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Water quality monitoring in Cape York streams, June to August 2021

Queensland Department of Environment and Science 2021

Queensland Government

1 Introduction

During June 2021, the Environmental Monitoring and Assessment Science (EMAS) group within the Division of Science and Technology undertook a short water quality monitoring campaign in some Cape York streams between Cooktown and Coen. Additional streams further north in Cape York were monitored in August 2021 through the Cape York Water Partnership. This report covers both these programs.

The principal aim of the project was to acquire water quality data in streams for which there was little or no previous data available. Most of these streams currently have very limited development in their catchments, although some of them are at risk of being developed in the next 5-10 years. The project would thus provide a baseline of water quality data in all these streams in their undeveloped state. This is important for all of them, but is particularly important for those that may be developed in the foreseeable future.

While a single set of data has obvious limitations in terms of establishing a reliable baseline, it is nevertheless one step in the right direction. If further funding becomes available, this data set can be built upon until a more statistically robust baseline is established.

The sampling of many of the streams was undertaken with the permission of, and in collaboration with, the Traditional Owners of the respective areas. They came out on country with us, provided guidance in accessing sites and were involved with the sampling. Their involvement and assistance are acknowledged and it is hoped that that this collaboration can continue into the future.

Christina Howley of the Cape York Water Partnership provided significant liaison and logistical support, without which the project could not have been undertaken.

2 Study area

The project covered four groups of streams:

Group 1: East coast streams immediately to the south (Figure 1) and north (Figure 2) of Cooktown.

Group 2: East coast streams to the north and south of Port Stewart (which is approximately adjacent to Coen) (Figures 3 and 4)

Group 3: Archer River, which flows west into the Gulf of Carpentaria (Figure 5)

Group 4: Wenlock, Pascoe (and tributaries) and Claudie Rivers (Figure 6))

A complete list of sites, their locations and indicators monitored is provided in Appendices A1 and A2. Site groups 1-3 were sampled by EMAS in June 2021; group 4 sites were sampled by the Cape York Water Monitoring Network in August 2021.

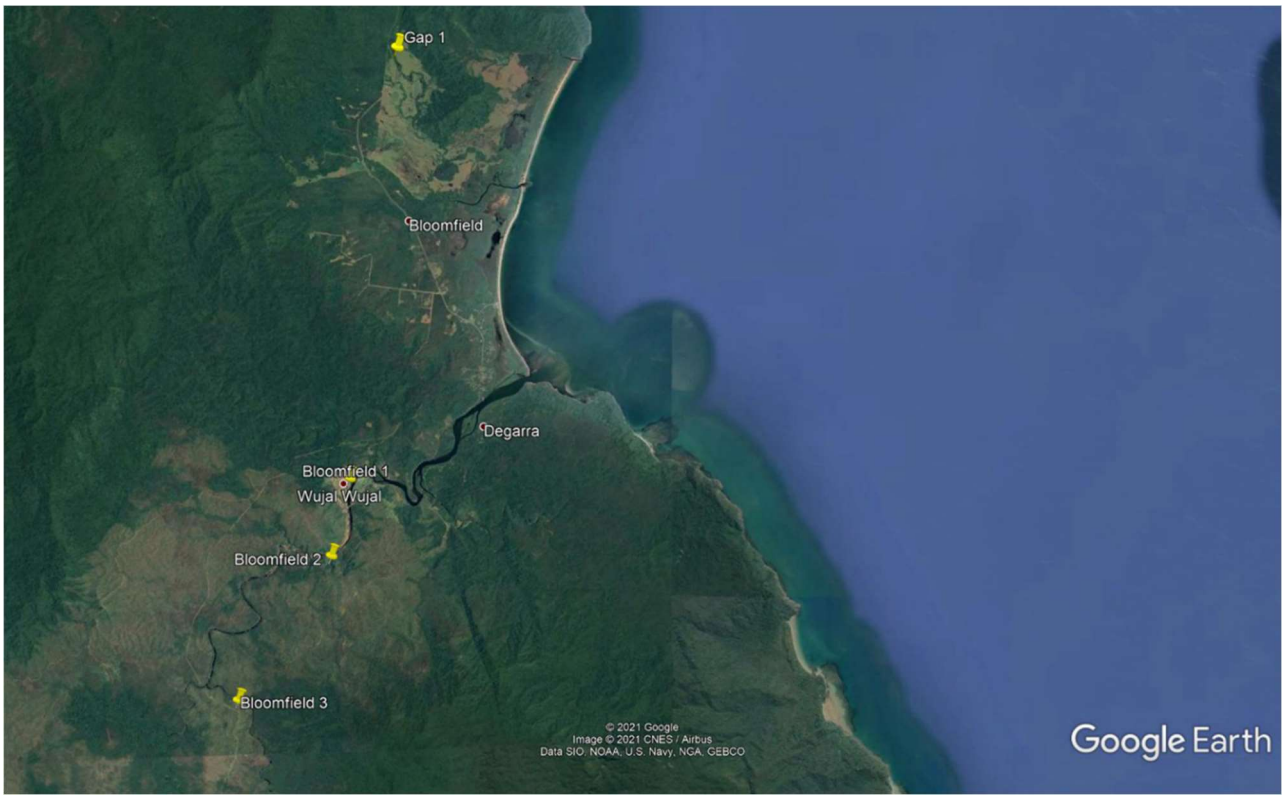

Figure 1: Bloomfield River and Gap Creek

Figure 2: Starcke River, McIvor River, Morgan River, Isabella Creek and North Endeavour River

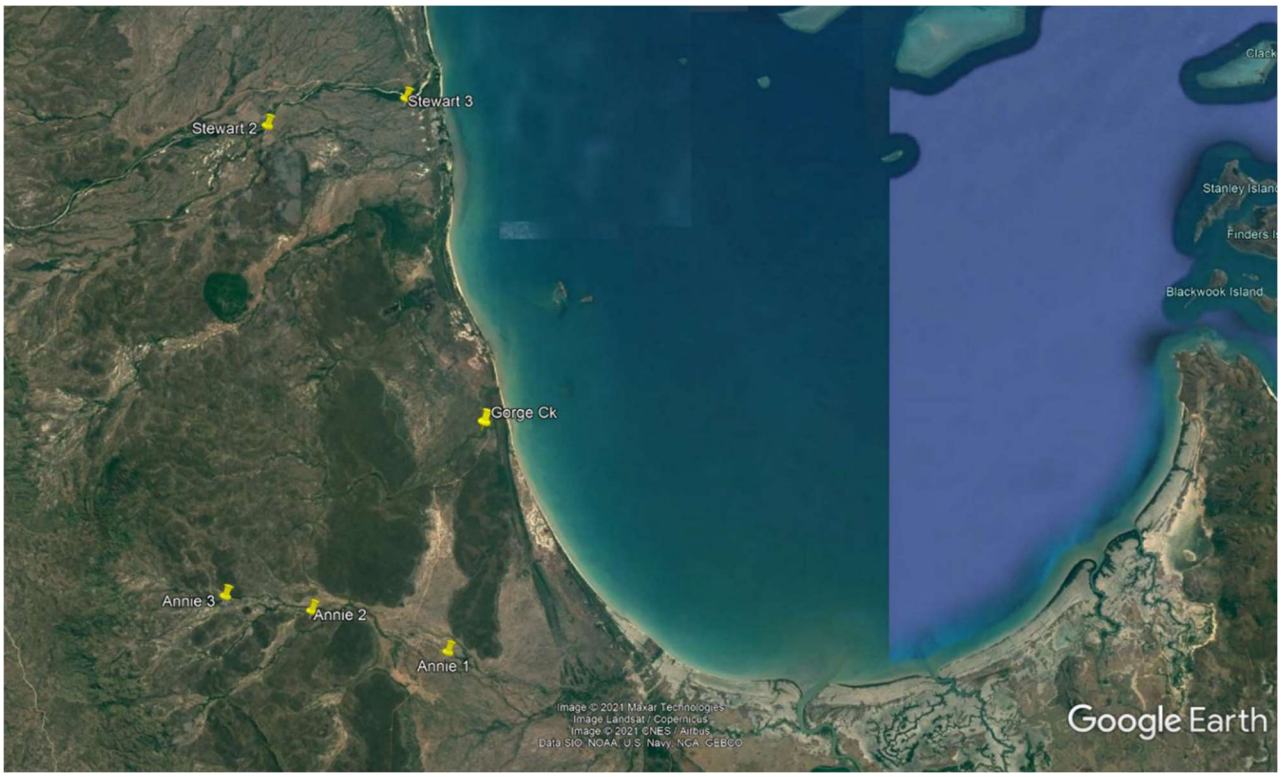

Figure 3: Annie River and Gorge Creek

Figure 4: Stewart River, Breakfast Creek, Massie Creek, Chester River and Nesbit River

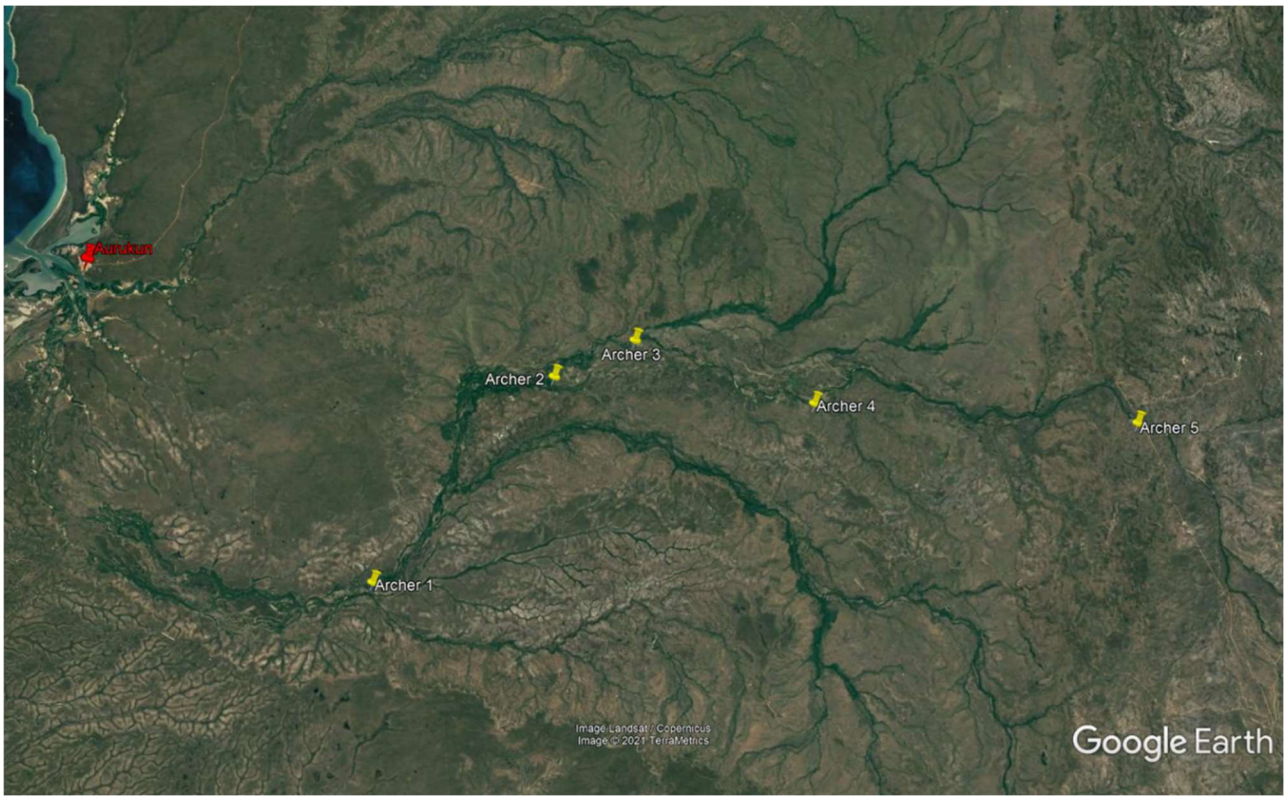

Figure 5: Archer River

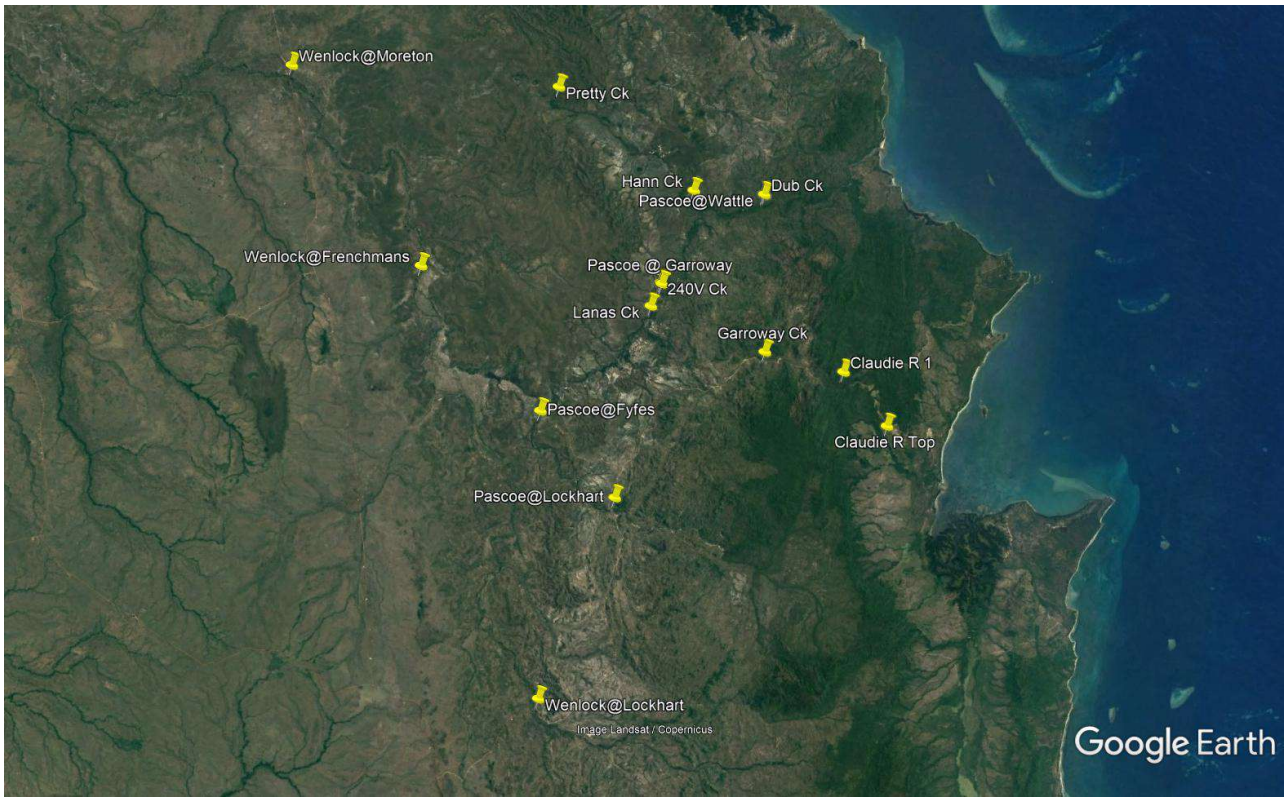

Figure 6: Wenlock River, Pascoe River (and tributaries), Claudie River

The east coast streams have relatively small catchments. They originate in the uplands of the Great Dividing Range and then flow across short flood plains (often less than 30 km) to the sea. The uplands receive good rainfall while the flood plains are more arid, so that most of the flow originates from the upland areas.

The Archer River has a large catchment (13,820 km^2), again originating in the Great Dividing Range but flowing west to the Gulf of Carpentaria. Again, the majority of the flow originates from the Range uplands. The more northerly streams (Wenlock, Pascoe and Claudie similarly receive most of their flows from the Dividing Range.

Climate across Cape York is tropical with highly seasonal rainfall. Most rain occurs during the wet season of October to March influenced by monsoonal lows and tropical storms. This is reflected in high stream flows during and immediately following the wet season with low flows occurring throughout the dry season (Figure 7). In 2021, there had been some reasonable late wet season rainfall during April to May and at the time of sampling site groups 1-3 in June all the streams were flowing, some quite significantly. No significant rainfall events occurred between June and sampling of the group 4 sites in August. Figure 8 shows the hydrograph of the Stewart River for 2021, representing east coast streams (Groups 1 and 2). Figure 9 shows the Archer River hydrograph (Group 3) and Figure 10 shows the Pascoe River, also representing the Wenlock and Claudie rivers (Group 4). The three hydrographs are fairly similar, showing a small peak of flow in late April and tailing off after that until the end of August. Thus, all streams were sampled at a time of falling flow (but with good flow still present), comprising groundwater or sub-surface drainage, but with no overland flow component. As a result, all the streams had clear water with minimal particulate load. The data collected in this program are therefore representative of base flow conditions. Sampling in post-event or nil flow conditions would likely give different results.

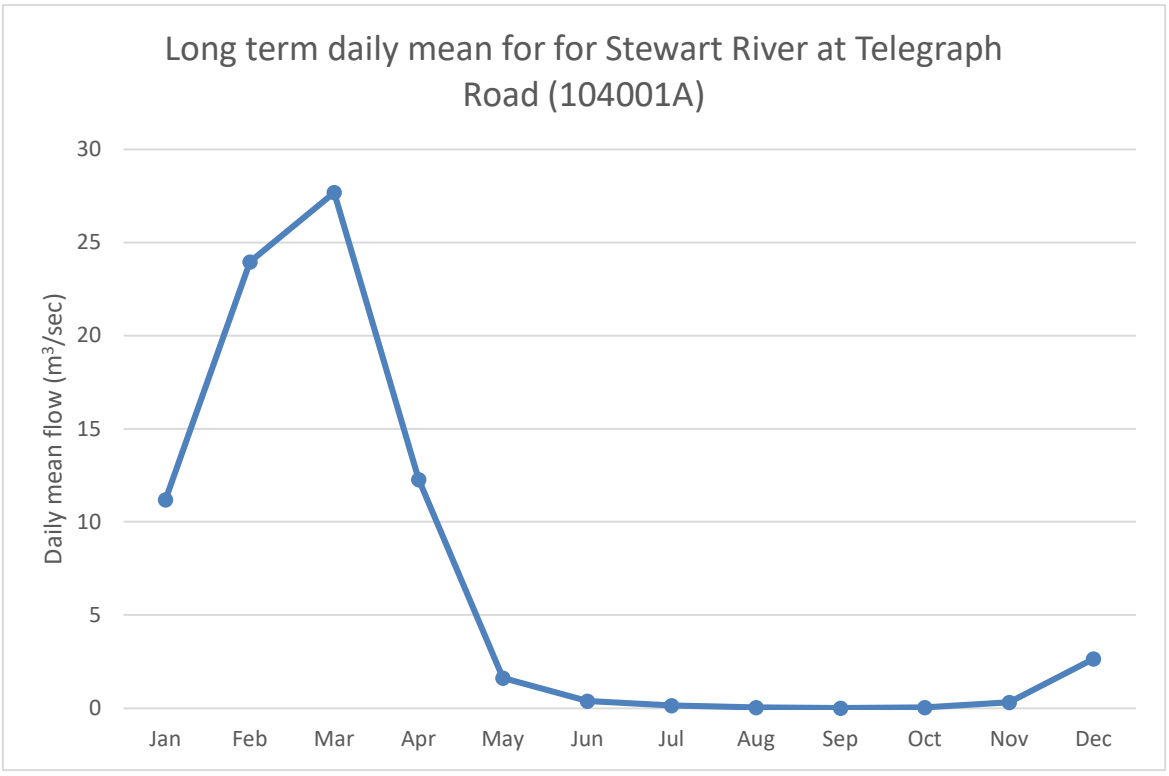

Figure 7: Long term average of daily mean flow for Stewart River at Telegraph Road (104001A). (Data available https://water-monitoring.information.qld.gov.au/)

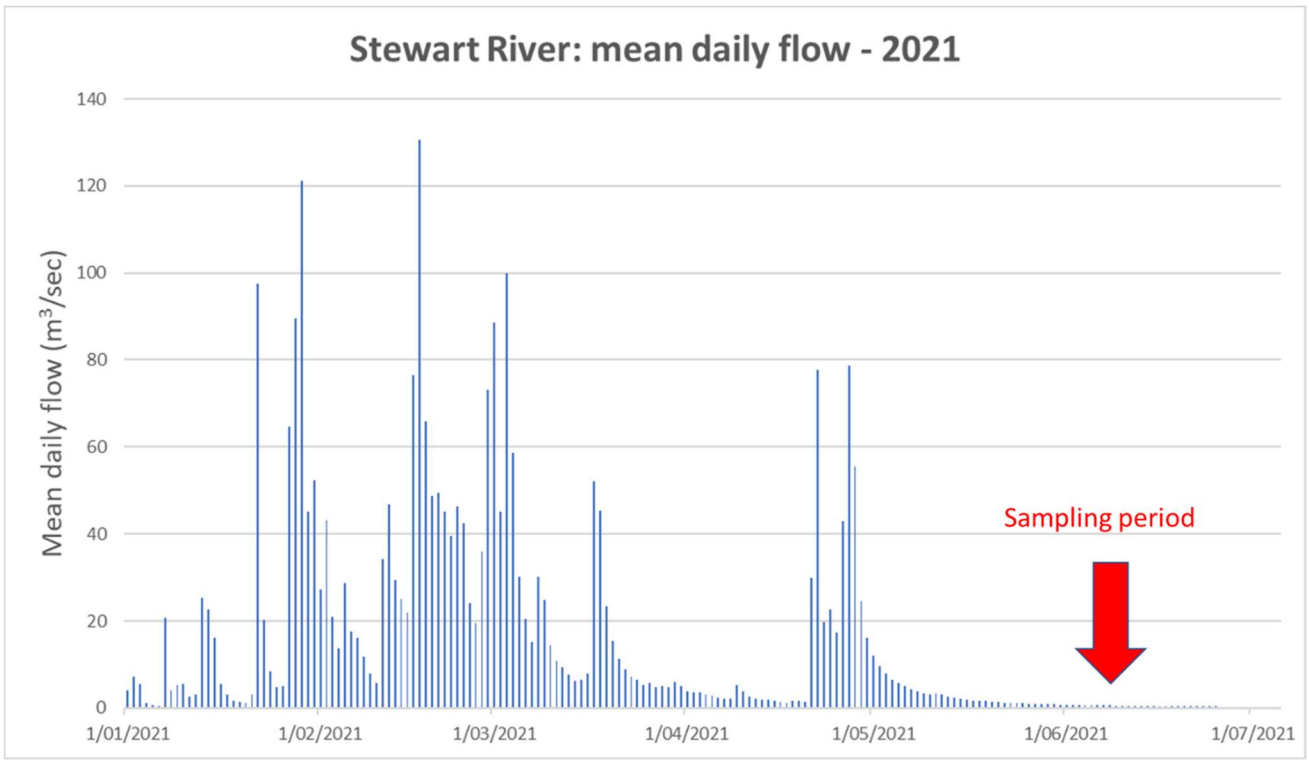

Figure 8: Daily flow in the Stewart River Jan-July 2021

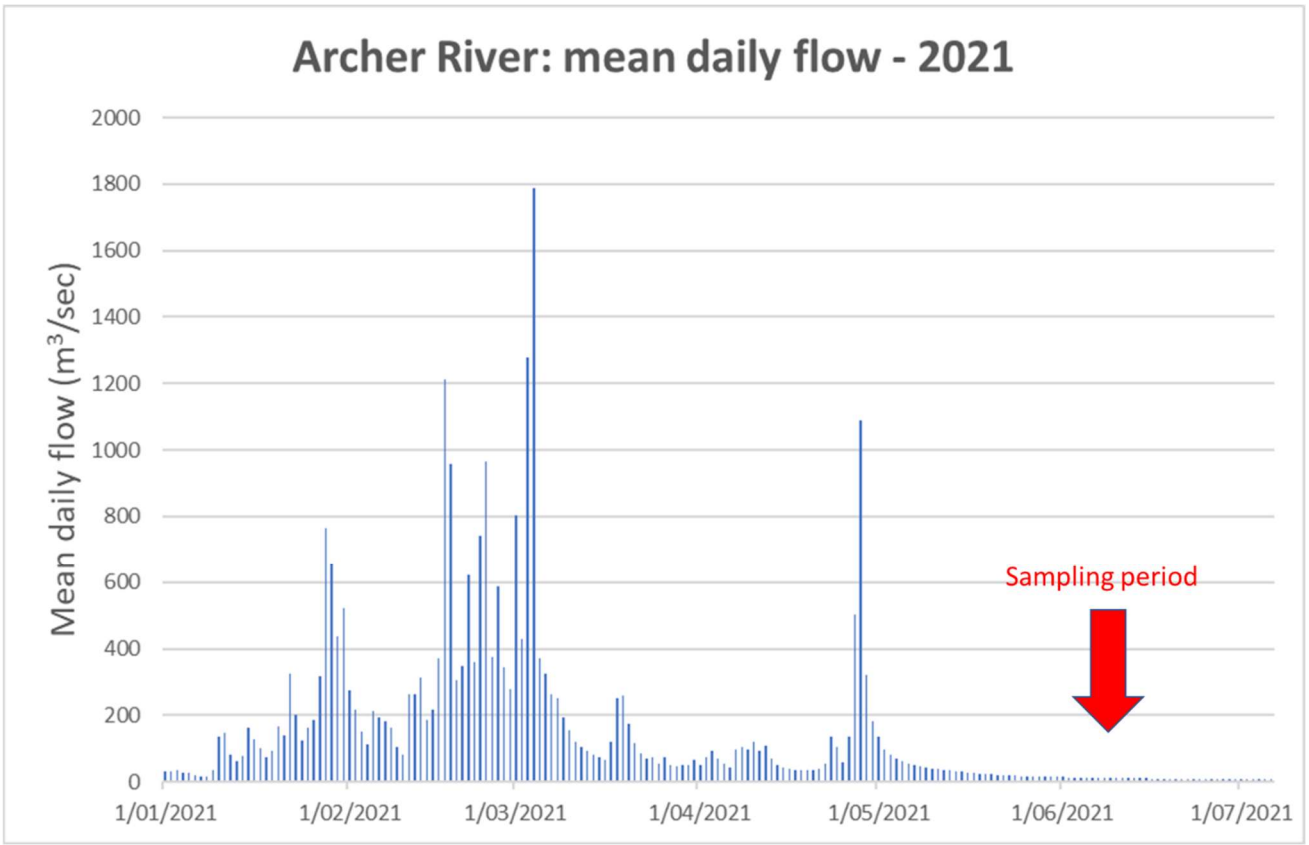

Figure 9: Daily flow in the Archer River January to July 2021

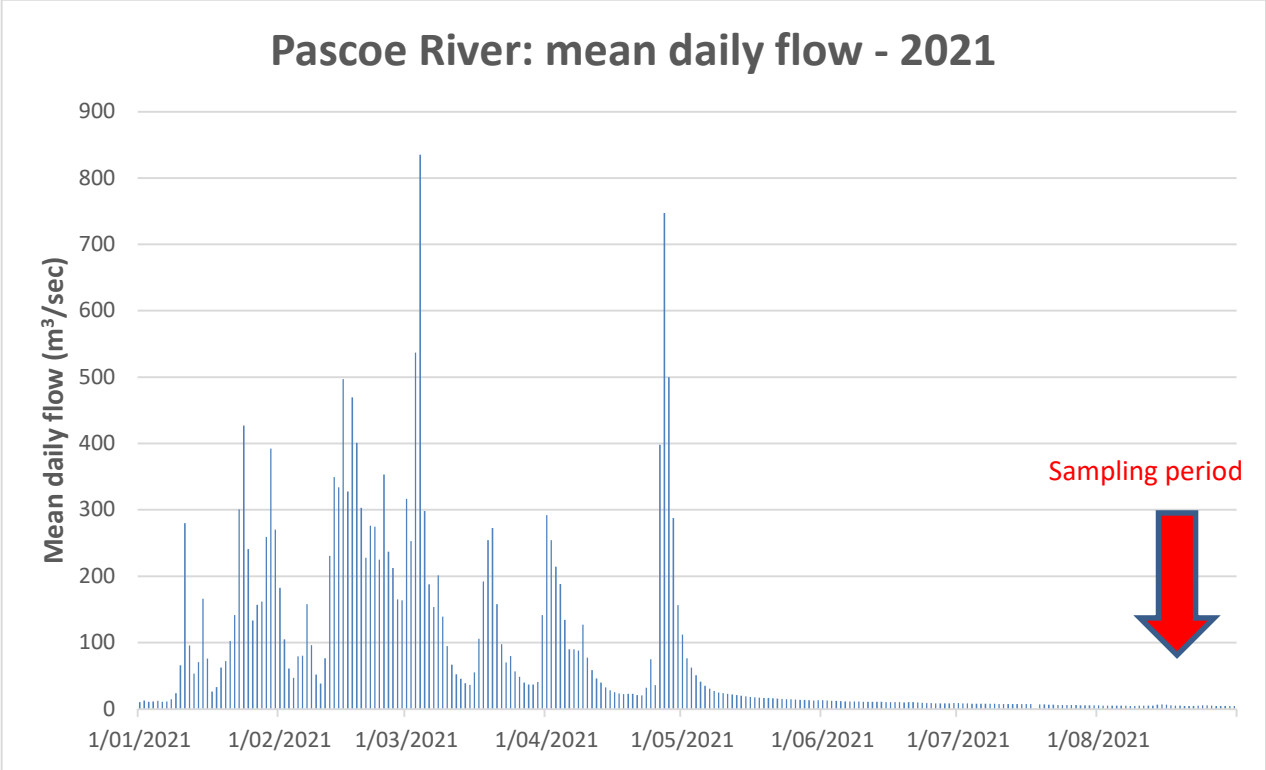

Figure 10: Daily flow in the Pascoe River during 2021

3 Sites

An initial list of streams to be sampled was compiled at the start of the project, with the aim of sampling at least two sites in each, the main focus being on freshwater sites. Once out in the field, accessibility issues and opportunistic sampling led to the original list of streams and sites being altered, with some additional streams added and some streams having only one site. A complete list of the final streams/sites is provided in Appendices A1 and A2.

4 Indicators

The following indicators were measured at the majority of sites. At a few sites, only a selection of indicators were measured (for full details of indicators monitored at each site see Appendices A1 and A2). Field readings were not undertaken at Group 4 sites due to a lack of equipment, however conductivity and turbidity were analysed in the lab on collected water samples.

- Field readings
    - Conductivity
    - pH
    - Temperature
    - Dissolved oxygen
    - Turbidity

- Standard Water Analysis
    - All major anions and cations
    - Hardness and alkalinity
    - Silica
    - Colour
    - Iron, Aluminium

- Nutrients
    - Oxidised nitrogen (as N)
    - Ammonia (as N)
    - Total nitrogen (as N)
    - Filterable reactive phosphorus (as P)
    - Total phosphorus (as P)

- Metals (total and filtered (<0.45µm), at trace levels)
    - Antimony
    - Selenium
    - Arsenic
    - Beryllium
    - Boron
    - Cadmium
    - Chromium
    - Cobalt
    - Copper
    - Lead
    - Manganese
    - Molybdenum
    - Nickel
    - Silver
    - Tin
    - Zinc
- Chlorophyll a (at Group 4 sites)

Pesticides were not included, as they were not identified as a risk in these Cape York catchments.

5 Field program

Sample collection in Group 1-3 streams occurred between 3 and 11 June 2021, undertaken by staff from EMAS. Dates of monitoring in each stream are included in Appendix A1 .

The streams around Cooktown were sampled by road. The Traditional Owners from each area accompanied EMAS staff while we sampled the McIvor, Bloomfield and Starcke Rivers and their tributaries.

The streams north and south of Port Stewart were sampled by both road and helicopter. Lama Lama Traditional Owners accompanied us on some days.

Sites in Group 4 streams were sampled later, between 11 and 24 August 2021. Samples were collected by a member of the Cape York Water Monitoring Network (Lana Polglase) with sites largely selected on the basis of available road access. Dates of monitoring in each stream are included in Appendix A2 .

6 Results

6.1 Field readings

Field reading results are detailed in Appendix B. Note there were no field readings for Group 4 streams. However, laboratory measured conductivity and turbidity data for Group 4 streams are provided in Appendix C2.

Temperature: Temperatures varied between 20.5 and 29.9 ^{O}C. This variation is a reflection of the depth, the degree of shading and the flow at each site. The Bloomfield River, with strong flows and good shading, had temperatures at the low end of the scale whilst shallow exposed sites such as Annie 1 and Stewart 3 exhibited temperatures at the upper end of the scale.

Conductivity: Conductivity (a measure of salinity) at all sites was very low compared to other parts of Queensland. Freshwater sites were generally below 200 µS/cm, and more than half were less than 100 µS/cm. These low values are due to the largely undisturbed nature of catchments and the seasonally abundant rainfall in this part of Queensland. Note that Starcke 3 was an estuarine site with conductivity strongly impacted by seawater and Nesbit site 2 was located in an area likely to be occasionally affected by tidal waters. Apart from these two sites, the only other site where conductivity exceeded 200 µS/cm was the downstream site on the Claudie River (Claudie River Top Crossing), which also featured higher oxidised nitrogen levels than most other sites. Whether these slightly higher readings are natural or due to human activity is not known.

pH: At most sites the pH lay in a typical freshwater range of 7.0 - 7.7. Values of 8.4 at Stewart site 3 and 9.0 at Annie site 1 are likely related to high rates of benthic algal production in these shallow and largely unshaded sites. Further evidence of benthic algal production at these sites was the presence of supersaturated oxygen levels. Algal production removes CO_2 from the water column which causes an increase in pH during the day.

Dissolved oxygen: There was reasonable flow at all sites and under these conditions dissolved oxygen in unimpacted freshwaters could be expected to exceed 80% saturation. This was the case at nearly all sites. The lowest value (67.8 % sat) occurred at the Morgan River site 1. This site also had the highest turbidity levels (10.9 NTU). It is possible this site is impacted by the agricultural development in its catchment but this would need to be confirmed by further monitoring.

Turbidity: Given the flow condition at the time of sampling (i.e. falling base flow) it would be expected that streams would have low turbidity levels. This was the case at nearly all sites but as noted above, turbidity at Morgan site 1 was higher than other sites, although not by a large margin, and was the only fresh water site to exceed 10NTU.

6.2 Standard Water Analysis

Data for all sites is given in Appendices C1 and C2. Consistent with the very low conductivity concentrations at all sites, values of all the component anions and cations are also very low everywhere. The slightly higher conductivity values at the downstream Claudie River site appear to be due mainly to higher $CaCO_3$ concentrations than at other sites. The generally low ionic values are a reflection of the high rainfall and largely undeveloped catchments of most of these waterways. Particularly low concentrations occur in the Bloomfield River, most likely related to its large flows and an almost totally pristine catchment, although geological factors may also play a part.

6.3 Nutrients

Data for all sites is given in Appendix D1. Concentrations of both soluble and total nitrogen and phosphorus were low at all sites. Again, this result is not unexpected given the largely undeveloped nature of these catchments. There were elevated oxidised nitrogen concentrations at Morgan River site 1 (0.039 mg/L) and the downstream Claudie River site (0.033 mg/L). The concentration at these two sites is approximately twice the next highest concentration of 0.018 mg/L measured at McIvor Site 2. As with the slightly higher conductivity levels at these sites, there may be some impact from upstream agricultural development but further work would be required to confirm this.

6.4 Chlorophyll a

Chlorophyll a was sampled at all Group 4 stream sites and results are included in Appendix D2. As would be expected in these clear flowing freshwaters, concentrations were low, between 0.4-1.2 µg/L. Higher values may occur at the end of the dry season when some streams are reduced to isolated waterholes, where warm still conditions can allow algae to proliferate.

6.5 Metals

The results from trace metal analysis for both filtered (<0.45µm) and total forms are given in Appendices E1 and E2. Differences between total and filtered concentrations are very small, which indicates that any metals present were largely in the dissolved form. Concentrations of nearly all metals at all sites are below limits of reporting. This result is not unexpected, given the relatively pristine catchments of all the streams monitored. Some limited minerals mining has occurred in the past in the Starcke catchment, but the results indicate no ongoing water quality impact from this.

Concentrations of most metals at most sites were below the level of reporting and well below ANZG (2018) guideline values. Trace concentrations of arsenic and manganese were detected at most sites while trace concentrations of boron, chromium, cobalt, molybdenum and nickel were found at one or more sites. Few of these detected filtered or total concentrations exceed the ANZG (2018) default guideline values at the 95% level of protection. There was minimal exceedance (filtered and total) of the 99% level of protection default guideline values for arsenic at Stewart site 3 (1.2 µg/L dissolved and 1.4 µg/L total compared to 1.0 µg/L guideline). This is almost certainly a natural value as there are no anthropogenic sources of arsenic in the catchment. In general,

these trace concentrations of metals can be considered as representative of background natural values in this region.

One sample from Pascoe River at Wattle Hills had a filtered zinc concentration of 24 µg/L. However, the total zinc concentration at that site was below detection, indicating that the filtered value was erroneous.

Three other sites had total zinc detections (max value of 26µg/L) above the ANZG (2018) default guideline value of 8 µg/L, however as filtered values were below detection and no anthropogenic sources of zinc are known in the catchments, these results are most likely due to geologic sources or sampling and analysis error. The low filtered values indicate there was no toxicity risk, even in the unlikely event that total values are correct.

Dissolved Iron concentrations in largely unimpacted catchments vary depending on local geology. Most of the results here lie within a fairly typical range of 0.04 to 0.4 mg/L. Values outside this range occur in the McIvor/Morgan catchment, from 0.67 to 1.0 mg/L and at the downstream Claudie site (0.88 mg/L). As there are no obvious anthropogenic sources of iron, this is most likely related to catchment geology.

7 Conclusions

Given the relatively pristine nature of the catchments of the streams monitored it was expected that water quality would be good. The data supported this expectation with indicators in all streams exhibiting either low concentrations or levels typical of pristine streams. The fact that streams were monitored during a period of falling flows increased the likelihood of a high level of water quality. If the streams were monitored during rain events or at the end of the dry season, a different quality could be expected.

The data provide a point-in-time baseline of water quality in these streams under base flow conditions. As there are only single samples at each site, collection of additional water quality data in these streams is required to provide a more statistically robust baseline.

The data will be stored on a Queensland Department of Environment and Science database and will be publicly available on request.

Appendix A1: Site details - Groups 1-3								
Site	**Lat**	**Long**	**Date**	**Indicators**				
				Field	**Nutrients**	**Metals**	**Std Water**	**Chl a**
Bloomfield 1	-15.9444	145.3206	4/06/2021	x	x	x	x	
Bloomfield 2	-15.9623	145.3164	4/06/2021	x	x	x	x	
Bloomfield 3	-15.9955	145.2947	4/06/2021	x	x	x	x	
Gap	-15.8474	145.3304	4/06/2021	x	x	x	x	
Isabella 1	-15.285	145.0236	3/06/2021	x	x	x		
McIvor 1	-15.1191	145.0749	3/06/2021	x	x	x	x	
McIvor 2	-15.149	145.0945	3/06/2021	x	x	x	x	
McIvor 3	-15.1346	145.1781	3/06/2021	x	x	x	x	
Morgan 1	-15.0927	145.1384	3/06/2021	x	x	x	x	
Nth Endeavour 1	-15.2798	145.128	3/06/2021	x	x	x	x	
Starcke 1	-14.894	145.0073	5/06/2021	x	x	x	x	
Starcke 2	-14.8186	144.9711	5/06/2021	x	x	x	x	
Starcke 3 (estuary)	-14.7896	145.0181	5/06/2021	x	x	x		
Annie 1	-14.4644	143.6987	9/06/2021	x	x	x		
Annie 2	-14.4365	143.6056	9/06/2021	x	x	x	x	
Annie 3	-14.4264	143.5465	9/06/2021	x	x	x		
Gorge 1	-14.3157	143.7203	9/06/2021	x	x	x	x	
Stewart 1	-14.1316	143.2738	7/06/2021	x	x	x	x	
Stewart 2	-14.1065	143.5753	7/06/2021	x	x	x	x	
Stewart 3 (estuary)	-14.0881	143.6701	7/06/2021	x	x	x		
Little Stewart 1	-14.0655	143.3167	7/06/2021	x	x	x	x	
Breakfast 1	-13.9932	143.52	8/06/2021	x	x	x	x	
Breakfast 2	-13.9959	143.571	9/06/2021	x	x	x		
Massie 1	-13.9229	143.5191	8/06/2021	x	x	x	x	
Massie 2	-13.9111	143.5703	11/06/2021	x	x	x		
Chester 1	-13.6899	143.5169	11/06/2021	x	x	x	x	
Nesbit 1	-13.5325	143.5062	11/06/2021	x	x	x	x	
Nesbit 2	-13.5396	143.5373	11/06/2021	x	x	x		
Archer 1	-13.6818	142.0853	10/06/2021	x	x	x	x	
Archer 2	-13.4371	142.2743	10/06/2021	x	x	x	x	
Archer 3	-13.3896	142.3633	10/06/2021	x	x	x		
Archer 4	-13.4438	142.574	10/06/2021	x	x	x	x	
Archer 5	-13.4363	142.9457	10/06/2021	x	x	x	x	

Appendix A2: Site details - Group 4								
Site	**Lat**	**Long**	**Date**	**Indicators**				
				Field	**Nutrients**	**Metals**	**Std Water**	**Chl a**
Wenlock River on Lockhart Road	-13.09559	142.94197	18/08/2021		x	x	x	x
Wenlock River on Frenchmans Track	-12.65550	142.79063	18/08/2021		x	x	x	x
Wenlock River at Moreton bridge	-12.45556	142.64085	18/08/2021		x	x	x	x
Pascoe River on Lockhart Road	-12.88306	143.01030	24/08/2021		x	x	x	x
Pascoe River at Fyfe's crossing	-12.79800	142.92613	24/08/2021		x	x	x	x
Pascoe River at Garroway Gauge station	-12.65930	143.0466	11/08/2021		x	x	x	x
Pascoe River at Wattle Hills homestead	-12.56067	143.1492	11/08/2021		x	x	x	x
Garroway Creek	-12.72329	143.15979	24/08/2021		x	x	x	x
Lana's Creek	-12.68301	143.0363	11/08/2021		x	x	x	x
240 Volt Creek	-12.65824	143.0456	11/08/2021		x	x	x	x
Hann Creek	-12.56097	143.0744	11/08/2021		x	x	x	x
Pretty Little Creek	-12.46202	142.9252	18/08/2021		x	x	x	x
Dub Creek	-12.56065	143.1493	11/08/2021		x	x	x	x
Claudie River 01	-12.73909	143.24440	24/08/2021		x	x	x	x
Claudie River Top Crossing	-12.79228	143.29387	24/08/2021		x	x	x	x

Appendix B: Field readings						
Site	**Date**	**Indicators**				
		Temp	**DO**	**Cond**	**pH**	**Turb**
		°C	**% sat**	**µS/cm**		**NTU**
Bloomfield 1	4/06/2021	21.1	100.7	43	7.5	0.7
Bloomfield 2	4/06/2021	20.9	103.2	39	7.6	0.9
Bloomfield 3	4/06/2021	20.5	98.6	32	7.7	0.4
Gap Ck	4/06/2021	22.4	98.1	55	7.6	0.3
Isabella Ck 1	3/06/2021	22.0	96.4	63	6.5	1.3
McIvor 1	3/06/2021	23.6	77.4	168	7.1	4.7
McIvor 2	3/06/2021	23.2	88.9	163	7.2	4.1
McIvor 3	3/06/2021	24.3	87.4	166	7.3	6.8
Morgan 1	3/06/2021	23.4	67.8	196	7.0	10.9
Starcke 1	5/06/2021	25.0	94.8	108	7.5	1.5
Starcke 2	5/06/2021	25.7	101.9	122	7.7	1.8
Starcke 3	5/06/2021	27.8	94	39270	7.9	10.1
Annie 1	9/06/2021	29.2	127.2	66	9.0	3.2
Annie 2	9/06/2021	25.0	89.3	81	7.2	3.1
Annie 3	9/06/2021	25.6	93.1	161	7.4	5.4
Gorge Creek 1	9/06/2021	27.7	106.5	68	7.4	5.3
Stewart 1	7/06/2021	22.2	95.4	101	7.7	0.7
Stewart 2	7/06/2021	28.1	96.5	107	7.6	2.2
Stewart 3	7/06/2021	29.9	119.4	109	8.4	2.8
Little Stewart 1	7/06/2021	23.9	101.4	163	8.0	0.7
Breakfast Creek 1	8/06/2021	24.6	104	78	7.6	3.5
Breakfast Creek 2	9/06/2021	25.7	105.6	72	7.3	2.8
Massie Creek 1	8/06/2021	22.5	97.5	68	7.6	1.8
Massie Creek 2	11/06/2021	23.8	98	68	7.3	0.9
Chester 1	11/06/2021	24.6	111.3	124	7.7	0.4
Nesbit 1	11/06/2021	24.1	89.8	136	7.1	1.2
Nesbit 2	11/06/2021	25.2	99.7	450	7.3	0.9
Archer 1	10/06/2021	25.6	82	80	7.0	8.9
Archer 2	10/06/2021	25.3	87	90	7.0	8.2
Archer 3	10/06/2021	25.9	90.1	94	7.1	5.8
Archer 4	10/06/2021	26.7	91.5	95	7.2	5.4
Archer 5	10/06/2021	26.3	95.9	98	7.2	3.7

Appendix C 1: Standard Water Analysis - Groups 1-3																	
Site	Total Hardness	Alkalinity	Si	Total Dissolved Ions	Total Dissolved Solids	True Colour	Na	K	Ca	Mg	HCO_3	CO_3	Cl	Fl	SO4	Fe Dissolved	Al Dissolved
	mg $CaCO_3$/L	mg $CaCO_3$/L	mg/L	mg/L	mg/L	Hazen	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
Bloomfield 1	5.1	7	8.8	25	30	11	5	0.67	0.6	0.88	9	0	8.6	0.02	0.9	0.07	< 0.03
Bloomfield 2	4.8	6	8.8	23	28	11	4.5	0.59	0.6	0.83	8	0	8	< 0.02	0.8	0.08	0.04
Bloomfield 3	3.1	4	6.8	18	22	8	3.7	0.56	< 0.4	0.57	5	0	7.3	< 0.02	0.8	0.04	0.03
Gap Ck 1	5.9	8	13	32	40	< 8	6.8	1	0.8	0.97	10	0	11	0.03	1.5	0.02	< 0.03
North Endeavour 1	19	24	20	66	71	23	12	0.45	2.5	3	29	0	18	< 0.02	0.8	0.38	< 0.03
McIvor 2	43	51	27	113	110	32	15	0.77	6.1	6.8	62	0	21	0.03	0.8	0.67	< 0.03
McIvor 3	39	46	25	108	110	68	16	0.73	5.4	6.3	56	0	23	0.03	0.9	1	0.04
Morgan 1	56	63	35	137	130	43	16	1.1	8.3	8.6	77	0	24	0.03	0.7	0.69	< 0.03
Starcke 1	16	15	13	61	65	16	13	0.48	1.7	2.9	19	0	23	0.03	1.6	0.3	< 0.03
Starcke 2	18	19	14	71	73	25	15	0.57	2	3.3	24	0	25	0.03	1.6	0.42	< 0.03
Stewart 2	15	27	29	71	83	13	14	1.2	3.3	1.6	34	0	17	0.11	0.8	0.15	0.06
Annie Creek 2	5.7	19	24	53	65	28	13	0.63	1.1	0.69	23	0	14	0.19	< 0.2	0.17	0.2
Gorge_Ck 1	7.6	15	20	43	53	39	9.4	0.47	0.8	1.4	18	0	13	0.02	< 0.2	0.61	0.16
Stewart 1	13	22	28	64	79	18	13	1.5	2.4	1.8	27	0	18	0.08	0.9	0.16	0.04
Little Stewart 1	28	41	39	107	120	23	21	1	5	3.7	50	0	26	0.14	1.3	0.39	< 0.03
Breakfast Creek 1	11	20	23	52	63	21	10	0.85	2	1.4	25	0	12	0.06	0.5	0.26	0.07
Massie Creek 1	6.6	15	27	44	61	10	9.4	1.2	1.2	0.84	18	0	12	0.07	1.1	0.06	0.03
Chester 1	12	23	38	75	99	18	18	0.84	2.4	1.5	28	0	23	0.09	1.6	0.09	0.05
Nesbit 1	23	30	31	87	100	20	17	0.97	4.8	2.6	36	0	24	0.1	1.2	0.23	0.04
Archer 1	11	18	20	51	59	37	10	0.94	1.9	1.5	22	0	14	0.05	0.4	0.52	0.23
Archer 2	12	20	21	57	66	31	12	1.1	2	1.7	24	0	16	0.06	0.6	0.43	0.14
Archer 4	12	20	23	60	71	27	12	1.2	2	1.7	25	0	18	0.06	0.7	0.39	0.15
Archer 5	11	19	24	61	73	26	13	1.2	1.9	1.6	23	0	19	0.07	0.6	0.23	0.14

Appendix C 2: Standard Water Analysis - Group 4																		
Site	Total Hardness	Alkalinity	Si	Total Dissolved Ions	Total Dissolved Solids	True Colour	Na	K	Ca	Mg	HCO_3	CO_3	Cl	Fl	SO4	Fe Dissolved	Al Dissolved	Conductivity @ 25°C	Turbidity
	mg $CaCO_3$/L	mg $CaCO_3$/L	mg/L	mg/L	mg/L	Hazen	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	µS/cm	NTU
Wenlock at Lockhart Rd	14	17	19	70	78	22	17	1.1	1.9	2.2	21	0	25	0.07	1.1	0.41	< 0.03	120	2
Wenlock at Frenchmans Track	9.4	14	19	52	63	29	13	0.86	1.1	1.6	17	0	18	0.03	0.8	0.39	0.07	88	4
Wenlock at Moreton bridge	7.1	10	15	41	50	22	10	0.55	0.7	1.3	12	0	15	0.02	0.8	0.27	0.06	70	4
Pascoe at Lockhart Rd	9.6	14	20	59	70	28	14	1.7	1.2	1.6	17	0	21	0.08	1.5	0.25	0.05	100	1
Pascoe at Fyfe's crossing	9.7	13	20	56	67	28	14	1.6	1.3	1.6	16	0	20	0.07	1.5	0.29	< 0.03	96	1
Pascoe at Garroway Ck	9.4	13	19	49	60	17	11	1.2	1.2	1.5	15	0	17	0.05	1.3	0.22	< 0.03	84	1
Pascoe at Wattle Hills	7.8	10	16	41	51	16	9.6	0.88	0.9	1.3	12	0	15	0.03	1.2	0.23	< 0.03	71	2
Garroway CK	12	19	36	86	110	30	22	2.5	1.7	1.9	24	0	31	0.12	2.9	0.22	0.03	150	1
Lanas Ck	3.9	4	13	28	38	< 8	7.5	0.28	< 0.4	0.9	5	0	13	< 0.02	0.9	0.04	< 0.03	52	< 1
240 Volt Ck	4.2	5	13	29	38	8	7.3	0.5	< 0.4	0.86	7	0	12	< 0.02	1.2	0.06	< 0.03	51	< 1
Hann Ck	3.6	4	12	25	34	10	6.3	0.25	< 0.4	0.81	5	0	11	< 0.02	1	0.13	0.03	44	1
Pretty Little Ck	3.8	2	11	30	40	13	8.8	0.15	< 0.4	0.88	3	0	15	< 0.02	1.3	0.12	0.04	59	1
Dub Ck	8.2	10	27	67	88	10	18	2.7	< 0.4	1.8	13	0	29	0.03	1.7	0.03	0.06	120	1
Claudie River 01	17	21	28	87	100	23	21	1.9	2.6	2.5	25	0	31	0.09	2.8	0.27	< 0.03	150	3
Claudie River Top Crossing	65	66	25	161	150	53	21	1.6	13	8.1	80	0	34	0.12	2	0.88	< 0.03	240	7

Appendix D1: Nutrient data – Groups 1-3

Site	Filterable Reactive Phosphorus	Total Phosphorus	Ammonia	Nitrogen Oxides	Total Nitrogen
	mg/L as P	mg/L as P	mg/L as N	mg/L as N	mg/L as N
Bloomfield 1	0.005	0.009	0.045	0.009	0.120
Bloomfield 2	0.002	0.006	0.002	0.007	0.050
Bloomfield 3	< 0.002	0.004	0.002	0.014	0.100
Gap Ck	0.006	0.011	0.003	0.005	0.040
Isabella Ck 1	0.002	0.005	< 0.002	0.002	0.060
McIvor 1	0.006	0.019	0.017	0.014	0.100
McIvor 2	0.005	0.018	0.009	0.018	0.080
McIvor 3	0.004	0.018	0.012	0.017	0.130
Morgan 1	0.006	0.027	0.011	0.039	0.140
North Endeavour 1	0.003	0.010	0.002	0.015	0.070
Starcke 1	0.002	0.011	0.005	0.010	0.160
Starcke 2	0.003	0.010	< 0.002	< 0.002	0.060
Starcke 3	< 0.002	0.015	0.009	< 0.002	0.230
Annie 1	0.004	0.012	0.002	0.002	0.230
Annie 2	0.007	0.015	< 0.002	0.004	0.130
Annie 3	0.003	0.010	< 0.002	0.003	0.120
Gorge Creek 1	0.003	0.009	< 0.002	< 0.002	0.100
Stewart 1	0.003	0.009	< 0.002	0.003	0.080
Stewart 2	0.006	0.013	0.002	0.006	0.090
Stewart 3	0.005	0.014	< 0.002	< 0.002	0.120
Little Stewart 1	0.005	0.011	0.002	0.002	0.100
Breakfast Creek 1	0.003	0.008	< 0.002	0.006	0.080
Breakfast Creek 2	0.003	0.009	0.002	0.002	0.110
Massie Creek 1	0.010	0.017	0.002	0.014	0.050

Appendix D1: Nutrient data – Groups 1-3					
Site	**Filterable Reactive Phosphorus**	**Total Phosphorus**	**Ammonia**	**Nitrogen Oxides**	**Total Nitrogen**
Massie Creek 2	0.010	0.017	0.005	0.008	0.060
Chester 1	0.019	0.028	< 0.002	< 0.002	0.090
Nesbit 1	0.009	0.019	0.004	0.008	0.100
Nesbit 2	0.008	0.022	< 0.002	0.004	0.170
Archer 1	0.004	0.014	0.008	0.014	0.150
Archer 2	0.003	0.013	0.005	0.014	0.140
Archer 3	0.004	0.012	0.002	0.008	0.120
Archer 4	0.003	0.013	0.004	0.008	0.140
Archer 5	0.003	0.011	< 0.002	0.005	0.110

Appendix D2: Nutrient and Chlorophyll a data - Group 4						
Site	**Filterable Reactive Phosphorus**	**Total Phosphorus**	**Ammonia**	**Nitrogen Oxides**	**Total Nitrogen**	**Chl a**
	mg/L as P	**mg/L as P**	**mg/L as N**	**mg/L as N**	**mg/L as N**	**µg/L**
Wenlock River on Lockhart Road	0.002	0.009	0.004	0.008	0.090	0.4
Wenlock River on Frenchmans Track	0.002	0.010	0.002	0.003	0.100	0.5
Wenlock River at Moreton bridge	0.002	0.010	0.004	0.007	0.090	0.4
Pascoe River on Lockhart Road	0.002	0.010	< 0.002	0.002	0.11	1.1
Pascoe River at Fyfe's crossing	0.002	0.010	< 0.002	0.002	0.11	1.4
Pascoe River at Garroway Gauge station	0.002	0.009	< 0.002	0.002	0.070	0.9
Pascoe River at Wattle Hills homestead	0.002	0.007	0.002	0.003	0.050	0.5
Garroway Creek	0.003	0.012	0.003	0.004	0.11	1.5
Lana's Creek	< 0.002	0.006	< 0.002	< 0.002	< 0.02	0.9
240 Volt Creek	< 0.002	0.006	< 0.002	0.004	0.020	0.4
Hann Creek	< 0.002	0.006	< 0.002	0.003	0.040	1
Pretty Little Creek	< 0.002	0.007	0.002	0.002	0.050	1.1
Dub Creek	< 0.002	0.008	0.002	< 0.002	0.070	0.5
Claudie River 01	0.004	0.014	0.003	0.004	0.12	1.1
Claudie River Top Crossing	0.007	0.017	0.012	0.033	0.14	1.2

Appendix E1: Filtered metals data																
Site	Antimony	Selenium	Arsenic	Beryllium	Boron	Cadmium	Chromium	Cobalt	Copper	Lead	Manganese	Molybdenum	Nickel	Silver	Tin	Zinc
	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L
Bloomfield 1	<0.2	<0.2	0.3	<0.1	<5	<0.05	<0.2	<0.1	<0.5	<0.1	2.1	<0.1	<0.5	<0.1	<0.2	<1
Bloomfield 2	<0.2	<0.2	0.3	<0.1	<5	<0.05	<0.2	<0.1	<0.5	<0.1	1.9	<0.1	<0.5	<0.1	<0.2	<1
Bloomfield 3	<0.2	<0.2	<0.2	<0.1	<5	<0.05	<0.2	<0.1	<0.5	<0.1	1.6	<0.1	<0.5	<0.1	<0.2	<1
Isabella Ck 1	<0.2	<0.2	<0.2	<0.1	<5	<0.05	<0.2	<0.1	<0.5	<0.1	2.2	<0.1	<0.5	<0.1	<0.2	<1
McIvor 1	<0.2	<0.2	0.3	<0.1	<5	<0.05	<0.2	0.4	<0.5	<0.1	42.4	<0.1	0.6	<0.1	<0.2	<1
McIvor 2	<0.2	<0.2	0.3	<0.1	<5	<0.05	<0.2	0.3	<0.5	<0.1	28.8	<0.1	0.6	<0.1	<0.2	<1
McIvor 3	<0.2	<0.2	0.3	<0.1	<5	<0.05	<0.2	0.3	<0.5	<0.1	29.8	<0.1	0.6	<0.1	<0.2	<1
Morgan 1	<0.2	<0.2	0.3	<0.1	<5	<0.05	<0.2	0.6	<0.5	<0.1	47.3	<0.1	0.9	<0.1	<0.2	<1
Starcke 1	<0.2	<0.2	0.3	<0.1	<5	<0.05	<0.2	0.3	<0.5	<0.1	34.6	<0.1	<0.5	<0.1	<0.2	<1
Starcke 2	<0.2	<0.2	0.4	<0.1	<5	<0.05	<0.2	<0.1	<0.5	<0.1	18.5	<0.1	<0.5	<0.1	<0.2	<1
Annie 1	<0.2	<0.2	0.5	<0.1	<5	<0.05	0.4	<0.1	<0.5	<0.1	5.8	<0.1	<0.5	<0.1	<0.2	<1
Annie 2	<0.2	<0.2	0.5	<0.1	<5	<0.05	0.3	0.1	<0.5	<0.1	20.3	<0.1	<0.5	<0.1	<0.2	<1
Annie 3	<0.2	<0.2	0.5	<0.1	12	<0.05	0.8	0.1	<0.5	<0.1	27.4	<0.1	0.5	<0.1	<0.2	<1
Gorge Creek 1	<0.2	<0.2	<0.2	<0.1	<5	<0.05	0.4	<0.1	<0.5	<0.1	9.4	<0.1	<0.5	<0.1	<0.2	<1
Stewart 1	<0.2	<0.2	0.6	<0.1	<5	<0.05	<0.2	<0.1	<0.5	<0.1	7.8	<0.1	<0.5	<0.1	<0.2	<1
Stewart 2	<0.2	<0.2	0.8	<0.1	<5	<0.05	<0.2	<0.1	<0.5	<0.1	19.9	<0.1	<0.5	<0.1	<0.2	<1
Stewart 3	<0.2	<0.2	1.2	<0.1	<5	<0.05	<0.2	<0.1	<0.5	<0.1	26.9	0.1	<0.5	<0.1	<0.2	<1
Little Stewart 1	<0.2	<0.2	0.3	<0.1	<5	<0.05	<0.2	<0.1	<0.5	<0.1	16.6	0.1	<0.5	<0.1	<0.2	<1
Breakfast Creek 1	<0.2	<0.2	<0.2	<0.1	<5	<0.05	<0.2	<0.1	<0.5	<0.1	17	<0.1	<0.5	<0.1	<0.2	<1
Massie Creek 1	<0.2	<0.2	<0.2	<0.1	<5	<0.05	<0.2	<0.1	<0.5	<0.1	4	<0.1	<0.5	<0.1	<0.2	<1
Massie Creek 2	<0.2	<0.2	<0.2	<0.1	<5	<0.05	<0.2	<0.1	<0.5	<0.1	6.1	<0.1	<0.5	<0.1	<0.2	<1
Chester 1	<0.2	<0.2	0.9	<0.1	<5	<0.05	<0.2	<0.1	<0.5	<0.1	4.5	<0.1	<0.5	<0.1	<0.2	<1
Nesbit 1	<0.2	<0.2	0.7	<0.1	<5	<0.05	<0.2	<0.1	<0.5	<0.1	24.2	<0.1	<0.5	<0.1	<0.2	<1
Nesbit 2	<0.2	<0.2	0.8	<0.1	25	<0.05	<0.2	<0.1	<0.5	<0.1	22.2	<0.1	<0.5	<0.1	<0.2	<1
Archer 1	<0.2	<0.2	0.4	<0.1	<5	<0.05	<0.2	<0.1	<0.5	<0.1	18.6	<0.1	<0.5	<0.1	<0.2	<1
Archer 2	<0.2	<0.2	0.6	<0.1	<5	<0.05	<0.2	<0.1	<0.5	<0.1	20.7	<0.1	<0.5	<0.1	<0.2	<1
Archer 3	<0.2	<0.2	0.5	<0.1	<5	<0.05	<0.2	<0.1	<0.5	<0.1	8.8	<0.1	<0.5	<0.1	<0.2	<1
Archer 4	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
Archer 5	<0.2	<0.2	0.6	<0.1	<5	<0.05	<0.2	<0.1	<0.5	<0.1	3	<0.1	<0.5	<0.1	<0.2	<1
Wenlock River on Lockhart Road	<0.2	<0.2	0.6	<0.1	<5	<0.05	<0.2	0.2	<0.5	<0.1	45.9	<0.1	<0.5	<0.1	<0.2	<1
Wenlock River on Frenchmans Track	<0.2	<0.2	0.4	<0.1	<5	<0.05	<0.2	0.2	<0.5	<0.1	31.5	<0.1	<0.5	<0.1	<0.2	<1
Wenlock River at Moreton bridge	<0.2	<0.2	0.3	<0.1	<5	<0.05	<0.2	<0.1	<0.5	<0.1	14.2	<0.1	<0.5	<0.1	<0.2	<1
Pascoe River on Lockhart road	<0.2	<0.2	0.3	<0.1	<5	<0.05	<0.2	<0.1	<0.5	<0.1	4.5	<0.1	<0.5	<0.1	<0.2	<1
Pascoe River at Fyfe's crossing	<0.2	<0.2	0.4	<0.1	<5	<0.05	<0.2	0.1	<0.5	<0.1	15.9	<0.1	<0.5	<0.1	<0.2	<1
Pascoe River at Garroway Gauge station	<0.2	<0.2	0.3	<0.1	<5	<0.05	<0.2	<0.1	<0.5	<0.1	9.8	<0.1	<0.5	<0.1	<0.2	<1
Pascoe River at Wattle Hills homestead	<0.2	<0.2	0.3	<0.1	<5	<0.05	<0.2	<0.1	<0.5	<0.1	6.8	<0.1	<0.5	<0.1	<0.2	24
Garroway Creek	<0.2	<0.2	0.2	<0.1	<5	<0.05	<0.2	<0.1	<0.5	<0.1	6.4	<0.1	<0.5	<0.1	<0.2	<1
Lana's Creek	<0.2	<0.2	<0.2	<0.1	<5	<0.05	<0.2	<0.1	<0.5	<0.1	0.8	<0.1	<0.5	<0.1	<0.2	<1
240 Volt Creek	<0.2	<0.2	<0.2	<0.1	<5	<0.05	<0.2	<0.1	<0.5	<0.1	0.6	<0.1	<0.5	<0.1	<0.2	<1
Hann Creek	<0.2	<0.2	<0.2	<0.1	<5	<0.05	<0.2	<0.1	<0.5	<0.1	0.7	<0.1	<0.5	<0.1	<0.2	<1
Pretty Little Creek	<0.2	<0.2	<0.2	<0.1	<5	<0.05	<0.2	<0.1	<0.5	<0.1	1.1	<0.1	<0.5	<0.1	<0.2	<1
Dub Creek	<0.2	<0.2	<0.2	<0.1	<5	<0.05	<0.2	<0.1	<0.5	<0.1	1.1	<0.1	<0.5	<0.1	<0.2	<1
Claudie River 01	<0.2	<0.2	0.7	<0.1	<5	<0.05	<0.2	<0.1	1.8	<0.1	6.2	<0.1	<0.5	<0.1	<0.2	<1
Claudie River Top Crossing	<0.2	<0.2	0.9	<0.1	<5	<0.05	<0.2	0.2	<0.5	<0.1	43.5	<0.1	<0.5	<0.1	<0.2	<1

Appendix E2: Total metals data																
Site	Antimony	Selenium	Arsenic	Beryllium	Boron	Cadmium	Chromium	Cobalt	Copper	Lead	Manganese	Molybdenum	Nickel	Silver	Tin	Zinc
	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L
Bloomfield 1	<0.2	<0.2	0.7	<0.1	<5	0.09	0.5	<0.1	<0.5	0.4	2.9	<0.1	<0.5	<0.1	<0.2	1
Bloomfield 2	<0.2	<0.2	0.4	<0.1	<5	<0.05	<0.2	<0.1	<0.5	<0.1	2.8	<0.1	<0.5	<0.1	<0.2	<1
Bloomfield 3	<0.2	<0.2	<0.2	<0.1	<5	<0.05	<0.2	<0.1	<0.5	<0.1	2.4	<0.1	<0.5	<0.1	<0.2	<1
Isabella Ck 1	<0.2	<0.2	<0.2	<0.1	<5	<0.05	<0.2	0.2	<0.5	<0.1	5.4	<0.1	<0.5	<0.1	<0.2	2
McIvor 1	<0.2	<0.2	0.2	<0.1	<5	<0.05	0.2	0.5	0.6	0.2	43	0.1	0.8	<0.1	0.3	19
McIvor 2	<0.2	<0.2	0.3	<0.1	<5	<0.05	<0.2	0.4	<0.5	<0.1	31.3	<0.1	0.6	<0.1	<0.2	<1
McIvor 3	<0.2	<0.2	0.4	<0.1	<5	<0.05	0.2	0.5	<0.5	<0.1	35.2	<0.1	0.7	<0.1	<0.2	<1
Morgan 1	<0.2	<0.2	0.5	<0.1	<5	<0.05	0.3	0.8	0.5	0.1	50.6	<0.1	1.1	<0.1	<0.2	<1
Starcke 1	<0.2	<0.2	0.4	<0.1	<5	<0.05	0.2	0.3	<0.5	<0.1	34.6	<0.1	<0.5	<0.1	<0.2	<1
Starcke 2	<0.2	<0.2	0.4	<0.1	<5	<0.05	<0.2	0.1	<0.5	<0.1	20.7	<0.1	<0.5	<0.1	<0.2	<1
Annie 1	<0.2	<0.2	0.6	<0.1	<5	<0.05	0.8	0.2	<0.5	0.2	10.5	<0.1	<0.5	<0.1	<0.2	<1
Annie 2	<0.2	<0.2	0.5	<0.1	<5	<0.05	0.5	0.1	<0.5	0.1	23.7	<0.1	<0.5	<0.1	<0.2	<1
Annie 3	<0.2	<0.2	0.5	<0.1	11	<0.05	0.8	0.2	<0.5	0.2	35.3	<0.1	0.5	<0.1	0.3	2
Gorge Creek 1	<0.2	<0.2	<0.2	<0.1	<5	<0.05	0.6	0.1	<0.5	0.1	10.1	<0.1	<0.5	<0.1	0.3	<1
Stewart 1	<0.2	<0.2	0.6	<0.1	<5	<0.05	<0.2	<0.1	<0.5	<0.1	9	<0.1	<0.5	<0.1	<0.2	<1
Stewart 2	<0.2	<0.2	0.8	<0.1	<5	<0.05	<0.2	0.2	<0.5	<0.1	20.6	0.2	<0.5	<0.1	0.5	26
Stewart 3	<0.2	<0.2	1.4	<0.1	<5	<0.05	0.2	0.2	<0.5	0.2	33.1	<0.1	<0.5	<0.1	<0.2	<1
Little Stewart 1	<0.2	<0.2	0.2	<0.1	<5	<0.05	<0.2	0.2	0.5	<0.1	18.3	0.2	<0.5	<0.1	<0.2	<1
Breakfast Creek 1	<0.2	<0.2	<0.2	<0.1	<5	<0.05	0.5	0.1	<0.5	<0.1	18.8	<0.1	<0.5	<0.1	<0.2	<1
Massie Creek 1	<0.2	<0.2	<0.2	<0.1	<5	<0.05	0.2	<0.1	<0.5	<0.1	6.2	<0.1	<0.5	<0.1	<0.2	<1
Massie Creek 2	<0.2	<0.2	<0.2	<0.1	<5	<0.05	<0.2	<0.1	<0.5	<0.1	9.1	<0.1	<0.5	<0.1	<0.2	<1
Chester 1	<0.2	<0.2	0.9	<0.1	<5	<0.05	<0.2	<0.1	<0.5	<0.1	5.4	<0.1	<0.5	<0.1	<0.2	<1
Nesbit 1	<0.2	<0.2	0.8	<0.1	<5	<0.05	<0.2	0.2	<0.5	<0.1	26.1	<0.1	<0.5	<0.1	<0.2	1
Nesbit 2	<0.2	<0.2	0.9	<0.1	30	<0.05	<0.2	0.2	<0.5	<0.1	22.6	<0.1	<0.5	<0.1	<0.2	<1
Archer 1	<0.2	<0.2	0.6	<0.1	<5	<0.05	0.3	0.2	0.7	0.3	22.3	<0.1	<0.5	<0.1	0.2	5
Archer 2	<0.2	<0.2	0.6	<0.1	<5	<0.05	<0.2	0.2	<0.5	0.3	23.6	<0.1	<0.5	<0.1	<0.2	2
Archer 3	<0.2	<0.2	0.8	<0.1	<5	<0.05	<0.2	0.1	<0.5	0.2	12.2	<0.1	<0.5	<0.1	<0.2	1
Archer 4	<0.2	<0.2	0.9	<0.1	<5	<0.05	0.4	0.3	<0.5	0.2	50.4	<0.1	<0.5	<0.1	<0.2	4
Archer 5	<0.2	<0.2	0.7	<0.1	<5	<0.05	<0.2	<0.1	<0.5	0.2	6.2	<0.1	<0.5	<0.1	<0.2	<1
Wenlock River on Lockhart Road	<0.2	<0.2	0.7	<0.1	<5	<0.05	<0.2	0.2	<0.5	<0.1	48.7	<0.1	<0.5	<0.1	<0.2	<1
Wenlock River on Frenchmans Track	<0.2	<0.2	0.6	<0.1	<5	<0.05	<0.2	0.2	<0.5	0.2	40.3	<0.1	<0.5	<0.1	<0.2	<1
Wenlock River at Moreton bridge	<0.2	<0.2	0.4	<0.1	<5	<0.05	<0.2	0.1	<0.5	<0.1	16.4	<0.1	<0.5	<0.1	<0.2	<1
Pascoe River on Lockhart road	<0.2	<0.2	0.3	<0.1	<5	<0.05	<0.2	<0.1	<0.5	0.1	7.5	<0.1	<0.5	<0.1	<0.2	1
Pascoe River at Fyfe's crossing	<0.2	<0.2	0.4	<0.1	<5	<0.05	<0.2	0.2	<0.5	<0.1	19	<0.1	<0.5	<0.1	<0.2	<1
Pascoe River at Garroway Gauge station	<0.2	<0.2	0.4	<0.1	<5	<0.05	<0.2	<0.1	<0.5	<0.1	9.4	<0.1	<0.5	<0.1	<0.2	4
Pascoe River at Wattle Hills homestead	<0.2	<0.2	0.3	<0.1	<5	<0.05	<0.2	<0.1	<0.5	<0.1	7.1	<0.1	<0.5	<0.1	<0.2	<1
Garroway Creek	<0.2	<0.2	0.3	<0.1	<5	<0.05	<0.2	<0.1	<0.5	<0.1	7.4	<0.1	<0.5	<0.1	<0.2	<1
Lana's Creek	<0.2	<0.2	<0.2	<0.1	<5	<0.05	<0.2	<0.1	<0.5	<0.1	1.9	<0.1	<0.5	<0.1	<0.2	5
240 Volt Creek	<0.2	<0.2	<0.2	<0.1	<5	<0.05	<0.2	<0.1	<0.5	<0.1	1.2	<0.1	<0.5	<0.1	<0.2	4
Hann Creek	<0.2	<0.2	<0.2	<0.1	<5	<0.05	<0.2	<0.1	<0.5	<0.1	1	<0.1	<0.5	<0.1	<0.2	2
Pretty Little Creek	<0.2	<0.2	<0.2	<0.1	<5	<0.05	<0.2	<0.1	<0.5	<0.1	1.5	<0.1	<0.5	<0.1	<0.2	1
Dub Creek	<0.2	<0.2	<0.2	<0.1	<5	<0.05	<0.2	<0.1	<0.5	0.1	1.4	<0.1	<0.5	<0.1	<0.2	14
Claudie River 01	<0.2	<0.2	0.8	<0.1	<5	<0.05	<0.2	<0.1	1	<0.1	8	<0.1	<0.5	<0.1	<0.2	<1
Claudie River Top Crossing	<0.2	<0.2	1.2	<0.1	<5	<0.05	<0.2	0.2	<0.5	0.1	54.8	<0.1	<0.5	<0.1	<0.2	<1