FOLLOWING THE FLOOD

Identifying sources of environmental contaminants in North Burnett subcatchments post Cyclone Oswald

Final Report

The Burnett River at Ceratodus

"And wherever the river goes, every living creature that swarms will live, and there will be very many fish. For this water goes there, that the waters of the sea may become fresh, so that everything may live where the water goes." Ezekiel 47:9

BCCA
BURNETT CATCHMENT CARE ASSOCIATION

Queensland Government

Everyone's Environment grants

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This report prepared by Marion Denholm, BCCA Project Officer (water quality monitoring) March 2017.

Yarrol Swan is a site on the upper reaches of the Burnett River – a good flow March 2014.

INTRODUCTION

In January 2013, the Burnett River catchment experienced one of the most devastating floods in living memory. Due to rainfall associated with Cyclone Oswald, the upper reaches of the catchment received very large totals over a short period of time. The Burnett and many of it's tributaries, overflowed their banks in many places. Farms, homes, business places and local rubbish dumps were all inundated. As all the towns along the river draw their water supplies from the river or associated waters and many irrigators and livestock farmers also, good water quality is vital for both human health and food production.

The 'Following the Flood' project aimed to gather data on the current state of water quality in the upper Burnett catchment, by taking actual measurements in the field over three years. We also collated historical water data in an attempt to establish what changes may have occurred due to the recent flooding and to provide a baseline of data against which to measure future changes.

The project has been funded by an 'Everyone's Environment' grant from the Department of Environment & Heritage, Queensland Government. We partnered with Qld. Health and also had the support of local natural resources management groups; North Burnett Landcare, Central Burnett Landcare and the Burnett Mary Regional Group.

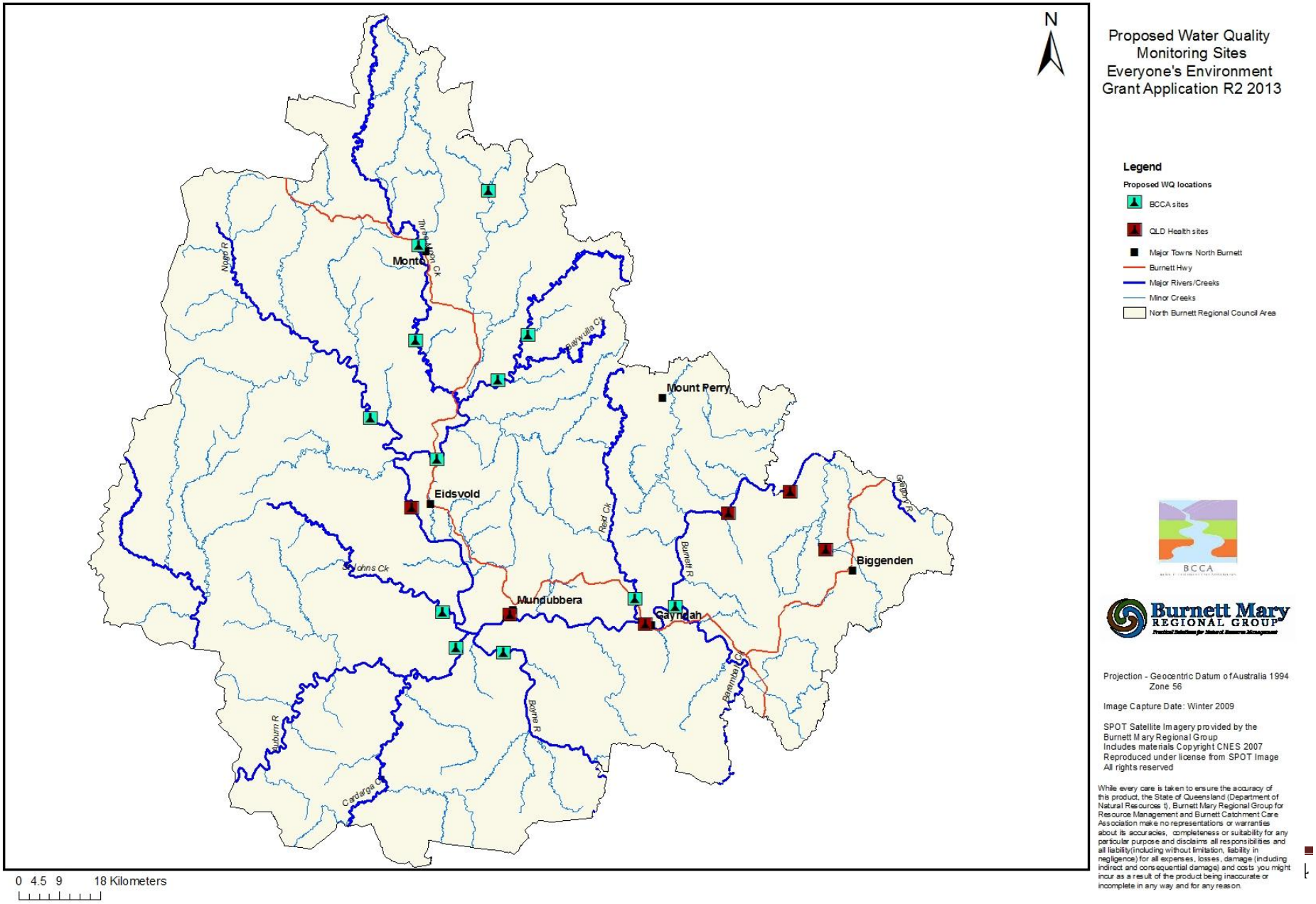
The project was run by the Burnett Catchment Care Association, a natural resource management group that covers the whole of the Burnett catchment.

TECHNICAL ADVISORY PANEL

The Burnett Catchment Care Association invited a number of experts in their fields to oversee the progress of the project and they kindly agreed to participate;

- Ms Emily Maher, Operations Manager, Burnett Mary Regional Group. Emily was previously an officer with Murray Catchment Management Authority, where she gained experience in freshwater monitoring.
- Mr Ray Maynard, Supervising Hydrographer, Department of Environment & Resource Management. Ray is a local with many years of experience in monitoring river flows.
- Mr Greg Crisp, Senior Environment Health Officer, Wide Bay Public Health Unit. Greg has a background in environmental water monitoring.
- Mr Ryan Turner, Principal Scientist, Water Quality & Investigations, Qld Department of Science, Information Technology.

Rubbish from the Mundubbera Dump litters Middle Boyne Road as floodwaters recede. 28th January 2013.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Proposed Water Quality Monitoring Sites
Everyone's Environment Grant Application R2 2013
Legend
Proposed WQ locations
BCCA sites
QLD Health sites
Major Towns North Burnett
Burnett Hwy
Major Rivers/Creeks
Minor Creeks
North Burnett Regional Council Area
Monto
Mount Perry
Eidsvold
Mundubbera
Gayndah
Biggenden
Nogo R
Three Moon Ck
Barambah Ck
Reid Ck
Burnett R
Gregory R
Johns Ck
Auburn R
Boyne R
Cardarga Ck
Barambah Ck
0 4.5 9 18 Kilometers
BCCA
Burnett Mary Regional Group
Projection - Geocentric Datum of Australia 1994 Zone 56
Image Capture Date: Winter 2009
SPOT Satellite Imagery provided by the Burnett Mary Regional Group
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THE WATER SAMPLING SITES

Twelve sites were chosen to be sampled by the Burnett Catchment Care Association. They include;

1. Bancroft – on Splinter Creek near the Hayes Bridge on Cannindah Road north of Monto.
2. Bunyip Hole – local fishing spot on Three Moon Creek, southwest of Monto on Anyarro Road.
3. Langley – on the lower reach of Three Moon Creek, south of Monto where it crosses under the Burnett Highway.
4. Yarrol Swan – our highest sampling point on the Burnett River, east of Monto on Yarrol Road.
5. Mt Perry Bridge – on the Burnett River, south-east of Monto on the Monto – Mt Perry Road.
6. Wuruma – sampling from the Wuruma Dam impoundment on the Nogo River, north-west of Eidsvold.
7. On the Burnett River at the Ceratodus Bridge, part of the Burnett Highway north of Eidsvold.
8. Pearlinga- named for a station on St. John's Creek, Pearlinga Road north-west of Mundubbera.
9. Dykehead – also named for a station on the Auburn River, at the Dykehead Bridge on the Dykehead Road west of Mundubbera.
10. Reinkes – at a crossing of the lower reach of the Boyne River, by Reinkes Road south-west of Mundubbera.
11. Reids – at the bridge where the Burnett Highway crosses over Reids Creek, north of Gayndah.
12. Bon Accord – named after one of the original squatter's runs east of Gayndah, where Barambah Creek crosses under the Yenda – Benyenda Road.

All the sites were chosen to be easily accessible and on public land so no permissions were needed from private landholders. They represented a range of streams in the Upper Burnett catchment, and were historically sampled by other organisations.

NOGO RIVER

You will note also in the site results, references to Nogo. This refers to the Nogo River, where it is crossed by the Mount Eagle Road, Eidsvold, about 400m below the Wuruma Dam wall. On my first visit to the Wuruma Dam site, in January 2014, both myself and the volunteer that attended the site with me, noticed a distinct odour of sewage around the dam wall area. On the second site visit in February, the odour was still present, so the I decided to test the water running down the bed of the Nogo River and take a sample for analysis of nutrients back at the office. I was startled to find that most of the measurements were higher than readings from other sites. Since that time, sampling has been done at this site, when possible.

SAMPLING AND ANALYSIS OF WATER

Samples of water are taken close to the edge of streams, taking care not to disturb the stream bed, with a plastic container held at the end of a telescopic pole. I normally work alone and therefore don't enter the water for safety reasons. Samples are transferred to a bucket, which is then taken to my vehicle where they are analysed for; (1) temperature, (2) dissolved oxygen, (3) electrical conductivity & total dissolved solids (4) pH and (5) turbidity, using a TPS 90-FLT digital meter. The results are entered directly onto a digital form on a laptop computer. A sample of 200ml is set aside from each site and processed in the office at home. Palintest tablet reagents are used to prepare samples for analysis for nitrates, nitrites, ammonia nitrogen and phosphates. The samples are read using a Palintest 7000se spectrophotometer.

EXPLANATION OF WATER QUALITY MEASURMENTS

1. Temperature – is measured in degrees Celsius. Affects the ability of water to absorb oxygen from the atmosphere.
2. Electrical conductivity – is a measure of the inorganic elements dissolved in water such as sodium, calcium, phosphorus, iron, sulphur etc. Generally used to rate the salinity or 'saltiness' of fresh water. Measured in micro (millionths) of Siemens per cubic centimetre.
3. Total dissolved solids – measures both inorganic and organic matter suspended in the water. These tiny particles can include calcium, phosphates, nitrates, sodium, potassium & chloride elements and organic particles from human sewerage, intensive livestock and agricultural chemicals.
4. Dissolved oxygen – this is the 'free' oxygen in the water (not the O in H_2O) that is used by fish & other water dwellers to 'breathe'. As the water temperature drops, it is able to absorb more oxygen from the atmosphere. When organic matter is washed into streams, bacteria multiply rapidly and use up much of the 'free' oxygen – this is often the cause of fish kills.
5. pH (the potential of hydrogen) – is a measure of the acidity or alkalinity of a solution. In the case of fresh water, it usually reflects the geological makeup of the surrounding catchment. The soils & rocks of the Burnett are mostly made up of alkaline elements and consequently the river water is almost always above pH 7 which is neutral.
6. Turbidity – a measure of the particles suspended in water that cause it to have a more or less cloudy appearance. In the upper Burnett, most of the turbidity of the water is caused by soil particles washed into streams during rainfall events. Management of the surrounding landscape has a dramatic effect on soil loss into creeks & rivers.
7. Nitrates, Nitrites, Ammonium & Phosphates – naturally occurring forms of nitrogen & phosphorus elements that may be more or less present in the environment. Are also present in concentrated form in agricultural fertilisers & chemicals, urban run-off & sewerage or intensive livestock systems from where they can be easily leached out and enter watercourses. Have health implications for humans directly ingesting them in drinking water or indirectly as part of the food chain.

LABORATORY ANALYSIS OF WATER SAMPLES

In order to get more accurate results and to test for a range of possible unnatural contaminants, the project officer has taken water samples at each site, mostly during flood events over the past three years. The samples are bottled directly in the field and returned to the office in an esky with cool bricks. The samples are then either frozen or chilled in a dedicated refrigerator until all sites have been visited. Samples are then packaged in polystyrene boxes with frozen gel packs and sent overnight by courier to the laboratory. The following tests on the water samples are carried out by Forensic & Scientific Services, Qld. Health;

- Standard Water Analysis – this includes a range of physical characteristics such as pH, hardness, electrical conductivity and turbidity plus a range of elements such as calcium and copper.
- Nutrient Analysis – several forms of nitrogen and phosphorus, which are important as measures of general catchment health, as they indicate potential sources of organic pollution.
- Heavy Metals – trace elements ranging from aluminium to zinc. Small amounts of these elements are normal and necessary, however the detection of larger amounts may indicate a pollution source.
- Pesticides & Herbicides – a very wide range of man-made chemicals are used for perceived problems in residential areas, from cockroach baits to slug repellents and also in agriculture, to protect crops and livestock.

The summer of 2016 – 2017 was much drier than average and because of the necessity to complete the project to an artificial timeline, the last two sets of laboratory samples were taken in January and March 2017. Only four of the twelve sites had minor flood flows (Bon Accord, Reids, Bunyip Hole & Langley) in January and none in March. These samples have still yielded valuable information however, about the state of water health during dry periods, when elements become more concentrated.

DATA CONFIDENCE

During the life of this project, the same person has done all the calibration of instruments and sampling & analysis of water, which has provided uniformity.
A protocol has been strictly followed throughout, for every sample.
Laboratory samples have been taken in the field, stored, packaged and transported according to requirements as set out by the laboratory.
The Forensic and Scientific Service Laboratory located at Coopers Plains, Brisbane was chosen to analyse samples. This laboratory is operated by Queensland Health and performs analyses of all kinds of materials from all around the State. Our partners in this project, the Wide Bay Public Health Unit, based at Hervey Bay, are a part of Queensland Health and were using the laboratory for analysis of their own water samples.

COLLABORATION

Several organisations and individuals have assisted during this project;

- Participants of the Technical Advisory Panel, in particular Ray Maynard, have been helpful in providing advice and support to the Project Officer.
- Members of the Burnett Catchment Care Association, particularly the paid staff & executive, have overseen the progress of the project and provided advice and support to the Project Officer.
- Greg Crisp and other staff of the Environmental Health Section of the Wide Bay Public Health Unit provided advice and training to the Project Officer at the commencement of the project as well as ongoing support.
- Central Burnett Landcare President, David Rolfe, provided logistical support at the beginning of the project to the Project Officer.

Part of the vision for this project was to make it accessible to the community and ensure that results were available to whoever could make use of them. To this end, the Project Officer has spoken publicly about the project to local media, individuals and groups, as well as providing printed results when requested.

DEVELOPING BASELINE PARAMETERS

As a result of examination of data collected by this project and the examination of records of data collected by other projects and agencies and incorporating recommendations by State, Federal and international Government agencies, we present the following parameters for water quality measurement of surface waters in the Upper Burnett River catchment region;

Indicator	**Minimum value**	**Maximum value**
Water temperature	$10^{o}C$	$35^{o}C$
Electrical conductivity	$300uS/cm^{3}$	$3{,}500uS/cm^{3}$
Total dissolved solids	200ppm	2,000ppm
Dissolved oxygen (ppm)	3.5ppm	12ppm
Dissolved oxygen (% saturated)	50% sat.	150% sat.
Potential of hydrogen (pH)	6.5pH	9pH
Turbidity (nephelometric turbidity units)	2NTU	2,000NTU

Nitrates	0mg/lt	50mg/lt
Nitrites	0mg/lt	3mg/lt
Ammonia Nitrogen	0mg/lt	0.5mg/lt
Phosphates	0mg/lt	0.1mg/lt

Untreated water from the Upper Burnett catchment that is found to have measurements outside these parameters will be unusual and need some explanation.

THE RESULTS

Data obtained from the project is presented on the following pages. At each visit to each site, I kept a record of some of the physical conditions at the site and noted any unusual activity or changes. The physical measurements taken at the site were recorded and the results of samples taken from the site and processed back at the office, were also noted on the same sheet. An example is given as Appendix A. For the sake of brevity, these records are not included in this booklet.

The bare figures from these records were then collated each month into a spreadsheet. These collated results are shown in the next few pages. In all, twenty-four visits were made to all the sites over the three and a quarter years of the project life.

You will notice that there are some measurements not present on some of the sheets. This is where a sample has been missed for some reason.

Laboratory samples were expected to be taken twice each year (2014, 2015, 2016) during flood events. The natural world doesn't always fall into line with our expectations and in fact only one set of samples was taken in 2014 and 2015. Two sets of samples were taken in 2016 and the final two sets that we were contracted to achieve were taken in January and March of 2017. Both these latter sampling rounds were taken in a very dry period, but still yield valuable information. Selected data from the laboratory analyses are presented for each site, for each set of samples. We have chosen measurements that may be compared to the results our own processing has obtained. A full laboratory analysis of one site, on one date, is given in Appendix B.

At the first visits conducted in January 2014, a streambank assessment was made of each site. This looked at the condition of the beds and banks of each site and the land above the channels. A record of the amount and condition of the site vegetation was also kept. On the occasion of our final visits during March 2017, the streambank assessments were repeated. A copy of one streambank assessment at one site is given as Appendix C.

ACCESS TO FULL RESULTS

Complete project results of all work and analyses undertaken are available from the Secretary of the Burnett Catchment Care Association, in electronic form, upon request. You may be asked to defray the costs of copying and postage.

Flood debris at Killala Creek, Mundubbera 29th January 2013.

MONTH OF: January 2014												
Parameter	Site Identicication											
	Bancroft	Langley	Bunyip Hole	Yarrol Swan	Mt Perry Bridge	Wuruma	Ceratodus	Pearlinga	Dykehead	Reinkes	Reids	Bon Accord
Temperature	27.3 oC	24.4 oC	27.6 oC	28 oC	28.9 oC	25.8 oC	27.1 oC	31.1oC	26.1 oC	25.5 oC	26.7 oC	32 oC
Elec. Cond.	2376 uS/cm	1874 uS	1392 uS	2110 ppm	1438 uS/cm	525 uS	1488 uS	3.23mS	1028 uS	1130 uS	3440 uS	2238 uS/cm
Total Diss. Solids	1208 ppm	951 ppm	693 ppm	1073 ppm	738 ppm	250 ppm	742 ppm	1.66 ppk	498 ppm	558 ppm	1770 uS	1143 ppm
Diss. Oxy. ppm		6.85 ppm				7.66 ppm	6.38 ppm	7.95ppm	7.96 ppm	6.35 ppm	8.6 ppm	9.28 ppm
Diss. Oxy. % sat.		88 % sat.				88.9 % satu	80.6% satur	107.3%sat	95.4 % sat	78.6 % satu	107.6 % sat	173.98 5 sat
pH	7.86 pH	8.07 pH	8.05 pH	7.63 pH	7.73 pH	7.91 pH	7.23 pH	9.14 pH	7.89 ppm	7.89 pH	7.74 pH	8.5 pH
Turbidity	7.1 NTU	12.5 NTU	10.4 NTU	10.6 NTU	3.5 NTU	10.6 NTU	4.3 NTU	17.1 NTU	15.2 NTU	4.1 NTU	3.3 NTU	8.3 NTU
Nitrate nitrogen												
(N) mg/lt	0.02	0.05	0.06	0.05	0.002	0.09	0.05	0.05	0.001	0.02	0.42	below rang
Nitrate												
(N) mg/lt	0.1	0.22	0.32	0.2	0.12	0.4	0.2	0.22	0	0.1	0.14	below rang
Nitrite nitrogen												
(N) mg/lt	0.01	0.004	0	0.001	0.003	0	0.004	0	0.02	0	0	0.032
Nitrite												
(NO2) mg/lt	0	0.01	0	0.01	0	0	0.02	0	0.08	0	0	0.11
Ammonia nitrogen												
(N) mg/lt	0.33	0.06	0.07	0.71	0.07	0.01	0.06	0.3	0.04	0.02	below rang	0.41
Ammonium												
(NH4) mg/lt	0.57	0.08	0.09	0.69	0.16	0.03	0.21	0.44	0.05	0.02	below rang	0.53
Phosphate												
(PO4) mg/lt	0.93	0.25	0.26	0.61	0.24	0.4	1.1	0.3	0.37	0.58	0.54	0.86
Phosphate												
(P) mg/lt	0.35		0.1	0.23	0.09				0.13	0.19	0.28	0.29

MONTH OF: February 2014													
Parameter	Site Identicication												
	Bancroft	Langley	Bunyip Ho	Yarrol Swar	Mt Perry Bri	Wuruma	Ceratodus	Pearlinga	Dykehead	Reinkes	Reids	Bon Accord	Nogo River
Temperature	25.5 oC	25 oC	27.9 oC	27 oC	27.2 oC	27.3 oC	28.2 oC	27.5 oC	26.9 oC	27.9 oC	29 oC	28.9 oC	20.2 oC
Elec. Cond.	4440 uS/c	1921 uS	1562 uS	2148 uS	1716 uS	530 uS	1459 uS	3710 uS	1072 uS	1187 uS	3500 uS	2258 uS	460 uS
Total Diss Solids	2310 ppm	968 ppm	777 ppm	1077 ppm	866 ppm	251 ppm	725 ppm	1910 uS	524 ppm	585 ppm	1770 uS	1141 ppm	216 ppm
Diss. Oxy. ppm	7.85 ppm	4.68 ppm	5.84 ppm	4.64 ppm	5.89 ppm	7.98 ppm	2.82 ppm	5.54 ppm	5.29 ppm	3.5 ppm	7.13 ppm	9.12 ppm	9.28 ppm
Diss. Oxy. % sat.	94.8 % sat	60.7 % sat	74.8 % satu	58.4 % satu	73.7 % satur	101.3 % sat	36.7 % satu	70.4 % satu	70.4 % sat	44.5 % satu	91.9 % satu	119.7 % sat	104.4 % satu
pH	8.42 pH	7.68 pH	8.32 pH	7.63 pH	7.64 pH	9.05 pH	6.98 pH	9.16 pH	8.41 pH	7.55 pH	7.86 pH	8.89 pH	7.7 pH
Turbidity	23.3 NTU	5.2 NTU	8.3 NTU	1.2 NTU	1.4 NTU	103.4 NTU	1.1 NTU	7.6 NTU	9.8 NTU	4.8 NTU	1.6 NTU	13.7 NTU	1.6 NTU
Nitrate nitrogen (N) mg/lt	0.02	0.04	0.04	0.04	0.03	0.05	0.02	0.05	0.04	0.06	0.03	0.03	0.09
Nitrate (NO3) mg/lt	0.1	0.18	0.18	0.18	0.14	0.22	0.08	0.22	0.2	0.24	0.14	0.14	0.44
Nitrite nitrogen (N) mg/lt	0	0.006	0.003	0.001	0.002	0	0	0	0	0.004	0	0	0.017
Nitrite (NO2) mg/lt	0	0.02	0.01	0	0	0	0	0	0	0.01	0	0	0.06
Ammonia nitroger (N) mg/lt	below ran	0.09	0	0.06	0	below rang	0.02	0.25	0.02	0.02	0.71	0.38	0.5
Ammonium (NH4) mg/lt	below ran	0.12	0	0.07	below range	below rang	0.03	0.31	0.03	0.03	0.94	0.49	0.63
Phosphate (PO4) mg/lt	0.88	0.48	1.8	1.95	2.3	0.82	0.6	0.03	0.41	0.22	0.09	0.16	2.1
Phosphate (P) mg/lt	0.29	0.16	0.64	0.65	0.78	0.29	0.2	0.01	0.13	0.07	0.03	0.05	0.71

MONTH OF: March 2014													
Parameter	Site Identification												
	Bancroft	Langley	Bunyip Ho	Yarrol Swa	Mt Perry Br	Wuruma	Ceratodus	Pearlinga	Dykehead	Reinkes	Reids	Bon Accord	Nogo
Temperature	26.0 oC	28.5 oC	25.9 oC	25.8 oC	25.5 oC	29.4 oC	26.9 oC	30 oC	24.1 oC	25.6 oC	26.6 oC	29.4 oC	25.6 oC
Elec. Cond.	1893 uS/cm	703 uS/cm	746 uS/cm	477 uS/cm	571 uS/cm	546 uS/cm	1323 uS/cm	245 uS/cm	1121 uS/cr	661 uS/cm	3790 uS/cm	2321 uS/cm	462 uS/cm
Total Diss Solids	948 ppm	337 ppm	358 ppm	224 ppm	272 ppm	257 ppm	653ppm	112 ppm	528 ppm	314 ppm	1950 ppm	1170 ppm	217 ppm
Diss. Oxy. ppm	6.14 ppm	3.55 ppm	6.79 ppm	5.89 ppm	5.93 ppm	9.63 ppm	6.44 ppm	5.16 ppm	6.94 ppm	5.48 ppm	11.18 ppm	11.73 ppm	8.78 ppm
Diss. Oxy. % sat.	75.8 % satu	45.1 % sat	83.7 % sat	72.2 % satu	76.2 % satu	126.3 % sat	84.1 % satu	69.0 % satu	83.1 % sat	66.9 % satu	123.2 % sat	154.1 % sat	109.1 % sat
pH	7.48 pH	6.58 pH	7.45 % sat	7.23 pH	6.73 pH	8.59 pH	7.27 pH	6.94 pH	7.49 pH	6,89 pH	7.6 pH	8.25 pH	8.17 pH
Turbidity	5.9 NTU	25.5 NTU	5.6 NTU	29.9 NTU	30.5 NTU	9.4 ntu	21.8 NTU	1371 NTU	12.5 NTU	9.8 NTU	0.1 NTU	16.4 NTU	1.2 NTU
Nitrate nitrogen (N) mg/lt	0.22	0.08	0.06	0.34	0.33	0.06	0.09	below rang	0.04	below rang	0.04	0.02	0.16
Nitrate (NO3) mg/lt	1	0.36	0.26	1.5	1.48	0.26	0.4	below rang	0.2	below rang	0.2	0.22	0.72
Nitrite nitrogen (N) mg/lt	0.019	0.006	0.001	0.013	0.027	0	0.006	below rang	0.003	0.006	0.003	0	0.045
Nitrite (NO2) mg/lt	0.06	0.02	0	0.05	0.09	0	0.02	below rang	0.01	0	0.01	0	0.15
Ammonia nitrogen (N) mg/lt	0.02	0.32	0	0.06	0.08	0.08	0.03	below rang	0.04	0.02	0.19	0.91	0.72
Ammonium (NH4) mg/lt	0.02	0.4	0	0.08	0.09	0.09	0.04	below rang	0.05	0.02	0.26	1.16	0.92
Phosphate (PO4) mg/lt	1.25	0.57	0.89	0.29	0.81	0.82	0.65	below rang	0.14	0.29	0.28	0.27	2
Phosphate (P) mg/lt	0.42	0.19	0.3	0.09	0.27	0.28	0.22	below rang	0.05	0.09	0.09	0.08	0.68

MONTH OF: April 2014													
Parameter	Site Identification												
	Bancroft	Langley	Bunyip Hol	Yarrol Swa	Mt Perry Bri	Wuruma	Ceratodus	Pearlinga	Dykehead	Reinkes	Reids	Bon Accord	Nogo
Temperature	19.5 oC	17 oC	21.6 oC	21.4 oC	19.9 oC	21.7 oC	20.7 oC	27.6 oC	23.6 oC	23.2 oC	24.6 oC	28 oC	15.4 oC
Elec. Cond.	3440 uS/cr	774 uS/cn	722 uS/cm	831 uS/cm	924 uS/cm	560 uS/cm	824 uS/cm	2780 uS/cm	259 uS/cm	1022 uS/cm	1556 uS/cn	2310 uS/cm	469 uS/cm
Total Diss Solids	1780 ppm	376 ppm	351 ppm	405 ppm	454 ppm	268 ppm	400 ppm	1420 ppm	117 ppm	505 ppm	769 ppm	1165 ppm	223 ppm
Diss. Oxy. ppm	7.19 ppm	4.86 ppm	4.26 ppm	5.26 ppm	6.99 ppm	6.88 ppm	6.99 ppm	9.51 ppm	6.2 ppm	9.78 ppm	6.1 ppm	11.25 ppm	9.83 ppm
Diss. Oxy. % sat.	79.8 % satı	50.9% sat	48.5 % satu	58.6 % satu	77.9% satur	79.8 %satu	78.5% satu	120.8 % sat	72.8 % sat	115.2 % sat	74 % satura	145.6 %satu	98.4% satu
pH	8.3 pH	8.1 pH	7.87 pH	7.91 pH	7.55 pH	8.03 pH	8.26 pH	8.37 pH	7.15 pH	7.95 pH	7.23 pH	8.48 pH	8.26 pH
Turbidity	5.1 NTU	14.8 NTU	8.3 NTU	7.2 NTU	4.1 NTU	3.4 NTU	8.5 NTU	21.8 NTU	367 NTU	3.6 NTU	42.7 NTU	13.3 NTU	1.9 NTU
Nitrate nitrogen													
(N) mg/lt	0.04	0.04	0.04	0.02	0.03	0.04	0.05	0.02	0.07	0.02	0.18	0.06	0.08
Nitrate													
(NO3) mg/lt	0.16	0.2	0.18	0.1	0.14	0.18	0.24	0.12	0.3	0.12	0.78	0.24	0.36
Nitrite nitrogen													
(N) mg/lt	0.006	0.003	0	0	0	0.002	0.001	0	0.003	0	0.014	0.003	0.024
Nitrite													
(NO2) mg/lt	0.02	0.01	0	0	0	0.01	0	0	0.01	0	0.05	0.01	0.08
Ammonia nitrogen													
(N) mg/lt	0.7	0.04	0.01	0.01	0	0.01	0.02	0.46	0.02	0.02	0.26	0.37	0.99
Ammonium													
(NH4) mg/lt	0.89	0.05	0.02	0.01	0	0.01	0.02	0.61	0.03	0.03	0.32	0.46	1.26
Phosphate													
(PO4) mg/lt	0.39	0.39	0.39	0.22	0.34	0.46	0.29	0.13	0.29	0.1	0.47	0.37	1.4
Phosphate													
(P) mg/lt	0.13	0.13	0.13	0.07	0.11	0.15	0.09	0.04	0.09	0.03	0.15	0.12	0.46

MONTH OF: May 2014													
Parameter	Site Identification												
	Bancroft	Langley	Bunyip Hc	Yarrol Swa	Mt Perry Br	Wuruma	Ceratodus	Pearlinga	Dykehead	Reinkes	Reids	Bon Accord	Nogo
Temperature	17 oC	17.7 oC	17.9 oC	20.2 oC	20.3 oC	20.0 oC	20.4 oC	21.2 oC	18.7 oC	20.9 oC	20.0 oC	28 oC	17.5 oC
Elec. Cond.	3600 uS	840 uS	850 uS	977 uS	1080 uS	549 uS	1042 uS	3130 uS	854 uS	1068 uS	3050 uS	2310 uS/cm	479 uS
Total Diss Solids	1870 ppm	410 ppm	415 ppm	479 ppm	531 ppm	263 ppm	513 ppm	1610 ppm	418 ppm	527 ppm	1570 ppm	1165 ppm	228 ppm
Diss. Oxy. ppm	7.03 ppm	3.81 ppm	5.58 ppm	3.63 ppm	10.01 ppm	5.73 ppm	7.38 ppm	10.48 ppm	6.93 ppm	10.16 ppm	7.45 ppm	11.25 ppm	8.83 ppm
Diss. Oxy. % sat.	73.7 % sat	39.9 % sa	59.3 % sat	40.5 % sat	110.8 % sat	63.5 % satu	82.9 % satu	118.4 % sat	74.6 % sat	114.8 % sat	81.6 % satu	145.6 %satu	92.5 % sat
pH	8.07 pH	8.1 pH	7.7 pH	8 pH	8.77 pH	7.81 pH	7.94 pH	8.56 pH	7.65 pH	8.51 pH	8 pH	8.48 pH	8.18 pH
Turbidity	4.4 NTU	7.3 pH	8.2 NTU	1.8 NTU	2 NTU	2.5 NTU	3.7 NTU	19.6 NTU	8.5 NTU	3 NTU	2.5 NTU	13.3 NTU	1.5 NTU
Nitrate nitrogen													
(N) mg/lt	0.05	0.07	0.03	0.03	0.03	0.09	0.04	0.02	0.02	0.03	0.04	0.06	0.12
Nitrate													
(NO3) mg/lt	0.22	0.32	0.14	0.14	0.12	0.38	0.2	0.08	0.1	0.14	0.18	0.24	0.56
Nitrite nitrogen													
(N) mg/lt	0.001	0.002	0	0.001	0	0.01	0.001	0	0	0	0	0.003	0.005
Nitrite													
(NO2) mg/lt	0	0.01	0	0	0	0.03	0	0	0	0	0	0.01	0.02
Ammonia nitrogen													
(N) mg/lt	below rar	0.02	0	0.01	0.02	0.01	0.02	0	0.01	0.03	0.98	0.37	above rang
Ammonium													
(NH4) mg/lt	below rar	0.03	0	0.01	0	0.01	0.03	0	0.01	0.03	1.24	0.46	above rang
Phosphate													
(PO4) mg/lt	0.44	0.29	0.11	0.35	0.23	0.34	0.68	0.14	0.13	0.17	0.1	0.37	1.6
Phosphate													
(P) mg/lt	0.15	0.09	0.03	0.11	0.07	0.11	0.22	0.04	0.04	0.06	below rang	0.12	0.54

MONTH OF: June 2014													
Parameter	Site Identification												
	Bancroft	Langley	Bunyip Ho	Yarrol Swa	Mt Perry Bric	Wuruma	Ceratodus	Pearlinga	Dykehead	Reinkes	Reids	Bon Accord	Nogo
Temperature	11.7 oC	14.6 oC	16.5 oC	16.3 oC	17.5 oC	19 oC	16.7 oC	17.7 oC	15.8 oC	18.2 oC	17.6 oC	19.1 oC	16.3 oC
Elec. Cond.	4120 uS	890 uS	876 uS	1182 uS	1220 uS	571 uS	1418 uS	3360 uS	1002 uS	1021 uS	3140 uS	1363 uS	587 Us
Total Diss Solids	2140 ppm	434 ppm	427 ppm	584 ppm	603 ppm	272 ppm	706 ppm	1730 ppm	491 ppm	538 ppm	1610 ppm	678 ppm	281 ppm
Diss. Oxy. ppm	10.17 ppm	7.87 ppm	6.58 ppm	4.26 ppm	11.27 ppm	7.09 ppm	10.11 ppm	14.07 ppm	8.9 ppm	10.04 ppm	7.36 ppm	9.81 ppm	10.18 ppm
Diss. Oxy. % sat.	95.2% sat	93.3 % sat	68.5 % sat	43.6 % sat	118.9 % sat	76.7 % sat	104.5 % sat	148.3 % sat	91.8 % sat	106.6 %sat	77.6 % sat	107.1 % sat	104.9 % sa
pH	7.7 pH	7.38 pH	7.43 pH	7.26 pH	7.62 pH	7.54 pH	7.25 pH	8.79 pH	7.65 pH	7.88 pH	7.63 pH	8.19 pH	7.75 pH
Turbidity	1.5 NTU	4.4 NTU	4.5 NTU	2.6 NTU	3.3 NTU	0.8 NTU	6.3 NTU	24.7 NTU	1.6 NTU	2.8 NTU	1.3 NTU	4.1 NTU	2.2 NTU
Nitrate nitrogen (N) mg/lt	0.03	0.01	0.02	0.02	0.02	0.15	0.04	0.02	0.02	0.02	0.03	0.02	0.13
Nitrate (NO3) mg/lt	0.12	0.04	0.62	0.1	0.08	0.68	0.2	0.1	0.1	0	0.14	0.1	0.62
Nitrite nitrogen (N) mg/lt	0.001	0.003	0	0.001	0	0.066	0	0	0.001	0	0.001	0	0.047
Nitrite (NO2) mg/lt	0	0.01	0	0	0	0.22	0	0	0	0	0	0	0.16
Ammonia nitrogen (N) mg/lt	0.47	0.02	0.01	0.01	0	0.05	0	below rang	0.01	0.01	0.75	0	0.26
Ammonium (NH4) mg/lt	0.6	0.03	0.01	0.02	0	0.06	0	below rang	0	0.01	0.97	0	0.33
Phosphate (PO4) mg/lt	0.15	0.07	0.06	0.18	0.23	0.16	0.08	0.04	0.09	0.09	0.07	0.04	0.29
Phosphate (P) mg/lt	0.05	0.02	0.02	0.06	0.07	0.05	0.02	0.01	0.02	0.03	0.02	0.01	0.09

MONTH OF: July 2014													
Parameter	Site Identification												
	Bancroft	Langley	Bunyip Ho	Yarrol Swa	Mt Perry Bric	Wuruma	Ceratodus	Pearlinga	Dykehead	Reinkes	Reids	Bon Accord	Nogo
Temperature	15.1 oC	14.7 oC	15.8 oC	18.7 oC	17.9 oC	18.1 oC	17.2 oC	19.7 oC	13.5 oC	15.6 oC	15.9 oC	18.5 oC	17 oC
Elec. Cond.	4420 uS/cm	923 uS/cm	919 uS/cm	1293 uS/cr	1317 uS/cm	579 uS/cm	1599 uS/cr	3540 uS/cr	1112 uS/cr	1072 uS/cm	3290 uS	1417 uS	562 uS/cm
Total Diss Solids	2300 ppm	449 ppm	448 ppm	640 ppm	652 ppm	276 ppm	800 ppm	1830 ppm	547 ppm	527 ppm	1690 ppm	704 ppm	266 ppm
Diss. Oxy. ppm	11.56 ppm	8.16 ppm	9.84 ppm	639 ppm	14.22 ppm	9.45 ppm	8.97 ppm	15.69 ppm	10.62 ppm	13.07 ppm	12.69 ppm	10.5 ppm	10.7 ppm
Diss. Oxy. % sat.	114.7 % sat	80.6 % sat	98.8 % sat	93.6 % sat	150.6 % sat	99.7 % sat	93.6 % sat	170.6 %sat	101.8 % sa	132.8 % sat	127.4 % sat	113.3 %sat	110.2 % sat
pH	7.99 pH	7.75 pH	8.47 pH	7.68 pH	7.94 pH	8.38 pH	7.58 pH	9.29 pH	8.51 pH	8.73 pH	8.16 pH	8.26 pH	8.31 pH
Turbidity	3.5 NTU	12 NTU	4.7 NTU	4.1 NTU	2 NTU	3.5 NTU	9.7 NTU	10.1 NTU	6.5 NTU	2.6 NTU	2.3 NTU	9.8 NTU	4.2 NTU
Nitrate nitrogen (N) mg/lt	0.02	0.04	0.02	0.02	0.03	0.09	0.08	0.04	0.03	0.02	0.02	0.03	0.06
Nitrate (NO3) mg/lt	0.1	0.16	0.1	0.1	0.12	0.4	0.36	0.16	0.12	0.08	0.1	0.14	0.26
Nitrite nitrogen (N) mg/lt	0	0.001	0	0.004	0.003	0.009	0.002	0	0	0.021	0	0	0
Nitrite (NO2) mg/lt	0	0	0	0.01	0.01	0.03	0	0	0	0.07	0	0	0
Ammonia nitrogen (N) mg/lt	0.9	0.02	0.02	0	0.01	0.16	0	0.11	0.02	0.01	0.01	0	0.04
Ammonium (NH4) mg/lt	1.16	0.02	0.03	0	0.03	0.19	0	0.12	0	0	0	0	0.05
Phosphate (PO4) mg/lt	0.15	0.02	0.01	0.12	0.14	0.91	0	0	0.03	0	0	0.04	1.3
Phosphate (P) mg/lt	0.05	0	0.01	0.03	0.04	0.3	0	0	0	0	0	0.01	0.44

MONTH OF: August 2014													
Parameter	Site Identification												
	Bancroft	Langley	Bunyip Hol	Yarrol Swa	Mt Perry Brid	Wuruma	Ceratodus	Pearlinga	Dykehead	Reinkes	Reids	Bon Accor	Nogo
Temperature	16.8 oC	17.5 oC	16.9 oC	19.8 oC	19.6 oC		19.4 oC	19 oC	16.2 oC	17.2 oC	19.8 oC	22.1 oC	18.9 oC
Elec. Cond.	4800 uS/cm	941 uS	997 uS/cm	1430 uS/cr	1435 uS/cm		1871 uS	3650 uS/cm	1223 uS/cr	1069 uS/cr	3520 uS/cm	1536 uS	573 uS/cm
Total Diss Solids	2430 ppm	445 ppm	472 ppm	689 ppm	692 ppm		912 ppm	1820 ppm	585 ppm	510 ppm	1750 ppm	742 ppm	264 ppm
Diss. Oxy. ppm	10.01 ppm	6.61 ppm	8.36 ppm	6.35 ppm	8.36 ppm		104.6 ppm	11.28 ppm	9.72 ppm	8.56 ppm	9.93 ppm	11.15 ppm	6.83 ppm
Diss. Oxy. % sat.	104.4 % sat	70.9 % sat.	86.9 % sat.	69.8 % sat.	94.1 % sat.		106.2 % sat	120.9 % sat	101 % sat.	89.1 % sat.	110.3 % sat	127.8 % sa	94.9 % sat
pH	7.76 pH	7.38 pH	7.68 pH	7.29 pH	7.52 pH		7.26 pH	9.01 pH	7.93 pH	7.71 pH	7.9 pH	8.23 pH	8.16 pH
Turbidity	4.00 NTU	14.1 NTU	4.5 NTU	2.4 NTU	2.2 NTU		10.5 NTU	10.5 NTU	4.2 NTU	4.4 NTU	2.2 NTU	9.9 NTU	5.1 NTU
Nitrate nitrogen													
(N) mg/lt	0.02	0.03	0.05	0.01	0.04		0.06	0.04	0.04	0.04	0.05	0.04	0.06
Nitrate													
(NO3) mg/lt	0.12	0.16	0.24	0.04	0.18		0.26	0.18	0.16	0.18	0.24	0.16	0.26
Nitrite nitrogen													
(N) mg/lt	0	0.002	0	0	0.004		0.001	0.001	0.001	0	0	0	0.002
Nitrite													
(NO2) mg/lt	0	0	0	0	0.01		0	0	0	0	0	0	0
Ammonia nitrogen													
(N) mg/lt	0.94	0.02	0.02	b range	0.02		0	0.31	0.02	0.01	0.3	0.02	0.02
Ammonium													
(NH4) mg/lt	1.22	0.04	0.02	b range	0.04		0	0.4	0.05	0.05	0.4	0.36	0.03
Phosphate													
(PO4) mg/lt	0.09	0.19	0.33	0.17	0.22		0.37	0	0.03	0.05	0.23	0.12	0.47
Phosphate													
(P) mg/lt	0.03	0.06	0.11	0.05	0.07		0.1	b range	0.01	0.01	0.07	0.04	0.15

MONTH OF: September 2014													
Parameter	Site Identification												
	Bancroft	Langley	Bunyip Hc	Yarrol Swa	Mt Perry Bri	Wuruma	Ceratodus	Pearlinga	Dykehead	Reinkes	Reids	Bon Accord	Nogo
Temperature	21.2 oC	22 oC	20 oC	25 oC	24.2 oC	18.7 oC	21.1 oC	26.4 oC	26.5 oC	26.5 oC	24.8 oC	25.0 oC	18.9 oC
Elec. Cond.	4800 uS/cm	1255 uS/cr	1016 uS/cı	1530 uS/cı	1480 uS/cm	602 uS/cm	1868 uS/cm	3310 uS/cm	1271 uS/cı	1305 uS/cm	3560 uS/cm	1570 uS/cm	573 uS/cm
Total Diss Solids	2520 ppm	622 ppm	481 ppm	766 ppm	738 ppm	255 ppm	943 ppm	1700 ppm	630 ppm	651 ppm	1840 ppm	788 ppm	264 ppm
Diss. Oxy. ppm	11.27 ppm	5.21 ppm	7.29 ppm	8.19 ppm	12.18 ppm	6.56 ppm	9.08 ppm	10.28 ppm	6.44 ppm	7.66 ppm	13.39 ppm	10.49 ppm	6.83 ppm
Diss. Oxy. % sat.	128 % sat	58.5 % sat	80.5 % sat	98.8 % sat	147.8 % sat	70.3 % sat	101.4 % sat	125.9 % sat	80.2 % sat	96.4 % sat	164.1 % sat	128 % sat	94.9 % sat
pH	8.2 pH	7.74 pH	7.91 pH	7.66 pH	7.98 pH	7.87 pH	7.5 pH	9.88 pH	8.17 pH	7.82 pH	8.34 pH	8.7 pH	8.16 pH
Turbidity	5.4 NTU	10.5 NTU	4.3 NTU	4.4 NTU	1.2 NTU	5.4 NTU	5.8 NTU	5.7 NTU	7.6 NTU	3 NTU	3.9 NTU	8.8 NTU	5.1 NTU
Nitrate nitrogen													
(N) mg/lt	0.04	0.04	0.03	0.03	0.03	0.06	0.11	0.09	0.09	0.05	0.05	0.09	0.06
Nitrate													
(NO3) mg/lt	0.18	0.18	0.12	0.14	0.12	0.26	0.52	0.46	0.42	0.22	0.24	0.44	0.26
Nitrite nitrogen													
(N) mg/lt	0.001	0	0	0	0	0	0.009	0	0	0.001	0	0	0.002
Nitrite													
(NO2) mg/lt	0	0	0	0	0	0	0.03	0	0	0	0	0	0
Ammonia nitrogen													
(N) mg/lt	0.74	0.02	0.02	0	0	0.01	b range	0.17	0	0.05	0.2	0	0.02
Ammonium													
(NH4) mg/lt	0.95	b range	0.04	0	0	0	b range	0.41	b range	0.06	0.26	b range	0.03
Phosphate													
(PO4) mg/lt	0.21	0.12	0.14	0.75	1.2	0.24	1	0	0.35	0.09	0.22	0.31	0.47
Phosphate													
(P) mg/lt	0.07	0.03	0.04	0.25	0.4	0.08	0.34	b range	0.11	0.03	0.07	0.1	0.15

MONTH OF: October 2014													
Parameter	Site Identification												
	Bancroft	Langley	Bunyip Hol	Yarrol Swa	Mt Perry Brid	Wuruma	Ceratodus	Pearlinga	Dykehead	Reinkes	Reids	Bon Accord	Nogo
Temperature	20.4 oC	20.4 oC	27.6 oC	27.2 oC	27.3 oC	28 oC	20.2 oC	24.5 oC	24.2 oC	23.5 oC	29.9 oC	31 oC	20.7 oC
Elec. Cond.	4710 uS/c	1296 uS/c	1045 uS/cm	1514 uS/cm	1521 uS/cm	591 uS/cm	1858 uS/cm	4240 uS/c	1288 uS/c	1120 uS/c	3650 uS/	1592 uS/cm	575 uS/cm
Total Diss Solids	2520 ppm	656 ppm	525 ppm	772 ppm	776 ppm	289 ppm	956 ppm	2260 ppm	652 ppm	564 ppm	1920 ppr	815 ppm	289 ppm
Diss. Oxy. ppm	7.28 ppm	3.45 ppm	4.19 ppm	11.71 ppm	10.33 ppm	8.49 ppm	4.46 ppm	9.82 ppm	8.47 ppm	4.72 ppm	15.78 pp	12.7 ppm	9.74 ppm
Diss. Oxy. % sat.	80.6 % sat	38.8 % sa	53.6 % sat	148.7 % sa	131.4 % sat	108.9 % sa	49.1 % sat	118.1 % sa	99 % sat	54.3 % sat	209.3 % s	169.9 % sat	109.7 % sat
pH	7.66 pH	7.33 pH	7.32 pH	7.52 pH	7.21 pH	8.33 pH	6.83 pH	9.53 pH	7.96 pH	7.18 pH	7.88 pH	8.67 pH	7.86 pH
Turbidity	3.9 NTU	5.1 NTU	1 NTU	4.6 NTU	1.7 NTU	4.5 NTU	3.7 NTU	9 NTU	9.1 NTU	1.5 NTU	2.3 NTU	3.3 NTU	3.9 NTU
Nitrate nitrogen (N) mg/lt	0.06	0.05	0.05	0.06	0.03	0.06	0.11	0.07	0.04	0.08	0.04	0.09	0.05
Nitrate (NO3) mg/lt	0.24	0.2	0.24	0.26	0.14	0.24	0.52	0.3	0.18	0.36	0.18	0.38	0.24
Nitrite nitrogen (N) mg/lt	0.002	0	0	0.002	0	0	0.019	0	0	0	0	0	0.004
Nitrite (NO2) mg/lt	0	0	0	0	0	0	0.06	0	0	0	0	0	0.01
Ammonia nitrogen (N) mg/lt	0.99	b range	0.03	0	b range	0.01	b range	0.28	b range	0.09	0.33	0.26	0.15
Ammonium (NH4) mg/lt	1.26	b range	0.04	0	b range	0.01	b range	0.36	b range	0.13	0.47	0.33	0.18
Phosphate (PO4) mg/lt	0.15	0.82	0.15	0.21	0.37	0.26	1.7	0.07	0.38	0.06	0.17	0.17	0.82
Phosphate (P) mg/lt	0.05	0.29	0.05	0.07	0.12	0.09	0.61	0.02	0.13	0.01	0.06	0.05	0.27

MONTH OF: November 2014													
Parameter	Site Identification												
	Bancroft	Langley	Bunyip Hol	Yarrol Swar	Mt Perry Br	Wuruma	Ceratodus	Pearlinga	Dykehead	Reinkes	Reids	Bon Accord	Nogo
Temperature	28.8 oC	29.7 oC	27.4 oC	31.5 oC	27.1 oC	32.2 oC	27.1 oC	30 oC	32.3 oC	32.4 oC	30.8 oC	30.1 oC	23.7 oC
Elec. Cond.	4570 uS	490 uS/cm	1060 uS/cn	1504 uS/cm	1331 uS/cm	615 uS/cm	1701 uS/cm	5160 uS/cr	1209 uS	935 uS/cm	4010 uS/cm	1635 uS/cm	576 uS/cm
Total Diss Solids	2370 ppm	230 ppm	514 ppm	745 ppm	654 ppm	292 ppm	844 ppm	2680 ppm	592 ppm	453 ppm	2070 ppm	812 ppm	272 ppm
Diss. Oxy. ppm	9.9 ppm	1.36 ppm	8 ppm	10.52 ppm	6.42 ppm	9.15 ppm	10.55 ppm	13.14 ppm	8.84 ppm	9.82 ppm	12.08 ppm	12.32 ppm	11.51 ppm
Diss. Oxy. % sat.	128.8 % sat	17.7 % sat	102 % sat	142.9 % sat	80.6 % sat	126.7 % sa	132.4 % sat	186.9 % sa	119.9 % sa	135.8 % sat	159.9 % sat	165 % sat	137.9 % sa
pH	7.91 pH	6.85 pH	8.25 pH	7.88 pH	7.56 pH	8.76 pH	7.39 pH	9.48 pH	8.34 pH	8.56 pH	8.32 pH	9 pH	8.14 pH
Turbidity	15.4 NTU	99.4 NTU	14.7 NTU	16.7 NTU	4 NTU	6.9 NTU	6.4 NTU	5 NTU	8.3 NTU	2.2 NTU	2.9 NTU	16.2 NTU	4.12 NTU
Nitrate nitrogen (N) mg/lt	0.03	0.02	0.03	0.02	0.06	0.06	0.07	0.08	0.06	0.05	0.04	0.06	0.11
Nitrate (NO3) mg/lt	0.12	0.12	0.14	0.12	0.26	0.26	0.32	0.34	0.26	0.24	0.18	0.26	0.5
Nitrite nitrogen (N) mg/lt	0	0	0.004	0.001	0.011	0.005	0.001	0	0	0	0	0	0.19
Nitrite (NO2) mg/lt	0	0	0.01	0	0.04	0.02	0	0	0	0	0	0	0.06
Ammonia nitrogen (N) mg/lt	0.18	0	0	0	0.02	0	b range	0.01	0	0.04	0.02	0.09	0.17
Ammonium (NH4) mg/lt	0.22	0	0.09	0	0.03	0	b range	0.01	0	0.05	0.03	0.11	0.22
Phosphate (PO4) mg/lt	0.1	0.73	0.56	0.59	0.95	0.38	1.4	0.06	0.72	0.34	0.17	0.13	1.1
Phosphate (P) mg/lt	0.03	0.24	0.11	0.19	0.32	0.12	0.47	0.02	0.24	0.11	0.05	0.04	0.36

MONTH OF: December 2014													
Parameter	Site Identification												
	Bancroft	Langley	Bunyip Hol	Yarrol Swa	Mt Perry Bri	Wuruma	Ceratodus	Pearlinga	Dykehead	Reinkes	Reids	Bon Accord	Nogo
Temperature	24.0 oC	24.1	24.1 oC	25.4 oC	26.0 oC	29.5 oC	25.9 oC	25.3 oC	27 oC	26.4 oC	31.8 oC	29.3 oC	31 oC
Elec. Cond.	964 uS/cm	172.7	203.1 uS/cr	306 uS/cm	311 Us/cm	615 uS/cm	265 uS/cm	1014 uS/cr	114.2 uS/c	598 uS/cm	3300 uS/cm	806 uS/cm	410 uS/cm
Total Diss Solids	475 ppm	79.1	94.7 ppm	143 ppm	145 ppm	216 ppm	122 ppm	502 ppm	51.2 ppm	289 ppm	1710 ppm	398 ppm	195 ppm
Diss. Oxy. ppm	6.21 ppm	5.59	6.38 ppm	6.95 ppm	6.85 ppm	7.74 ppm	8.1 ppm	3.41 ppm	7.15 ppm	4.73 ppm	9.37 ppm	7.25 ppm	8.35 ppm
Diss. Oxy. % sat.	74.2 % sat	67	76.3 % sat	84.95 % sa	85.7 % sat	101.2 % sat	99.2 % sat	41.6 % sat	89.2 % sat	58.6 % sat	128.8 % sat	92.8 % sat	113.9 % sat
pH	7.21 pH	6.57	6.64 pH	7.07 pH	6.85 pH	8.09 pH	6.76 pH	7.31 pH	6.46 pH	6.91 pH	7.74 pH	7.5 pH	7.93 pH
Turbidity	49.3 NTU	501	309 NTU	55.5 NTU	56.7 NTU	0.2 NTU	503 NTU	194.4 NTU	476 NTU	56.1 NTU	9.8 NTU	77.3 NTU	9.6 NTU
Nitrate nitrogen (N) mg/lt	0.1	b range	b range	0.09	0.11	0.05	b range	0.01	b range	0.04	0.04	0.18	0.1
Nitrate (NO3) mg/lt	0.46	b range	b range	0.38	0.54	0.22	b range	0.04	b range	0.2	0.16	0.82	0.46
Nitrite nitrogen (N) mg/lt	0.004	0.012	0.011	0.013	0.018	0	0.008	0.001	b range	0.001	0.002	0.008	0.011
Nitrite (NO2) mg/lt	0.01	0.04	0.04	0.05	0.06	0	0.03	0	b range	0	0	0.03	0.04
Ammonia nitrogen (N) mg/lt	b range	0.01	0.04	0.02	0.03	0	b range	b range	0.02	0.02	0.29	0.05	0.02
Ammonium (NH4) mg/lt	b range	0.01	0.05	0.03	0.04	0	b range	b range	0.03	0.03	0.38	0.05	0.02
Phosphate (PO4) mg/lt	1.85	1.2	1.25	0.38	0.89	1.55	1.3	0.31	0	0.49	0.27	0.44	0.57
Phosphate (P) mg/lt	0.61	0.39	0.42	0.13	0.3	0.51	0.42	0.1	0	0.16	0.09	0.14	0.19

MONTH OF: February 2015													
Parameter	Site Identification												
	Bancroft	Langley	Bunyip Ho	Yarrol Swa	Mt Perry Bri	Wuruma	Ceratodus	Pearlinga	Dykehead	Reinkes	Reids	Bon Accord	Nogo
Temperature	26.9 oC	28.8 oC	28.5 oC	28.3 oC	29.5 oC	34.8 oC	29.4 oC	30.7 oC	27.1 oC	28.5 oC	27.0 oC	27.7 oC	31.0 oC
Elec. Cond.	2191 uS/cm	635 uS/cm	496 uS/cm	329 uS/cm	385 uS	595 uS/cm	596 uS	756 uS/cm	163.4 uS/c	673 uS/cm	924 uS/cm	639 uS/cm	586 uS/cm
Total Diss Solids	1109 ppm	304 ppm	235 ppm	152 ppm	181 ppm	284 ppm	284 ppm	365 ppm	73.7 ppm	323 ppm	449 ppm	307 ppm	278 ppm
Diss. Oxy. ppm	7.95 ppm	6.22 ppm	6.79 ppm	5.96 ppm	6.26 ppm	9.44 ppm	7.24 ppm	6.8 ppm	6.8 ppm	5.57 ppm	7.03 ppm	13.15 ppm	8.77 ppm
Diss. Oxy. % sat.	100.9 % sat	80.6 % sat	84.6 % sat	76.6 % sat	81.23 % sat	103.4 % sat	94.9 % sat	89.9 % sat	85.8 % sat	72.1 % sat	81.2 % sat	89.9 % sat	120.1 % sat
pH	7.59 pH	7.95 pH	7.31 pH	6.86 pH	6.9 pH	8.43 pH	7.28 pH	7.62 pH	6.67 pH	7.15 pH	7.77 pH	7.14 pH	8.54 pH
Turbidity	5 NTU	26.7 NTU	21.2 NTU	31.5 NTU	43.7 NTU	5.2 NTU	40.8 NTU	30.9 NTU	219 NTU	21.9 NTU	511 NTU	91.9 NTU	7.4 NTU
Nitrate nitrogen (N) mg/lt	0.06	0.1	0.1	0.06	0.06	0.08	0.09	0.07	0.01	0.22	0.14	0.09	0.008
Nitrate (NO3) mg/lt	0.3	0.46	0.46	0.26	0.26	0.34	0.42	0.3	0.02	1	0.64	0.42	0.34
Nitrite nitrogen (N) mg/lt	0.001	0.004	0.009	0.003	0.007	0	0.007	0	0	0.011	0.018	0.006	0
Nitrite (NO2) mg/lt	0	0.01	0.03	0.01	0.02	0	0.02	0	0	0.04	0.05	0.02	0
Ammonia nitrogen (N) mg/lt	b. range	0	0.02	0.02	0.02	0	0	0	0.04	0.03	0.11	0.03	0.03
Ammonium (NH4) mg/lt	b. range	b. range	0.02	0.03	0.03	0	b. range	0	0.05	0.03	0.16	0.05	0.03
Phosphate (PO4) mg/lt	0.89	0.06	0.63	0.52	0.42	0.24	0.55	1.1	0.55	0.98	1.5	0.95	0.36
Phosphate (P) mg/lt	0.3	0.29	0.2	0.17	0.14	0.08	0.19	0.37	0.18	0.32	0.49	0.31	0.12

MONTH OF: May 2015												
Parameter	Site Identification											
	Bancroft	Langley	Bunyip H	Yarrol Swa	Mt Perry Br	Wuruma	Ceratodus	Pearlinga	Dykehead	Reinkes	Reids	Bon Accord	Nogo
Temperature		18.5 oC		22.4 oC	21.2 oC	25.7 oC	21.5 oC	18.5 oC	16.4 o c	19.3 oC	18.8 oC	19.6 oC	24.5 oC
Elec. Cond.		1142 uS/cm		958 uS/cm	871 uS/cm	448 uS/cm	1208 uS/cm	1198 uS/cm	272 uS/cm	604 uS/cm	1680 uS/cm	584 uS/cm	579 uS/cm
Total Diss Solids		564 ppm		478 ppm	426 ppm	212 ppm	601 ppm	593 ppm	125 ppm	291 ppm	845 ppm	286 ppm	278 ppm
Diss. Oxy. ppm		9.12 ppm		7.19 ppm	5.79 ppm	7.34 ppm	6.81 ppm	3.35 ppm	6.08 ppm	6.56 ppm	6.58 ppm	6.95 ppm	8.67 ppm
Diss. Oxy. % sat.		95.1 % sat		82.2 % sat	64.7 % sat	90.2 % sat	88.8 % sat	35.7 % sat	60.4 % sat	72.1 % sat	89.4 % sat	75.4 % sat	103.8 % sat
pH		8.16 pH		8.19 pH	8.2 pH	8.08 pH	8.09 pH	8.86 pH	7.77 pH	7.78 pH	8.4 pH	8.32 pH	8.37 pH
Turbidity		28.7 NTU		5 NTU	3.1 NTU	2.2 NTU	8.6 NTU	11.5 NTU	208.1 NTU	64.7 NTU	7.7 NTU	17 NTU	6.7 NTU
Nitrate nitrogen (N) mg/lt		0.02		0.04	0.06	0.09	0.02	0.04	0.06	0.06	0.05	0.09	0.34
Nitrate (NO3) mg/lt		0.06		0.18	0.24	0.42	0.1	0.18	0.24	0.24	0.24	0.4	1.52
Nitrite nitrogen (N) mg/lt		0		0	0.001	0.058	0	0.001	0.001	0.002	0.007	0.003	0.066
Nitrite (NO2) mg/lt		0		0	0	0.2	0	0	0	0.01	0.02	0.01	0.22
Ammonia nitrogen (N) mg/lt		b. range		0	0	0.02	0.01	0	0.01	0	0.06	0	0.19
Ammonium (NH4) mg/lt		b. range		0	0	0.03	0	0	0	0	0.19	b. range	0.24
Phosphate (PO4) mg/lt		0.39		0.4	0.36	0.07	0.19	0.05	0.25	0.07	0.35	0.39	0.31
Phosphate (P) mg/lt		0.13		0.13	0.12	0.02	0.06	0.01	0.08	0.03	0.11	0.13	0.1

MONTH OF: July 2015												
Parameter	Site Identification											
	Bancroft	Langley	Bunyip	Yarrol Swa	Mt Perry Br	Wuruma	Ceratodus	Pearlinga	Dykehead	Reinkes	Reids	Bon Accord	Nogo
Temperature		13.7 oC		16.6 oC	14.6 oC	19.4 oC	16.1 oC	17.8 oC	15 oC	17.2 oC	17.6 oC	18.7 oC	17.3 oC
Elec. Cond.		1402 uS/cm		1181 uS/cm	1046 uS/cm	462 uS/cm	1393 uS/cm	2314 uS/cm	1006 uS/c	1010 uS/cm	2447 uS	1073 uS/cm	486uS/cm
Total Diss Solids		708 ppm		591 ppm	523 ppm	211 ppm	702 ppm	1193 ppm	500 ppm	501 ppm	1263 ppm	534 ppm	234 ppm
Diss. Oxy. ppm		10.48 ppm		6.82 ppm	10.81 ppm	18.57 ppm	12.55 ppm	12.45 ppm	10.53 ppm	10.56 ppm	13.66 ppm	15.07 ppm	14.5 ppm
Diss. Oxy. % sat.		110 % sat		71.2 % sat	106.1 % sat	207.6 % sat	120.5 % sat	142.2 %sat	99.6 % sat	112.6 % sat	135.1 % sat	167.1 %sat	149.5 % sat
pH		8.23 pH		7.66 pH	8.08 pH	9.3 pH	8.16 pH	8.99 pH	8.06 pH	8.4 pH	8.31 pH	8.46 pH	8.9 pH
Turbidity		8.8 NTU		8.6 NTU	3.9 NTU	13.5 NTU	3.7 NTU	23.9 NTU	12. 7NTU	5.8 NTU	3.3 NTU	3.4 NTU	5.2 NTU
Nitrate nitrogen													
(N) mg/lt		0.05		0.02	0.02	0.04	0.03	0.01	0.02	0.04	0.04	0.01	0.05
Nitrate													
(NO3) mg/lt		0.2		0.1	0.06	0.2	0.16	0.06	0.08	0.1	0.18	0.06	0.24
Nitrite nitrogen													
(N) mg/lt		0.006		0	0	0	0	0	0	0	0	0	0
Nitrite													
(NO2) mg/lt		0.02		0	0	0	0	0	0	0	0	0	0
Ammonia nitrogen													
(N) mg/lt		0.04		0	b. range	0.03	0.03	b. range	0	0.01	0.01	b. range	b. range
Ammonium													
(NH4) mg/lt		0.03		0	b. range	0.03	0.04	0.22	b. range	0	0.01	b. range	b. range
Phosphate													
(PO4) mg/lt		1.7		1.9	1.9	1.55	2.4	0.67	0.81	1	0.82	0.56	1.85
Phosphate													
(P) mg/lt		0.55		1.85	0.62	0.51	0.79	0.21	0.27	0.33	0.27	0.18	0.62

MONTH OF: August 2015												
Parameter	Site Identification											
	Bancroft	Langley	Bunyip Hole	Yarrol Swan	Mt Perry Bridge	Wuruma	Ceratodus	Pearlinga	Dykehead	Reinkes	Reids	Bon Accord	Nogo
Temperature		14.3 oC		17.6 oC	15 oC	19.4 oC	14.5 oC	22.8 oC	19 oC	21.1 oC	21.1 oC	22.5 oC	17.6 oC
Elec. Cond.		1572 uS/cm		1338 uS	1169 US/cm	420 uS/cm	1499 uS	2700 uS	1186 uS	933 uS	2740 uS	1114 uS	431 uS/cm
Total Diss Solids		797 ppm		674 ppm	584 ppm	200 ppm	755 ppm	1400 ppm	594 ppm	459 ppm	1420 ppm	552 ppm	206 ppm
Diss. Oxy. ppm		8.21 ppm		7.98 ppm	13.27 ppm	11.97 ppm	9.19 ppm	12.95 ppm	10.35 ppm	9.26 ppm	8.75 ppm	10.7 ppm	10.19 ppm
Diss. Oxy. % sat.		79.9 % sat		83.1 % sat	132 % sat	132 % sat	91.1 % sat	150.3 %sat	110.2 %sat	103.9 %sat	98.7 %sat	123.9% sat	106.9 % sat
pH		7.21 pH		6.99 pH	7.31 pH	8.09 pH	7.11 pH	8.24 pH	7.65 pH	7.64 pH	7.43pH	7.76 pH	7.84 pH
Turbidity		3.8 NTU		4.4 NTU	9 NTU	4.9 NTU	4.2 NTU	14.4 NTU	6.6 NTU	3 NTU	2.7 NTU	5.6 NTU	7.4 NTU
Nitrate nitrogen (N) mg/lt		0.02		0.01	0.02	0.07	0.09	0.06	0.03	0.04	0.1	0.09	0.06
Nitrate (NO3) mg/lt		0.12		0.06	0.08	0.32	0.4	0.26	0.14	0.18	0.44	0.4	0.26
Nitrite nitrogen (N) mg/lt		0		0.001	0	0	0.001	0	0	0	0	0.002	0.001
Nitrite (NO2) mg/lt		0		0	0	0	0	0	0	0	0	0.01	0
Ammonia nitrogen (N) mg/lt		0		0	0.07	0.04	0.03	0	b. range	0.01	0.56	0.04	0
Ammonium (NH4) mg/lt		0		0.02	0.1	0.05	0.03	0	b. range	0	0.67	0.09	0
Phosphate (PO4) mg/lt		1		1	0.85	0.44	0.51	0.04	0.17	0.19	3.5	2.4	0.49
Phosphate (P) mg/lt		0.28		0.33	0.28	0.14	0.17	0.01	0.05	0.06	1.2	0.01	0.17

MONTH OF: OCTOBER 2015												
Parameter	Site Identification											
	Bancroft	Langley	Bunyip	Yarrol Swa	Mt Perry Bridge	Wuruma	Ceratodus	Pearlinga	Dykehead	Reinkes	Reids	Bon Accord	Nogo
Temperature		22.6 oC		25.6 oC	24.6 oC	27.8 oC	24.1 oC	33.6 oC	27 oC	26.5 oC	26.9 oC	25.5 oC	19.0 oC
Elec. Cond.		1447 uS/cm		1531 uS/cm	1335 uS/cm	438 uS/cm	1627 uS/cm	462 uS/cm	1157 uS/cr	660 uS/cm	3030 uS/cm	869 uS/cm	504 uS/cm
Total Diss Solids		725 ppm		770 ppm	680 ppm	208 ppm	821 ppm	220 ppm	574 ppm	320 ppm	1560 ppm	426 ppm	240 ppm
Diss. Oxy. ppm		4.98 ppm		11.62 ppm	8.02 ppm	10.77 ppm	7.52 ppm	5.83 ppm	5.84 ppm	55.2 ppm	9.72 ppm	7.08 ppm	10.16 ppm
Diss. Oxy. % sat.		58.1 % sat		142.2 % sat	96.1 % sat	135.3 % sat	91.5 % sat	82.2 % sat	73.1 % sat	4.15 % sat	122.4 % sat	87.6 % sat	110.4 % sat
pH		7.8 pH		7.85 pH	7.84 pH	8.69 pH	7.32 pH	8.17 pH	7.78 pH	7.13 pH	7.99 pH	7.72 pH	8.12 pH
Turbidity		13.8 NTU		4.5 NTU	2.1 NTU	6.1 NTU	5.2 NTU	60.6 NTU	6.7 NTU	237 NTU	6.1 NTU	37.2 NTU	6.8 NTU
Nitrate nitrogen													
(N) mg/lt		0.09		0.08	0.05	0.08	0.09	0.08	0.11	0.12	0.07	0.13	0.1
Nitrate													
(NO3) mg/lt		0.42		0.38	0.22	0.34	0.4	0.34	0.5	0.56	0.32	0.62	0.46
Nitrite nitrogen													
(N) mg/lt		0		0	0	0	0	0	0	0.004	0.001	0.003	0.011
Nitrite													
(NO2) mg/lt		0		0	0	0	0	0	0	0.01	0	0.01	0.04
Ammonia nitrogen													
(N) mg/lt		0		< b. range	< b. range	0.01	< b. range	< b. range	0.01	0	0.46	0.04	0.11
Ammonium													
(NH4) mg/lt		0		< b. range	< b. range	0.01	< b. range	< b. range	0	0.03	0.57	0.05	0.13
Phosphate													
(PO4) mg/lt		1.1		1.45	> above range	> above rar	> above rar	> above rar	> above ra	> above ran	> above rar	> above rar	2.1
Phosphate													
(P) mg/lt		0.35		0.48	> above range	> above rar	> above rar	> above rar	> above ra	> above ran	> above rar	> above rar	0.7

MONTH OF: December 2015												
Parameter	Site Identification											
	Bancroft	Langley	Bunyip	Yarrol Swar	Mt Perry Bridg	Wuruma	Ceratodus	Pearlinga	Dykehead	Reinkes	Reids	Bon Accord	Nogo
Temperature		26.5 oC		29.5 oC	29.8 oC	31.3 oC	27.9 oC	31 oC	26.8 oC	29.2 oC	27.3 oC	28.8 oC	23.9 oC
Elec. Cond.		682 uS/cm		1531 uS/cm	854 uS/cm	510 uS/cm	1584 uS/cm	1133 uS/cm	547 uS/cm	645 uS/cm	1983 uS/cm	596 uS/cm	506 uS/cm
Total Diss Solids		327 ppm		805 ppm	414 ppm	242 ppm	790 ppm	557 ppm	259 ppm	308 ppm	1003 ppm	284 ppm	239 ppm
Diss. Oxy. ppm		4.23 ppm		9.31 ppm	7.97 ppm	11.01 ppm	6.75 ppm	5.68ppm	5.89 ppm	4.88 ppm	7.91 ppm	6.2 ppm	9.78 ppm
Diss. Oxy. % sat.		53.6 5 sat		121.9 % sat	103.4 % sat	147.7 % sat	88.5 % sat	75.9 % sat	74 % sat	63.4 % sat	101.4 % sat	80.4 % sat	114.8 % sat
pH		7.92 pH		7.73 pH	8.57 pH	9.57 pH	8.12 pH	7.54 pH	7.6 pH	7.36 pH	7.92 pH	7.42 pH	9.04 pH
Turbidity		53.8 NTU		10.9 NTU	4.8 NTU	5.5 NTU	3.8 NTU	72.3 NTU	206 NTU	134.8 NTU	6.3 NTU	73.2 NTU	17 NTU
Nitrate nitrogen (N) mg/lt		0.1		0.08	0.09	0.14	0.09	0	< below r.	0.09	0.07	0.13	0.09
Nitrate (NO3) mg/lt		0.44		0.34	0.42	0.64	0.38	0.02	< b. range	0.4	0.24	0.6	0.38
Nitrite nitrogen (N) mg/lt		0.002		0	0	0.001	0.002	0.001	0.003	0.006	0.002	0.012	0
Nitrite (NO2) mg/lt		0		0	0	0	0.01	0	0.01	0.02	0.01	0.04	0
Ammonia nitrogen (N) mg/lt		< b. range			0.01	< b. range	0	< b. range	< b. range	< below r.			0.02
Ammonium (NH4) mg/lt		< b. range			0.02	< b. range	< b. range	< b. range	< b. range	0			0.04
Phosphate (PO4) mg/lt		> above range		2.1	2.1	2.7	3.9	> above rar	3.5	3.5	2.5	2.6	> above rar
Phosphate (P) mg/lt		> above range		0.7	0.68	0.89	1.28	> above rar	1.2	1.16	0.82	0.85	> above rar

MONTH OF: February 2016												
Parameter	Site Identification											
	Bancroft	Langley	Bunyip Hol	Yarrol Swan	Mt Perry Bri	Wuruma	Ceratodus	Pearlinga	Dykehead	Reinkes	Reids	Bon Accord
Temperature	25 oC	26.1 oC	26.5 oC	26 oC	27.7 oC	29.4 oC	27.7 oC	31.8 oC	28.9 oC	29.4 oC	29.6 oC	30.3 oC
Elec. Cond.	808 uS/cm3	169.7 uS/cn	301 uS/cm3	253.9 uS/cn	281 uS/cm	540 uS/cm3	335 uS/cm3	2243 uS/cr	844 uS/cm	614 uS/cm	1073 uS/c	389 uS/cm3
Total Diss Solids	395 ppm	78.1 ppm	140 ppm	118.7 ppm	132 ppm	260 ppm	158 ppm	1153 ppm	414 ppm	297 ppm	533 ppm	185 ppm
Diss. Oxy. ppm	6.35 ppm	5.58 ppm	4.61 ppm	5.19 ppm	6.45 ppm	6.23 ppm	5.74 ppm	3.05 ppm?	3.1 ppm?	3.97 ppm	4.33 ppm	3.58 ppm
Diss. Oxy. % sat.	69.2 % sat	70.2 % sat	57.1 % sat	64.3 % sat	83.9 % sat	83 % sat	70.7% sat	39.5 % sat	40.1 % sat	52.6 % sat	59.7 % sa	47.1 % sat
pH	7.71 pH	7.34 pH	7.29 pH	7 pH	7.12 pH	8.43 pH	7.39 pH	8.91 pH	8.08 pH	7.26 pH	7.71 pH	7.34 pH
Turbidity	75.6 NTU	410 NTU	75.1 NTU	54.3 NTU	67.5 NTU	2.7 NTU	108 NTU	4.1 NTU	16.3 NTU	70.6 NTU	15.8 NTU	55.1 NTU
Nitrate nitrogen												
(N) mg/lt	0.15	0.01	0.15	0.17	0.24	0.07	0.14	0.12	0.1	0.07	0.2	0.15
Nitrate												
(NO3) mg/lt	0.68	0.04	0.68	0.74	1.04	0.28	0.62	0.58	0.46	0.32	0.86	0.66
Nitrite nitrogen												
(N) mg/lt	0.003	0.006	0.008	0.004	0.003	0	0.006	0	0	0.004	0.004	0.01
Nitrite												
(NO2) mg/lt	0.01	0.01	0.02	0.01	0.01	0	0.02	0	0	0.01	0.01	0.03
Ammonia nitrogen												
(N) mg/lt	0.01	0.05	0.07	0.03	0.04	0.02	0.04	0.01	0	0.01	b. range	0.02
Ammonium												
(NH4) mg/lt	0	0.06	0.09	0.04	0.05	0.02	0.05	0.01	0.01	0	b. range	0.03
Phosphate												
(PO4) mg/lt	0.61	0.89	0.9	0.24	0.34	0	0.45	b. range	0.03	0.39	0.27	0.69
Phosphate												
(P) mg/lt	0.2	0.3	0.3	0.08	0.11	0	0.15	0	0.01	0.14	0.09	0.22

MONTH OF: May 2016													
Parameter	Site Identification												
	Bancroft	Langley	Bunyip Hole	Yarrol Swan	Mt Perry Bridge	Wuruma	Ceratodus	Pearlinga	Dykehead	Reinkes	Reids	Bon Accord	Nogo
Temperature		20.4 oC		23.9 oC	22.6 oC	24.6 oC	24.1 oC	19.1 oC	25.0 oC	24.6 oC	23.4 oC	24.0 oC	19.4 oC
Elec. Cond.		1146 uS/cm		1045 uS/cm	1129 uS/cm	486 uS/cm	1364 uS/cm	2438 uS/cm	951 uS/cm	1030 uS/cm	2395 uS/cm	805 uS/cm	525 uS/cm
Total Diss Solids		570 ppm		517 ppm	561 ppm	232 ppm	664 ppm	1254 ppm	468 ppm	510 ppm	1230 ppm	6.91 ppm	252 ppm
Diss. Oxy. ppm		8.97 ppm		6.26 ppm	7.23 ppm	7.89 ppm	6.68 ppm	5.28 ppm	5.33 ppm	9.37 ppm	7.63 ppm	6.9 ppm	8.97 ppm
Diss. Oxy. % sat.		97.6 % sat		74.9 % sat	83.8 % sat	95.5 % sat	79.6 % sat	57.1 % sat	61.9 % sat	113.9 % sat	90.1 % sat	82.4 % sat	97.6 % sat
pH		7.1 pH		6.94 pH	7.14 pH	7.87 pH	7.05 pH	7.70 pH	7.04 pH	7.49 pH	7.26 pH	7.46 pH	7.42 pH
Turbidity		11.3 NTU		8.10 NTU	3.0 NTU	2.6 NTU	4.6 NTU	65.6 NTU	11.9 NTU	8.9 NTU	4.4 NTU	7.5 NTU	4.5 NTU
Nitrate nitrogen													
(N) mg/lt		0.04		0.02	0.02	0.04	0.06	0.06	0.02	0.03	0.04	0.03	0.24
Nitrate													
(NO3) mg/lt		0.18		0.1	0.06	0.2	0.26	0.26	0.1	0.14	0.18	0.12	1.08
Nitrite nitrogen													
(N) mg/lt		0		0	0	b. range	0.004	0.007	0	0	0	0	0.105
Nitrite													
(NO2) mg/lt		0		0	0	b. range	0.01	0.03	0	0	0	0	0.35
Ammonia nitrogen													
(N) mg/lt		0.62		b. range	0.06	0	0.04	0	0.01	0	0.2	0.01	0.81
Ammonium													
(NH4) mg/lt		0.76		b. range	0.09	0	0.05	0	0	0	0.23	0.01	1.03
Phosphate		0.17		0.13	0.16	0.17	0.43	0.02	0.08	0.07	0.23	0.37	0.61
(PO4) mg/lt		above range		above range	above range	above rang	above rang	above rang	above ran	above rang	above rang	above rang	above rang
Phosphate		0.05		0.04	0.05	0.05	0.14	0.01	0.03	0.02	0.07	0.12	0.19
(P) mg/lt		above range		above range	above range	above rang	above rang	above rang	above ran	above rang	above rang	above rang	above rang

MONTH OF: June 2016												
Parameter	Site Identification											
	Bancroft	Langley	Bunyip	Yarrol Swan	Mt Perry Bridge	Wuruma	Ceratodus	Pearlinga	Dykehead	Reinkes	Reids	Bon Accord	Nogo
Temperature		12.3 oC		16.9 oC	13.5 oC	18.4 oC	14.6 oC	15.6 oC	10.0 oC	18.4 oC	18.8 oC	19.4 oC	15.9 oC
Elec. Cond.		1249 uS/cm		1284 uS/cm	1261 uS/cm	565 uS/cm	1278 uS/cm	3150 uS/cı	931 uS/cm	985 uS/cm	2590 uS/	851 uS/cm	498 uS/cm
Total Diss Solids		623 ppm		638 ppm	628 ppm	271 ppm	635 ppm	1620 ppm	455 ppm	484 ppm	1320 ppr	415 ppm	237 ppm
Diss. Oxy. ppm		10.17 ppm		11.07 ppm	11.77 ppm	10.25 ppm	10.65 ppm	12.12 ppm	15.64 ppm	10.72 ppm	9.27 ppm	10.39 ppm	10.2 ppm
Diss. Oxy. % sat.		95.7 % sat		115 % sat	113.4 % sat	109.9 % sa	104.9 % sat	124.6 % sa	136.8 % sat	114.9 % sa	100.1 % s	113.5 % sat	103.2 % sat
pH		7.85 pH		7.73 pH	7.79 pH	8.15 pH	7.55 pH	8.74 pH	8.32pH	7.49 pH	7.69 pH	8.06 pH	7.97 pH
Turbidity		9.1 NTU		13.2 NTU	3.3 NTU	3.8 NTU	4.7 NTU	13.3 NTU	15.8 NTU	8.3 NTU	2.7 NTU	10.6 NTU	6.6 NTU
Nitrate nitrogen													
(N) mg/lt		0.02		0.02	0.04	0.22	0.07	0.08	0.07	0.02	0.02	0.03	0.23
Nitrate													
(NO3) mg/lt		0.1		0.12	0.16	1	0.32	0.36	0.28	0.12	0.08	0.12	1.04
Nitrite nitrogen													
(N) mg/lt		0		0	0	0.105	0.001	0.008	0	0.003	0	0	0.037
Nitrite													
(NO2) mg/lt		0		0	0	0.35	0	0.02	0	0	0	0	0.12
Ammonia nitrogen													
(N) mg/lt		0.01		0.2	0	0.03	0.02	0.01	b. range	0	0.16	b. range	0
Ammonium													
(NH4) mg/lt		0		0.26	0	0.05	0.02	0	b. range	0	0.21	b. range	0
Phosphate													
(PO4) mg/lt		0.02		0.1	0.03	0.03	0.03	0.03	0.32	0.06	0.1	0.06	0.03
Phosphate													
				0.02	0	0.01	0	0.01	0.09	0.02	0.03	0.01	0.01

MONTH OF: December 2016													
Parameter	Site Identification												
	Bancroft	Langley	Bunyip Hol	Yarrol Swar	Mt Perry Bric	Wuruma	Ceratodus	Pearlinga	Dykehead	Reinkes	Reids	Bon Accor	Nogo
Temperature	27.3 oC	28.8 oC	28.6 oC	30.1 oC	30.8 oC	28.4 oC	24.8 oC	27 oC	31.2 oC	32.7 oC	29 oC	32 oC	20.4 oC
Elec. Cond.	4220 uS/cm	878 uS/cm	964 uS/cm	1066 uS/cm	1025 uS/cm	605 uS/cm	1575 uS	335 uS/cm	1099 uS/cı	855 uS/cm	3180 uS	995 uS/cm	589 uS/cm
Total Diss Solids	2190 ppm	427 ppm	470 ppm	527 ppm	503 ppm	289 ppm	787 ppm	156 ppm	540 ppm	416 ppm	1630 ppm	488 ppm	282 ppm
Diss. Oxy. ppm	6.46 ppm	5.26 ppm	4.31 ppm	5.96 ppm	8.18 ppm	8 ppm	5.12 ppm	2.3 ppm	9.07 ppm	9.29 ppm	8.65 ppm	10.43 ppm	9.36 ppm
Diss. Oxy. % sat.	82.5 % sat	67.7 % sat	55.7 % sat	79.1 % sat	110.2 % sat	102 % sat	62.2 % sat	29.1 % sat	122.9 ppm	129.8 % sat	111.8 % sa	143.8 % sa	103.6 % sat
pH	7.2 pH	7.24 pH	7.81 pH	6.99 pH	7.9 pH	8.71 pH	7.16 pH	6.71 pH	8.58 pH	7.9 pH	7.95 pH	8.37 pH	7.96 pH
Turbidity	8.8 NTU	23.7 NTU	6.3 NTU	5.4 NTU	9.1 NTU	5 NTU	5.6 NTU	70.8 NTU	10.1 NTU	8 NTU	5.4 NTU	11.4 NTU	7 NTU
Nitrate nitrogen													
(N) mg/lt	0.06	0.05	0.04	0.02	0.02	0.07	0.02	0	0.04	0.06	0.04	0.05	0.15
Nitrate													
(NO3) mg/lt	0.26	0.2	0.18	0.12	0.08	0.34	0.08	0	0.2	0.26	0.16	0.22	0.7
Nitrite nitrogen													
(N) mg/lt	0	0	0	0.002	0.002	0.004	0	0	0	0.002	0	0	0.066
Nitrite													
(NO2) mg/lt	0	0	0	0	0	0.01	0	0	0	0	0	0	0.22
Ammonia nitrogen													
(N) mg/lt	below rang	below rang	0	below rang	0	below ran	0	below rang	below ran	0.03	0.21	< below ra	0.41
Ammonium													
(NH4) mg/lt	below rang	0.02	0	below rang	0.02	below ran	below ran	below rang	below ran	0.04	0.28	< below ra	0.53
Phosphate													
(PO4) mg/lt	0	0.23	0.12	0.12	0.1	0.2	0.03	0.1	0	0.14	< below ra	0.01	0.3
Phosphate													
(P) mg/lt	0	0.07	0.04	0.04	0.02	0.07	0.01	0.03	0	0.04	< below ra	0	0.1

MONTH OF: January 2017													
Parameter	Site Identification												
	Bancroft	Langley	Bunyip Hol	Yarrol Swa	Mt Perry B	Wuruma	Ceratodus	Pearlinga	Dykehead	Reinkes	Reids	Bon Accord	Nogo
Temperature		28.7 oC	28.2 oC	28.8 oC	30.7 oC	28.6 oC	27.5 oC	29.8 oC	22.8 oC	30.7 oC	28.6 oC	25 oC	19.9 oC
Elec. Cond.		571 uS/cm	454 uS/cm	1118 uS/c	863 uS/cm	596 uS/cm	1355 uS/cm	867 uS/cm	1241 uS/c	1041 uS/cm	2860 uS/cm	911 uS/cm	588 uS/cm
Total Diss Solids		272 ppm	213 ppm	549 ppm	419 ppm	283 ppm	671 ppm	420 ppm	612 ppm	509 ppm	1460 ppm	444 ppm	280 ppm
Diss. Oxy. ppm		5.55 ppm	4.21 ppm	6.7 ppm	6.85 ppm	7.78 ppm	5.68 ppm	7.97 ppm	1.23 ppm	508 ppm	5.53 ppm	5.65 ppm	9.`13 ppm
Diss. Oxy. % sat.		72.1 % sat	53.7 % sat	87.1 % sat	92.2 % sat	100.8 % sat	72.1 % sat	104.8 % sat	15.6 % sat	112.4 % sat	71.9 % sat	72.4 % sat	101.2 % sat
pH		7.29 pH	7.69 pH	7.09 pH	7.51 pH	8.54 pH	7.43 pH	8.39 pH	7.62 pH	8.12 pH	8.15 pH	7.35 pH	7.92 pH
Turbidity		50.6 NTU	28.7 NTU	4.8 NTU	5.5 NTU	4.6 NTU	6.7 NTU	46.2 NTU	17.8 NTU	6.4 NTU	5.2 NTU	10.3 NTU	7.1 NTU
Nitrate nitrogen													
(N) mg/lt		0.03	0.26	0.15	0.12	0.05	0.06	0.03	0.06	0.05	0.03	0.06	0.15
Nitrate													
(NO3) mg/lt		0.1	1.14	0.68	0.54	0.22	0.26	0.14	0.26	0.22	0.14	0.26	0.7
Nitrite nitrogen													
(N) mg/lt		0	0	0.005	0.006	0.004	0.046	0.002	0	0	0	0	0.042
Nitrite													
(NO2) mg/lt		0	0	0.01	0.02	0.01	0.14	0	0	0	0	0	0.14
Ammonia nitrogen													
(N) mg/lt		0.11	below rang	below ran	0.01	below rang	0.03	below rang	0.16	0	0.35	below rang	0.5
Ammonium													
(NH4) mg/lt		0.13	below rang	below ran	0.01	below rang	0.06	below rang	0.2	0.01	0.44	below rang	0.63
Phosphate													
(PO4) mg/lt		0.31	0.34	0.24	0.17	0.01	0	0.29	0.13	0.09	0.02	0.06	0.38
Phosphate													
(P) mg/lt		0.1	0.11	0.08	0.05	0	0	0.1	0.04	0.03	0	0.02	0.13

MONTH OF: March 2017													
Parameter	Site Identification												
	Bancroft	Langley	Bunyip Hole	Yarrol Swan	Mt Perry Bridge	Wuruma	Ceratodus	Pearlinga	Dykehead	Reinkes	Reids	Bon Accord	Nogo
Temperature		26.6 oC	29.2 oC	31.6 oC	26.3 oC	30.1 oC	25.6 oC	33.1 oC	27.4 oC	28.1 oC	30.7 oC	30.2 oC	21.3 oC
Elec. Cond.		742 uS/cm	484 uS/cm	1218 uS/cm	1253 uS/cm	635 uS/cm	1563 uS/cm	3140 uS/cm	1456 uS/cr	690 uS/cm	2720 uS/cm	1045 uS/cm	609 uS/cm
Total Diss Solids		342 ppm	219 ppm	575 ppm	591 ppm	292 ppm	746 ppm	1550 ppm	693 ppm	316 ppm	1310 ppm	490 ppm	279 ppm
Diss. Oxy. ppm		3.81 ppm	4.11 ppm	5.31 ppm	3.89 ppm	8.19 ppm	2.53 ppm	12.99 ppm	7.29 ppm	5.03 ppm	8.64 ppm	10.54 ppm	8.41 ppm
Diss. Oxy. % sat.		47.3 % sat	53.4 % sat	72.1 % sat	49.1 % sat	111.1 % sat	30.6 % sat	180.4 % sat	91.7 % sat	65.3 % sat	114.3 % sat	139.2 % sat	93.2 % sat
pH		7.73 pH	7.32 pH	7.65 pH	7.52 pH	8.74 pH	7.14 pH	8.55 pH	8.09 pH	7.3 pH	8.21 pH	8.75 pH	8.07 pH
Turbidity		12.8 NTU	2.9 NTU	28.2 NTU	4.6 NTU	5.7 NTU	4 NTU	85.2 NTU	7.3 NTU	93.2 NTU	12.2 NTU	13.2 NTU	10.4 NTU
Nitrate nitrogen (N) mg/lt		0.05	0.13	0.04	> above range	0.37	0.08	0.04	0.05	0.04	0.01	0.004	
Nitrate (NO3) mg/lt		0.22	0.58	0.18	> above range	1.62	0.36	0.18	0.24	0.2	0.02	0.2	
Nitrite nitrogen (N) mg/lt		0	0.001	0.006	0	0	0.003	0.005	0.005	0.004	0.005	0.005	
Nitrite (NO2) mg/lt		0	0	0.02	0	0	0.01	0.01	0.02	0.01	0.02	0.02	
Ammonia nitrogen (N) mg/lt		0	< b. range	< b. range	< b. range	< b. range	< b. range	< b. range	< b. range	0.03	< b. range	< b. range	
Ammonium (NH4) mg/lt		< b. range	< b. range	< b. range	0.03	< b. range	0	< b. range	< b. range	< b. range	< b. range	< b. range	
Phosphate (PO4) mg/lt		0.3	0.06	0.39	0.33	0.06	0.19	0.17	0.04	0	0.1	0.04	
Phosphate (P) mg/lt		0.09	0.01	0.12	0.11	0.02	0.06	0.01	0.01	0	0.03	0.01	

DATE: December 2014												
Parameter	Site Identification											
	Bancroft	Langley	Bunyip Hole	Yarrol Swan	Mt Perry Bridge	Wuruma	Ceratodus	Pearlinga	Dykehead	Reinkes	Reids	Bon Accord
Elec. Cond.												
at 25 oC uS/cm	948	173	202	299	284	603	263	1010	118	586	3220	800
Total Diss Solids												
mg/lt	500	96	113	172	162	307	140	507	68	293	1640	395
pH												
at 22 oC	7.4	7.25	7.49	7.37	7.41	8.25	7.47	7.32	6.9	7.5	8.14	7.61
Turbidity												
NTU	27	306	170	35	30	1	287	83	263	29	7	38
Nitrogen oxides												
(N) mg/lt	0.11	0.18	0.16	0.26	0.25	0.012	0.23	0.009	0.047	0.055	0.006	6.2
Total nitrogen												
(N) mg/lt	1	1.5	1.2	0.81	0.83	0.44	1.5	1.1	1.3	0.86	0.28	1.6
Ammonia nitrogen												
(N) mg/lt	0.022	0.01	0.053	0.016	0.015	0.004	0.031	0.006	0.34	0.025	0.008	0.084
Filterable reactive												
phosphorus(P) mg/lt	0.37	0.16	0.2	0.057	0.057	0.01	0.1	0.055	0.027	0.017	0.011	0.059
Total phosphorus(P) mg/lt												
(P) mg/lt	0.51	0.47	0.41	0.14	0.14	0.038	0.42	0.21	0.27	0.065	0.045	0.16

DATE: February 2015												
Parameter	Site Identification											
	Bancroft	Langley	Bunyip Hole	Yarrol Swan	Mt Perry Bridge	Wuruma	Ceratodus	Pearlinga	Dykehead	Reinkes	Reids	Bon Accord
Elec. Cond.												
at 25 oC uS/cm	2080	606	481	315	368	579	568	742	159	662	909	632
Total Diss Solids												
mg/lt	1150	336	270	180	207	302	310	391	95	359	457	316
pH												
at 22 oC	7.97	7.95	7.96	7.63	7.68	8.65	7.76	7.98	7.28	7.69	7.52	7.61
Turbidity												
NTU	2	11	14	22	25	1	25	29	145	18	293	57
Nitrogen oxides												
(N) mg/lt	0.011	0.063	0.11	0.08	0.88	0.007	0.24	0.006	0.071	0.23	0.2	0.069
Total nitrogen												
(N) mg/lt	0.65	0.48	0.49	0.57	0.54	0.46	0.66	0.41	1	0.71	1.2	0.81
Ammonia nitrogen												
(N) mg/lt	0.004	0.003	0.019	0.025	0.028	0.003	0.027	0.008	0.042	0.013	0.018	0.053
Filterable reactive												
phosphorus(P) mg/lt	0.081	0.05	0.05	0.047	0.047	0.009	0.041	0.05	0.029	0.021	0.079	0.045
Total phosphorus(P) mg/lt												
(P) mg/lt	0.19	0.15	0.13	0.093	0.1	0.042	0.12	0.1	0.14	0.074	0.25	0.13

DATE: February 2016												
Parameter	Site Identification											
	Bancroft	Langley	Bunyip Hole	Yarrol Swan	Mt Perry Brid	Wuruma	Ceratodus	Pearlinga	Dykehead	Reinkes	Reids	Bon Accord
Elec. Cond.												
at 25 oC uS/cm	819	170	304	252	283	542	383	2240	820	616	1050	380
Total Diss Solids												
mg/lt	429	103	173	144	160	265	207	1160	426	324	546	210
pH												
at 22 oC	7.7	7.22	7.54	7.41	7.44	8.42	7.61	8.87	8.07	7.71	8.04	7.72
Turbidity												
NTU	46	266	54	40	46	2	89	4	12	57	11	46
Nitrogen oxides												
(N) mg/lt	0.23	0.045	0.23	0.32	0.4	0.002	0.17	b. range	0.002	0.094	0.2	0.19
Total nitrogen												
(N) mg/lt	0.81	1	1	0.85	0.88	0.51	0.93	0.62	0.54	0.58	0.61	1.1
Ammonia nitrogen												
(N) mg/lt	0.023	0.02	0.063	0.011	0.013	0.003	0.045	0.004	0.002	0.039	0.029	0.052
Filterable reactive												
phosphorus(P) mg/lt	0.12	0.22	0.21	0.04	0.048	0.006	0.13	0.006	0.013	0.027	0.029	0.17
Total phosphorus(P) mg/lt												
(P) mg/lt	0.2	0.45	0.33	0.1	0.1	0.035	0.25	0.031	0.063	0.1	0.08	0.27

DATE: December 2016												
Parameter	Site Identification											
	Bancroft	Langley	Bunyip Hole	Yarrol Swar	Mt Perry Bri	Wuruma	Ceratodus	Pearlinga	Dykehead	Reinkes	Reids	Bon Accord
Elec. Cond.												
at 25 oC uS/cm	4130	853	940	1030	1000	593	1530	325	1090	842	3060	980
Total Diss Solids												
mg/lt	2350	446	492	561	539	308	824	179	560	431	1650	501
pH												
at 22 oC	7.65	7.65	7.85	7.63	7.94	8.5	7.65	6.91	8.61	8.09	8.07	8.4
Turbidity												
NTU	2	4	< 1	< 1	< 1	< 1	2	39	2	2	< 1	2
Nitrogen oxides												
(N) mg/lt	0.004	0.003	0.007	0.007	0.002	0.002	0.074	0.005	0.002	0.013	0.003	0.011
Total nitrogen												
(N) mg/lt	0.45	0.72	0.44	0.2	0.3	0.41	0.23	1.1	0.83	0.54	0.19	0.76
Ammonia nitrogen												
(N) mg/lt	b. range	0.021	0.014	b. range	0.007	0.004	0.009	0.019	0.018	0.056	0.006	0.003
Filterable reactive												
phosphorus(P) mg/lt	0.004	0.044	0.02	0.026	0.02	0.007	0.017	0.027	0.01	0.011	0.008	0.002
Total phosphorus(P) mg/lt												
(P) mg/lt	0.028	0.13	0.051	0.047	0.034	0.012	0.03	0.16	0.042	0.024	0.013	0.033

DATE: January 2017													
Parameter	Site Identification												
	Bancroft	Langley	Bunyip Ho	Yarrol Swa	Mt Perry E	Wuruma	Ceratodus	Pearlinga	Dykehead	Reinkes	Reids	Bon Accor	Nogo
Elec. Cond.													
at 25 oC uS/cm		580	458	1130	865		1370	886	1240	1030	2810	914	597
Total Diss Solids													
mg/lt		305	244	585	457		688	454	637	526	1490	463	309
pH													
at 22 oC		7.72	7.65	7.76	7.93		7.83	7.72	7.53	8.4	7.88	7.84	7.61
Turbidity													
NTU		11	14	< 1	< 1		< 1	7	6	3	2	6	5
Nitrogen oxides													
(N) mg/lt		0.009	0.016	0.01	0.005	0.015	0.007	0.006	0.008	0.012	0.01	0.016	0.13
Total nitrogen													
(N) mg/lt		0.65	0.49	0.17	0.3	0.42	0.38	1.6	2.1	0.51	0.24	0.65	1.2
Ammonia nitrogen													
(N) mg/lt		0.002	0.007	0.005	b. range	0.01	0.014	0.012	0.27	0.008	0.014	0.016	0.62
Filterable reactive													
phosphorus(P) mg/lt		0.055	0.1	0.017	0.017	0.007	0.008	0.032	0.028	0.008	0.013	0.032	0.029
Total phosphorus(P) mg/lt													
(P) mg/lt		0.17	0.16	0.023	0.039	0.013	0.028	0.19	0.079	0.031	0.016	0.074	0.16

CONCLUSIONS

Our main reason for conducting this project was to ensure that there are no lingering effects from the 2013 flood, such as chemical pollution of our waterways.

Testing water quality is an easy way to check on the general health of the landscape in a stream catchment. The measurements we have used, such as pH and nitrates, are typical of similar projects carried out worldwide. Laboratory tests have been for a range of pesticides and herbicides that are in common use in agricultural and urban areas. We have also tested for a range of heavy metals and for nutrients, that give indications of problems such as point sources of pollution from agriculture, industry or urban sewage.

None of the tests carried out by our project, or our collaborators in the Wide Bay Public Health Unit, has found any contaminants at unsafe levels in the streams of the Upper Burnett.

NOGO RIVER

One of the more intriguing results of the project has been water quality measurements taken in the Nogo River, downstream of the Wuruma Dam wall.

When I first visited Wuruma, in company with fellow BCCA member David Rolfe, we were amazed at the number of campers that packed themselves into the main camping area. We also visited the Dam wall and noted an extremely strong smell, just like sewage, in the vicinity.

When I next visited in February, water was being released from the main gate of the Dam. The sewage odour was very pronounced. Out of curiosity, I sampled the water coming out of the Dam and running down the Nogo, about half a kilometre downstream. The physical measurements (temperature, oxygen, salinity, pH and turbidity) were similar to the Dam water, but when I analysed the nitrogen & phosphorus levels, I found they tended to be much higher.

I have continued sampling and analysing the water in the Nogo since then and the nutrient levels are almost always higher that the Dam water levels and often higher than the other sites where I sample.

What is causing this?

I put this question to the project's Reference Panel and have done some research myself. Both nitrogen and phosphorus are naturally-occurring and very important elements in the natural world. Our bodies will not function without them. They are present in our food, in the air we breathe, the water we drink and the soil that grows the plants & animals that we eat.

In very simple terms, nitrogen is absorbed from the atmosphere by plants and stored in their roots. Micro-organisms break the roots down and release the nitrogen back into the air. Phosphorus is present in soil, which grows plants, which are eaten by animals. The animals leave dung & urine, which is broken down by micro-organisms and returned to the soil. These cycles work in water & silt and water plants, as well.

Human activity has seen a dramatic increase in the availability of some forms of nitrogen & phosphorus. We take nitrogen from the air and mine phosphorus from the soil in extremely large quantities and treat them in various ways to make them readily available to boost plant growth. This has allowed us to feed many more people, but the downside comes when trying to dispose of all the excess nutrient which is coming from farm run-off and urban run-off & sewage.

There are no intensive farming industries anywhere near Wuruma Dam, as it is all poor country agriculturally. The Dam is however, very popular with campers as there is no charge to stay. Over the course of a year, there are thousands of visitors, some of whom stay for weeks at a time. There are only two small ablutions blocks, with septic tanks, totally inadequate for the number of visitors and no dump points for caravan or campervan waste tanks. Anecdotal evidence from locals makes clear that it is common practice for visitors to dump their waste in the Dam.

It's quite common for dam releases to have a strong hydrogen-sulphide smell (rotten-egg gas) when anaerobic water stored under relatively high pressure towards the bottom of a dam is suddenly released into the air from a cone-valve or similar device. The water pressure immediately plummets to atmospheric pressure, suddenly releasing hydrogen-sulphide gas stored in the water.

Hydrogen sulphide gas is produced by anaerobic digestion of organic matter by microbes that generate usable energy in low-oxygen environments, by using sulphates to oxidise organic compounds or hydrogen, producing hydrogen sulphide as a waste product. Whether human wastes are a significant factor in producing hydrogen-sulphide gas at Wuruma Dam isn't yet known.

These may be the explanations for the relatively high levels of nitrogen and particularly phosphates that I have found in samples during the months when large releases are being made from the bottom of the Dam. Phosphate particles will filter will be suspended or dissolved in the water or cling to silt particles on the bottom and some of this is released, along with water, when the valves are opened.

Water being released from Wuruma Dam January 2017.

Nogo River February 2014.

POST-FLOOD TRENDS

The 2013 flood in the Burnett Catchment had a major impact on the natural environment. It came at the end of three well-above-average rainfall years (2010, 2011, 2012) when water storages and soil holding were at near capacity. Vegetation large & small was stripped out of streambeds, sand was scoured from some areas and huge drifts deposited in other places. Riverbanks were gouged and slumped. The incredible volume of water, an estimated 16,660 cubic metres each second, flowing from Paradise Dam at the lower end of the Upper Burnett, wreaked terrible destruction to both the man-made and natural environment. Since that time, a large amount of resources have been expended to repair and restore the river and surrounds.

Since the flood, the region has experienced much drier weather, with the 2016-2017 summer, being one of the hottest and driest on record. At the time of writing (March 2017), 87.47% of Queensland is drought-declared, the most ever declared at one time.

Water quality is affected by these changes in weather. Since the flood, generally higher salt concentrations have been recorded in local streams, due to the rise in the underground water table height during the wet years 2010 to 2012 and the flushing of the salts from the soil during rain and flooding.

Vegetation in streambeds has recovered to a fair extent, though it will take time for large trees and shrubs to regrow. Aquatic plants and macroinverterbrates (water bugs) have recovered well. Exotic weeds have had mixed results – parthenium (*Parthenium hysterophorus*) has spread downstream and is developing a strong presence at the Ceratodus site, where it did not appear before the flood. Cats claw vine (*Macfadyena unguis-cati*), which previously grew prolifically in much of the Boyne & Burnett Rivers' streambeds, was ripped out bodily by the flood and is now a much smaller problem.

The human population along the riverside has learnt to be wary and a number of measures have been put in place to deal with future flood emergencies. Miraculously, on-one died as a result of the floods in the Upper Burnett.

There is anecdotal evidence to suggest that much larger floods have occurred in the region in the past and it is likely that it will happen again, one day.

The day the river came to us – the Burnett, normally a mile away, came marching up our driveway – sunset, 27th January 2013.

APPENDIX A FIELD RECORD SHEET SAMPLE

Site ID	Bon Accord	Temperature oC	30.3 oC	Nitrate nitrogen	
				(N) mg/lt	0.15
Date	11th February 2016	Elec. Cond. uS/cm	389 uS/cm3	Nitrate	
				(NO3) mg/lt	0.66
Time	3.00 pm	TDS ppm	185 ppm	Nitrite nitrogen	
				(N) mg/lt	0.01
Stream name	Barambah Creek	Diss. Oxy. ppm	3.58 ppm	Nitrite	
				(NO2) mg/lt	0.03
Stream velocity	medium flow	Diss. Oxy. % sat.	47.1 % sat	Ammonia nitrogen	
				(N) mg/lt	0.02
Colour	brownish	pH	7.34 pH	Ammonium	
				(NH4) mg/lt	0.03
Monitors name	M J Denholm	Turb NTU	55.1 NTU	Phosphate	
				(PO4) mg/lt	0.69
				Phosphate	
				(P) mg/lt	0.22

APPENDIX B LABORATORY REPORT - STANDARD WATER ANALYSIS

Queensland Government

Forensic and Scientific Services
HealthSupport Queensland

CERTIFICATE OF ANALYSIS

CLIENT : (HBCCAC)
Burnett Catchment Care Association
PO Box 43
MUNDUBBERA QLD 4626

ATTN: M Myles

Laboratory Reference : SSP0048900
Client Order No. : MYLES_M
Quote Number : BCCA 140326 el
Date Received : 16-Feb-2016
Laboratory Number : 16NA1051
Batch No : 865-21

Client Reference : **BON12BCCA**
Date Sampled : **11-Feb-2016**
Sample Source : **River**
Sample Point :
Further Information :
Owner : **Marion Denholm**

Submitting Authority : **Burnett Catchment Care Association**
Reason for Analysis :
Water Treatment : **Untreated**
Scheme/Job/Survey :
Sampler :

Method		Units	Result	Guidelines ** Health	Guidelines ** Aesthetic
18320	Conductivity @ 25°C	µs/cm	**380**		
18226	pH	at 21°C	**7.72**		6.5 - 8.5
18209	Total Hardness*	mg $CaCO_3$/L	**91**		200
18209	Temporary Hardness*	mg $CaCO_3$/L	**74**		
18208	Alkalinity*	mg $CaCO_3$/L	**74**		
18209	Residual Alkalinity*	meq/L	**0.0**		
18195	Silica	mg/L	**24**		80
18209	Total Dissolved Ions*	mg/L	**231**		
18209	Total Dissolved Solids*	mg/L	**210**		600
18206	True Colour	Hazen	**133**		15
18212	Turbidity	NTU	**46**		5
18209	pH Sat.* (calc. for $CaCO_3$)		**8.3**		
18209	Saturation Index*		**-0.6**		
18209	Mole Ratio*		**2.5**		
18209	Sodium Absorpt. Ratio*		**1.7**		
18209	Figure of Merit Ratio*		**1.1**		

Method		Units	Result	Guidelines ** Health	Guidelines ** Aesthetic
	CATIONS				
18195	Sodium	mg/L	**37**		180
18195	Potassium	mg/L	**4.1**		
18195	Calcium	mg/L	**17**		
18195	Magnesium	mg/L	**12**		
18209	Hydrogen*	mg/L	**0.0**		
	ANIONS				
18209	Bicarbonate*	mg/L	**90**		
18209	Carbonate*	mg/L	**0.3**		
18209	Hydroxide*	mg/L	**0.0**		
18204	Chloride	mg/L	**65**		250
18204	Fluoride	mg/L	**0.08**	1.5	
18204	Nitrate	mg/L	**0.9**	50	
18204	Sulphate	mg/L	**5.5**	500	250
	OTHER DISSOLVED ELEMENTS				
18195	Iron	mg/L	**0.46**		0.3
18195	Manganese	mg/L	**<0.01**	0.5	0.1
18195	Zinc	mg/L	**0.02**		3
18195	Aluminium	mg/L	**0.65**		0.2
18195	Boron	mg/L	**0.03**	4	
18195	Copper	mg/L	**<0.03**	2	1

Notes: * parameter is derived from calculation.
** Australian Drinking Water Guidelines 2011 (ADWG) Health and Aesthetic Values
'-' not determined

Lab use Only: TE 829.00 TC 3.51 TA 3.45 Imb 0.05 A I/C 0.49

Please note that the concentration of total elements present may be higher than that of dissolved elements stated in this report.
The water does not comply with the Australian Drinking Water Guidelines 2011 for Aluminium, Colour, Iron and Turbidity.
Suitable for irrigation of all crops except tobacco.
Suitable for all stock.
High turbidity and colour could contribute to the elevated metal results in the sample

NATA Accredited Laboratory 41 Accredited for compliance with ISO/IEC 17025.

Daphne Huang
Chemist, Inorganic Chemistry
25-Feb-2016

16NA1051

Enquiries **Daphne Huang**
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AUSTRALIA

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Archerfield QLD 4108
AUSTRALIA

Phone (+61 7) 3274 9111
Fax (+61 7) 3000 9628
Email FSS@health.qld.gov.au

LABORATORY REPORT – NITROGEN AND PHOSPHORUS

Client Reference				PEAR9BCCA	DYK10BCCA	REID11BCCA	BON12BCCA
Sample Type				Water River Untreated	Water River Untreated	Water River Untreated	Water River Untreated
Sampling Time/Date				16:30 10-Feb-2016	17:45 10-Feb-2016	14:30 11-Feb-2016	15:30 11-Feb-2016
Sample Description							
Method	Nutrients	Units	Reporting Limit	16KN356	16KN357	16KN358	16KN359
13796	Ammonia	mg/L as N	0.002	0.004	0.002	0.029	0.052
13799	Filterable Reactive Phosphorus	mg/L as P	0.002	0.006	0.013	0.029	0.17
13798	Nitrogen Oxides	mg/L as N	0.002	< 0.002	0.002	0.20	0.19
13800	Total Phosphorus	mg/L as P	0.003	0.031	0.063	0.080	0.27
13802	Total Nitrogen	mg/L as N	0.02	0.62	0.54	0.61	1.1

16KN348-16KN359

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LABORATORY REPORT – HEAVY METAL

Client Reference					PEAR9BCCA	DYK10BCCA	REID11BCCA	BON12BCCA
Sample Type					Water River Untreated	Water River Untreated	Water River Untreated	Water River Untreated
Sampling Time/Date					16:30 10-Feb-2016	17:45 10-Feb-2016	14:30 11-Feb-2016	15:30 11-Feb-2016
Sample Description								
Method	Herbicides and Other Compounds by SPE	Health Value	Units	Reporting Limit	16KE1600	16KE1601	16KE1602	16KE1603
29937	Acetamiprid		µg/L	0.01	< 0.01	< 0.01	< 0.01	< 0.01
29937	N-Demethyl Acetamiprid		µg/L	0.02	< 0.02	< 0.02	< 0.02	< 0.02
29937	Total Acetamiprid		µg/L	0.03	< 0.03	< 0.03	< 0.03	< 0.03
29937	Ametryn	70	µg/L	0.01	< 0.01	< 0.01	< 0.01	< 0.01
29937	Atrazine	20	µg/L	0.01	< 0.01	< 0.01	< 0.01	**0.04**
29937	Desethyl Atrazine		µg/L	0.01	< 0.01	< 0.01	< 0.01	< 0.01
29937	Desisopropyl Atrazine		µg/L	0.01	< 0.01	< 0.01	< 0.01	< 0.01
29937	Bromacil	400	µg/L	0.01	< 0.01	< 0.01	< 0.01	< 0.01
29937	Clothianidin		µg/L	0.01	< 0.01	< 0.01	< 0.01	< 0.01
29937	3,4-Dichloroaniline		µg/L	0.05	< 0.05	< 0.05	< 0.05	< 0.05
29937	Diuron	20	µg/L	0.01	< 0.01	< 0.01	< 0.01	< 0.01
29937	Total Diuron	20	µg/L	0.10	< 0.10	< 0.10	< 0.10	< 0.10
29937	Fluometuron	70	µg/L	0.01	< 0.01	< 0.01	< 0.01	< 0.01
29937	Hexazinone	400	µg/L	0.01	< 0.01	**0.06**	< 0.01	< 0.01
29937	Imazapic		µg/L	0.01	< 0.01	< 0.01	< 0.01	< 0.01
29937	Imazapic Metabolites		µg/L	0.02	NA	NA	NA	NA
29937	Imazapyr	9000	µg/L	0.01	< 0.01	< 0.01	< 0.01	< 0.01
29937	Imidacloprid		µg/L	0.01	< 0.01	< 0.01	< 0.01	< 0.01
29937	Imidacloprid metabolites		µg/L	0.01	< 0.01	< 0.01	< 0.01	< 0.01
29937	Total Imidacloprid		µg/L	0.03	< 0.03	< 0.03	< 0.03	< 0.03
29937	Methoxyfenozide		µg/L	0.01	< 0.01	< 0.01	< 0.01	< 0.01
29937	Metolachlor	300	µg/L	0.01	< 0.01	< 0.01	< 0.01	**0.11**
29937	Prometryn		µg/L	0.01	< 0.01	< 0.01	< 0.01	< 0.01
29937	Simazine	20	µg/L	0.01	< 0.01	< 0.01	< 0.01	< 0.01
29937	Tebuthiuron		µg/L	0.01	< 0.01	< 0.01	< 0.01	< 0.01
29937	Terbutryn	400	µg/L	0.02	< 0.02	< 0.02	< 0.02	< 0.02
29937	Thiacloprid		µg/L	0.01	< 0.01	< 0.01	< 0.01	< 0.01
29937	Thiamethoxam		µg/L	0.01	< 0.01	< 0.01	< 0.01	< 0.01

16KE1592-16KE1603

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LABORATORY REPORT – PESTICIDES & HERBICIDES

Client Reference					PEAR9BCCA	DYK10BCCA	REID11BCCA	BON12BCCA
Sample Type					Water River Untreated	Water River Untreated	Water River Untreated	Water River Untreated
Sampling Time/Date					16:30 10-Feb-2016	17:45 10-Feb-2016	14:30 11-Feb-2016	15:30 11-Feb-2016
Sample Description								
Method	Herbicides and Other Compounds by SPE	Health Value	Units	Reporting Limit	16KE1600	16KE1601	16KE1602	16KE1603
29937	Acetamiprid		µg/L	0.01	< 0.01	< 0.01	< 0.01	< 0.01
29937	N-Demethyl Acetamiprid		µg/L	0.02	< 0.02	< 0.02	< 0.02	< 0.02
29937	Total Acetamiprid		µg/L	0.03	< 0.03	< 0.03	< 0.03	< 0.03
29937	Ametryn	70	µg/L	0.01	< 0.01	< 0.01	< 0.01	< 0.01
29937	Atrazine	20	µg/L	0.01	< 0.01	< 0.01	< 0.01	**0.04**
29937	Desethyl Atrazine		µg/L	0.01	< 0.01	< 0.01	< 0.01	< 0.01
29937	Desisopropyl Atrazine		µg/L	0.01	< 0.01	< 0.01	< 0.01	< 0.01
29937	Bromacil	400	µg/L	0.01	< 0.01	< 0.01	< 0.01	< 0.01
29937	Clothianidin		µg/L	0.01	< 0.01	< 0.01	< 0.01	< 0.01
29937	3,4-Dichloroaniline		µg/L	0.05	< 0.05	< 0.05	< 0.05	< 0.05
29937	Diuron	20	µg/L	0.01	< 0.01	< 0.01	< 0.01	< 0.01
29937	Total Diuron	20	µg/L	0.10	< 0.10	< 0.10	< 0.10	< 0.10
29937	Fluometuron	70	µg/L	0.01	< 0.01	< 0.01	< 0.01	< 0.01
29937	Hexazinone	400	µg/L	0.01	< 0.01	**0.06**	< 0.01	< 0.01
29937	Imazapic		µg/L	0.01	< 0.01	< 0.01	< 0.01	< 0.01
29937	Imazapic Metabolites		µg/L	0.02	NA	NA	NA	NA
29937	Imazapyr	9000	µg/L	0.01	< 0.01	< 0.01	< 0.01	< 0.01
29937	Imidacloprid		µg/L	0.01	< 0.01	< 0.01	< 0.01	< 0.01
29937	Imidacloprid metabolites		µg/L	0.01	< 0.01	< 0.01	< 0.01	< 0.01
29937	Total Imidacloprid		µg/L	0.03	< 0.03	< 0.03	< 0.03	< 0.03
29937	Methoxyfenozide		µg/L	0.01	< 0.01	< 0.01	< 0.01	< 0.01
29937	Metolachlor	300	µg/L	0.01	< 0.01	< 0.01	< 0.01	**0.11**
29937	Prometryn		µg/L	0.01	< 0.01	< 0.01	< 0.01	< 0.01
29937	Simazine	20	µg/L	0.01	< 0.01	< 0.01	< 0.01	< 0.01
29937	Tebuthiuron		µg/L	0.01	< 0.01	< 0.01	< 0.01	< 0.01
29937	Terbutryn	400	µg/L	0.02	< 0.02	< 0.02	< 0.02	< 0.02
29937	Thiacloprid		µg/L	0.01	< 0.01	< 0.01	< 0.01	< 0.01
29937	Thiamethoxam		µg/L	0.01	< 0.01	< 0.01	< 0.01	< 0.01

16KE1592-16KE1603

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APPENDIX C STREAMBANK ASSESSMENT

LEFT or RIGHT banks described facing downstream.
Use a transect, where possible, not less than 400m in width including both banks and the stream bed.
The 'stream bed' is the normal watercourse which would usually be covered by water. The 'riparian zone' is the next level. The 'transition zone' is the rising bank up to normal landscape level, defined as the 'managed zone'.
Cover means all living vegetation including grasses and forbs.

DATE
14th March 2017

MONITORS NAME
Marion J. Denholm

STREAM NAME
Burnett River

SITE NAME
Yarrol Swan

GPS Easting 0333113 Northing 7236277

WIDTH OF STREAM (water actually present)
10m - stream not flowing, pond only.

WIDTH OF STREAM BED (normal watercourse which is mostly covered by water)
17m

WIDTH OF RIPARIAN ZONE (from stream bed edge to outer edge of first or lower bank)
LEFT 2m RIGHT 20m

WIDTH OF TRANSITION ZONE (buffer area between lower bank edge and intensively used land)
LEFT 40m RIGHT 10m

MANAGED ZONE uses above and beyond the stream)
LEFT grazing RIGHT grazing

STREAM BANK STABILITY over not less than 400m transect)
LEFT Soil stability good.

RIGHT Soil stability poor in transition zone, due to cattle tracks and tree roots on a steep slope, with no groundcover.

NOTES ON STREAMBANK CONDITION
Heavily grazed with much cattle disturbance and a variety of exotic weeds. Some erosion evident on right.

STREAMBANK VEGETATION (over not less than 400m transect)
Canopy cover (higher than 5m) % 10
Canopy cover as natives % 100
Understorey cover (1-5m height) % 40
Understorey cover as natives % 100
Ground cover (less than 1m height) % 50
Ground cover as natives % 5
Cover overhanging or in the streambed % 70
Bare ground % 60

DEBRIS (over not less than 400m transect)
Standing dead trees Two
Fallen logs Many
Leaf litter Very little

COVER VIGOUR, HEALTH AND STRUCTURAL INTACTNESS (over not less than 400m transect)
Canopy (higher than 5m)
Healthy and intact.

Understorey (1-5m in height)
Excellent.

Ground cover (less than 1m in height)
In poor condition, heavily grazed with many weeds.

NOTES ON VEGETATION CONDITION
Larger vegetation generally in fair condition, almost all native plants. Groundcover plants are mostly introduced species, in very dry & poor condition.

GENERAL CONDITION RATING - STREAMBANK CONDITION

Rating		Transition Zone	Riparian Zone	Stream Bed	Erosion	Managed Zone
Excellent	4					
Good	3				3	
Fair	2		2	2		2
Poor	1	1				

TOTAL RATING SCORE (max. 20, min. 5) 10

GENERAL CONDITION RATING - RIPARIAN VEGETATION CONDITION

Rating		Canopy	Under storey	Ground Cover	Leaf Litter	Vigour
Excellent	4	4	4			
Good	3					3
Fair	2					
Poor	1			1	1	

TOTAL RATING SCORE (max. 20, min. 5) 13

LIST OF EXOTIC WEED SPECIES NOTED AT SITE

Common Name	Botanical Name
Blue heliotrope	Heliotropum amplexicaule
Noogoora burr	Xanthium pungens
Spear thistle	Cirsium vulgare
Creeping lantana	Lantana montevidensis

VEGETATION LIST

Common Name	Botanical Name
Bluegum	Eucalyptus teretacornis
Silver-leaved ironbark	Eucalyptus melanophloia
River oak	Casuarina cunninghamiana
Swamp mahogany	Lophostemon suaveolens
Poplar-leaved kurrajong	Brachychiton populneum
Crimson bottlebrush	Callistemon viminalis
Cream ti-tree	Melaleuca bracteata
Beefwood	Grevillea striata
Sida retusa	Sida rhombifolium
Sandpaper fig	Ficus opposita
Couch grass	Cynodon dactylon
Water ribbons	Valisneria nana
Water pepper	Persecaria attenuata
Pond lily	Otellia ovalifolia
Water fern	Azolla pinnata
Water primrose	Ludwigia adscendens
Purple lily	Nymphaea violacea
Hornwort	Caeratophyllum demersum