the edge habitat were more diverse and there were some notable variations in FFGs between sites, however no clear distinction between treatments.

Within edge habitats, sites were largely dominated by predators, however collectors were also present as were scrapers, shredders and parasites. Predators and parasites represented at least 50% of the macroinvertebrate assemblage present within the edge habitats of all sites except AB8, with the remaining macroinvertebrates typically collectors. The edge community at site AB8 had higher levels of filtering collectors, namely copepods. Predators are a highly diverse FFG, and typically represent a stable contribution to the macroinvertebrate taxa, however overabundance can be indicative of disturbed systems.

Predators typically represent a stable contribution to the macroinvertebrate taxa but are usually classified as over-abundant when the predator: prey ratio exceeds 0.2, and usually represent <45% of the overall assemblage(Kaboré et al., 2016; Masese et al., 2014; Rai et al., 2019; Sitati et al., 2021). Some suggested reasons for domination by predator taxa have included prey communities able to support large predator abundances (short life history traits) and seasonality of prey availability within the overall community; however high predator abundances are often linked to disturbances, poor water quality and surrounding land use(Carrasco-Badajoz et al., 2022; Edegbene & Akamagwuna, 2022; Miserendino & Masi, 2010; Rai et al., 2019; Sitati et al., 2021). The dominance of predators within the edge habitats of most sites would suggest that these sites are highly disturbed with poor water and/or habitat quality, which is consistent with the noted lower than expected diversity and abundance of tolerant taxa, particularly downstream of Lake Callide.

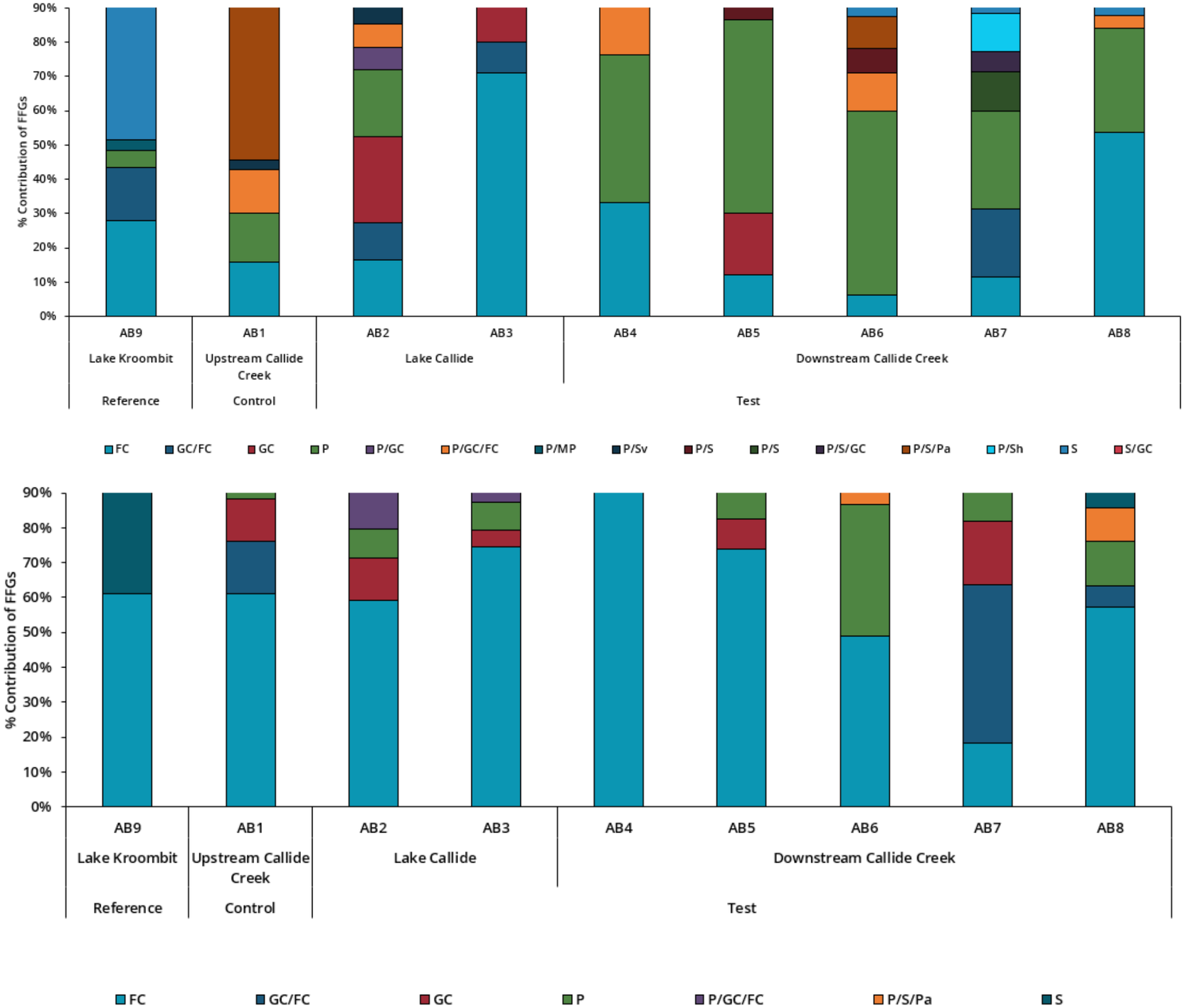


Figure 3-17 Functional Feeding Guides (FFGs) of macroinvertebrate taxa (high contributing species -90%) within edge (top) and bed (bottom) habitats. FFGS present in the study included filtering collectors (FC), gathering/filtering collectors (GC/FC), gathering collectors (GC), predators (P), predators/gat5hering collectors (P/GC), predators/gathering collectors/filtering collectors (P/GC/FC), predators/macrophyte piercers (P/MP), predators/scavengers (P/Sv), predators/ scrapers (P/S), predators/scrapers/gathering collectors (P/S/GC), predators/scrapers/parasites (P/S/PA), predators/shredders (P/Sh), scrapers (S), scrapers/gathering collectors (S/GC).

3.3.4 AUSRIVAS MODELLING

Within edge habitats all sites were in significantly impaired condition including the control site. Within bed habitats the control site recorded better than reference condition and site AB8 the furthest downstream recorded reference condition bed habitat. Sites more directly downstream of Lake Callide such as AB4, AB6, and AB7 all had significantly impaired bed habitat and downstream site AB5 had severely impaired bed habitat. As mentioned previously, the habitat condition of site AB1 was superior to the condition of the downstream Callide Creek sites due to higher variability in the substrate and microhabitat.

Table 3-2 OE50 scores from the March 2023 data. Bands are indicated in brackets and by cell colour; dark green (X) = more biologically diverse than reference site; light green (A) = reference condition; yellow (B) = significantly impaired; orange (C) = severely impaired; red (D) = extremely impaired.

Site	OE50 Edge scores	OE50 Bed Scores
Control – Upstream Callide Creek		
AB1	0.72(B)	0.96(X)
Test – Downstream Callide Creek(B)		
AB4	0.88(B)	1.06(B)
AB5	0.85(B)	0.78(C)
AB6	0.83(B)	0.97(B)
AB7	0.72(B)	0.77(B)
AB8	0.86(B)	0.9(A)

3.4 FISH, MACROCRUSTACEANS, AND REPTILES

Diversity, community assemblages and recruitment and biomass of all aquatic species caught at sites during the survey event are explored below.

3.4.1 FISH

WQO COMPARISSON

Ratio of Observed to Expected native species (O/E50) and exotic fish species WQO values were defined by DEHP (2011) for sites along the main trunk of Callide Creek only. This meant that data from site AB9 could not be used as it was located in a different catchment (Kroombit Creek). Overall, control sites scored better than test sites, but sites were typically less diverse than expected.

Control site AB1 was the only site along the main trunk of Callide Creek that met the WQO for O/E50 values (Table 3-3). All test sites fell below the O/E50, meaning that they contained fewer native taxa that would be expected in. All sites except control site AB1 and test site AB3 contained *Gambusia holbrooki*. The species has been recorded within Callide Creek main trunk before and is listed within the defined WQO. However, as no site recorded non-native species not listed within the WQOs or more than two non-native species, all sites met the WQO for alien taxa.

Table 3-3 Comparison of Callide Creek main trunk fish WQOs to observed fish diversity indices of each assessed reach. Highlighted values indicate non-conformance with the defined biological WQO.

Site	Treatment	O/E50	Alien Taxa
AB1	Control	1	0
AB2	Test	0.7857	1
AB3	Test	0.5714	0
AB4	Test	0.5714	1
AB5	Test	0.2143	1
AB6	Test	0	1
AB7	Test	0.3571	1
AB8	Test	0.8571	1

DIVERSITY

Across the study area a total of 3,863 individuals representing 19 taxa were recorded in varying abundances across sites (Figure 3-18; Table 3-4). Species recorded in higher abundances included bony bream (*Nematalosa erebi,* n=1032), fly-specked hardyhead (*Craterocephalus stercusmuscarum,* n=955), Agassizii's glassfish (*Ambassis agassizii,* n= 513), and barred grunter (*Amniataba percoides,* n = 501). Agassizii's glassfish was additionally the most abundant species occurring at all but one site (AB6). Other widespread taxa included fly-speckled hardyhead (n=6), mosquitofish (*Gambusia holbrooki*, n= 6), and carp gudgeon (*Hypseleotris sp.,* n=6). Conversely, the larger-bodied southern saratoga was only represented by one individual recorded in the deepest waterbody; Lake Callide site AB2.

AB1 (14 taxa) had the highest taxa richness across the surveyed sites followed by downstream Callide Creek site AB8 (13 taxa). Downstream of Lake Callide sites AB5, AB6 and AB7 had the lowest taxa richness and fish abundance. Taxa that prevailed at these less diverse sites included Agassizi's glassfish, mosquitofish (*Gambusia holbrooki*), and southern purplespotted gudgeon (*Mogurnda adspersa*). Sites AB5, AB6 and AB7 consisted of small, shallow pools dense with macrophytes and therefore there was limited available macrohabitat and food sources available for a wider range of species. In Callide Creek taxa exclusively recorded in the upstream site AB1 and the downstream site AB8 included golden perch (*Macquira ambigua),* barred grunter (*Amniataba percoides),* spangled perch (*Leiopotherapon unicolor),* bony bream *(Nematalosa erebi),* Hyrtl's catfish *(Neosilurus hyrtlii)* and freshwater longtom *(Strongylura krefftii).* The presence of these species is likely attributed to more diverse macrohabitats and microhabitats. These larger bodied taxa, most of which are carnivores or omnivores need larger areas and greater access to suitable food sources to meet their reproductive and survival needs. Therefore AB1 and AB8 as larger, more connected, more diverse aquatic habitats are more likely to support these species.

Fish abundance was greatest within Lake Callide at site AB3 (n=1515), followed by AB2 (n=1010) and greatly exceeded the reference site AB9 at Lake Kroombit (n=202). The smaller Lake Kroombit was less diverse than the test sites in Lake Callide as only six taxa were recorded at AB9 whereas in

comparison 13 taxa were recorded across sites AB2 and AB3. Taxa recorded in both lakes included Agassizii's glassfish, carp gudgeon, Hyrtl's catfish and freshwater catfish (*Tandanus tandanus*). Species absent from the test sites that were present in the reference included spangled perch (*Leiopotherapon unicolor*) and eastern rainbowfish (*Melanotaenia splendida*). Overall, the larger Lake Callide supported more individuals and taxa as predicted.

EXOTIC SPECIES

Sites AB5 and AB6 were dominated by the exotic species mosquitofish (*Gambusia holbrooki,* n=107) which were also present at sites AB2, AB4, AB7 and AB8. Mosquitofish were present in low numbers (n=2) in Lake Callide and were not recorded in Lake Kroombit nor upstream at site AB1.

COMMUNITY ASSEMBLAGES

Typically, downstream creek site assemblages were dominated by small-bodied fish with site AB8 additionally supporting medium bodied species such as spangled perch (*Leiopotherapon unicolor*) and bony bream. Whereas upstream at Callide Creek site AB1 there was more diverse assemblage of fish and higher abundances of medium bodied fish such as bony bream and spangled perch. Within Lake Callide larger individuals such as southern saratoga (*Scleropages leichardti*) that require bigger and deeper bodies of water are a part of the system.

Species stocked by the Callide Valley Native Fish Stocking Association (CVNFSA) within Lake Callide include golden perch (*Macquaria ambigua*), barrumundi (*Lates calcarifer*), southern saratoga (*Scleropages leichardti*) and sleepy cod (*Oxyeleotris lineolata*) of which the three latter species were recorded at Lake Callide and downstream in the case of sleepy cod, in low abundances and likely represent translocated populations. One golden perch was recorded upstream of the dam wall at site AB1.

RECRUITMENT AND BIOMASS OF FISH

Variation in fish length suggests the presence of several different age/size classes (fingerlings, juveniles and adults) at all sites excluding AB6 where no fish were recorded (Table 3-5). Species recorded in low abundances such as *Strongylura kreffti* (freshwater longtom), golden perch and southern saratoga do not demonstrate this pattern and their sizes indicate adult individuals. These individuals may then only be present in the environment through stocking and associated dispersal and not from local populations within Lake Callide and Callide Creek. For most of the taxa present within site assemblage variation in size classes suggests successive generations and that both sites are providing suitable nesting habitat as all the species identified are potadromous (i.e. their lifecycle is completed in freshwater). The invasive mosquitofish individuals were mostly small indicating they are the result of successive generations where there a few reproductively active individuals producing many offspring that are heavily predated and/or resource limited due to their population density, leading to mortality before they reach full maturity.

The sites downstream of Callide Dam, excluding AB8 the furthest from Lake Callide, were populated by relatively small fish, indicating that present habitat may not be sufficient to support larger fish species. However, these sites may still serve as nursery habitats for fish before they move into areas with deeper pools like those provided at site A8 to mature. The availability of suitable nesting and spawning habitat within these more degraded reaches is likely a factor that limited the presence of juveniles of other species.

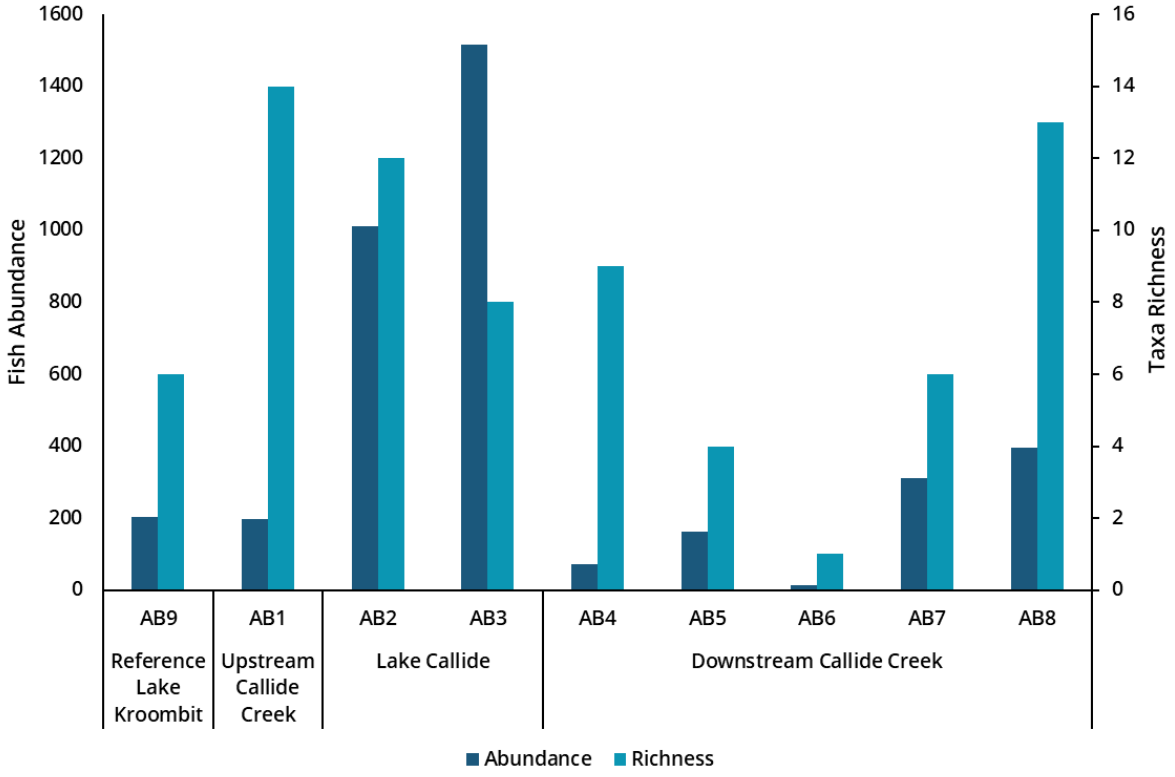


Figure 3-18 Abundance and taxa richness of fish caught at all sites.

Table 3-4 Fish captured in March 2023 survey.

Species	Common name	Reference Lake Kroombit	Upstream Callide Creek	Lake Callide		Downstream Callide Creek				
		AB9	AB1	AB2	AB3	AB4	AB5	AB6	AB7	AB8
Ambassidae										
Ambassis agassizii	Agassiz's glassfish	46	20	225	182	18	1		6	15
Anguillidae										
Anguilla reinhardtii	longfinned eel									3
Apogonidae										
Glossamia aprion	mouth almighty		7	24	19	14				1
Atherinidae										
Craterocephalus stercusmuscarum	fly-specked hardyhead		50	483	339	18			1	64
Belonidae										
Strongylura krefftii	freshwater longtom		1	3	5					
Butidae										
Oxyeleotris lineolata	sleepy cod				6	1				
Clupeidae										
Nematalosa erebi	bony bream		30	225	521					256
Eleotridae										
Hypseleotris sp.	carp gudgeon	6	6	1		2			103	6
Mogurnda adspersa	southern purplespotted gudgeon		1			10	35		20	
Latidae										
Lates calcarifer	barramundi			2	3					
Melanotaeniidae										
Melanotaenia splendida	eastern rainbowfish	50	22						117	10
Osteoglossidae										
Scleropages leichardti	southern saratoga			1						
Percichthyidae										
Macquaria ambigua	golden perch		1							1
Plotosidae										
Neosilurus hyrtlii	Hyrtl's catfish	68	26	1						15

Species	Common name	Reference Lake Kroombit	Upstream Callide Creek	Lake Callide		Downstream Callide Creek				
		AB9	AB1	AB2	AB3	AB4	AB5	AB6	AB7	AB8
Porochilus rendahli	Rendahl's catfish		1			1	18			3
Tandanus tandanus	freshwater catfish	4	1	3		1				
Poeciliidae										
Gambusia holbrooki	mosquitofish			2		6	107	13	56	2
Terapontidae										
Amniataba percoides	barred grunter		18	40	440					3
Leiopotherapon unicolor	spangled percch	28	12							17
Total		202	196	1010	1515	71	161	13	312	396
Taxa richness		6	14	12	8	9	4	1	6	13

Table 3-5 Minimum, maximum and average lengths (mm) of taxa recorded at each site.

Species	common name	Reference Lake Kroombit			Upstream Callide Creek			Lake Callide						Downstream Callide Creek												
		AB9			AB1			AB2			AB3			AB4			AB5			AB6			AB7			AB8		
		Total length(mm)			Total length(mm)			Total length(mm)			Total length(mm)			Total length(mm)			Total length(mm)			Total length(mm)			Total length(mm)			Total length(mm)		
		Min	Mean	Max	Min	Mean	Max	Min	Mean	Max	Min	Mean	Max	Min	Mean	Max	Min	Mean	Max	Min	Mean	Max	Min	Mean	Max	Min	Mean	Max
Ambassidae																												
Ambassis agassizii	Agassiz's glassfish	40	64	77	26	37	58	21	34	57	23	35	54	20	27	35	41	41	41	-	-	-	24	27	30	34	47	62
Anguillidae																												
Anguilla reinhardtii	longfinned eel	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	540	763	1000
Apogonidae																												
Glossamia aprion	mouth almighty	-	-	-	46	93	130	37	65	112	27	59	130	22	38	94	-	-	-	-	-	-	-	-	-	124	124	124
Atherinidae																												
Craterocephalus stercusmuscarum	fly-specked hardyhead	-	-	-	26	46	71	27	42	75	16	32	78	22	28	37	-	-	-	-	-	-	26	26	26	25	46	93
Belonidae																												
Strongylura krefftii	freshwater longtom	-	-	-	257	257	257	675	735	780	255	442	546	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Species	common name	Reference Lake Kroombit			Upstream Callide Creek			Lake Callide						Downstream Callide Creek												
		AB9			AB1			AB2			AB3			AB4			AB5			AB6			AB7			AB8		
		Total length(mm)			Total length(mm)			Total length(mm)			Total length(mm)			Total length(mm)			Total length(mm)			Total length(mm)			Total length(mm)			Total length(mm)		
		Min	Mean	Max	Min	Mean	Max	Min	Mean	Max	Min	Mean	Max	Min	Mean	Max	Min	Mean	Max	Min	Mean	Max	Min	Mean	Max	Min	Mean	Max
Butidae																												
Oxyeleotris lineolata	sleepy cod	-	-	-	-	-	-	-	-	-	46	202	410	87	87	87	-	-	-	-	-	-	-	-	-	-	-	-
Clupeidae																												
Nematalosa erebi	bony bream	-	-	-	25	152	256	34	121	370	64	120	370	-	-	-	-	-	-	-	-	-	-	-	-	68	216	318
Eleotridae																												
Hypseleotris sp.	carp gudgeon	28	40	47	21	26	32	20	20	20	-	-	-	18	25	32	-	-	-	-	-	-	18	30	38	16	19	21
Mogurnda adspersa	southern purplespotted gudgeon	-	-	-	78	78	78	-	-	-	-	-	-	21	42	61	26	41	75	-	-	-	21	31	57	-	-	-
Latidae																												
Lates calcarifer	barramundi	-	-	-	-	-	-	880	925	970	800	852	925	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Melanotaeniidae																												
Melanotaenia splendida	eastern rainbowfish	32	64	90	43	74	97	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	26	31	38	26	39	78
Osteoglossidae																												
Scleropages leichardti	southern saratoga	-	-	-	-	-	-	700	700	700	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Percichthyidae																												
Macquaria ambigua	golden perch	-	-	-	554	554	554	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	252	252	252
Plotosidae																												
Neosilurus hyrtlii	Hyrtl's catfish	118	171	288	98	197	324	220	220	220	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	121	134	156
Porochilus rendahli	Rendahl's catfish	-	-	-	127	127	127	-	-	-	-	-	-	76	76	76	64	75	86	-	-	-	-	-	-	100	136	162
Tandanus tandanus	freshwater catfish	137	180	205	452	452	452	80	159	225	-	-	-	445	445	445	-	-	-	-	-	-	-	-	-	-	-	-
Poeciliidae																												

Species	common name	Reference Lake Kroombit			Upstream Callide Creek			Lake Callide						Downstream Callide Creek												
		AB9			AB1			AB2			AB3			AB4			AB5			AB6			AB7			AB8		
		Total length(mm)			Total length(mm)			Total length(mm)			Total length(mm)			Total length(mm)			Total length(mm)			Total length(mm)			Total length(mm)			Total length(mm)		
		Min	Mean	Max	Min	Mean	Max	Min	Mean	Max	Min	Mean	Max	Min	Mean	Max	Min	Mean	Max	Min	Mean	Max	Min	Mean	Max	Min	Mean	Max
Gambusia holbrooki	Mosquitofish*	-	-	-	-	-	-	20	21	21	-	-	-	18	26	31	18	27	38	17	27	36	21	28	36	36	39	41
Terapontidae																											
Amniataba percoides	barred grunter	-	-	-	46	87	180	26	86	135	12	86	196	-	-	-	-	-	-	-	-	-	-	-	-	92	143	174
Leiopotherapon unicolor	spangled perch	66	116	213	80	121	186	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	88	132	200

*exotic

3.4.2 MACROCRUSTACEANS

Across the surveyed sites, a total of three macrocrustacean taxa were recorded with assemblages notably different upstream and downstream of Callide Dam (Figure 3-19, Table 3-6). Only freshwater shrimp (*Atyidae sp*.) were recorded downstream of Callide Dam and only at sites AB4 (n=5) and AB7 (n=20). No macrocrustaceans were recorded at AB5, AB6 and AB8 likely a result of the reduced available habitat. Upstream of the Callide Dam spillway, where more water and habitat was available at sites AB3, AB2 and AB1 macrocrustacean taxa richness was higher as two taxa were present: redclaw crayfish (*Cherax quadricarinatus*); and freshwater prawns (*Macrobrachium sp*.). Abundance of these two taxa was highest at site AB3 (n=43) followed by similarly abundant sites AB1(n=15) and AB2 (n=14). At the reference site AB9, a smaller lake than Lake Callide macrocrustacean abundance was lower (n = 9) and only freshwater prawn was recorded.

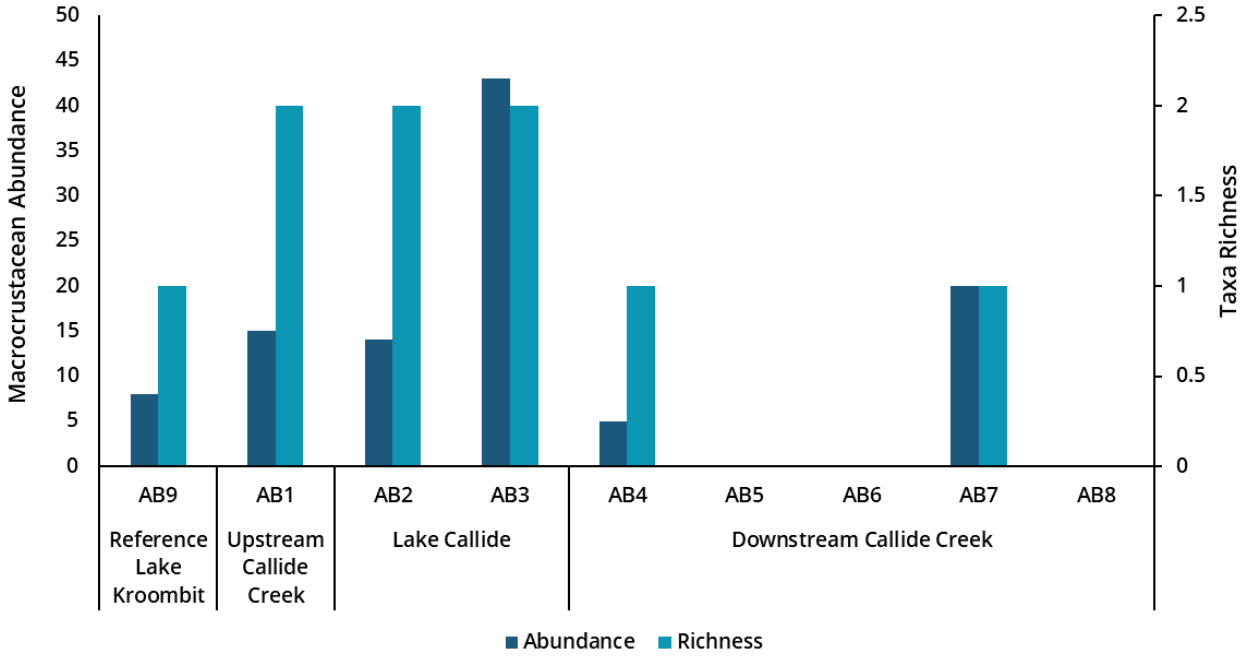


Figure 3-19 Abundance and taxa richness of macrocrustaceans caught at all sites - no macrocrustaceans were captured or observed at AB5, AB6 or AB8.

Table 3-6 Macrocrustaceans captured in March 2023 survey.

Taxa	common name	Reference	Upstream Callide Creek	Lake Callide		Downstream Callide Creek				
		AB9	AB1	AB2	AB3	AB4	AB5	AB6	AB7	AB8
Atyidae	freshwater shrimp					5			20	
Cherax quadricarinatus	redclaw crayfish		4	12	23					
Macrobrachium	freshwater prawn	8	11	2	20					
Total		8	15	14	43	5			20	

3.4.3 REPTILES

Krefft's turtle (*Emydura krefftii*) was present at all sites except for AB7 and abundant at sites AB9 (n=49), AB1 (n-40) and AB8 (n=45). The remaining four species were present at low abundances, each present across a few sites. Control site AB1 which had greater availability of microhabitats and better water quality, had the highest taxa richness with all five species recorded. Single broad-shelled river turtles were present at sites AB1, AB7 and AB8. Sawshell turtles were also recorded in low abundances at sites AB9 (n=3), AB1 (n=1) and AB8 (n=1). Eastern long-necked turtles were recorded at AB1 (n=1) and AB3 (n=2). The critically endangered White throated snapping turtle was only recorded at the most diverse site AB1 (n=1). The dissolved oxygen at this site was significantly higher than recorded at the downstream sites and more conducive to turtle physiology (i.e. cloacal breathing). Habitats downstream are also likely limited in the number of turtles they can support due to the size of the waterbodies and the abundance of microhabitats and food. The infrastructure of the Dam may create barriers to dispersal of turtles, especially when population numbers are low, as in the case of the white-throated snapping turtle.

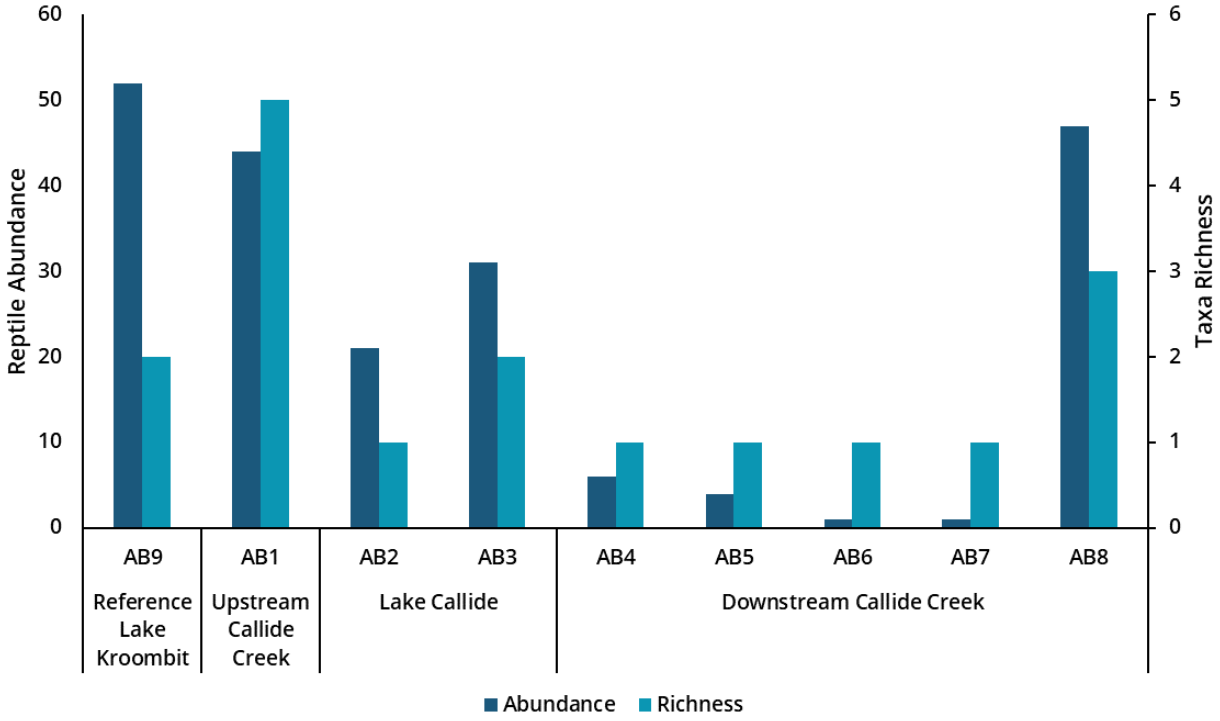


Figure 3-20 Abundance and taxa richness of reptiles caught at all sites - no reptiles were captured or observed at AB14.

Table 3-7 Aquatic reptiles captured in March 2023 survey.

Species	common name	Reference Lake Kroombit	Upstream Callide Creek	Lake Callide		Downstream Callide Creek				
		AB9	AB1	AB2	AB3	AB4	AB5	AB6	AB7	AB8
Chelidae										
Chelodina expansa	broad-shelled river turtle		1						1	1
Chelodina longicollis	eastern longnecked turtle		1		2					
Elseya albagula	white-throated snapping turtle		1							
Emydura krefftii	Krefft's river turtle	49	40	21	29	6	4	1		45
Myuchelys latisternum	sawshelled turtle	3	1							1
Total		52	44	21	31	6	4	1	1	47

3.5 BIOTA TISSUE ANALYSIS

3.5.1 PFAS

The target human and ecological health species were chosen based on the Sampling Analysis and Quality Plan (SAQP) (Epic Environmental, 2022). The human and ecological health target biota caught and subsequently analysed are displayed in Table 3-8.

HUMAN HEALTH TARGET SPECIES

To inform the human health risk assessment, the target samples were edible size biota that are more commonly consumed by local residents. This provides the most representative dataset regarding risk to human health via consumption of fish.

The target freshwater species for human health assessment as designated in the SAQP (Epic Environmental, 2022) were:

- Barramundi (Lates calcarifer);
- Crayfish (*Cherax quadricarinatus*); and
- Yellowbelly (*Macquaria ambigua*).

As the target species were not well represented at all sites within in the catchment it was decided that additional human health target species should be selected. These species were those potentially eaten by humans and were selected based on local knowledge and those defined as common edible freshwater species for PFAS sampling programs (Queensland Health, no date). The additional species were:

- Eeltail catfish (*Tandanus tandanus*);
- Hyrtl's catfish (*Neosilurius hyrtlii*);
- Rendahl's catfish (*Porochilus rendahli*); and
- Sleepy cod (*Oxyeleotris lineolata*).

The results were compared against human health screening criteria (see Table 5-2 in Appendix A).

ECOLOGICAL HEALTH TARGET SPECIES

Target species for the ecological risk assessment vary from the human health risk assessment and largely represent lower trophic organisms that are predated by higher order species.

The target freshwater species for ecological health assessment as designated in the SAQP were:

- Eeltail catfish (*Tandanus tandanus*)
- Eastern rainbowfish (*Melanotaenia splendida*)
- Fresh water mussels (*Velesunio sp.)*
- Spangled perch (*Leiopotherapon unicolour*)
- Freshwater prawn (*Macrobrachium sp.*)

As only freshwater prawns were well represented in the catchment the following additional target species were selected:

- Agassiz's perchlet (Ambassis agassizii);
- Fly-specked hardyhead (Craterocephalus stercusmuscarum); and
- Freshwater shrimp (Atyidae).

Table 3-8 Human and ecological health species caught and selected for analysis.

Common name	Species	Reference	Control	Test					
		Lake Kroombit	Callide Creek U/S	Lake Callide		Callide Creek D/S			
		AB9	AB1	AB2	AB3	AB4	AB5	AB7	AB8
Human health									
Barramundi	*Lates calcarifer*			✓	✓				
Crayfish	*Cherax quadricarinatus*		✓	✓	✓				
Eeltail Catfish	*Tandanus tandanus*	✓	✓	✓		✓			
Hyrtl's Catfish	*Neosilurus hyrtlii*	✓	✓						✓
Rendahl's Catfish	*Porochilus rendahli*		✓			✓	✓		
Sleepy cod	*Oxyeleotris lineolata*		✓			✓			
Yellowbelly	*Macquaria ambigua*		✓						✓
Ecological health									
Agassiz's perchlet	*Ambassis agassizii*	✓	✓		✓	✓	✓	✓	✓
Flyspecked Hardyhead	*Craterocephalus stercusmuscarum*		✓	✓	✓	✓		✓	✓
Freshwater prawn	*Macrobrachium sp.*	✓	✓	✓	✓				
Freshwater shrimp	Atyidae					✓		✓	

RESULTS

Results are presented below for detectable concentrations of PFAS, metal/metalloids and fluoride. Collected data has been tabulated in Appendix E and the relevant laboratory reports are provided in Appendix F.

The results of the human health target species were compared against human health screening criteria values (see Table 5-2 in Appendix A). The results of the ecological health target species were compared against ecological screening criteria values (see Table 5-3 in Appendix A).

Human Health Target Species

No PFOA (Perfluorooctanoic Acid) was detected in any sample, however PFOS[1] (Perfluorooctanesulfonic acid) were detected in five of the six human health targets and values were above guideline levels for each sample tested apart from *O. lineolata* (Figure 3-21). PFOS was detected at both the control site and test sites on Callide Creek and results indicated an increase in PFOS at sites furthest downstream, with the highest values recorded in *N. hyrtlii* at site AB8. The concentration of PFOS within the edible portion on *M. ambigua* was broadly similar to the rest of the body.

No PFOS was detected in biota tissue from either the reference site on Kroombit Lake or the test sites on Lake Callide. It should be noted that PFOS was not detected in barramundi (caught in Lake Callide at sites AB2 and AB3), a species highly likely to be targeted and consumed by humans.

1 PFOS represents PFHxS + PFOS

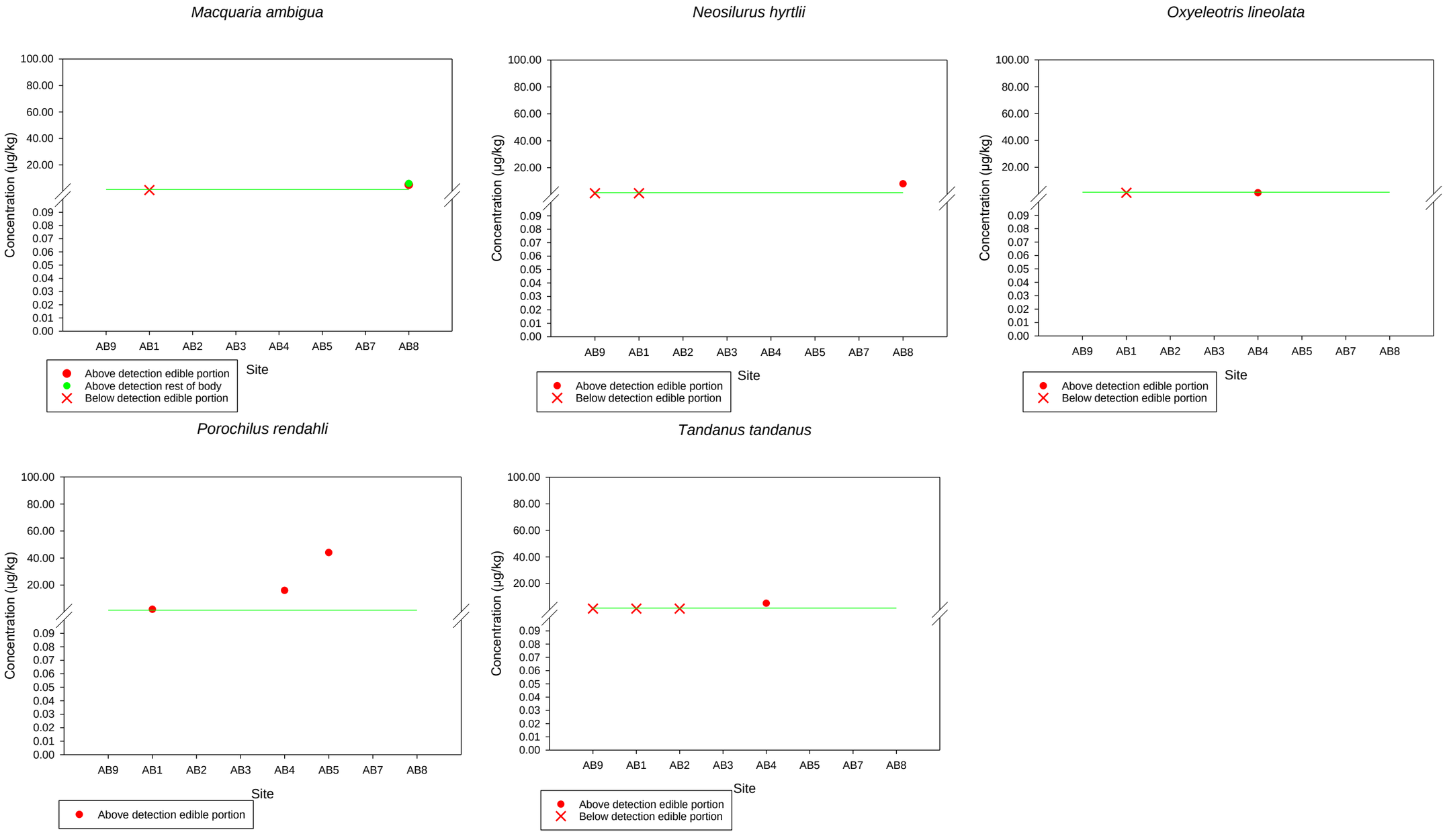


Figure 3-21 PFOS measured from human health target species. Green line represents human health guideline value (NEPM, 2020).

Ecological Health Target Species

PFOS detections were limited to test sites on Callide Creek, with all values except one (Atyidae, AB4) being above both the avian and mammalian diet guideline levels (NEMP, 2020) (Figure 3-22). PFOS concentration showed an increase at sites further downstream, with the highest values recorded in *A. agassizii* at AB8.

There were no detections of PFOS at the reference site on Kroombit Lake, the control site on Callide Creek or at test sites on

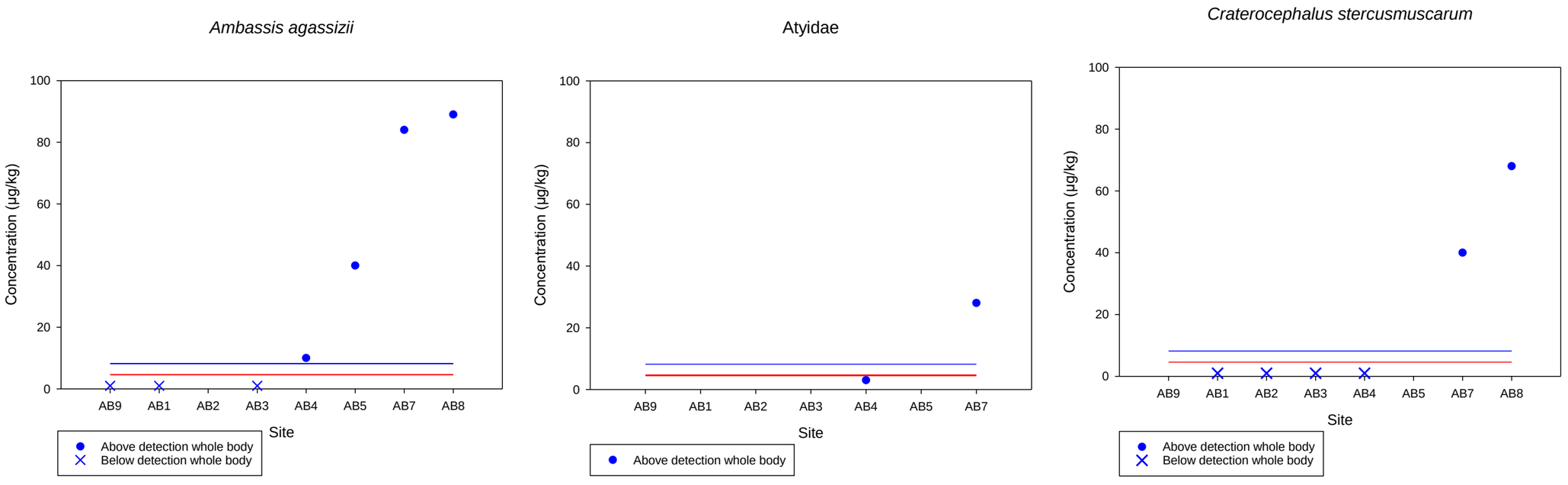


Figure 3-22 PFOS measured from ecological health target species. Lines represents avian (blue) and mammalian (red) diet ecological guideline values (NEMP, 2020).

3.5.2 METALS

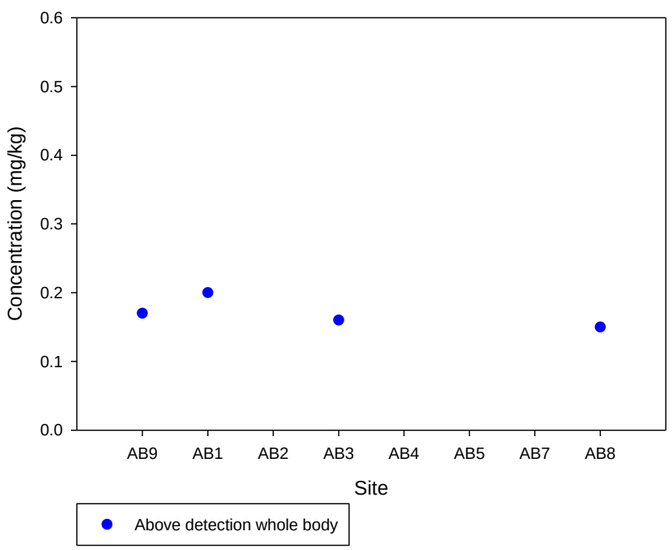
ARSENIC

There are no available guideline values for arsenic in biota tissue therefore the following represents comparative assessment only.

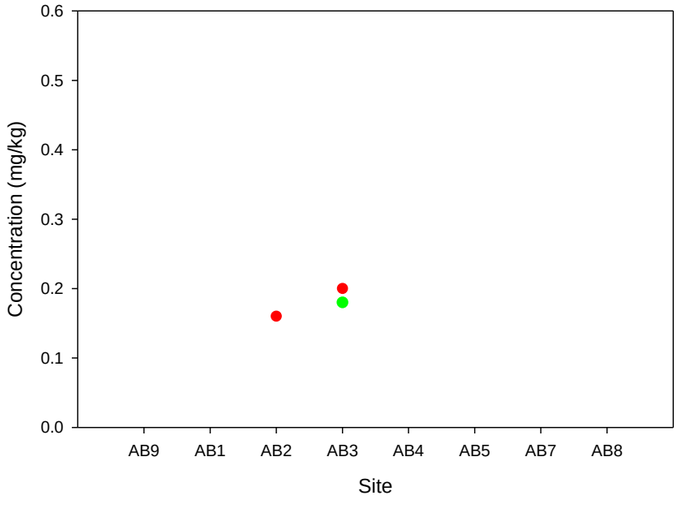
Arsenic was detected at most sites across the study area with no obvious pattern observed. Macrocrustaceans (Atyidae and *Macrobrachium sp*.) tended to have higher arsenic levels than fish, with the highest concentration recorded in *Macrobrachium sp.* at Callide Creek control site AB9. Arsenic is naturally higher in crustacean tissue compared to fish tissue and values do not indicate obvious arsenic contamination in the receiving environment (Stewart & Turnbull, 2015).

Arsenic levels did not vary considerably between the edible portion and the rest of body in the *L. calcarifer* tested.

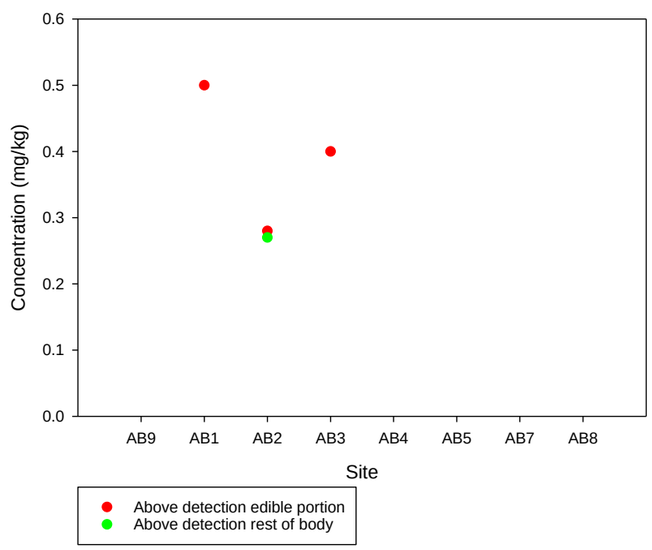
Ambassis agassizii



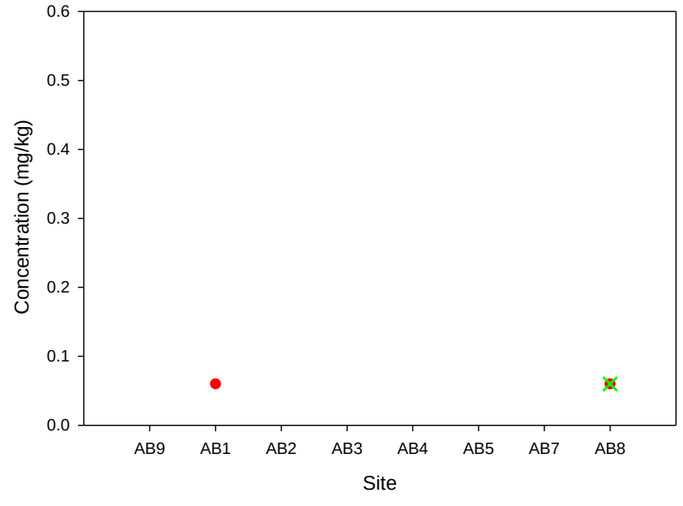
Lates calcarifer



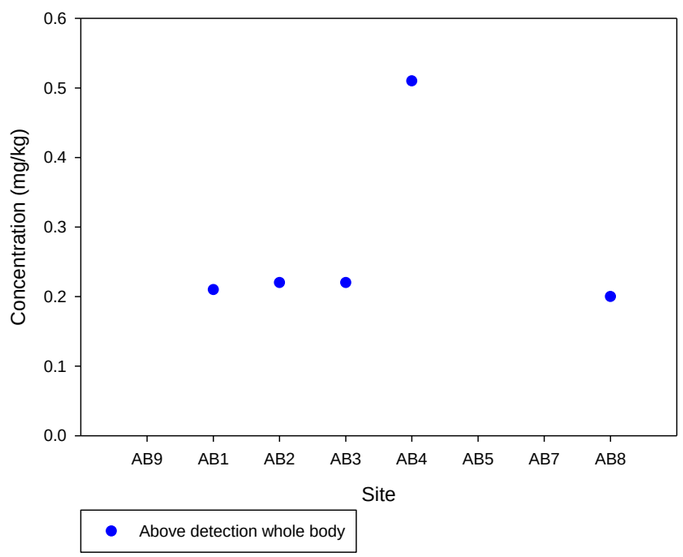
Cherax quadricarinatus



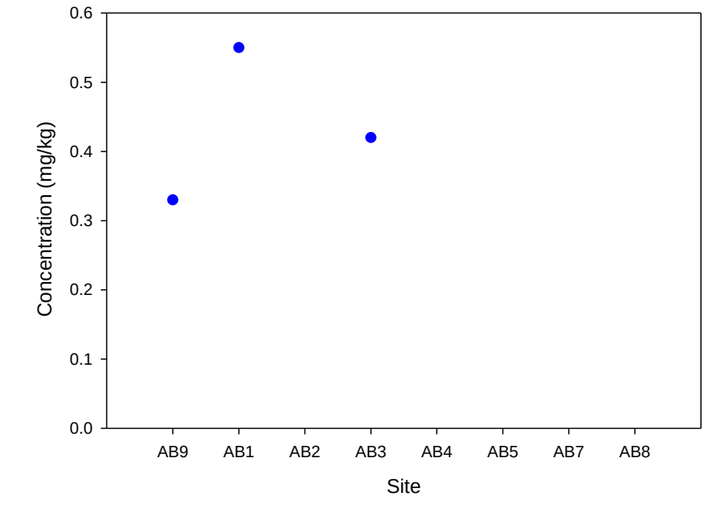
Macquaria ambigua



Craterocephalus stercusmuscarum



Macrobrachium sp.



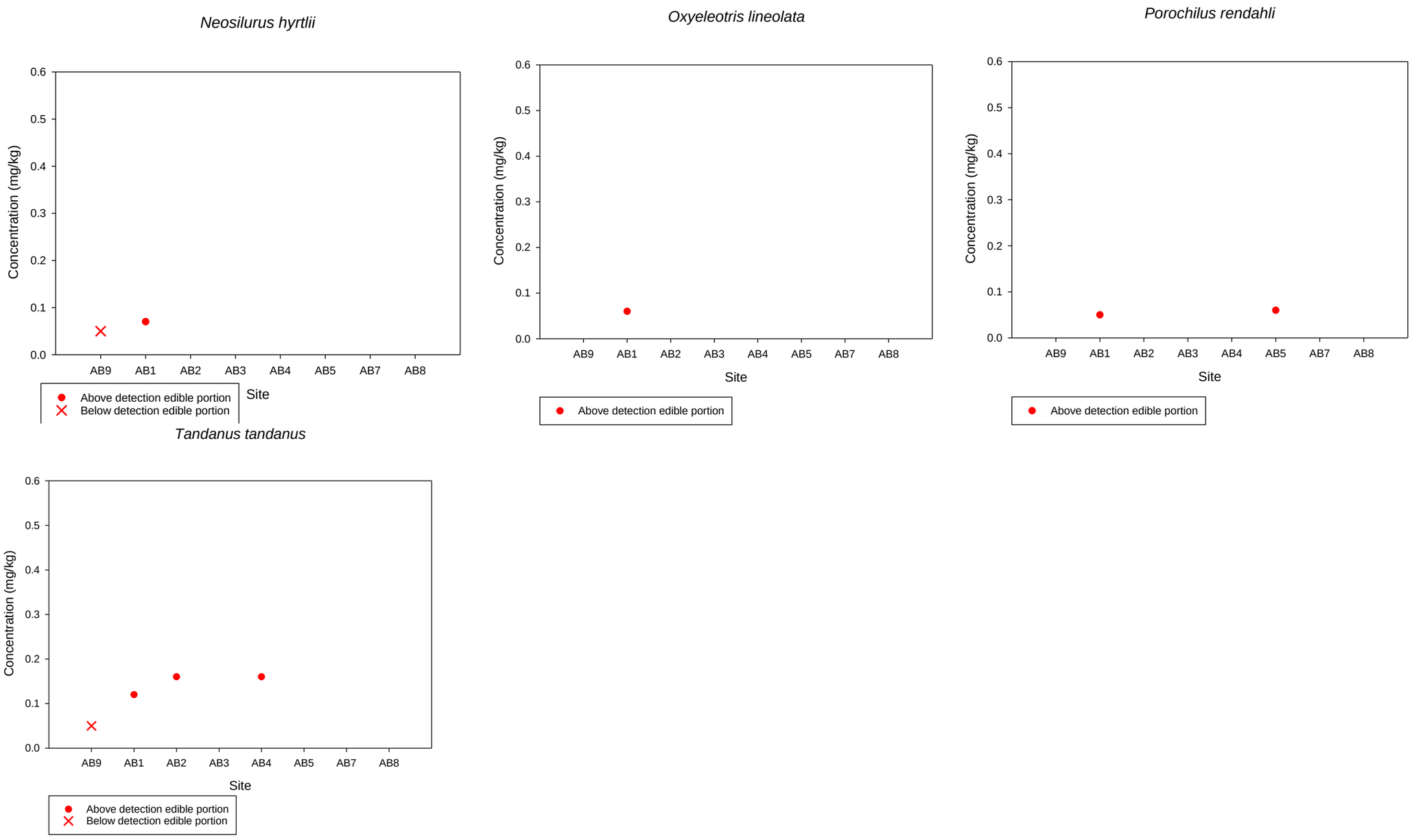


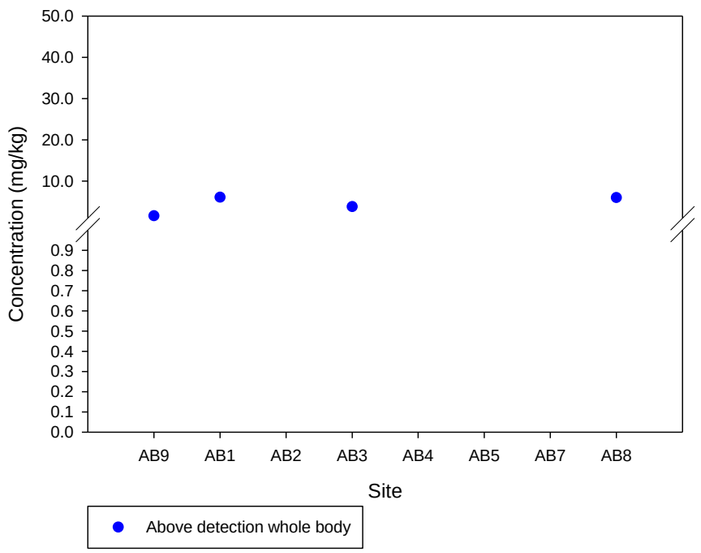
Figure 3-23 Arsenic concentration in biota tissue.

BARIUM

There are no available guideline values for barium in biota tissue therefore the following represents comparative assessment only.

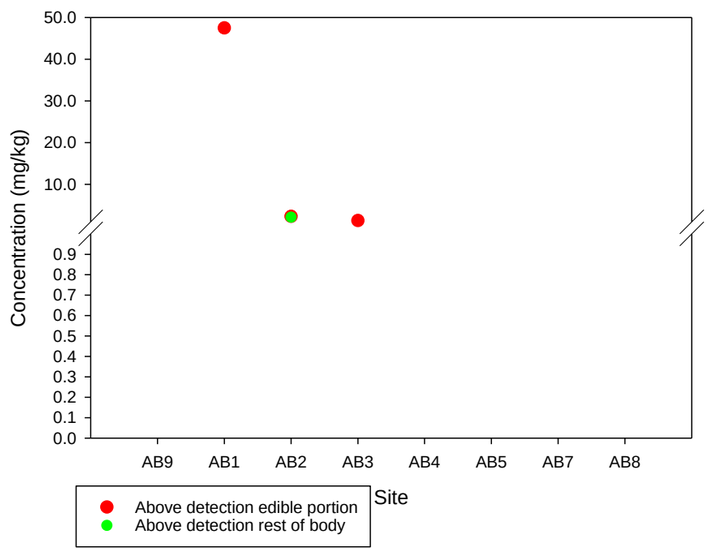
Barium was detected at most sites with no obvious relationship differences between test and control/reference sites (Figure 3-24). Similar to arsenic, levels tended to be higher in macrocrustaceans (*C. quaricarinatus* and *Macrobrachium sp.*,) compared to fish, with the highest value recorded in *C. quadricarinatus* at control site AB1. Barium is known to be naturally higher in crustaceans relative to fish (Verbruggen et al., 2020).

Ambassis agassizii



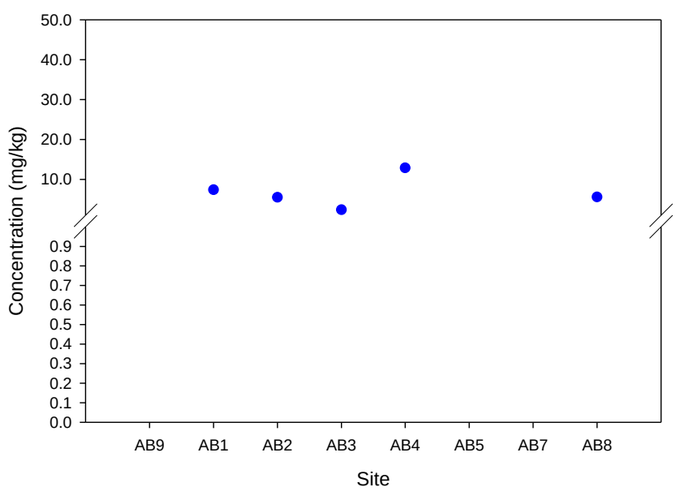
Lates calcarifer

Cherax quadricarinatus

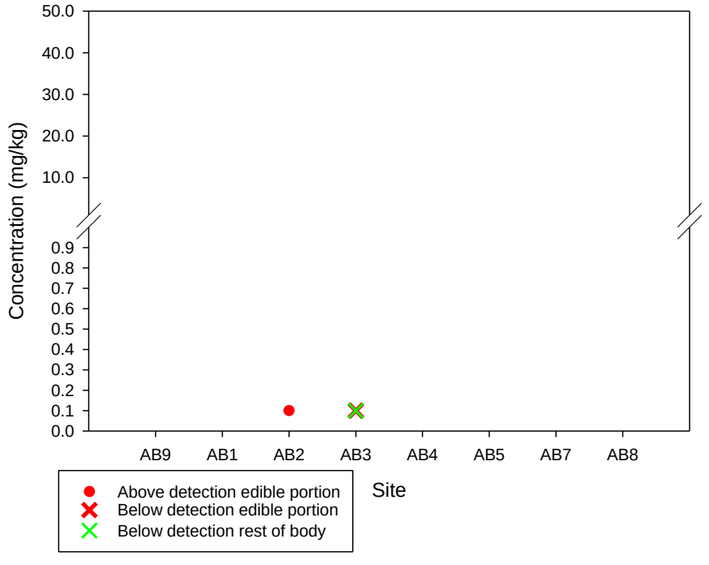


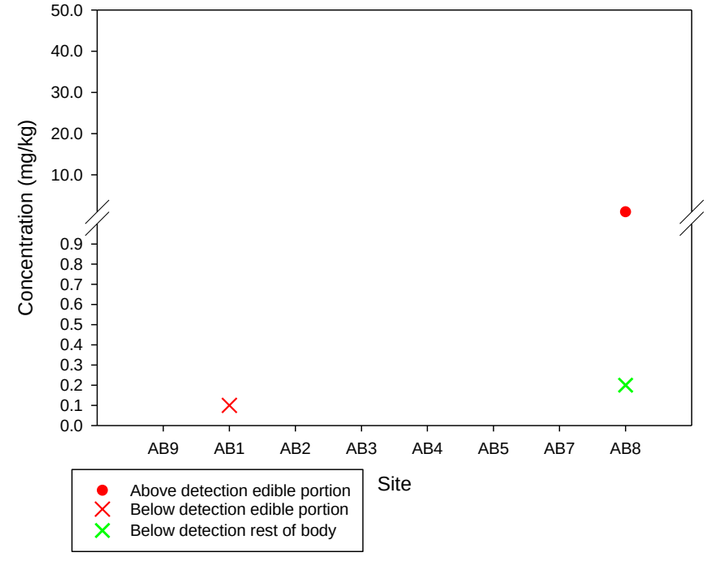
Macquaria ambigua

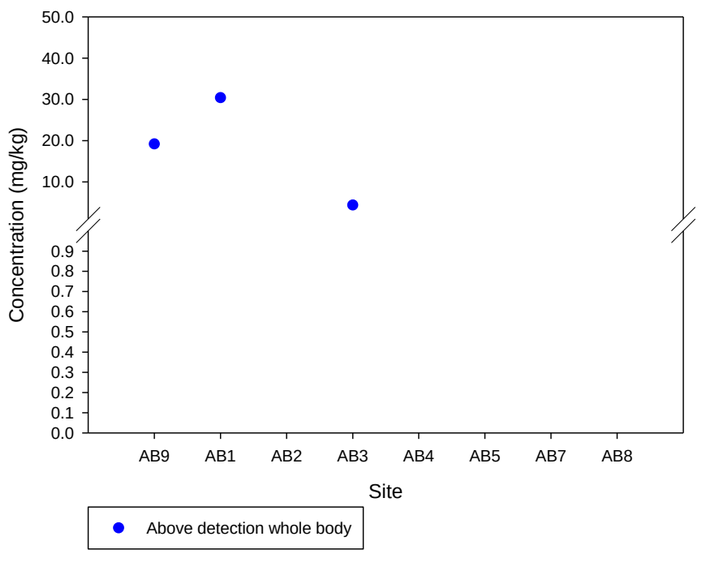
Craterocephalus stercusmuscarum



Macrobrachium sp.







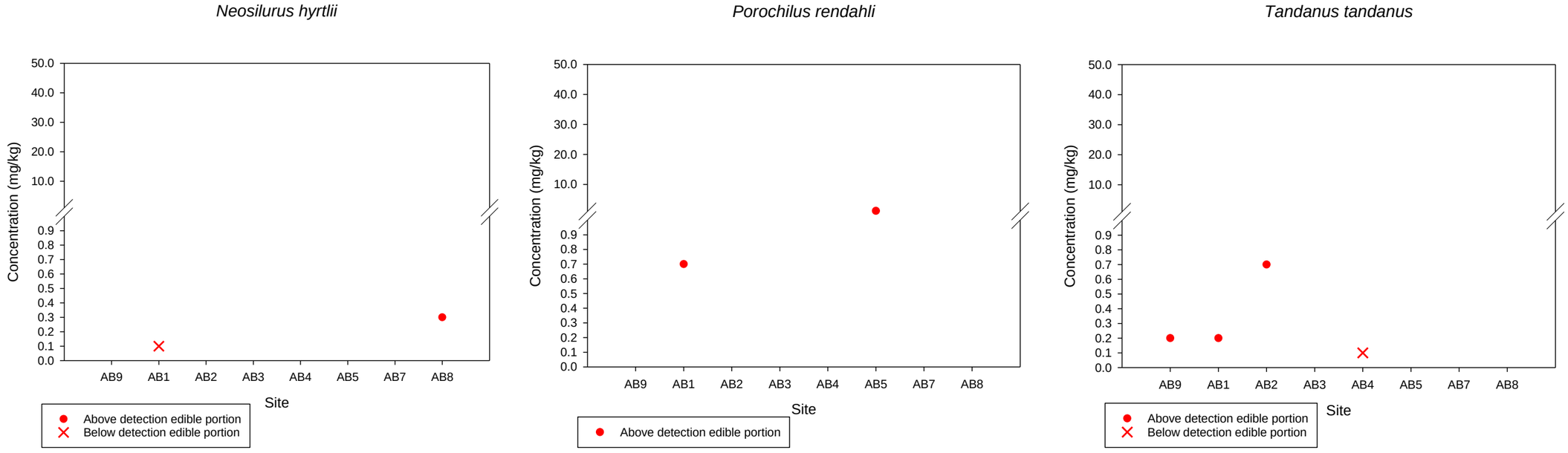


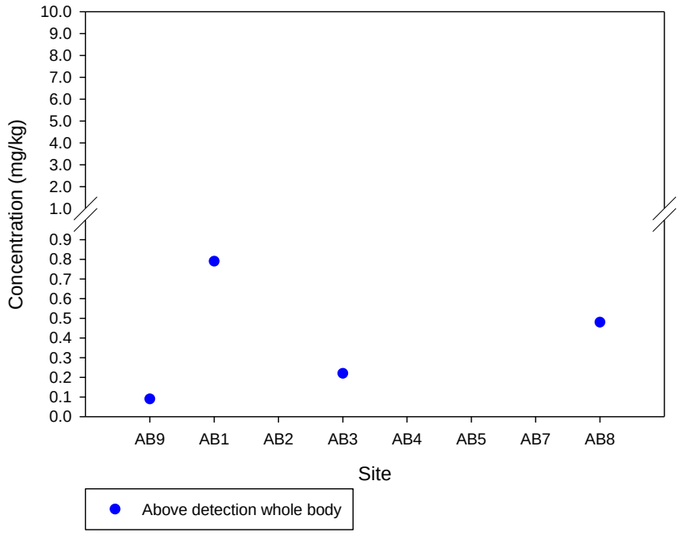
Figure 3-24 Barium concentration in biota tissue.

CHROMIUM

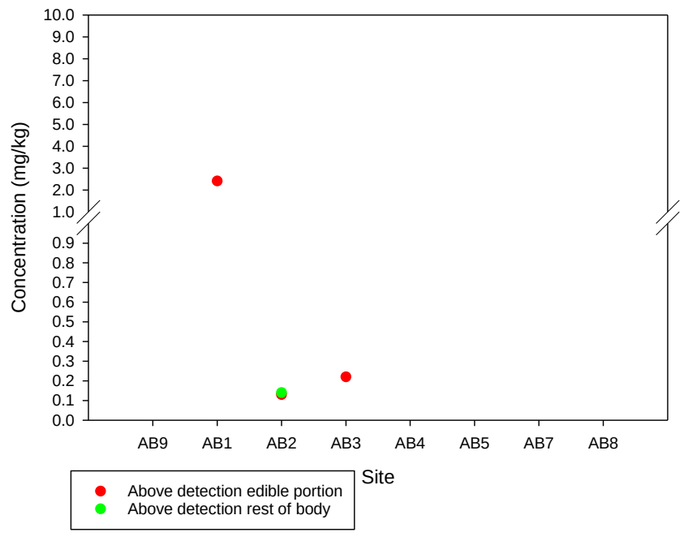
There are no available guideline values for chromium in biota tissue therefore the following represents comparative assessment only.

Chromium was detected at most sites with no obvious relationship between test and control/reference sites, however notable elevations were recorded at control site AB1 and test sites on Lake Callide (Figure 3-25). The highest chromium value was recorded in *T. tandanus* at control site AB1.

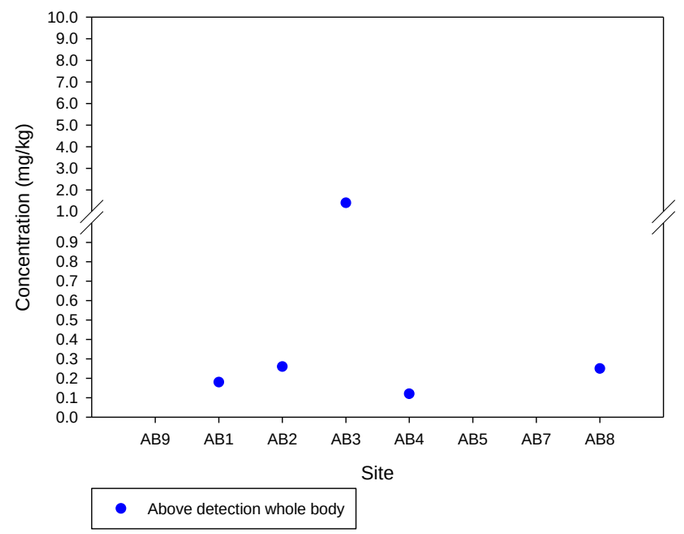
Ambassis agassizii



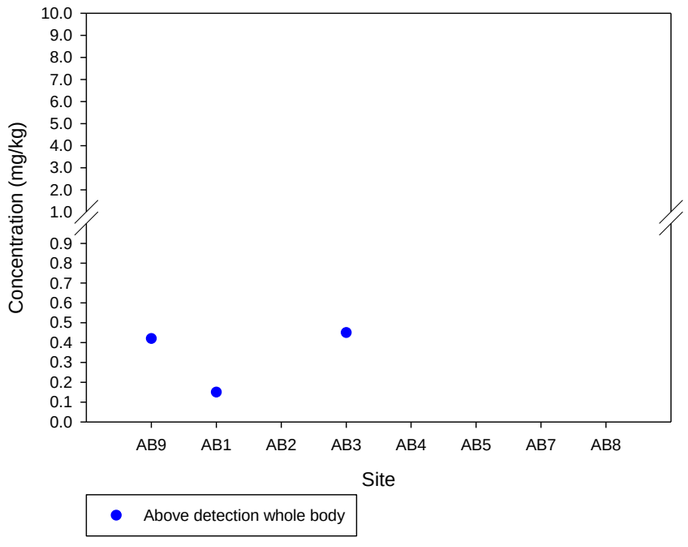
Cherax quadricarinatus



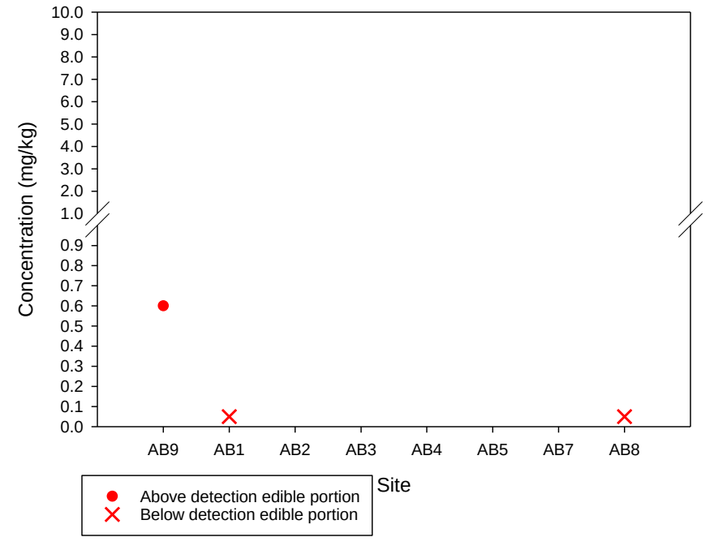
Craterocephalus stercusmuscarum



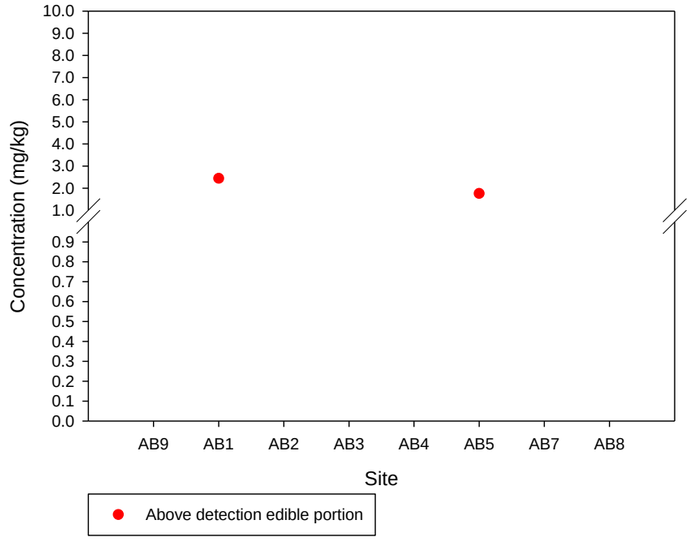
Macrobrachium sp.



Neosilurus hyrtlii



Porochilus rendahli



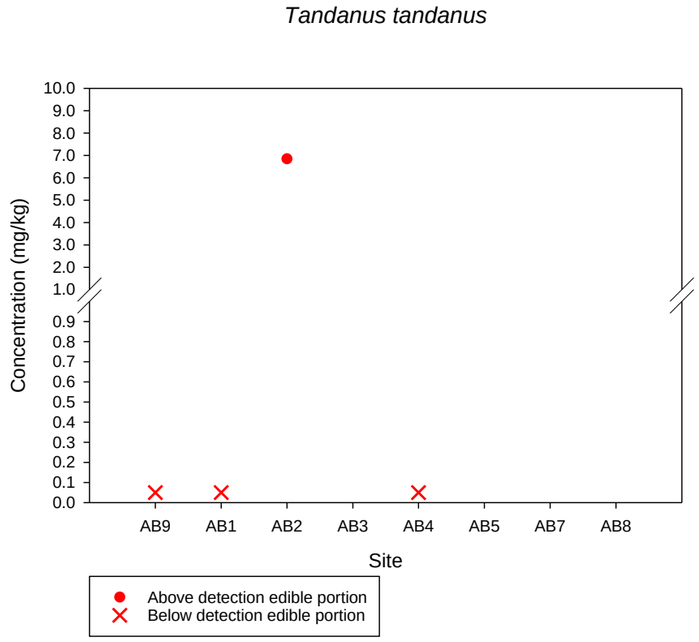
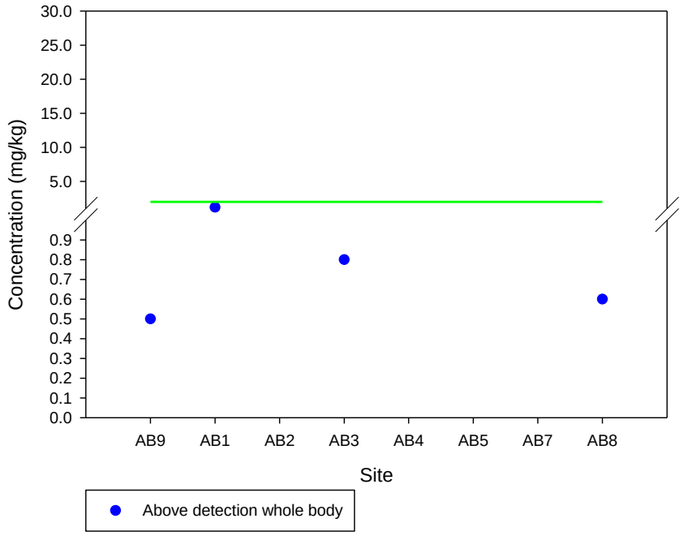


Figure 3-25 Chromium concentration in biota tissue.

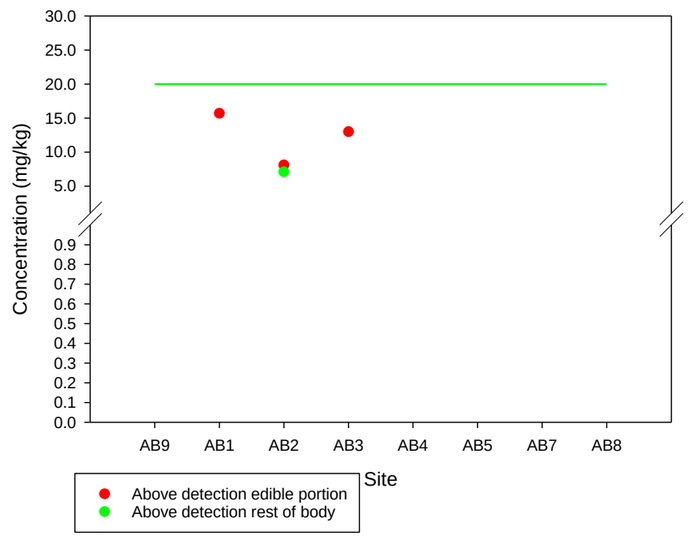
COPPER

Copper was detected at most sites with no obvious relationship between test and control/reference sites (Figure 3-26). All values were below generally expected levels (GELs) except for *Macrobrachium sp.* at control site AB1. Copper levels in the edible portions of *L. calcarifer* and *C. quadricarinatus* were broadly similar to those recorded in the rest of body samples.

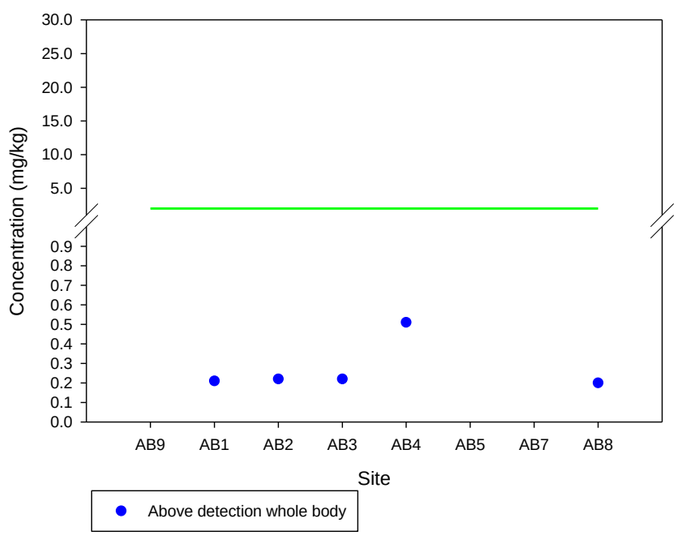
Ambassis agassizii



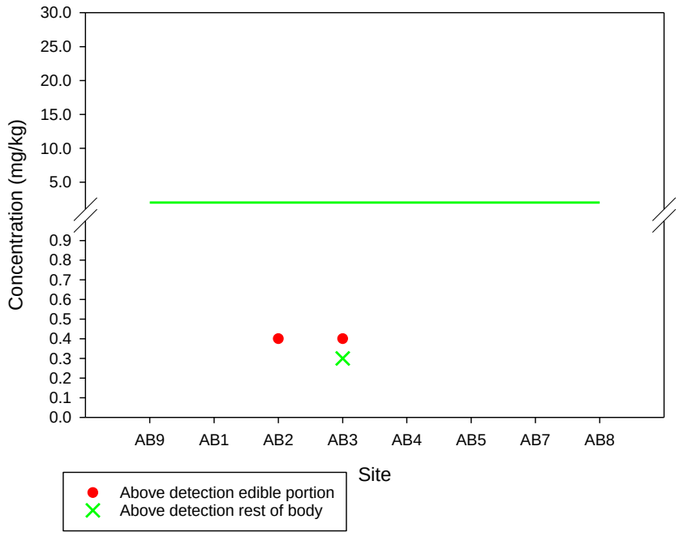
Cherax quadricarinatus



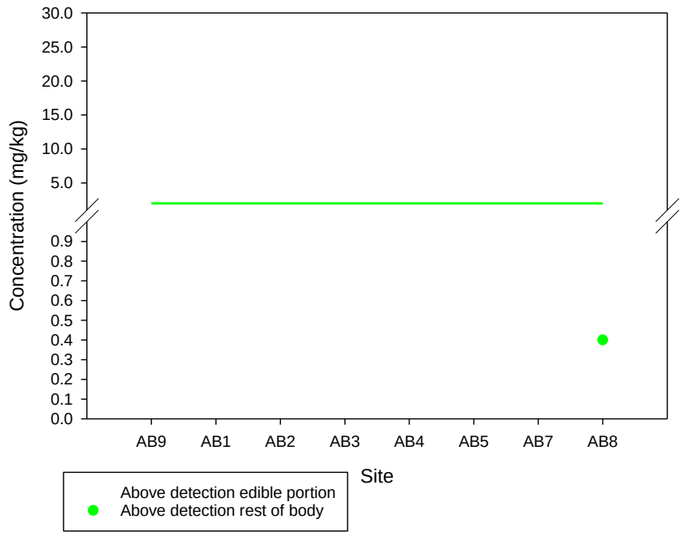
Craterocephalus stercusmuscarum



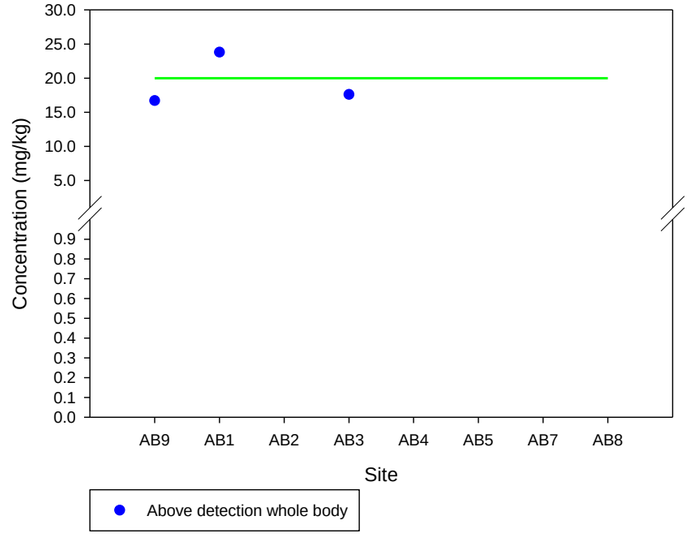
Lates calcarifer



Macquaria ambigua



Macrobrachium sp.



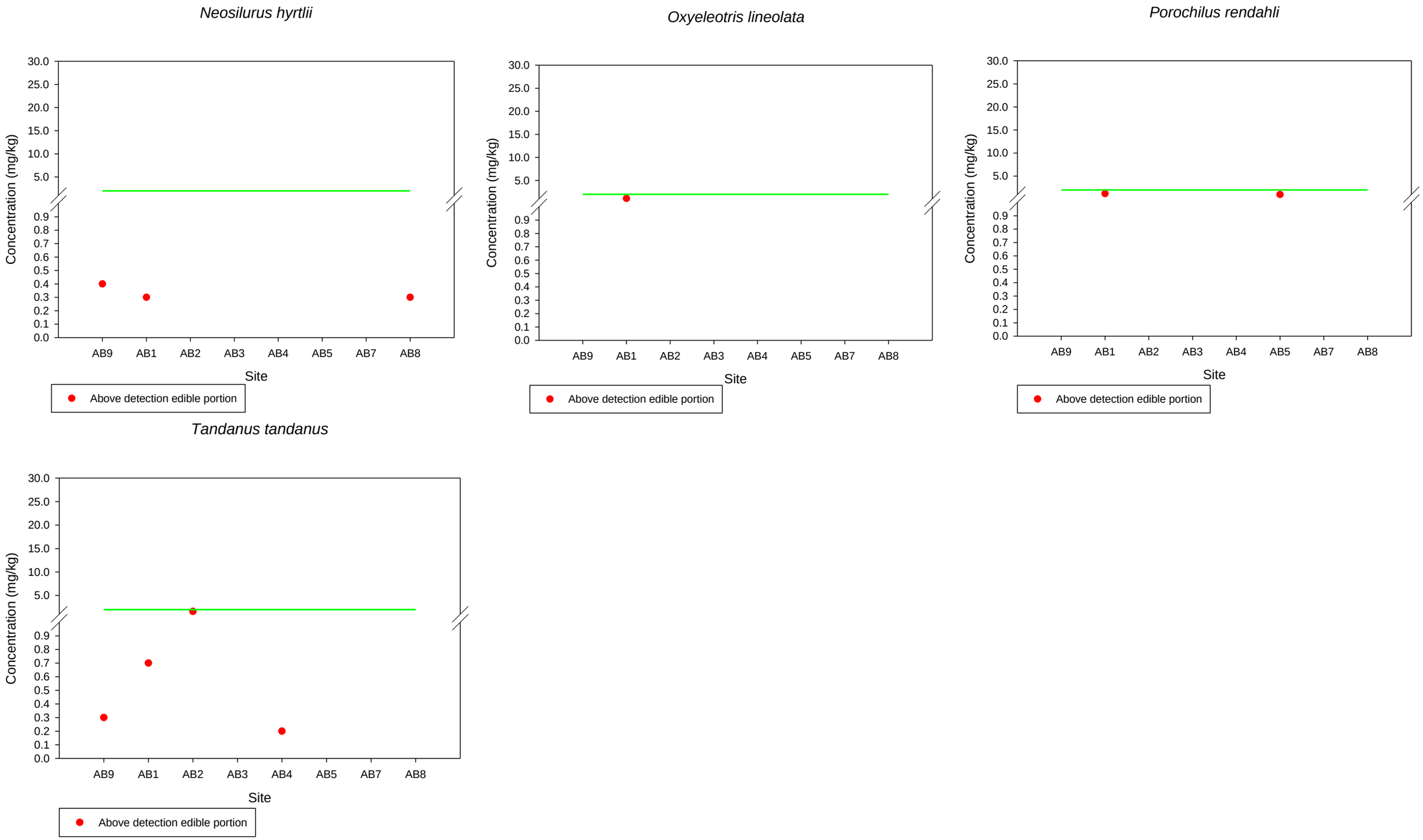


Figure 3-26 Copper concentration in biota tissue. Green lines represent GELs (ANZFA, 2001).

MOLYBDENUM

There are no available guideline values for molybdenum in biota tissue therefore the following represents comparative assessment only.

Molybdenum was detected at most sites with no obvious relationship between test and control/reference sites (Figure 3-27). No molybdenum was detected in either the edible portion or rest of body sample from *N. hyrtlii* at site AB2.

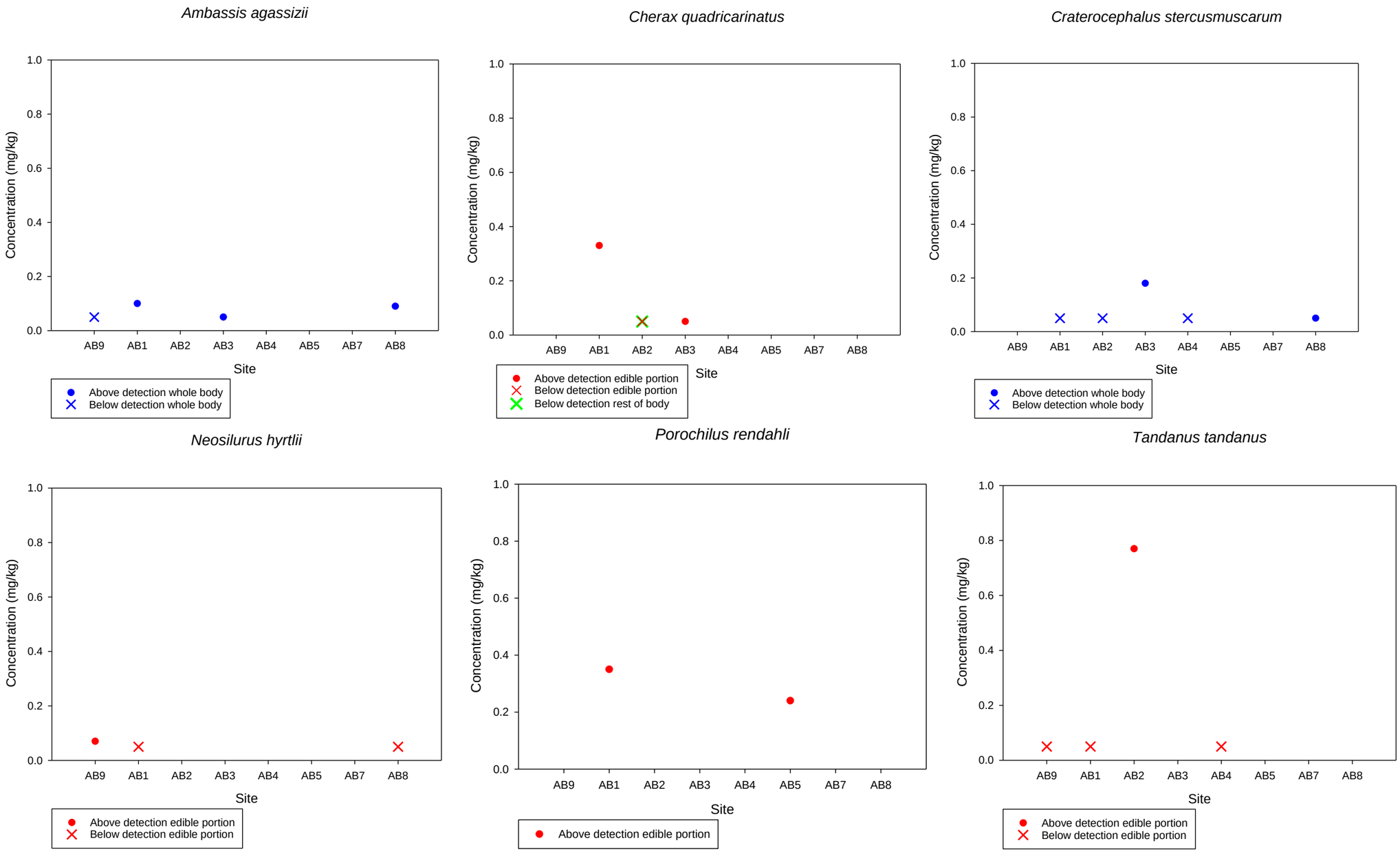
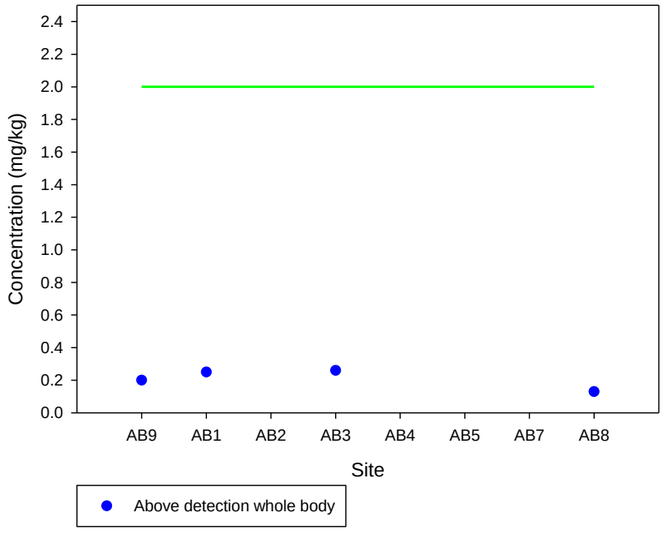


Figure 3-27 Molybdenum concentration in biota tissue.

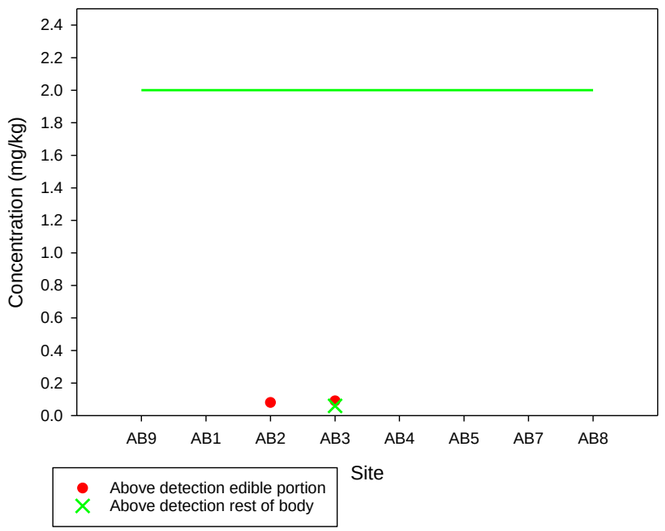
SELENIUM

Selenium was detected at most sites with no obvious relationship between test and control/reference sites (Figure 3-28). Levels were below GELs for all sites and there was no difference in concentrations between the edible portion and rest of body samples.

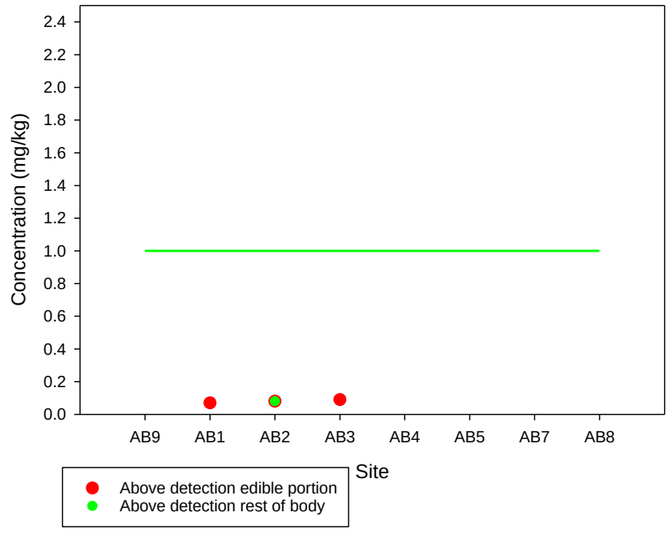
Ambassis agassizii



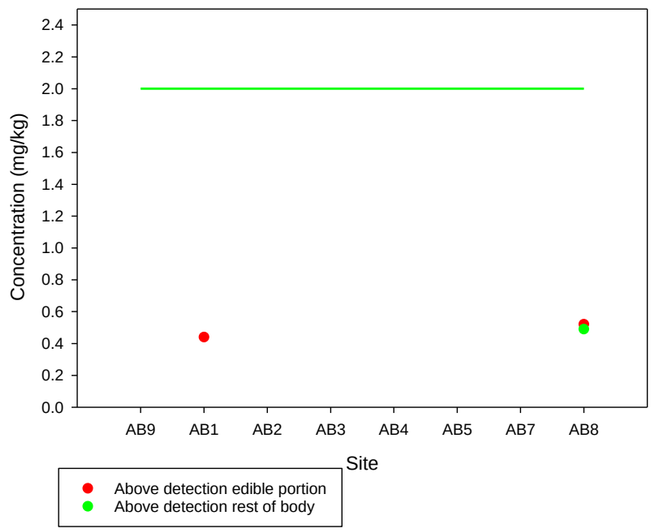
Lates calcarifer



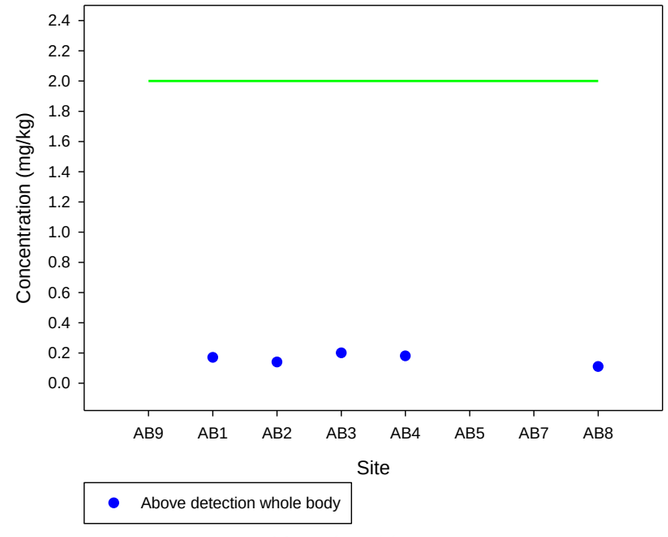
Cherax quadricarinatus



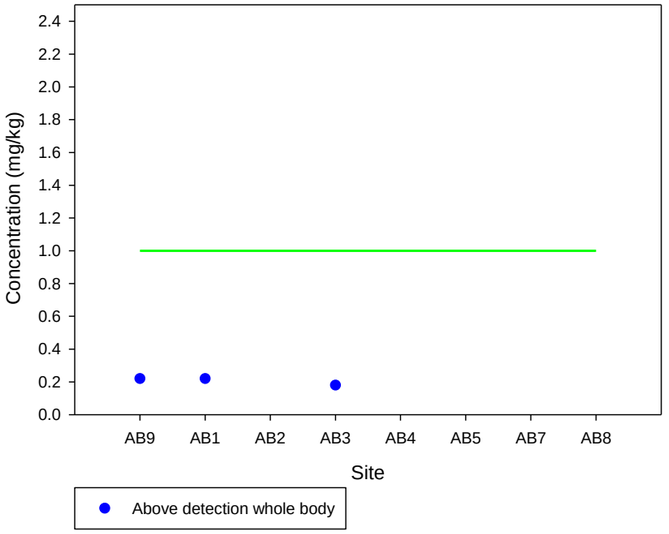
Macquaria ambigua



Craterocephalus stercusmuscarum



Macrobrachium sp.



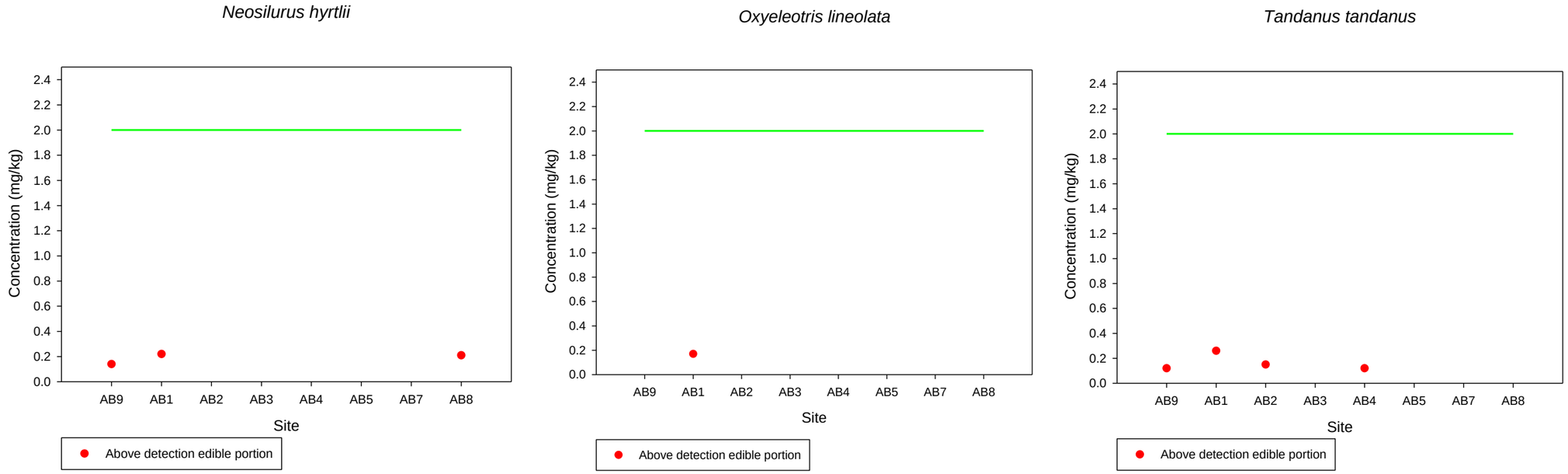


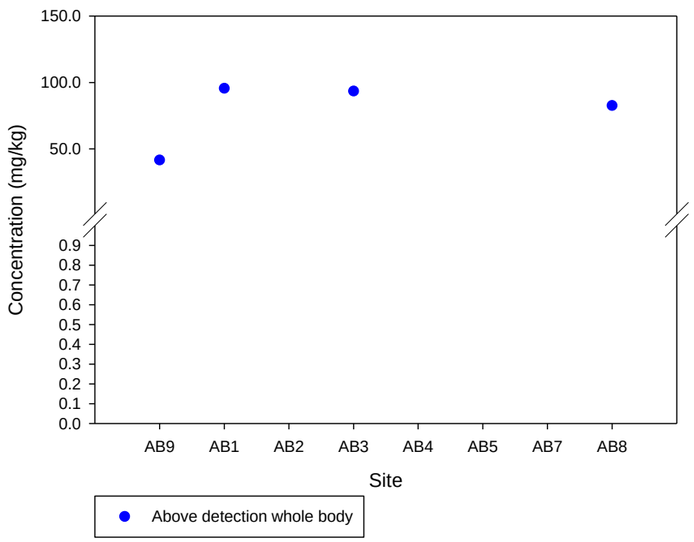
Figure 3-28 Selenium concentration in biota tissue. Green lines represent GELs (ANZFA, 2001).

STRONTIUM

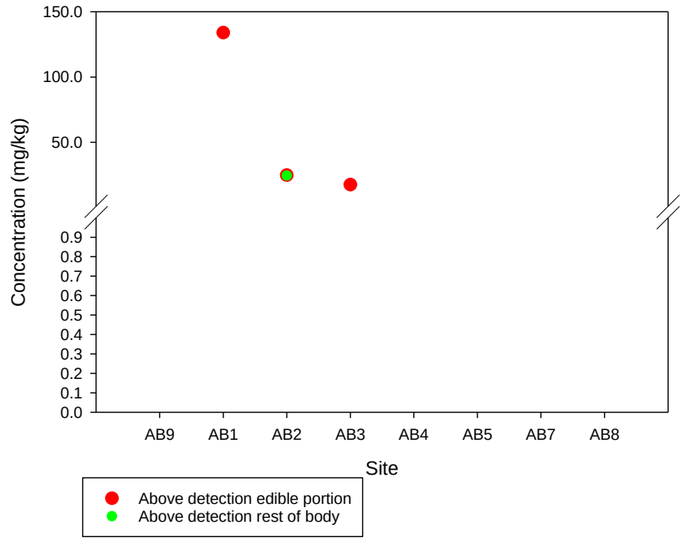
There are no available guideline values for stontium in biota tissue therefore the following represents comparative assessment only.

Strontium was detected at most sites with no obvious relationship between treatments (Figure 3-29). Strontium levels were broadly similar in the edible portion and rest of body samples.

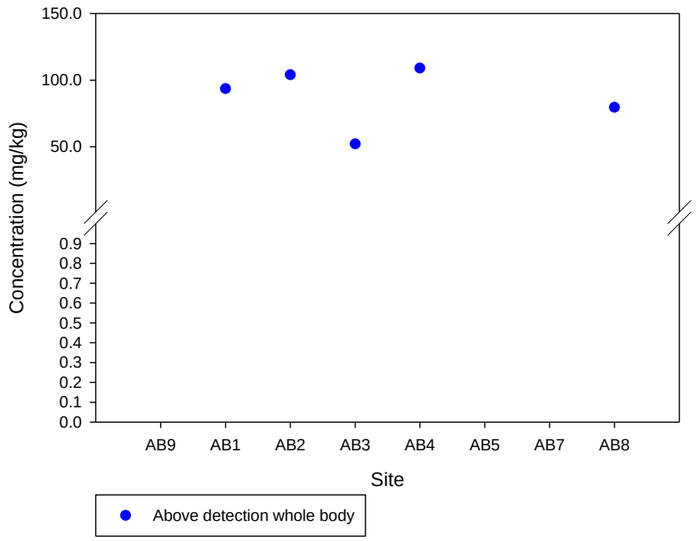
Ambassis agassizii



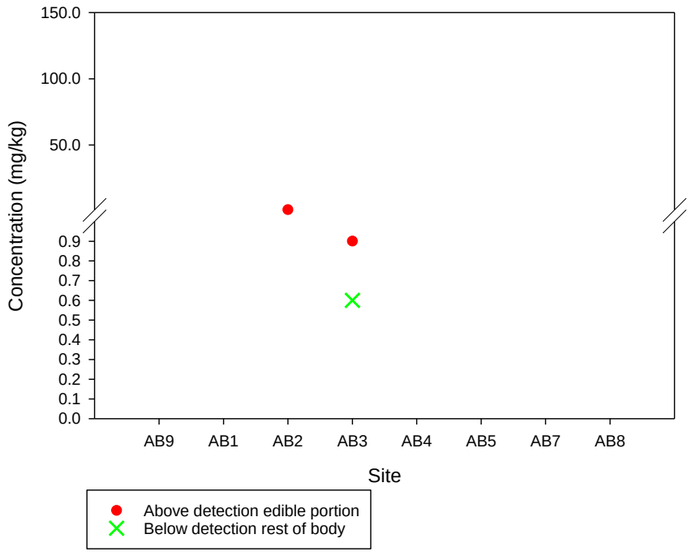
Cherax quadricarinatus



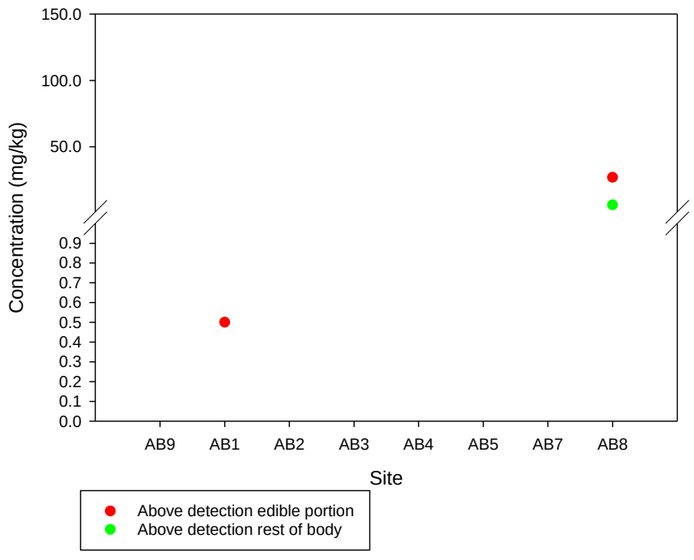
Craterocephalus stercusmuscarum



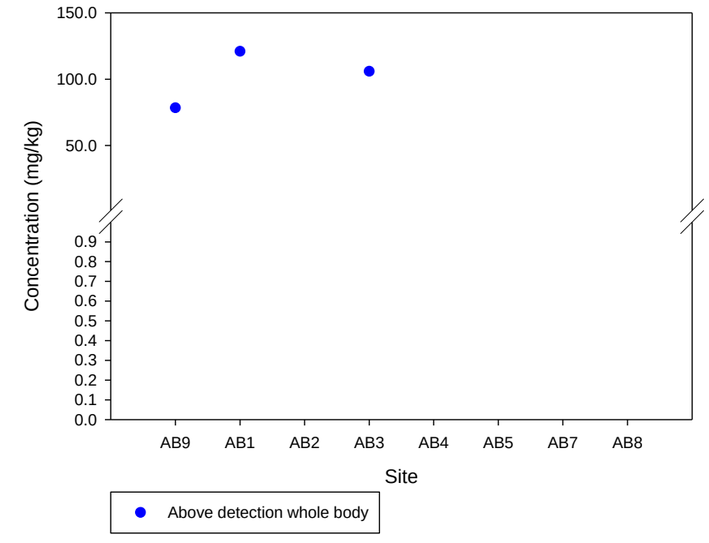
Lates calcarifer



Macquaria ambigua



Macrobrachium sp.



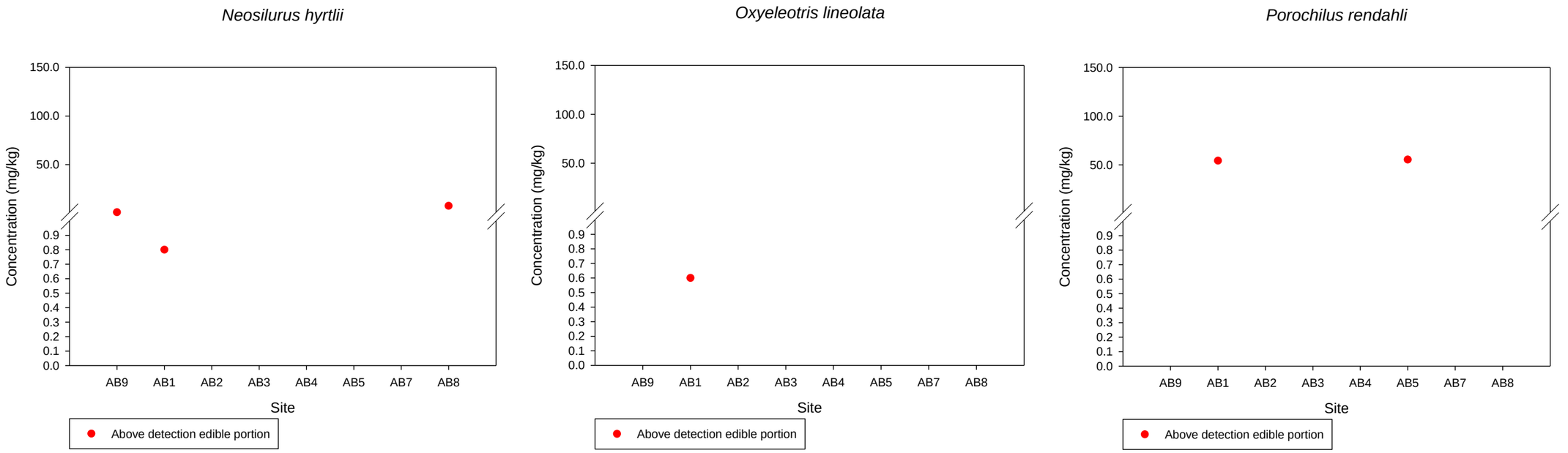


Figure 3-29 Strontium concentration in biota tissue.

VANADIUM

There are no available guideline values for vanadium in biota tissue therefore the following represents comparative assessment only.

Vanadium detection was limited to a single sample of *T. tandanus* at Lake Callide test site AB2 (Figure 3-30).

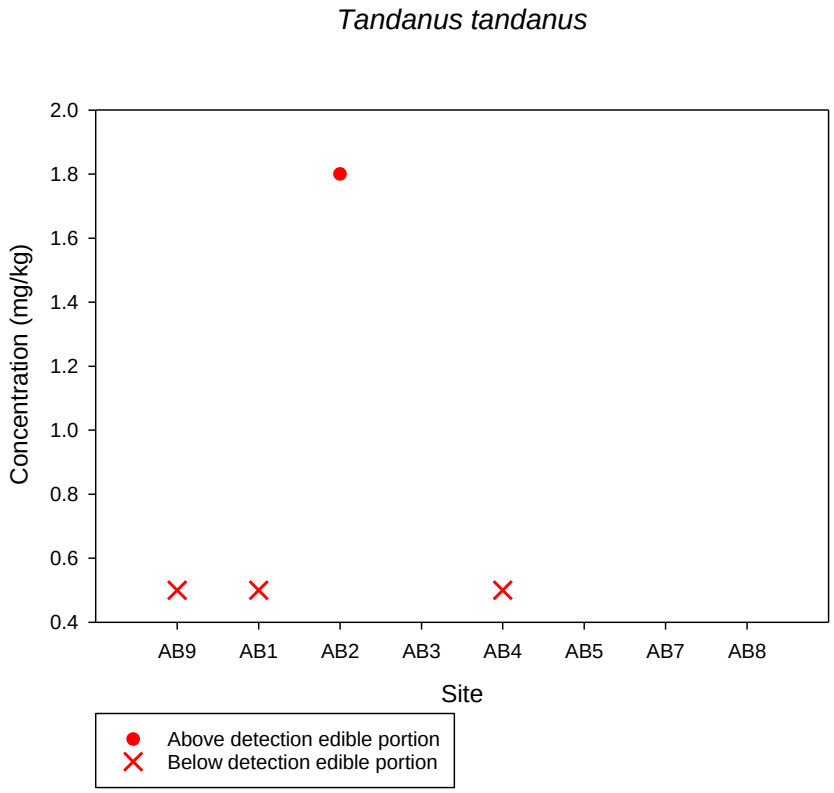
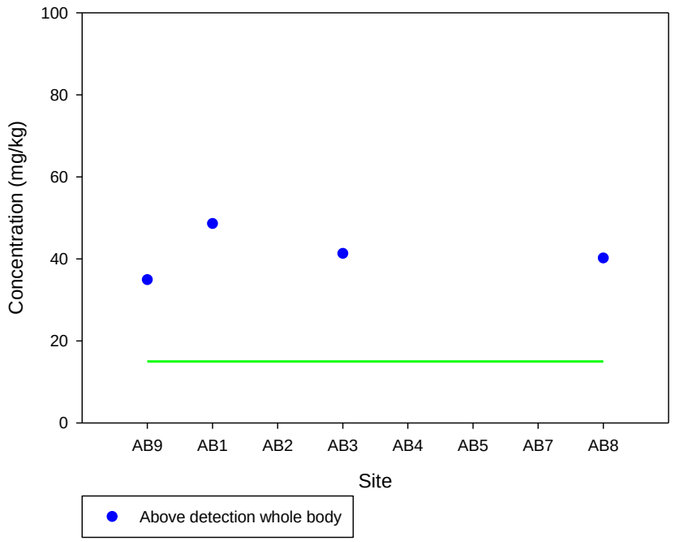


Figure 3-30 Vanadium concentration in biota tissue.

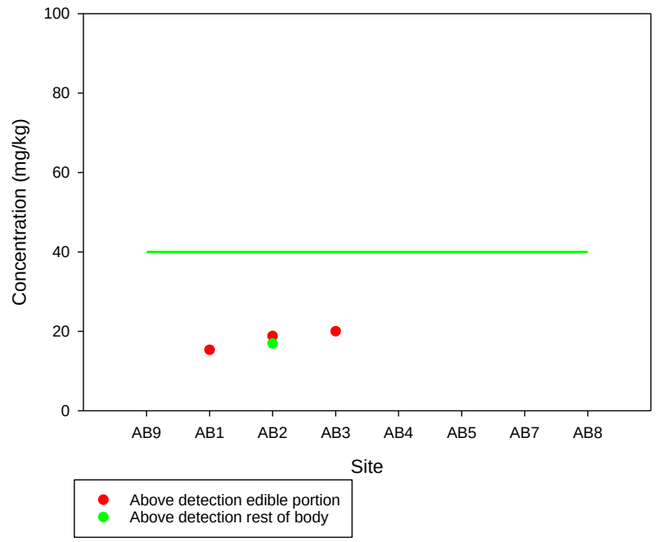
ZINC

Zinc was detected at most sites with no obvious relationship between treatments (Figure 3-31). Values were above GELs for *A. agassizii*, *C. stercusmuscarum*, *Macrobrachium sp.* and *P. rendahli*, with exceedances occurring at the reference site in Kroombit Lake, both control and test sites on Callide Creek and within Lake Callide. Zinc levels were similar between edible portion and rest of body samples.

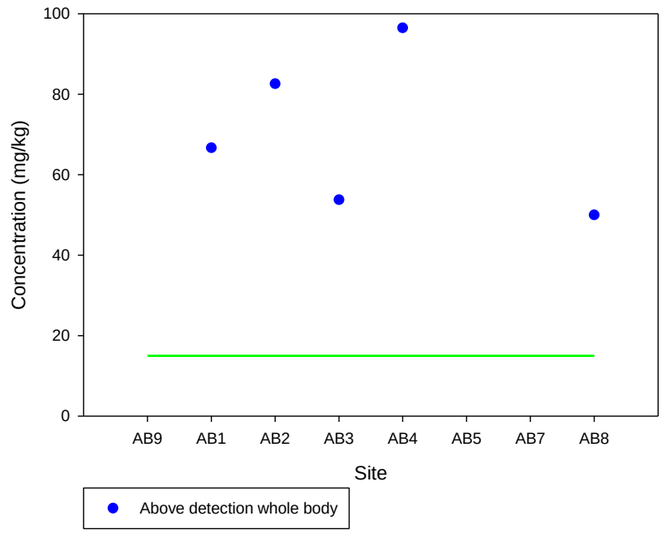
Ambassis agassizii



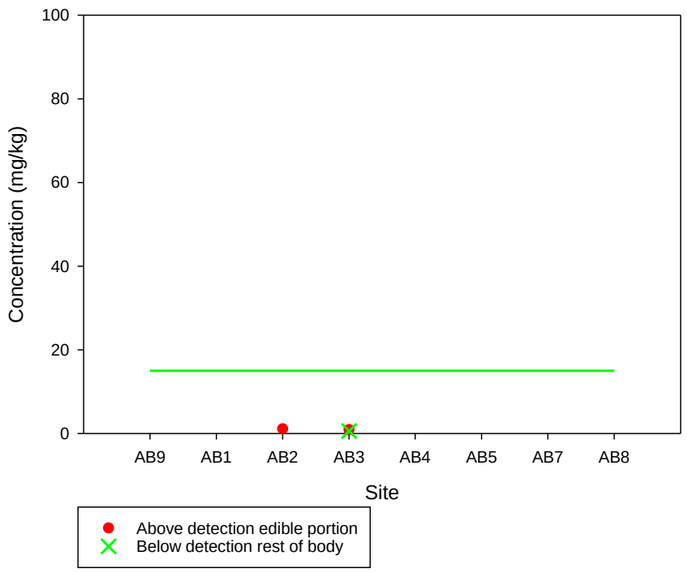
Cherax quadricarinatus



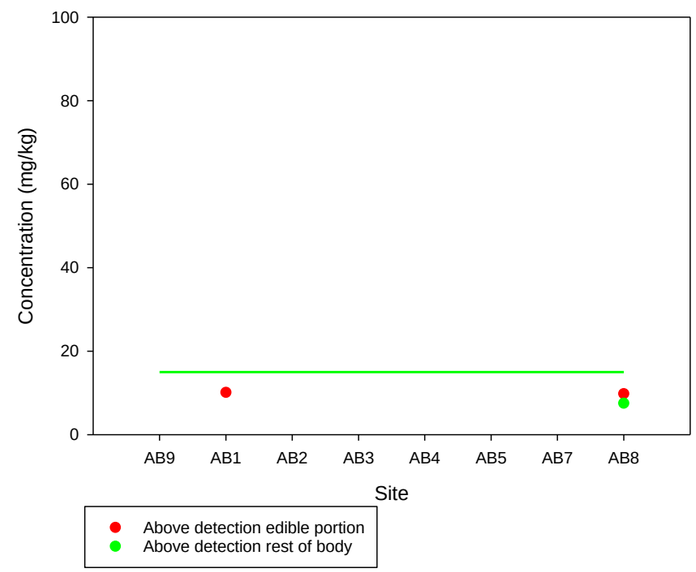
Craterocephalus stercusmuscarum



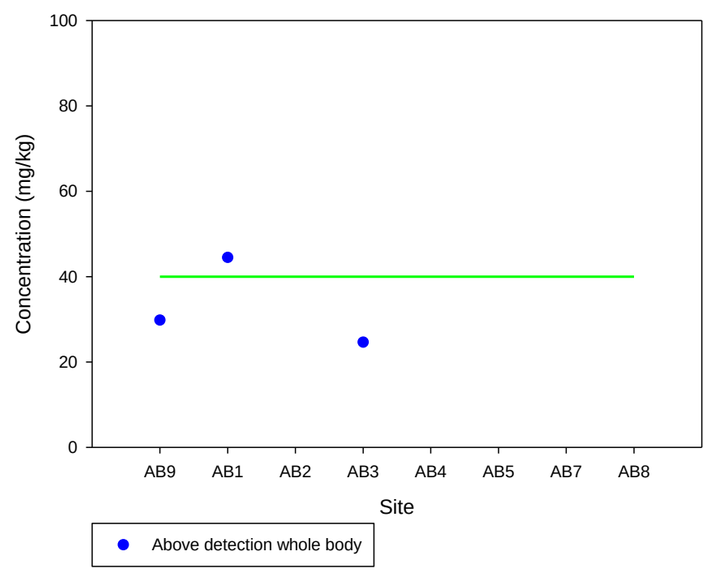
Lates calcarifer



Macquaria ambigua



Macrobrachium sp.



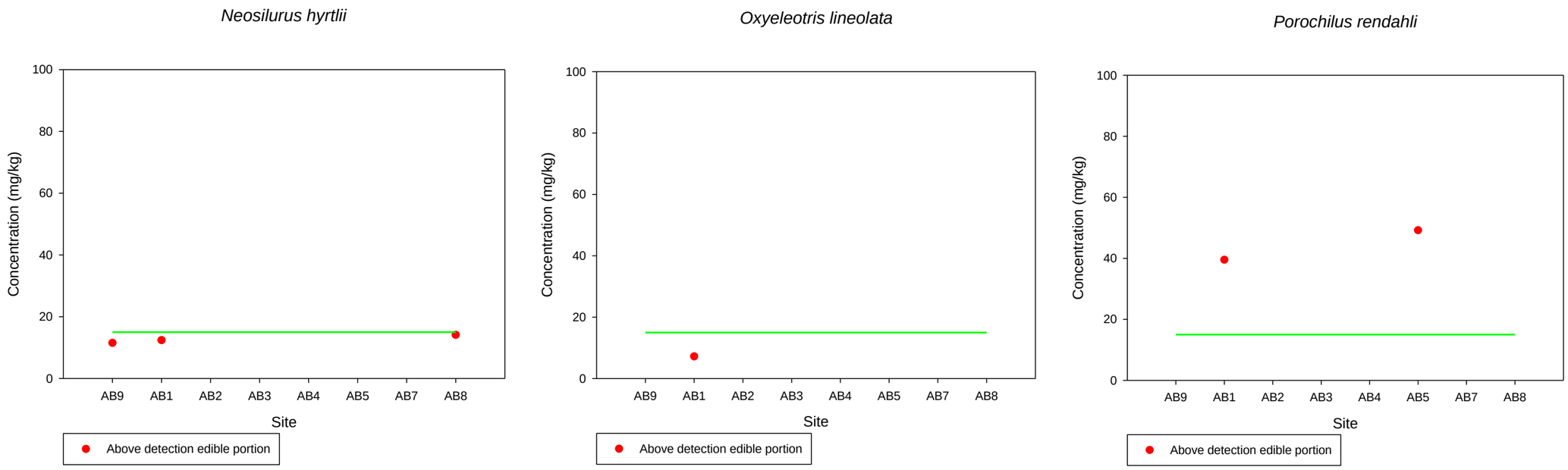


Figure 3-31 Zinc concentration in biota tissue.

THORIUM

There are no available guideline values for thorium in biota tissue therefore the following represents comparative assessment only.

Thorium detections were limited to the control site AB1 and Callide Lake test site AB2, with no detections recorded at Lake Kroombit reference site AB9.

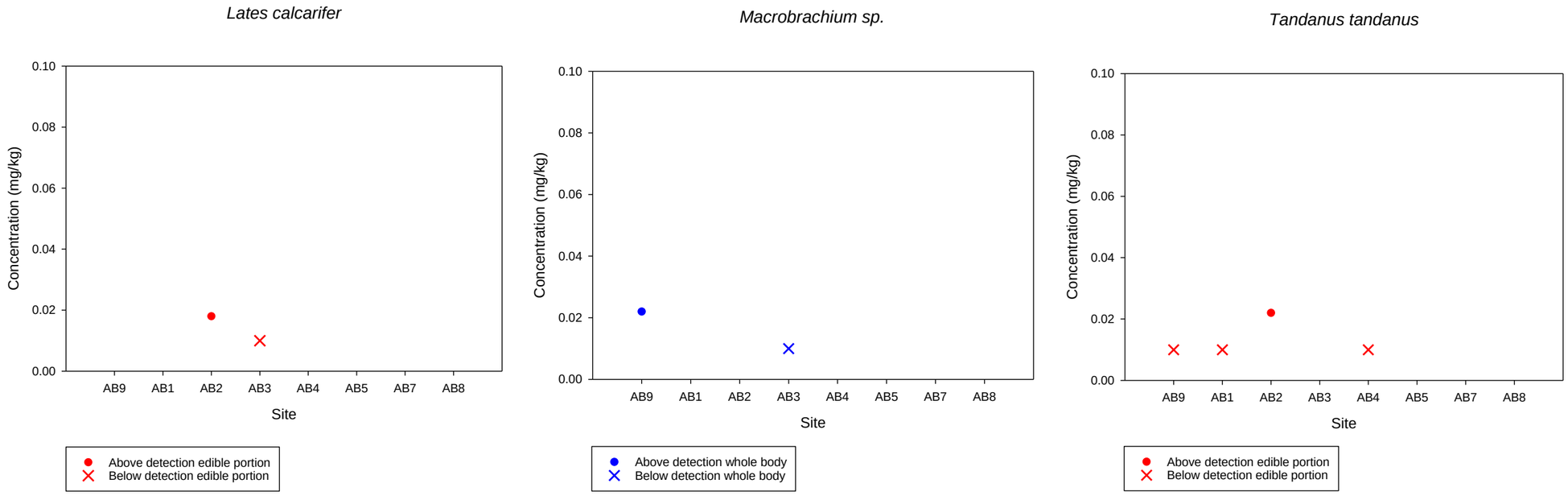


Figure 3-32 Thorium concentration in biota tissue.

FLUORIDE

There are no available guideline values for fluoride in biota tissue therefore the following represents comparative assessment only.

Fluoride was detected at just two sites; Lake Callide test site AB3 and Callide Creek test site AB8 (Figure 3-33).

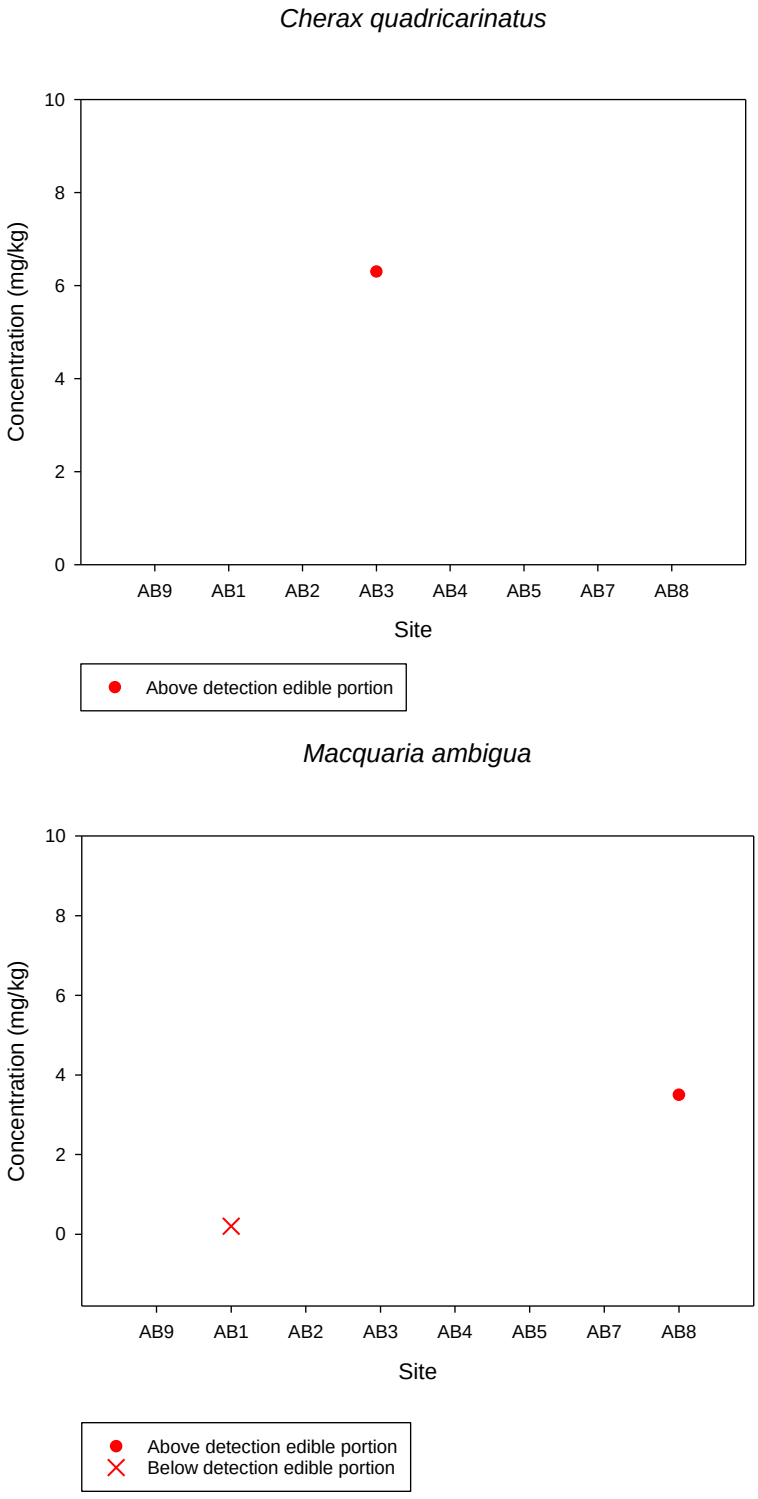


Figure 3-33 Fluoride concentration in biota tissue.

3.5.3 SUMMARY

The results of the biota tissue analysis are summarised in Table 3-8.

PFOS concentrations in biota appear increase downstream and are highest at the site furthest downstream (AB8). It should also be noted that site AB8 is downstream from the township of Biloela which may be another potential source of PFOS. PFOS was also detected in biota at the control site upstream of CP on Callide Creek (AB1).

There were no detections of PFOS within Lake Callide, which reflects surface water sampling in the lake, where PFOS was either not detected or was present at low levels. Interestingly, PFOS concentrations were relatively low at site AB4, despite being closest in positioned in proximity to the CPS, however it should be noted that this site is located just upstream of the main channel draining the CPS, potentially away from the bulk of PFOS influence.

Most of the fish species identified in the current study are potamodromus, meaning that they may migrate upstream and downstream during their lifecycle. The movement habits and subsequent degree of PFOS exposure of the fish analysed in the current study is unknown and could have potentially influenced results. Fish movement in the catchment is influenced by seasonal flow patterns and barriers to fish movement, these include the dam wall at Lake Callide and Callide Weir.

There was no obvious difference between contaminant concentrations between the edible portions and rest of body samples where these were analysed separately. This indicates that contaminants do not appear to accumulate in certain organs/body parts.

Table 3-9 Biota tissue analysis results summary.

Contaminant	Trends and observations regarding treatments	Trends and observations regarding species
PFOS	Detected at both control sites and test sites on Callide Creek with an increasing trend downstream on Callide Creek	Large-bodied predators (*M. ambigua*), large/medium predator/omnivores (*O. lineolata* and various eel-tail catfish) that may be consumed by humans. Small-bodied micropredator/omnivores (e.g *A. aggassizii*) and scavengers (Atyidae) likely consumed by higher order organisms.
Arsenic	No obvious trend	Higher concentration in macrocrustaceans
Barium	No obvious trend	Higher concentration in macrocrustaceans
Chromium	No obvious trend	No obvious trend
Molybdenum	No obvious trend	No obvious trend
Selenium	No obvious trend	No obvious trend
Vanadium	No obvious trend	Detection limited to a single eel-tail catfish in Lake Callide
Zinc	No obvious trend	No obvious trend - values above guideline levels for most species

Contaminant	Trends and observations regarding treatments	Trends and observations regarding species
Thorium	No obvious trend	No obvious trend
Fluoride	No obvious trend	Detection limited to a single large bodied predator (*M. ambigua*) and medium-bodied scavenger (*C. quadricarinatus*) that may be consumed by humans

4. CONCLUSION

The habitat condition, aquatic biota, and macroinvertebrate communities varied between control/reference sites and test sites. Upstream of Callide Dam within Callide Creek habitat condition was excellent and aquatic biota and macroinvertebrates were abundant and diverse for this system. Downstream some disturbance was evident based on the state of the habitat, water quality, and macroinvertebrate assemblages. Habitat quality overall was in good to excellent condition, with most sites limited due to lower water depth, availability of micro and macrohabitats and by high fine sediment content. Lake Callide, a larger water body with sections of sheltered habitat was able to support similar, and in some cases more diverse aquatic biota and macroinvertebrates communities than the comparable reference site Lake Kroombit. Analysis of historical water quality showed that site AB4 had high conductivity (2,631µS/cm) and that dissolved oxygen (%saturation) was relatively low across all sites, in particular downstream of Lake Callide.

PFOS was detected in biota at sites on Callide Creek both upstream and downstream of the CP with most concentrations being above human and ecological health guideline levels. No PFOS was detected in Lake Callide or within Lake Kroombit. PFOS concentrations appear to increase with increasing distance downstream of CPS, with the highest concentrations recorded at the furthest downstream site. Concentration of metals and fluoride did not show an obvious trend across treatments. Where guidelines (generally expected levels) were available, most metals/metalloids concentrations were below respective guidelines, except for zinc. However, zinc concentrations were above guideline levels regardless of species and site.

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APPENDIX A. METHODS

OVERVIEW

The methods detailed below are based on those stipulated in the SAQP (Epic Environmental, 2022).

HABITAT

Habitat characteristics at sites within riverine habitats (watercourses) were recorded via the use of the Queensland AUSRIVAS River Bioassessment field sheets. Any notable site characteristics and features were recorded and accompanied by photos. A brief site summary was compiled that included notes on bed and bank stability, riparian coverage, substrate coverage, shading and macro and micro-habitat features. For riverine environments, River Bioassessment Program scores (bio-assessment scores; out of 135) were calculated for all sites based on nine AUSRIVAS categories, including: habitat availability (pool/riffle, run/bend ratio); bank stability; streamside cover; bed substrate composition and embeddedness; channel alteration; and presence of scouring and/or deposition. From these scores, an aquatic habitat condition rating was calculated and categorised into: Poor, Fair, Good or Excellent habitat conditions.

A number of surveyed sites were also located with lacustrine habitats. The AquaBAMM method used to score wetlands and riverine systems in Australia is used to assess natural and near natural wetlands and cannot be applied to Lake Callide or Kroombit Dam. Additionally, the assessment focuses on conservation significant species presence and priority species in its scoring rather than the assessment of macro and microhabitat variables and items affecting such variables (i.e. deposition, scouring, etc.). Many defined guidelines for such assessments are drafted overseas but assess similar variables to AquaBAMM. In order to maintain consistency with AUSRIVAS habitat condition assessments, AUSRIVAS Physical Assessment Protocol scores was adapted by Hydrobiology for the assessment of lacustrine habitats. As with riverine sites, all sites were scored and classified as being in poor, fair, good or excellent condition however the scores required for each of these classifications differed to those defined for riverine sites.

WATER QUALITY

DATA COLLECTION AND PROCESSING

Physiochemical parameters were not measured in-situ at the time of the survey as this method was not required by the SAQP (Epic Environmental, 2022) for biota sampling.

The latest in-situ water quality data was provided by the client for the water monitoring points closest to each survey site. Data was as recent as February 2023 but dates back to July 2022. Note that it was provided for background/general consideration.

GUIDELINE COMPARISON

Water quality data provided by the client was compared against the WQO's defined for the Callide Creek catchment (DEHP, 2011) and against ANZG/ANZEEC guideline values where relevant (ANZG, 2018).

MACROINVERTEBRATES

SAMPLE COLLECTION AND PROCESSING

Macroinvertebrate sampling was undertaken in accordance with AUSRIVAS protocols for Queensland streams (DNRM, 2001) and more recent macroinvertebrate sampling manuals (DES, 2018). In order to target macroinvertebrates occurring in different freshwater habitats and to assess varying impact processes, both kick (pool/bed habitat) and sweep (edge habitat) samples were collected from each site. Collected samples were live-picked and returned to the laboratory for identification to family and sub-family (chironomids only) level, where possible. Importantly, macroinvertebrate sampling, processing, identification and enumeration was undertaken by AUSRIVAS accredited scientists.

DATA ANALYSIS

GUIDELINE COMPARISONS

Collected macroinvertebrate data were used to calculate several diversity indices including:

- Taxonomic richness (the number of individual taxa recorded at each site);
- Total abundance (the number of macroinvertebrates at each site);
- Tolerant taxa (the percentage of tolerant taxa in represented within each sites overall assemblage);
- Plecoptera, Ephemeroptera and Trichoptera (PET) richness (the number of pollution-sensitive taxa at each site); and
- SIGNAL (the condition score calculated for each site based on present macroinvertebrates and their associated sensitivity grades).

Calculated diversity index values were compared to relevant biological quality objectives (BQO) for edge and composite (includes run, riffle, pools) habitats defined for the Callide Creek Catchment, which for all catchments in the Fitzroy basin are based on the 20:80 percentile values defined for the central coast region (EHP, 2009).

AUSRIVAS PREDICTIVE MODELLING

The macroinvertebrate and predictor variable (habitat) data were analysed using the AUSRIVAS macroinvertebrate predictive modelling program, version 3.2.2 (Coyush et al., 2000). Based on the period of sampling and the habitat in which macroinvertebrates were collected, the autumn (post-wet) edge and pool predictive models were used to provide an indication of water quality and/or habitat condition.

AUSRIVAS predictive model produces various outputs, of which the most valuable for interpretation is the observed to expected ratio (OE50) score. It provides a measure of biological impairment at each site (Coyush et al., 2000). The OE50 scores are assigned to band sections provided by the model, ranging from Band X (better than AUSRIVAS database reference condition) to Band D (extremely impaired).

FUNCTIONAL FEEDING GUILDS

Macroinvertebrates are often grouped into functional feeding guilds (FFGs) for ease of conceptualisation. FFGs classification of aquatic organisms enhances the knowledge of trophic dynamics in streams by simplifying the benthic community into FFGs. The pattern of FFG distribution has been related to the environmental gradient in the river (River Continuum Concept – Vannote et al., 1980) and can therefore provide an indication of the health of a river system (i.e. should there be changes to the expected distribution of guilds).

Functional feeding guilds were assigned to each taxa recorded in edge and bed habitat, graphed and compared visually among sites and habitats.

FISH, REPTILES AND MACROCRUSTACEANS

DATA COLLECTION AND PROCESSING

During the sampling event, a range of passive (fyke nets, pyramid and box traps) and active (electrofishing) survey methods were utilised. The aforementioned techniques are suitable and commonly used apparatus for the survey of fish (small and large bodies species) and aquatic reptiles. The below methods are also efficient methods for the capture of macrocrustaceans, and while not specifically used for this reason, were commonly caught as by-catch.

All individuals of native species not required for tissue analysis were released after identification and measurement near to where they were captured. All exotic and voucher specimens were euthanised via a lethal dose of Aqui-S® solution in accordance with Hydrobiology's Animal Ethics approval. Exotics were disposed of in accordance with current State legislative requirements.

Fish and aquatic reptile surveys were undertaken in accordance with relevant permits, including:

- Department of Agriculture and Fisheries (DAF) Animal Ethics Approval - #CA 2021/02/1462;
- General Fisheries Permit - #206951;
- Research permit issued under the provisions of the *Nature Conservation Act 1992*- # P-PTUKI-100325946; and
- Research permit issued under the provisions of the *Forestry Act 1959*- # P-PTC-100325951.

FYKE NETS

At each site with sufficient water, a large dual wing fyke and a smaller single wing fyke were deployed with entrances facing downstream where possible. The large fyke had two 5.1 m wings, a mouth 1m wide and a tunnel 3.2m long. The smaller fyke had a single 4.8 m wing, a mouth 0.6 m wide and a tunnel 3.2 m long. The mesh sizes of the large and small fyke nets were 5 and 3 mm, respectively. A float was placed in the cod end of each fyke net to provide an air space for air breathing fauna (turtles, freshwater snakes etc). Fyke nets were set either in the morning or afternoon following site habitat assessment, electrofishing and macroinvertebrate sampling and processing. Fyke nets were cleared after night deployment.

BOX TRAPS

At each site a total of five box traps were deployed around available microhabitat (i.e. around woody debris, amongst rushes, large rocks/rubble). Each trap was baited with cat biscuits. Box traps were set either in the morning or afternoon following site habitat assessment, electrofishing and macroinvertebrate sampling and processing. Box traps were cleared after night deployment.

PYRAMID TRAPS

Three pyramid traps were deployed at each site amongst suitable microhabitat (i.e. around woody debris, amongst rushes, large rocks/rubble). Traps were baited with cat food, cow organs and fruits). Pyramid traps were set either in the morning or afternoon following site habitat assessment, electrofishing and macroinvertebrate sampling and processing. Pyramid traps were cleared after night deployment.

ELECTROFISHING

Creek Sites

Backpack electrofishing was employed at creek sites in wadable areas using a Smith-root APEX backpack electrofisher fitted with a 28 cm anode ring and a tightly covered dip net (10 mm stretched mesh). Both frequency (300 Hz) and duty cycle (~50%) was fixed to maintain a constant pulse width, with voltage varying according to conductivity levels. Sampling effort aimed to be consistent across habitats, with approximately 600 seconds 'on time' at sites. Due to the conductivity of site AB11 backpack electrofishing could not be performed.

Lake Sites

Boat electrofishing was conducted at Lake Callide sites (AB2 and AB3) and at Lake Kroombit (AB9). Boat electrofishing was undertaken via the use of a 5 m boat fitted with a 5 KVA generator and Smith–Root control box. Each standard boat electrofishing shot was completed of power–on time of approximately 600 seconds (± 5%). Applied voltage varied according to the prevailing conductivity and temperature conditions. Stunned fish were blind sweep-netted from the water with a 3 mm open–mesh dip net fitted to a fibreglass pole.

VERTEBRATE PROCESSING

The following vertebrate processing methods were employed at all sites:

- Fish, macrocrustaceans, and turtles were identified to species level and enumerated;
- Carapace length was taken for each macrocrustacean collected until 20 individuals of the species were recorded for the particular site and capture method. Following this, the individuals would be counted; and
- Each fish specimen was measured for total length until 20 individuals of the species were recorded for the particular site and capture method. Following this, the individuals were counted.

DATA ANALYSIS

Total species richness and abundances was summarised for each class across all sites.

Diversity and composition of sites along the main trunk of Callide Creek were compared against fish WQO values defined by DEHP (2011) OE50 values were calculated by dividing the number of native fish species at each site by 14 to determine a ratio value. The value of 14 was defined within the WQO as the expected number of native species along Callide Creek's main trunk, and the WQO defined the OE50 ratio values as ≥1. The WQO also specified values for exotic fish species, where the number of alien fish present could not exceed 2 exotic species, with *Carassius austratus* and *Gambusia holbrooki* both previously identified with Callide Creek main trunk.

BIOTA TISSUE ANALYSIS

This study aimed to quantify levels of PFAS, metals/metalloids and fluoride in aquatic organisms relevant to the assessment of risks to human and ecological receptors. Therefore, different species/tissues were be targeted as defined by the SAQP (Epic Environmental, 2022). A range of species were considered for sampling, though the capture of target species was limited by what is caught on each sampling day. Sampling the same species at each site which provided for a more robust dataset and allowed for comparison among treatments/sites.

The following considerations were made:

- If possible, the same species were collected across sites for comparison; and
- If the primary or secondary target species were not present at sites additional species representing the same functional feeding group (i.e. predator, planktivore, omnivores, etc.) were selected.

SAMPLE SIZE AND PROCESSING

The edible portions (fillet/muscle tissue for fish or abdomen flesh for macrocrustaceans) of five or more individuals were combined and processed (composited) for each human health target species at each site where possible. The rest of the body of selected individuals from three species were processed separately to investigate any variability of contaminant concentration within different body parts. This included samples from:

- Yellowbelly (*M. ambigua*);
- Barramundi (*L. calcarifer*); and
- Crayfish (*C. quadricarinatus*).

The whole bodies of 5 or more individual ecological health target species were combined and processed (composited) at each site where possible.

All dissection, compositing and homogenisation of biota samples were conducted at the primary laboratory to reduce potential contamination in the field.

LABORATORY METHODOLOGIES

Australian Laboratory Services (ALS) was selected as the primary laboratory to perform sample analysis and Eurofins Environmental Testing Australia Pty Ltd (Eurofins) were selected to conduct triplicate analysis. National Measurement Institute (NMI) were selected to conduct additional analysis for lithium, thorium and total fluoride on each sample and for these analyses represent the primary laboratory.

The analytical procedures used by the laboratories selected are in accordance with established internationally recognised procedures such as those published by the United States Environmental Protection Agency (USEPA), American Public Health Association (APHA) and relevant Australian Standards/New Zealand Standards (AS/NZS).

The following PFAS constituents were analysed:

- Perfluorobutane sulfonic acid <0.02(PFBS)
- Perfluoropentane sulfonic acid (PFPeS)
- Perfluorohexane sulfonic acid (PFHxS)
- Perfluoroheptane sulfonic acid (PFHpS)
- Perfluorooctane sulfonic acid (PFOS, both linear and branched)
- Perfluorodecane sulfonic acid (PFDS)
- Perfluorobutanoic acid (PFBA)
- Perfluoropentanoic acid (PFPeA)
- Perfluorohexanoic acid (PFHxA)
- Perfluoroheptanoic acid (PFHpA)
- Perfluorooctanoic acid (PFOA)
- Perfluorononanoic acid (PFNA)
- Perfluorodecanoic acid (PFDA)
- Perfluoroundecanoic acid (PFUnDA)
- Perfluorododecanoic acid (PFDoDA)
- Perfluorotridecanoic acid (PFTrDA)
- Perfluorotetradecanoic acid (PFTeDA)
- Perfluorooctane sulfonamide (FOSA)

- N-Methyl perfluorooctane sulfonamide (MeFOSA)
- N-Ethyl perfluorooctane sulfonamide (EtFOSA)
- N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)
- N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)
- N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)
- N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)
- 4:2 Fluorotelomer sulfonic acid (4:2 FTS)
- 6:2 Fluorotelomer sulfonic acid (6:2 FTS)
- 8:2 Fluorotelomer sulfonic acid (8:2 FTS)
- 10:2 Fluorotelomer sulfonic acid (10:2 FTS)

The primary laboratory (ALS) analysed for the following total metals/metalloids:

- Arsenic
- Barium
- Chromium
- Copper
- Molybdenum
- Selenium
- Strontium
- Uranium
- Vanadium
- Zinc
- Boron

Additional metals analysis was requested that could not be completed by the primary laboratory, these being total lithium and total thorium. A sub-sample was therefore provided to the secondary laboratory (NMI) for this analysis where sample volume was sufficient. Sub-samples were prepared and distributed by ALS.

Sub-samples of each sample were provided to the secondary laboratory (NMI) for analysis of total fluoride where sample volume was sufficient. Sub-samples were prepared and distributed by ALS.

QA/QC

Primary samples consisted of tissue removed from multiple individuals (5-10) that were combined and homogenised. A sub-sample was taken from selected (homogenised) samples to provide duplicate and triplicate QA/QC samples. Duplicate and triplicate samples were collected at a rate of one duplicate and one triplicate every ten primary samples. Duplicate samples were analysed by the primary laboratory (ALS) and triplicate samples were analysed by Eurofins. The primary samples and their respective duplicate/triplicate samples are displayed in Table 5-1.

Table 5-1 Primary samples and their respective duplicate/triplicate samples.

Primary sample	Duplicate	Triplicate
AB2-LC-EP	AB2-BC-DU	-
AB3-CS-WB	AB3-CS-DU	-

Primary sample	Duplicate	Triplicate
AB9-NH-EP	AB9-NH-DU	-
AB1-MA-EP	AB1-MA-DU	AB1-MA-TR
AB1-NH-EP	-	AB1-NH-TR

Rinsate water samples were collected each day by rinsing down sampling equipment to check for potential contamination. Each rinsate sample contained water collected from rinsing the measuring board used to measure and weigh each fish/crustacean. Additionally, a sample of dilute Aqui-S was collected and analysed to check if the anaesthetic was a potential source of contaminants. Laboratory QA/QA measures included method blanks, control samples and method spikes. The results of the QA/QC analysis are detailed in (Appendix B).

SCREENING CRITERIA

Human Health

The PFAS National Environmental Management Plan (NEMP, 2020) provides Australian guidance on food consumption screening criteria for PFAS levels relevant to human health. It should be noted that that the food consumption guideline values were based on FSANZ trigger values that consider 100% of total dietary intake (TDI) (NEMP, 2020 Table 5-2). As such, when considering the consumption of seafood only, they may not be protective for people exposed to PFAS from other unaccounted potential pathways. Additional TDI values were then calculated for an average weigh male (70kg) as defined in national guidelines for assessing human health risks from environmental hazards (enHEALTH, 2012). These values were then compared to the levels of PFAS in biota collected in the current study and are displayed in the associated graphs.

Table 5-2 Summary of human health screening criteria, extracted from NEMP (2020)

Exposure scenario	Unit	PFOS + PFHxS	PFOA	Note
Tolerable daily intake (TDI)	µg/kg$_{BW}$/day*	0.02	0.16	These criteria are based on 100 % of total dietary intake (TDI) and may not be protective for people exposed to PFAS from other potential pathways.
Calculated TDI for average 70kg adult (µg/day)	µg/day	1.4	11.2	

* BW stands for body weight

Ecological

All ecological screening values for the protection against bioaccumulation and secondary poisoning available from NEMP (2020) are summarised in Table 5-3.

Table 5-3 Summary of ecological screening criteria, extracted from NEMP (2020).

Exposure scenario	PFOS	PFOA	Note
Mammalian diet (biota ww food)	4.6 µg/kg	Not available	Based on Canadian guidelines for screening of biota (e.g. fish tissue) samples consumed by mammals and/or birds. The value refers to the concentration of PFOS in the aquatic biota food item. It should be noted that data is not based on relevant species; e.g. wetland birds in Australia may have higher risk based on size and consumption rates.
Avian diet (biota ww food)	8.2 µg/kg	Not available	

GENERALLY EXPECTED LEVELS

Results were compared to historical data and against Generally Expected Levels (GELs) for metals/metalloids in fish and crustaceans according to ANZFA (2001) guidelines. GELs provide a benchmark against which to measure contaminant levels in food. The GELs used in the current study are displayed in Table 5-4.

Table 5-4 GELs used in the current study. Units in mg/kg.

Metal	Crustacean GEL	Fish GEL
Copper	20	2
Selenium	1	2
Zinc	40	15

APPENDIX B. QA/QC

OVERVIEW

Sampling and analysis was conducted by appropriately qualified samplers (including fisheries biologists, aquatic ecologists and contamination scientist with over 70 years of collective experience) following methods consistent with national and state guidelines. Sampling of biota for PFAS followed guidelines specific for the collection of seafood (i.e., fish and crustacean) samples for human health risk assessment (Queensland Health, n.d). This includes measures such as:

- Appropriate species selection;
- Differentiating edible portions specific for human consumption;
- Obtaining sufficient sample sizes;
- Minimising contamination in the field by avoiding materials containing PFAS (e.g. clothing, containers, etc.);
- Conducting sample preparation in a laboratory;
- Chilling/freezing samples promptly after collection; and
- Following a defined SAQP.

DUPLICATES

Duplicate samples (collected at a rate of one every ten samples) were collected to assess the precision and repeatability of the primary laboratory. Relative percent differences (RPD) were used to qualify quality control efforts. The duplicates were analysed by the primary laboratory provider (ALS).

The results of the duplicate analysis indicate that all RPDs apart from strontium were below the measurement quality objective (MQO) of ≤50% (Table 5-5). This indicates that there may be decreased precision of the strontium data analysis provided in this report.

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Table 5-5 Duplicate tissue analysis QA/QC results. Shaded cells represent RPD >50%.

Analyte	Units	LOR	AB2 Barramundi	Duplicate	RPD(%)	AB3 Hardyhead	Duplicate	RPD(%)	AB9 Hyrtlii	Duplicate	RPD(%)	AB1 Yellowbelly	Duplicate	RPD(%)
Arsenic	mg/kg	0.05	0.08	0.07	13	0.22	0.24	9	<0.05	<0.05	-	0.06	0.05	18
Barium	mg/kg	0.1	0.1	<0.1	-	2.4	2.8	15	<0.1	0.2	-	<0.1	<0.1	-
Boron	mg/kg	5	<5	<5	-	<5	<5	-	<5	<5	-	<5	<5	-
Chromium	mg/kg	0.05	<0.05	<0.05	-	1.4	1.44	3	0.6	0.55	9	<0.05	<0.05	-
Copper	mg/kg	0.1	0.4	0.3	29	0.6	0.6	0	0.4	0.4	0	0.3	0.3	0
Molybdenum	mg/kg	0.05	<0.05	<0.05	-	0.18	0.2	11	0.07	0.07	0	<0.05	<0.05	-
Selenium	mg/kg	0.05	0.16	0.18	12	0.2	0.21	5	0.14	0.13	7	0.44	0.4	10
Strontium	mg/kg	0.1	1.1	0.8	32	52.1	61.3	16	1	5.9	142	0.5	0.4	22
Uranium	mg/kg	0.01	<0.01	<0.01	-	<0.01	<0.01	-	<0.01	<0.01	-	<0.01	<0.01	-
Vanadium	mg/kg	0.5	<0.5	<0.5	-	<0.5	<0.5	-	<0.5	<0.5	-	<0.5	<0.5	-
Zinc	mg/kg	0.5	5.6	4.9	13	53.8	54.3	-1	11.5	15.6	30	10.1	9.3	8
Perfluorobutane sulfonic acid (PFBS)	µg/kg	1	<1	<1	-	<1	<1	-	<1	<1	-	<1	<1	-
Perfluoropentane sulfonic acid (PFPeS)	µg/kg	1	<1	<1	-	<1	<1	-	<1	<1	-	<1	<1	-
Perfluorohexane sulfonic acid (PFHxS)	µg/kg	1	<1	<1	-	<1	<1	-	<1	<1	-	<1	<1	-
Perfluoroheptane sulfonic acid (PFHpS)	µg/kg	1	<1	<1	-	<1	<1	-	<1	<1	-	<1	<1	-
Perfluorooctane sulfonic acid (PFOS) - Linear	µg/kg	1	<1	<1	-	<1	<1	-	<1	<1	-	<1	<1	-
Perfluorooctane sulfonic acid (PFOS) - Branched	µg/kg	1	<1	<1	-	<1	<1	-	<1	<1	-	<1	<1	-
Perfluorooctane sulfonic acid (PFOS)	µg/kg	1	<1	<1	-	<1	<1	-	<1	<1	-	<1	<1	-
Perfluorodecane sulfonic acid (PFDS)	µg/kg	2	<2	<2	-	<2	<2	-	<2	<2	-	<2	<2	-
Perfluorobutanoic acid (PFBA)	µg/kg	5	<5	<5	-	<5	<5	-	<5	<5	-	<5	<5	-
Perfluoropentanoic acid (PFPeA)	µg/kg	2	<2	<2	-	<2	<2	-	<2	<2	-	<2	<2	-
Perfluorohexanoic acid (PFHxA)	µg/kg	1	<1	<1	-	<1	<1	-	<1	<1	-	<1	<1	-
Perfluoroheptanoic acid (PFHpA)	µg/kg	1	<1	<1	-	<1	<1	-	<1	<1	-	<1	<1	-
Perfluorooctanoic acid (PFOA)	µg/kg	1	<1	<1	-	<1	<1	-	<1	<1	-	<1	<1	-
Perfluorononanoic acid (PFNA)	µg/kg	1	<1	<1	-	<1	<1	-	<1	<1	-	<1	<1	-
Perfluorodecanoic acid (PFDA)	µg/kg	1	<1	<1	-	<1	<1	-	<1	<1	-	<1	<1	-

Analyte	Units	LOR	AB2 Barramundi	Duplicate	RPD(%)	AB3 Hardyhead	Duplicate	RPD(%)	AB9 Hyrtlii	Duplicate	RPD(%)	AB1 Yellowbelly	Duplicate	RPD(%)
Perfluoroundecanoic acid (PFUnDA)	µg/kg	1	<1	<1	-	<1	<1	-	<1	<1	-	<1	<1	-
Perfluorododecanoic acid (PFDoDA)	µg/kg	2	<2	<2	-	<2	<2	-	<2	<2	-	<2	<2	-
Perfluorotridecanoic acid (PFTrDA)	µg/kg	2	<2	<2	-	<2	<2	-	<2	<2	-	<2	<2	-
Perfluorotetradecanoic acid (PFTeDA)	µg/kg	2	<2	<2	-	<2	<2	-	<2	<2	-	<2	<2	-
Perfluorooctane sulfonamide (FOSA)	µg/kg	5	<5	<5	-	<5	<5	-	<5	<5	-	<5	<5	-
N-Methyl perfluorooctane sulfonamide (MeFOSA)	µg/kg	5	<5	<5	-	<5	<5	-	<5	<5	-	<5	<5	-
N-Ethyl perfluorooctane sulfonamide (EtFOSA)	µg/kg	2	<2	<2	-	<2	<2	-	<2	<2	-	<2	<2	-
N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	µg/kg	2	<2	<2	-	<2	<2	-	<2	<2	-	<2	<2	-
N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	µg/kg	2	<2	<2	-	<2	<2	-	<2	<2	-	<2	<2	-
N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	µg/kg	1	<1	<1	-	<1	<1	-	<1	<1	-	<1	<1	-
N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	µg/kg	1	<1	<1	-	<1	<1	-	<1	<1	-	<1	<1	-
4:2 Fluorotelomer sulfonic acid (4:2 FTS)	µg/kg	2	<2	<2	-	<2	<2	-	<2	<2	-	<2	<2	-
6:2 Fluorotelomer sulfonic acid (6:2 FTS)	µg/kg	2	<2	<2	-	<2	<2	-	<2	<2	-	<2	<2	-
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	µg/kg	2	<2	<2	-	<2	<2	-	<2	<2	-	<2	<2	-
10:2 Fluorotelomer sulfonic acid (10:2 FTS)	µg/kg	2	<2	<2	-	<2	<2	-	<2	<2	-	<2	<2	-
Sum of PFAS	µg/kg	1	<1	<1	-	<1	<1	-	<1	<1	-	<1	<1	-
Sum of PFHxS and PFOS	µg/kg	1	<1	<1	-	<1	<1	-	<1	<1	-	<1	<1	-

TRIPLICATES

Triplicate samples (collected at a rate of one every ten primary samples) were collected to assess any lab biases. Relative percent differences (RPD) were used to qualify quality control efforts. The triplicates were analysed by Eurofins.

The results of the triplicates analysis indicate that all RPDs were below the measurement quality objective (MQO) of ≤50% (Table 5-6).

Table 5-6 Triplicate tissue analysis QA/QC results.

Analyte	AB1 Yellowbelly	Triplicate	RPD (%)	AB1 Hyrtlii	Triplicate	RPD (%)
Arsenic	0.06	< 2	-	0.07	< 2	-
Barium	<0.1	< 10	-	<0.1	< 10	-
Boron	<5	< 10	-	<5	< 25	-
Chromium	<0.05	< 5	-	<0.05	< 5	-
Copper	0.3	< 5	-	0.3	< 5	-
Molybdenum	<0.05	< 5	-	<0.05	< 5	-
Selenium	0.44	< 2	-	0.22	< 2	-
Strontium	0.5	< 10	-	0.8	< 10	-
Uranium	<0.01	< 10	-	<0.01	< 10	-
Vanadium	<0.5	< 10	-	<0.5	< 10	-
Zinc	10.1	7.8	26	12.4	10	21
1H.1H.2H.2H-perfluorodecanesulfonic acid (8:2 FTSA)	<2	< 5	-	<2	< 5	-
1H.1H.2H.2H-perfluorododecanesulfonic acid (10:2 FTSA)	<2	< 5	-	<2	< 5	-
1H.1H.2H.2H-perfluorohexanesulfonic acid (4:2 FTSA)	<2	< 5	-	<2	< 5	-
1H.1H.2H.2H-perfluorooctanesulfonic acid(6:2 FTSA)	<2	< 10	-	<2	< 10	-
Perfluorobutanoic acid (PFBA)	<5	< 5	-	<5	< 5	-
Perfluorodecanoic acid (PFDA)	<1	< 5	-	<1	< 5	-
Perfluorododecanoic acid (PFDoDA)	<2	< 5	-	<2	< 5	-
Perfluoroheptanoic acid (PFHpA)	<1	< 5	-	<1	< 5	-
Perfluorohexanoic acid (PFHxA)	<1	< 5	-	<1	< 5	-
Perfluorononanoic acid (PFNA)	<1	< 5	-	<1	< 5	-
Perfluorooctanoic acid (PFOA)	<1	< 5	-	<1	< 5	-
Perfluoropentanoic acid (PFPeA)	<2	< 5	-	<2	< 5	-
Perfluorotetradecanoic acid (PFTeDA)	<2	< 5	-	<2	< 5	-
Perfluorotridecanoic acid (PFTrDA)	<2	< 5	-	<2	< 5	-
Perfluoroundecanoic acid (PFUnDA)	<1	< 5	-	<1	< 5	-
2-(N-ethylperfluoro-1-octane sulfonamido)-ethanol(N-EtFOSE)	<2	< 5	-	<2	< 5	-

Analyte	AB1 Yellowbelly	Triplicate	RPD (%)	AB1 Hyrtlii	Triplicate	RPD (%)
2-(N-methylperfluoro-1-octane sulfonamido)-ethanol(N-MeFOSE)	<2	< 5	-	<2	< 5	-
N-ethylperfluoro-1-octane sulfonamide (N-EtFOSA)	<2	< 5	-	<2	< 5	-
N-ethyl-perfluorooctanesulfonamidoacetic acid (N-EtFOSAA)	<1	< 10	-	<1	< 10	-
N-methylperfluoro-1-octane sulfonamide (N-MeFOSA)	<5	< 5	-	<5	< 5	-
N-methyl-perfluorooctanesulfonamidoacetic acid (N-MeFOSAA)	<1	< 10	-	<1	< 10	-
Perfluorooctane sulfonamide (FOSA)	<5	< 5	-	<5	< 5	-
Perfluorobutanesulfonic acid (PFBS)	<1	< 5	-	<1	< 5	-
Perfluorodecanesulfonic acid (PFDS)	<2	< 5	-	<2	< 5	-
Perfluoroheptanesulfonic acid (PFHpS)	<1	< 5	-	<1	< 5	-
Perfluorohexanesulfonic acid (PFHxS)	<1	< 5	-	<1	< 5	-
Perfluorooctanesulfonic acid (PFOS)	<1	< 5	-	<1	< 5	-
Perfluoropentanesulfonic acid (PFPeS)	<1	< 5	-	<1	< 5	-
Sum (PFHxS + PFOS)*	<1	< 5	-	<1	< 5	-
Sum of enHealth PFAS (PFHxS + PFOS + PFOA)*	<1	< 5	-	<1	< 5	-

METHOD BLANK

The quality control term Method / Laboratory Blank refers to an analyte free matrix to which all reagents are added in the same volumes or proportions as used in standard sample preparation. The purpose of this QC parameter is to monitor potential laboratory contamination.

All analytes in the method blank samples were below detection indicating that there was no laboratory contamination.

LABORATORY CONTROL SAMPLE

The Laboratory Control Sample refers to a certified reference material, or a known interference free matrix spiked with target analytes. The purpose of this QC parameter is to monitor method precision and accuracy independent of sample matrix.

All laboratory control samples were within acceptable limits (70-130% recovery).

MATRIX SPIKES

A matrix spike refers to an intralaboratory split sample spiked with a representative set of target analytes. The purpose of this QC parameter is to monitor potential matrix effects on analyte recoveries.

All matrix spike recoveries were within the acceptable limits (70-130%).

RINSATES

All analytes were below detectable levels within rinsate samples and within the dilute Aqui-s sample, indicating no contamination from sampling equipment or chemicals used in fish anesthetisation (Table 5-7).

Table 5-7 Rinsate and dilute Aqui-s QA/QC analysis results.

Analyte	Units	LOR	Rinsate 1 (30/01/2023)	Rinsate 2 (31/01/2023)	Rinsate 3 (1/02/2023)	Rinsate 4 (2/02/2023)	Rinsate 5 (3/02/2023)	Dilute Aqui-s
Arsenic	mg/L	0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Barium	mg/L	0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Chromium	mg/L	0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Copper	mg/L	0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Molybdenum	mg/L	0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Selenium	mg/L	0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Strontium	mg/L	0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Uranium	mg/L	0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Vanadium	mg/L	0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Zinc	mg/L	0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
Boron	mg/L	0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Perfluorobutane sulfonic acid (PFBS)	µg/L	0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02
Perfluoropentane sulfonic acid (PFPeS)	µg/L	0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02
Perfluorohexane sulfonic acid (PFHxS)	µg/L	0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Perfluoroheptane sulfonic acid (PFHpS)	µg/L	0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02
Perfluorooctane sulfonic acid (PFOS)	µg/L	0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Perfluorodecane sulfonic acid (PFDS)	µg/L	0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02
Perfluorobutanoic acid (PFBA)	µg/L	0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Perfluoropentanoic acid (PFPeA)	µg/L	0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02
Perfluorohexanoic acid (PFHxA)	µg/L	0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02
Perfluoroheptanoic acid (PFHpA)	µg/L	0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02
Perfluorooctanoic acid (PFOA)	µg/L	0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Perfluorononanoic acid (PFNA)	µg/L	0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02
Perfluorodecanoic acid (PFDA)	µg/L	0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02
Perfluoroundecanoic acid (PFUnDA)	µg/L	0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02
Perfluorododecanoic acid (PFDoDA)	µg/L	0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02
Perfluorotridecanoic acid (PFTrDA)	µg/L	0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02

Analyte	Units	LOR	Rinsate 1 (30/01/2023)	Rinsate 2 (31/01/2023)	Rinsate 3 (1/02/2023)	Rinsate 4 (2/02/2023)	Rinsate 5 (3/02/2023)	Dilute Aqui-s
Perfluorotetradecanoic acid (PFTeDA)	µg/L	0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Perfluorooctane sulfonamide (FOSA)	µg/L	0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02
N-Methyl perfluorooctane sulfonamide (MeFOSA)	µg/L	0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
N-Ethyl perfluorooctane sulfonamide (EtFOSA)	µg/L	0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	µg/L	0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	µg/L	0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	µg/L	0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02
N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	µg/L	0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02
4:2 Fluorotelomer sulfonic acid (4:2 FTS)	µg/L	0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
6:2 Fluorotelomer sulfonic acid (6:2 FTS)	µg/L	0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	µg/L	0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
10:2 Fluorotelomer sulfonic acid (10:2 FTS)	µg/L	0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Sum of PFAS	µg/L	0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Sum of PFHxS and PFOS	µg/L	0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Sum of PFAS (WA DER List)	µg/L	0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01

APPENDIX C. FIELD DATASHEETS

Site number	~~SOS-AB3~~	Site name	
Watercourse		Collector	1000V 120Hz 10% 7A
Date	30/1/23	Project code	

Kept for tissue

Barred Humm
Redclaw
Golden perch

Tandanus Eco
Rainbow
Mussel
Pygmy perch
Macrobrachium

Hydrobiology

#	Species	Stats	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	count
1	Barramundi	Total length (mm)	925	~~900~~	832																		
		Fork length (mm)																					
		weight (g)	10.25	885	6.95																		
2	Longfin	Total length (mm)				442	427	255	546	538													
		Fork length (mm)																					
		weight (g)				186	180	24	~~90~~	440													
3	Bony bream	Total length (mm)	83	72	101	106	76	68	73	86	82	64	97	175	110	300	180	163	86	82	74		+500
		Fork length (mm)																					
		weight (g)	4	2	8	8	4	2	6	4	6	2	10	58	14	34	73	36	10	10	10		
4	Barred grunter	Total length (mm)	82	106	52	62	97	82	108	91													
		Fork length (mm)																					
		weight (g)	6	18	6	6	10	12	22	10													
5	Kreffts	Total length (mm)	1 juvenile																				
		Fork length (mm)	1 adults (see photo?)																				
		weight (g)																					
6	Sleepy cod	Total length (mm)	320	200	125	112	410																
		Fork length (mm)																					
		weight (g)	488	92	~~40~~ 140	18	1.3																
7	Mouth almighty	Total length (mm)	61	130	105																		
		Fork length (mm)																					
		weight (g)	4	40	20																		
8	Ely-spotted headwaterhead	Total length (mm)	16	26	32	24	68																
		Fork length (mm)																					
		weight (g)	1	1	1	1	4																
9		Total length (mm)																					
		Fork length (mm)																					
		weight (g)																					
10	Redclaw	Total length (mm)	48	27																			
		Fork length (mm)	kept for tissue																				
		weight (g)	16	12																			

Site number	AB3	Site name	
Watercourse		Collector	
Date	31/11/23	Project code	

Traps

Kept. for tissue

Hydrobiology

#	Species	Stats	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	count
1	Koaro tadpole	Total length (mm)	1	juvenile																			
		Fork length (mm)																					
		weight (g)																					
2	Redclaw	Total length (mm)	57	43	47	32	30	31	31	27													
		Fork length (mm)																					
		weight (g)	120	60	70	20	20	20	20	14													
3	Mouth almighty	Total length (mm)	53	41																			
		Fork length (mm)																					
		weight (g)	4	2																			
4	Banded gourami	Total length (mm)	86																				
		Fork length (mm)																					
		weight (g)	20																				
5		Total length (mm)																					
		Fork length (mm)																					
		weight (g)																					
6		Total length (mm)																					
		Fork length (mm)																					
		weight (g)																					
7		Total length (mm)																					
		Fork length (mm)																					
		weight (g)																					
8		Total length (mm)																					
		Fork length (mm)																					
		weight (g)																					
9		Total length (mm)																					
		Fork length (mm)																					
		weight (g)																					
10		Total length (mm)																					
		Fork length (mm)																					
		weight (g)																					

Hydrobiology

Site number	~~AB2~~	Site name	
Watercourse		Collector	500V 13A 20% 120HZ
Date ~~20/6/23~~	30/1/23	Project code	

kept for tissue

#	Species	Stats	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	count
1	~~Barramundi~~ Lates Calcalifer	Total length (mm)	~~880~~	970																			
		Fork length (mm)																					
		weight (g)	9.500	13000																			
2	Long Tom Strongylura kreffti	Total length (mm)	~~760~~	750	675																		
		Fork length (mm)																					
		weight (g)	1168	702	724																		
3	bony bream Nematalosa erebi	Total length (mm)	290	120	115	85	150	110	80	80	90	65	72	110	285	80	95	78	370	145	150	150	+20
		Fork length (mm)																					
		weight (g)	314	~~350~~	22	16	30	18	12	12	18	10	10	25	306	30	22	15	660	40	62	54	
4	Fly Specked Hardyhead Craterocephalus stercusmuscarum	Total length (mm)	75	70																			
		Fork length (mm)																					
		weight (g)	4	8																			
5	Mouth Almighty Glossamia aprion	Total length (mm)	100	110	60																		
		Fork length (mm)																					
		weight (g)	20	20	2																		
6	Banded Grunter Amniataba percoides	Total length (mm)	66	122	130	130	90	92	56	63	100												
		Fork length (mm)			~~125~~																		
		weight (g)	5	30	35	20	10	14	3	4	34												
7	Eel tail Catfish Tandanus tandanus	Total length (mm)	(172	80	225)	– kept for tissue																	
		Fork length (mm)																					
		weight (g)	66	5	110																		
8	Hypseleotris ~~sp~~ spp	Total length (mm)	20																				
		Fork length (mm)																					
		weight (g)	1																				
9	Red claw	Total length (mm)																					
		Fork length (mm)	(28	– kept for tissue																			
		weight (g)	28																				
10		Total length (mm)																					
		Fork length (mm)																					
		weight (g)																					

Site number	AB2	Site name	
Watercourse		Collector	
Date	31/2/23	Project code	

* kept for tissue labelled Glassgrub
** kept for tissue labelled Redclaw ACS
**** kept for tissue

Hydrobiology

#	Species	Stats	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	count
1	Traps / Barred grunter	Total length (mm)	90	82																			
		Fork length (mm)																					
		weight (g)	12	10																			
2	1-wing gsfc / Kreggts	Total length (mm)	IIII	IIII I	adults, juvenile																		
		Fork length (mm)	11																				
		weight (g)																					
3	Barred grunter	Total length (mm)	100	47	70	92	63	71	88	98	92	98	86	118	135	72	64	112	114	112	76	84	
		Fork length (mm)																					
		weight (g)	24	10	15	20	10	10	10	20	20	20	10	10	50	10	10	24	18	25	4	10	
4	Ambassis *	Total length (mm)	26	54	57	56	56																
		Fork length (mm)																					
		weight (g)	2	5	9	6	6																
5	Mouth almighty	Total length (mm)	64	65	52	56	52	43	64														
		Fork length (mm)																					
		weight (g)	4	3	3	3	3	3	5														
6	Hardyhead ****	Total length (mm)	56																				
		Fork length (mm)																					
		weight (g)	4																				
7	Hyrtlii	Total length (mm)	220																				
		Fork length (mm)																					
		weight (g)	88						kept														
8	Redclaw **	Total length (mm)	26	38	48	27	28	29	34	29	25												
		Fork length (mm)																					
		weight (g)	14	40	52	22	10	16	10	24	12												
9	mosquito fish	Total length (mm)	20	21																			
		Fork length (mm)																					
		weight (g)																					
10	Saratoga observed	Total length (mm)	~700																				
		Fork length (mm)																					
		weight (g)																					

Site number		Site name	
Watercourse	AB3	Collector	
Date	31/2/23	Project code	

Hydrobiology

Small 1-way sytle

#	Species	Stats	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	count
1	trigger tubble	Total length (mm)	IIII	1 adults																			
		Fork length (mm)	III	juveniles																			
		weight (g)																					
2	Banded grunter	Total length (mm)	112	115	104	105	95	53	93	107	22	90	46	45	75	48							
		Fork length (mm)																					
		weight (g)	20	24	18	18	14	2	10	20	10	14	2	2	10	2							
3	Bony bream	Total length (mm)	102																				
		Fork length (mm)																					
		weight (g)	10																				
4	Mouth almighty	Total length (mm)	40	56																			
		Fork length (mm)																					
		weight (g)	10	12																			
5	Fly-specked hardyhead	Total length (mm)	35	28	30	18	31	22	21	28	22	35	32	25	21	24	28	21	25	29	21	36	
		Fork length (mm)																					
		weight (g)	4	2	2	1	2	2	2	2	2	4	4	2	2	2	2	2	2	2	2	4	
6		Total length (mm)																					
		Fork length (mm)																					
		weight (g)																					
7	Redclaw	Total length (mm)	34	43	23	36	35	34	28	32	35	29	29										
		Fork length (mm)																					
		weight (g)	20	57	4	40	30	28	10	36	38	48	20										
8	sleepy cod	Total length (mm)	46																				
		Fork length (mm)																					
		weight (g)	1																				
9		Total length (mm)																					
		Fork length (mm)																					
		weight (g)																					
10		Total length (mm)																					
		Fork length (mm)																					
		weight (g)																					

Site number	AB3	Site name	
Watercourse		Collector	
Date	31/1/23	Project code	

* 50 taken for tissue (labelled as narrowhead)
** 50 taken for tissue (labelled as glassgrish)
Large 2-wing
*** Tissue ① to ALS ② to NMi

Hydrobiology

#	Species	Stats	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	count
1	Kreffts	Total length (mm)	IIII	II	adult																		
		Fork length (mm)	IIII	III	juvenile																		
		weight (g)	II																				
2	Long-nosed turtle	Total length (mm)	1		adult																		
		Fork length (mm)																					
		weight (g)																					
3	Bony Bream	Total length (mm)	370																				
		Fork length (mm)																					
		weight (g)	650																				
4	Fly-spotted hardyhead*	Total length (mm)	29	27	18	30	31	35	36	35	31	41	36	47	28	32	54	78	71	34	26	37	+42
		Fork length (mm)																					+52
		weight (g)	2	2	1	2	2	2	2	2	2	4	2	4	2	2	4	4	4	2	2	4	+200
5	Banded grunter	Total length (mm)	196	82	65	78	93	120	127	126	115	78	55	51	132	97	67	153	46				+400
		Fork length (mm)																					
		weight (g)	50	12	10	104	10	28	35	28	24	10	6	6	55	30	10	64	45				
6	Ambassis** agassizi	Total length (mm)	26	48	51	32	29	30	27	28	31	54	50	48	36	31	26	23	32	31	37	30	+12
		Fork length (mm)																					+50
		weight (g)	2	1	4	2	2	2	2	2	2	4	4	4	2	2	2	2	2	2	2	2	+100
7	Mouth almighty	Total length (mm)	27	45	60	51	67	64	57	42	73	64	47	40									
		Fork length (mm)																					
		weight (g)	2	4	10	10	10	10	5	5	10	10	5	4									
8	Macrobrachium***	Total length (mm)	5	5	5	5	5	5	5	5	5	5	10	10	10	10	10	10	10	10	10	10	
		Fork length (mm)																					
		weight (g)	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	
9	Gerres [illegible]	Total length (mm)	26	14																			
		Fork length (mm)																					
		weight (g)	12	2																			
10		Total length (mm)																					
		Fork length (mm)																					
		weight (g)																					

Site number		Site name	
Watercourse	AB2	Collector	
Date	31/5/23	Project code	

* kept for tissue (~20)

** kept for tissue

Hydrobiology

#	Species	Stats	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	count
1	[illegible] bream	Total length (mm)	36	46	83	104	34																
		Fork length (mm)																					
		weight (g)	2	5	10	10	2																
2	Hardyhead *	Total length (mm)	41	38	27	42	36	34	44	38	44	41	37	36	32	35	47	43	35	37	38	36	+160
		Fork length (mm)																					+300
		weight (g)	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	
3	Glassgoby	Total length (mm)	28	30	24	32	21	28	24	52	36	31	33	28	31	28	24	30	32	26	27	33	+ 200
		Fork length (mm)																					
		weight (g)	2	2	2	2	2	2	2	4	2	2	2	2	2	2	2	2	2	2	2	2	
4	Freyts toadfish	Total length (mm)	III	1	adult																		
		Fork length (mm)	1		Juvenile																		
		weight (g)																					
5	Mouth almighty	Total length (mm)	61	37	62	96	71	68	53	62	112	67	60	62	65	47	62	64					
		Fork length (mm)																					
		weight (g)	10	5	10	10	10	16	10	10	20	10	10	10	10	10	10	10					
6	Barred grunter	Total length (mm)	116	110	90	88	52	57	62	114	56												
		Fork length (mm)																					
		weight (g)	50	50	15	12	5	5	5	30	18												
7	Redclaw	Total length (mm)	34	45																			
		Fork length (mm)																					
		weight (g)	35	78																			
8	Macrobrachium * *	Total length (mm)	5	5																			
		Fork length (mm)																					
		weight (g)	1	1																			
9		Total length (mm)																					
		Fork length (mm)																					
		weight (g)																					
10		Total length (mm)																					
		Fork length (mm)																					
		weight (g)																					

Site number	AB4	Site name	
Watercourse		Collector	
Date	1/2/23	Project code	

1-mm fyke

kept for tissue (x5)

kept for [illegible]

Hydrobiology

#	Species	Stats	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	count
1	Hyrtlii	Total length (mm)	147	149	193	144	168	167															
		Fork length (mm)																					
		weight (g)	24	26	72	38	56	52															
2	Kreggts	Total length (mm)	25	adults																			
		Fork length (mm)																					
		weight (g)																					
3	Sawshell (chat photo	Total length (mm)	2	adults																			
		Fork length (mm)																					
		weight (g)																					
4	Large spike Hypseleotris	Total length (mm)	47	28	36	42	47	43															
		Fork length (mm)																					
		weight (g)	2	1	2	2	2	2															
5	Rainbow	Total length (mm)	83	66	67	43	37	46	62	90	42	51	55	32	36	68	77	72	80	74	51	34	+2 +4+5 +3 +6
		Fork length (mm)																					
		weight (g) kept	8	4	8	2	2	2	8	10	2	2	2	2	2	4	4	4	8	4	2	1	
6	Ambassis	Total length (mm)	77	64	50	70	40	72	66	57	53	52	61	68	72	74	77	64	67	67	68	67	+7+4 +8+1 +6
		Fork length (mm)																					
		weight (g)	6	8	6	6	3	6	6	6	6	6	6	6	6	6	6	4	4		4	4	
7	Kreffts turtle	Total length (mm)	24	adults																			
		Fork length (mm)																					
		weight (g)																					
8	Sawshell turtle	Total length (mm)																					
		Fork length (mm)	1	adult																			
		weight (g)																					
	Hyrtlii	Total length (mm)	150	119	207	168	162	119	147	142	178	288	206	160	172	146	151	192	180	175	192	128	+16 +4 +7 +1
		Fork length (mm)																					
		weight (g)	24	14	76	49	26	12	~~30~~	22	50	232	[illegible]	[illegible]	44	60	34	34	58	50	60	20	
10		Total length (mm)																					
		Fork length (mm)																					
		weight (g)																					

Site number		Site name	
Watercourse	AE9	Collector	
Date	1/2/22	Project code	

Hydrobiology

Large fish cont.

kept

#	Species	Stats	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	count
1	Spotted perch	Total length (mm)	135	154	174	118	84	96	105	100													
		Fork length (mm)																					
		weight (g)	30	60	92	152	20	17	20	24													
2	Macrobrachium	Total length (mm)	5	5	6	5	5	5	kept														
		Fork length (mm)																					
		weight (g)	1	1	1	1	1	1															
3	Eel 120w 600v 1kA 15% Spangled	Total length (mm)	88	90	138	68	107	112	164	76	25	127	116	102	93	92	72	102	94	111	108	138	+120
		Fork length (mm)																					
		weight (g)	4	6	34	8	12	22	110	6	165	22	20	10	6	8	5	10	14	34	22	46	
4	Macrobrachium	Total length (mm)	6	10	-	except																	
		Fork length (mm)																					
		weight (g)	2	5																			
5	Ranson	Total length (mm)	62	62	75	77	72	81	82	66	76	81											
		Fork length (mm)																					
		weight (g)	4	2	4	4	4	4	4	2	4	4											
6	Tandanus	Total length (mm)	209	184	192	137	-	kept															
		Fork length (mm)																					
		weight (g)	64	48	88	13																	
7	Ambassis	Total length (mm)	62																				
		Fork length (mm)																					
		weight (g)	2																				
8	Hyrtlii	Total length (mm)	229	267	150	120	246	141	130	154	210	170											
		Fork length (mm)																					
		weight (g)	110	190	20	9	100	20	12	20	70	52											
9		Total length (mm)																					
		Fork length (mm)																					
		weight (g)																					
10		Total length (mm)																					
		Fork length (mm)																					
		weight (g)																					

Site number		Site name	
Watercourse		Collector	
Date		Project code	

AB8 1/2/23

* 20 kept for tissue.

** 20 kept for tissue

Hydrobiology

small eyte

#	Species	Stats	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	count
1	Fregfly	Total length (mm)		10	Adult																		
		Fork length (mm)		?	Juvenile																		
		weight (g)																					
2	flatheaded *	Total length (mm)	34	38	42	37	43	39	39	34	51	33	36	36	42	43	48	34	41	36	28	38	+8 +4
		Fork length (mm)																					
		weight (g)	2	2	3	2	2	2	2	2	4	2	2	2	2	2	2	2	2	2	2	2	
3	Potamopyrgus antipodarum	Total length (mm)	100	145																			
		Fork length (mm)																					
		weight (g)	2	20																			
4	Hyalella	Total length (mm)	[31] – kept																				
		Fork length (mm)																					
		weight (g)	14																				
5	Rainbow	Total length (mm)	36 – kept																				
		Fork length (mm)																					
		weight (g)	2																				
6	Long jaw eel	Total length (mm)	540																				
		Fork length (mm)																					
		weight (g)	408																				
7	Large eyte fregfly	Total length (mm)	1 juv																				
		Fork length (mm)	1 adult																				
		weight (g)																					
8	Banded bream	Total length (mm)	230	246																			
		Fork length (mm)																					
		weight (g)	150	120																			
9	Spangled	Total length (mm)	[166]	138	97	132	38	105	200	105	101												
		Fork length (mm)																					
		weight (g)	66	20	12	30	10	30	120														
10	flatheaded **	Total length (mm)	52	90	41	48	46	38	31	43	72	38	31	31	45	46	48	46	43	36	41	32	+13 +10 +1(
		Fork length (mm)	2	2	2	2	2	2	2	2	4	2	2	2	2	2	2	2	2	2	1	2	
		weight (g)																					

Gorne Lagoon

E-fish 1/2/23

BIOLOGICAL RECORD Site name: AB8 Waterbody:

Date / /2022

Seq #	Op#	Species Code	Fish #	Length (mm)	Weight (g)	Comments	DNA	Kept
1		Bony bream		326	57		o	o
2				~~57~~			o	o
3				279	50		o	o
4				286	280		o	o
5				304	320		o	o
6				275	290		o	o
7				252	188		o	o
8				164	94		o	o
9				318	410		o	o
D 20				200	400		o	o
1				295	180		o	o
2				312	312		o	o
3				205	270		o	o
4				142	30		o	o
5				146	40		o	o
6		kept		169	50		o	o
7				242	160		o	o
8				316	370		o	o
9				121	14		o	o
D 30				132	30		o	o
1				242	240		o	o
2				212	114		o	o
3				114	20		o	o
4				110	14		o	o
5				116	24		o	o
6				102	16		o	o
7				63	10	+12+16+200	o	o
8							o	o
9							o	o
D 40		Longfin eel		750	200	} kept	o	o
1				1000	350		o	o
2							o	o
3							o	o
4							o	o
5							o	o
6							o	o
7							o	o
8							o	o
9							o	o
D 50							o	o

Seq #	Op#	Species Code	Fish #	Length (mm)	Weight (g)	Comments	DNA	Kept
E 1		Bassich gudgy		164	55		o	o
2				92	36		o	o
3				174	96		o	o
4							o	o
5							o	o
6				126	30		o	o
7							o	o
8							o	o
9							o	o
E 10		Harding		68	4		o	o
1		Harding		93	4		o	o
2				71	4		o	o
3				75	4		o	o
4				53	2	} kept	o	o
5				72	1x		o	o
6							o	o
7							o	o
8							o	o
9							o	o
E 20		Rainbow		260	2	} kept	o	o
1				174	2		o	o
2				96	1x		o	o
3							o	o
4							o	o
5							o	o
6							o	o
7							o	o
8							o	o
9							o	o
E 30				152	50		o	o
1				107	18		o	o
2				150	56	} kept	o	o
3				172	46		o	o
4				140	40		o	o
5				147	26		o	o
6				116	20		o	o
7				98	10		o	o
8							o	o
9							o	o
E 40		Goldfish		290			o	o
				350	260	- kept	o	o

Return to: Conservation Research, GFC Private Mail Bag 2, Grafton, NSW 2460

BIOLOGICAL RECORD **Site name:** **Waterbody:** **Date / /2022**

Seq #	Op#	Species Code	Fish #	Length (mm)	Weight (g)	Comments	DNA	Kept
1							o	o
2							o	o
3							o	o
4							o	o
5							o	o
6							o	o
7							o	o
8							o	o
9							o	o
E 50							o	o
F 1							o	o
2							o	o
3							o	o
4							o	o
5							o	o
6							o	o
7							o	o
8							o	o
9							o	o
F 10							o	o
1							o	o
2							o	o
3							o	o
4							o	o
5							o	o
6							o	o
7							o	o
8							o	o
9							o	o
F 20							o	o
1							o	o
2							o	o
3							o	o
4							o	o
5							o	o
6							o	o
7							o	o
8							o	o
9							o	o
F 30							o	o

Seq #	Op#	Species Code	Fish #	Length (mm)	Weight (g)	Comments	DNA	Kept
1							o	o
2							o	o
3							o	o
4							o	o
5							o	o
6							o	o
7							o	o
8							o	o
9							o	o
F 40							o	o
1							o	o
2							o	o
3							o	o
4							o	o
5							o	o
6							o	o
7							o	o
8							o	o
9							o	o
F 50							o	o
G 1							o	o
2							o	o
3							o	o
4							o	o
5							o	o
6							o	o
7							o	o
8							o	o
9							o	o
G 10							o	o
1							o	o
2							o	o
3							o	o
4							o	o
5							o	o
6							o	o
7							o	o
8							o	o
9							o	o
G 20							o	o

Return to: Conservation Research, GFC Private Mail Bag 2, Grafton, NSW 2460

Site number		Site name	
Watercourse		Collector	
Date	ABS 1/2/23	Project code	

Hydrobiology

Cane fyke (continued)

#	Species	Stats	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	count
1	Rainbow	Total length (mm)	28	32	38	32	36	37	kept														
		Fork length (mm)																					
		weight (g)	2	2	2	2	2	2															
2	Glassgrush	Total length (mm)	48	4	46	58	56	49	60	38	42	62	58	40	34	36	43	kept					
		Fork length (mm)																					
		weight (g)	2	2	2	4	4	2	4	2	2	4	4	2	2	2	2						
3	Gambusia	Total length (mm)	36	41																			
		Fork length (mm)																					
		weight (g)	2	2																			
4	Hyrtii	Total length (mm)	142	132	156	130	146	—	kept		136	130	130	13/	125	128	132	136	121				
		Fork length (mm)																					
		weight (g)	10	10	15	10	10				10	10	10	10	10	10	10	10	10				
5	Porocheilus	Total length (mm)	162																				
		Fork length (mm)																					
		weight (g)	20																				
6	Snake-neck (seephis) → total shell	Total length (mm)	1	adult																			
		Fork length (mm)	(Chelodina expansa)																				
		weight (g)																					
7	Saw-shelled turtle	Total length (mm)	1	adult																			
		Fork length (mm)																					
		weight (g)																					
8	Trap: Hardyhead	Total length (mm)	25	28	31	28	31																
		Fork length (mm)																					
		weight (g)	1	2	2	2	2																
9	Hypseleotris	Total length (mm)	16	18	20	18	20	21															
		Fork length (mm)																					
		weight (g)	1	1	1	1	1	1															
10		Total length (mm)																					
		Fork length (mm)																					
		weight (g)																					

Hydrobiology

Site number		Site name	
Watercourse	AB4	Collector	
Date	2/2/23	Project code	

Traps / kept

#	Species	Stats	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	count
1	Mogurnda	Total length (mm)	61	55	41	36	21	29	]														
		Fork length (mm)																					
		weight (g)	4	4	2	2	1	1															
2	Fregata	Total length (mm)	2 x adults																				
		Fork length (mm)																					
		weight (g)							kept														
3	Hypseleotris	Total length (mm)	17	25	26	27	[26																
		Fork length (mm)																					
		weight (g)	1	1	1	1	1																
4	Small gyre Fregata	Total length (mm)	6	adults																			
		Fork length (mm)																					
		weight (g)																					
5	Atyidae	Total length (mm)	[1	1]	kept																		
		Fork length (mm)																					
		weight (g)	1	1		kept																	
6	Hypseleotris	Total length (mm)	32	18	]																		
		Fork length (mm)																					
		weight (g)	1	1																			
7		Total length (mm)	4																				
		Fork length (mm)																					
		weight (g)																					
8		Total length (mm)																					
		Fork length (mm)																					
		weight (g)																					
9		Total length (mm)																					
		Fork length (mm)																					
		weight (g)																					
10		Total length (mm)																					
		Fork length (mm)																					
		weight (g)																					

Site number		Site name	
Watercourse		Collector	
Date	APL4	Project code	2/2/23

Hydrobiology

Lower cut

* 1-A 10
** Kept 20

#	Species	Stats	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	count
1	Tandanus	Total length (mm)	445	- Kept																			
		Fork length (mm)																					
		weight (g)	1195																				
2	Potamididae	Total length (mm)		76	- Kept																		
		Fork length (mm)																					
		weight (g)		4																			
3	Hyridella depressa **	Total length (mm)	29	26	27	26	30	29	26	26	26	24	29	27	31	25	27	26	27	25	26	24	
		Fork length (mm)																					
		weight (g)	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	
4	Hyridella hastata *	Total length (mm)	23	40	42	33	26	29	—	—	26	23	21	27	—	—	25	25	24	26	—	22	+20+1
		Fork length (mm)																					
		weight (g)	1	2	2	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	+1
5	Macrobrachium	Total length (mm)	54	51	27	46	- Kept																
		Fork length (mm)																					
		weight (g)	4	4	1	2																	
6	Notopala	Total length (mm)	32	32	28	21	30	24	35	27	31	31	36	26	31	32	26	30	27	- Kept			
		Fork length (mm)																					
		weight (g)	1	1	1	1	1	1	2	1	1	1	1	1	1	1	1	1	1	1			
7	Neritidae	Total length (mm)	31	32		26	22	26	30	31	28	28	25	24	26	27	24						
		Fork length (mm)																					
		weight (g)	2	1		2	2	5	5	5	2	2	2	1	2	2	2						
8	Gambusia	Total length (mm)	21	19																			
		Fork length (mm)																					
		weight (g)	1	1																			
9	Glaridae	Total length (mm)	27	- Kept																			
		Fork length (mm)																					
		weight (g)	8																				
10		Total length (mm)																					
		Fork length (mm)																					
		weight (g)																					

Hydrobiology

Site number		Site name	
Watercourse		Collector	
Date	ADL 2/2/23	Project code	

E-fish 500s 100v 10% 50 Hz → Not rolling right → macrophytes absorbing amp?

#	Species	Stats	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	count
1	Gambusia	Total length (mm)	18	19	29	28																	
		Fork length (mm)																					
		weight (g)	1	1	1	1																	
2	Hyseleotris	Total length (mm)	20	21	26																		
		Fork length (mm)																					
		weight (g)	2	1	1																		
3	Alydra	Total length (mm)	[illegible]	1	1	Kept																	
		Fork length (mm)																					
		weight (g)	1	1	1																		
4		Total length (mm)																					
		Fork length (mm)																					
		weight (g)																					
5		Total length (mm)																					
		Fork length (mm)																					
		weight (g)																					
6		Total length (mm)																					
		Fork length (mm)																					
		weight (g)																					
7		Total length (mm)																					
		Fork length (mm)																					
		weight (g)																					
8		Total length (mm)																					
		Fork length (mm)																					
		weight (g)																					
9		Total length (mm)																					
		Fork length (mm)																					
		weight (g)																					
10		Total length (mm)																					
		Fork length (mm)																					
		weight (g)																					

Site number		Site name	
Watercourse		Collector	
Date	ABS 11:30 2/2	Project code	

Hydrobiology

* kept 60

Traps

#	Species	Stats	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	count
1	Gambusia *	Total length (mm)	23	28	35	26	31	34	33	36	30	23	26	26	32	22	24	35	26	28	27	26	+5
		Fork length (mm)																					
		weight (g)	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	
2	Mogurnda	Total length (mm)	[68	50	47	58]	- kept																
		Fork length (mm)																					
		weight (g)	6	2	2	2																	
3	Large fyke Gambusia	Total length (mm)	28	26	21	27	24	25	27	21	26	31	26	22	21	26	18	22	26	21	27	28	+6+5 +14 +16
		Fork length (mm)																					
		weight (g)	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	
4	Porochelus	Total length (mm)	[72	73	82	72	78	69	76	80	74]	- kept		78	71	86	64	72	80				
		Fork length (mm)																					
		weight (g)	2	2	2	2	2	2	2	2	2			2	2	2	2	2	2				
5	Mogurnda	Total length (mm)	[34	75	36	55	28	53	30	73	27	46 -	32	33	32	32	31						
		Fork length (mm)									kept.												
		weight (g)	4	6	4	4	2	4	4	6	2	4	4	4	2	2	2						
6	Kreyfft	Total length (mm)	2 x adults																				
		Fork length (mm)																					
		weight (g)																					
7	Small fyke Ambassis	Total length (mm)	[41]	- kept																			
		Fork length (mm)																					
		weight (g)	2																				
8	Kreyfft	Total length (mm)	1 adult																				
		Fork length (mm)																					
		weight (g)	1 juvenile																				
9	Mogurnda	Total length (mm)	31	46	28	37	33	32	33	50	29	34	57	24	30	32	35	65					
		Fork length (mm)																					
		weight (g)	2	2	2	2	2	2	2	4	2	2	4	2	2	2	2	4					
10	Gambusia	Total length (mm)	24	32	28	24	24	22	29	36	28	27	26	25	35	31							
		Fork length (mm)																					
		weight (g)	1	1	1	1	1	1	1	1	1	1	1	1	1	1							

Site number		Site name	
Watercourse		Collector	
Date		Project code	

Hydrobiology

#	Species	Stats	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	count
1	Poecheilus	Total length (mm)	78	75	65																		
		Fork length (mm)																					
		weight (g)	4	4	4																		
2	Fished E-fish 100V 10% 60Hz Gambusia	Total length (mm)	21	18	25	24	25	28	27														
		Fork length (mm)																					
		weight (g)	1	1	1	1	1	1	1														
3		Total length (mm)																					
		Fork length (mm)																					
		weight (g)																					
4		Total length (mm)																					
		Fork length (mm)																					
		weight (g)																					
5		Total length (mm)																					
		Fork length (mm)																					
		weight (g)																					
6		Total length (mm)																					
		Fork length (mm)																					
		weight (g)																					
7		Total length (mm)																					
		Fork length (mm)																					
		weight (g)																					
8		Total length (mm)																					
		Fork length (mm)																					
		weight (g)																					
9		Total length (mm)																					
		Fork length (mm)																					
		weight (g)																					
10		Total length (mm)																					
		Fork length (mm)																					
		weight (g)																					

Site number		Site name	
Watercourse	AB7	Collector	
Date	3/2/22	Project code	

Hydrobiology

Traps

#	Species	Stats	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	count
1	Mogurnda	Total length (mm)	32	28	kept																		
		Fork length (mm)																					
		weight (g)	1	1																			
2	Gambusia	Total length (mm)	25	21	kept																		
		Fork length (mm)																					
		weight (g)	1	1																			
3	Hypseleotris	Total length (mm)	26	19	kept																		
		Fork length (mm)																					
		weight (g)	1	1																			
4	Atyidae	Total length (mm)	2	2	kept																		
		Fork length (mm)																					
		weight (g)	1	1																			
5	Large sylke / Broad-skull snake-neck	Total length (mm)	1	adult																			
		Fork length (mm)																					
		weight (g)																					
6	Rainbow - kept	Total length (mm)	26	36	32	29	33	27	34	31	38	32	30	37	32	38	47	34	26	28	29	27	+24 +2 +6 +34 +25
		Fork length (mm)																					
		weight (g)	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	
7	Gambusia - All kept	Total length (mm)	30	30	30	26	23	35	33	26	29	28	32	34	35	26	32	30	30	27	33	21	
		Fork length (mm)																					
		weight (g)	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	
8	Hypseleotris - All kept	Total length (mm)	33	29	27	28	38	36	36	31	28	34	28	33	27	30	29	29	28	31	31	36	+14 +10 +25 +30
		Fork length (mm)																					
		weight (g)	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	
9	Ambassis All kept	Total length (mm)	26	24	30	26	29	26															
		Fork length (mm)																					
		weight (g)	1	1	1	1	1	1															
10	Hardyhead - kept	Total length (mm)	26																				
		Fork length (mm)																					
		weight (g)	1																				

Site number		Site name	
Watercourse		Collector	
Date		Project code	

* kept

Hydrobiology

#	Species	Stats	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	count
1	[Mozambique — All kept]	Total length (mm)	32	26	26	22	32	29	28	32	28	57	56	26	21	26	22	27	29	31			
		Fork length (mm)																					
		weight (g)	1	1	1	1	1	1	1	1	1	2	2	1	1	1	1	1	1	1			
2	Small size Mozambique	Total length (mm)	27	26	32																		
		Fork length (mm)																					
		weight (g)	1	1	1																		
3	Rainbow	Total length (mm)	30	28	26	31	32	29	25														
		Fork length (mm)																					
		weight (g)	1	1	1	1	1	1	1														
4	Gambusia	Total length (mm)	26	28	21	27	22	26	29	27	24	32	28	29	27	35	28	31	26	26	30	21	+4 +0
		Fork length (mm)																					
		weight (g)	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	
5	Hyperlechia	Total length (mm)	23	38	24																		
		Fork length (mm)																					
		weight (g)	1	1	1																		
6	150 Fish 4665 Rainbow	Total length (mm)	34	32	38																		
		Fork length (mm)																					
		weight (g)	1	1	1																		
7	Gambusia	Total length (mm)	27	27	23	26	35	27	28	19	25	21	27	18	27	23	32	29					
		Fork length (mm)																					
		weight (g)	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1					
8	Hyperlechia	Total length (mm)	20																				
		Fork length (mm)																					
		weight (g)	1																				
9	Atyidae *	Total length (mm)	2	2	2	2	2	3	3	2	2	2	2	2	2	2	2	2	2	2			
		Fork length (mm)																					
		weight (g)	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1			
10		Total length (mm)																					
		Fork length (mm)																					
		weight (g)																					

Site number		Site name	
Watercourse		Collector	
Date	AB/6 3/2/12	Project code	

Hydrobiology

* Kept

#	Species	Stats	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	count
1	Traps → No fish	Total length (mm)																					
		Fork length (mm)																					
		weight (g)																					
2	1 - long sytic Gambusia	Total length (mm)	36	34	35	26	31	27	26	17	23	17	- Kept										
		Fork length (mm)																					
		weight (g)	1	1	1	1	1	1	1	1	1	1											
3	2 - long carp fingerlings	Total length (mm)	1	multi																			
		Fork length (mm)																					
		weight (g)																					
4	Gambusia *	Total length (mm)	34	35	1 - Kept																		
		Fork length (mm)																					
		weight (g)	1	1																			
5	E-fish 300s No fish	Total length (mm)																					
		Fork length (mm)																					
		weight (g)																					
6		Total length (mm)																					
		Fork length (mm)																					
		weight (g)																					
7		Total length (mm)																					
		Fork length (mm)																					
		weight (g)																					
8		Total length (mm)																					
		Fork length (mm)																					
		weight (g)																					
9		Total length (mm)																					
		Fork length (mm)																					
		weight (g)																					
10		Total length (mm)																					
		Fork length (mm)																					
		weight (g)																					

Site number	AK1	Site name	
Watercourse		Collector	
Date	4/2/22	Project code	

Hydrobiology

#	Lowspecies ft..	Stats	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	count
1	Koaro	Total length (mm)	28	adults +																			
		Fork length (mm)																					
		weight (g)	2	Juveniles +																			
2	Broad-shelled long nosed	Total length (mm)	1	Juvenile																			
		Fork length (mm)																					
		weight (g)																					
3	Sawshelled	Total length (mm)	1	Adult																			
		Fork length (mm)																					
		weight (g)																					
4	Trap Redfin	Total length (mm)			[27]	-	Koaro																
		Fork length (mm)																					
		weight (g)	-		14																		
5	Hyaleadora	Total length (mm)			21																		
		Fork length (mm)																					
		weight (g)			1																		
6	Gluxfish	Total length (mm)			31	32	29																
		Fork length (mm)																					
		weight (g)			1	1	1																
7		Total length (mm)																					
		Fork length (mm)																					
		weight (g)																					
8		Total length (mm)																					
		Fork length (mm)																					
		weight (g)																					
9		Total length (mm)																					
		Fork length (mm)																					
		weight (g)																					
10		Total length (mm)																					
		Fork length (mm)																					
		weight (g)																					

Site number		Site name	
Watercourse		Collector	
Date		Project code	

Hydrobiology

ABJ

#	Species	Stats	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	count
1	Lamprey sucker / Bony bream	Total length (mm)	[214	155	126	78	210	162	156	138	150]	– kept			102	134	190	170	102				
		Fork length (mm)																					
		weight (g)	100	36	36	4	108	110	40	40	30				5	28	80	68	5				
2	Tandanus	Total length (mm)	[452]	– kept																			
		Fork length (mm)																					
		weight (g)	1204																				
3	Mouth almighty	Total length (mm)	[97	96	104	80	100]	– kept															
		Fork length (mm)																					
		weight (g)	12	12	16	10	50																
4	Rainbow	Total length (mm)	[78]	– kept																			
		Fork length (mm)																					
		weight (g)	4																				
5	Hardyhead	Total length (mm)	[50	45	51	58	54	63	52	51	48	52	56	48	62	61]	– kept						
		Fork length (mm)																					
		weight (g)	4	2	4	4	4	4	4	4	2	4	4	2	4	4							
6	Glassgoby	Total length (mm)	[33	47	34	33	46	31	51	57	26	29	53	26	32]	kept							
		Fork length (mm)																					
		weight (g)	1	2	1	1	2	1	2	2	1	1	2	1	1								
7	Roseichthys	Total length (mm)	[127]	– kept																			
		Fork length (mm)																					
		weight (g)	16																				
8	Hyrtlii	Total length (mm)	[292	270	298	220	194	252]	182	135	186	126	110	[324]	274	308	223	165	219	228	202	178	+2
		Fork length (mm)																					
		weight (g)	200	160	260	26	40	40	40	25	40	25	15	260	160	240	90	35	90	120	50	36	
9	Bony bream	Total length (mm)	146																				
		Fork length (mm)																					
		weight (g)	20																				
10	Macrobrachium	Total length (mm)	[8]	kept																			
		Fork length (mm)																					
		weight (g)	1																				

Site number		Site name	
Watercourse		Collector	
Date		Project code	

Hydrobiology

Small eytes

#	Species	Stats	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	count
1	Eastern long-neck (dark lines)	Total length (mm)	1	adult																			
		Fork length (mm)																					
		weight (g)																					
2	Redclaw	Total length (mm)	28																				
		Fork length (mm)																					
		weight (g)	2																				
3	Kuyoto	Total length (mm)		Small juv																			
		Fork length (mm)																					
		weight (g)		Juveniles																			
4	Glassgrass	Total length (mm)	33	34	31																		
		Fork length (mm)																					
		weight (g)	2	2	2																		
5	Flyspeck	Total length (mm)	62	51	58	60	53	31	34	33	26	26	28	34	27	32	57	33	16	31	31	38	+5
		Fork length (mm)																					
		weight (g)	2	2	2	2	2	1	1	1	1	1	1	1	1	1	2	1	1	1	1	1	
6	Hyposelecta	Total length (mm)	28	21	23	32	28																
		Fork length (mm)																					
		weight (g)	1	1	1	1	1																
7	Rainbowfish	Total length (mm)	128																				
		Fork length (mm)																					
		weight (g)	22																				
8		Total length (mm)																					
		Fork length (mm)																					
		weight (g)																					
9		Total length (mm)																					
		Fork length (mm)																					
		weight (g)																					
10		Total length (mm)																					
		Fork length (mm)																					
		weight (g)																					

Site number		Site name	
Watercourse	AB1	Collector	
Date	4/2/2[illegible]	Project code	

Hydrobiology

E-fish 600s

#	Species	Stats	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	count
1	Brown bream	Total length (mm)	160	106	226	256	120	206	62	178	137	154	250	186	112	215	120						
		Fork length (mm)																					
		weight (g)	50	12	178	184	19	92	40	60	32	54	150	60	24	185	25						
2	Rainbow	Total length (mm)	97	74	76	92	72	63	65	92	83	79	72	53	86	72						78	+1
		Fork length (mm)																					
		weight (g)	10	4	4	12	4	4	2	6	4	2	4	2	4	4					2	4	
3	Yellowbelly	Total length (mm)	554	kept																			
		Fork length (mm)																					
		weight (g)	3038																				
4	Hybrid	Total length (mm)	98	105	117	121																	
		Fork length (mm)																					
		weight (g)	10	20	20	20																	
5		Total length (mm)																					
		Fork length (mm)																					
		weight (g)																					
6	Hybrid	Total length (mm)	31	36	41	46	62	48	41														
		Fork length (mm)																					
		weight (g) kept	2	1	1	2	2	2	2														
7	Spangled	Total length (mm)	186	156	118	80	135	112	100	82	125	88	102	162									
		Fork length (mm)																					
		weight (g)	74	62	30	20	40	36	20	6	30	6	18	86									
8	Mosquito	Total length (mm)	78	kept																			
		Fork length (mm)																					
		weight (g)	6																				
9	Longfin	Total length (mm)	257																				
		Fork length (mm)																					
		weight (g)	30																				
10	Machrobrachium	Total length (mm)	10	kept																			
		Fork length (mm)																					
		weight (g)	2																				

Site number		Site name	
Watercourse		Collector	
Date		Project code	

Hydrobiology

#	Species	Stats	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	count
1	~~Dan~~ granular Barred	Total length (mm)	180	92	80	83	81	81	104	86	95	64	68	71	78	76	65	103	109				
		Fork length (mm)																					
		weight (g)	12	8	6	4		15		12	16	4	4	8	10	12	8	24	24				
2	Mouse Whitebait	Total length (mm)	80	45																			
		Fork length (mm)																					
		weight (g)	30																				
3	sleepy cod	Total length (mm)	[457]	–	kept																		
		Fork length (mm)	–																				
		weight (g)	1780																				
4	Macrobrachium	Total length (mm)	[10	(0)	kept																		
		Fork length (mm)																					
		weight (g)	2	2																			
5	Glassfish	Total length (mm)	[58]	–	kept																		
		Fork length (mm)																					
		weight (g)	4																				
6	Hardyhead	Total length (mm)	46	62	48	41																	
		Fork length (mm)																					
		weight (g)	1	2	1	1																	
7	Redclaw	Total length (mm)	24	22																			
		Fork length (mm)																					
		weight (g)	16	12																			
observed 8	White-throated Treecle	Total length (mm)	1 adult																				
		Fork length (mm)																					
		weight (g)																					
9		Total length (mm)																					
		Fork length (mm)																					
		weight (g)																					
10		Total length (mm)																					
		Fork length (mm)																					
		weight (g)																					

REACH OBSERVATIONS (of 100 m stream length)

Site Details

Site Number	AB3
Watercourse	
Date (DD/MM/YYYY)	30/1/23
Time (24 hrs)	12:30

Site Name	
Collector (initials):	Project Code:
Drone footage time:	length:

Observations

Left Bank land use: cleared/grazing	Algae on substrate % cover: 30
Left Bank erosion (%): 0	Algae in water column % cover: 20
Right Bank land use: cleared/grazing	Flow level: ☑ None ☐ Low ☐ Moderate ☐ High ☐ Flood
Right Bank erosion %: 0	Local catchment erosion %: —
Point Source Discharges ☐ yes ☑ no	Sediment Odour ☐ yes ☑ no, Specify .....
Sediment Deposits ☑ None ☐ Sand ☐ Silt	Water Odour ☐ yes ☑ no, Specify .....
Bars (bed surface protruding from normal water level) %: 0	

Macrohabitat

Cover	Value (%)
Riffle (%)	—
Run (%)	—
Pool (rocky) (%)	—
Pool (sandy/silt) (%)	100
Dry (%)	—

Microhabitat

Cover	Value (%)
LWD (>15 cm dia)	0
SWD (<15 cm dia)	10
Detritus	5
Periphyton	0 (Lots of filamentous)
Blanketing Silt	0
Undercut Banks	0

Substrate Description

Cover	Value (%)
Bedrock	0
Boulder (>256 mm)	10
Cobble (64-256 mm)	20
Pebble (4-64 mm)	0
Gravel (2-4 mm)	5
Sand (0.05 -2 mm)	5
Silt/Clay (<0.05 mm)	60

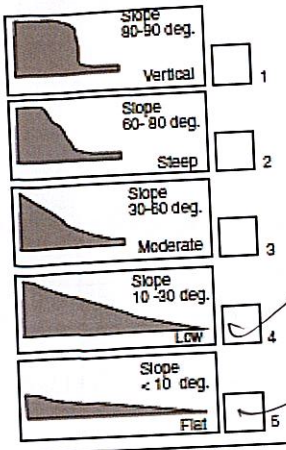
Macrophytes and Algae

Primary Production	In
Macrophyte % [20]	Edge % [100]
	Run % [ ]
	Riffle % [ ]
	Pool (rocky) % [ ]
Algae % [30]	Edge % [90]
	Run % [ ]
	Riffle % [ ]
	Pool (rocky) % [10]

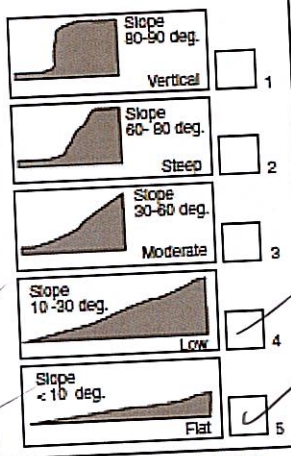
Macrophyte Botanical Name	Value (%)
1. Myriophyllum	25
2. Bacopa (check photo)	25
3. Ludwigia	25
4. Typha	25
5	
6	
7	
8.	

REACH OBSERVATIONS (of 100 m stream length)

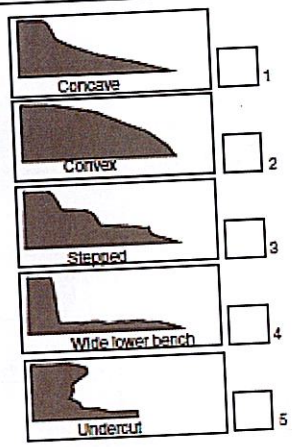
3 LEFT BANK Slope (RANK types)



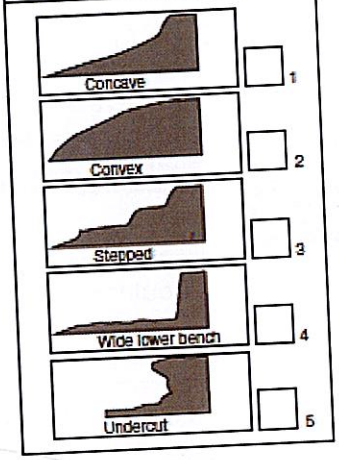
8 RIGHT BANK Slope (RANK types)



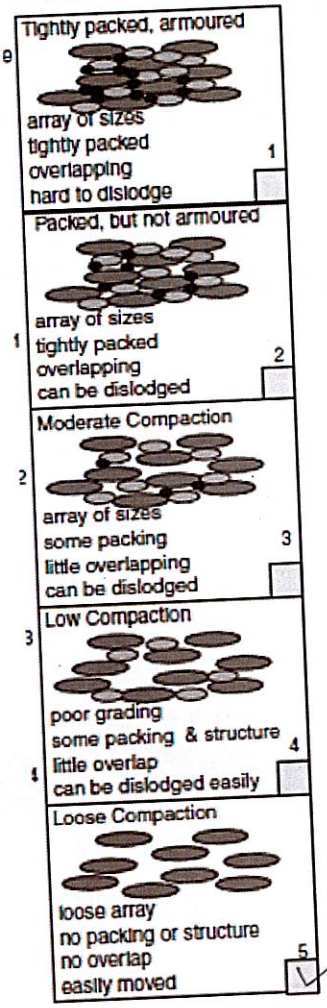
4 LEFT BANK Shape (RANK types)



9 RIGHT BANK Shape (RANK types)



5 Bed Compaction



Riparian Zone Structure

Left Bank	
Width (m)	5
Bare (%)	10
Grasses (%)	50
Shrubs (%)	10
Trees <10 m high (%)	0
Trees >10 m high (%)	0
Exotics (%)	30

Right Bank	
Width (m)	5
Bare (%)	10
Grasses (%)	50
Shrubs (%)	10
Trees <10 m high (%)	0
Trees >10 m high (%)	0
Exotics (%)	30

Longitudinal Extent of Riparian Vegetation

Category	Description	Category	Description
None	No trees or shrubs, only exotic grasses or pasture	Occasional clumps	Clumps of tree among exotic grasses and pastures
Isolated/scattered	Isolated trees or shrubs among exotic grasses or pasture	Semi-contiguous	Cleared patches of trees
Regularly space	Evenly spaced trees among exotic grasses and pastures	Contiguous	Intact tree line

Comments

cleared, v. little habitat, Boulders, sticks & filamentous algae providing some habitat. Algal scum on shore → elevated nutrients?

Hydrobiology

MACROINVERTEBRATE SAMPLING FIELD SHEET

Site Details

Site Number	AB3
Watercourse	
Date (DD/MM/YYYY)	30/1/23
Time (24 hrs)	12:30

Site Name	
Collector (initials)	
Project Code	

Edge/Backwater: Yes ☐ No ☐ QA/QC Residue Yes ☐ No ☐

Rep	No Vials	Collected by	Picked by	Label	Comment
1	1	JH	JH	AB3 - Edge	
2					
3					
4					
5					

Variables

Mean Sample Depth (m)	0.2	**Substrate Description (% cover)**			
Mean Wetted Width (m)	>100m	Bedrock	—	Gravel (2-4 mm)	10
Method: Sweep		Boulder (>256 mm)	—	Sand (0.05- 2 mm)	—
Canopy cover (%)	0	Cobble (64-256 mm)	—	Silt/Clay (<0.05 mm)	90
Shading (%)	0	Pebble (4 – 64 mm)	—		
Snags and LWD (% cover)		**Microhabitat Attributes (% cover)**			
Detritus (leaves & twigs)	10	Periphyton	5	Bank overhang veg	0
Sticks (<2 cm diam)	10	Moss	—	Trailing bank veg	0
Branches (<15 cm diam)	0	Filamentous algae	40	Blanketing Silt	0
Logs (>15 cm diam)	0	Macrophytes	40	Substrate anoxia	0

Comments

Very exposed lake edge w/ little habitat apart from dense algae / myriophyllum.

Hydrobiology

MACROINVERTEBRATE SAMPLING FIELD SHEET

Bed: Yes ☐ No ☐ Collected by: [|] Picked by: [|] No. vials/reps: [ ] QA/QC Residue Yes ☐ No ☐

Type: Riffle ☐ Run ☐ Pool (rocky/gravel) ☐ Pool (sandy/silt) ☐

Rep	No Vials	Collected by	Picked by	Label	Comment
1		JH	JH	ABS-Bed	
2					
3					
4					
5					

Variables

Mean Sample Depth (m)	0.5	**Substrate Description (% cover)**			
Mean Wetted Width (m)	>100m	Bedrock	—	Gravel (2-4 mm)	10
Method: Sweep		Boulder (>256 mm)	—	Sand (0.05- 2 mm)	—
Canopy cover (%)	0	Cobble (64-256 mm)	—	Silt/Clay (<0.005 mm)	90
Shading (%)	—	Pebble (4 – 64 mm)	—		
Snags and LWD (% cover)		**Microhabitat Attributes (% cover)**			
Detritus (leaves & twigs)	5	Periphyton	0	Bank overhang veg	0
Sticks (<2 cm diam)	5	Moss	0	Trailing bank veg	0
Branches (<15 cm diam)	0	Filamentous algae	10	Blanketing Silt	5
Logs (>15 cm diam)	0	Macrophytes	5	Substrate anoxia	0

Comments

Turbid, little habitat.

Hydrobiology

REACH OBSERVATIONS (of 100 m stream length)

Site Details

Site Number	AB
Watercourse	
Date (DD/MM/YYYY)	3/
Time (24 hrs)	10:00

Site Name	
Collector (initials):	Project Code:
Drone footage time:	length:

Observations

Left Bank land use: cleared	Algae on substrate % cover: 30
Left Bank erosion (%): —	Algae in water column % cover: 20
Right Bank land use: cleared	Flow level: ☐ None ☐ Low ☐ Moderate ☐ High ☐ Flood
Right Bank erosion %: —	Local catchment erosion %: —
Point Source Discharges ☐ yes ☑ no	Sediment Odour ☐ yes ☑ no, Specify .....
Sediment Deposits ☐ None ☐ Sand ☐ Silt	Water Odour ☐ yes ☐ no, Specify .....
Bars (bed surface protruding from normal water level) %: —	

Macrohabitat

Cover	Value (%)
Riffle (%)	
Run (%)	
Pool (rocky) (%)	
Pool (sandy/silt) (%)	
Dry (%)	

Microhabitat

Cover	Value (%)
LWD (>15 cm dia)	5
SWD (<15 cm dia)	10
Detritus	10
Periphyton	—
Blanketing Silt	—
Undercut Banks	—

Substrate Description

Cover	Value (%)
Bedrock	—
Boulder (>256 mm)	5
Cobble (64-256 mm)	10
Pebble (4-64 mm)	—
Gravel (2-4 mm)	—
Sand (0.05 -2 mm)	—
Silt/Clay (<0.05 mm)	90

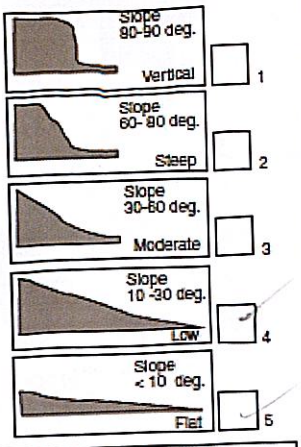
Macrophytes and Algae

Primary Production	In
Macrophyte % [35]	Edge % [100]
	Run % [ ]
	Riffle % [ ]
	Pool (rocky) % [ ]
Algae % [50]	Edge % [90]
	Run % [ ]
	Riffle % [ ]
	Pool (rocky) % [10]

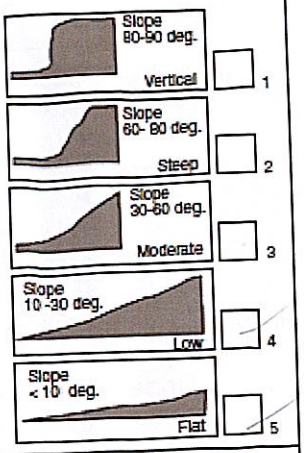
Macrophyte Botanical Name	Value (%)
1. Myriophyllum	70
2. Ludwigia	10
3. Persicaria	10
4. Cyperus	10
5	
6	
7	
8.	

REACH OBSERVATIONS (of 100 m stream length)

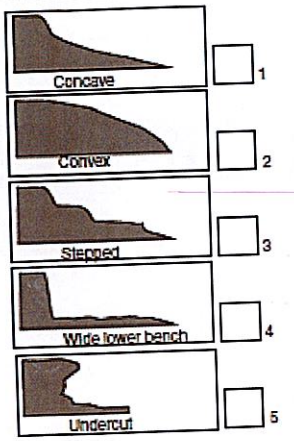
3 LEFT BANK Slope (RANK types)



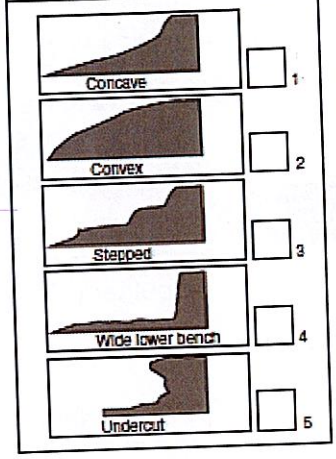
8 RIGHT BANK Slope (RANK types)



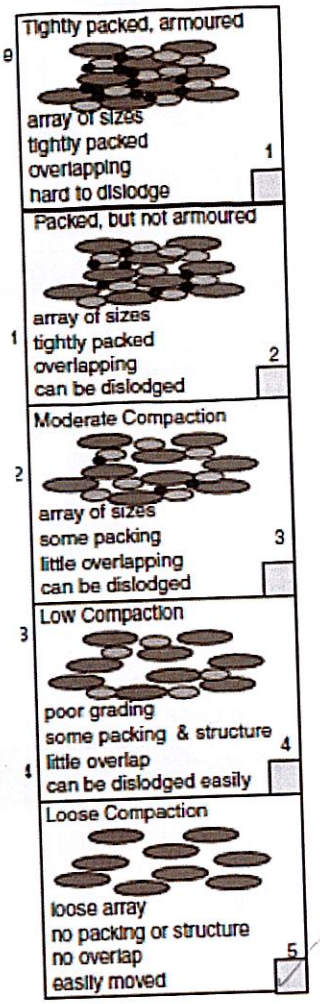
4 LEFT BANK Shape (RANK types)



9 RIGHT BANK Shape (RANK types)



5 Bed Compaction



Riparian Zone Structure

Left Bank	
Width (m)	5
Bare (%)	10
Grasses (%)	50
Shrubs (%)	10
Trees <10 m high (%)	0
Trees >10 m high (%)	0
Exotics (%)	30

Right Bank	
Width (m)	5
Bare (%)	10
Grasses (%)	50
Shrubs (%)	10
Trees <10 m high (%)	0
Trees >10 m high (%)	0
Exotics (%)	30

Longitudinal Extent of Riparian Vegetation

Category	Description	Category	Description
None	No trees or shrubs, only exotic grasses or pasture	Occasional clumps	Clumps of tree among exotic grasses and pastures
Isolated/scattered	Isolated trees or shrubs among exotic grasses or pasture	Semi-contiguous	Cleared patches of trees
Regularly space	Evenly spaced trees among exotic grasses and pastures	Contiguous	Intact tree line

Comments

Same as previous side. Lots of decaying algae from water level drop. Dense macrophytes + filamentous algae along edge. Create other habitat diversity. Some dead trees (LWD).

Hydrobiology

MACROINVERTEBRATE SAMPLING FIELD SHEET

Site Details

Site Number	AB2
Watercourse	
Date (DD/MM/YYYY)	31/1/23
Time (24 hrs)	10:30

Site Name	
Collector (initials)	
Project Code	

Edge/Backwater: Yes ☑ No ☐ QA/QC Residue Yes ☐ No ☐

Rep	No Vials	Collected by	Picked by	Label	Comment
1	1	JH	JL	AB2-Edge	
2					
3					
4					
5					

Variables

Mean Sample Depth (m)	0.5	**Substrate Description (% cover)**			
Mean Wetted Width (m)	>100	Bedrock	0	Gravel (2-4 mm)	0
Method: Sweep		Boulder (>256 mm)	0	Sand (0.05- 2 mm)	5
Canopy cover (%)	0	Cobble (64-256 mm)	5	Silt/Clay (<0.05 mm)	95
Shading (%)	5	Pebble (4 – 64 mm)	0		
Snags and LWD (% cover)		**Microhabitat Attributes (% cover)**			
Detritus (leaves & twigs)	10	Periphyton	5	Bank overhang veg	0
Sticks (<2 cm diam)	5	Moss	0	Trailing bank veg	0
Branches (<15 cm diam)	5	Filamentous algae	50	Blanketing Silt	5
Logs (>15 cm diam)	0	Macrophytes	30	Substrate anoxia	0

Comments

Myriophyllum + algae

Hydrobiology

MACROINVERTEBRATE SAMPLING FIELD SHEET

Bed: Yes ☑ No ☐ Collected by: [|] Picked by: [|] No. vials/reps: [ ] QA/QC Residue Yes ☐ No ☐

Type: Riffle ☐ Run ☐ Pool (rocky/gravel) ☐ Pool (sandy/silt) ☑

Rep	No Vials	Collected by	Picked by	Label	Comment
1	1	JH	JH	AB2 - Bed	
2					
3					
4					
5					

Variables

Mean Sample Depth (m)	0.75	**Substrate Description (% cover)**			
Mean Wetted Width (m)	>100	Bedrock	—	Gravel (2-4 mm)	—
Method: Sweep?		Boulder (>256 mm)	—	Sand (0.05- 2 mm)	—
Canopy cover (%)	0	Cobble (64-256 mm)	—	Silt/Clay (<0.005 mm)	100
Shading (%)	0	Pebble (4 – 64 mm)	—		
Snags and LWD (% cover)		**Microhabitat Attributes (% cover)**			
Detritus (leaves & twigs)	5	Periphyton	—	Bank overhang veg	—
Sticks (<2 cm diam)	5	Moss	—	Trailing bank veg	—
Branches (<15 cm diam)	—	Filamentous algae	10	Blanketing Silt	—
Logs (>15 cm diam)	—	Macrophytes	—	Substrate anoxia	

Comments

Hydrobiology

REACH OBSERVATIONS (of 100 m stream length)

Site Details

Site Number	AB8
Watercourse	
Date (DD/MM/YYYY)	31/1/23
Time (24 hrs)	15:15

Site Name	
Collector (initials):	Project Code:
Drone footage time:	length:

Observations

Left Bank land use: Native / cleared	Algae on substrate % cover: 20
Left Bank erosion (%): 0	Algae in water column % cover: 10
Right Bank land use: Native / cleared	Flow level: ☑ None ☑ Low ☐ Moderate ☐ High ☐ Flood
Right Bank erosion %: 5	Local catchment erosion %: —
Point Source Discharges ☐ yes ☑ no	Sediment Odour ☐ yes ☑ no, Specify .....
Sediment Deposits ☑ None ☐ Sand ☐ Silt	Water Odour ☐ yes ☐ no, Specify .....
Bars (bed surface protruding from normal water level) %: —	

Macrohabitat

Cover	Value (%)
Riffle (%)	0
Run (%)	0
Pool (rocky) (%)	100
Pool (sandy/silt) (%)	0
Dry (%)	0

Microhabitat

Cover	Value (%)
LWD (>15 cm dia)	5
SWD (<15 cm dia)	5
Detritus	10
Periphyton	0
Blanketing Silt	0
Undercut Banks	15

Substrate Description

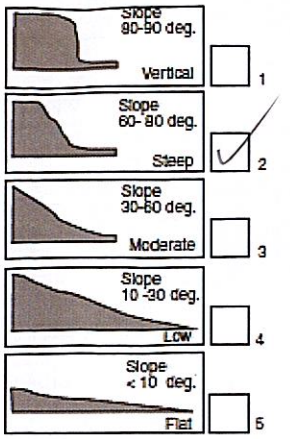
Cover	Value (%)
Bedrock	0
Boulder (>256 mm)	0
Cobble (64-256 mm)	20
Pebble (4-64 mm)	60
Gravel (2-4 mm)	10
Sand (0.05 -2 mm)	0
Silt/Clay (<0.05 mm)	10

Macrophytes and Algae

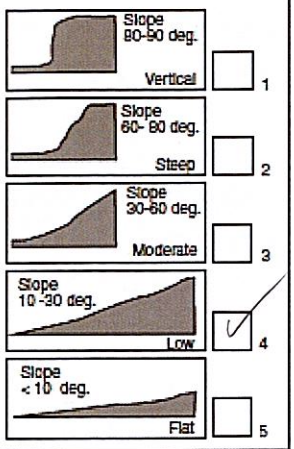
Primary Production	In
Macrophyte % [80]	Edge % [50]
	Run % [ ]
	Riffle % [ ]
	Pool (rocky) % [50]
Algae % [80]	Edge % [50]
	Run % [ ]
	Riffle % [ ]
	Pool (rocky) % [50]

Macrophyte Botanical Name	Value (%)
1. Ceratophyllum	50
2. Hydrilla	10
3. Ludwigia	10
4. Lemna	10
5 Cyperus	10
6 Myriophyllum	10
7	
8.	

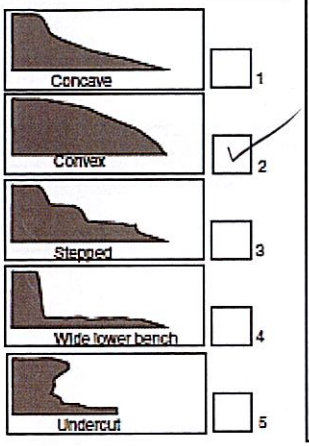
3 LEFT BANK Slope (RANK types)



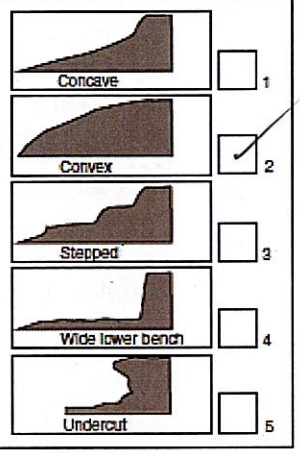
8 RIGHT BANK Slope (RANK types)



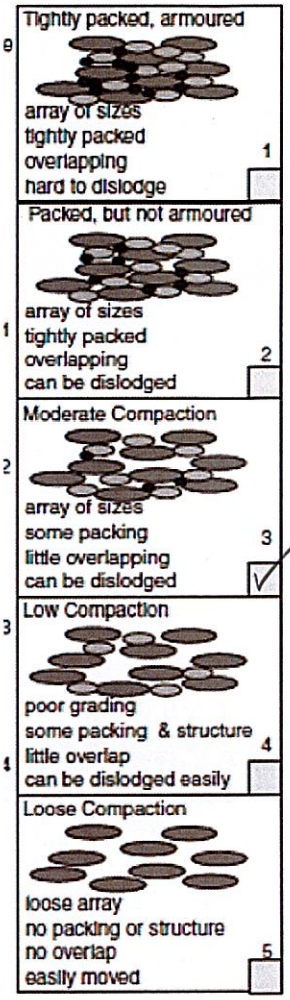
4 LEFT BANK Shape (RANK types)



9 RIGHT BANK Shape (RANK types)



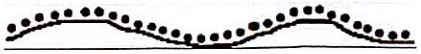
5 Bed Compaction



Riparian Zone Structure

Left Bank	
Width (m)	10
Bare (%)	5
Grasses (%)	5
Shrubs (%)	10
Trees <10 m high (%)	10
Trees >10 m high (%)	60
Exotics (%)	10
Right Bank	
Width (m)	10
Bare (%)	5
Grasses (%)	40
Shrubs (%)	5
Trees <10 m high (%)	20
Trees >10 m high (%)	10
Exotics (%)	20

Longitudinal Extent of Riparian Vegetation

Category	Description	Category	Description
None	 No trees or shrubs, only exotic grasses or pasture	Occasional clumps	 Clumps of tree among exotic grasses and pastures
Isolated/scattered	 Isolated trees or shrubs among exotic grasses or pasture	Semi-contiguous	 Cleared patches of trees
Regularly space	 Evenly spaced trees among exotic grasses and pastures	Contiguous	 Intact tree line

Comments

Site just D/S from weir. V. dense + diverse macrophytes with filamentous algae covering most of water. Left bank riparian relatively intact w/ gums, Casuarina + callistemon. Right bank semi-cleared for access. Moderate habitat diversity → Undercut banks and some LWD. Fish observed gathering at weir wall.

Hydrobiology

MACROINVERTEBRATE SAMPLING FIELD SHEET

Site Details

Site Number	AB8
Watercourse	
Date (DD/MM/YYYY)	31/1/23
Time (24 hrs)	19:00

Site Name	
Collector (initials)	
Project Code	

Edge/Backwater: Yes ☑ No ☐ QA/QC Residue Yes ☐ No ☐

Rep	No Vials	Collected by	Picked by	Label	Comment
1		JH	JH	AB8 - Edge	
2					
3					
4					
5					

Variables

		Substrate Description (% cover)			
Mean Sample Depth (m)	0.5	Bedrock	—	Gravel (2-4 mm)	—
Mean Wetted Width (m)	30m	Boulder (>256 mm)	—	Sand (0.05- 2 mm)	—
Method: Sweep		Cobble (64-256 mm)	—	Silt/Clay (<0.05 mm)	100
Canopy cover (%)	0	Pebble (4 – 64 mm)	—		
Shading (%)	0				
Snags and LWD (% cover)		**Microhabitat Attributes (% cover)**			
Detritus (leaves & twigs)	10	Periphyton	0	Bank overhang veg	—
Sticks (<2 cm diam)	10	Moss	0	Trailing bank veg	20
Branches (<15 cm diam)	5	Filamentous algae	50	Blanketing Silt	—
Logs (>15 cm diam)	0	Macrophytes	40	Substrate anoxia	—

Comments

Dense macrophytes + algae

Hydrobiology

MACROINVERTEBRATE SAMPLING FIELD SHEET

Bed: Yes ☑ No ☐ Collected by: [|] Picked by: [|] No. vials/reps: [ ] QA/QC Residue Yes ☐ No ☐

Type: Riffle ☐ Run ☐ Pool (rocky/gravel) ☐ Pool (sandy/silt) ☐

Rep	No Vials	Collected by	Picked by	Label	Comment
1		JH	JH	ABS-Bed	
2					
3					
4					
5					

Variables

Mean Sample Depth (m)	0.7	**Substrate Description (% cover)**			
Mean Wetted Width (m)	30	Bedrock	0	Gravel (2-4 mm)	5
Method: Sweep		Boulder (>256 mm)	0	Sand (0.05- 2 mm)	0
Canopy cover (%)	0	Cobble (64-256 mm)	40	Silt/Clay (<0.005 mm)	5
Shading (%)	0	Pebble (4 – 64 mm)	50		
Snags and LWD (% cover)		**Microhabitat Attributes (% cover)**			
Detritus (leaves & twigs)	10	Periphyton	0	Bank overhang veg	0
Sticks (<2 cm diam)	0	Moss	0	Trailing bank veg	0
Branches (<15 cm diam)	0	Filamentous algae	20	Blanketing Silt	0
Logs (>15 cm diam)	0	Macrophytes	20	Substrate anoxia	0

Comments

Rocky substrate, habitat largely algae + macrophytes

Hydrobiology

REACH OBSERVATIONS (of 100 m stream length)

Site Details

Site Number	ABS
Watercourse	
Date (DD/MM/YYYY)	1/2/23
Time (24 hrs)	11:30

Site Name	
Collector (initials):	Project Code:
Drone footage time:	length:

Observations

Left Bank land use: Dam	Algae on substrate % cover: 10
Left Bank erosion (%): —	Algae in water column % cover: 10
Right Bank land use: Dam	Flow level: ☑ None ☑ Low ☐ Moderate ☐ High ☐ Flood
Right Bank erosion %: —	Local catchment erosion %: —
Point Source Discharges ☐ yes ☑ no	Sediment Odour ☑ yes ☐ no, Specify Organic
Sediment Deposits ☑ None ☐ Sand ☐ Silt	Water Odour ☐ yes ☑ no, Specify .....
Bars (bed surface protruding from normal water level) %: —	

Macrohabitat

Cover	Value (%)
Riffle (%)	
Run (%)	
Pool (rocky) (%)	
Pool (sandy/silt) (%)	100
Dry (%)	

Microhabitat

Cover	Value (%)
LWD (>15 cm dia)	1
SWD (<15 cm dia)	10
Detritus	5
Periphyton	15
Blanketing Silt	0
Undercut Banks	0

Substrate Description

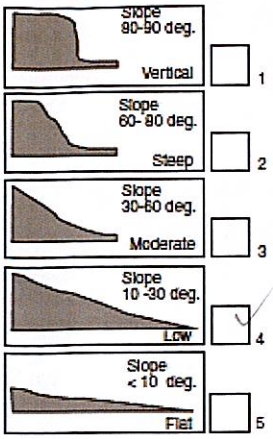
Cover	Value (%)
Bedrock	—
Boulder (>256 mm)	20
Cobble (64-256 mm)	20
Pebble (4-64 mm)	—
Gravel (2-4 mm)	—
Sand (0.05 -2 mm)	
Silt/Clay (<0.05 mm)	60

Macrophytes and Algae

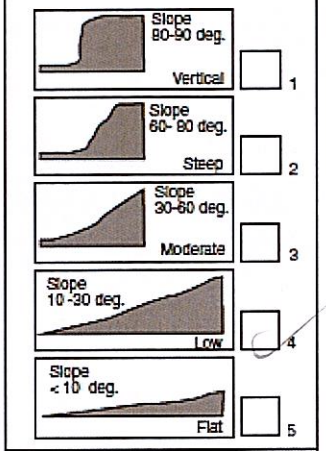
Primary Production	In
Macrophyte % [60]	Edge % [100]
	Run % [ ]
	Riffle % [ ]
	Pool (rocky) % [ ]
Algae % [15]	Edge % [100]
	Run % [ ]
	Riffle % [ ]
	Pool (rocky) % [ ]

Macrophyte Botanical Name	Value (%)
1. Persicaria	80
2. Cyperus	10
3. Ludwigia	10
4.	
5	
6	
7	
8.	

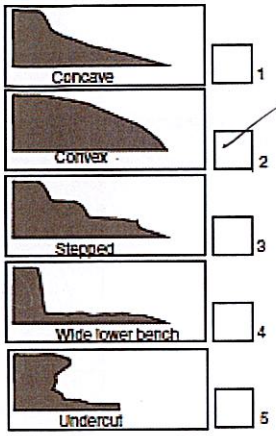
3 LEFT BANK Slope (RANK types)



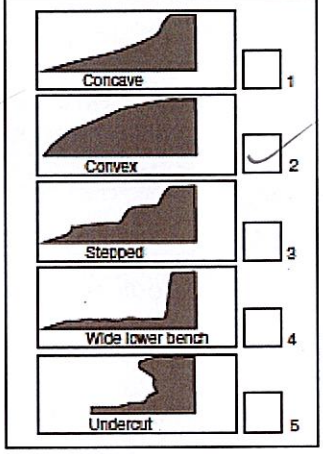
8 RIGHT BANK Slope (RANK types)



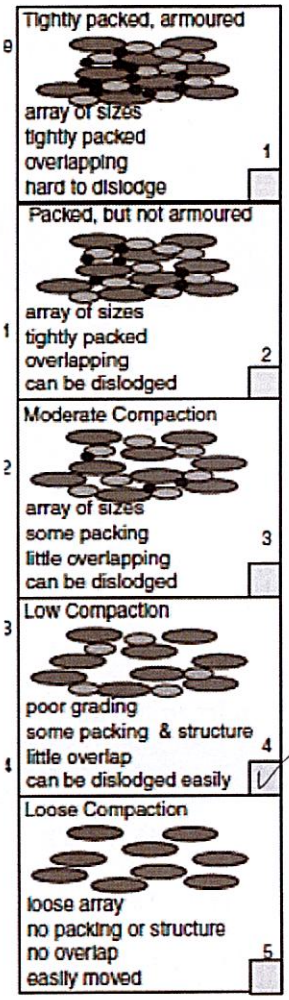
4 LEFT BANK Shape (RANK types)



9 RIGHT BANK Shape (RANK types)



5 Bed Compaction



Riparian Zone Structure

Left Bank	
Width (m)	5
Bare (%)	1
Grasses (%)	30
Shrubs (%)	30
Trees <10 m high (%)	1
Trees >10 m high (%)	—
Exotics (%)	40

Right Bank	
Width (m)	5
Bare (%)	1
Grasses (%)	30
Shrubs (%)	30
Trees <10 m high (%)	—
Trees >10 m high (%)	—
Exotics (%)	40

Longitudinal Extent of Riparian Vegetation

Category	Description	Category	Description
None	No trees or shrubs, only exotic grasses or pasture	Occasional clumps	Clumps of tree among exotic grasses and pastures
Isolated/scattered No trees	Isolated trees or shrubs among exotic grasses or pasture	Semi-contiguous	Cleared patches of trees
Regularly space	Evenly spaced trees among exotic grasses and pastures	Contiguous	Intact tree line

Comments

Impoundment (at 1% capacity). Turtle haven. Habitat provided by boulders/cobbles at edges. Boggy in deeper areas. Lots of Persicaria but is setting above water level.

Hydrobiology

MACROINVERTEBRATE SAMPLING FIELD SHEET

Site Details

Site Number	ABS
Watercourse	
Date (DD/MM/YYYY)	
Time (24 hrs)	11:50

Site Name	
Collector (initials)	
Project Code	

Edge/Backwater: Yes ☐ No ☐ QA/QC Residue Yes ☐ No ☐

Rep	No Vials	Collected by	Picked by	Label	Comment
1	1	JFI	JH	ABS-Edge	
2					
3					
4					
5					

Variables

Mean Sample Depth (m)	0.75	**Substrate Description (% cover)**			
Mean Wetted Width (m)	2100	Bedrock		Gravel (2-4 mm)	
Method:		Boulder (>256 mm)	10	Sand (0.05- 2 mm)	
Canopy cover (%)	0	Cobble (64-256 mm)	20	Silt/Clay (<0.05 mm)	70
Shading (%)	0	Pebble (4 – 64 mm)			
Snags and LWD (% cover)		**Microhabitat Attributes (% cover)**			
Detritus (leaves & twigs)	15	Periphyton	10	Bank overhang veg	0
Sticks (<2 cm diam)	10	Moss	0	Trailing bank veg	0
Branches (<15 cm diam)	5	Filamentous algae	0	Blanketing Silt	0
Logs (>15 cm diam)	—	Macrophytes	0	Substrate anoxia	—

Comments

Dislodged cobbles for macros. Habitat limited but

Hydrobiology

MACROINVERTEBRATE SAMPLING FIELD SHEET

Bed: Yes ☑ No ☐ Collected by: [|] Picked by: [|] No. vials/reps: [ ] QA/QC Residue Yes ☐ No ☐

Type: Riffle ☐ Run ☐ Pool (rocky/gravel) ☑ Pool (sandy/silt) ☑

Rep	No Vials	Collected by	Picked by	Label	Comment
1					
2					
3					
4					
5					

Variables

Mean Sample Depth (m)		**Substrate Description (% cover)**			
Mean Wetted Width (m)		Bedrock		Gravel (2-4 mm)	
Method:		Boulder (>256 mm)		Sand (0.05- 2 mm)	
Canopy cover (%)		Cobble (64-256 mm)		Silt/Clay (<0.005 mm)	
Shading (%)		Pebble (4 – 64 mm)			
Snags and LWD (% cover)		**Microhabitat Attributes (% cover)**			
Detritus (leaves & twigs)		Periphyton		Bank overhang veg	
Sticks (<2 cm diam)		Moss		Trailing bank veg	
Branches (<15 cm diam)		Filamentous algae		Blanketing Silt	
Logs (>15 cm diam)		Macrophytes		Substrate anoxia	

Comments

Hydrobiology

REACH OBSERVATIONS (of 100 m stream length)

Site Details

Site Number	ABL4
Watercourse	
Date (DD/MM/YYYY)	2/2/23
Time (24 hrs)	9:30

Site Name	
Collector (initials):	Project Code:
Drone footage time:	length:

Observations

Left Bank land use: Native/cleared	Algae on substrate % cover: 5
Left Bank erosion (%): —	Algae in water column % cover: 0
Right Bank land use: Native/cleared	Flow level: ☑ None ☐ Low ☐ Moderate ☐ High ☐ Flood
Right Bank erosion %: —	Local catchment erosion %: —
Point Source Discharges ☐ yes ☑ no	Sediment Odour ☑ yes ☐ no, Specify Sulphur/rotten
Sediment Deposits ☑ None ☐ Sand ☐ Silt	Water Odour ☑ yes ☐ no, Specify Sulphur/rotten
Bars (bed surface protruding from normal water level) %:	

Macrohabitat

Cover	Value (%)
Riffle (%)	—
Run (%)	—
Pool (rocky) (%)	—
Pool (sandy/silt) (%)	100
Dry (%)	—

Microhabitat

Cover	Value (%)
LWD (>15 cm dia)	5
SWD (<15 cm dia)	10
Detritus	10
Periphyton	5
Blanketing Silt	yes
Undercut Banks	—

Substrate Description

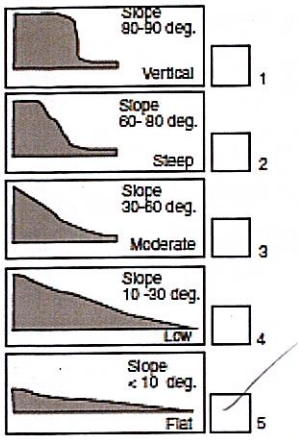
Cover	Value (%)
Bedrock	—
Boulder (>256 mm)	5
Cobble (64-256 mm)	20
Pebble (4-64 mm)	10
Gravel (2-4 mm)	0
Sand (0.05 -2 mm)	0
Silt/Clay (<0.05 mm)	65

Macrophytes and Algae

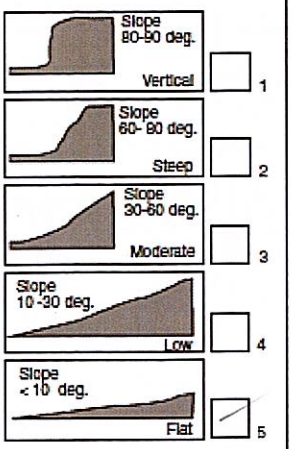
Primary Production	In
Macrophyte % [90]	Edge % [50]
	Run % [—]
	Riffle % [—]
	Pool (rocky) % [50]
Algae % [90]	Edge % [50]
	Run % [ ]
	Riffle % [ ]
	Pool (rocky) % [50]

Macrophyte Botanical Name	Value (%)
1. Phragmites	40
2. Ceratophyllum	40
3. Lemna	5
4. Nymphoides	5
5 Azolla	5
6 Myriophyllum	5
7	
8.	

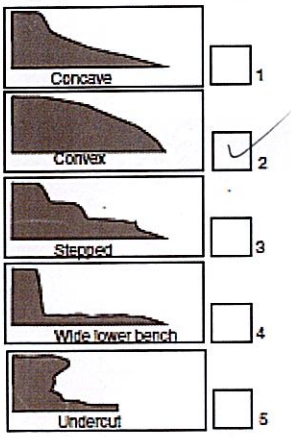
3 LEFT BANK Slope (RANK types)



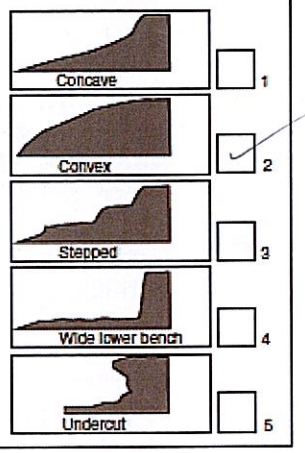
8 RIGHT BANK Slope (RANK types)



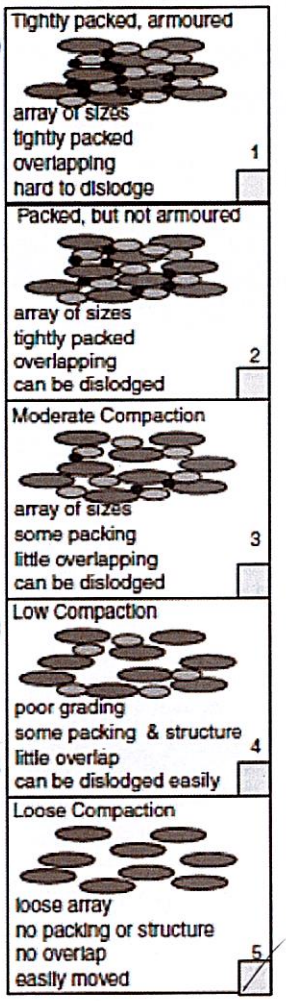
4 LEFT BANK Shape (RANK types)



9 RIGHT BANK Shape (RANK types)



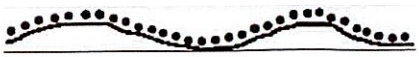
5 Bed Compaction



Riparian Zone Structure

Left Bank	
Width (m)	
Bare (%)	
Grasses (%)	10
Shrubs (%)	90
Trees <10 m high (%)	
Trees >10 m high (%)	
Exotics (%)	
Right Bank	
Width (m)	
Bare (%)	
Grasses (%)	10
Shrubs (%)	90
Trees <10 m high (%)	
Trees >10 m high (%)	
Exotics (%)	

Longitudinal Extent of Riparian Vegetation

Category	Description	Category	Description
None	 No trees or shrubs, only exotic grasses or pasture	Occasional clumps	 Clumps of tree among exotic grasses and pastures
Isolated/scattered	 Isolated trees or shrubs among exotic grasses or pasture	Semi-contiguous	 Cleared patches of trees
Regularly space	 Evenly spaced trees among exotic grasses and pastures	Contiguous	 Intact tree line

Comments

Essentially a wetland dominated by typha on edge + ceratophyllum / submerged. Water + sediment with anoxic sulphuric smell, substrate rocky with thick layer of organic matter and blanketed with dark silt. Electrofishing not so effective despite 5 Amps → vegetation may be absorbing.

Hydrobiology

MACROINVERTEBRATE SAMPLING FIELD SHEET

Site Details

Site Number	AB4
Watercourse	
Date (DD/MM/YYYY)	2/2/23
Time (24 hrs)	9:00

Site Name	
Collector (initials)	
Project Code	

Edge/Backwater: Yes ☑ No ☐ QA/QC Residue Yes ☐ No ☐

Rep	No Vials	Collected by	Picked by	Label	Comment
1	1	JH	JH	AB-4 Edge	
2	1	JH	JH	AB-4 Bed	
3					
4					
5					

Variables

Mean Sample Depth (m)	0,7	**Substrate Description (% cover)**			
Mean Wetted Width (m)	10	Bedrock	—	Gravel (2-4 mm)	—
Method: Sweep		Boulder (>256 mm)	—	Sand (0.05- 2 mm)	—
Canopy cover (%) 0		Cobble (64-256 mm)	—	Silt/Clay (<0.05 mm)	100
Shading (%) 0		Pebble (4 – 64 mm)	—		
Snags and LWD (% cover)		**Microhabitat Attributes (% cover)**			
Detritus (leaves & twigs)	20	Periphyton	5	Bank overhang veg	0
Sticks (<2 cm diam)	0	Moss	0	Trailing bank veg	0
Branches (<15 cm diam)	0	Filamentous algae	30	Blanketing Silt	10
Logs (>15 cm diam)	0	Macrophytes	30	Substrate anoxia	Yes

Comments

Edge not well defined as Phragmites can dense reeds. Habitat heavily poor → dominated by Phragmites + patchy vegetation. Anoxic smell + blanketing silt → clogged up macro net

Hydrobiology

MACROINVERTEBRATE SAMPLING FIELD SHEET

Bed: Yes ☐ No ☐ Collected by: [|] Picked by: [|] No. vials/reps: [ ] QA/QC Residue Yes ☐ No ☐

Type: Riffle ☐ Run ☐ Pool (rocky/gravel) ☐ Pool (sandy/silt) ☑

Rep	No Vials	Collected by	Picked by	Label	Comment
1	1	TH	TH	APL-Pd	
2					
3					
4					
5					

Variables

Mean Sample Depth (m)	0.7	**Substrate Description (% cover)**			
Mean Wetted Width (m)	10	Bedrock		Gravel (2-4 mm)	
Method: Surber		Boulder (>256 mm)	30	Sand (0.05- 2 mm)	
Canopy cover (%) 0		Cobble (64-256 mm)	30	Silt/Clay (<0.005 mm)	40
Shading (%) 0		Pebble (4 – 64 mm)			
Snags and LWD (% cover)		**Microhabitat Attributes (% cover)**			
Detritus (leaves & twigs)	5	Periphyton	0	Bank overhang veg	
Sticks (<2 cm diam)	0	Moss	0	Trailing bank veg	0
Branches (<15 cm diam)	0	Filamentous algae	10	Blanketing Silt	Y/N
Logs (>15 cm diam)	0	Macrophytes	10	Substrate anoxia	Y/N

Comments

Sample digested - v silted → net clogged with fine silt. Anoxic smell.

Hydrobiology

REACH OBSERVATIONS (of 100 m stream length)

Site Details

Site Number	ABS
Watercourse	
Date (DD/MM/YYYY)	2/2/23
Time (24 hrs)	13:30

Site Name	
Collector (initials):	Project Code:
Drone footage time:	length:

Observations

Left Bank land use: Native	Algae on substrate % cover: 10
Left Bank erosion (%): —	Algae in water column % cover: —
Right Bank land use: Native	Flow level: ☐ None ☐ Low ☐ Moderate ☐ High ☐ Flood
Right Bank erosion %: —	Local catchment erosion %: —
Point Source Discharges ☐ yes ☑ no	Sediment Odour ☑ yes ☐ no, Specify ...Anoxic...
Sediment Deposits ☐ None ☐ Sand ☑ Silt	Water Odour ☑ yes ☐ no, Specify ...Anoxic...
Bars (bed surface protruding from normal water level) %: —	

Macrohabitat

Cover	Value (%)
Riffle (%)	—
Run (%)	—
Pool (rocky) (%)	—
Pool (sandy/silt) (%)	100
Dry (%)	—

Microhabitat

Cover	Value (%)
LWD (>15 cm dia)	5
SWD (<15 cm dia)	25
Detritus	30
Periphyton	5
Blanketing Silt	Yes
Undercut Banks	0

Substrate Description

Cover	Value (%)
Bedrock	0
Boulder (>256 mm)	0
Cobble (64-256 mm)	40
Pebble (4-64 mm)	0
Gravel (2-4 mm)	0
Sand (0.05 -2 mm)	0
Silt/Clay (<0.05 mm)	60

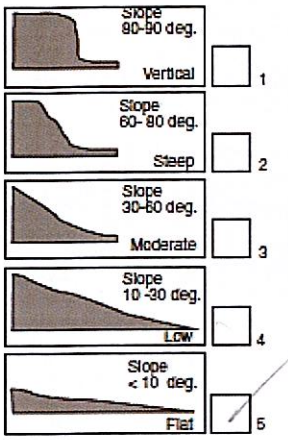
Macrophytes and Algae

Primary Production	In	
Macrophyte % [90]	Edge % [50]	
	Run % [ ]	
	Riffle % [ ]	
	Pool (rocky) % [50]	
Algae % [90]	Edge % [50]	
	Run % [ ]	
	Riffle % [ ]	
	Pool (rocky) % [50]	

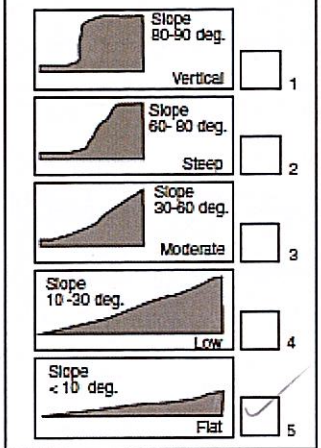
Macrophyte Botanical Name	Value (%)
1. Persicaria	30
2. Nymphoides indica	10
3. Ceratophyllum	40
4. Ludwigia	5
5 Lemna	5
6 Azolla	10
7	
8.	

Hydrobiology

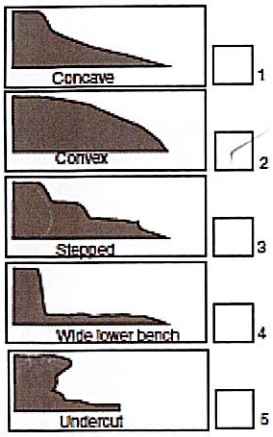
3 LEFT BANK Slope (RANK types)



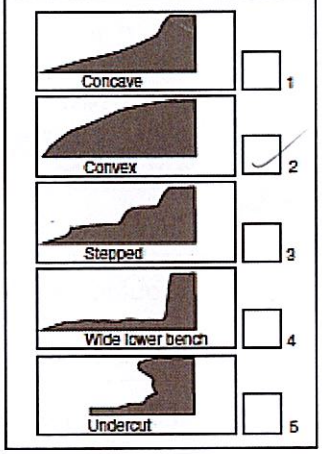
8 RIGHT BANK Slope (RANK types)



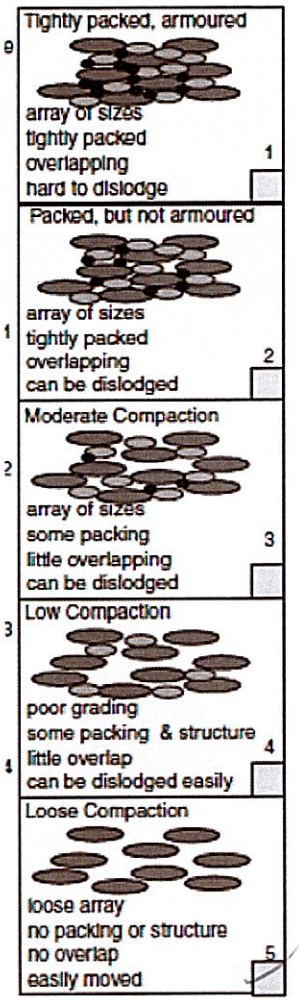
4 LEFT BANK Shape (RANK types)



9 RIGHT BANK Shape (RANK types)



5 Bed Compaction

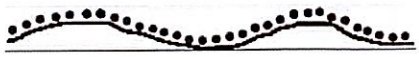


Riparian Zone Structure

Left Bank	
Width (m)	10
Bare (%)	
Grasses (%)	30
Shrubs (%)	40
Trees <10 m high (%)	
Trees >10 m high (%)	20
Exotics (%)	10

Right Bank	
Width (m)	10
Bare (%)	
Grasses (%)	30
Shrubs (%)	40
Trees <10 m high (%)	
Trees >10 m high (%)	20
Exotics (%)	10

Longitudinal Extent of Riparian Vegetation

Category	Description	Category	Description
None	 No trees or shrubs, only exotic grasses or pasture	Occasional clumps	 Clumps of tree among exotic grasses and pastures
Isolated/scattered	 Isolated trees or shrubs among exotic grasses or pasture	Semi-contiguous	 Cleared patches of trees
Regularly space	 Evenly spaced trees among exotic grasses and pastures	Contiguous	 Intact tree line

Comments

Similar to previous. Dense macrophytes/algae + rotting organic material

Hydrobiology

MACROINVERTEBRATE SAMPLING FIELD SHEET

Site Details

Site Number	ABS
Watercourse	
Date (DD/MM/YYYY)	13:00
Time (24 hrs)	2/2/23

Site Name	
Collector (initials)	
Project Code	

Edge/Backwater: Yes ☐ No ☐ QA/QC Residue Yes ☐ No ☐

Rep	No Vials	Collected by	Picked by	Label	Comment
1	1	JH	JH	ABS - Edge	
2					
3					
4					
5					

Variables

Mean Sample Depth (m)	0.5	**Substrate Description (% cover)**			
Mean Wetted Width (m)	50	Bedrock		Gravel (2-4 mm)	
Method:		Boulder (>256 mm)		Sand (0.05- 2 mm)	
Canopy cover (%)	0	Cobble (64-256 mm)		Silt/Clay (<0.05 mm)	100
Shading (%)	0	Pebble (4 – 64 mm)			
Snags and LWD (% cover)		**Microhabitat Attributes (% cover)**			
Detritus (leaves & twigs)	10	Periphyton		Bank overhang veg	
Sticks (<2 cm diam)	20	Moss		Trailing bank veg	
Branches (<15 cm diam)	5	Filamentous algae	30	Blanketing Silt	
Logs (>15 cm diam)		Macrophytes	30	Substrate anoxia	

Comments

soft silty with organics – similar to previous site

Hydrobiology

MACROINVERTEBRATE SAMPLING FIELD SHEET

Bed: Yes ☑ No ☐ Collected by: [|] Picked by: [|] No. vials/reps: [ ] QA/QC Residue Yes ☐ No ☐

Type: Riffle ☐ Run ☐ Pool (rocky/gravel) ☐ Pool (sandy/silt) ☑

Rep	No Vials	Collected by	Picked by	Label	Comment
1		JH	JM	ABS-Bed	
2					
3					
4					
5					

Variables

Mean Sample Depth (m)	0.5	**Substrate Description (% cover)**			
Mean Wetted Width (m)	50	Bedrock		Gravel (2-4 mm)	
Method:		Boulder (>256 mm)		Sand (0.05- 2 mm)	
Canopy cover (%)	0	Cobble (64-256 mm)	10	Silt/Clay (<0.005 mm)	90
Shading (%)	0	Pebble (4 – 64 mm)			
Snags and LWD (% cover)		**Microhabitat Attributes (% cover)**			
Detritus (leaves & twigs)	20	Periphyton	~	Bank overhang veg	0
Sticks (<2 cm diam)	20	Moss	~	Trailing bank veg	0
Branches (<15 cm diam)	—	Filamentous algae	10	Blanketing Silt	0
Logs (>15 cm diam)	—	Macrophytes	10	Substrate anoxia	0

Comments

Similar to prev site

REACH OBSERVATIONS (of 100 m stream length)

Site Details

Site Number	AB7
Watercourse	
Date (DD/MM/YYYY)	3/2/22
Time (24 hrs)	9:45

Site Name	
Collector (initials):	Project Code:
Drone footage time:	length:

Observations

Left Bank land use: Native / cleared	Algae on substrate % cover: —
Left Bank erosion (%): —	Algae in water column % cover: —
Right Bank land use: Native / cleared	Flow level: ☑ None ☐ Low ☐ Moderate ☐ High ☐ Flood
Right Bank erosion %: —	Local catchment erosion %: —
Point Source Discharges ☐ yes ☑ no	Sediment Odour ☑ yes ☐ no, Specify Anoxic / organic
Sediment Deposits ☐ None ☐ Sand ☐ Silt —	Water Odour ☑ yes ☐ no, Specify Anoxic / organic
Bars (bed surface protruding from normal water level) %: —	

Macrohabitat

Cover	Value (%)
Riffle (%)	—
Run (%)	—
Pool (rocky) (%)	20
Pool (sandy/silt) (%)	80
Dry (%)	—

Microhabitat

Cover	Value (%)
LWD (>15 cm dia)	0
SWD (<15 cm dia)	5
Detritus	20
Periphyton	5
Blanketing Silt	Yes
Undercut Banks	—

Substrate Description

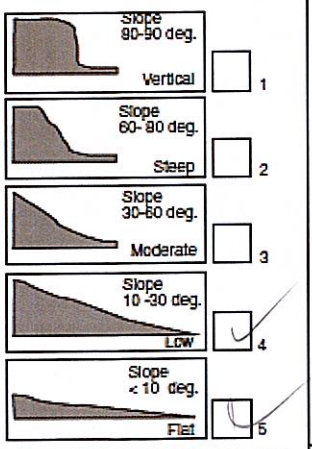
Cover	Value (%)
Bedrock	—
Boulder (>256 mm)	—
Cobble (64-256 mm)	—
Pebble (4-64 mm)	—
Gravel (2-4 mm)	20
Sand (0.05 -2 mm)	—
Silt/Clay (<0.05 mm)	80

Macrophytes and Algae

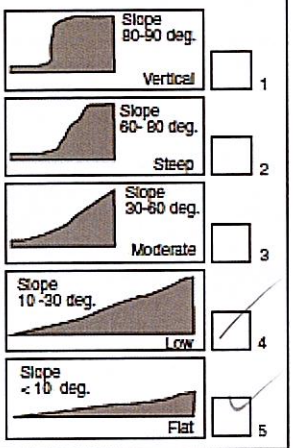
Primary Production	In
Macrophyte % [10]	Edge % [90]
	Run % [ ]
	Riffle % [ ]
	Pool (rocky) % [10]
Algae % [10]	Edge % [100]
	Run % [ ]
	Riffle % [ ]
	Pool (rocky) % [ ]

Macrophyte Botanical Name	Value (%)
1. Typha	70
2. Persicaria	10
3. Acolla	10
4. Lemna	10
5	
6	
7	
8.	

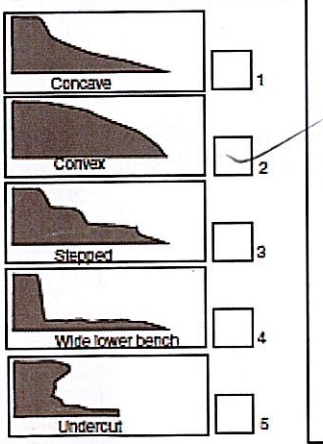
3 LEFT BANK Slope (RANK types)



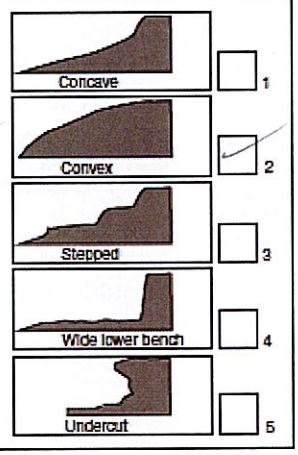
8 RIGHT BANK Slope (RANK types)



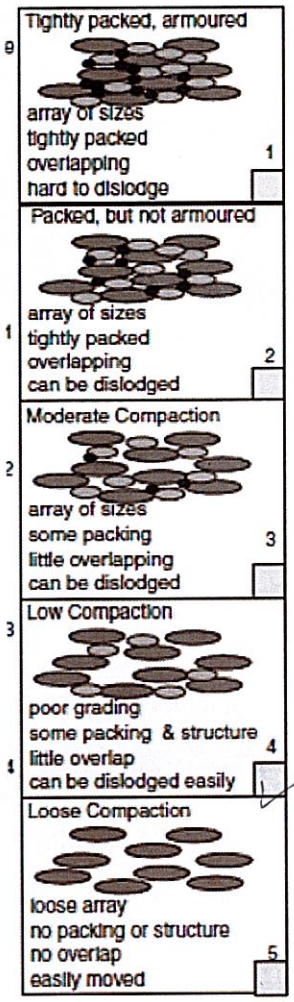
4 LEFT BANK Shape (RANK types)



9 RIGHT BANK Shape (RANK types)



5 Bed Compaction



Riparian Zone Structure

Left Bank	
Width (m)	15
Bare (%)	10
Grasses (%)	10
Shrubs (%)	10
Trees <10 m high (%)	10
Trees >10 m high (%)	30
Exotics (%)	30

Right Bank	
Width (m)	15
Bare (%)	10
Grasses (%)	10
Shrubs (%)	10
Trees <10 m high (%)	10
Trees >10 m high (%)	30
Exotics (%)	30

Longitudinal Extent of Riparian Vegetation

Category	Description	Category	Description
None	 Nq trees or shrubs, only exotic grasses or pasture	Occasional clumps	 Clumps of tree among exotic grasses and pastures
Isolated/scattered	 Isolated trees or shrubs among exotic grasses or pasture	Semi-contiguous	 Cleared patches of trees
Regularly space	 Evenly spaced trees among exotic grasses and pastures	Contiguous	 Intact tree line

Comments

Riparian clearing associated with road crossing (U/S) + bridge crossing (D/S) Site highly overgrown with exotics choking most of channel (Paragrass + gamba (?) grass (see photo)). Water + sediment anoxic smell lots of decaying veg. No access for boat + little for e-fishing / Sytes. Habitat heavily low + lack of open water for large fish. Some macrophytes present (mostly Typha)

Hydrobiology

MACROINVERTEBRATE SAMPLING FIELD SHEET

Site Details

Site Number	AB7
Watercourse	
Date (DD/MM/YYYY)	3/2/23
Time (24 hrs)	10:00

Site Name	
Collector (initials)	
Project Code	

Edge/Backwater: Yes ☑ No ☐ QA/QC Residue Yes ☐ No ☐

Rep	No Vials	Collected by	Picked by	Label	Comment
1		JH	J+I	AB7 - Edg	
2					
3					
4					
5					

Variables

Mean Sample Depth (m)	0.4	**Substrate Description (% cover)**			
Mean Wetted Width (m)	20	Bedrock	—	Gravel (2-4 mm)	—
Method:		Boulder (>256 mm)	—	Sand (0.05- 2 mm)	—
Canopy cover (%)	0	Cobble (64-256 mm)	—	Silt/Clay (<0.05 mm)	100
Shading (%)	10	Pebble (4 – 64 mm)	—		
Snags and LWD (% cover)		**Microhabitat Attributes (% cover)**			
Detritus (leaves & twigs)	30	Periphyton	5	Bank overhang veg	—
Sticks (<2 cm diam)	0	Moss	0	Trailing bank veg	—
Branches (<15 cm diam)	0	Filamentous algae	5	Blanketing Silt	Yes
Logs (>15 cm diam)	0	Macrophytes	65	Substrate anoxia	Yes

Comments

Edge undefined → Dense Typha. Habit largely living/dead Typha

Hydrobiology

MACROINVERTEBRATE SAMPLING FIELD SHEET

Bed: Yes ☑ No ☐ Collected by: [|] Picked by: [|] No. vials/reps: [ ] QA/QC Residue Yes ☐ No ☐

Type: Riffle ☐ Run ☐ Pool (rocky/gravel) ☐ Pool (sandy/silt) ☑

Rep	No Vials	Collected by	Picked by	Label	Comment
1		JH	JC	AB-7 Bed	
2					
3					
4					
5					

Variables

Mean Sample Depth (m)	0.7	**Substrate Description (% cover)**			
Mean Wetted Width (m)	30	Bedrock	—	Gravel (2-4 mm)	10
Method:		Boulder (>256 mm)	—	Sand (0.05- 2 mm)	—
Canopy cover (%)	0	Cobble (64-256 mm)	—	Silt/Clay (<0.005 mm)	90
Shading (%)	0	Pebble (4 – 64 mm)	—		
Snags and LWD (% cover)		**Microhabitat Attributes (% cover)**			
Detritus (leaves & twigs)	40	Periphyton	—	Bank overhang veg	—
Sticks (<2 cm diam)	—	Moss	—	Trailing bank veg	—
Branches (<15 cm diam)	—	Filamentous algae	5	Blanketing Silt	—
Logs (>15 cm diam)	—	Macrophytes	10	Substrate anoxia	—

Comments

Boggy → substrate gravel + organic material
- Habitat diversity low

Hydrobiology

Site Details

Site Number	AB6
Watercourse	
Date (DD/MM/YYYY)	3/2/22
Time (24 hrs)	11:30

Site Name	
Collector (initials):	Project Code:
Drone footage time:	length:

Observations

Left Bank land use: Native/cleared	Algae on substrate % cover: —
Left Bank erosion (%): —	Algae in water column % cover: —
Right Bank land use: Native/cleared	Flow level: ☑ None ☑ Low ☐ Moderate ☐ High ☐ Flood
Right Bank erosion %: —	Local catchment erosion %: —
Point Source Discharges ☐ yes ☑ no	Sediment Odour ☑ yes ☐ no, Specify ...Anoxic...
Sediment Deposits ☑ None ☐ Sand ☐ Silt	Water Odour ☑ yes ☐ no, Specify ...Anoxic...
Bars (bed surface protruding from normal water level) %: —	

Macrohabitat

Cover	Value (%)
Riffle (%)	—
Run (%)	—
Pool (rocky) (%)	—
Pool (sandy/silt) (%)	100
Dry (%)	—

Microhabitat

Cover	Value (%)
LWD (>15 cm dia)	5
SWD (<15 cm dia)	5
Detritus	15
Periphyton	5
Blanketing Silt	—
Undercut Banks	10

Substrate Description

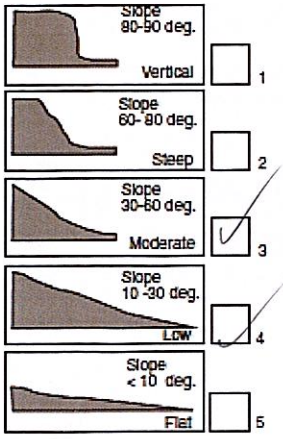
Cover	Value (%)
Bedrock	—
Boulder (>256 mm)	—
Cobble (64-256 mm)	—
Pebble (4-64 mm)	5
Gravel (2-4 mm)	10
Sand (0.05 -2 mm)	—
Silt/Clay (<0.05 mm)	85

Macrophytes and Algae

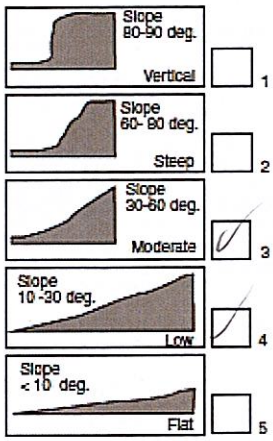
Primary Production	In	
Macrophyte % [75]	Edge % [30]	
	Run % [ ]	
	Riffle % [ ]	
	Pool (rocky) % [70]	
Algae % [20]	Edge % [ ]	
	Run % [ ]	
	Riffle % [ ]	
	Pool (rocky) % [100]	

Macrophyte Botanical Name	Value (%)
1. Ceratophyllum	60
2. Typha	10
3. Nitella	5
4. Lemna	5
5	
6	
7	
8.	

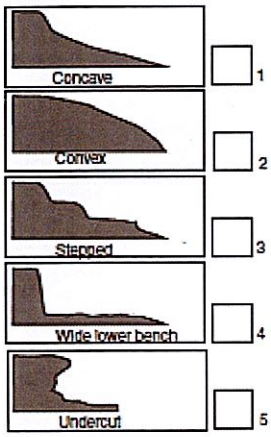
3 LEFT BANK Slope (RANK types)



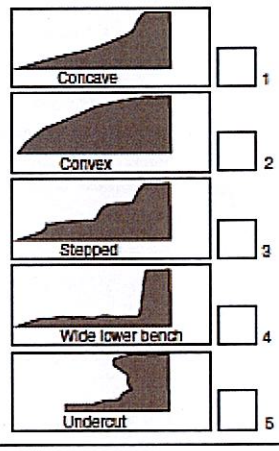
8 RIGHT BANK Slope (RANK types)



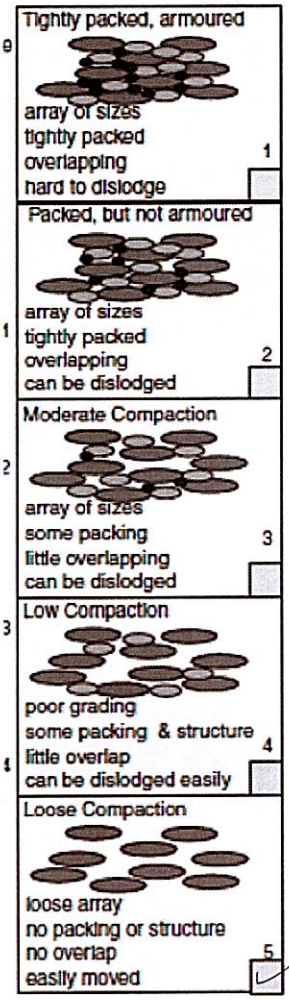
4 LEFT BANK Shape (RANK types)



9 RIGHT BANK Shape (RANK types)



5 Bed Compaction



Riparian Zone Structure

Left Bank	
Width (m)	5
Bare (%)	–
Grasses (%)	15
Shrubs (%)	15
Trees <10 m high (%)	10
Trees >10 m high (%)	30
Exotics (%)	30

Right Bank	
Width (m)	5
Bare (%)	
Grasses (%)	15
Shrubs (%)	15
Trees <10 m high (%)	10
Trees >10 m high (%)	30
Exotics (%)	30

Longitudinal Extent of Riparian Vegetation

Category	Description	Category	Description
None	 No trees or shrubs, only exotic grasses or pasture	Occasional clumps	 Clumps of tree among exotic grasses and pastures
Isolated/scattered	 Isolated trees or shrubs among exotic grasses or pasture	Semi-contiguous	 Cleared patches of trees
Regularly space	 Evenly spaced trees among exotic grasses and pastures	Contiguous	 Intact tree line

Comments

Highly overgrown with paragrass in channel and around pools. Some slow observed upstream. P/S composed of large pools choked with macrophytes (mainly Ceratophyllum + algae). Anoxic smell from water + sediment. Density of vegetation reduced eastwards + E bank, higher habitat diversity compared to other sides → [WD, undercut banks + root masses

Hydrobiology

MACROINVERTEBRATE SAMPLING FIELD SHEET

Site Details

Site Number	AB6
Watercourse	
Date (DD/MM/YYYY)	
Time (24 hrs)	12:00

Site Name	
Collector (initials)	
Project Code	

Edge/Backwater: Yes ☐ No ☐ QA/QC Residue Yes ☐ No ☐

Rep	No Vials	Collected by	Picked by	Label	Comment
1		JH	JH	AB6 - Edge	
2					
3					
4					
5					

Variables

Mean Sample Depth (m)	0.8	**Substrate Description (% cover)**			
Mean Wetted Width (m)	10	Bedrock	—	Gravel (2-4 mm)	—
Method: Sweep		Boulder (>256 mm)	—	Sand (0.05- 2 mm)	—
Canopy cover (%)	10	Cobble (64-256 mm)	—	Silt/Clay (<0.05 mm)	100
Shading (%)	10	Pebble (4 – 64 mm)	—		
Snags and LWD (% cover)		**Microhabitat Attributes (% cover)**			
Detritus (leaves & twigs)	20	Periphyton	5	Bank overhang veg	
Sticks (<2 cm diam)	20	Moss	0	Trailing bank veg	15
Branches (<15 cm diam)	5	Filamentous algae	5	Blanketing Silt	—
Logs (>15 cm diam)	5	Macrophytes	40	Substrate anoxia	—

Comments

Taken from pool with dense ceratophyllum, higher habitat diversity than previous ⇒ Included undercut banks + root masses + logs

Hydrobiology

MACROINVERTEBRATE SAMPLING FIELD SHEET

Bed: Yes ☑ No ☐ Collected by: [|] Picked by: [|] No. vials/reps: [ ] QA/QC Residue Yes ☐ No ☐

Type: Riffle ☐ Run ☐ Pool (rocky/gravel) ☐ Pool (sandy/silt) ☑

Rep	No Vials	Collected by	Picked by	Label	Comment
1		JH	JH	AB6 - Bet	
2					
3					
4					
5					

Variables

Mean Sample Depth (m)	0.8	**Substrate Description (% cover)**			
Mean Wetted Width (m)	10	Bedrock		Gravel (2-4 mm)	
Method:		Boulder (>256 mm)		Sand (0.05- 2 mm)	
Canopy cover (%)	0	Cobble (64-256 mm)		Silt/Clay (<0.005 mm)	100
Shading (%)	0	Pebble (4 – 64 mm)			
Snags and LWD (% cover)		**Microhabitat Attributes (% cover)**			
Detritus (leaves & twigs)	20	Periphyton	0	Bank overhang veg	0
Sticks (<2 cm diam)	5	Moss	0	Trailing bank veg	0
Branches (<15 cm diam)	5	Filamentous algae	0	Blanketing Silt	–
Logs (>15 cm diam)	0	Macrophytes	10	Substrate anoxia	Y.L

Comments

Boggy – lots of debris + decaying veg.
Taken from pool w/ dense ceratophyllum

Hydrobiology

Site Details

Site Number	AB1
Watercourse	
Date (DD/MM/YYYY)	3/2/23
Time (24 hrs)	16:00

Site Name	
Collector (initials):	Project Code:
Drone footage time:	length:

Observations

Left Bank land use: Native	Algae on substrate % cover: 10
Left Bank erosion (%): —	Algae in water column % cover: 10
Right Bank land use: Native	Flow level: ☑ None ☐ Low ☐ Moderate ☐ High ☐ Flood
Right Bank erosion %: —	Local catchment erosion %: —
Point Source Discharges ☐ yes ☑ no	Sediment Odour ☐ yes ☑ no, Specify .....
Sediment Deposits ☐ None ☐ Sand ☐ Silt	Water Odour ☐ yes ☑ no, Specify .....
Bars (bed surface protruding from normal water level) %: —	

Macrohabitat

Cover	Value (%)
Riffle (%)	—
Run (%)	—
Pool (rocky) (%)	100
Pool (sandy/silt) (%)	—
Dry (%)	—

Microhabitat

Cover	Value (%)
LWD (>15 cm dia)	10
SWD (<15 cm dia)	10
Detritus	10
Periphyton	10
Blanketing Silt	—
Undercut Banks	20

Substrate Description

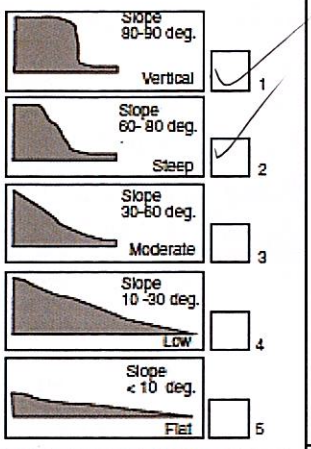
Cover	Value (%)
Bedrock	10
Boulder (>256 mm)	10
Cobble (64-256 mm)	30
Pebble (4-64 mm)	30
Gravel (2-4 mm)	10
Sand (0.05 -2 mm)	5
Silt/Clay (<0.05 mm)	5

Macrophytes and Algae

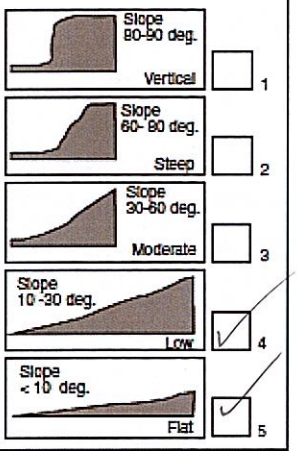
Primary Production	In
Macrophyte % [40]	Edge % [50]
	Run % [ ]
	Riffle % [ ]
	Pool (rocky) % [50]
Algae % [20]	Edge % [10]
	Run % [ ]
	Riffle % [ ]
	Pool (rocky) % [10]

Macrophyte Botanical Name	Value (%)
1. Typha	
2. Ludwigia	
3. Cyperus	
4. Myriophyllum	? 10
5 Ceratophyllum	
6 Acorus	
7 Lemna	
8.	

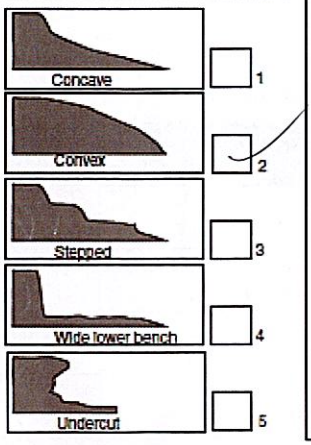
3 LEFT BANK Slope (RANK types)



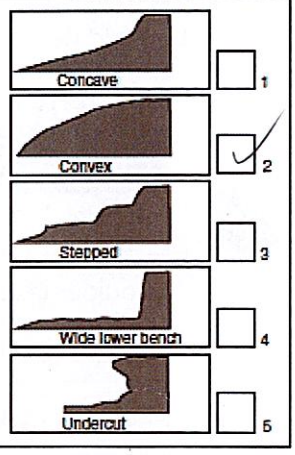
8 RIGHT BANK Slope (RANK types)



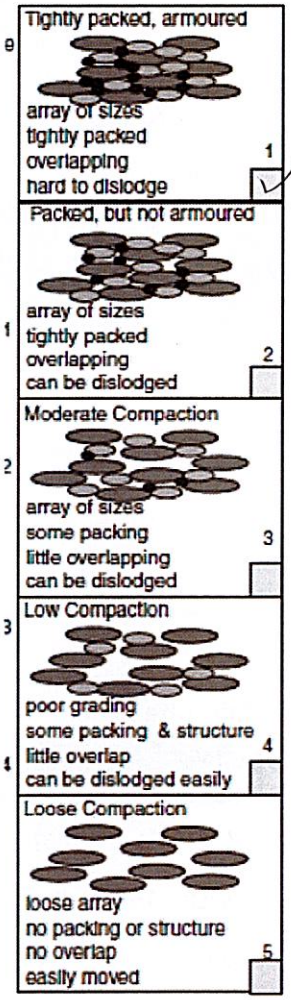
4 LEFT BANK Shape (RANK types)



9 RIGHT BANK Shape (RANK types)



5 Bed Compaction

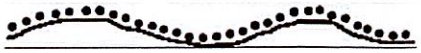


Riparian Zone Structure

Left Bank	
Width (m)	20
Bare (%)	—
Grasses (%)	20
Shrubs (%)	20
Trees <10 m high (%)	10
Trees >10 m high (%)	40
Exotics (%)	10

Right Bank	
Width (m)	10
Bare (%)	—
Grasses (%)	20
Shrubs (%)	20
Trees <10 m high (%)	10
Trees >10 m high (%)	40
Exotics (%)	10

Longitudinal Extent of Riparian Vegetation

Category	Description	Category	Description
None	 No trees or shrubs, only exotic grasses or pasture	Occasional clumps	 Clumps of tree among exotic grasses and pastures
Isolated/scattered	 Isolated trees or shrubs among exotic grasses or pasture	Semi-contiguous	 Cleared patches of trees
Regularly space	 Evenly spaced trees among exotic grasses and pastures	Contiguous	 Intact tree line

Comments

Intact reach, varied habitat, rocky substrate, highly armoured. Undercut banks, LWD. exposed bedrock on banks. Visible periphyton, edge habitat include marking veg + macrophytes but not much debris → water level recently changed. Visible high fish activity. High O_2. Hymenachne starting to colonise (bright green)

Hydrobiology

MACROINVERTEBRATE SAMPLING FIELD SHEET

Site Details

Site Number	AB1
Watercourse	
Date (DD/MM/YYYY)	3/2/23
Time (24 hrs)	16:00

Site Name	
Collector (initials)	
Project Code	

Edge/Backwater: Yes ☑ No ☐ QA/QC Residue Yes ☐ No ☐

Rep	No Vials	Collected by	Picked by	Label	Comment
1		JH	JH	AB1-Edge	
2					
3					
4					
5					

Variables

Mean Sample Depth (m)	0.4	**Substrate Description (% cover)**			
Mean Wetted Width (m)	30	Bedrock	—	Gravel (2-4 mm)	—
Method: Sweep		Boulder (>256 mm)	—	Sand (0.05- 2 mm)	—
Canopy cover (%)	0	Cobble (64-256 mm)	80	Silt/Clay (<0.05 mm)	10
Shading (%)	10	Pebble (4 – 64 mm)	10		
Snags and LWD (% cover)		**Microhabitat Attributes (% cover)**			
Detritus (leaves & twigs)		Periphyton	10	Bank overhang veg	—
Sticks (<2 cm diam)		Moss	—	Trailing bank veg	30
Branches (<15 cm diam)		Filamentous algae	5	Blanketing Silt	—
Logs (>15 cm diam)		Macrophytes	30	Substrate anoxia	

Comments

Edge of macrophytes + submerged grasses / trailing veg. Not much debris

MACROINVERTEBRATE SAMPLING FIELD SHEET

Bed: Yes ☑ No ☐ Collected by: [|] Picked by: [|] No. vials/reps: [ ] QA/QC Residue Yes ☐ No ☐

Type: Riffle ☐ Run ☐ Pool (rocky/gravel) ☑ Pool (sandy/silt) ☐

Rep	No Vials	Collected by	Picked by	Label	Comment
1		JH	JH	ABI-Bed	
2					
3					
4					
5					

Variables

Mean Sample Depth (m)		**Substrate Description (% cover)**			
Mean Wetted Width (m)		Bedrock	—	Gravel (2-4 mm)	—
Method:		Boulder (>256 mm)	10	Sand (0.05- 2 mm)	—
Canopy cover (%)		Cobble (64-256 mm)	30	Silt/Clay (<0.005 mm)	20
Shading (%)		Pebble (4 – 64 mm)	40		
Snags and LWD (% cover)		**Microhabitat Attributes (% cover)**			
Detritus (leaves & twigs)	10	Periphyton	5	Bank overhang veg	
Sticks (<2 cm diam)	—	Moss	0	Trailing bank veg	
Branches (<15 cm diam)	—	Filamentous algae	5	Blanketing Silt	
Logs (>15 cm diam)	—	Macrophytes	20	Substrate anoxia	

Comments

highly armoured, rocky

Hydrobiology

APPENDIX D. WATER QUALITY DATA

Table 5-8 In-situ water quality data provided by client.

Site	Sample date	Temp (°C)	Dissolved Oxygen (%)	Dissolved Oxygen (mg/L)	Electrical Conductivity (µS/cm)	pH
AB9	15/09/2022	20.9	67.4	6.01	547	8.03
AB1	28/02/2023	29.3	67.7	5.2	377	8.65
AB2	27/02/2023	31	72.8	5.34	454	8.87
AB3	28/02/2023	31	72.8	5.34	454	8.87
AB4	28/02/2023	31.5	50.6	3.67	2631	8.25
AB5	7/03/2023	30.4	35.7	2.68	215	7.74
AB6	no result					
AB7	26/10/2022	24	17.40%	1.46	720	6.78
AB8	6/03/2023	34.2	29.7	2.09	672	7.6

Site AB6 was dry during previous attempts for water sampling

APPENDIX E. TABULATED DATA

Sample number				AB1-AA-WB	AB1-CS-WB	AB1-NH-EP	AB1-MS-WB	AB1-PR-EP	AB1-CQ-EP	AB1-OL-EP	AB1-TT-EP	AB1-MA-EP
Date sampled				4/02/2023	4/02/2023	4/02/2023	4/02/2023	2/02/2023	4/02/2023	4/02/2023	4/02/2023	4/02/2023
Species				Ambassis agassizii	Craterocephalus stercusmuscarum	Neosilurus hyrtlii	Macrobrachium sp.	Porochilus rendahli	Cherax quadricarinatus	Oxyeleotris lineolata	Tandanus tandanus	Macquaria ambigua
Common name				Agassiz's perchlet	Flyspecked Hardyhead	Hyrtl's Catfish	Freshwater prawn	Rendahl's Catfish	Crayfish	Sleepy cod	Eeltail Catfish	Yellowbelly
Site				AB1	AB1	AB1	AB1	AB1	AB1	AB1	AB1	AB1
System				Callide Creek U/S	Callide Creek U/S	Callide Creek U/S	Callide Creek U/S	Callide Creek U/S	Callide Creek U/S	Callide Creek U/S	Callide Creek U/S	Callide Creek U/S
Condition				Control	Control	Control	Control	Control	Control	Control	Control	Control
Assessment				Ecological health	Ecological health	Human health	Ecological health	Human health	Human health	Human health	Human health	Human health
Tissue analysed				Whole body	Whole body	Edible portion	Whole body	Edible portion	Edible portion	Edible portion	Edible portion	Edible portion
	Unit	LOR	Screening criteria									
Weight	g	0.1	-	7.9	13	141	3.4	7.7	63	535	238	1150
Arsenic	mg/kg	0.05	-	0.2	0.21	0.07	0.55	0.05	0.5	0.06	0.12	0.06
Barium	mg/kg	0.1	-	6.1	7.4	<0.1	30.4	0.7	47.5	<0.1	0.2	<0.1
Boron	mg/kg	5	-	<5	<5	<5	<5	<5	<5	<5	<5	<5
Chromium	mg/kg	0.05	-	0.79	0.18	<0.05	0.15	2.44	2.41	<0.05	<0.05	<0.05
Copper	mg/kg	0.1	20/2*	1.2	0.6	0.3	23.8	1.2	15.7	1.1	0.7	0.3
Molybdenum	mg/kg	0.05	-	0.1	<0.05	<0.05	<0.05	0.35	0.33	<0.05	<0.05	<0.05
Selenium	mg/kg	0.05	1/2*	0.25	0.17	0.22	0.22	0.16	0.07	0.17	0.26	0.44
Strontium	mg/kg	0.1	-	95.6	93.6	0.8	121	54.3	134	0.6	1.9	0.5
Uranium	mg/kg	0.01	-	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01

Sample number				AB1-AA-WB	AB1-CS-WB	AB1-NH-EP	AB1-MS-WB	AB1-PR-EP	AB1-CQ-EP	AB1-OL-EP	AB1-TT-EP	AB1-MA-EP
Vanadium	mg/kg	0.5	-	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Zinc	mg/kg	0.5	40/15*	48.6	66.7	12.4	44.5	39.5	15.3	7.2	6.1	10.1
Perfluorobutane sulfonic acid (PFBS)	µg/kg	1	-	<1	<1	<1	<1	<1	<1	<1	<1	<1
Perfluoropentane sulfonic acid (PFPeS)	µg/kg	1	-	<1	<1	<1	<1	<1	<1	<1	<1	<1
Perfluorohexane sulfonic acid (PFHxS)	µg/kg	1	-	<1	<1	<1	<1	<1	<1	<1	<1	<1
Perfluoroheptane sulfonic acid (PFHpS)	µg/kg	1	-	<1	<1	<1	<1	<1	<1	<1	<1	<1
Perfluorooctane sulfonic acid (PFOS) - Linear	µg/kg	1	-	<1	<1	<1	<1	2	<1	<1	<1	<1
Perfluorooctane sulfonic acid (PFOS) - Branched	µg/kg	1	-	<1	<1	<1	<1	<1	<1	<1	<1	<1
Perfluorooctane sulfonic acid (PFOS)	µg/kg	1	-	<1	<1	<1	<1	2	<1	<1	<1	<1
Perfluorodecane sulfonic acid (PFDS)	µg/kg	2	-	<2	<2	<2	<2	<2	<2	<2	<2	<2
Perfluorobutanoic acid (PFBA)	µg/kg	5	-	<5	<5	<5	<5	<5	<5	<5	<5	<5
Perfluoropentanoic acid (PFPeA)	µg/kg	2	-	<2	<2	<2	<2	<2	<2	<2	<2	<2
Perfluorohexanoic acid (PFHxA)	µg/kg	1	-	<1	<1	<1	<1	<1	<1	<1	<1	<1
Perfluoroheptanoic acid (PFHpA)	µg/kg	1	-	<1	<1	<1	<1	<1	<1	<1	<1	<1
Perfluorooctanoic acid (PFOA)	µg/kg	1	11.2**	<1	<1	<1	<1	<1	<1	<1	<1	<1
Perfluorononanoic acid (PFNA)	µg/kg	1	-	<1	<1	<1	<1	<1	<1	<1	<1	<1
Perfluorodecanoic acid (PFDA)	µg/kg	1	-	<1	<1	<1	<1	<1	<1	<1	<1	<1
Perfluoroundecanoic acid (PFUnDA)	µg/kg	1	-	<1	<1	<1	<1	<1	<1	<1	<1	<1

Sample number				AB1-AA-WB	AB1-CS-WB	AB1-NH-EP	AB1-MS-WB	AB1-PR-EP	AB1-CQ-EP	AB1-OL-EP	AB1-TT-EP	AB1-MA-EP
Perfluorododecanoic acid (PFDoDA)	µg/kg	2	-	<2	<2	<2	<2	<2	<2	<2	<2	<2
Perfluorotridecanoic acid (PFTrDA)	µg/kg	2	-	<2	<2	<2	<2	<2	<2	<2	<2	<2
Perfluorotetradecanoic acid (PFTeDA)	µg/kg	2	-	<2	<2	<2	<2	<2	<2	<2	<2	<2
Perfluorooctane sulfonamide (FOSA)	µg/kg	5	-	<5	<5	<5	<5	<5	<5	<5	<5	<5
N-Methyl perfluorooctane sulfonamide (MeFOSA)	µg/kg	5	-	<5	<5	<5	<5	<5	<5	<5	<5	<5
N-Ethyl perfluorooctane sulfonamide (EtFOSA)	µg/kg	2	-	<2	<2	<2	<2	<2	<2	<2	<2	<2
N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	µg/kg	2	-	<2	<2	<2	<2	<2	<2	<2	<2	<2
N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	µg/kg	2	-	<2	<2	<2	<2	<2	<2	<2	<2	<2
N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	µg/kg	1	-	<1	<1	<1	<1	<1	<1	<1	<1	<1
N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	µg/kg	1	-	<1	<1	<1	<1	<1	<1	<1	<1	<1
4:2 Fluorotelomer sulfonic acid (4:2 FTS)	µg/kg	2	-	<2	<2	<2	<2	<2	<2	<2	<2	<2
6:2 Fluorotelomer sulfonic acid (6:2 FTS)	µg/kg	2	-	<2	<2	<2	<2	<2	<2	<2	<2	<2
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	µg/kg	2	-	<2	<2	<2	<2	<2	<2	<2	<2	<2
10:2 Fluorotelomer sulfonic acid (10:2 FTS)	µg/kg	2	-	<2	<2	<2	<2	<2	<2	<2	<2	<2
Sum of PFAS	µg/kg	1	-	<1	<1	<1	<1	2	<1	<1	<1	<1
Sum of PFHxS and PFOS	µg/kg	1	1.4/4.6/8.2***	<1	<1	<1	<1	2	<1	<1	<1	<1
Lithium	mg/kg	0.2	-	<0.2	<0.2	<0.2	----	<0.2	<0.2	<0.2	<0.2	<0.2
Thorium	mg/kg	0.01	-	<0.01	<0.01	<0.01	----	<0.01	<0.01	<0.01	<0.01	<0.01

Sample number				AB1-AA-WB	AB1-CS-WB	AB1-NH-EP	AB1-MS-WB	AB1-PR-EP	AB1-CQ-EP	AB1-OL-EP	AB1-TT-EP	AB1-MA-EP
Fluoride	mg/kg	0.2	-	----	----	<0.2	----	----	----	<0.2	<0.2	<0.2

Sample number				AB2-LC-EP	AB2-CS-WB	AB2-MP-WB	AB2-CQ-EP	AB2-CQ-RB	AB2-TT-EP	AB3-LC-EP	AB3-LC-RB	AB3-AA-WB
Date sampled				30/01/2023	31/01/2023	31/01/2023	31/01/2023	30/01/2023	30/01/2023	30/01/2023	30/01/2023	31/01/2023
Species				Lates calcarifer	Craterocephalus stercusmuscarum	Macrobrachium sp.	Cherax quadricarinatus	Cherax quadricarinatus	Tandanus tandanus	Lates calcarifer	Lates calcarifer	Ambassis agassizii
Common name				Barramundi	Flyspecked Hardyhead	Freshwater prawn	Crayfish	Crayfish	Eeltail Catfish	Barramundi	Barramundi	Agassiz's perchlet
Site				AB2	AB2	AB2	AB2	AB2	AB2	AB3	AB3	AB3
System				Lake Callide	Lake Callide	Lake Callide	Lake Callide	Lake Callide	Lake Callide	Lake Callide	Lake Callide	Lake Callide
Condition				Test	Test	Test	Test	Test	Test	Test	Test	Test
Assessment				Human health	Ecological health	Ecological health	Human health	Human health	Human health	Human health	Human health	Ecological health
Tissue analysed				Edible portion	Whole body	Whole body	Edible portion	Rest of body	Edible portion	Edible portion	Rest of body	Whole body
	Unit	LOR	Screening criteria									
Weight	g	0.1	-	11200	6	1.3	10	10	85	10600	10600	8
Arsenic	mg/kg	0.05	-	0.08	0.22	----	0.28	0.27	0.16	0.09	0.06	0.16
Barium	mg/kg	0.1	-	0.1	5.5	----	2.3	2.1	0.7	<0.1	<0.1	3.8
Boron	mg/kg	5	-	<5	<5	----	<5	<5	<5	<5	<5	<5
Chromium	mg/kg	0.05	-	<0.05	0.26	----	0.13	0.14	6.85	<0.05	<0.05	0.22
Copper	mg/kg	0.1	20/2*	0.4	0.6	----	8.1	7.1	1.6	0.4	0.3	0.8
Molybdenum	mg/kg	0.05	-	<0.05	<0.05	----	<0.05	<0.05	0.77	<0.05	<0.05	0.05
Selenium	mg/kg	0.05	1/2*	0.16	0.14	----	0.08	0.08	0.15	0.2	0.18	0.26
Strontium	mg/kg	0.1	-	1.1	104	----	24.9	24.5	2	0.9	0.6	93.5
Uranium	mg/kg	0.01	-	<0.01	<0.01	----	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Vanadium	mg/kg	0.5	-	<0.5	<0.5	----	<0.5	<0.5	1.8	<0.5	<0.5	<0.5
Zinc	mg/kg	0.5	40/15*	5.6	82.6	----	18.8	16.9	6.7	5.7	5.1	41.3
Perfluorobutane sulfonic acid (PFBS)	µg/kg	1	-	<1	<1	<1	<1	<1	<1	<1	<1	<1

Sample number				AB2-LC-EP	AB2-CS-WB	AB2-MP-WB	AB2-CQ-EP	AB2-CQ-RB	AB2-TT-EP	AB3-LC-EP	AB3-LC-RB	AB3-AA-WB
Perfluoropentane sulfonic acid (PFPeS)	µg/kg	1	-	<1	<1	<1	<1	<1	<1	<1	<1	<1
Perfluorohexane sulfonic acid (PFHxS)	µg/kg	1	-	<1	<1	<1	<1	<1	<1	<1	<1	<1
Perfluoroheptane sulfonic acid (PFHpS)	µg/kg	1	-	<1	<1	<1	<1	<1	<1	<1	<1	<1
Perfluorooctane sulfonic acid (PFOS) - Linear	µg/kg	1	-	<1	<1	<1	<1	<1	<1	<1	<1	<1
Perfluorooctane sulfonic acid (PFOS) - Branched	µg/kg	1	-	<1	<1	<1	<1	<1	<1	<1	<1	<1
Perfluorooctane sulfonic acid (PFOS)	µg/kg	1	-	<1	<1	<1	<1	<1	<1	<1	<1	<1
Perfluorodecane sulfonic acid (PFDS)	µg/kg	2	-	<2	<2	<2	<2	<2	<2	<2	<2	<2
Perfluorobutanoic acid (PFBA)	µg/kg	5	-	<5	<5	<5	<5	<5	<5	<5	<5	<5
Perfluoropentanoic acid (PFPeA)	µg/kg	2	-	<2	<2	<2	<2	<2	<2	<2	<2	<2
Perfluorohexanoic acid (PFHxA)	µg/kg	1	-	<1	<1	<1	<1	<1	<1	<1	<1	<1
Perfluoroheptanoic acid (PFHpA)	µg/kg	1	-	<1	<1	<1	<1	<1	<1	<1	<1	<1
Perfluorooctanoic acid (PFOA)	µg/kg	1	11.6**	<1	<1	<1	<1	<1	<1	<1	<1	<1
Perfluorononanoic acid (PFNA)	µg/kg	1	-	<1	<1	<1	<1	<1	<1	<1	<1	<1
Perfluorodecanoic acid (PFDA)	µg/kg	1	-	<1	<1	<1	<1	<1	<1	<1	<1	<1
Perfluoroundecanoic acid (PFUnDA)	µg/kg	1	-	<1	<1	<1	<1	<1	<1	<1	<1	<1
Perfluorododecanoic acid (PFDoDA)	µg/kg	2	-	<2	<2	<2	<2	<2	<2	<2	<2	<2
Perfluorotridecanoic acid (PFTrDA)	µg/kg	2	-	<2	<2	<2	<2	<2	<2	<2	<2	<2
Perfluorotetradecanoic acid (PFTeDA)	µg/kg	2	-	<2	<2	<2	<2	<2	<2	<2	<2	<2
Perfluorooctane sulfonamide (FOSA)	µg/kg	5	-	<5	<5	<5	<5	<5	<5	<5	<5	<5
N-Methyl perfluorooctane sulfonamide (MeFOSA)	µg/kg	5	-	<5	<5	<5	<5	<5	<5	<5	<5	<5
N-Ethyl perfluorooctane sulfonamide (EtFOSA)	µg/kg	2	-	<2	<2	<2	<2	<2	<2	<2	<2	<2
N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	µg/kg	2	-	<2	<2	<2	<2	<2	<2	<2	<2	<2

Sample number				AB2-LC-EP	AB2-CS-WB	AB2-MP-WB	AB2-CQ-EP	AB2-CQ-RB	AB2-TT-EP	AB3-LC-EP	AB3-LC-RB	AB3-AA-WB
N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	µg/kg	2	-	<2	<2	<2	<2	<2	<2	<2	<2	<2
N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	µg/kg	1	-	<1	<1	<1	<1	<1	<1	<1	<1	<1
N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	µg/kg	1	-	<1	<1	<1	<1	<1	<1	<1	<1	<1
4:2 Fluorotelomer sulfonic acid (4:2 FTS)	µg/kg	2	-	<2	<2	<2	<2	<2	<2	<2	<2	<2
6:2 Fluorotelomer sulfonic acid (6:2 FTS)	µg/kg	2	-	<2	<2	<2	<2	<2	<2	<2	<2	<2
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	µg/kg	2	-	<2	<2	<2	<2	<2	<2	<2	<2	<2
10:2 Fluorotelomer sulfonic acid (10:2 FTS)	µg/kg	2	-	<2	<2	<2	<2	<2	<2	<2	<2	<2
Sum of PFAS	µg/kg	1	-	<1	<1	<1	<1	<1	<1	<1	<1	<1
Sum of PFHxS and PFOS	µg/kg	1	1.4/4.6/8.2***	<1	<1	<1	<1	<1	<1	<1	<1	<1
Lithium	mg/kg	0.2	-	<0.2	<0.2	----	<0.2	----	<0.2	<0.2	----	<0.2
Thorium	mg/kg	0.01	-	0.018	<0.01	----	<0.01	----	0.022	<0.01	----	<0.01
Fluoride	mg/kg	0.2	-	<0.2		----		----	<0.2	<0.2	----	----

Sample number				AB3-CS-WB	AB3-MS-WB	AB3-CQ-EP	AB4-AT-WB	AB4-AA-WB	AB4-CS-WB	AB4-PR-EP	AB4-OL-EP	AB4-TT-EP
Date sampled				31/01/2023	31/01/2023	31/01/2023	2/02/2023	2/02/2023	2/02/2023	2/02/2023	2/02/2023	2/02/2023
Species				Craterocephalus stercusmuscarum	Macrobrachium sp.	Cherax quadricarinatus	Atyidae	Ambassis agassizii	Craterocephalus stercusmuscarum	Porochilus rendahli	Oxyeleotris lineolata	Tandanus tandanus
Common name				Flyspecked Hardyhead	Freshwater prawn	Crayfish	Freshwater shrimp	Agassiz's perchlet	Flyspecked Hardyhead	Rendahl's Catfish	Sleepy cod	Eeltail Catfish
Site				AB3	AB3	AB3	AB4	AB4	AB4	AB4	AB4	AB4
System				Lake Callide	Lake Callide	Lake Callide	Callide Creek D/S	Callide Creek D/S	Callide Creek D/S	Callide Creek D/S	Callide Creek D/S	Callide Creek D/S
Condition				Test	Test	Test	Test	Test	Test	Test	Test	Test
Assessment				Ecological health	Ecological health	Human health	Ecological health	Ecological health	Ecological health	Human health	Human health	Human health
Tissue analysed				Whole body	Whole body	Edible portion	Whole body	Whole body	Whole body	Edible portion	Edible portion	Edible portion
	Unit	LOR	Screening criteria									
Weight	g	0.1	-	27	16	121	1.9	3	2.2	2.4	5.1	112
Arsenic	mg/kg	0.05	-	0.22	0.42	0.4	----	----	0.51	----	----	0.16
Barium	mg/kg	0.1	-	2.4	4.4	1.3	----	----	12.9	----	----	<0.1
Boron	mg/kg	5	-	<5	<5	<5	----	----	<5	----	----	<5
Chromium	mg/kg	0.05	-	1.4	0.45	0.22	----	----	0.12	----	----	<0.05
Copper	mg/kg	0.1	20/2*	0.6	17.6	13	----	----	0.7	----	----	0.2
Molybdenum	mg/kg	0.05	-	0.18	0.07	0.05	----	----	<0.05	----	----	<0.05
Selenium	mg/kg	0.05	1/2*	0.2	0.18	0.09	----	----	0.18	----	----	0.12
Strontium	mg/kg	0.1	-	52.1	106	17.6	----	----	109	----	----	0.5
Uranium	mg/kg	0.01	-	<0.01	<0.01	<0.01	----	----	<0.01	----	----	<0.01
Vanadium	mg/kg	0.5	-	<0.5	<0.5	<0.5	----	----	<0.5	----	----	<0.5
Zinc	mg/kg	0.5	40/15*	53.8	24.6	20	----	----	96.5	----	----	5.2
Perfluorobutane sulfonic acid (PFBS)	µg/kg	1	-	<1	<1	<1	<1	<1	<1	<1	<1	<1
Perfluoropentane sulfonic acid (PFPeS)	µg/kg	1	-	<1	<1	<1	<1	<1	<1	<1	<1	<1
Perfluorohexane sulfonic acid (PFHxS)	µg/kg	1	-	<1	<1	<1	<1	<1	<1	<1	<1	1

Sample number				AB3-CS-WB	AB3-MS-WB	AB3-CQ-EP	AB4-AT-WB	AB4-AA-WB	AB4-CS-WB	AB4-PR-EP	AB4-OL-EP	AB4-TT-EP
Perfluoroheptane sulfonic acid (PFHpS)	µg/kg	1	-	<1	<1	<1	<1	<1	<1	<1	<1	<1
Perfluorooctane sulfonic acid (PFOS) - Linear	µg/kg	1	-	<1	<1	<1	3	7	<1	14	1	3
Perfluorooctane sulfonic acid (PFOS) - Branched	µg/kg	1	-	<1	<1	<1	<1	3	<1	2	<1	1
Perfluorooctane sulfonic acid (PFOS)	µg/kg	1	-	<1	<1	<1	3	10	<1	16	1	4
Perfluorodecane sulfonic acid (PFDS)	µg/kg	2	-	<2	<2	<2	<2	<2	<2	<2	<2	<2
Perfluorobutanoic acid (PFBA)	µg/kg	5	-	<5	<5	<5	<5	<5	<5	<5	<5	<5
Perfluoropentanoic acid (PFPeA)	µg/kg	2	-	<2	<2	<2	<2	<2	<2	<2	<2	<2
Perfluorohexanoic acid (PFHxA)	µg/kg	1	-	<1	<1	<1	<1	<1	<1	<1	<1	<1
Perfluoroheptanoic acid (PFHpA)	µg/kg	1	-	<1	<1	<1	<1	<1	<1	<1	<1	<1
Perfluorooctanoic acid (PFOA)	µg/kg	1	11.2**	<1	<1	<1	<1	<1	<1	<1	<1	<1
Perfluorononanoic acid (PFNA)	µg/kg	1	-	<1	<1	<1	<1	<1	<1	<1	<1	<1
Perfluorodecanoic acid (PFDA)	µg/kg	1	-	<1	<1	<1	<1	<1	<1	<1	<1	<1
Perfluoroundecanoic acid (PFUnDA)	µg/kg	1	-	<1	<1	<1	<1	<1	<1	<1	<1	<1
Perfluorododecanoic acid (PFDoDA)	µg/kg	2	-	<2	<2	<2	<2	<2	<2	<2	<2	<2
Perfluorotridecanoic acid (PFTrDA)	µg/kg	2	-	<2	<2	<2	<2	<2	<2	<2	<2	<2
Perfluorotetradecanoic acid (PFTeDA)	µg/kg	2	-	<2	<2	<2	<2	<2	<2	<2	<2	<2
Perfluorooctane sulfonamide (FOSA)	µg/kg	5	-	<5	<5	<5	<5	<5	<5	<5	<5	<5
N-Methyl perfluorooctane sulfonamide (MeFOSA)	µg/kg	5	-	<5	<5	<5	<5	<5	<5	<5	<5	<5
N-Ethyl perfluorooctane sulfonamide (EtFOSA)	µg/kg	2	-	<2	<2	<2	<2	<2	<2	<2	<2	<2
N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	µg/kg	2	-	<2	<2	<2	<2	<2	<2	<2	<2	<2

Sample number				AB3-CS-WB	AB3-MS-WB	AB3-CQ-EP	AB4-AT-WB	AB4-AA-WB	AB4-CS-WB	AB4-PR-EP	AB4-OL-EP	AB4-TT-EP
N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	µg/kg	2	-	<2	<2	<2	<2	<2	<2	<2	<2	<2
N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	µg/kg	1	-	<1	<1	<1	<1	<1	<1	<1	<1	<1
N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	µg/kg	1	-	<1	<1	<1	<1	<1	<1	<1	<1	<1
4:2 Fluorotelomer sulfonic acid (4:2 FTS)	µg/kg	2	-	<2	<2	<2	<2	<2	<2	<2	<2	<2
6:2 Fluorotelomer sulfonic acid (6:2 FTS)	µg/kg	2	-	<2	<2	<2	<2	<2	<2	<2	<2	<2
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	µg/kg	2	-	<2	<2	<2	<2	<2	<2	<2	<2	<2
10:2 Fluorotelomer sulfonic acid (10:2 FTS)	µg/kg	2	-	<2	<2	<2	<2	<2	<2	<2	<2	<2
Sum of PFAS	µg/kg	1	-	<1	<1	<1	3	10	<1	16	1	5
Sum of PFHxS and PFOS	µg/kg	1	1.4/4.6/8.2***	<1	<1	<1	3	10	<1	16	1	5
Lithium	mg/kg	0.2	-	<0.2	<0.2	<0.2	----	----	----	----	<0.2	<0.2
Thorium	mg/kg	0.01	-	<0.01	<0.01	<0.01	----	----	----	----	<0.01	<0.01
Fluoride	mg/kg	0.2	-	----	----	6.3	----	----	----	----		<0.2

Sample number				AB5-AA-WB	AB5-PR-EP	AB7-AT-WB	AB7-AA-WB	AB7-CS-WB	AB8-AA-WB	AB8-CS-WB	AB8-NH-EP	AB8-MA-EP
Date sampled				2/02/2023	2/02/2023	3/02/2023	3/02/2023	3/02/2023	1/02/2023	1/02/2023	1/02/2023	1/02/2023
Species				Ambassis agassizii	Porochilus rendahli	Atyidae	Ambassis agassizii	Craterocephalus stercusmuscarum	Ambassis agassizii	Craterocephalus stercusmuscarum	Neosilurus hyrtlii	Macquaria ambigua
Common name				Agassiz's perchlet	Rendahl's Catfish	Freshwater shrimp	Agassiz's perchlet	Flyspecked Hardyhead	Agassiz's perchlet	Flyspecked Hardyhead	Hyrtl's Catfish	Yellowbelly
Site				AB5	AB5	AB7	AB7	AB7	AB8	AB8	AB8	AB8
System				Callide Creek D/S	Callide Creek D/S	Callide Creek D/S	Callide Creek D/S	Callide Creek D/S	Callide Creek D/S	Callide Creek D/S	Callide Creek D/S	Callide Creek D/S
Condition				Test	Test	Test	Test	Test	Test	Test	Test	Test
Assessment				Ecological health	Human health	Ecological health	Ecological health	Ecological health	Ecological health	Ecological health	Human health	Human health
Tissue analysed				Whole body	Edible portion	Whole body	Whole body	Whole body	Whole body	Whole body	Edible portion	Edible portion
	Unit	LOR	Screening criteria									
Weight	g	0.1	-	0.9	39	1.2	1.4	0.6	15	17	13	154
Arsenic	mg/kg	0.05	-	----	0.06	----	----	----	0.15	0.2	<0.05	0.06
Barium	mg/kg	0.1	-	----	1.2	----	----	----	6	5.6	0.3	1
Boron	mg/kg	5	-	----	<5	----	----	----	<5	<5	<5	<5
Chromium	mg/kg	0.05	-	----	1.76	----	----	----	0.48	0.25	<0.05	<0.05
Copper	mg/kg	0.1	20/2*	----	1	----	----	----	0.6	0.5	0.3	0.4
Molybdenum	mg/kg	0.05	-	----	0.24	----	----	----	0.09	0.05	<0.05	<0.05
Selenium	mg/kg	0.05	1/2*	----	0.1	----	----	----	0.13	0.11	0.21	0.52
Strontium	mg/kg	0.1	-	----	55.5	----	----	----	82.6	79.6	7.6	27
Uranium	mg/kg	0.01	-	----	<0.01	----	----	----	<0.01	<0.01	<0.01	<0.01
Vanadium	mg/kg	0.5	-	----	<0.5	----	----	----	<0.5	<0.5	<0.5	<0.5

Sample number				AB5-AA-WB	AB5-PR-EP	AB7-AT-WB	AB7-AA-WB	AB7-CS-WB	AB8-AA-WB	AB8-CS-WB	AB8-NH-EP	AB8-MA-EP
Zinc	mg/kg	0.5	40/15*	----	49.2	----	----	----	40.2	50	14.1	9.8
Perfluorobutane sulfonic acid (PFBS)	µg/kg	1	-	<1	<1	<1	<1	<2	<1	<1	<1	<1
Perfluoropentane sulfonic acid (PFPeS)	µg/kg	1	-	<1	<1	<1	<1	<2	<1	<1	<1	<1
Perfluorohexane sulfonic acid (PFHxS)	µg/kg	1	-	<1	<1	<1	<1	<2	<1	<1	<1	<1
Perfluoroheptane sulfonic acid (PFHpS)	µg/kg	1	-	<1	<1	<1	<1	<2	<1	<1	<1	<1
Perfluorooctane sulfonic acid (PFOS) - Linear	µg/kg	1	-	35	42	28	66	30	82	64	7	4
Perfluorooctane sulfonic acid (PFOS) - Branched	µg/kg	1	-	5	2	3	18	10	7	4	1	1
Perfluorooctane sulfonic acid (PFOS)	µg/kg	1	-	40	44	31	84	40	89	68	8	5
Perfluorodecane sulfonic acid (PFDS)	µg/kg	2	-	<2	<2	<2	<2	<2	<2	<2	<2	<2
Perfluorobutanoic acid (PFBA)	µg/kg	5	-	<5	<5	<5	<5	<5	<5	<5	<5	<5
Perfluoropentanoic acid (PFPeA)	µg/kg	2	-	<2	<2	<2	<2	<2	<2	<2	<2	<2
Perfluorohexanoic acid (PFHxA)	µg/kg	1	-	<1	<1	<1	<1	<2	<1	<1	<1	<1
Perfluoroheptanoic acid (PFHpA)	µg/kg	1	-	<1	<1	<1	<1	<2	<1	<1	<1	<1
Perfluorooctanoic acid (PFOA)	µg/kg	1	11.2**	<1	<1	<1	<1	<2	<1	<1	<1	<1
Perfluorononanoic acid (PFNA)	µg/kg	1	-	<1	<1	<1	<1	<2	<1	<1	<1	<1
Perfluorodecanoic acid (PFDA)	µg/kg	1	-	<1	<1	<1	<1	<2	<1	<1	<1	<1
Perfluoroundecanoic acid (PFUnDA)	µg/kg	1	-	<1	<1	<1	<1	<2	<1	<1	<1	<1
Perfluorododecanoic acid (PFDoDA)	µg/kg	2	-	<2	<2	<2	<2	<2	<2	<2	<2	<2
Perfluorotridecanoic acid (PFTrDA)	µg/kg	2	-	<2	<2	<2	<2	<2	<2	<2	<2	<2
Perfluorotetradecanoic acid (PFTeDA)	µg/kg	2	-	<2	<2	<2	<2	<6	<2	<2	<2	<2

Sample number				AB5-AA-WB	AB5-PR-EP	AB7-AT-WB	AB7-AA-WB	AB7-CS-WB	AB8-AA-WB	AB8-CS-WB	AB8-NH-EP	AB8-MA-EP
Perfluorooctane sulfonamide (FOSA)	µg/kg	5	-	<5	<5	<5	<5	<5	<5	<5	<5	<5
N-Methyl perfluorooctane sulfonamide (MeFOSA)	µg/kg	5	-	<5	<5	<5	<5	<6	<5	<5	<5	<5
N-Ethyl perfluorooctane sulfonamide (EtFOSA)	µg/kg	2	-	<2	<2	<2	<2	<6	<2	<2	<2	<2
N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	µg/kg	2	-	<2	<2	<2	<2	<6	<2	<2	<2	<2
N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	µg/kg	2	-	<2	<2	<2	<2	<6	<2	<2	<2	<2
N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	µg/kg	1	-	<1	<1	<1	<1	<2	<1	<1	<1	<1
N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	µg/kg	1	-	<1	<1	<1	<1	<2	<1	<1	<1	<1
4:2 Fluorotelomer sulfonic acid (4:2 FTS)	µg/kg	2	-	<2	<2	<2	<2	<2	<2	<2	<2	<2
6:2 Fluorotelomer sulfonic acid (6:2 FTS)	µg/kg	2	-	<2	<2	<2	<2	<2	<2	<2	<2	<2
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	µg/kg	2	-	<2	<2	<2	<2	<2	<2	<2	<2	<2
10:2 Fluorotelomer sulfonic acid (10:2 FTS)	µg/kg	2	-	<2	<2	<2	<2	<2	<2	<2	<2	<2
Sum of PFAS	µg/kg	1	-	40	44	31	84	40	89	68	8	5
Sum of PFHxS and PFOS	µg/kg	1	1.4/4.6/8.2***	40	44	31	84	40	89	68	8	5
Lithium	mg/kg	0.2	-	----	<0.2	----	----	----	<0.2	<0.2	<0.2	<0.2
Thorium	mg/kg	0.01	-	----	<0.01	----	----	----	<0.01	<0.01	<0.01	<0.01
Fluoride	mg/kg	0.2	-	----	----	----	----	----	----	----	----	3.5

Sample number				AB8-MA-RB	AB9-AA-WB	AB9-NH-EP	AB9-MS-WB	AB9-TT-EP	AB2-LC-DU
Date sampled				30/01/2023	1/02/2023	1/02/2023	1/02/2023	1/02/2023	30/01/2023
Species				Macquaria ambigua	Ambassis agassizii	Neosilurus hyrtlii	Macrobrachium sp.	Tandanus tandanus	Lates calcarifer
Common name				Yellowbelly	Agassiz's perchlet	Hyrtl's Catfish	Freshwater prawn	Eeltail Catfish	Barramundi
Site				AB8	AB9	AB9	AB9	AB9	AB2
System				Callide Creek D/S	Lake Kroombit	Lake Kroombit	Lake Kroombit	Lake Kroombit	Lake Callide
Condition				Test	Reference	Reference	Reference	Reference	Test
Assessment				Human health	Ecological health	Human health	Ecological health	Human health	Human health
Tissue analysed				Rest of body	Whole body	Edible portion	Whole body	Edible portion	Edible portion
	Unit	LOR	Screening criteria						
Weight	g	0.1	-	154	19	15	4.3	12.5	11200
Arsenic	mg/kg	0.05	-	0.06	0.17	<0.05	0.33	<0.05	0.07
Barium	mg/kg	0.1	-	0.2	1.6	<0.1	19.2	0.2	<0.1
Boron	mg/kg	5	-	<5	<5	<5	<5	<5	<5
Chromium	mg/kg	0.05	-	<0.05	0.09	0.6	0.42	<0.05	<0.05
Copper	mg/kg	0.1	20/2*	0.4	0.5	0.4	16.7	0.3	0.3
Molybdenum	mg/kg	0.05	-	<0.05	<0.05	0.07	0.06	<0.05	<0.05
Selenium	mg/kg	0.05	1/2*	0.49	0.2	0.14	0.22	0.12	0.18
Strontium	mg/kg	0.1	-	6.2	41.6	1	78.4	0.5	0.8
Uranium	mg/kg	0.01	-	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Vanadium	mg/kg	0.5	-	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Zinc	mg/kg	0.5	40/15*	7.5	34.9	11.5	29.8	7	4.9
Perfluorobutane sulfonic acid (PFBS)	µg/kg	1	-	<1	<1	<1	<1	<1	<1
Perfluoropentane sulfonic acid (PFPeS)	µg/kg	1	-	<1	<1	<1	<1	<1	<1
Perfluorohexane sulfonic acid (PFHxS)	µg/kg	1	-	<1	<1	<1	<1	<1	<1
Perfluoroheptane sulfonic acid (PFHpS)	µg/kg	1	-	<1	<1	<1	<1	<1	<1

Sample number				AB8-MA-RB	AB9-AA-WB	AB9-NH-EP	AB9-MS-WB	AB9-TT-EP	AB2-LC-DU
Perfluorooctane sulfonic acid (PFOS) - Linear	µg/kg	1	-	4	<1	<1	<1	<1	<1
Perfluorooctane sulfonic acid (PFOS) - Branched	µg/kg	1	-	2	<1	<1	<1	<1	<1
Perfluorooctane sulfonic acid (PFOS)	µg/kg	1	-	6	<1	<1	<1	<1	<1
Perfluorodecane sulfonic acid (PFDS)	µg/kg	2	-	<2	<2	<2	<2	<2	<2
Perfluorobutanoic acid (PFBA)	µg/kg	5	-	<5	<5	<5	<5	<5	<5
Perfluoropentanoic acid (PFPeA)	µg/kg	2	-	<2	<2	<2	<2	<2	<2
Perfluorohexanoic acid (PFHxA)	µg/kg	1	-	<1	<1	<1	<1	<1	<1
Perfluoroheptanoic acid (PFHpA)	µg/kg	1	-	<1	<1	<1	<1	<1	<1
Perfluorooctanoic acid (PFOA)	µg/kg	1	11.2**	<1	<1	<1	<1	<1	<1
Perfluorononanoic acid (PFNA)	µg/kg	1	-	<1	<1	<1	<1	<1	<1
Perfluorodecanoic acid (PFDA)	µg/kg	1	-	<1	<1	<1	<1	<1	<1
Perfluoroundecanoic acid (PFUnDA)	µg/kg	1	-	<1	<1	<1	<1	<1	<1
Perfluorododecanoic acid (PFDoDA)	µg/kg	2	-	<2	<2	<2	<2	<2	<2
Perfluorotridecanoic acid (PFTrDA)	µg/kg	2	-	<2	<2	<2	<2	<2	<2
Perfluorotetradecanoic acid (PFTeDA)	µg/kg	2	-	<2	<2	<2	<2	<2	<2
Perfluorooctane sulfonamide (FOSA)	µg/kg	5	-	<5	<5	<5	<5	<5	<5
N-Methyl perfluorooctane sulfonamide (MeFOSA)	µg/kg	5	-	<5	<5	<5	<5	<5	<5
N-Ethyl perfluorooctane sulfonamide (EtFOSA)	µg/kg	2	-	<2	<2	<2	<2	<2	<2
N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	µg/kg	2	-	<2	<2	<2	<2	<2	<2
N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	µg/kg	2	-	<2	<2	<2	<2	<2	<2
N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	µg/kg	1	-	<1	<1	<1	<1	<1	<1
N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	µg/kg	1	-	<1	<1	<1	<1	<1	<1
4:2 Fluorotelomer sulfonic acid (4:2 FTS)	µg/kg	2	-	<2	<2	<2	<2	<2	<2

Sample number				AB8-MA-RB	AB9-AA-WB	AB9-NH-EP	AB9-MS-WB	AB9-TT-EP	AB2-LC-DU
6:2 Fluorotelomer sulfonic acid (6:2 FTS)	µg/kg	2	-	<2	<2	<2	<2	<2	<2
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	µg/kg	2	-	<2	<2	<2	<2	<2	<2
10:2 Fluorotelomer sulfonic acid (10:2 FTS)	µg/kg	2	-	<2	<2	<2	<2	<2	<2
Sum of PFAS	µg/kg	1	-	6	<1	<1	<1	<1	<1
Sum of PFHxS and PFOS	µg/kg	1	1.4/4.6/8.2***	6	<1	<1	<1	<1	<1
Lithium	mg/kg	0.2	-	----	<0.2	<0.2	<0.2	<0.2	-
Thorium	mg/kg	0.01	-	----	<0.01	<0.01	0.022	<0.01	-
Fluoride	mg/kg	0.2	-	----	----	----	----	----	-

Sample number				AB3-CS-DU	AB9-NH-DU	AB1-MA-DU	AB1-MA-TR	AB1-NH-TR
Date sampled				30/01/2023	30/01/2023	30/1/2023	30/1/2023	30/01/2023
Species				Craterocephalus stercusmuscarum	Neosilurus hyrtlii	Macquaria ambigua	Macquaria ambigua	Neosilurus hyrtlii
Common name				Flyspecked Hardyhead	Hyrtl's Catfish	Yellowbelly	Yellowbelly	Hyrtl's Catfish
Site				AB3	AB9	AB1	AB1	AB1
System				Lake Callide	Lake Kroombit	Callide Creek U/S	Callide Creek U/S	Callide Creek U/S
Condition				Test	Reference	Control	Control	Control
Assessment				Ecological health	Human health	Human health	Human health	Human health
Tissue analysed				Whole body	Edible portion	Edible portion	Edible portion	Edible portion
	Unit	LOR	Screening criteria					
Weight	g	0.1	-	27	15	1150	-	-
Arsenic	mg/kg	0.05	-	0.24	<0.05	0.05	< 2	< 2
Barium	mg/kg	0.1	-	2.8	0.2	<0.1	< 10	< 10
Boron	mg/kg	5	-	<5	<5	<5	< 10	< 25
Chromium	mg/kg	0.05	-	1.44	0.55	<0.05	< 5	< 5

Sample number				AB3-CS-DU	AB9-NH-DU	AB1-MA-DU	AB1-MA-TR	AB1-NH-TR
Copper	mg/kg	0.1	20/2*	0.6	0.4	0.3	< 5	< 5
Molybdenum	mg/kg	0.05	-	0.2	0.07	<0.05	< 5	< 5
Selenium	mg/kg	0.05	1/2*	0.21	0.13	0.4	< 2	< 2
Strontium	mg/kg	0.1	-	61.3	5.9	0.4	< 10	< 10
Uranium	mg/kg	0.01	-	<0.01	<0.01	<0.01	< 10	< 10
Vanadium	mg/kg	0.5	-	<0.5	<0.5	<0.5	< 10	< 10
Zinc	mg/kg	0.5	40/15*	54.3	15.6	9.3	7.8	10
Perfluorobutane sulfonic acid (PFBS)	µg/kg	1	-	<1	<1	<1	<1	<1
Perfluoropentane sulfonic acid (PFPeS)	µg/kg	1	-	<1	<1	<1	<1	<1
Perfluorohexane sulfonic acid (PFHxS)	µg/kg	1	-	<1	<1	<1	<1	<1
Perfluoroheptane sulfonic acid (PFHpS)	µg/kg	1	-	<1	<1	<1	<1	<1
Perfluorooctane sulfonic acid (PFOS) - Linear	µg/kg	1	-	<1	<1	<1	<1	<1
Perfluorooctane sulfonic acid (PFOS) - Branched	µg/kg	1	-	<1	<1	<1	<1	<1
Perfluorooctane sulfonic acid (PFOS)	µg/kg	1	-	<1	<1	<1	<1	<1
Perfluorodecane sulfonic acid (PFDS)	µg/kg	2	-	<2	<2	<2	<2	<2
Perfluorobutanoic acid (PFBA)	µg/kg	5	-	<5	<5	<5	<5	<5
Perfluoropentanoic acid (PFPeA)	µg/kg	2	-	<2	<2	<2	<2	<2
Perfluorohexanoic acid (PFHxA)	µg/kg	1	-	<1	<1	<1	<1	<1
Perfluoroheptanoic acid (PFHpA)	µg/kg	1	-	<1	<1	<1	<1	<1
Perfluorooctanoic acid (PFOA)	µg/kg	1	11.2**	<1	<1	<1	<1	<1

Sample number				AB3-CS-DU	AB9-NH-DU	AB1-MA-DU	AB1-MA-TR	AB1-NH-TR
Perfluorononanoic acid (PFNA)	µg/kg	1	-	<1	<1	<1	<1	<1
Perfluorodecanoic acid (PFDA)	µg/kg	1	-	<1	<1	<1	<1	<1
Perfluoroundecanoic acid (PFUnDA)	µg/kg	1	-	<1	<1	<1	<1	<1
Perfluorododecanoic acid (PFDoDA)	µg/kg	2	-	<2	<2	<2	<2	<2
Perfluorotridecanoic acid (PFTrDA)	µg/kg	2	-	<2	<2	<2	<2	<2
Perfluorotetradecanoic acid (PFTeDA)	µg/kg	2	-	<2	<2	<2	<2	<2
Perfluorooctane sulfonamide (FOSA)	µg/kg	5	-	<5	<5	<5	<5	<5
N-Methyl perfluorooctane sulfonamide (MeFOSA)	µg/kg	5	-	<5	<5	<5	<5	<5
N-Ethyl perfluorooctane sulfonamide (EtFOSA)	µg/kg	2	-	<2	<2	<2	<2	<2
N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	µg/kg	2	-	<2	<2	<2	<2	<2
N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	µg/kg	2	-	<2	<2	<2	<2	<2
N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	µg/kg	1	-	<1	<1	<1	<1	<1
N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	µg/kg	1	-	<1	<1	<1	<1	<1
4:2 Fluorotelomer sulfonic acid (4:2 FTS)	µg/kg	2	-	<2	<2	<2	<2	<2
6:2 Fluorotelomer sulfonic acid (6:2 FTS)	µg/kg	2	-	<2	<2	<2	<2	<2

Sample number				AB3-CS-DU	AB9-NH-DU	AB1-MA-DU	AB1-MA-TR	AB1-NH-TR
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	µg/kg	2	-	<2	<2	<2	<2	<2
10:2 Fluorotelomer sulfonic acid (10:2 FTS)	µg/kg	2	-	<2	<2	<2	<2	<2
Sum of PFAS	µg/kg	1	-	<1	<1	<1	<1	<1
Sum of PFHxS and PFOS	µg/kg	1	1.4/4.6/8.2***	<1	<1	<1	<1	<1
Lithium	mg/kg	0.2	-	-	-	-	-	-
Thorium	mg/kg	0.01	-	-	-	-	-	-
Fluoride	mg/kg	0.2	-	-	-	-	-	-

* Crustacean GEL/ Fish GEL. Units mg/kgbw/day.

** Human health screening value. Units µg/kgbw/day.

***Human health screening value/Mammalian diet/ Avian diet. Units µg/kgbw/day.

APPENDIX F. LABORATORY REPORTS

Hydrobiology QLD Pty Ltd
Unit 27/43 Lang Parade
Auchenflower
QLD 4066

Attention: **Josh Hatton**

Report **968084-S**
Project name
Project ID B22096
Received Date Feb 24, 2023

Client Sample ID			**ES2304523-036**
Sample Matrix			**Solid**
Eurofins Sample No.			**B23-Ma0002543**
Date Sampled			**Feb 04, 2023**
Test/Reference	LOR	Unit	
Heavy Metals			
Arsenic	2	mg/kg	< 2
Barium	10	mg/kg	< 10
Boron	10	mg/kg	< 10
Chromium	5	mg/kg	< 5
Copper	5	mg/kg	< 5
Lithium	5	mg/kg	< 5
Molybdenum	5	mg/kg	< 5
Selenium	2	mg/kg	< 2
Strontium	10	mg/kg	< 10
Thallium	10	mg/kg	< 10
Uranium	10	mg/kg	< 10
Vanadium	10	mg/kg	< 10
Zinc	5	mg/kg	7.8
Perfluoroalkyl carboxylic acids (PFCAs)			
Perfluorobutanoic acid (PFBA)[N11]	5	ug/kg	< 5
Perfluoropentanoic acid (PFPeA)[N11]	5	ug/kg	< 5
Perfluorohexanoic acid (PFHxA)[N11]	5	ug/kg	< 5
Perfluoroheptanoic acid (PFHpA)[N11]	5	ug/kg	< 5
Perfluorooctanoic acid (PFOA)[N11]	5	ug/kg	< 5
Perfluorononanoic acid (PFNA)[N11]	5	ug/kg	< 5
Perfluorodecanoic acid (PFDA)[N11]	5	ug/kg	< 5
Perfluoroundecanoic acid (PFUnDA)[N11]	5	ug/kg	< 5
Perfluorododecanoic acid (PFDoDA)[N11]	5	ug/kg	< 5
Perfluorotridecanoic acid (PFTrDA)[N15]	5	ug/kg	< 5
Perfluorotetradecanoic acid (PFTeDA)[N11]	5	ug/kg	< 5
13C4-PFBA (surr.)	1	%	74
13C5-PFPeA (surr.)	1	%	131
13C5-PFHxA (surr.)	1	%	87
13C4-PFHpA (surr.)	1	%	75
13C8-PFOA (surr.)	1	%	107
13C5-PFNA (surr.)	1	%	124
13C6-PFDA (surr.)	1	%	136
13C2-PFUnDA (surr.)	1	%	115
13C2-PFDoDA (surr.)	1	%	86
13C2-PFTeDA (surr.)	1	%	76

Client Sample ID			ES2304523-036
Sample Matrix			Solid
Eurofins Sample No.			B23-Ma0002543
Date Sampled			Feb 04, 2023
Test/Reference	LOR	Unit	
Perfluoroalkyl sulfonamido substances			
Perfluorooctane sulfonamide (FOSA)[N11]	5	ug/kg	< 5
N-methylperfluoro-1-octane sulfonamide (N-MeFOSA)[N11]	5	ug/kg	< 5
N-ethylperfluoro-1-octane sulfonamide (N-EtFOSA)[N11]	5	ug/kg	< 5
2-(N-methylperfluoro-1-octane sulfonamido)-ethanol(N-MeFOSE)[N11]	5	ug/kg	< 5
2-(N-ethylperfluoro-1-octane sulfonamido)-ethanol(N-EtFOSE)[N11]	5	ug/kg	< 5
N-ethyl-perfluorooctanesulfonamidoacetic acid (N-EtFOSAA)[N11]	10	ug/kg	< 10
N-methyl-perfluorooctanesulfonamidoacetic acid (N-MeFOSAA)[N11]	10	ug/kg	< 10
13C8-FOSA (surr.)	1	%	28
D3-N-MeFOSA (surr.)	1	%	INT
D5-N-EtFOSA (surr.)	1	%	INT
D7-N-MeFOSE (surr.)	1	%	INT
D9-N-EtFOSE (surr.)	1	%	INT
D5-N-EtFOSAA (surr.)	1	%	118
D3-N-MeFOSAA (surr.)	1	%	119
Perfluoroalkyl sulfonic acids (PFSAs)			
Perfluorobutanesulfonic acid (PFBS)[N11]	5	ug/kg	< 5
Perfluorononanesulfonic acid (PFNS)[N15]	5	ug/kg	< 5
Perfluoropropanesulfonic acid (PFPrS)[N15]	5	ug/kg	< 5
Perfluoropentanesulfonic acid (PFPeS)[N15]	5	ug/kg	< 5
Perfluorohexanesulfonic acid (PFHxS)[N11]	5	ug/kg	< 5
Perfluoroheptanesulfonic acid (PFHpS)[N15]	5	ug/kg	< 5
Perfluorooctanesulfonic acid (PFOS)[N11]	5	ug/kg	< 5
Perfluorodecanesulfonic acid (PFDS)[N15]	5	ug/kg	< 5
13C3-PFBS (surr.)	1	%	81
18O2-PFHxS (surr.)	1	%	103
13C8-PFOS (surr.)	1	%	88
n:2 Fluorotelomer sulfonic acids (n:2 FTSAs)			
1H.1H.2H.2H-perfluorohexanesulfonic acid (4:2 FTSA)[N11]	5	ug/kg	< 5
1H.1H.2H.2H-perfluorooctanesulfonic acid(6:2 FTSA)[N11]	10	ug/kg	< 10
1H.1H.2H.2H-perfluorodecanesulfonic acid (8:2 FTSA)[N11]	5	ug/kg	< 5
1H.1H.2H.2H-perfluorododecanesulfonic acid (10:2 FTSA)[N11]	5	ug/kg	< 5
13C2-4:2 FTSA (surr.)	1	%	143
13C2-6:2 FTSA (surr.)	1	%	115
13C2-8:2 FTSA (surr.)	1	%	78
13C2-10:2 FTSA (surr.)	1	%	191
PFASs Summations			
Sum (PFHxS + PFOS)*	5	ug/kg	< 5
Sum of US EPA PFAS (PFOS + PFOA)*	5	ug/kg	< 5
Sum of enHealth PFAS (PFHxS + PFOS + PFOA)*	5	ug/kg	< 5
Sum of WA DWER PFAS (n=10)*	10	ug/kg	< 10
Sum of PFASs (n=30)*	50	ug/kg	< 50

Sample History

Where samples are submitted/analysed over several days, the last date of extraction is reported.

If the date and time of sampling are not provided, the Laboratory will not be responsible for compromised results should testing be performed outside the recommended holding time.

Description	Testing Site	Extracted	Holding Time
Heavy Metals	Melbourne	Apr 03, 2023	28 Days
- Method: LTM-MET-3040 Metals in Waters, Soils & Sediments by ICP-MS			
Per- and Polyfluoroalkyl Substances (PFASs)			
Perfluoroalkyl carboxylic acids (PFCAs)	Brisbane	Mar 01, 2023	28 Days
- Method: LTM-ORG-2100 Per- and Polyfluoroalkyl Substances (PFAS)			
Perfluoroalkyl sulfonamido substances	Brisbane	Mar 01, 2023	28 Days
- Method: LTM-ORG-2100 Per- and Polyfluoroalkyl Substances (PFAS)			
Perfluoroalkyl sulfonic acids (PFSAs)	Brisbane	Mar 01, 2023	28 Days
- Method: LTM-ORG-2100 Per- and Polyfluoroalkyl Substances (PFAS)			
n:2 Fluorotelomer sulfonic acids (n:2 FTSAs)	Brisbane	Mar 01, 2023	28 Days
- Method: LTM-ORG-2100 Per- and Polyfluoroalkyl Substances (PFAS)			

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Project Name:
Project ID: B22096

Order No.:
Report #: 968084
Phone: 0431 647 627
Fax:

Received: Feb 24, 2023 3:47 PM
Due: Mar 3, 2023
Priority: 5 Day
Contact Name: Josh Hatton

Eurofins Analytical Services Manager : Alana Wadsworth

Sample Detail						Arsenic	Barium	Boron	Chromium	Copper	Lithium	Molybdenum	Selenium	Strontium	Thallium	Uranium	Vanadium	Zinc	Per- and Polyfluoroalkyl Substances (PFASs)
Brisbane Laboratory - NATA # 1261 Site # 20794						X	X	X	X	X	X	X	X	X	X	X	X	X	X
External Laboratory																			
No	**Sample ID**	**Sample Date**	**Sampling Time**	**Matrix**	**LAB ID**														
1	ES2304523-001	Jan 30, 2023		Fish	B23-Ma0002542	X	X	X	X	X	X	X	X	X	X	X	X	X	X
2	ES2304523-036	Feb 04, 2023		Fish	B23-Ma0002543	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Test Counts						2	2	2	2	2	2	2	2	2	2	2	2	2	2

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Internal Quality Control Review and Glossary

General

1. Laboratory QC results for Method Blanks, Duplicates, Matrix Spikes, and Laboratory Control Samples follows guidelines delineated in the National Environment Protection (Assessment of Site Contamination) Measure 1999, as amended May 2013 and are included in this QC report where applicable. Additional QC data may be available on request.
2. All soil/sediment/solid results are reported on a dry basis, unless otherwise stated.
3. All biota/food results are reported on a wet weight basis on the edible portion, unless otherwise stated.
4. Actual LORs are matrix dependant. Quoted LORs may be raised where sample extracts are diluted due to interferences.
5. Results are uncorrected for matrix spikes or surrogate recoveries except for PFAS compounds.
6. SVOC analysis on waters are performed on homogenised, unfiltered samples, unless noted otherwise.
7. Samples were analysed on an 'as received' basis.
8. Information identified on this report with blue colour, indicates data provided by customer that may have an impact on the results.
9. This report replaces any interim results previously issued.

Holding Times

Please refer to 'Sample Preservation and Container Guide' for holding times (QS3001).

For samples received on the last day of holding time, notification of testing requirements should have been received at least 6 hours prior to sample receipt deadlines as stated on the SRA.

If the Laboratory did not receive the information in the required timeframe, and regardless of any other integrity issues, suitably qualified results may still be reported.

Holding times apply from the date of sampling, therefore compliance to these may be outside the laboratory's control.

For VOCs containing vinyl chloride, styrene and 2-chloroethyl vinyl ether the holding time is 7 days however for all other VOCs such as BTEX or C6-10 TRH then the holding time is 14 days.

Units

mg/kg: milligrams per kilogram
mg/L: milligrams per litre
µg/L: micrograms per litre
ppm: parts per million
ppb: parts per billion
%: Percentage
org/100 mL: Organisms per 100 millilitres
NTU: Nephelometric Turbidity Units
MPN/100 mL: Most Probable Number of organisms per 100 millilitres
CFU: Colony forming unit

Terms

APHA	American Public Health Association
COC	Chain of Custody
CP	Client Parent - QC was performed on samples pertaining to this report
CRM	Certified Reference Material (ISO17034) - reported as percent recovery.
Dry	Where a moisture has been determined on a solid sample the result is expressed on a dry basis.
Duplicate	A second piece of analysis from the same sample and reported in the same units as the result to show comparison.
LOR	Limit of Reporting.
LCS	Laboratory Control Sample - reported as percent recovery.
Method Blank	In the case of solid samples these are performed on laboratory certified clean sands and in the case of water samples these are performed on de-ionised water.
NCP	Non-Client Parent - QC performed on samples not pertaining to this report, QC is representative of the sequence or batch that client samples were analysed within.
RPD	Relative Percent Difference between two Duplicate pieces of analysis.
SPIKE	Addition of the analyte to the sample and reported as percentage recovery.
SRA	Sample Receipt Advice
Surr - Surrogate	The addition of a like compound to the analyte target and reported as percentage recovery.
TBTO	Tributyltin oxide (*bis*-tributyltin oxide) - individual tributyltin compounds cannot be identified separately in the environment however free tributyltin was measured and its values were converted stoichiometrically into tributyltin oxide for comparison with regulatory limits.
TCLP	Toxicity Characteristic Leaching Procedure
TEQ	Toxic Equivalency Quotient or Total Equivalence
QSM	US Department of Defense Quality Systems Manual Version 5.4
US EPA	United States Environmental Protection Agency
WA DWER	Sum of PFBA, PFPeA, PFHxA, PFHpA, PFOA, PFBS, PFHxS, PFOS, 6:2 FTSA, 8:2 FTSA

QC - Acceptance Criteria

The acceptance criteria should be used as a guide only and may be different when site specific Sampling Analysis and Quality Plan (SAQP) have been implemented

RPD Duplicates: Global RPD Duplicates Acceptance Criteria is 30% however the following acceptance guidelines are equally applicable:

Results <10 times the LOR: No Limit

Results between 10-20 times the LOR: RPD must lie between 0-50%

Results >20 times the LOR : RPD must lie between 0-30%

NOTE: pH duplicates are reported as a range not as RPD

Surrogate Recoveries: Recoveries must lie between 20-130% for Speciated Phenols & 50-150% for PFAS

PFAS field samples that contain surrogate recoveries in excess of the QC limit designated in QSM 5.4 where no positive PFAS results have been reported have been reviewed and no data was affected.

QC Data General Comments

1. Where a result is reported as a less than (<), higher than the nominated LOR, this is due to either matrix interference, extract dilution required due to interferences or contaminant levels within the sample, high moisture content or insufficient sample provided.
2. Duplicate data shown within this report that states the word "BATCH" is a Batch Duplicate from outside of your sample batch, but within the laboratory sample batch at a 1:10 ratio. The Parent and Duplicate data shown is not data from your samples.
3. pH and Free Chlorine analysed in the laboratory - Analysis on this test must begin within 30 minutes of sampling. Therefore, laboratory analysis is unlikely to be completed within holding time.Analysis will begin as soon as possible after sample receipt.
4. Recovery Data (Spikes & Surrogates) - where chromatographic interference does not allow the determination of recovery the term "INT" appears against that analyte.
5. For Matrix Spikes and LCS results a dash "-" in the report means that the specific analyte was not added to the QC sample.
6. Duplicate RPDs are calculated from raw analytical data thus it is possible to have two sets of data.

Quality Control Results

Test	Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
Method Blank							
Heavy Metals							
Arsenic	mg/kg	< 2			2	Pass	
Barium	mg/kg	< 10			10	Pass	
Boron	mg/kg	< 10			10	Pass	
Chromium	mg/kg	< 5			5	Pass	
Copper	mg/kg	< 5			5	Pass	
Lithium	mg/kg	< 5			5	Pass	
Molybdenum	mg/kg	< 5			5	Pass	
Selenium	mg/kg	< 2			2	Pass	
Strontium	mg/kg	< 10			10	Pass	
Thallium	mg/kg	< 10			10	Pass	
Uranium	mg/kg	< 10			10	Pass	
Vanadium	mg/kg	< 10			10	Pass	
Zinc	mg/kg	< 5			5	Pass	
Method Blank							
Perfluoroalkyl carboxylic acids (PFCAs)							
Perfluorobutanoic acid (PFBA)	ug/kg	< 5			5	Pass	
Perfluoropentanoic acid (PFPeA)	ug/kg	< 5			5	Pass	
Perfluorohexanoic acid (PFHxA)	ug/kg	< 5			5	Pass	
Perfluoroheptanoic acid (PFHpA)	ug/kg	< 5			5	Pass	
Perfluorooctanoic acid (PFOA)	ug/kg	< 5			5	Pass	
Perfluorononanoic acid (PFNA)	ug/kg	< 5			5	Pass	
Perfluorodecanoic acid (PFDA)	ug/kg	< 5			5	Pass	
Perfluoroundecanoic acid (PFUnDA)	ug/kg	< 5			5	Pass	
Perfluorododecanoic acid (PFDoDA)	ug/kg	< 5			5	Pass	
Perfluorotridecanoic acid (PFTrDA)	ug/kg	< 5			5	Pass	
Perfluorotetradecanoic acid (PFTeDA)	ug/kg	< 5			5	Pass	
Method Blank							
Perfluoroalkyl sulfonamido substances							
Perfluorooctane sulfonamide (FOSA)	ug/kg	< 5			5	Pass	
N-methylperfluoro-1-octane sulfonamide (N-MeFOSA)	ug/kg	< 5			5	Pass	
N-ethylperfluoro-1-octane sulfonamide (N-EtFOSA)	ug/kg	< 5			5	Pass	
2-(N-methylperfluoro-1-octane sulfonamido)-ethanol(N-MeFOSE)	ug/kg	< 5			5	Pass	
2-(N-ethylperfluoro-1-octane sulfonamido)-ethanol(N-EtFOSE)	ug/kg	< 5			5	Pass	
N-ethyl-perfluorooctanesulfonamidoacetic acid (N-EtFOSAA)	ug/kg	< 10			10	Pass	
N-methyl-perfluorooctanesulfonamidoacetic acid (N-MeFOSAA)	ug/kg	< 10			10	Pass	
Method Blank							
Perfluoroalkyl sulfonic acids (PFSAs)							
Perfluorobutanesulfonic acid (PFBS)	ug/kg	< 5			5	Pass	
Perfluorononanesulfonic acid (PFNS)	ug/kg	< 5			5	Pass	
Perfluoropropanesulfonic acid (PFPrS)	ug/kg	< 5			5	Pass	
Perfluoropentanesulfonic acid (PFPeS)	ug/kg	< 5			5	Pass	
Perfluorohexanesulfonic acid (PFHxS)	ug/kg	< 5			5	Pass	
Perfluoroheptanesulfonic acid (PFHpS)	ug/kg	< 5			5	Pass	
Perfluorooctanesulfonic acid (PFOS)	ug/kg	< 5			5	Pass	
Perfluorodecanesulfonic acid (PFDS)	ug/kg	< 5			5	Pass	
Method Blank							
n:2 Fluorotelomer sulfonic acids (n:2 FTSAs)							
1H.1H.2H.2H-perfluorohexanesulfonic acid (4:2 FTSA)	ug/kg	< 5			5	Pass	
1H.1H.2H.2H-perfluorooctanesulfonic acid(6:2 FTSA)	ug/kg	< 10			10	Pass	

Test	Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
1H.1H.2H.2H-perfluorodecanesulfonic acid (8:2 FTSA)	ug/kg	< 5			5	Pass	
1H.1H.2H.2H-perfluorododecanesulfonic acid (10:2 FTSA)	ug/kg	< 5			5	Pass	
LCS - % Recovery							
Heavy Metals							
Arsenic	%	102			80-120	Pass	
Barium	%	101			80-120	Pass	
Boron	%	95			80-120	Pass	
Chromium	%	106			80-120	Pass	
Copper	%	102			80-120	Pass	
Lithium	%	102			80-120	Pass	
Molybdenum	%	109			80-120	Pass	
Selenium	%	103			80-120	Pass	
Strontium	%	96			80-120	Pass	
Thallium	%	120			80-120	Pass	
Uranium	%	114			80-120	Pass	
Vanadium	%	106			80-120	Pass	
Zinc	%	97			80-120	Pass	
LCS - % Recovery							
Perfluoroalkyl carboxylic acids (PFCAs)							
Perfluorobutanoic acid (PFBA)	%	99			50-150	Pass	
Perfluoropentanoic acid (PFPeA)	%	94			50-150	Pass	
Perfluorohexanoic acid (PFHxA)	%	93			50-150	Pass	
Perfluoroheptanoic acid (PFHpA)	%	82			50-150	Pass	
Perfluorooctanoic acid (PFOA)	%	85			50-150	Pass	
Perfluorononanoic acid (PFNA)	%	94			50-150	Pass	
Perfluorodecanoic acid (PFDA)	%	86			50-150	Pass	
Perfluoroundecanoic acid (PFUnDA)	%	92			50-150	Pass	
Perfluorododecanoic acid (PFDoDA)	%	101			50-150	Pass	
Perfluorotridecanoic acid (PFTrDA)	%	144			50-150	Pass	
Perfluorotetradecanoic acid (PFTeDA)	%	74			50-150	Pass	
LCS - % Recovery							
Perfluoroalkyl sulfonamido substances							
Perfluorooctane sulfonamide (FOSA)	%	78			50-150	Pass	
N-methylperfluoro-1-octane sulfonamide (N-MeFOSA)	%	104			50-150	Pass	
N-ethylperfluoro-1-octane sulfonamide (N-EtFOSA)	%	72			50-150	Pass	
2-(N-methylperfluoro-1-octane sulfonamido)-ethanol(N-MeFOSE)	%	100			50-150	Pass	
2-(N-ethylperfluoro-1-octane sulfonamido)-ethanol(N-EtFOSE)	%	102			50-150	Pass	
N-ethyl-perfluorooctanesulfonamidoacetic acid (N-EtFOSAA)	%	101			50-150	Pass	
N-methyl-perfluorooctanesulfonamidoacetic acid (N-MeFOSAA)	%	101			50-150	Pass	
LCS - % Recovery							
Perfluoroalkyl sulfonic acids (PFSAs)							
Perfluorobutanesulfonic acid (PFBS)	%	85			50-150	Pass	
Perfluorononanesulfonic acid (PFNS)	%	87			50-150	Pass	
Perfluoropropanesulfonic acid (PFPrS)	%	106			50-150	Pass	
Perfluoropentanesulfonic acid (PFPeS)	%	52			50-150	Pass	
Perfluorohexanesulfonic acid (PFHxS)	%	100			50-150	Pass	
Perfluoroheptanesulfonic acid (PFHpS)	%	97			50-150	Pass	
Perfluorooctanesulfonic acid (PFOS)	%	92			50-150	Pass	
Perfluorodecanesulfonic acid (PFDS)	%	74			50-150	Pass	
LCS - % Recovery							
n:2 Fluorotelomer sulfonic acids (n:2 FTSAs)							
1H.1H.2H.2H-perfluorohexanesulfonic acid (4:2 FTSA)	%	125			50-150	Pass	
1H.1H.2H.2H-perfluorooctanesulfonic acid(6:2 FTSA)	%	111			50-150	Pass	
1H.1H.2H.2H-perfluorodecanesulfonic acid (8:2 FTSA)	%	96			50-150	Pass	
1H.1H.2H.2H-perfluorododecanesulfonic acid (10:2 FTSA)	%	126			50-150	Pass	

Test	Lab Sample ID	QA Source	Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
Spike - % Recovery									
Heavy Metals				Result 1					
Arsenic	M23-Ma0039803	NCP	%	99			75-125	Pass	
Barium	M23-Ma0039803	NCP	%	106			75-125	Pass	
Boron	M23-Ma0041836	NCP	%	80			75-125	Pass	
Chromium	M23-Ma0041836	NCP	%	80			75-125	Pass	
Copper	M23-Ma0041836	NCP	%	81			75-125	Pass	
Lithium	M23-Ma0041836	NCP	%	78			75-125	Pass	
Molybdenum	M23-Ma0041836	NCP	%	82			75-125	Pass	
Selenium	M23-Ma0039803	NCP	%	96			75-125	Pass	
Strontium	M23-Ma0036586	NCP	%	97			75-125	Pass	
Thallium	M23-Ma0041836	NCP	%	80			75-125	Pass	
Uranium	M23-Ma0041836	NCP	%	89			75-125	Pass	
Vanadium	M23-Ma0041836	NCP	%	102			75-125	Pass	
Zinc	M23-Ma0041836	NCP	%	78			75-125	Pass	
Spike - % Recovery									
Perfluoroalkyl carboxylic acids (PFCAs)				Result 1					
Perfluorobutanoic acid (PFBA)	B23-Ma0002543	CP	%	101			50-150	Pass	
Perfluoropentanoic acid (PFPeA)	B23-Ma0002543	CP	%	97			50-150	Pass	
Perfluorohexanoic acid (PFHxA)	B23-Ma0002543	CP	%	92			50-150	Pass	
Perfluoroheptanoic acid (PFHpA)	B23-Ma0002543	CP	%	87			50-150	Pass	
Perfluorooctanoic acid (PFOA)	B23-Ma0002543	CP	%	78			50-150	Pass	
Perfluorononanoic acid (PFNA)	B23-Ma0002543	CP	%	84			50-150	Pass	
Perfluorodecanoic acid (PFDA)	B23-Ma0002543	CP	%	81			50-150	Pass	
Perfluoroundecanoic acid (PFUnDA)	B23-Ma0002543	CP	%	101			50-150	Pass	
Perfluorododecanoic acid (PFDoDA)	B23-Ma0002543	CP	%	106			50-150	Pass	
Perfluorotridecanoic acid (PFTrDA)	B23-Ma0002543	CP	%	60			50-150	Pass	
Perfluorotetradecanoic acid (PFTeDA)	B23-Ma0002543	CP	%	113			50-150	Pass	
Spike - % Recovery									
Perfluoroalkyl sulfonamido substances				Result 1					
Perfluorooctane sulfonamide (FOSA)	B23-Ma0002543	CP	%	70			50-150	Pass	
N-methylperfluoro-1-octane sulfonamide (N-MeFOSA)	B23-Ma0002543	CP	%	83			50-150	Pass	
N-ethylperfluoro-1-octane sulfonamide (N-EtFOSA)	B23-Ma0002543	CP	%	70			50-150	Pass	
2-(N-methylperfluoro-1-octane sulfonamido)-ethanol(N-MeFOSE)	B23-Ma0002543	CP	%	147			50-150	Pass	
2-(N-ethylperfluoro-1-octane sulfonamido)-ethanol(N-EtFOSE)	B23-Ma0002543	CP	%	94			50-150	Pass	
N-ethyl-perfluorooctanesulfonamidoacetic acid (N-EtFOSAA)	B23-Ma0002543	CP	%	85			50-150	Pass	
N-methyl-perfluorooctanesulfonamidoacetic acid (N-MeFOSAA)	B23-Ma0002543	CP	%	109			50-150	Pass	
Spike - % Recovery									
Perfluoroalkyl sulfonic acids (PFSAs)				Result 1					
Perfluorobutanesulfonic acid (PFBS)	B23-Ma0002543	CP	%	80			50-150	Pass	
Perfluorononanesulfonic acid (PFNS)	B23-Ma0002543	CP	%	89			50-150	Pass	
Perfluoropropanesulfonic acid (PFPrS)	B23-Ma0002543	CP	%	118			50-150	Pass	
Perfluoropentanesulfonic acid (PFPeS)	B23-Ma0002543	CP	%	54			50-150	Pass	

Test	Lab Sample ID	QA Source	Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
Perfluorohexanesulfonic acid (PFHxS)	B23-Ma0002543	CP	%	102			50-150	Pass	
Perfluoroheptanesulfonic acid (PFHpS)	B23-Ma0002543	CP	%	100			50-150	Pass	
Perfluorooctanesulfonic acid (PFOS)	B23-Ma0002543	CP	%	94			50-150	Pass	
Perfluorodecanesulfonic acid (PFDS)	B23-Ma0002543	CP	%	62			50-150	Pass	
Spike - % Recovery									
n:2 Fluorotelomer sulfonic acids (n:2 FTSAs)				Result 1					
1H.1H.2H.2H-perfluorohexanesulfonic acid (4:2 FTSA)	B23-Ma0002543	CP	%	113			50-150	Pass	
1H.1H.2H.2H-perfluorooctanesulfonic acid(6:2 FTSA)	B23-Ma0002543	CP	%	112			50-150	Pass	
1H.1H.2H.2H-perfluorodecanesulfonic acid (8:2 FTSA)	B23-Ma0002543	CP	%	94			50-150	Pass	
1H.1H.2H.2H-perfluorododecanesulfonic acid (10:2 FTSA)	B23-Ma0002543	CP	%	108			50-150	Pass	
Test	**Lab Sample ID**	**QA Source**	**Units**	**Result 1**			**Acceptance Limits**	**Pass Limits**	**Qualifying Code**
Duplicate									
Heavy Metals				Result 1	Result 2	RPD			
Arsenic	B23-Ma0002543	CP	mg/kg	< 2	< 2	<1	30%	Pass	
Barium	B23-Ma0002543	CP	mg/kg	< 10	< 10	<1	30%	Pass	
Boron	B23-Ma0002543	CP	mg/kg	< 10	< 10	<1	30%	Pass	
Chromium	B23-Ma0002543	CP	mg/kg	< 5	< 5	<1	30%	Pass	
Copper	B23-Ma0002543	CP	mg/kg	< 5	< 5	<1	30%	Pass	
Lithium	B23-Ma0002543	CP	mg/kg	< 5	< 5	<1	30%	Pass	
Molybdenum	B23-Ma0002543	CP	mg/kg	< 5	< 5	<1	30%	Pass	
Selenium	B23-Ma0002543	CP	mg/kg	< 2	< 2	<1	30%	Pass	
Strontium	B23-Ma0002543	CP	mg/kg	< 10	< 10	<1	30%	Pass	
Thallium	B23-Ma0002543	CP	mg/kg	< 10	< 10	<1	30%	Pass	
Uranium	B23-Ma0002543	CP	mg/kg	< 10	< 10	<1	30%	Pass	
Vanadium	B23-Ma0002543	CP	mg/kg	< 10	< 10	<1	30%	Pass	
Zinc	B23-Ma0002543	CP	mg/kg	7.8	7.8	<1	30%	Pass	
Duplicate									
Perfluoroalkyl carboxylic acids (PFCAs)				Result 1	Result 2	RPD			
Perfluorobutanoic acid (PFBA)	B23-Ma0002543	CP	ug/kg	< 5	< 5	<1	30%	Pass	
Perfluoropentanoic acid (PFPeA)	B23-Ma0002543	CP	ug/kg	< 5	< 5	<1	30%	Pass	
Perfluorohexanoic acid (PFHxA)	B23-Ma0002543	CP	ug/kg	< 5	< 5	<1	30%	Pass	
Perfluoroheptanoic acid (PFHpA)	B23-Ma0002543	CP	ug/kg	< 5	< 5	<1	30%	Pass	
Perfluorooctanoic acid (PFOA)	B23-Ma0002543	CP	ug/kg	< 5	< 5	<1	30%	Pass	
Perfluorononanoic acid (PFNA)	B23-Ma0002543	CP	ug/kg	< 5	< 5	<1	30%	Pass	
Perfluorodecanoic acid (PFDA)	B23-Ma0002543	CP	ug/kg	< 5	< 5	<1	30%	Pass	
Perfluoroundecanoic acid (PFUnDA)	B23-Ma0002543	CP	ug/kg	< 5	< 5	<1	30%	Pass	
Perfluorododecanoic acid (PFDoDA)	B23-Ma0002543	CP	ug/kg	< 5	< 5	<1	30%	Pass	
Perfluorotridecanoic acid (PFTrDA)	B23-Ma0002543	CP	ug/kg	< 5	< 5	<1	30%	Pass	
Perfluorotetradecanoic acid (PFTeDA)	B23-Ma0002543	CP	ug/kg	< 5	< 5	<1	30%	Pass	

Duplicate									
Perfluoroalkyl sulfonamido substances				Result 1	Result 2	RPD			
Perfluorooctane sulfonamide (FOSA)	B23-Ma0002543	CP	ug/kg	< 5	< 5	<1	30%	Pass	
N-methylperfluoro-1-octane sulfonamide (N-MeFOSA)	B23-Ma0002543	CP	ug/kg	< 5	< 5	<1	30%	Pass	
N-ethylperfluoro-1-octane sulfonamide (N-EtFOSA)	B23-Ma0002543	CP	ug/kg	< 5	< 5	<1	30%	Pass	
2-(N-methylperfluoro-1-octane sulfonamido)-ethanol(N-MeFOSE)	B23-Ma0002543	CP	ug/kg	< 5	< 5	<1	30%	Pass	
2-(N-ethylperfluoro-1-octane sulfonamido)-ethanol(N-EtFOSE)	B23-Ma0002543	CP	ug/kg	< 5	< 5	<1	30%	Pass	
N-ethyl-perfluorooctanesulfonamidoacetic acid (N-EtFOSAA)	B23-Ma0002543	CP	ug/kg	< 10	< 10	<1	30%	Pass	
N-methyl-perfluorooctanesulfonamidoacetic acid (N-MeFOSAA)	B23-Ma0002543	CP	ug/kg	< 10	< 10	<1	30%	Pass	
Duplicate									
Perfluoroalkyl sulfonic acids (PFSAs)				Result 1	Result 2	RPD			
Perfluorobutanesulfonic acid (PFBS)	B23-Ma0002543	CP	ug/kg	< 5	< 5	<1	30%	Pass	
Perfluorononanesulfonic acid (PFNS)	B23-Ma0002543	CP	ug/kg	< 5	< 5	<1	30%	Pass	
Perfluoropropanesulfonic acid (PFPrS)	B23-Ma0002543	CP	ug/kg	< 5	< 5	<1	30%	Pass	
Perfluoropentanesulfonic acid (PFPeS)	B23-Ma0002543	CP	ug/kg	< 5	< 5	<1	30%	Pass	
Perfluorohexanesulfonic acid (PFHxS)	B23-Ma0002543	CP	ug/kg	< 5	< 5	<1	30%	Pass	
Perfluoroheptanesulfonic acid (PFHpS)	B23-Ma0002543	CP	ug/kg	< 5	< 5	<1	30%	Pass	
Perfluorooctanesulfonic acid (PFOS)	B23-Ma0002543	CP	ug/kg	< 5	< 5	<1	30%	Pass	
Perfluorodecanesulfonic acid (PFDS)	B23-Ma0002543	CP	ug/kg	< 5	< 5	<1	30%	Pass	
Duplicate									
n:2 Fluorotelomer sulfonic acids (n:2 FTSAs)				Result 1	Result 2	RPD			
1H.1H.2H.2H-perfluorohexanesulfonic acid (4:2 FTSA)	B23-Ma0002543	CP	ug/kg	< 5	< 5	<1	30%	Pass	
1H.1H.2H.2H-perfluorooctanesulfonic acid(6:2 FTSA)	B23-Ma0002543	CP	ug/kg	< 10	< 10	<1	30%	Pass	
1H.1H.2H.2H-perfluorodecanesulfonic acid (8:2 FTSA)	B23-Ma0002543	CP	ug/kg	< 5	< 5	<1	30%	Pass	
1H.1H.2H.2H-perfluorododecanesulfonic acid (10:2 FTSA)	B23-Ma0002543	CP	ug/kg	< 5	< 5	<1	30%	Pass	

Comments

Sample Integrity

Custody Seals Intact (if used)	N/A
Attempt to Chill was evident	Yes
Sample correctly preserved	Yes
Appropriate sample containers have been used	Yes
Sample containers for volatile analysis received with minimal headspace	N/A
Samples received within HoldingTime	Yes
Some samples have been subcontracted	No

Qualifier Codes/Comments

Code	Description
N11	Isotope dilution is used for calibration of each native compound for which an exact labelled analogue is available (Isotope Dilution Quantitation). The isotopically labelled analogues allow identification and recovery correction of the concentration of the associated native PFAS compounds.
N15	Where the native PFAS compound does not have labelled analogue then the quantification is made using the Extracted Internal Standard Analyte with the closest retention time to the analyte and no recovery correction has been made (Internal Standard Quantitation).

Authorised by:

Alana Wadsworth	Analytical Services Manager
Emily Rosenberg	Senior Analyst-Metal
Jonathon Angell	Senior Analyst-PFAS

Glenn Jackson
General Manager

Final Report – this report replaces any previously issued Report

- Indicates Not Requested

* Indicates NATA accreditation does not cover the performance of this service

Measurement uncertainty of test data is available on request or please click here.

Hydrobiology QLD Pty Ltd
Unit 27/43 Lang Parade
Auchenflower
QLD 4066

Attention: **Josh Hatton**

Report **975237-S**
Project name ES2304523
Received Date Mar 21, 2023

Client Sample ID			**NM1**
Sample Matrix			**Fish**
Eurofins Sample No.			**B23-Ma0059448**
Date Sampled			**Not Provided**[I12]
Test/Reference	LOR	Unit	
Heavy Metals			
Arsenic	2	mg/kg	< 2
Barium	10	mg/kg	< 10
Boron	10	mg/kg	< 25
Chromium	5	mg/kg	< 5
Copper	5	mg/kg	< 5
Lithium	5	mg/kg	< 5
Molybdenum	5	mg/kg	< 5
Selenium	2	mg/kg	< 2
Strontium	10	mg/kg	< 10
Thallium	10	mg/kg	< 10
Uranium	10	mg/kg	< 10
Vanadium	10	mg/kg	< 10
Zinc	5	mg/kg	10.0
Perfluoroalkyl carboxylic acids (PFCAs)			
Perfluorobutanoic acid (PFBA)[N11]	5	ug/kg	< 5
Perfluoropentanoic acid (PFPeA)[N11]	5	ug/kg	< 5
Perfluorohexanoic acid (PFHxA)[N11]	5	ug/kg	< 5
Perfluoroheptanoic acid (PFHpA)[N11]	5	ug/kg	< 5
Perfluorooctanoic acid (PFOA)[N11]	5	ug/kg	< 5
Perfluorononanoic acid (PFNA)[N11]	5	ug/kg	< 5
Perfluorodecanoic acid (PFDA)[N11]	5	ug/kg	< 5
Perfluoroundecanoic acid (PFUnDA)[N11]	5	ug/kg	< 5
Perfluorododecanoic acid (PFDoDA)[N11]	5	ug/kg	< 5
Perfluorotridecanoic acid (PFTrDA)[N15]	5	ug/kg	< 5
Perfluorotetradecanoic acid (PFTeDA)[N11]	5	ug/kg	< 5
13C4-PFBA (surr.)	1	%	INT
13C5-PFPeA (surr.)	1	%	51
13C5-PFHxA (surr.)	1	%	65
13C4-PFHpA (surr.)	1	%	88
13C8-PFOA (surr.)	1	%	75
13C5-PFNA (surr.)	1	%	89
13C6-PFDA (surr.)	1	%	57
13C2-PFUnDA (surr.)	1	%	85
13C2-PFDoDA (surr.)	1	%	83
13C2-PFTeDA (surr.)	1	%	57

Client Sample ID			NM1
Sample Matrix			Fish
Eurofins Sample No.			B23-Ma0059448
Date Sampled			Not Provided[I12]
Test/Reference	LOR	Unit	
Perfluoroalkyl sulfonamido substances			
Perfluorooctane sulfonamide (FOSA)[N11]	5	ug/kg	< 5
N-methylperfluoro-1-octane sulfonamide (N-MeFOSA)[N11]	5	ug/kg	< 5
N-ethylperfluoro-1-octane sulfonamide (N-EtFOSA)[N11]	5	ug/kg	< 5
2-(N-methylperfluoro-1-octane sulfonamido)-ethanol(N-MeFOSE)[N11]	5	ug/kg	< 5
2-(N-ethylperfluoro-1-octane sulfonamido)-ethanol(N-EtFOSE)[N11]	5	ug/kg	< 5
N-ethyl-perfluorooctanesulfonamidoacetic acid (N-EtFOSAA)[N11]	10	ug/kg	< 10
N-methyl-perfluorooctanesulfonamidoacetic acid (N-MeFOSAA)[N11]	10	ug/kg	< 10
13C8-FOSA (surr.)	1	%	34
D3-N-MeFOSA (surr.)	1	%	20
D5-N-EtFOSA (surr.)	1	%	21
D7-N-MeFOSE (surr.)	1	%	INT
D9-N-EtFOSE (surr.)	1	%	INT
D5-N-EtFOSAA (surr.)	1	%	46
D3-N-MeFOSAA (surr.)	1	%	30
Perfluoroalkyl sulfonic acids (PFSAs)			
Perfluorobutanesulfonic acid (PFBS)[N11]	5	ug/kg	< 5
Perfluorononanesulfonic acid (PFNS)[N15]	5	ug/kg	< 5
Perfluoropropanesulfonic acid (PFPrS)[N15]	5	ug/kg	< 5
Perfluoropentanesulfonic acid (PFPeS)[N15]	5	ug/kg	< 5
Perfluorohexanesulfonic acid (PFHxS)[N11]	5	ug/kg	< 5
Perfluoroheptanesulfonic acid (PFHpS)[N15]	5	ug/kg	< 5
Perfluorooctanesulfonic acid (PFOS)[N11]	5	ug/kg	[N09]< 5
Perfluorodecanesulfonic acid (PFDS)[N15]	5	ug/kg	< 5
13C3-PFBS (surr.)	1	%	62
18O2-PFHxS (surr.)	1	%	75
13C8-PFOS (surr.)	1	%	82
n:2 Fluorotelomer sulfonic acids (n:2 FTSAs)			
1H.1H.2H.2H-perfluorohexanesulfonic acid (4:2 FTSA)[N11]	5	ug/kg	< 5
1H.1H.2H.2H-perfluorooctanesulfonic acid(6:2 FTSA)[N11]	10	ug/kg	< 10
1H.1H.2H.2H-perfluorodecanesulfonic acid (8:2 FTSA)[N11]	5	ug/kg	< 5
1H.1H.2H.2H-perfluorododecanesulfonic acid (10:2 FTSA)[N11]	5	ug/kg	< 5
13C2-4:2 FTSA (surr.)	1	%	96
13C2-6:2 FTSA (surr.)	1	%	INT
13C2-8:2 FTSA (surr.)	1	%	191
13C2-10:2 FTSA (surr.)	1	%	14
PFASs Summations			
Sum (PFHxS + PFOS)*	5	ug/kg	< 5
Sum of US EPA PFAS (PFOS + PFOA)*	5	ug/kg	< 5
Sum of enHealth PFAS (PFHxS + PFOS + PFOA)*	5	ug/kg	< 5
Sum of WA DWER PFAS (n=10)*	10	ug/kg	< 10
Sum of PFASs (n=30)*	50	ug/kg	< 50

Sample History

Where samples are submitted/analysed over several days, the last date of extraction is reported.

If the date and time of sampling are not provided, the Laboratory will not be responsible for compromised results should testing be performed outside the recommended holding time.

Description	Testing Site	Extracted	Holding Time
Heavy Metals	Melbourne	Mar 30, 2023	28 Days
- Method: LTM-MET-3040 Metals in Waters, Soils & Sediments by ICP-MS			
Per- and Polyfluoroalkyl Substances (PFASs)			
Perfluoroalkyl carboxylic acids (PFCAs)	Brisbane	Mar 24, 2023	28 Days
- Method: LTM-ORG-2100 Per- and Polyfluoroalkyl Substances (PFAS)			
Perfluoroalkyl sulfonamido substances	Brisbane	Mar 24, 2023	28 Days
- Method: LTM-ORG-2100 Per- and Polyfluoroalkyl Substances (PFAS)			
Perfluoroalkyl sulfonic acids (PFSAs)	Brisbane	Mar 24, 2023	28 Days
- Method: LTM-ORG-2100 Per- and Polyfluoroalkyl Substances (PFAS)			
n:2 Fluorotelomer sulfonic acids (n:2 FTSAs)	Brisbane	Mar 24, 2023	28 Days
- Method: LTM-ORG-2100 Per- and Polyfluoroalkyl Substances (PFAS)			

eurofins

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Company Name: Hydrobiology QLD Pty Ltd
Address: Unit 27/43 Lang Parade
Auchenflower
QLD 4066

Project Name: ES2304523

Order No.:
Report #: 975237
Phone: 0431 647 627
Fax:

Received: Mar 21, 2023 11:49 AM
Due: Mar 28, 2023
Priority: 5 Day
Contact Name: ALL INVOICES

Eurofins Analytical Services Manager : Alana Wadsworth

Sample Detail						Arsenic	Barium	Boron	Chromium	Copper	Lithium	Molybdenum	Selenium	Strontium	Thallium	Uranium	Vanadium	Zinc	Per- and Polyfluoroalkyl Substances (PFASs)
Melbourne Laboratory - NATA # 1261 Site # 1254						X	X	X	X	X	X	X	X	X	X	X	X	X	
Brisbane Laboratory - NATA # 1261 Site # 20794																			X
External Laboratory																			
No	**Sample ID**	**Sample Date**	**Sampling Time**	**Matrix**	**LAB ID**														
1	NM1	Not Provided		Fish	B23-Ma0059448	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Test Counts						1	1	1	1	1	1	1	1	1	1	1	1	1	1

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Internal Quality Control Review and Glossary

General

1. Laboratory QC results for Method Blanks, Duplicates, Matrix Spikes, and Laboratory Control Samples follows guidelines delineated in the National Environment Protection (Assessment of Site Contamination) Measure 1999, as amended May 2013 and are included in this QC report where applicable. Additional QC data may be available on request.
2. All soil/sediment/solid results are reported on a dry basis, unless otherwise stated.
3. All biota/food results are reported on a wet weight basis on the edible portion, unless otherwise stated.
4. Actual LORs are matrix dependant. Quoted LORs may be raised where sample extracts are diluted due to interferences.
5. Results are uncorrected for matrix spikes or surrogate recoveries except for PFAS compounds.
6. SVOC analysis on waters are performed on homogenised, unfiltered samples, unless noted otherwise.
7. Samples were analysed on an 'as received' basis.
8. Information identified on this report with blue colour, indicates data provided by customer that may have an impact on the results.
9. This report replaces any interim results previously issued.

Holding Times

Please refer to 'Sample Preservation and Container Guide' for holding times (QS3001).

For samples received on the last day of holding time, notification of testing requirements should have been received at least 6 hours prior to sample receipt deadlines as stated on the SRA.

If the Laboratory did not receive the information in the required timeframe, and regardless of any other integrity issues, suitably qualified results may still be reported.

Holding times apply from the date of sampling, therefore compliance to these may be outside the laboratory's control.

For VOCs containing vinyl chloride, styrene and 2-chloroethyl vinyl ether the holding time is 7 days however for all other VOCs such as BTEX or C6-10 TRH then the holding time is 14 days.

Units

mg/kg: milligrams per kilogram
mg/L: milligrams per litre
µg/L: micrograms per litre
ppm: parts per million
ppb: parts per billion
%: Percentage
org/100 mL: Organisms per 100 millilitres
NTU: Nephelometric Turbidity Units
MPN/100 mL: Most Probable Number of organisms per 100 millilitres
CFU: Colony forming unit

Terms

APHA	American Public Health Association
COC	Chain of Custody
CP	Client Parent - QC was performed on samples pertaining to this report
CRM	Certified Reference Material (ISO17034) - reported as percent recovery.
Dry	Where a moisture has been determined on a solid sample the result is expressed on a dry basis.
Duplicate	A second piece of analysis from the same sample and reported in the same units as the result to show comparison.
LOR	Limit of Reporting.
LCS	Laboratory Control Sample - reported as percent recovery.
Method Blank	In the case of solid samples these are performed on laboratory certified clean sands and in the case of water samples these are performed on de-ionised water.
NCP	Non-Client Parent - QC performed on samples not pertaining to this report, QC is representative of the sequence or batch that client samples were analysed within.
RPD	Relative Percent Difference between two Duplicate pieces of analysis.
SPIKE	Addition of the analyte to the sample and reported as percentage recovery.
SRA	Sample Receipt Advice
Surr - Surrogate	The addition of a like compound to the analyte target and reported as percentage recovery.
TBTO	Tributyltin oxide (*bis*-tributyltin oxide) - individual tributyltin compounds cannot be identified separately in the environment however free tributyltin was measured and its values were converted stoichiometrically into tributyltin oxide for comparison with regulatory limits.
TCLP	Toxicity Characteristic Leaching Procedure
TEQ	Toxic Equivalency Quotient or Total Equivalence
QSM	US Department of Defense Quality Systems Manual Version 5.4
US EPA	United States Environmental Protection Agency
WA DWER	Sum of PFBA, PFPeA, PFHxA, PFHpA, PFOA, PFBS, PFHxS, PFOS, 6:2 FTSA, 8:2 FTSA

QC - Acceptance Criteria

The acceptance criteria should be used as a guide only and may be different when site specific Sampling Analysis and Quality Plan (SAQP) have been implemented

RPD Duplicates: Global RPD Duplicates Acceptance Criteria is 30% however the following acceptance guidelines are equally applicable:

Results <10 times the LOR: No Limit

Results between 10-20 times the LOR: RPD must lie between 0-50%

Results >20 times the LOR : RPD must lie between 0-30%

NOTE: pH duplicates are reported as a range not as RPD

Surrogate Recoveries: Recoveries must lie between 20-130% for Speciated Phenols & 50-150% for PFAS

PFAS field samples that contain surrogate recoveries in excess of the QC limit designated in QSM 5.4 where no positive PFAS results have been reported have been reviewed and no data was affected.

QC Data General Comments

1. Where a result is reported as a less than (<), higher than the nominated LOR, this is due to either matrix interference, extract dilution required due to interferences or contaminant levels within the sample, high moisture content or insufficient sample provided.
2. Duplicate data shown within this report that states the word "BATCH" is a Batch Duplicate from outside of your sample batch, but within the laboratory sample batch at a 1:10 ratio. The Parent and Duplicate data shown is not data from your samples.
3. pH and Free Chlorine analysed in the laboratory - Analysis on this test must begin within 30 minutes of sampling. Therefore, laboratory analysis is unlikely to be completed within holding time.Analysis will begin as soon as possible after sample receipt.
4. Recovery Data (Spikes & Surrogates) - where chromatographic interference does not allow the determination of recovery the term "INT" appears against that analyte.
5. For Matrix Spikes and LCS results a dash "-" in the report means that the specific analyte was not added to the QC sample.
6. Duplicate RPDs are calculated from raw analytical data thus it is possible to have two sets of data.

Quality Control Results

Test	Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
Method Blank							
Heavy Metals							
Arsenic	mg/kg	< 2			2	Pass	
Barium	mg/kg	< 10			10	Pass	
Boron	mg/kg	< 10			10	Pass	
Chromium	mg/kg	< 5			5	Pass	
Copper	mg/kg	< 5			5	Pass	
Lithium	mg/kg	< 5			5	Pass	
Molybdenum	mg/kg	< 5			5	Pass	
Selenium	mg/kg	< 2			2	Pass	
Strontium	mg/kg	< 10			10	Pass	
Thallium	mg/kg	< 10			10	Pass	
Uranium	mg/kg	< 10			10	Pass	
Vanadium	mg/kg	< 10			10	Pass	
Zinc	mg/kg	< 5			5	Pass	
Method Blank							
Perfluoroalkyl carboxylic acids (PFCAs)							
Perfluorobutanoic acid (PFBA)	ug/kg	< 5			5	Pass	
Perfluoropentanoic acid (PFPeA)	ug/kg	< 5			5	Pass	
Perfluorohexanoic acid (PFHxA)	ug/kg	< 5			5	Pass	
Perfluoroheptanoic acid (PFHpA)	ug/kg	< 5			5	Pass	
Perfluorooctanoic acid (PFOA)	ug/kg	< 5			5	Pass	
Perfluorononanoic acid (PFNA)	ug/kg	< 5			5	Pass	
Perfluorodecanoic acid (PFDA)	ug/kg	< 5			5	Pass	
Perfluoroundecanoic acid (PFUnDA)	ug/kg	< 5			5	Pass	
Perfluorododecanoic acid (PFDoDA)	ug/kg	< 5			5	Pass	
Perfluorotridecanoic acid (PFTrDA)	ug/kg	< 5			5	Pass	
Perfluorotetradecanoic acid (PFTeDA)	ug/kg	< 5			5	Pass	
Method Blank							
Perfluoroalkyl sulfonamido substances							
Perfluorooctane sulfonamide (FOSA)	ug/kg	< 5			5	Pass	
N-methylperfluoro-1-octane sulfonamide (N-MeFOSA)	ug/kg	< 5			5	Pass	
N-ethylperfluoro-1-octane sulfonamide (N-EtFOSA)	ug/kg	< 5			5	Pass	
2-(N-methylperfluoro-1-octane sulfonamido)-ethanol(N-MeFOSE)	ug/kg	< 5			5	Pass	
2-(N-ethylperfluoro-1-octane sulfonamido)-ethanol(N-EtFOSE)	ug/kg	< 5			5	Pass	
N-ethyl-perfluorooctanesulfonamidoacetic acid (N-EtFOSAA)	ug/kg	< 10			10	Pass	
N-methyl-perfluorooctanesulfonamidoacetic acid (N-MeFOSAA)	ug/kg	< 10			10	Pass	
Method Blank							
Perfluoroalkyl sulfonic acids (PFSAs)							
Perfluorobutanesulfonic acid (PFBS)	ug/kg	< 5			5	Pass	
Perfluorononanesulfonic acid (PFNS)	ug/kg	< 5			5	Pass	
Perfluoropropanesulfonic acid (PFPrS)	ug/kg	< 5			5	Pass	
Perfluoropentanesulfonic acid (PFPeS)	ug/kg	< 5			5	Pass	
Perfluorohexanesulfonic acid (PFHxS)	ug/kg	< 5			5	Pass	
Perfluoroheptanesulfonic acid (PFHpS)	ug/kg	< 5			5	Pass	
Perfluorooctanesulfonic acid (PFOS)	ug/kg	< 5			5	Pass	
Perfluorodecanesulfonic acid (PFDS)	ug/kg	< 5			5	Pass	
Method Blank							
n:2 Fluorotelomer sulfonic acids (n:2 FTSAs)							
1H.1H.2H.2H-perfluorohexanesulfonic acid (4:2 FTSA)	ug/kg	< 5			5	Pass	
1H.1H.2H.2H-perfluorooctanesulfonic acid(6:2 FTSA)	ug/kg	< 10			10	Pass	

Test	Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
1H.1H.2H.2H-perfluorodecanesulfonic acid (8:2 FTSA)	ug/kg	< 5			5	Pass	
1H.1H.2H.2H-perfluorododecanesulfonic acid (10:2 FTSA)	ug/kg	< 5			5	Pass	
LCS - % Recovery							
Heavy Metals							
Arsenic	%	101			80-120	Pass	
Barium	%	105			80-120	Pass	
Boron	%	85			80-120	Pass	
Chromium	%	115			80-120	Pass	
Copper	%	114			80-120	Pass	
Lithium	%	110			80-120	Pass	
Molybdenum	%	103			80-120	Pass	
Selenium	%	108			80-120	Pass	
Strontium	%	109			80-120	Pass	
Thallium	%	114			80-120	Pass	
Uranium	%	114			80-120	Pass	
Vanadium	%	111			80-120	Pass	
Zinc	%	102			80-120	Pass	
LCS - % Recovery							
Perfluoroalkyl carboxylic acids (PFCAs)							
Perfluorobutanoic acid (PFBA)	%	90			50-150	Pass	
Perfluoropentanoic acid (PFPeA)	%	86			50-150	Pass	
Perfluorohexanoic acid (PFHxA)	%	92			50-150	Pass	
Perfluoroheptanoic acid (PFHpA)	%	56			50-150	Pass	
Perfluorooctanoic acid (PFOA)	%	88			50-150	Pass	
Perfluorononanoic acid (PFNA)	%	89			50-150	Pass	
Perfluorodecanoic acid (PFDA)	%	99			50-150	Pass	
Perfluoroundecanoic acid (PFUnDA)	%	91			50-150	Pass	
Perfluorododecanoic acid (PFDoDA)	%	99			50-150	Pass	
Perfluorotridecanoic acid (PFTrDA)	%	103			50-150	Pass	
Perfluorotetradecanoic acid (PFTeDA)	%	98			50-150	Pass	
LCS - % Recovery							
Perfluoroalkyl sulfonamido substances							
Perfluorooctane sulfonamide (FOSA)	%	96			50-150	Pass	
N-methylperfluoro-1-octane sulfonamide (N-MeFOSA)	%	95			50-150	Pass	
N-ethylperfluoro-1-octane sulfonamide (N-EtFOSA)	%	102			50-150	Pass	
2-(N-methylperfluoro-1-octane sulfonamido)-ethanol(N-MeFOSE)	%	107			50-150	Pass	
2-(N-ethylperfluoro-1-octane sulfonamido)-ethanol(N-EtFOSE)	%	105			50-150	Pass	
N-ethyl-perfluorooctanesulfonamidoacetic acid (N-EtFOSAA)	%	93			50-150	Pass	
N-methyl-perfluorooctanesulfonamidoacetic acid (N-MeFOSAA)	%	97			50-150	Pass	
LCS - % Recovery							
Perfluoroalkyl sulfonic acids (PFSAs)							
Perfluorobutanesulfonic acid (PFBS)	%	95			50-150	Pass	
Perfluorononanesulfonic acid (PFNS)	%	101			50-150	Pass	
Perfluoropropanesulfonic acid (PFPrS)	%	94			50-150	Pass	
Perfluoropentanesulfonic acid (PFPeS)	%	106			50-150	Pass	
Perfluorohexanesulfonic acid (PFHxS)	%	99			50-150	Pass	
Perfluoroheptanesulfonic acid (PFHpS)	%	91			50-150	Pass	
Perfluorooctanesulfonic acid (PFOS)	%	87			50-150	Pass	
Perfluorodecanesulfonic acid (PFDS)	%	95			50-150	Pass	
LCS - % Recovery							
n:2 Fluorotelomer sulfonic acids (n:2 FTSAs)							
1H.1H.2H.2H-perfluorohexanesulfonic acid (4:2 FTSA)	%	97			50-150	Pass	
1H.1H.2H.2H-perfluorooctanesulfonic acid(6:2 FTSA)	%	96			50-150	Pass	
1H.1H.2H.2H-perfluorodecanesulfonic acid (8:2 FTSA)	%	91			50-150	Pass	
1H.1H.2H.2H-perfluorododecanesulfonic acid (10:2 FTSA)	%	94			50-150	Pass	

Test	Lab Sample ID	QA Source	Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
Spike - % Recovery									
Heavy Metals				Result 1					
Arsenic	M23-Ma0072995	NCP	%	89			75-125	Pass	
Barium	M23-Ma0066623	NCP	%	94			75-125	Pass	
Boron	M23-Ma0072995	NCP	%	103			75-125	Pass	
Chromium	M23-Ma0066623	NCP	%	100			75-125	Pass	
Copper	M23-Ma0072995	NCP	%	93			75-125	Pass	
Lithium	M23-Ma0072995	NCP	%	99			75-125	Pass	
Molybdenum	M23-Ma0072995	NCP	%	105			75-125	Pass	
Selenium	M23-Ma0072995	NCP	%	94			75-125	Pass	
Strontium	M23-Ma0066623	NCP	%	105			75-125	Pass	
Thallium	M23-Ma0072995	NCP	%	106			75-125	Pass	
Uranium	M23-Ma0072995	NCP	%	114			75-125	Pass	
Vanadium	M23-Ma0066623	NCP	%	89			75-125	Pass	
Zinc	M23-Ma0066623	NCP	%	84			75-125	Pass	
Spike - % Recovery									
Perfluoroalkyl carboxylic acids (PFCAs)				Result 1					
Perfluorobutanoic acid (PFBA)	B23-Ma0069480	NCP	%	89			50-150	Pass	
Perfluoropentanoic acid (PFPeA)	B23-Ma0069480	NCP	%	86			50-150	Pass	
Perfluorohexanoic acid (PFHxA)	B23-Ma0069480	NCP	%	89			50-150	Pass	
Perfluoroheptanoic acid (PFHpA)	B23-Ma0069480	NCP	%	56			50-150	Pass	
Perfluorooctanoic acid (PFOA)	B23-Ma0069480	NCP	%	91			50-150	Pass	
Perfluorononanoic acid (PFNA)	B23-Ma0069480	NCP	%	83			50-150	Pass	
Perfluorodecanoic acid (PFDA)	B23-Ma0069480	NCP	%	104			50-150	Pass	
Perfluoroundecanoic acid (PFUnDA)	B23-Ma0069480	NCP	%	87			50-150	Pass	
Perfluorododecanoic acid (PFDoDA)	B23-Ma0069480	NCP	%	94			50-150	Pass	
Perfluorotridecanoic acid (PFTrDA)	B23-Ma0069480	NCP	%	100			50-150	Pass	
Perfluorotetradecanoic acid (PFTeDA)	B23-Ma0069480	NCP	%	98			50-150	Pass	
Spike - % Recovery									
Perfluoroalkyl sulfonamido substances				Result 1					
Perfluorooctane sulfonamide (FOSA)	B23-Ma0069480	NCP	%	90			50-150	Pass	
N-methylperfluoro-1-octane sulfonamide (N-MeFOSA)	B23-Ma0069480	NCP	%	94			50-150	Pass	
N-ethylperfluoro-1-octane sulfonamide (N-EtFOSA)	B23-Ma0069480	NCP	%	101			50-150	Pass	
2-(N-methylperfluoro-1-octane sulfonamido)-ethanol(N-MeFOSE)	B23-Ma0069480	NCP	%	118			50-150	Pass	
2-(N-ethylperfluoro-1-octane sulfonamido)-ethanol(N-EtFOSE)	B23-Ma0069480	NCP	%	99			50-150	Pass	
N-ethyl-perfluorooctanesulfonamidoacetic acid (N-EtFOSAA)	B23-Ma0069480	NCP	%	93			50-150	Pass	
N-methyl-perfluorooctanesulfonamidoacetic acid (N-MeFOSAA)	B23-Ma0069480	NCP	%	100			50-150	Pass	
Spike - % Recovery									
Perfluoroalkyl sulfonic acids (PFSAs)				Result 1					
Perfluorobutanesulfonic acid (PFBS)	B23-Ma0069480	NCP	%	85			50-150	Pass	
Perfluorononanesulfonic acid (PFNS)	B23-Ma0069480	NCP	%	108			50-150	Pass	
Perfluoropropanesulfonic acid (PFPrS)	B23-Ma0069480	NCP	%	81			50-150	Pass	
Perfluoropentanesulfonic acid (PFPeS)	B23-Ma0069480	NCP	%	88			50-150	Pass	

Test	Lab Sample ID	QA Source	Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
Perfluorohexanesulfonic acid (PFHxS)	B23-Ma0069480	NCP	%	86			50-150	Pass	
Perfluoroheptanesulfonic acid (PFHpS)	B23-Ma0069480	NCP	%	79			50-150	Pass	
Perfluorooctanesulfonic acid (PFOS)	B23-Ma0069480	NCP	%	101			50-150	Pass	
Perfluorodecanesulfonic acid (PFDS)	B23-Ma0069480	NCP	%	112			50-150	Pass	
Spike - % Recovery									
n:2 Fluorotelomer sulfonic acids (n:2 FTSAs)				Result 1					
1H.1H.2H.2H-perfluorohexanesulfonic acid (4:2 FTSA)	B23-Ma0069480	NCP	%	98			50-150	Pass	
1H.1H.2H.2H-perfluorooctanesulfonic acid(6:2 FTSA)	B23-Ma0069480	NCP	%	94			50-150	Pass	
1H.1H.2H.2H-perfluorodecanesulfonic acid (8:2 FTSA)	B23-Ma0069480	NCP	%	92			50-150	Pass	
1H.1H.2H.2H-perfluorododecanesulfonic acid (10:2 FTSA)	B23-Ma0069480	NCP	%	93			50-150	Pass	
Test	**Lab Sample ID**	**QA Source**	**Units**	**Result 1**			**Acceptance Limits**	**Pass Limits**	**Qualifying Code**
Duplicate									
Heavy Metals				Result 1	Result 2	RPD			
Arsenic	M23-Ma0067240	NCP	mg/kg	2.5	2.4	2.0	30%	Pass	
Barium	M23-Ma0067240	NCP	mg/kg	200	200	<1	30%	Pass	
Boron	M23-Ma0067240	NCP	mg/kg	< 25	< 25	<1	30%	Pass	
Chromium	M23-Ma0067240	NCP	mg/kg	43	43	<1	30%	Pass	
Copper	M23-Ma0067240	NCP	mg/kg	120	120	<1	30%	Pass	
Lithium	M23-Ma0067240	NCP	mg/kg	13	13	<1	30%	Pass	
Molybdenum	M23-Ma0067240	NCP	mg/kg	< 5	< 5	<1	30%	Pass	
Selenium	M23-Ma0067240	NCP	mg/kg	< 2	< 2	<1	30%	Pass	
Strontium	M23-Ma0067240	NCP	mg/kg	120	120	1.4	30%	Pass	
Thallium	M23-Ma0067240	NCP	mg/kg	< 10	< 10	<1	30%	Pass	
Uranium	M23-Ma0067240	NCP	mg/kg	< 10	< 10	<1	30%	Pass	
Vanadium	M23-Ma0067240	NCP	mg/kg	140	140	<1	30%	Pass	
Zinc	M23-Ma0067240	NCP	mg/kg	310	310	<1	30%	Pass	
Duplicate									
Perfluoroalkyl carboxylic acids (PFCAs)				Result 1	Result 2	RPD			
Perfluorobutanoic acid (PFBA)	B23-Ma0069479	NCP	ug/kg	< 5	< 5	<1	30%	Pass	
Perfluoropentanoic acid (PFPeA)	B23-Ma0069479	NCP	ug/kg	< 5	< 5	<1	30%	Pass	
Perfluorohexanoic acid (PFHxA)	B23-Ma0069479	NCP	ug/kg	< 5	< 5	<1	30%	Pass	
Perfluoroheptanoic acid (PFHpA)	B23-Ma0069479	NCP	ug/kg	< 5	< 5	<1	30%	Pass	
Perfluorooctanoic acid (PFOA)	B23-Ma0069479	NCP	ug/kg	< 5	< 5	<1	30%	Pass	
Perfluorononanoic acid (PFNA)	B23-Ma0069479	NCP	ug/kg	< 5	< 5	<1	30%	Pass	
Perfluorodecanoic acid (PFDA)	B23-Ma0069479	NCP	ug/kg	< 5	< 5	<1	30%	Pass	
Perfluoroundecanoic acid (PFUnDA)	B23-Ma0069479	NCP	ug/kg	< 5	< 5	<1	30%	Pass	
Perfluorododecanoic acid (PFDoDA)	B23-Ma0069479	NCP	ug/kg	< 5	< 5	<1	30%	Pass	
Perfluorotridecanoic acid (PFTrDA)	B23-Ma0069479	NCP	ug/kg	< 5	< 5	<1	30%	Pass	
Perfluorotetradecanoic acid (PFTeDA)	B23-Ma0069479	NCP	ug/kg	< 5	< 5	<1	30%	Pass	

Duplicate									
Perfluoroalkyl sulfonamido substances				Result 1	Result 2	RPD			
Perfluorooctane sulfonamide (FOSA)	B23-Ma0069479	NCP	ug/kg	< 5	< 5	<1	30%	Pass	
N-methylperfluoro-1-octane sulfonamide (N-MeFOSA)	B23-Ma0069479	NCP	ug/kg	< 5	< 5	<1	30%	Pass	
N-ethylperfluoro-1-octane sulfonamide (N-EtFOSA)	B23-Ma0069479	NCP	ug/kg	< 5	< 5	<1	30%	Pass	
2-(N-methylperfluoro-1-octane sulfonamido)-ethanol(N-MeFOSE)	B23-Ma0069479	NCP	ug/kg	< 5	< 5	<1	30%	Pass	
2-(N-ethylperfluoro-1-octane sulfonamido)-ethanol(N-EtFOSE)	B23-Ma0069479	NCP	ug/kg	< 5	< 5	<1	30%	Pass	
N-ethyl-perfluorooctanesulfonamidoacetic acid (N-EtFOSAA)	B23-Ma0069479	NCP	ug/kg	< 10	< 10	<1	30%	Pass	
N-methyl-perfluorooctanesulfonamidoacetic acid (N-MeFOSAA)	B23-Ma0069479	NCP	ug/kg	< 10	< 10	<1	30%	Pass	
Duplicate									
Perfluoroalkyl sulfonic acids (PFSAs)				Result 1	Result 2	RPD			
Perfluorobutanesulfonic acid (PFBS)	B23-Ma0069479	NCP	ug/kg	< 5	< 5	<1	30%	Pass	
Perfluorononanesulfonic acid (PFNS)	B23-Ma0069479	NCP	ug/kg	< 5	< 5	<1	30%	Pass	
Perfluoropropanesulfonic acid (PFPrS)	B23-Ma0069479	NCP	ug/kg	< 5	< 5	<1	30%	Pass	
Perfluoropentanesulfonic acid (PFPeS)	B23-Ma0069479	NCP	ug/kg	< 5	< 5	<1	30%	Pass	
Perfluorohexanesulfonic acid (PFHxS)	B23-Ma0069479	NCP	ug/kg	< 5	< 5	<1	30%	Pass	
Perfluoroheptanesulfonic acid (PFHpS)	B23-Ma0069479	NCP	ug/kg	< 5	< 5	<1	30%	Pass	
Perfluorooctanesulfonic acid (PFOS)	B23-Ma0069479	NCP	ug/kg	< 5	< 5	<1	30%	Pass	
Perfluorodecanesulfonic acid (PFDS)	B23-Ma0069479	NCP	ug/kg	< 5	< 5	<1	30%	Pass	
Duplicate									
n:2 Fluorotelomer sulfonic acids (n:2 FTSAs)				Result 1	Result 2	RPD			
1H.1H.2H.2H-perfluorohexanesulfonic acid (4:2 FTSA)	B23-Ma0069479	NCP	ug/kg	< 5	< 5	<1	30%	Pass	
1H.1H.2H.2H-perfluorooctanesulfonic acid(6:2 FTSA)	B23-Ma0069479	NCP	ug/kg	< 10	< 10	<1	30%	Pass	
1H.1H.2H.2H-perfluorodecanesulfonic acid (8:2 FTSA)	B23-Ma0069479	NCP	ug/kg	< 5	< 5	<1	30%	Pass	
1H.1H.2H.2H-perfluorododecanesulfonic acid (10:2 FTSA)	B23-Ma0069479	NCP	ug/kg	< 5	< 5	<1	30%	Pass	

Comments

Sample Integrity

Custody Seals Intact (if used)	N/A
Attempt to Chill was evident	Yes
Sample correctly preserved	Yes
Appropriate sample containers have been used	Yes
Sample containers for volatile analysis received with minimal headspace	Yes
Samples received within HoldingTime	N/A
Some samples have been subcontracted	No

Qualifier Codes/Comments

Code	Description
N09	Quantification of linear and branched isomers has been conducted as a single total response using the relative response factor for the corresponding linear/branched standard.
N11	Isotope dilution is used for calibration of each native compound for which an exact labelled analogue is available (Isotope Dilution Quantitation). The isotopically labelled analogues allow identification and recovery correction of the concentration of the associated native PFAS compounds.
N15	Where the native PFAS compound does not have labelled analogue then the quantification is made using the Extracted Internal Standard Analyte with the closest retention time to the analyte and no recovery correction has been made (Internal Standard Quantitation).

Authorised by:

Alana Wadsworth	Analytical Services Manager
Caitlin Breeze	Senior Analyst-Metal
Emily Rosenberg	Senior Analyst-Metal
Jonathon Angell	Senior Analyst-PFAS

Glenn Jackson
General Manager

Final Report – this report replaces any previously issued Report

- Indicates Not Requested

* Indicates NATA accreditation does not cover the performance of this service

Measurement uncertainty of test data is available on request or please click here.

ALS Environmental

CERTIFICATE OF ANALYSIS

Work Order	: **ES2304523**	Page	: 1 of 30
Client	: **HYDROBIOLOGY PTY LTD**	Laboratory	: Environmental Division Sydney
Contact	: JOSH HATTON	Contact	: Customer Services ES
Address	: 40 TERRIGAL STREET FIG TREE POCKET 4069	Address	: 277-289 Woodpark Road Smithfield NSW Australia 2164
Telephone	: ----	Telephone	: +61-2-8784 8555
Project	: B22096	Date Samples Received	: 13-Feb-2023 11:00
Order number	: ----	Date Analysis Commenced	: 14-Feb-2023
C-O-C number	: ----	Issue Date	: 09-Mar-2023 15:34
Sampler	: JOSH HATTON		
Site	: ----		
Quote number	: SY/415/22		
No. of samples received	: 47		
No. of samples analysed	: 45		

Accreditation No. 825
Accredited for compliance with
ISO/IEC 17025 - Testing

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted, unless the sampling was conducted by ALS. This document shall not be reproduced, except in full.

This Certificate of Analysis contains the following information:

- General Comments
- Analytical Results
- Surrogate Control Limits

Additional information pertinent to this report will be found in the following separate attachments: Quality Control Report, QA/QC Compliance Assessment to assist with Quality Review and Sample Receipt Notification.

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is carried out in compliance with procedures specified in 21 CFR Part 11.

Signatories	*Position*	*Accreditation Category*
Franco Lentini	LCMS Coordinator	Sydney Organics, Smithfield, NSW
Ivan Taylor	Analyst	Sydney Inorganics, Smithfield, NSW

General Comments

The analytical procedures used by ALS have been developed from established internationally recognised procedures such as those published by the USEPA, APHA, AS and NEPM. In house developed procedures are fully validated and are often at the client request.

Where moisture determination has been performed, results are reported on a dry weight basis.

Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis.

Where the LOR of a reported result differs from standard LOR, this may be due to high moisture content, insufficient sample (reduced weight employed) or matrix interference.

When sampling time information is not provided by the client, sampling dates are shown without a time component. In these instances, the time component has been assumed by the laboratory for processing purposes.

Where a result is required to meet compliance limits the associated uncertainty must be considered. Refer to the ALS Contract for details.

Key : CAS Number = CAS registry number from database maintained by Chemical Abstracts Services. The Chemical Abstracts Service is a division of the American Chemical Society.
LOR = Limit of reporting
^ = This result is computed from individual analyte detections at or above the level of reporting
ø = ALS is not NATA accredited for these tests.
~ = Indicates an estimated value.

- EG094: Insufficient sample for analysis for samples ES2304523-#012, #021, #025, #026, #027, #028, #29, #38 and #051.
- EP231X (Biota): ALS NATA accreditation for PFAS in Biota covers all Perfluoroalkyl Sulfonic Acids, Perfluoroalkyl Carboxylic Acids and (n:2) Fluorotelomer Sulfonic Acids in fish (whole and muscle), plants and vegetable matrices, with the exception PFBA (fish only), EtFOSA, MeFOSE, EtFOSE, MeFOSAA, EtFOSAA.
- EP231: Stable isotope enriched internal standards are added to samples prior to extraction. Target compounds have a direct analogous internal standard with the exception of PFPeS, PFHpA, PFDS, PFTrDA and 10:2 FTS. These compounds use an internal standard that is chemically related and has a retention time close to that of the target compound. The DQO for internal standard response is 50-150% of that established at initial calibration. PFOS is quantified using a certified, traceable standard consisting of linear and branched PFOS isomers. These practices are in line with recommendations in the National Environmental Management Plan for PFAS (Australian HEPA) and also conform to QSM 5.3 (US DoD) requirements.

Analytical Results

Sub-Matrix: **BIOTA**
(Matrix: **BIOTA**)

Compound	CAS Number	LOR	Unit	Sample ID	AB3 Barramundi a	AB2 Barramundi AB2	AB2 Tandanus AB2	AB3 Redclaw AB3	AB2 Redclaw ALS AB2
				Sampling date / time	30-Jan-2023 00:00	30-Jan-2023 00:00	30-Jan-2023 00:00	31-Jan-2023 00:00	31-Jan-2023 00:00
					ES2304523-001	ES2304523-002	ES2304523-003	ES2304523-004	ES2304523-006
					Result	Result	Result	Result	Result
Biota Sample Pre-Preparation									
ø **Sample Description**	----	-	--		**Barramundi**	**Barramundi**	**Tandanus**	**Redclaw**	**Redclaw**
ø **Weight of Sample Prepared**	----	0.1	g		**10600**	**11200**	**85.0**	**121**	**10.0**
EG094: Metals in Biota by ICPMS									
ø **Arsenic**	7440-38-2	0.05	mg/kg		**0.09**	**0.08**	**0.16**	**0.40**	**0.28**
ø **Barium**	7440-39-3	0.1	mg/kg		<0.1	**0.1**	**0.7**	**1.3**	**2.3**
ø **Boron**	7440-42-8	5	mg/kg		<5	<5	<5	<5	<5
ø **Chromium**	7440-47-3	0.05	mg/kg		<0.05	<0.05	**6.85**	**0.22**	**0.13**
ø **Copper**	7440-50-8	0.1	mg/kg		**0.4**	**0.4**	**1.6**	**13.0**	**8.1**
ø **Molybdenum**	7439-98-7	0.05	mg/kg		<0.05	<0.05	**0.77**	**0.05**	<0.05
ø **Selenium**	7782-49-2	0.05	mg/kg		**0.20**	**0.16**	**0.15**	**0.09**	**0.08**
ø **Strontium**	7440-24-6	0.1	mg/kg		**0.9**	**1.1**	**2.0**	**17.6**	**24.9**
ø **Uranium**	7440-61-1	0.01	mg/kg		<0.01	<0.01	<0.01	<0.01	<0.01
ø **Vanadium**	7440-62-2	0.5	mg/kg		<0.5	<0.5	**1.8**	<0.5	<0.5
ø **Zinc**	7440-66-6	0.5	mg/kg		**5.7**	**5.6**	**6.7**	**20.0**	**18.8**
EP231A: Perfluoroalkyl Sulfonic Acids									
Perfluorobutane sulfonic acid (PFBS)	375-73-5	1	µg/kg		<1	<1	<1	<1	<1
Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	1	µg/kg		<1	<1	<1	<1	<1
Perfluorohexane sulfonic acid (PFHxS)	355-46-4	1	µg/kg		<1	<1	<1	<1	<1
Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	1	µg/kg		<1	<1	<1	<1	<1
Perfluorooctane sulfonic acid (PFOS) - Linear	2795-39-3	1	µg/kg		<1	<1	<1	<1	<1
Perfluorooctane sulfonic acid (PFOS) - Branched	----	1	µg/kg		<1	<1	<1	<1	<1
Perfluorooctane sulfonic acid (PFOS)	1763-23-1	1	µg/kg		<1	<1	<1	<1	<1
Perfluorodecane sulfonic acid (PFDS)	335-77-3	2	µg/kg		<2	<2	<2	<2	<2
EP231B: Perfluoroalkyl Carboxylic Acids									
Perfluorobutanoic acid (PFBA)	375-22-4	5	µg/kg		<5	<5	<5	<5	<5
Perfluoropentanoic acid (PFPeA)	2706-90-3	2	µg/kg		<2	<2	<2	<2	<2
Perfluorohexanoic acid (PFHxA)	307-24-4	1	µg/kg		<1	<1	<1	<1	<1

Analytical Results

Sub-Matrix: **BIOTA**
(Matrix: **BIOTA**)

Compound	CAS Number	LOR	Unit	Sample ID	AB3 Barramundi a	AB2 Barramundi AB2	AB2 Tandanus AB2	AB3 Redclaw AB3	AB2 Redclaw ALS AB2
				Sampling date / time	30-Jan-2023 00:00	30-Jan-2023 00:00	30-Jan-2023 00:00	31-Jan-2023 00:00	31-Jan-2023 00:00
					ES2304523-001	ES2304523-002	ES2304523-003	ES2304523-004	ES2304523-006
					Result	Result	Result	Result	Result
EP231B: Perfluoroalkyl Carboxylic Acids - Continued									
Perfluoroheptanoic acid (PFHpA)	375-85-9	1	µg/kg		<1	<1	<1	<1	<1
Perfluorooctanoic acid (PFOA)	335-67-1	1	µg/kg		<1	<1	<1	<1	<1
Perfluorononanoic acid (PFNA)	375-95-1	1	µg/kg		<1	<1	<1	<1	<1
Perfluorodecanoic acid (PFDA)	335-76-2	1	µg/kg		<1	<1	<1	<1	<1
Perfluoroundecanoic acid (PFUnDA)	2058-94-8	1	µg/kg		<1	<1	<1	<1	<1
Perfluorododecanoic acid (PFDoDA)	307-55-1	2	µg/kg		<2	<2	<2	<2	<2
Perfluorotridecanoic acid (PFTrDA)	72629-94-8	2	µg/kg		<2	<2	<2	<2	<2
Perfluorotetradecanoic acid (PFTeDA)	376-06-7	2	µg/kg		<2	<2	<2	<2	<2
EP231C: Perfluoroalkyl Sulfonamides									
Perfluorooctane sulfonamide (FOSA)	754-91-6	5	µg/kg		<5	<5	<5	<5	<5
N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	5	µg/kg		<5	<5	<5	<5	<5
N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	2	µg/kg		<2	<2	<2	<2	<2
N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	2	µg/kg		<2	<2	<2	<2	<2
N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	2	µg/kg		<2	<2	<2	<2	<2
N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	1	µg/kg		<1	<1	<1	<1	<1
N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	1	µg/kg		<1	<1	<1	<1	<1
EP231D: (n:2) Fluorotelomer Sulfonic Acids									
4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	2	µg/kg		<2	<2	<2	<2	<2
6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	2	µg/kg		<2	<2	<2	<2	<2
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	2	µg/kg		<2	<2	<2	<2	<2

Analytical Results

Sub-Matrix: BIOTA (Matrix: BIOTA)				Sample ID	AB3 Barramundi a	AB2 Barramundi AB2	AB2 Tandanus AB2	AB3 Redclaw AB3	AB2 Redclaw ALS AB2
				Sampling date / time	30-Jan-2023 00:00	30-Jan-2023 00:00	30-Jan-2023 00:00	31-Jan-2023 00:00	31-Jan-2023 00:00
Compound	CAS Number	LOR	Unit		ES2304523-001	ES2304523-002	ES2304523-003	ES2304523-004	ES2304523-006
					Result	Result	Result	Result	Result
EP231D: (n:2) Fluorotelomer Sulfonic Acids - Continued									
10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	2	µg/kg		<2	<2	<2	<2	<2
EP231P: PFAS Sums									
^ Sum of PFAS	----	1	µg/kg		<1	<1	<1	<1	<1
^ Sum of PFHxS and PFOS	355-46-4/1763-23-1	1	µg/kg		<1	<1	<1	<1	<1
EP231S: PFAS Surrogate									
13C4-PFOS	----	1	%		**85.8**	**90.2**	**96.6**	**105**	**102**
13C8-PFOA	----	1	%		**97.2**	**97.9**	**98.2**	**95.4**	**94.6**

Analytical Results

Sub-Matrix: BIOTA (Matrix: BIOTA)			Sample ID	AB3 Hardyhead AB3	AB3 Glassfish AB3	AB3 Macrobrachium	AB2 Hardyhead AB2	AB2 Macrobrachium AB2
			Sampling date / time	31-Jan-2023 00:00	31-Jan-2023 00:00	31-Jan-2023 00:00	31-Jan-2023 00:00	31-Jan-2023 00:00
Compound	CAS Number	LOR	Unit	ES2304523-007	ES2304523-008	ES2304523-009	ES2304523-011	ES2304523-012
				Result	Result	Result	Result	Result
Biota Sample Pre-Preparation								
ø Sample Description	----	-	--	Hardyhead	Glassfish	Macrobrachium	Hardyhead	Macrobrachium
ø Weight of Sample Prepared	----	0.1	g	27.0	8.0	16.0	6.0	1.3
EG094: Metals in Biota by ICPMS								
ø Arsenic	7440-38-2	0.05	mg/kg	0.22	0.16	0.42	0.22	----
ø Barium	7440-39-3	0.1	mg/kg	2.4	3.8	4.4	5.5	----
ø Boron	7440-42-8	5	mg/kg	<5	<5	<5	<5	----
ø Chromium	7440-47-3	0.05	mg/kg	1.40	0.22	0.45	0.26	----
ø Copper	7440-50-8	0.1	mg/kg	0.6	0.8	17.6	0.6	----
ø Molybdenum	7439-98-7	0.05	mg/kg	0.18	0.05	0.07	<0.05	----
ø Selenium	7782-49-2	0.05	mg/kg	0.20	0.26	0.18	0.14	----
ø Strontium	7440-24-6	0.1	mg/kg	52.1	93.5	106	104	----
ø Uranium	7440-61-1	0.01	mg/kg	<0.01	<0.01	<0.01	<0.01	----
ø Vanadium	7440-62-2	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	----
ø Zinc	7440-66-6	0.5	mg/kg	53.8	41.3	24.6	82.6	----
EP231A: Perfluoroalkyl Sulfonic Acids								
Perfluorobutane sulfonic acid (PFBS)	375-73-5	1	µg/kg	<1	<1	<1	<1	<1
Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	1	µg/kg	<1	<1	<1	<1	<1
Perfluorohexane sulfonic acid (PFHxS)	355-46-4	1	µg/kg	<1	<1	<1	<1	<1
Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	1	µg/kg	<1	<1	<1	<1	<1
Perfluorooctane sulfonic acid (PFOS) - Linear	2795-39-3	1	µg/kg	<1	<1	<1	<1	<1
Perfluorooctane sulfonic acid (PFOS) - Branched	----	1	µg/kg	<1	<1	<1	<1	<1
Perfluorooctane sulfonic acid (PFOS)	1763-23-1	1	µg/kg	<1	<1	<1	<1	<1
Perfluorodecane sulfonic acid (PFDS)	335-77-3	2	µg/kg	<2	<2	<2	<2	<2
EP231B: Perfluoroalkyl Carboxylic Acids								
Perfluorobutanoic acid (PFBA)	375-22-4	5	µg/kg	<5	<5	<5	<5	<5
Perfluoropentanoic acid (PFPeA)	2706-90-3	2	µg/kg	<2	<2	<2	<2	<2
Perfluorohexanoic acid (PFHxA)	307-24-4	1	µg/kg	<1	<1	<1	<1	<1

Analytical Results

Sub-Matrix: **BIOTA**
(Matrix: **BIOTA**)

Compound	CAS Number	LOR	Unit	Sample ID	AB3 Hardyhead AB3	AB3 Glassfish AB3	AB3 Macrobrachium	AB2 Hardyhead AB2	AB2 Macrobrachium AB2
				Sampling date / time	31-Jan-2023 00:00	31-Jan-2023 00:00	31-Jan-2023 00:00	31-Jan-2023 00:00	31-Jan-2023 00:00
					ES2304523-007	ES2304523-008	ES2304523-009	ES2304523-011	ES2304523-012
					Result	Result	Result	Result	Result
EP231B: Perfluoroalkyl Carboxylic Acids - Continued									
Perfluoroheptanoic acid (PFHpA)	375-85-9	1	µg/kg		<1	<1	<1	<1	<1
Perfluorooctanoic acid (PFOA)	335-67-1	1	µg/kg		<1	<1	<1	<1	<1
Perfluorononanoic acid (PFNA)	375-95-1	1	µg/kg		<1	<1	<1	<1	<1
Perfluorodecanoic acid (PFDA)	335-76-2	1	µg/kg		<1	<1	<1	<1	<1
Perfluoroundecanoic acid (PFUnDA)	2058-94-8	1	µg/kg		<1	<1	<1	<1	<1
Perfluorododecanoic acid (PFDoDA)	307-55-1	2	µg/kg		<2	<2	<2	<2	<2
Perfluorotridecanoic acid (PFTrDA)	72629-94-8	2	µg/kg		<2	<2	<2	<2	<2
Perfluorotetradecanoic acid (PFTeDA)	376-06-7	2	µg/kg		<2	<2	<2	<2	<2
EP231C: Perfluoroalkyl Sulfonamides									
Perfluorooctane sulfonamide (FOSA)	754-91-6	5	µg/kg		<5	<5	<5	<5	<5
N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	5	µg/kg		<5	<5	<5	<5	<5
N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	2	µg/kg		<2	<2	<2	<2	<2
N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	2	µg/kg		<2	<2	<2	<2	<2
N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	2	µg/kg		<2	<2	<2	<2	<2
N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	1	µg/kg		<1	<1	<1	<1	<1
N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	1	µg/kg		<1	<1	<1	<1	<1
EP231D: (n:2) Fluorotelomer Sulfonic Acids									
4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	2	µg/kg		<2	<2	<2	<2	<2
6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	2	µg/kg		<2	<2	<2	<2	<2
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	2	µg/kg		<2	<2	<2	<2	<2

Analytical Results

Sub-Matrix: **BIOTA**
(Matrix: **BIOTA**)

Compound	CAS Number	LOR	Unit	Sample ID	AB3 Hardyhead AB3	AB3 Glassfish AB3	AB3 Macrobrachium	AB2 Hardyhead AB2	AB2 Macrobrachium AB2
				Sampling date / time	31-Jan-2023 00:00	31-Jan-2023 00:00	31-Jan-2023 00:00	31-Jan-2023 00:00	31-Jan-2023 00:00
					ES2304523-007	ES2304523-008	ES2304523-009	ES2304523-011	ES2304523-012
					Result	Result	Result	Result	Result
EP231D: (n:2) Fluorotelomer Sulfonic Acids - Continued									
10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	2	µg/kg		<2	<2	<2	<2	<2
EP231P: PFAS Sums									
^ Sum of PFAS	----	1	µg/kg		<1	<1	<1	<1	<1
^ Sum of PFHxS and PFOS	355-46-4/1763-23-1	1	µg/kg		<1	<1	<1	<1	<1
EP231S: PFAS Surrogate									
13C4-PFOS	----	1	%		**92.6**	**93.6**	**98.8**	**100**	**112**
13C8-PFOA	----	1	%		**93.8**	**90.8**	**94.4**	**99.9**	**102**

Analytical Results

Sub-Matrix: **BIOTA**
(Matrix: **BIOTA**)

Compound	CAS Number	LOR	Unit	Sample ID	AB9 Hyrtlii AB9	AB9 Glassfish AB9	AB9 Macrobrachium AB9	AB9 Tandanus AB9	AB8 Hardyhead AB8
				Sampling date / time	01-Feb-2023 00:00	01-Feb-2023 00:00	01-Feb-2023 00:00	01-Feb-2023 00:00	01-Feb-2023 00:00
					ES2304523-013	ES2304523-014	ES2304523-015	ES2304523-016	ES2304523-017
					Result	Result	Result	Result	Result
Biota Sample Pre-Preparation									
ø **Sample Description**	----	-	--		**Hyrtlii**	**Glassfish**	**Macrobrachium**	**Tandanus**	**Hardyhead**
ø **Weight of Sample Prepared**	----	0.1	g		**15.0**	**19.0**	**4.3**	**12.5**	**17.0**
EG094: Metals in Biota by ICPMS									
ø **Arsenic**	7440-38-2	0.05	mg/kg		<0.05	**0.17**	**0.33**	<0.05	**0.20**
ø **Barium**	7440-39-3	0.1	mg/kg		<0.1	**1.6**	**19.2**	**0.2**	**5.6**
ø **Boron**	7440-42-8	5	mg/kg		<5	<5	<5	<5	<5
ø **Chromium**	7440-47-3	0.05	mg/kg		**0.60**	**0.09**	**0.42**	<0.05	**0.25**
ø **Copper**	7440-50-8	0.1	mg/kg		**0.4**	**0.5**	**16.7**	**0.3**	**0.5**
ø **Molybdenum**	7439-98-7	0.05	mg/kg		**0.07**	<0.05	**0.06**	<0.05	**0.05**
ø **Selenium**	7782-49-2	0.05	mg/kg		**0.14**	**0.20**	**0.22**	**0.12**	**0.11**
ø **Strontium**	7440-24-6	0.1	mg/kg		**1.0**	**41.6**	**78.4**	**0.5**	**79.6**
ø **Uranium**	7440-61-1	0.01	mg/kg		<0.01	<0.01	<0.01	<0.01	<0.01
ø **Vanadium**	7440-62-2	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5	<0.5
ø **Zinc**	7440-66-6	0.5	mg/kg		**11.5**	**34.9**	**29.8**	**7.0**	**50.0**
EP231A: Perfluoroalkyl Sulfonic Acids									
Perfluorobutane sulfonic acid (PFBS)	375-73-5	1	µg/kg		<1	<1	<1	<1	<1
Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	1	µg/kg		<1	<1	<1	<1	<1
Perfluorohexane sulfonic acid (PFHxS)	355-46-4	1	µg/kg		<1	<1	<1	<1	<1
Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	1	µg/kg		<1	<1	<1	<1	<1
Perfluorooctane sulfonic acid (PFOS) - Linear	2795-39-3	1	µg/kg		<1	<1	<1	<1	**64**
Perfluorooctane sulfonic acid (PFOS) - Branched	----	1	µg/kg		<1	<1	<1	<1	**4**
Perfluorooctane sulfonic acid (PFOS)	1763-23-1	1	µg/kg		<1	<1	<1	<1	**68**
Perfluorodecane sulfonic acid (PFDS)	335-77-3	2	µg/kg		<2	<2	<2	<2	<2
EP231B: Perfluoroalkyl Carboxylic Acids									
Perfluorobutanoic acid (PFBA)	375-22-4	5	µg/kg		<5	<5	<5	<5	<5
Perfluoropentanoic acid (PFPeA)	2706-90-3	2	µg/kg		<2	<2	<2	<2	<2
Perfluorohexanoic acid (PFHxA)	307-24-4	1	µg/kg		<1	<1	<1	<1	<1

Analytical Results

Sub-Matrix: **BIOTA**
(Matrix: **BIOTA**)

Compound	CAS Number	LOR	Unit	Sample ID	AB9 Hyrtlii AB9	AB9 Glassfish AB9	AB9 Macrobrachium AB9	AB9 Tandanus AB9	AB8 Hardyhead AB8
				Sampling date / time	01-Feb-2023 00:00	01-Feb-2023 00:00	01-Feb-2023 00:00	01-Feb-2023 00:00	01-Feb-2023 00:00
					ES2304523-013	ES2304523-014	ES2304523-015	ES2304523-016	ES2304523-017
					Result	Result	Result	Result	Result
EP231B: Perfluoroalkyl Carboxylic Acids - Continued									
Perfluoroheptanoic acid (PFHpA)	375-85-9	1	µg/kg		<1	<1	<1	<1	<1
Perfluorooctanoic acid (PFOA)	335-67-1	1	µg/kg		<1	<1	<1	<1	<1
Perfluorononanoic acid (PFNA)	375-95-1	1	µg/kg		<1	<1	<1	<1	<1
Perfluorodecanoic acid (PFDA)	335-76-2	1	µg/kg		<1	<1	<1	<1	<1
Perfluoroundecanoic acid (PFUnDA)	2058-94-8	1	µg/kg		<1	<1	<1	<1	<1
Perfluorododecanoic acid (PFDoDA)	307-55-1	2	µg/kg		<2	<2	<2	<2	<2
Perfluorotridecanoic acid (PFTrDA)	72629-94-8	2	µg/kg		<2	<2	<2	<2	<2
Perfluorotetradecanoic acid (PFTeDA)	376-06-7	2	µg/kg		<2	<2	<2	<2	<2
EP231C: Perfluoroalkyl Sulfonamides									
Perfluorooctane sulfonamide (FOSA)	754-91-6	5	µg/kg		<5	<5	<5	<5	<5
N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	5	µg/kg		<5	<5	<5	<5	<5
N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	2	µg/kg		<2	<2	<2	<2	<2
N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	2	µg/kg		<2	<2	<2	<2	<2
N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	2	µg/kg		<2	<2	<2	<2	<2
N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	1	µg/kg		<1	<1	<1	<1	<1
N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	1	µg/kg		<1	<1	<1	<1	<1
EP231D: (n:2) Fluorotelomer Sulfonic Acids									
4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	2	µg/kg		<2	<2	<2	<2	<2
6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	2	µg/kg		<2	<2	<2	<2	<2
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	2	µg/kg		<2	<2	<2	<2	<2

Analytical Results

Sub-Matrix: BIOTA (Matrix: BIOTA)				Sample ID	AB9 Hyrtlii AB9	AB9 Glassfish AB9	AB9 Macrobrachium AB9	AB9 Tandanus AB9	AB8 Hardyhead AB8
				Sampling date / time	01-Feb-2023 00:00	01-Feb-2023 00:00	01-Feb-2023 00:00	01-Feb-2023 00:00	01-Feb-2023 00:00
Compound	CAS Number	LOR	Unit		ES2304523-013	ES2304523-014	ES2304523-015	ES2304523-016	ES2304523-017
					Result	Result	Result	Result	Result
EP231D: (n:2) Fluorotelomer Sulfonic Acids - Continued									
10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	2	µg/kg		<2	<2	<2	<2	<2
EP231P: PFAS Sums									
^ Sum of PFAS	----	1	µg/kg		<1	<1	<1	<1	**68**
^ Sum of PFHxS and PFOS	355-46-4/1763-23-1	1	µg/kg		<1	<1	<1	<1	**68**
EP231S: PFAS Surrogate									
13C4-PFOS	----	1	%		**97.2**	**95.8**	**96.5**	**104**	**105**
13C8-PFOA	----	1	%		**102**	**97.8**	**97.2**	**97.6**	**97.4**

Analytical Results

Sub-Matrix: **BIOTA**
(Matrix: **BIOTA**)

Compound	CAS Number	LOR	Unit	Sample ID	AB8 Hyrtlii AB8	AB8 Glassfish AB8	AB8 Yellowbelly AB8	AB4 Atyidae AB4	AB4 Tandanus AB4
				Sampling date / time	01-Feb-2023 00:00	01-Feb-2023 00:00	01-Feb-2023 00:00	02-Feb-2023 00:00	02-Feb-2023 00:00
					ES2304523-018	ES2304523-019	ES2304523-020	ES2304523-021	ES2304523-022
					Result	Result	Result	Result	Result
Biota Sample Pre-Preparation									
ø **Sample Description**	----	-	--		**Hyrtlii**	**Glassfish**	**Yellowbelly**	**Atyidae**	**Tandanus**
ø **Weight of Sample Prepared**	----	0.1	g		**13.0**	**15.0**	**154**	**1.9**	**112**
EG094: Metals in Biota by ICPMS									
ø **Arsenic**	7440-38-2	0.05	mg/kg		<0.05	**0.15**	**0.06**	**----**	**0.16**
ø **Barium**	7440-39-3	0.1	mg/kg		**0.3**	**6.0**	**1.0**	**----**	<0.1
ø **Boron**	7440-42-8	5	mg/kg		<5	<5	<5	**----**	<5
ø **Chromium**	7440-47-3	0.05	mg/kg		<0.05	**0.48**	<0.05	**----**	<0.05
ø **Copper**	7440-50-8	0.1	mg/kg		**0.3**	**0.6**	**0.4**	**----**	**0.2**
ø **Molybdenum**	7439-98-7	0.05	mg/kg		<0.05	**0.09**	<0.05	**----**	<0.05
ø **Selenium**	7782-49-2	0.05	mg/kg		**0.21**	**0.13**	**0.52**	**----**	**0.12**
ø **Strontium**	7440-24-6	0.1	mg/kg		**7.6**	**82.6**	**27.0**	**----**	**0.5**
ø **Uranium**	7440-61-1	0.01	mg/kg		<0.01	<0.01	<0.01	**----**	<0.01
ø **Vanadium**	7440-62-2	0.5	mg/kg		<0.5	<0.5	<0.5	**----**	<0.5
ø **Zinc**	7440-66-6	0.5	mg/kg		**14.1**	**40.2**	**9.8**	**----**	**5.2**
EP231A: Perfluoroalkyl Sulfonic Acids									
Perfluorobutane sulfonic acid (PFBS)	375-73-5	1	µg/kg		<1	<1	<1	<1	<1
Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	1	µg/kg		<1	<1	<1	<1	<1
Perfluorohexane sulfonic acid (PFHxS)	355-46-4	1	µg/kg		<1	<1	<1	<1	**1**
Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	1	µg/kg		<1	<1	<1	<1	<1
Perfluorooctane sulfonic acid (PFOS) - Linear	2795-39-3	1	µg/kg		**7**	**82**	**4**	**3**	**3**
Perfluorooctane sulfonic acid (PFOS) - Branched	----	1	µg/kg		**1**	**7**	**1**	<1	**1**
Perfluorooctane sulfonic acid (PFOS)	1763-23-1	1	µg/kg		**8**	**89**	**5**	**3**	**4**
Perfluorodecane sulfonic acid (PFDS)	335-77-3	2	µg/kg		<2	<2	<2	<2	<2
EP231B: Perfluoroalkyl Carboxylic Acids									
Perfluorobutanoic acid (PFBA)	375-22-4	5	µg/kg		<5	<5	<5	<5	<5
Perfluoropentanoic acid (PFPeA)	2706-90-3	2	µg/kg		<2	<2	<2	<2	<2
Perfluorohexanoic acid (PFHxA)	307-24-4	1	µg/kg		<1	<1	<1	<1	<1

Analytical Results

Sub-Matrix: **BIOTA**
(Matrix: **BIOTA**)

Compound	CAS Number	LOR	Unit	Sample ID	AB8 Hyrtlii AB8	AB8 Glassfish AB8	AB8 Yellowbelly AB8	AB4 Atyidae AB4	AB4 Tandanus AB4
				Sampling date / time	01-Feb-2023 00:00	01-Feb-2023 00:00	01-Feb-2023 00:00	02-Feb-2023 00:00	02-Feb-2023 00:00
					ES2304523-018	ES2304523-019	ES2304523-020	ES2304523-021	ES2304523-022
					Result	Result	Result	Result	Result
EP231B: Perfluoroalkyl Carboxylic Acids - Continued									
Perfluoroheptanoic acid (PFHpA)	375-85-9	1	µg/kg		<1	<1	<1	<1	<1
Perfluorooctanoic acid (PFOA)	335-67-1	1	µg/kg		<1	<1	<1	<1	<1
Perfluorononanoic acid (PFNA)	375-95-1	1	µg/kg		<1	<1	<1	<1	<1
Perfluorodecanoic acid (PFDA)	335-76-2	1	µg/kg		<1	<1	<1	<1	<1
Perfluoroundecanoic acid (PFUnDA)	2058-94-8	1	µg/kg		<1	<1	<1	<1	<1
Perfluorododecanoic acid (PFDoDA)	307-55-1	2	µg/kg		<2	<2	<2	<2	<2
Perfluorotridecanoic acid (PFTrDA)	72629-94-8	2	µg/kg		<2	<2	<2	<2	<2
Perfluorotetradecanoic acid (PFTeDA)	376-06-7	2	µg/kg		<2	<2	<2	<2	<2
EP231C: Perfluoroalkyl Sulfonamides									
Perfluorooctane sulfonamide (FOSA)	754-91-6	5	µg/kg		<5	<5	<5	<5	<5
N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	5	µg/kg		<5	<5	<5	<5	<5
N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	2	µg/kg		<2	<2	<2	<2	<2
N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	2	µg/kg		<2	<2	<2	<2	<2
N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	2	µg/kg		<2	<2	<2	<2	<2
N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	1	µg/kg		<1	<1	<1	<1	<1
N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	1	µg/kg		<1	<1	<1	<1	<1
EP231D: (n:2) Fluorotelomer Sulfonic Acids									
4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	2	µg/kg		<2	<2	<2	<2	<2
6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	2	µg/kg		<2	<2	<2	<2	<2
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	2	µg/kg		<2	<2	<2	<2	<2

Analytical Results

Sub-Matrix: **BIOTA**
(Matrix: **BIOTA**)

Compound	CAS Number	LOR	Unit	Sample ID	AB8 Hyrtlii AB8	AB8 Glassfish AB8	AB8 Yellowbelly AB8	AB4 Atyidae AB4	AB4 Tandanus AB4
				Sampling date / time	01-Feb-2023 00:00	01-Feb-2023 00:00	01-Feb-2023 00:00	02-Feb-2023 00:00	02-Feb-2023 00:00
					ES2304523-018	ES2304523-019	ES2304523-020	ES2304523-021	ES2304523-022
					Result	Result	Result	Result	Result
EP231D: (n:2) Fluorotelomer Sulfonic Acids - Continued									
10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	2	µg/kg		<2	<2	<2	<2	<2
EP231P: PFAS Sums									
^ Sum of PFAS	----	1	µg/kg		**8**	**89**	**5**	**3**	**5**
^ Sum of PFHxS and PFOS	355-46-4/1763-23-1	1	µg/kg		**8**	**89**	**5**	**3**	**5**
EP231S: PFAS Surrogate									
13C4-PFOS	----	1	%		**65.2**	**100**	**93.2**	**91.4**	**93.9**
13C8-PFOA	----	1	%		**79.1**	**93.2**	**121**	**111**	**111**

Analytical Results

Sub-Matrix: BIOTA (Matrix: BIOTA)			Sample ID	AB4 Hardyhead AB4	AB4 Sleepy cod AB4	AB5 Glassfish AB5	AB7 Atyidae AB7	AB7 Glassfish AB7
			Sampling date / time	02-Feb-2023 00:00	02-Feb-2023 00:00	02-Feb-2023 00:00	03-Feb-2023 00:00	03-Feb-2023 00:00
Compound	CAS Number	LOR	Unit	ES2304523-023	ES2304523-025	ES2304523-026	ES2304523-027	ES2304523-028
				Result	Result	Result	Result	Result
Biota Sample Pre-Preparation								
ø Sample Description	----	-	--	Hardyhead	Sleepy cod	Glassfish	Atyidae	Glassfish
ø Weight of Sample Prepared	----	0.1	g	2.2	5.1	0.9	1.2	1.4
EG094: Metals in Biota by ICPMS								
ø Arsenic	7440-38-2	0.05	mg/kg	0.51	----	----	----	----
ø Barium	7440-39-3	0.1	mg/kg	12.9	----	----	----	----
ø Boron	7440-42-8	5	mg/kg	<5	----	----	----	----
ø Chromium	7440-47-3	0.05	mg/kg	0.12	----	----	----	----
ø Copper	7440-50-8	0.1	mg/kg	0.7	----	----	----	----
ø Molybdenum	7439-98-7	0.05	mg/kg	<0.05	----	----	----	----
ø Selenium	7782-49-2	0.05	mg/kg	0.18	----	----	----	----
ø Strontium	7440-24-6	0.1	mg/kg	109	----	----	----	----
ø Uranium	7440-61-1	0.01	mg/kg	<0.01	----	----	----	----
ø Vanadium	7440-62-2	0.5	mg/kg	<0.5	----	----	----	----
ø Zinc	7440-66-6	0.5	mg/kg	96.5	----	----	----	----
EP231A: Perfluoroalkyl Sulfonic Acids								
Perfluorobutane sulfonic acid (PFBS)	375-73-5	1	µg/kg	<1	<1	<1	<1	<1
Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	1	µg/kg	<1	<1	<1	<1	<1
Perfluorohexane sulfonic acid (PFHxS)	355-46-4	1	µg/kg	<1	<1	<1	<1	<1
Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	1	µg/kg	<1	<1	<1	<1	<1
Perfluorooctane sulfonic acid (PFOS) - Linear	2795-39-3	1	µg/kg	<1	1	35	28	66
Perfluorooctane sulfonic acid (PFOS) - Branched	----	1	µg/kg	<1	<1	5	3	18
Perfluorooctane sulfonic acid (PFOS)	1763-23-1	1	µg/kg	<1	1	40	31	84
Perfluorodecane sulfonic acid (PFDS)	335-77-3	2	µg/kg	<2	<2	<2	<2	<2
EP231B: Perfluoroalkyl Carboxylic Acids								
Perfluorobutanoic acid (PFBA)	375-22-4	5	µg/kg	<5	<5	<5	<5	<5
Perfluoropentanoic acid (PFPeA)	2706-90-3	2	µg/kg	<2	<2	<2	<2	<2
Perfluorohexanoic acid (PFHxA)	307-24-4	1	µg/kg	<1	<1	<1	<1	<1

Analytical Results

Sub-Matrix: **BIOTA**
(Matrix: **BIOTA**)

Compound	CAS Number	LOR	Unit	Sample ID	AB4 Hardyhead AB4	AB4 Sleepy cod AB4	AB5 Glassfish AB5	AB7 Atyidae AB7	AB7 Glassfish AB7
				Sampling date / time	02-Feb-2023 00:00	02-Feb-2023 00:00	02-Feb-2023 00:00	03-Feb-2023 00:00	03-Feb-2023 00:00
					ES2304523-023	ES2304523-025	ES2304523-026	ES2304523-027	ES2304523-028
					Result	Result	Result	Result	Result
EP231B: Perfluoroalkyl Carboxylic Acids - Continued									
Perfluoroheptanoic acid (PFHpA)	375-85-9	1	µg/kg		<1	<1	<1	<1	<1
Perfluorooctanoic acid (PFOA)	335-67-1	1	µg/kg		<1	<1	<1	<1	<1
Perfluorononanoic acid (PFNA)	375-95-1	1	µg/kg		<1	<1	<1	<1	<1
Perfluorodecanoic acid (PFDA)	335-76-2	1	µg/kg		<1	<1	<1	<1	<1
Perfluoroundecanoic acid (PFUnDA)	2058-94-8	1	µg/kg		<1	<1	<1	<1	<1
Perfluorododecanoic acid (PFDoDA)	307-55-1	2	µg/kg		<2	<2	<2	<2	<2
Perfluorotridecanoic acid (PFTrDA)	72629-94-8	2	µg/kg		<2	<2	<2	<2	<2
Perfluorotetradecanoic acid (PFTeDA)	376-06-7	2	µg/kg		<2	<2	<2	<2	<2
EP231C: Perfluoroalkyl Sulfonamides									
Perfluorooctane sulfonamide (FOSA)	754-91-6	5	µg/kg		<5	<5	<5	<5	<5
N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	5	µg/kg		<5	<5	<5	<5	<5
N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	2	µg/kg		<2	<2	<2	<2	<2
N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	2	µg/kg		<2	<2	<2	<2	<2
N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	2	µg/kg		<2	<2	<2	<2	<2
N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	1	µg/kg		<1	<1	<1	<1	<1
N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	1	µg/kg		<1	<1	<1	<1	<1
EP231D: (n:2) Fluorotelomer Sulfonic Acids									
4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	2	µg/kg		<2	<2	<2	<2	<2
6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	2	µg/kg		<2	<2	<2	<2	<2
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	2	µg/kg		<2	<2	<2	<2	<2

Analytical Results

Sub-Matrix: **BIOTA**
(Matrix: **BIOTA**)

Compound	CAS Number	LOR	Unit	Sample ID	AB4 Hardyhead AB4	AB4 Sleepy cod AB4	AB5 Glassfish AB5	AB7 Atyidae AB7	AB7 Glassfish AB7
				Sampling date / time	02-Feb-2023 00:00	02-Feb-2023 00:00	02-Feb-2023 00:00	03-Feb-2023 00:00	03-Feb-2023 00:00
					ES2304523-023	ES2304523-025	ES2304523-026	ES2304523-027	ES2304523-028
					Result	Result	Result	Result	Result
EP231D: (n:2) Fluorotelomer Sulfonic Acids - Continued									
10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	2	µg/kg		<2	<2	<2	<2	<2
EP231P: PFAS Sums									
^ Sum of PFAS	----	1	µg/kg		<1	**1**	**40**	**31**	**84**
^ Sum of PFHxS and PFOS	355-46-4/1763-23-1	1	µg/kg		<1	**1**	**40**	**31**	**84**
EP231S: PFAS Surrogate									
13C4-PFOS	----	1	%		**95.0**	**98.8**	**103**	**100**	**103**
13C8-PFOA	----	1	%		**112**	**118**	**115**	**115**	**112**

Analytical Results

Sub-Matrix: **BIOTA**
(Matrix: **BIOTA**)

Compound	CAS Number	LOR	Unit	Sample ID	AB7 Hardyhead AB7	AB1 Redclaw AB1	AB1 Tandanus AB1	AB1 Hardyhead AB1	AB1 Glassfish AB1
				Sampling date / time	03-Feb-2023 00:00	04-Feb-2023 00:00	04-Feb-2023 00:00	04-Feb-2023 00:00	04-Feb-2023 00:00
					ES2304523-029	ES2304523-030	ES2304523-031	ES2304523-032	ES2304523-033
					Result	Result	Result	Result	Result
Biota Sample Pre-Preparation									
ø **Sample Description**	----	-	--		**Hardyhead**	**Redclaw**	**Tandanus**	**Hardyhead**	**Glassfish**
ø **Weight of Sample Prepared**	----	0.1	g		**0.6**	**63.0**	**238**	**13.0**	**7.9**
EG094: Metals in Biota by ICPMS									
ø **Arsenic**	7440-38-2	0.05	mg/kg		**----**	**0.50**	**0.12**	**0.21**	**0.20**
ø **Barium**	7440-39-3	0.1	mg/kg		**----**	**47.5**	**0.2**	**7.4**	**6.1**
ø **Boron**	7440-42-8	5	mg/kg		**----**	<5	<5	<5	<5
ø **Chromium**	7440-47-3	0.05	mg/kg		**----**	**2.41**	<0.05	**0.18**	**0.79**
ø **Copper**	7440-50-8	0.1	mg/kg		**----**	**15.7**	**0.7**	**0.6**	**1.2**
ø **Molybdenum**	7439-98-7	0.05	mg/kg		**----**	**0.33**	<0.05	<0.05	**0.10**
ø **Selenium**	7782-49-2	0.05	mg/kg		**----**	**0.07**	**0.26**	**0.17**	**0.25**
ø **Strontium**	7440-24-6	0.1	mg/kg		**----**	**134**	**1.9**	**93.6**	**95.6**
ø **Uranium**	7440-61-1	0.01	mg/kg		**----**	<0.01	<0.01	<0.01	<0.01
ø **Vanadium**	7440-62-2	0.5	mg/kg		**----**	<0.5	<0.5	<0.5	<0.5
ø **Zinc**	7440-66-6	0.5	mg/kg		**----**	**15.3**	**6.1**	**66.7**	**48.6**
EP231A: Perfluoroalkyl Sulfonic Acids									
Perfluorobutane sulfonic acid (PFBS)	375-73-5	1	µg/kg		<2	<1	<1	<1	<1
Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	1	µg/kg		<2	<1	<1	<1	<1
Perfluorohexane sulfonic acid (PFHxS)	355-46-4	1	µg/kg		<2	<1	<1	<1	<1
Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	1	µg/kg		<2	<1	<1	<1	<1
Perfluorooctane sulfonic acid (PFOS) - Linear	2795-39-3	1	µg/kg		**30**	<1	<1	<1	<1
Perfluorooctane sulfonic acid (PFOS) - Branched	----	1	µg/kg		**10**	<1	<1	<1	<1
Perfluorooctane sulfonic acid (PFOS)	1763-23-1	1	µg/kg		**40**	<1	<1	<1	<1
Perfluorodecane sulfonic acid (PFDS)	335-77-3	2	µg/kg		<2	<2	<2	<2	<2
EP231B: Perfluoroalkyl Carboxylic Acids									
Perfluorobutanoic acid (PFBA)	375-22-4	5	µg/kg		<5	<5	<5	<5	<5
Perfluoropentanoic acid (PFPeA)	2706-90-3	2	µg/kg		<2	<2	<2	<2	<2
Perfluorohexanoic acid (PFHxA)	307-24-4	1	µg/kg		<2	<1	<1	<1	<1

Analytical Results

Sub-Matrix: **BIOTA**
(Matrix: **BIOTA**)

Compound	CAS Number	LOR	Unit	Sample ID	AB7 Hardyhead AB7	AB1 Redclaw AB1	AB1 Tandanus AB1	AB1 Hardyhead AB1	AB1 Glassfish AB1
				Sampling date / time	03-Feb-2023 00:00	04-Feb-2023 00:00	04-Feb-2023 00:00	04-Feb-2023 00:00	04-Feb-2023 00:00
					ES2304523-029	ES2304523-030	ES2304523-031	ES2304523-032	ES2304523-033
					Result	Result	Result	Result	Result
EP231B: Perfluoroalkyl Carboxylic Acids - Continued									
Perfluoroheptanoic acid (PFHpA)	375-85-9	1	µg/kg		<2	<1	<1	<1	<1
Perfluorooctanoic acid (PFOA)	335-67-1	1	µg/kg		<2	<1	<1	<1	<1
Perfluorononanoic acid (PFNA)	375-95-1	1	µg/kg		<2	<1	<1	<1	<1
Perfluorodecanoic acid (PFDA)	335-76-2	1	µg/kg		<2	<1	<1	<1	<1
Perfluoroundecanoic acid (PFUnDA)	2058-94-8	1	µg/kg		<2	<1	<1	<1	<1
Perfluorododecanoic acid (PFDoDA)	307-55-1	2	µg/kg		<2	<2	<2	<2	<2
Perfluorotridecanoic acid (PFTrDA)	72629-94-8	2	µg/kg		<2	<2	<2	<2	<2
Perfluorotetradecanoic acid (PFTeDA)	376-06-7	2	µg/kg		<6	<2	<2	<2	<2
EP231C: Perfluoroalkyl Sulfonamides									
Perfluorooctane sulfonamide (FOSA)	754-91-6	5	µg/kg		<5	<5	<5	<5	<5
N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	5	µg/kg		<6	<5	<5	<5	<5
N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	2	µg/kg		<6	<2	<2	<2	<2
N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	2	µg/kg		<6	<2	<2	<2	<2
N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	2	µg/kg		<6	<2	<2	<2	<2
N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	1	µg/kg		<2	<1	<1	<1	<1
N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	1	µg/kg		<2	<1	<1	<1	<1
EP231D: (n:2) Fluorotelomer Sulfonic Acids									
4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	2	µg/kg		<2	<2	<2	<2	<2
6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	2	µg/kg		<2	<2	<2	<2	<2
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	2	µg/kg		<2	<2	<2	<2	<2

Analytical Results

Sub-Matrix: **BIOTA**
(Matrix: **BIOTA**)

Compound	CAS Number	LOR	Unit	Sample ID	AB7 Hardyhead AB7	AB1 Redclaw AB1	AB1 Tandanus AB1	AB1 Hardyhead AB1	AB1 Glassfish AB1
				Sampling date / time	03-Feb-2023 00:00	04-Feb-2023 00:00	04-Feb-2023 00:00	04-Feb-2023 00:00	04-Feb-2023 00:00
					ES2304523-029	ES2304523-030	ES2304523-031	ES2304523-032	ES2304523-033
					Result	Result	Result	Result	Result
EP231D: (n:2) Fluorotelomer Sulfonic Acids - Continued									
10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	2	µg/kg		<2	<2	<2	<2	<2
EP231P: PFAS Sums									
^ Sum of PFAS	----	1	µg/kg		**40**	<1	<1	<1	<1
^ Sum of PFHxS and PFOS	355-46-4/1763-23-1	1	µg/kg		**40**	<1	<1	<1	<1
EP231S: PFAS Surrogate									
13C4-PFOS	----	1	%		**93.0**	**100**	**98.2**	**105**	**104**
13C8-PFOA	----	1	%		**119**	**119**	**113**	**117**	**113**

Analytical Results

Sub-Matrix: BIOTA (Matrix: BIOTA)			Sample ID	AB1 Hyrtlii AB1	AB1 Macrobrachium AB1	AB1 Yellowbelly AB1	AB1 Sleepy cod AB1	AB4 Porocheilus AB4
			Sampling date / time	04-Feb-2023 00:00	04-Feb-2023 00:00	04-Feb-2023 00:00	04-Feb-2023 00:00	02-Feb-2023 00:00
Compound	CAS Number	LOR	Unit	ES2304523-034	ES2304523-035	ES2304523-036	ES2304523-037	ES2304523-038
				Result	Result	Result	Result	Result
Biota Sample Pre-Preparation								
ø Sample Description	----	-	--	Hyrtlii	Macrobrachium	Yellowbelly	Sleepy cod	Porocheilus
ø Weight of Sample Prepared	----	0.1	g	141	3.4	1150	535	2.4
EG094: Metals in Biota by ICPMS								
ø Arsenic	7440-38-2	0.05	mg/kg	0.07	0.55	0.06	0.06	----
ø Barium	7440-39-3	0.1	mg/kg	<0.1	30.4	<0.1	<0.1	----
ø Boron	7440-42-8	5	mg/kg	<5	<5	<5	<5	----
ø Chromium	7440-47-3	0.05	mg/kg	<0.05	0.15	<0.05	<0.05	----
ø Copper	7440-50-8	0.1	mg/kg	0.3	23.8	0.3	1.1	----
ø Molybdenum	7439-98-7	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05	----
ø Selenium	7782-49-2	0.05	mg/kg	0.22	0.22	0.44	0.17	----
ø Strontium	7440-24-6	0.1	mg/kg	0.8	121	0.5	0.6	----
ø Uranium	7440-61-1	0.01	mg/kg	<0.01	<0.01	<0.01	<0.01	----
ø Vanadium	7440-62-2	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	----
ø Zinc	7440-66-6	0.5	mg/kg	12.4	44.5	10.1	7.2	----
EP231A: Perfluoroalkyl Sulfonic Acids								
Perfluorobutane sulfonic acid (PFBS)	375-73-5	1	µg/kg	<1	<1	<1	<1	<1
Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	1	µg/kg	<1	<1	<1	<1	<1
Perfluorohexane sulfonic acid (PFHxS)	355-46-4	1	µg/kg	<1	<1	<1	<1	<1
Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	1	µg/kg	<1	<1	<1	<1	<1
Perfluorooctane sulfonic acid (PFOS) - Linear	2795-39-3	1	µg/kg	<1	<1	<1	<1	14
Perfluorooctane sulfonic acid (PFOS) - Branched	----	1	µg/kg	<1	<1	<1	<1	2
Perfluorooctane sulfonic acid (PFOS)	1763-23-1	1	µg/kg	<1	<1	<1	<1	16
Perfluorodecane sulfonic acid (PFDS)	335-77-3	2	µg/kg	<2	<2	<2	<2	<2
EP231B: Perfluoroalkyl Carboxylic Acids								
Perfluorobutanoic acid (PFBA)	375-22-4	5	µg/kg	<5	<5	<5	<5	<5
Perfluoropentanoic acid (PFPeA)	2706-90-3	2	µg/kg	<2	<2	<2	<2	<2
Perfluorohexanoic acid (PFHxA)	307-24-4	1	µg/kg	<1	<1	<1	<1	<1

Analytical Results

Sub-Matrix: **BIOTA**
(Matrix: **BIOTA**)

Compound	CAS Number	LOR	Unit	Sample ID	AB1 Hyrtlii AB1	AB1 Macrobrachium AB1	AB1 Yellowbelly AB1	AB1 Sleepy cod AB1	AB4 Porocheilus AB4
				Sampling date / time	04-Feb-2023 00:00	04-Feb-2023 00:00	04-Feb-2023 00:00	04-Feb-2023 00:00	02-Feb-2023 00:00
					ES2304523-034	ES2304523-035	ES2304523-036	ES2304523-037	ES2304523-038
					Result	Result	Result	Result	Result
EP231B: Perfluoroalkyl Carboxylic Acids - Continued									
Perfluoroheptanoic acid (PFHpA)	375-85-9	1	µg/kg		<1	<1	<1	<1	<1
Perfluorooctanoic acid (PFOA)	335-67-1	1	µg/kg		<1	<1	<1	<1	<1
Perfluorononanoic acid (PFNA)	375-95-1	1	µg/kg		<1	<1	<1	<1	<1
Perfluorodecanoic acid (PFDA)	335-76-2	1	µg/kg		<1	<1	<1	<1	<1
Perfluoroundecanoic acid (PFUnDA)	2058-94-8	1	µg/kg		<1	<1	<1	<1	<1
Perfluorododecanoic acid (PFDoDA)	307-55-1	2	µg/kg		<2	<2	<2	<2	<2
Perfluorotridecanoic acid (PFTrDA)	72629-94-8	2	µg/kg		<2	<2	<2	<2	<2
Perfluorotetradecanoic acid (PFTeDA)	376-06-7	2	µg/kg		<2	<2	<2	<2	<2
EP231C: Perfluoroalkyl Sulfonamides									
Perfluorooctane sulfonamide (FOSA)	754-91-6	5	µg/kg		<5	<5	<5	<5	<5
N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	5	µg/kg		<5	<5	<5	<5	<5
N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	2	µg/kg		<2	<2	<2	<2	<2
N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	2	µg/kg		<2	<2	<2	<2	<2
N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	2	µg/kg		<2	<2	<2	<2	<2
N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	1	µg/kg		<1	<1	<1	<1	<1
N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	1	µg/kg		<1	<1	<1	<1	<1
EP231D: (n:2) Fluorotelomer Sulfonic Acids									
4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	2	µg/kg		<2	<2	<2	<2	<2
6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	2	µg/kg		<2	<2	<2	<2	<2
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	2	µg/kg		<2	<2	<2	<2	<2

Analytical Results

Sub-Matrix: **BIOTA**
(Matrix: **BIOTA**)

Compound	CAS Number	LOR	Unit	Sample ID	AB1 Hyrtlii AB1	AB1 Macrobrachium AB1	AB1 Yellowbelly AB1	AB1 Sleepy cod AB1	AB4 Porocheilus AB4
				Sampling date / time	04-Feb-2023 00:00	04-Feb-2023 00:00	04-Feb-2023 00:00	04-Feb-2023 00:00	02-Feb-2023 00:00
					ES2304523-034	ES2304523-035	ES2304523-036	ES2304523-037	ES2304523-038
					Result	Result	Result	Result	Result
EP231D: (n:2) Fluorotelomer Sulfonic Acids - Continued									
10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	2	µg/kg		<2	<2	<2	<2	<2
EP231P: PFAS Sums									
^ Sum of PFAS	----	1	µg/kg		<1	<1	<1	<1	**16**
^ Sum of PFHxS and PFOS	355-46-4/1763-23-1	1	µg/kg		<1	<1	<1	<1	**16**
EP231S: PFAS Surrogate									
13C4-PFOS	----	1	%		**99.5**	**106**	**93.0**	**100**	**94.0**
13C8-PFOA	----	1	%		**100**	**98.0**	**100**	**102**	**106**

Analytical Results

Sub-Matrix: **BIOTA**
(Matrix: **BIOTA**)

Compound	CAS Number	LOR	Unit	Sample ID	AB5 Porocheilus AB5	AB1 Porocheilus AB1	AB3 Barramundi Duplicated (1)	AB3 Hardyhead Duplicated (7)	AB9 Hyrtlii Duplicated (13)
				Sampling date / time	02-Feb-2023 00:00	02-Feb-2023 00:00	30-Jan-2023 00:00	31-Jan-2023 00:00	01-Feb-2023 00:00
					ES2304523-039	ES2304523-040	ES2304523-047	ES2304523-048	ES2304523-049
					Result	Result	Result	Result	Result
Biota Sample Pre-Preparation									
ø **Sample Description**	----	-	--		**Porocheilus**	**Porocheilus**	**Barramundi**	**Hardyhead**	**Hyrtlii**
ø **Weight of Sample Prepared**	----	0.1	g		**39.0**	**7.7**	**10600**	**27.0**	**15.0**
EG094: Metals in Biota by ICPMS									
ø **Arsenic**	7440-38-2	0.05	mg/kg		**0.06**	**0.05**	**0.06**	**0.24**	<0.05
ø **Barium**	7440-39-3	0.1	mg/kg		**1.2**	**0.7**	<0.1	**2.8**	**0.2**
ø **Boron**	7440-42-8	5	mg/kg		<5	<5	<5	<5	<5
ø **Chromium**	7440-47-3	0.05	mg/kg		**1.76**	**2.44**	<0.05	**1.44**	**0.55**
ø **Copper**	7440-50-8	0.1	mg/kg		**1.0**	**1.2**	**0.3**	**0.6**	**0.4**
ø **Molybdenum**	7439-98-7	0.05	mg/kg		**0.24**	**0.35**	<0.05	**0.20**	**0.07**
ø **Selenium**	7782-49-2	0.05	mg/kg		**0.10**	**0.16**	**0.18**	**0.21**	**0.13**
ø **Strontium**	7440-24-6	0.1	mg/kg		**55.5**	**54.3**	**0.6**	**61.3**	**5.9**
ø **Uranium**	7440-61-1	0.01	mg/kg		<0.01	<0.01	<0.01	<0.01	<0.01
ø **Vanadium**	7440-62-2	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5	<0.5
ø **Zinc**	7440-66-6	0.5	mg/kg		**49.2**	**39.5**	**5.1**	**54.3**	**15.6**
EP231A: Perfluoroalkyl Sulfonic Acids									
Perfluorobutane sulfonic acid (PFBS)	375-73-5	1	µg/kg		<1	<1	<1	<1	<1
Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	1	µg/kg		<1	<1	<1	<1	<1
Perfluorohexane sulfonic acid (PFHxS)	355-46-4	1	µg/kg		<1	<1	<1	<1	<1
Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	1	µg/kg		<1	<1	<1	<1	<1
Perfluorooctane sulfonic acid (PFOS) - Linear	2795-39-3	1	µg/kg		**42**	**2**	<1	<1	<1
Perfluorooctane sulfonic acid (PFOS) - Branched	----	1	µg/kg		**2**	<1	<1	<1	<1
Perfluorooctane sulfonic acid (PFOS)	1763-23-1	1	µg/kg		**44**	**2**	<1	<1	<1
Perfluorodecane sulfonic acid (PFDS)	335-77-3	2	µg/kg		<2	<2	<2	<2	<2
EP231B: Perfluoroalkyl Carboxylic Acids									
Perfluorobutanoic acid (PFBA)	375-22-4	5	µg/kg		<5	<5	<5	<5	<5
Perfluoropentanoic acid (PFPeA)	2706-90-3	2	µg/kg		<2	<2	<2	<2	<2
Perfluorohexanoic acid (PFHxA)	307-24-4	1	µg/kg		<1	<1	<1	<1	<1

Analytical Results

Sub-Matrix: **BIOTA**
(Matrix: **BIOTA**)

Compound	CAS Number	LOR	Unit	Sample ID	AB5 Porocheilus AB5	AB1 Porocheilus AB1	AB3 Barramundi Duplicated (1)	AB3 Hardyhead Duplicated (7)	AB9 Hyrtlii Duplicated (13)
				Sampling date / time	02-Feb-2023 00:00	02-Feb-2023 00:00	30-Jan-2023 00:00	31-Jan-2023 00:00	01-Feb-2023 00:00
					ES2304523-039	ES2304523-040	ES2304523-047	ES2304523-048	ES2304523-049
					Result	Result	Result	Result	Result
EP231B: Perfluoroalkyl Carboxylic Acids - Continued									
Perfluoroheptanoic acid (PFHpA)	375-85-9	1	µg/kg		<1	<1	<1	<1	<1
Perfluorooctanoic acid (PFOA)	335-67-1	1	µg/kg		<1	<1	<1	<1	<1
Perfluorononanoic acid (PFNA)	375-95-1	1	µg/kg		<1	<1	<1	<1	<1
Perfluorodecanoic acid (PFDA)	335-76-2	1	µg/kg		<1	<1	<1	<1	<1
Perfluoroundecanoic acid (PFUnDA)	2058-94-8	1	µg/kg		<1	<1	<1	<1	<1
Perfluorododecanoic acid (PFDoDA)	307-55-1	2	µg/kg		<2	<2	<2	<2	<2
Perfluorotridecanoic acid (PFTrDA)	72629-94-8	2	µg/kg		<2	<2	<2	<2	<2
Perfluorotetradecanoic acid (PFTeDA)	376-06-7	2	µg/kg		<2	<2	<2	<2	<2
EP231C: Perfluoroalkyl Sulfonamides									
Perfluorooctane sulfonamide (FOSA)	754-91-6	5	µg/kg		<5	<5	<5	<5	<5
N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	5	µg/kg		<5	<5	<5	<5	<5
N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	2	µg/kg		<2	<2	<2	<2	<2
N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	2	µg/kg		<2	<2	<2	<2	<2
N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	2	µg/kg		<2	<2	<2	<2	<2
N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	1	µg/kg		<1	<1	<1	<1	<1
N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	1	µg/kg		<1	<1	<1	<1	<1
EP231D: (n:2) Fluorotelomer Sulfonic Acids									
4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	2	µg/kg		<2	<2	<2	<2	<2
6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	2	µg/kg		<2	<2	<2	<2	<2
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	2	µg/kg		<2	<2	<2	<2	<2

Analytical Results

Sub-Matrix: **BIOTA**
(Matrix: **BIOTA**)

Compound	CAS Number	LOR	Unit	Sample ID	AB5 Porocheilus AB5	AB1 Porocheilus AB1	AB3 Barramundi Duplicated (1)	AB3 Hardyhead Duplicated (7)	AB9 Hyrtlii Duplicated (13)
				Sampling date / time	02-Feb-2023 00:00	02-Feb-2023 00:00	30-Jan-2023 00:00	31-Jan-2023 00:00	01-Feb-2023 00:00
					ES2304523-039	ES2304523-040	ES2304523-047	ES2304523-048	ES2304523-049
					Result	Result	Result	Result	Result
EP231D: (n:2) Fluorotelomer Sulfonic Acids - Continued									
10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	2	µg/kg		<2	<2	<2	<2	<2
EP231P: PFAS Sums									
^ Sum of PFAS	----	1	µg/kg		**44**	**2**	<1	<1	<1
^ Sum of PFHxS and PFOS	355-46-4/1763-23-1	1	µg/kg		**44**	**2**	<1	<1	<1
EP231S: PFAS Surrogate									
13C4-PFOS	----	1	%		**96.5**	**92.0**	**93.0**	**94.5**	**105**
13C8-PFOA	----	1	%		**106**	**102**	**102**	**96.5**	**104**

Analytical Results

Sub-Matrix: **BIOTA**
(Matrix: **BIOTA**)

Compound	CAS Number	LOR	Unit	Sample ID	AB1 Yellowbelly Duplicated (36)	AB4 Glassfish AB4	AB2 Barramundi Duplicated (2)	AB2 Redclaw ALS Duplicated (6)	AB8 Yellowbelly Duplicated (20)
				Sampling date / time	04-Feb-2023 00:00	02-Feb-2023 00:00	30-Jan-2023 00:00	30-Jan-2023 00:00	30-Jan-2023 00:00
					ES2304523-050	ES2304523-051	ES2304523-052	ES2304523-053	ES2304523-054
					Result	Result	Result	Result	Result
Biota Sample Pre-Preparation									
ø **Sample Description**	----	-	--		**Yellowbelly**	**Glassfish**	**Barramundi**	**Redclaw**	**Yellowbelly**
ø **Weight of Sample Prepared**	----	0.1	g		**1150**	**3.0**	**11200**	**10.0**	**154**
EG094: Metals in Biota by ICPMS									
ø **Arsenic**	7440-38-2	0.05	mg/kg		**0.05**	**----**	**0.07**	**0.27**	**0.06**
ø **Barium**	7440-39-3	0.1	mg/kg		<0.1	**----**	<0.1	**2.1**	**0.2**
ø **Boron**	7440-42-8	5	mg/kg		<5	**----**	<5	<5	<5
ø **Chromium**	7440-47-3	0.05	mg/kg		<0.05	**----**	<0.05	**0.14**	<0.05
ø **Copper**	7440-50-8	0.1	mg/kg		**0.3**	**----**	**0.3**	**7.1**	**0.4**
ø **Molybdenum**	7439-98-7	0.05	mg/kg		<0.05	**----**	<0.05	<0.05	<0.05
ø **Selenium**	7782-49-2	0.05	mg/kg		**0.40**	**----**	**0.18**	**0.08**	**0.49**
ø **Strontium**	7440-24-6	0.1	mg/kg		**0.4**	**----**	**0.8**	**24.5**	**6.2**
ø **Uranium**	7440-61-1	0.01	mg/kg		<0.01	**----**	<0.01	<0.01	<0.01
ø **Vanadium**	7440-62-2	0.5	mg/kg		<0.5	**----**	<0.5	<0.5	<0.5
ø **Zinc**	7440-66-6	0.5	mg/kg		**9.3**	**----**	**4.9**	**16.9**	**7.5**
EP231A: Perfluoroalkyl Sulfonic Acids									
Perfluorobutane sulfonic acid (PFBS)	375-73-5	1	µg/kg		<1	<1	<1	<1	<1
Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	1	µg/kg		<1	<1	<1	<1	<1
Perfluorohexane sulfonic acid (PFHxS)	355-46-4	1	µg/kg		<1	<1	<1	<1	<1
Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	1	µg/kg		<1	<1	<1	<1	<1
Perfluorooctane sulfonic acid (PFOS) - Linear	2795-39-3	1	µg/kg		<1	**7**	<1	<1	**4**
Perfluorooctane sulfonic acid (PFOS) - Branched	----	1	µg/kg		<1	**3**	<1	<1	**2**
Perfluorooctane sulfonic acid (PFOS)	1763-23-1	1	µg/kg		<1	**10**	<1	<1	**6**
Perfluorodecane sulfonic acid (PFDS)	335-77-3	2	µg/kg		<2	<2	<2	<2	<2
EP231B: Perfluoroalkyl Carboxylic Acids									
Perfluorobutanoic acid (PFBA)	375-22-4	5	µg/kg		<5	<5	<5	<5	<5
Perfluoropentanoic acid (PFPeA)	2706-90-3	2	µg/kg		<2	<2	<2	<2	<2
Perfluorohexanoic acid (PFHxA)	307-24-4	1	µg/kg		<1	<1	<1	<1	<1

Analytical Results

Sub-Matrix: **BIOTA**
(Matrix: **BIOTA**)

Compound	CAS Number	LOR	Unit	Sample ID	AB1 Yellowbelly Duplicated (36)	AB4 Glassfish AB4	AB2 Barramundi Duplicated (2)	AB2 Redclaw ALS Duplicated (6)	AB8 Yellowbelly Duplicated (20)
				Sampling date / time	04-Feb-2023 00:00	02-Feb-2023 00:00	30-Jan-2023 00:00	30-Jan-2023 00:00	30-Jan-2023 00:00
					ES2304523-050	ES2304523-051	ES2304523-052	ES2304523-053	ES2304523-054
					Result	Result	Result	Result	Result
EP231B: Perfluoroalkyl Carboxylic Acids - Continued									
Perfluoroheptanoic acid (PFHpA)	375-85-9	1	µg/kg		<1	<1	<1	<1	<1
Perfluorooctanoic acid (PFOA)	335-67-1	1	µg/kg		<1	<1	<1	<1	<1
Perfluorononanoic acid (PFNA)	375-95-1	1	µg/kg		<1	<1	<1	<1	<1
Perfluorodecanoic acid (PFDA)	335-76-2	1	µg/kg		<1	<1	<1	<1	<1
Perfluoroundecanoic acid (PFUnDA)	2058-94-8	1	µg/kg		<1	<1	<1	<1	<1
Perfluorododecanoic acid (PFDoDA)	307-55-1	2	µg/kg		<2	<2	<2	<2	<2
Perfluorotridecanoic acid (PFTrDA)	72629-94-8	2	µg/kg		<2	<2	<2	<2	<2
Perfluorotetradecanoic acid (PFTeDA)	376-06-7	2	µg/kg		<2	<2	<2	<2	<2
EP231C: Perfluoroalkyl Sulfonamides									
Perfluorooctane sulfonamide (FOSA)	754-91-6	5	µg/kg		<5	<5	<5	<5	<5
N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	5	µg/kg		<5	<5	<5	<5	<5
N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	2	µg/kg		<2	<2	<2	<2	<2
N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	2	µg/kg		<2	<2	<2	<2	<2
N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	2	µg/kg		<2	<2	<2	<2	<2
N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	1	µg/kg		<1	<1	<1	<1	<1
N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	1	µg/kg		<1	<1	<1	<1	<1
EP231D: (n:2) Fluorotelomer Sulfonic Acids									
4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	2	µg/kg		<2	<2	<2	<2	<2
6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	2	µg/kg		<2	<2	<2	<2	<2
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	2	µg/kg		<2	<2	<2	<2	<2

Analytical Results

Sub-Matrix: **BIOTA** (Matrix: **BIOTA**)

Compound	CAS Number	LOR	Unit	Sample ID	AB1 Yellowbelly Duplicated (36)	AB4 Glassfish AB4	AB2 Barramundi Duplicated (2)	AB2 Redclaw ALS Duplicated (6)	AB8 Yellowbelly Duplicated (20)
				Sampling date / time	04-Feb-2023 00:00	02-Feb-2023 00:00	30-Jan-2023 00:00	30-Jan-2023 00:00	30-Jan-2023 00:00
					ES2304523-050	ES2304523-051	ES2304523-052	ES2304523-053	ES2304523-054
					Result	Result	Result	Result	Result
EP231D: (n:2) Fluorotelomer Sulfonic Acids - Continued									
10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	2	µg/kg		<2	<2	<2	<2	<2
EP231P: PFAS Sums									
^ Sum of PFAS	----	1	µg/kg		<1	**10**	<1	<1	**6**
^ Sum of PFHxS and PFOS	355-46-4/1763-23-1	1	µg/kg		<1	**10**	<1	<1	**6**
EP231S: PFAS Surrogate									
13C4-PFOS	----	1	%		**104**	**102**	**108**	**98.0**	**104**
13C8-PFOA	----	1	%		**102**	**100**	**102**	**99.0**	**103**

Surrogate Control Limits

Sub-Matrix: **BIOTA**		Recovery Limits (%)	
Compound	*CAS Number*	*Low*	*High*
EP231S: PFAS Surrogate			
13C4-PFOS	----	50	130
13C8-PFOA	----	50	130

ALS Environmental

CERTIFICATE OF ANALYSIS

Work Order	: **ES2304715**	Page	: 1 of 9
Client	: **HYDROBIOLOGY PTY LTD**	Laboratory	: Environmental Division Sydney
Contact	: JOSH HATTON	Contact	: Customer Services ES
Address	: 40 TERRIGAL STREET FIG TREE POCKET 4069	Address	: 277-289 Woodpark Road Smithfield NSW Australia 2164
Telephone	: ----	Telephone	: +61-2-8784 8555
Project	: B22096	Date Samples Received	: 14-Feb-2023 11:00
Order number	: ----	Date Analysis Commenced	: 14-Feb-2023
C-O-C number	: ----	Issue Date	: 17-Feb-2023 18:11
Sampler	: JOSH HATTON		
Site	: ----		
Quote number	: SY/415/22		
No. of samples received	: 6		
No. of samples analysed	: 6		

Accreditation No. 825
Accredited for compliance with
ISO/IEC 17025 - Testing

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted, unless the sampling was conducted by ALS. This document shall not be reproduced, except in full.

This Certificate of Analysis contains the following information:

- General Comments
- Analytical Results
- Surrogate Control Limits

Additional information pertinent to this report will be found in the following separate attachments: Quality Control Report, QA/QC Compliance Assessment to assist with Quality Review and Sample Receipt Notification.

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is carried out in compliance with procedures specified in 21 CFR Part 11.

Signatories	*Position*	*Accreditation Category*
Ankit Joshi	Senior Chemist - Inorganics	Sydney Inorganics, Smithfield, NSW
Franco Lentini	LCMS Coordinator	Sydney Organics, Smithfield, NSW

General Comments

The analytical procedures used by ALS have been developed from established internationally recognised procedures such as those published by the USEPA, APHA, AS and NEPM. In house developed procedures are fully validated and are often at the client request.

Where moisture determination has been performed, results are reported on a dry weight basis.

Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis.

Where the LOR of a reported result differs from standard LOR, this may be due to high moisture content, insufficient sample (reduced weight employed) or matrix interference.

When sampling time information is not provided by the client, sampling dates are shown without a time component. In these instances, the time component has been assumed by the laboratory for processing purposes.

Where a result is required to meet compliance limits the associated uncertainty must be considered. Refer to the ALS Contract for details.

Key : CAS Number = CAS registry number from database maintained by Chemical Abstracts Services. The Chemical Abstracts Service is a division of the American Chemical Society.
LOR = Limit of reporting
^ = This result is computed from individual analyte detections at or above the level of reporting
ø = ALS is not NATA accredited for these tests.
~ = Indicates an estimated value.

- EP231X - Per- and Polyfluoroalkyl Substances (PFAS): Samples received in 20ml or 125ml bottles have been tested in accordance with the QSM5.3 compliant, NATA accredited method. 60mL or 250mL bottles have been tested to the legacy QSM 5.1 aligned, NATA accredited method.
- EP231: Stable isotope enriched internal standards are added to samples prior to extraction. Target compounds have a direct analogous internal standard with the exception of PFPeS, PFHpA, PFDS, PFTrDA and 10:2 FTS. These compounds use an internal standard that is chemically related and has a retention time close to that of the target compound. The DQO for internal standard response is 50-150% of that established at initial calibration. PFOS is quantified using a certified, traceable standard consisting of linear and branched PFOS isomers. These practices are in line with recommendations in the National Environmental Management Plan for PFAS (Australian HEPA) and also conform to QSM 5.3 (US DoD) requirements.

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Sample ID	R1	R2	R3	R4	R5
				Sampling date / time	30-Jan-2023 00:00	31-Jan-2023 00:00	01-Feb-2023 00:00	02-Feb-2023 00:00	03-Feb-2023 00:00
Compound	CAS Number	LOR	Unit		ES2304715-001	ES2304715-002	ES2304715-003	ES2304715-004	ES2304715-005
					Result	Result	Result	Result	Result
EG020T: Total Metals by ICP-MS									
Arsenic	7440-38-2	0.001	mg/L		<0.001	<0.001	<0.001	<0.001	<0.001
Barium	7440-39-3	0.001	mg/L		<0.001	<0.001	<0.001	<0.001	<0.001
Chromium	7440-47-3	0.001	mg/L		<0.001	<0.001	<0.001	<0.001	<0.001
Copper	7440-50-8	0.001	mg/L		<0.001	<0.001	<0.001	<0.001	<0.001
Molybdenum	7439-98-7	0.001	mg/L		<0.001	<0.001	<0.001	<0.001	<0.001
Selenium	7782-49-2	0.01	mg/L		<0.01	<0.01	<0.01	<0.01	<0.01
Strontium	7440-24-6	0.001	mg/L		<0.001	<0.001	<0.001	<0.001	<0.001
Uranium	7440-61-1	0.001	mg/L		<0.001	<0.001	<0.001	<0.001	<0.001
Vanadium	7440-62-2	0.01	mg/L		<0.01	<0.01	<0.01	<0.01	<0.01
Zinc	7440-66-6	0.005	mg/L		<0.005	<0.005	<0.005	<0.005	<0.005
Boron	7440-42-8	0.05	mg/L		<0.05	<0.05	<0.05	<0.05	<0.05
EP231A: Perfluoroalkyl Sulfonic Acids									
Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.01	µg/L		<0.01	<0.01	<0.01	<0.01	<0.01
Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L		<0.01	<0.01	<0.01	<0.01	<0.01
Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
EP231B: Perfluoroalkyl Carboxylic Acids									
Perfluorobutanoic acid (PFBA)	375-22-4	0.1	µg/L		<0.1	<0.1	<0.1	<0.1	<0.1
Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L		<0.01	<0.01	<0.01	<0.01	<0.01
Perfluorononanoic acid (PFNA)	375-95-1	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
Perfluorodecanoic acid (PFDA)	335-76-2	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Sample ID	R1	R2	R3	R4	R5
				Sampling date / time	30-Jan-2023 00:00	31-Jan-2023 00:00	01-Feb-2023 00:00	02-Feb-2023 00:00	03-Feb-2023 00:00
Compound	CAS Number	LOR	Unit		ES2304715-001	ES2304715-002	ES2304715-003	ES2304715-004	ES2304715-005
					Result	Result	Result	Result	Result
EP231B: Perfluoroalkyl Carboxylic Acids - Continued									
Perfluorododecanoic acid (PFDoDA)	307-55-1	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	<0.05
EP231C: Perfluoroalkyl Sulfonamides									
Perfluorooctane sulfonamide (FOSA)	754-91-6	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	<0.05
N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	<0.05
N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	<0.05
N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	<0.05
N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
EP231D: (n:2) Fluorotelomer Sulfonic Acids									
4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	<0.05
6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	<0.05
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	<0.05
10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	<0.05
EP231P: PFAS Sums									
Sum of PFAS	----	0.01	µg/L		<0.01	<0.01	<0.01	<0.01	<0.01
Sum of PFHxS and PFOS	355-46-4/1763-23-1	0.01	µg/L		<0.01	<0.01	<0.01	<0.01	<0.01

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Sample ID	R1	R2	R3	R4	R5
				Sampling date / time	30-Jan-2023 00:00	31-Jan-2023 00:00	01-Feb-2023 00:00	02-Feb-2023 00:00	03-Feb-2023 00:00
Compound	CAS Number	LOR	Unit		ES2304715-001	ES2304715-002	ES2304715-003	ES2304715-004	ES2304715-005
					Result	Result	Result	Result	Result
EP231P: PFAS Sums - Continued									
Sum of PFAS (WA DER List)	----	0.01	µg/L		<0.01	<0.01	<0.01	<0.01	<0.01
EP231S: PFAS Surrogate									
13C4-PFOS	----	0.02	%		**95.6**	**102**	**98.8**	**96.1**	**100**
13C8-PFOA	----	0.02	%		**97.0**	**102**	**105**	**102**	**100**

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Sample ID	A1	----	----	----	----
				Sampling date / time	03-Feb-2023 00:00	----	----	----	----
Compound	CAS Number	LOR	Unit		ES2304715-006	--------	--------	--------	--------
					Result	----	----	----	----
EG020T: Total Metals by ICP-MS									
Arsenic	7440-38-2	0.001	mg/L		<0.001	----	----	----	----
Barium	7440-39-3	0.001	mg/L		<0.001	----	----	----	----
Chromium	7440-47-3	0.001	mg/L		<0.001	----	----	----	----
Copper	7440-50-8	0.001	mg/L		<0.001	----	----	----	----
Molybdenum	7439-98-7	0.001	mg/L		<0.001	----	----	----	----
Selenium	7782-49-2	0.01	mg/L		<0.01	----	----	----	----
Strontium	7440-24-6	0.001	mg/L		<0.001	----	----	----	----
Uranium	7440-61-1	0.001	mg/L		<0.001	----	----	----	----
Vanadium	7440-62-2	0.01	mg/L		<0.01	----	----	----	----
Zinc	7440-66-6	0.005	mg/L		<0.005	----	----	----	----
Boron	7440-42-8	0.05	mg/L		<0.05	----	----	----	----
EP231A: Perfluoroalkyl Sulfonic Acids									
Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L		<0.02	----	----	----	----
Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.02	µg/L		<0.02	----	----	----	----
Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.01	µg/L		<0.01	----	----	----	----
Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.02	µg/L		<0.02	----	----	----	----
Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L		<0.01	----	----	----	----
Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.02	µg/L		<0.02	----	----	----	----
EP231B: Perfluoroalkyl Carboxylic Acids									
Perfluorobutanoic acid (PFBA)	375-22-4	0.1	µg/L		<0.1	----	----	----	----
Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L		<0.02	----	----	----	----
Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L		<0.02	----	----	----	----
Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L		<0.02	----	----	----	----
Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L		<0.01	----	----	----	----
Perfluorononanoic acid (PFNA)	375-95-1	0.02	µg/L		<0.02	----	----	----	----
Perfluorodecanoic acid (PFDA)	335-76-2	0.02	µg/L		<0.02	----	----	----	----
Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.02	µg/L		<0.02	----	----	----	----

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Sample ID	A1	----	----	----	----
				Sampling date / time	03-Feb-2023 00:00	----	----	----	----
Compound	CAS Number	LOR	Unit		ES2304715-006	--------	--------	--------	--------
					Result	----	----	----	----
EP231B: Perfluoroalkyl Carboxylic Acids - Continued									
Perfluorododecanoic acid (PFDoDA)	307-55-1	0.02	µg/L		<0.02	----	----	----	----
Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.02	µg/L		<0.02	----	----	----	----
Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.05	µg/L		<0.05	----	----	----	----
EP231C: Perfluoroalkyl Sulfonamides									
Perfluorooctane sulfonamide (FOSA)	754-91-6	0.02	µg/L		<0.02	----	----	----	----
N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.05	µg/L		<0.05	----	----	----	----
N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.05	µg/L		<0.05	----	----	----	----
N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.05	µg/L		<0.05	----	----	----	----
N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.05	µg/L		<0.05	----	----	----	----
N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.02	µg/L		<0.02	----	----	----	----
N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.02	µg/L		<0.02	----	----	----	----
EP231D: (n:2) Fluorotelomer Sulfonic Acids									
4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.05	µg/L		<0.05	----	----	----	----
6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.05	µg/L		<0.05	----	----	----	----
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.05	µg/L		<0.05	----	----	----	----
10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.05	µg/L		<0.05	----	----	----	----
EP231P: PFAS Sums									
Sum of PFAS	----	0.01	µg/L		<0.01	----	----	----	----
Sum of PFHxS and PFOS	355-46-4/1763-23-1	0.01	µg/L		<0.01	----	----	----	----

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Sample ID	A1	----	----	----	----
				Sampling date / time	03-Feb-2023 00:00	----	----	----	----
Compound	CAS Number	LOR	Unit		ES2304715-006	--------	--------	--------	--------
					Result	----	----	----	----
EP231P: PFAS Sums - Continued									
Sum of PFAS (WA DER List)	----	0.01	µg/L		<0.01	----	----	----	----
EP231S: PFAS Surrogate									
13C4-PFOS	----	0.02	%		**97.8**	----	----	----	----
13C8-PFOA	----	0.02	%		**103**	----	----	----	----

Surrogate Control Limits

Sub-Matrix: **WATER**		Recovery Limits (%)	
Compound	*CAS Number*	*Low*	*High*
EP231S: PFAS Surrogate			
13C4-PFOS	----	60	120
13C8-PFOA	----	60	120

REPORT OF ANALYSIS

Report No. RN1385971

Client	: HYDROBIOLOGY 27/43 LANG PARADE MILTON QLD 4064	**Job No.**	: HYDR09/230224
		Quote No.	: QT-02232
		Order No.	: B22096
		Date Received	: 24-FEB-2023
Attention	: JOSH HATTON	**Sampled By**	: CLIENT
Project Name	:		
Your Client Services Manager	: Danny Slee	**Phone**	: 02 9449 0169

Lab Reg No.	Sample Ref	Sample Description
N23/003440	.	BIOTA ES2304523-006AB 31-JAN-2023
N23/003442	.	BIOTA ES2304523-007 31-JAN-2023
N23/003443	.	BIOTA ES2304523-008 31-JAN-2023
N23/003444	.	BIOTA ES2304523-009 31-JAN-2023

Lab Reg No.	Units	N23/003440	N23/003442	N23/003443	N23/003444	Method
Date Sampled		**31-JAN-2023**	**31-JAN-2023**	**31-JAN-2023**	**31-JAN-2023**	
Sample Reference		.	.	.	.	
Total Recoverable Trace Elements by ICP						
Lithium	mg/kg	<0.2	<0.2	<0.2	<0.2	NT2_46
Thorium Th	mg/kg	<0.01	<0.01	<0.01	<0.01	NT2_46
Dates						
Date extracted		14-MAR-2023	14-MAR-2023	14-MAR-2023	14-MAR-2023	
Date analysed		15-MAR-2023	15-MAR-2023	15-MAR-2023	15-MAR-2023	

Richard Tea, Analyst
Inorganics - NSW
Accreditation No. 198

17-MAR-2023

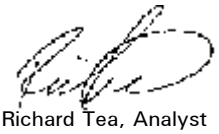
REPORT OF ANALYSIS

Report No. RN1385971

Client	: HYDROBIOLOGY	**Job No.**	: HYDR09/230224
	27/43 LANG PARADE	**Quote No.**	: QT-02232
	MILTON QLD 4064	**Order No.**	: B22096
		Date Received	: 24-FEB-2023
Attention	: JOSH HATTON	**Sampled By**	: CLIENT
Project Name	:		
Your Client Services Manager	: Danny Slee	**Phone**	: 02 9449 0169

Lab Reg No.	Sample Ref	Sample Description
N23/003445	.	BIOTA ES2304523-011 31-JAN-2023
N23/003446	.	BIOTA ES2304523-013 01-FEB-2023
N23/003447	.	BIOTA ES2304523-014 01-FEB-2023
N23/003448	.	BIOTA ES2304523-015 01-FEB-2023

Lab Reg No.	Units	N23/003445	N23/003446	N23/003447	N23/003448	Method
Date Sampled		**31-JAN-2023**	**01-FEB-2023**	**01-FEB-2023**	**01-FEB-2023**	
Sample Reference		.	.	.	.	
Total Recoverable Trace Elements by ICP						
Lithium	mg/kg	<0.2	<0.2	<0.2	<0.2	NT2_46
Thorium Th	mg/kg	<0.01	<0.01	<0.01	0.022	NT2_46
Dates						
Date extracted		14-MAR-2023	14-MAR-2023	14-MAR-2023	14-MAR-2023	
Date analysed		15-MAR-2023	15-MAR-2023	15-MAR-2023	15-MAR-2023	



Richard Tea, Analyst
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Accreditation No. 198

17-MAR-2023

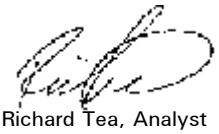
REPORT OF ANALYSIS

Report No. RN1385971

Client	: HYDROBIOLOGY	**Job No.**	: HYDR09/230224
	27/43 LANG PARADE	**Quote No.**	: QT-02232
	MILTON QLD 4064	**Order No.**	: B22096
		Date Received	: 24-FEB-2023
Attention	: JOSH HATTON	**Sampled By**	: CLIENT
Project Name	:		
Your Client Services Manager	: Danny Slee	**Phone**	: 02 9449 0169

Lab Reg No.	Sample Ref	Sample Description
N23/003449	.	BIOTA ES2304523-016 01-FEB-2023
N23/003450	.	BIOTA ES2304523-017 01-FEB-2023
N23/003451	.	BIOTA ES2304523-018 01-FEB-2023
N23/003452	.	BIOTA ES2304523-019 01-FEB-2023

Lab Reg No.	Units	N23/003449	N23/003450	N23/003451	N23/003452	Method
Date Sampled		01-FEB-2023	01-FEB-2023	01-FEB-2023	01-FEB-2023	
Sample Reference		.	.	.	.	
Total Recoverable Trace Elements by ICP						
Lithium	mg/kg	<0.2	<0.2	<0.2	<0.2	NT2_46
Thorium Th	mg/kg	<0.01	<0.01	<0.01	<0.01	NT2_46
Dates						
Date extracted		14-MAR-2023	14-MAR-2023	14-MAR-2023	14-MAR-2023	
Date analysed		15-MAR-2023	15-MAR-2023	15-MAR-2023	15-MAR-2023	



Richard Tea, Analyst
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Accreditation No. 198

17-MAR-2023

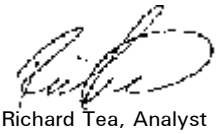
REPORT OF ANALYSIS

Report No. RN1385971

Client	: HYDROBIOLOGY	**Job No.**	: HYDR09/230224
	27/43 LANG PARADE	**Quote No.**	: QT-02232
	MILTON QLD 4064	**Order No.**	: B22096
		Date Received	: 24-FEB-2023
Attention	: JOSH HATTON	**Sampled By**	: CLIENT
Project Name	:		
Your Client Services Manager	: Danny Slee	**Phone**	: 02 9449 0169

Lab Reg No.	Sample Ref	Sample Description
N23/003456	.	BIOTA ES2304523-025 02-FEB-2023
N23/003457	.	BIOTA ES2304523-030 04-FEB-2023
N23/003459	.	BIOTA ES2304523-032 04-FEB-2023
N23/003460	.	BIOTA ES2304523-033 04-FEB-2023

Lab Reg No.	Units	N23/003456	N23/003457	N23/003459	N23/003460	Method
Date Sampled		02-FEB-2023	04-FEB-2023	04-FEB-2023	04-FEB-2023	
Sample Reference		.	.	.	.	
Total Recoverable Trace Elements by ICP						
Lithium	mg/kg	<0.2	<0.2	<0.2	<0.2	NT2_46
Thorium Th	mg/kg	<0.01	<0.01	<0.01	<0.01	NT2_46
Dates						
Date extracted		14-MAR-2023	14-MAR-2023	14-MAR-2023	14-MAR-2023	
Date analysed		15-MAR-2023	15-MAR-2023	15-MAR-2023	15-MAR-2023	



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Accreditation No. 198

17-MAR-2023

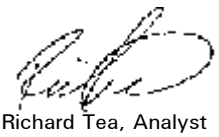
REPORT OF ANALYSIS

Report No. RN1385971

Client	: HYDROBIOLOGY	**Job No.**	: HYDR09/230224
	27/43 LANG PARADE	**Quote No.**	: QT-02232
	MILTON QLD 4064	**Order No.**	: B22096
		Date Received	: 24-FEB-2023
Attention	: JOSH HATTON	**Sampled By**	: CLIENT
Project Name	:		
Your Client Services Manager	: Danny Slee	**Phone**	: 02 9449 0169

Lab Reg No.	Sample Ref	Sample Description
N23/003464	.	BIOTA ES2304523-039 02-FEB-2023
N23/003465	.	BIOTA ES2304523-040 02-FEB-2023

Lab Reg No.		N23/003464	N23/003465			
Date Sampled		02-FEB-2023	02-FEB-2023			
Sample Reference	Units	.	.			Method
Total Recoverable Trace Elements by ICP						
Lithium	mg/kg	<0.2	<0.2			NT2_46
Thorium Th	mg/kg	<0.01	<0.01			NT2_46
Dates						
Date extracted		14-MAR-2023	14-MAR-2023			
Date analysed		15-MAR-2023	15-MAR-2023			



Richard Tea, Analyst
Inorganics - NSW
Accreditation No. 198

17-MAR-2023

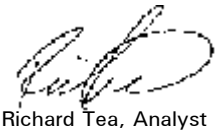
REPORT OF ANALYSIS

Report No. RN1385971

Client	: HYDROBIOLOGY	**Job No.**	: HYDR09/230224
	27/43 LANG PARADE	**Quote No.**	: QT-02232
	MILTON QLD 4064	**Order No.**	: B22096
		Date Received	: 24-FEB-2023
Attention	: JOSH HATTON	**Sampled By**	: CLIENT
Project Name	:		
Your Client Services Manager	: Danny Slee	**Phone**	: 02 9449 0169

Lab Reg No.	Sample Ref	Sample Description
N23/003436	.	BIOTA ES2304523-001 30-JAN-2023
N23/003437	.	BIOTA ES2304523-002 30-JAN-2023
N23/003438	.	BIOTA ES2304523-003 30-JAN-2023
N23/003439	.	BIOTA ES2304523-004 31-JAN-2023

Lab Reg No.			N23/003436	N23/003437	N23/003438	N23/003439	
Date Sampled			30-JAN-2023	30-JAN-2023	30-JAN-2023	31-JAN-2023	
Sample Reference		Units	.	.	.	.	Method
Total Recoverable Trace Elements by ICP							
Lithium		mg/kg	<0.2	<0.2	<0.2	<0.2	NT2_46
Thorium Th		mg/kg	<0.01	0.018	0.022	<0.01	NT2_46
Dates							
Date extracted			14-MAR-2023	14-MAR-2023	14-MAR-2023	14-MAR-2023	
Date analysed			15-MAR-2023	15-MAR-2023	15-MAR-2023	15-MAR-2023	



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Accreditation No. 198

17-MAR-2023

Lab Reg No.			N23/003436	N23/003437	N23/003438	N23/003439	
Date Sampled			30-JAN-2023	30-JAN-2023	30-JAN-2023	31-JAN-2023	
Sample Reference		Units	.	.	.	.	Method
Miscellaneous							
Fluoride - Total		mg/kg	<0.2	<0.2	<0.2	6.3	VL417

N23/003436
Note: Not NATA Accredited for Fluoride by Method VL417.

N23/003437
Note: Not NATA Accredited for Fluoride by Method VL417.

N23/003438

Note: Not NATA Accredited for Fluoride by Method VL417.

N23/003439
Note: Not NATA Accredited for Fluoride by Method VL417.

Paul Adorno, Section Manager
Inorganics - Vic
Accreditation No. 89

17-MAR-2023

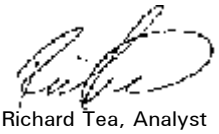
REPORT OF ANALYSIS

Report No. RN1385971

Client	: HYDROBIOLOGY	**Job No.**	: HYDR09/230224
	27/43 LANG PARADE	**Quote No.**	: QT-02232
	MILTON QLD 4064	**Order No.**	: B22096
		Date Received	: 24-FEB-2023
Attention	: JOSH HATTON	**Sampled By**	: CLIENT
Project Name	:		
Your Client Services Manager	: Danny Slee	**Phone**	: 02 9449 0169

Lab Reg No.	Sample Ref	Sample Description
N23/003441	.	BIOTA ES2304523-006AC 31-JAN-2023
N23/003453	.	BIOTA ES2304523-020AD 01-FEB-2023
N23/003454	.	BIOTA ES2304523-020AA 01-FEB-2023
N23/003455	.	BIOTA ES2304523-022 02-FEB-2023

Lab Reg No.		Units	N23/003441	N23/003453	N23/003454	N23/003455	Method
Date Sampled			**31-JAN-2023**	**01-FEB-2023**	**01-FEB-2023**	**02-FEB-2023**	
Sample Reference			.	.	.	.	
Total Recoverable Trace Elements by ICP							
Lithium		mg/kg	<0.2	<0.2	<0.2	<0.2	NT2_46
Thorium Th		mg/kg	<0.01	<0.01	<0.01	<0.01	NT2_46
Dates							
Date extracted			14-MAR-2023	14-MAR-2023	14-MAR-2023	14-MAR-2023	
Date analysed			15-MAR-2023	15-MAR-2023	15-MAR-2023	15-MAR-2023	



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17-MAR-2023

Lab Reg No.		Units	N23/003441	N23/003453	N23/003454	N23/003455	Method
Date Sampled			**31-JAN-2023**	**01-FEB-2023**	**01-FEB-2023**	**02-FEB-2023**	
Sample Reference			.	.	.	.	
Miscellaneous							
Fluoride - Total		mg/kg	18	0.25	3.5	<0.2	VL417

N23/003441
Note: Not NATA Accredited for Fluoride by Method VL417.

N23/003453

Note: Not NATA Accredited for Fluoride by Method VL417.

N23/003454
Note: Not NATA Accredited for Fluoride by Method VL417.

N23/003455
Note: Not NATA Accredited for Fluoride by Method VL417.

Paul Adorno, Section Manager
Inorganics - Vic
Accreditation No. 89

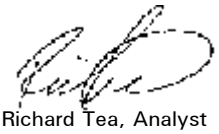
17-MAR-2023

REPORT OF ANALYSIS

Client	: HYDROBIOLOGY	**Job No.**	: HYDR09/230224
	27/43 LANG PARADE	**Quote No.**	: QT-02232
	MILTON QLD 4064	**Order No.**	: B22096
		Date Received	: 24-FEB-2023
Attention	: JOSH HATTON	**Sampled By**	: CLIENT
Project Name	:		
Your Client Services Manager	: Danny Slee	**Phone**	: 02 9449 0169

Lab Reg No.	Sample Ref	Sample Description
N23/003458	.	BIOTA ES2304523-031 04-FEB-2023
N23/003461	.	BIOTA ES2304523-034 04-FEB-2023
N23/003462	.	BIOTA ES2304523-036 04-FEB-2023
N23/003463	.	BIOTA ES2304523-037 04-FEB-2023

Lab Reg No.		Units	N23/003458	N23/003461	N23/003462	N23/003463	Method
Date Sampled			04-FEB-2023	04-FEB-2023	04-FEB-2023	04-FEB-2023	
Sample Reference			.	.	.	.	
Total Recoverable Trace Elements by ICP							
Lithium		mg/kg	<0.2	<0.2	<0.2	<0.2	NT2_46
Thorium Th		mg/kg	<0.01	<0.01	<0.01	<0.01	NT2_46
Dates							
Date extracted			14-MAR-2023	14-MAR-2023	14-MAR-2023	14-MAR-2023	
Date analysed			15-MAR-2023	15-MAR-2023	15-MAR-2023	15-MAR-2023	



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17-MAR-2023

Lab Reg No.		Units	N23/003458	N23/003461	N23/003462	N23/003463	Method
Date Sampled			04-FEB-2023	04-FEB-2023	04-FEB-2023	04-FEB-2023	
Sample Reference			.	.	.	.	
Miscellaneous							
Fluoride - Total		mg/kg	<0.2	<0.2	<0.2	<0.2	VL417

N23/003458
Note: Not NATA Accredited for Fluoride by Method VL417.

N23/003461
Note: Not NATA Accredited for Fluoride by Method VL417.

N23/003462
Note: Not NATA Accredited for Fluoride by Method VL417.

N23/003463
Note: Not NATA Accredited for Fluoride by Method VL417.

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Inorganics - Vic
Accreditation No. 89

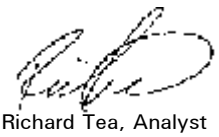
17-MAR-2023

REPORT OF ANALYSIS

Client	: HYDROBIOLOGY	**Job No.**	: HYDR09/230224
	27/43 LANG PARADE	**Quote No.**	: QT-02232
	MILTON QLD 4064	**Order No.**	: B22096
		Date Received	: 24-FEB-2023
Attention	: JOSH HATTON	**Sampled By**	: CLIENT
Project Name	:		
Your Client Services Manager	: Danny Slee	**Phone**	: 02 9449 0169

Lab Reg No.	Sample Ref	Sample Description
N23/003466	.	BIOTA ES2304523-048AA 31-JAN-2023
N23/003475	.	BIOTA ES2304523-050AC 04-FEB-2023

Lab Reg No.			N23/003466	N23/003475			
Date Sampled			31-JAN-2023	04-FEB-2023			
Sample Reference		Units	.	.			Method
Total Recoverable Trace Elements by ICP							
Lithium		mg/kg	<0.2	<0.2			NT2_46
Thorium Th		mg/kg	<0.01	0.011			NT2_46
Dates							
Date extracted			14-MAR-2023	14-MAR-2023			
Date analysed			15-MAR-2023	15-MAR-2023			



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Lab Reg No.			N23/003466	N23/003475			
Date Sampled			31-JAN-2023	04-FEB-2023			
Sample Reference		Units	.	.			Method
Miscellaneous							
Fluoride - Total		mg/kg	3.0	<0.2			VL417

N23/003466

Note: Not NATA Accredited for Fluoride by Method VL417.

N23/003475

REPORT OF ANALYSIS

Note: Not NATA Accredited for Fluoride by Method VL417.

Paul Adorno, Section Manager
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17-MAR-2023

This Report supersedes reports: *RN1385934*

Measurement Uncertainty is available upon request.
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