

# Upper Mary River Catchment & Kenilworth District

## Waterwatch Report

2016 – 2019



Mary River, Booroobin, June 2017

Report prepared by:  
Jess Dean and Brad Wedlock  
MRCCC Catchment Officers, April 2020 version: 2

*This report prepared with the assistance of the Sunshine Coast Council Partnership Program*





## Introduction

Welcome to the 2016 to 2019 edition of the Upper Mary Catchment and Kenilworth District Waterwatch Report. This report presents a summary of volunteer data collected from active Waterwatch sites between July 2016 and June 2019. This report covers the geographical area from the Sunshine Coast hinterland contained within the Mary River Catchment – consisting of the Upper Mary Catchment (containing the Maleny Plateau, Blackall Range, Conondale and Obi Obi districts), to Kenilworth and Belli Park.

Some of the original volunteers of the Upper Mary River Catchment and Kenilworth District Waterwatch networks have now collected over 100 water quality samples from their sites which earn those volunteers a gold medal for their Waterwatching century! Without this committed volunteer effort, we would not have access to the valuable water quality information that we have today.

The start of 2016 was dry and it forgot to rain until June 2016. During November 2016 the Mary River at Moy Pocket ceased to flow. Welcomed rains in December 2016 provided relief from extreme summer temperatures. The average annual rainfall for Kenilworth is 1286.2mm and 1922.3mm for Maleny. For 2016 Kenilworth received 794mm of annual rainfall, which is 492.2mm lower than average. Maleny recorded 1135mm, which is 787.3mm below average.

The start of 2017 was even drier with only 70mm falling in January and 15mm in February at Kenilworth. Maleny received 227.4mm in January and 60mm in February. This dry spell was endured throughout the Mary River Catchment before Cyclone Debbie arrived in late March 2017, causing many areas to receive severe flooding (~350mm for Upper Mary during March). As a result of Cyclone Debbie, the Mary River had risen to 9.536m at Moy Pocket in March and 2.632m in April 2017. Flooding was extensive post Cyclone Debbie, however rainfall was still well below average until October 2017. Overall, 2017 annual rainfall at Kenilworth was 1042mm, 244.2mm below average and Maleny's annual rainfall was 1748mm, 174.3mm below average.

January 2018 was quite dry with only 32mm of rainfall received at Kenilworth and 46mm for Maleny. February, the rains picked up; 272mm was received in Kenilworth and a whopping 413.2mm in Maleny. Spring rains resulted in 247mm in Kenilworth and 538.4mm in Maleny. 2018 December rains were received throughout the Upper Mary with 232mm at Kenilworth and 266mm at Maleny. In total, 2018 annual rainfall at Kenilworth was 1096mm, 190.2mm below average and Maleny's annual rainfall was 1892.0mm, 30.3mm below average.

The start of 2019 was even drier compared to 2016 and 2017 with only 21mm received in January and 88mm in February at Kenilworth, Maleny received 20.6mm in January and 122.4mm in February. Decent rainfall occurred during March and April, 178mm and 122mm at Kenilworth and 390.2mm and 305.4mm at Maleny. The lack of rain throughout the rest of the year resulted in severe drought conditions causing the Mary River to stop flowing upstream of the Kenilworth township and downstream of Moy Pocket during December 2019, which is a very rare occurrence. Fish kills were also observed during this period. Overall, 2019 annual rainfall at Kenilworth was 634mm, 652.2mm below average and Maleny's annual rainfall was 1305.4mm, 616.9mm below average.

The weather patterns experienced between 2016-19 can be likened to the to the pattern of weather conditions reported in the 2013-16 Waterwatch report; with the catchment experiencing a severe summer drought in late 2016/early 2017, broken by a cyclone in autumn 2017 (Cyclone Debbie), dry

conditions early 2018 then welcomed December rains, then a relatively dry 2019 causing the Mary River to cease to flow. Severe summer droughts are unusual for this catchment. Anecdotally these occur every forty to fifty years. However, in the past five years the catchment has experienced two of these summer droughts.

The 2019 Catchment Crawl report (MRCCCC, 2020) reported that four of the seven Upper Mary sites exceeded the *E.coli* guideline for primary contact of 150MPN/100ml (MPN = Most Probable Number of viable cells in 100 mL of sample) . These were the Mary River, Walli Mountain site (MAR148) at 650MPN/100ml, Mary River, Kenilworth (MAR169) at 200MPN/100ml, Mary River, Kenilworth (MAR170) at 770MPN/100ml and Mary River at Moy Pocket (MAR300) at 310MPN/100ml. *E.coli* was generally within guideline maximum levels at most other Catchment Crawl sites during 2019.

In the 2016-19 report, there are seven new Waterwatch sites, with new volunteers having collected valuable data, contributing to the current report. All Waterwatch volunteers are encouraged to continue collecting data and comment on any interesting fauna and flora observations in particular turtles and aquatic plants.

There is now enough long-term data from many sites within these networks to draw some statistically valid conclusions about differences in general physical and chemical characteristics of water quality between a number of sub-catchments in the Upper Mary Catchment and Kenilworth District.

The Upper Mary Catchment report card scores indicate that 18 of the 27 sites have maintained a score of A (A = more than 80% of the time compliant with water quality guidelines) over the past three years. New Waterwatch sites within the Upper Mary and Kenilworth Waterwatch Networks received either an A, B or C score, further data collection is required for all new Waterwatch sites to confirm results. All Mary River Waterwatch sites received an A grade except for the Mary River at Beausangs Lane, Conondale (MAR027, B grade), continuation of data collection at this site will confirm baseline information. Please keep recording any noticeable plant (weeds or new plants) and animal sightings (e.g. turtles) on datasheets. Even if you do not know what these are, please note it down and take photographs if possible. Knowing the presence of new plants and animals at Waterwatch sites assists in understanding overall catchment health and the potential for remedial works (e.g. weed management).



*Mary River, upstream of Pickering Bridge, Moy Pocket, November 2016*



*Mary River, Eastern Mary River Road, Cambron, November 2019*

Waterwatch sites monitored in the Upper Mary River Catchment and Kenilworth District  
Waterwatch Networks

Upper Mary River Catchment Waterwatch Network			
Site Code	Creek Name	Location	Water Type
BOO750	Booloumba Creek	Upstream of campgrounds	Southern Lowland Waters (<150m)
BOO800	Booloumba Creek	Downstream of campgrounds	Southern Lowland Waters (<150m)
BRD250	Bridge Creek	Ananada River School	Southern Upland Acid Waters
FRY050	Fryers Creek South	Maleny	Southern Upland Acid Waters
LOB990	Lobster Creek	Confluence with Booloumba Creek	Southern Lowland Waters (<150m)
LYC700	Little Yabba Creek	Upstream of campground	Southern Lowland Waters (<150m)
LYC800	Little Yabba Creek	Downstream of campground	Southern Lowland Waters (<150m)
LYC990	Little Yabba Creek	Confluence with Mary River	Southern Lowland Waters (<150m)
MAR003	Mary River	Booroobin	Southern Upland Waters (>150m)
MAR020	Mary River	Crystal Waters causeway	Southern Upland Waters (>150m)
MAR027	Mary River	Beausangs Lane, Conondale	Southern Upland Waters (>150m)
MAR099	Mary River	Dalton Bridge, Easton Mary River Rd	Southern Lowland Waters (<150m)
MAR111	Mary River	Watson's pontoon	Southern Lowland Waters (<150m)
OBI090	Obi Obi Creek	Cooperation Park, Maleny	Southern Upland Waters (>150m)
SKE010	Skene Creek	Russell Family Park, Montville	Southern Upland Acid Waters
SKE011	Skene Creek	Russell Family Park, middle of lagoon	Southern Upland Acid Waters
SUB950	Scrub Creek	Kennedy Lane, Crystal Waters	Southern Upland Waters (>150m)

Kenilworth District Waterwatch Network			
Site Code	Creek Name	Location	Water Type
BEL250	Belli Creek	Belli Creek Crossing 2, Belli Park	Southern Lowland Waters (<150m)
BEL800	Belli Creek	Newspaper Hill Road	Southern Lowland Waters (<150m)
BTR400	Tributary of Belli Creek	Belli Creek, Belli Park	Southern Lowland Waters (<150m)
COG450	Coonoongibber Creek	Callemonda Rd, Brooloo	Southern Lowland Waters (<150m)
MAR240	Mary River	Pickering Bridge, Moy Pocket	Southern Lowland Waters (<150m)
MAR290	Mary River	Old Moy Pocket Rd, Moy Pocket	Southern Lowland Waters (<150m)
MAR300	Mary River	Walker Rd, Moy Pocket	Southern Lowland Waters (<150m)
OAK800	Oakey Creek	McGinn Rd, Moy Pocket	Southern Lowland Waters (<150m)
OBI940	Obi Obi Creek	Houston Bridge, Coolabine	Southern Lowland Waters (<150m)
WAL195	Walli Creek	End of Walli Creek Rd	Southern Lowland Waters (<150m)

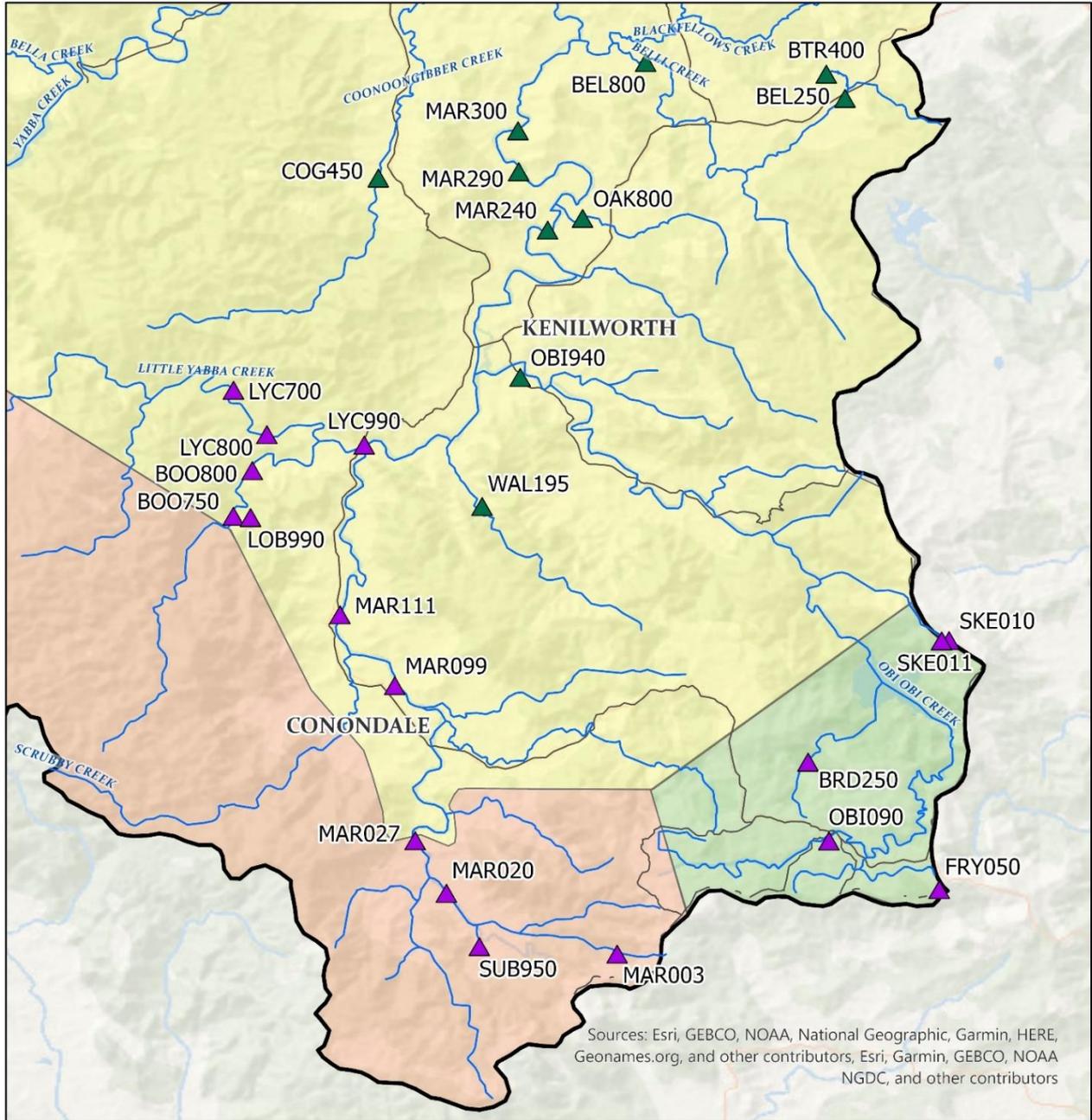
## Volunteers

The MRCCC extends our thanks to the dedicated Waterwatch volunteers past and present for their continued effort, assistance and involvement in the Waterwatch network during 2016 – 2019. Contributors to this report are: Bronwyn McAdam from Queensland Parks and Wildlife Service (QPWS), Taleeta Laird (QPWS), Dominic Tyrrell (QPWS), Matt Bateman, Robin and Norman Dobson, Sven and Debbie Fellius, Peter Watson, Eric Anderson, Roger Westcott, Carsten Villesen, Kathleen and Steve Dennis, Colleen Ryan, Des King, Ian Mackay, Mary Ann and Don Law, Graeme White and Miriam English. Thank you to Caitlin Mill, the team at Gympie Veterinary Services, David Lade from Sauers Produce & Garden Centre Gympie and Tony Gordon from Sauers Produce & Garden Centre Cooroy for transporting the Waterwatch kit and hosting pick up points. Thanks to Mapleton Reality, Barung Landcare and the Conondale Store for hosting pick up points for the Waterwatch kit.



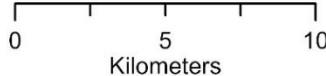
Some of the dedicated Waterwatchers: 1/ Mary Ann and Don Law, 2/ Sven and Debbie Fellius, 3/ Mary and Kerry Bowe, 4/ Graeme White and Miriam English, 5/ Peter Watson and 6/Robin Dobson

# Upper Mary Catchment and Kenilworth Waterwatch Network site locations



- ▲ Kenilworth sites
- ▲ Upper Mary sites
- Maleny Plateau Waters >150m
- Upper Catchment Waters >150m
- Lowland Waters <150m
- Watercourse
- Major Roads
- ▭ Mary River Catchment

Scale: 1:224,116



Geographic Coordinate System:  
GCS\_GDA\_1994

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Map produced by Jess Dean  
8th of April 2020



## Monitoring Methods

Sites monitored by the network volunteers are visited monthly. The volunteers use a TPS WP-81 to measure the temperature, pH and electrical conductivity of the water, a TPS WP-82 to measure dissolved oxygen, and a turbidity tube to measure turbidity. Volunteers are trained to follow the techniques outlined in the Mary River Catchment Coordinating Committee's (MRCCC) Quality Assurance Manual. The network coordinator verifies all data before the data is entered into the Waterwatch database. Each equipment kit is maintained and calibrated monthly by MRCCC staff with regular shadow testing against other equipment.

The Mary River Catchment comprises of eleven sub-catchments that are unique in terms of geology, flow regime and land use. It is therefore expected that the water in a sub-catchment would have its own unique baseline levels of the various parameters measured by Waterwatch. Some differences between sub-catchments in the Mary Catchment are recognized in the water quality guidelines scheduled in the Environment Protection Policy (Water) for the Mary Basin, under the Environment Protection Act.

Data from Waterwatch sites in the Upper Mary Waterwatch network are compared against the Mary Basin freshwater guidelines for all sites below 150m elevation, the Upland freshwater guidelines for all sites above 150m elevation and the Southern Upland Acid Waters above 150m elevation. These three sets of water quality guidelines are listed below. A specific set of pH guideline values for the eastern tributaries of the Mary, which drain the Maleny/Mapleton plateau, have been developed due to long term data displaying significant difference in the pH values compared to the other Upper Mary Waterwatch sites. All Waterwatch sites in the Kenilworth District network are compared against the Southern Lowland Waters below 150m elevation freshwater guidelines.

<b>Water Quality Guideline Values</b>	
Values obtained from Mary River Environmental Values and Water Quality Objectives (DERM, 2010) and the MRCCC's long-term Waterwatch datasets	
<b>Maleny Plateau (Southern Upland Acid Waters)</b> Upland (>150m) freshwaters draining acid red soils of the <b>Maleny/Mapleton plateau</b>	Electrical Conductivity 0 – 580 $\mu$ S/cm pH 6.0 – 8.0 Dissolved Oxygen 90 – 110 % saturation Turbidity 0 – 25 NTU Summer Temperature 18 – 28 °C Winter Temperature 13 – 21 °C
<b>Upper Catchment (Southern Upland Waters)</b> Upland (>150m) freshwaters in the main trunk of the Mary River and all tributaries which drain into the <b>Mary River upstream of Conondale</b> except for Southern Upland Acid Waters.	Electrical Conductivity 0 – 580 $\mu$ S/cm pH 6.5 – 8.2 Dissolved Oxygen 90 – 110 % saturation Turbidity 0 – 25 NTU Summer Temperature 18 – 28 °C Winter Temperature 13 – 21 °C
<b>Lowland Waters (Southern Lowland Waters)</b> Lowland (<150m) freshwaters in the main trunk of the Mary River and all tributaries which <b>drain into the Mary River downstream of Conondale</b>	Electrical Conductivity 0 – 580 $\mu$ S/cm pH 6.5 – 8.0 Dissolved Oxygen 85 – 110 % saturation Turbidity 0 – 50 NTU Summer Temperature 18 – 28 °C Winter Temperature 13 – 21 °C

## Upper Mary Catchment and Kenilworth District Waterwatch Results

Results – inter-site comparisons

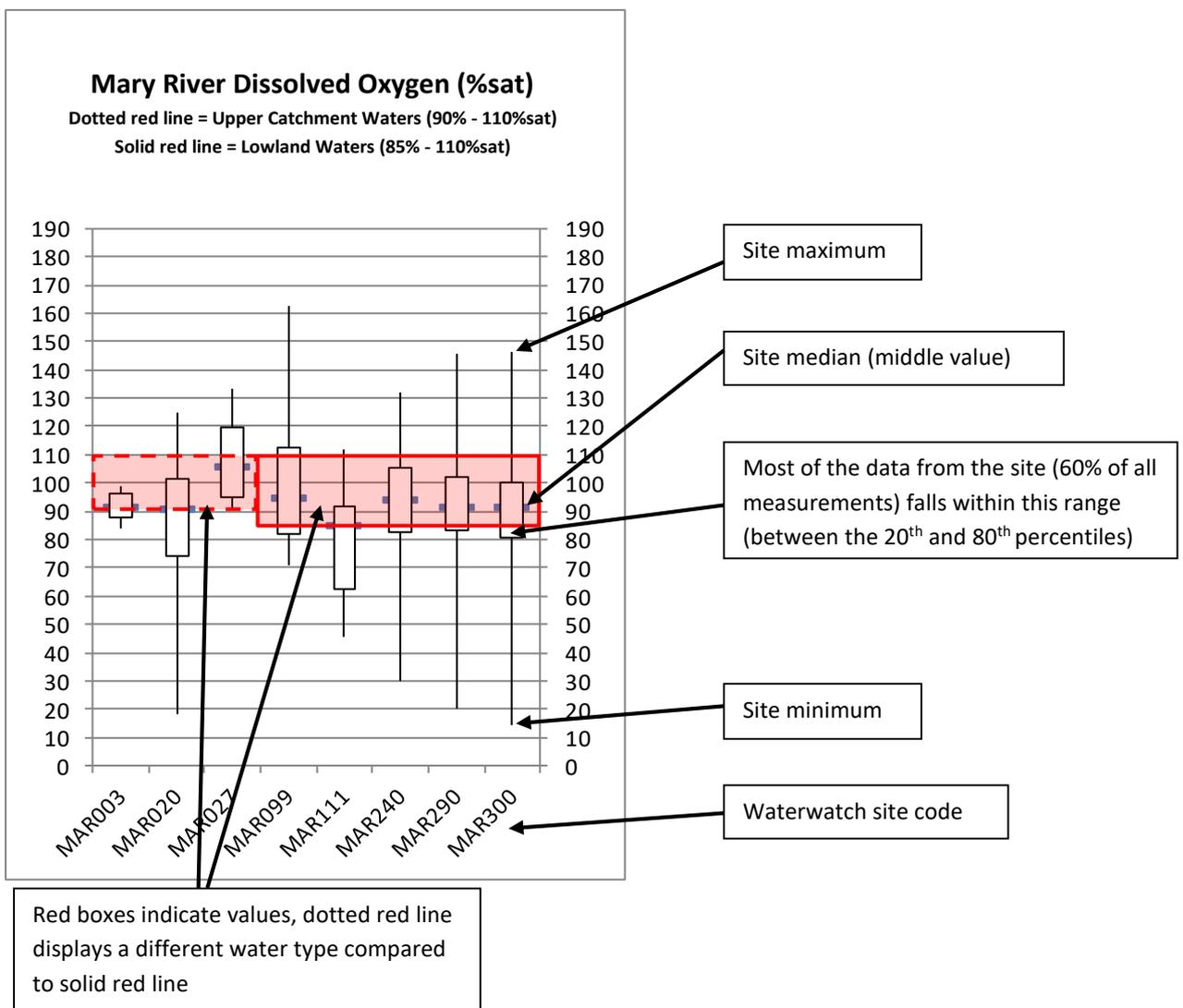
Within each Waterwatch network, the spread of pH, electrical conductivity and dissolved oxygen values are compared across all the sites. These inter-site comparisons use a modified box and whisker graph to look at the spread of values recorded for each parameter at each site.

Below is an example of how to read the inter-site comparison graphs.

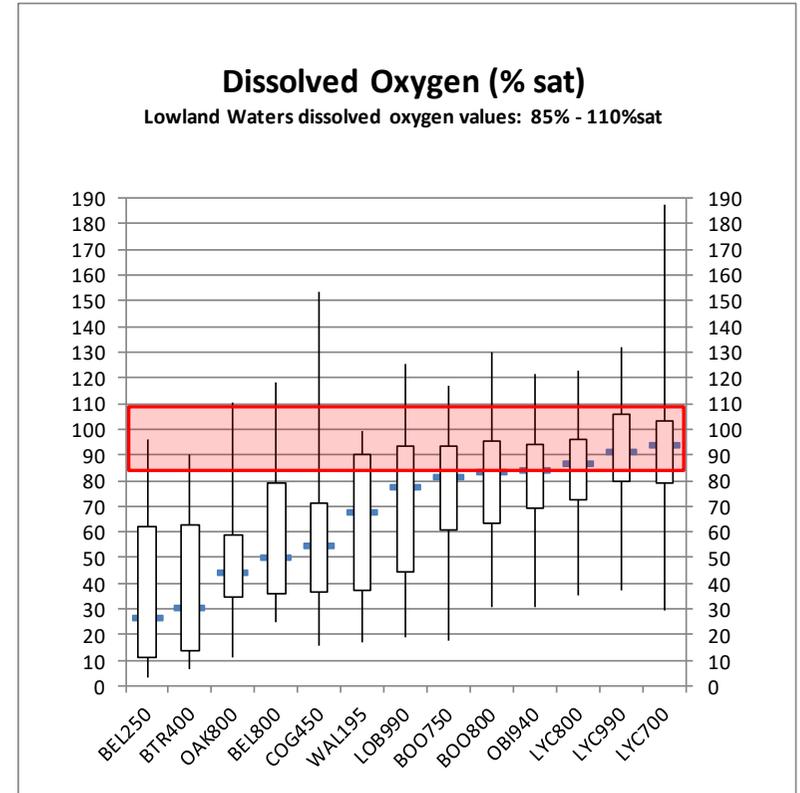
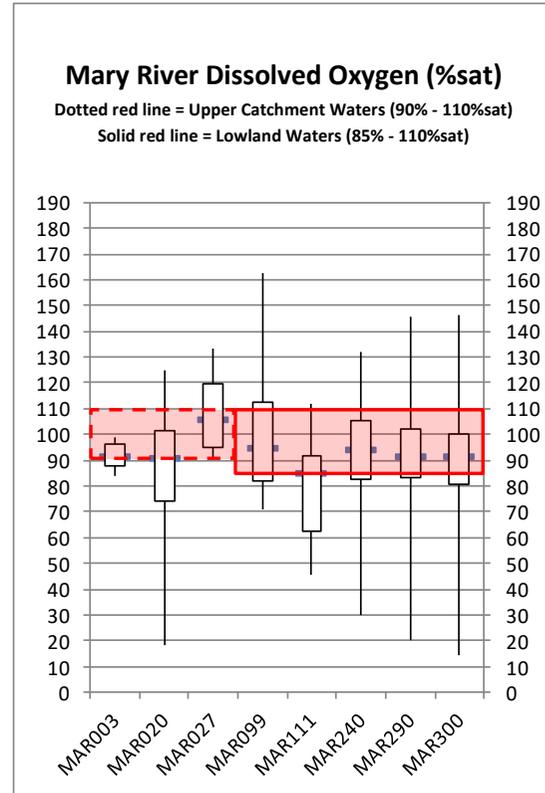
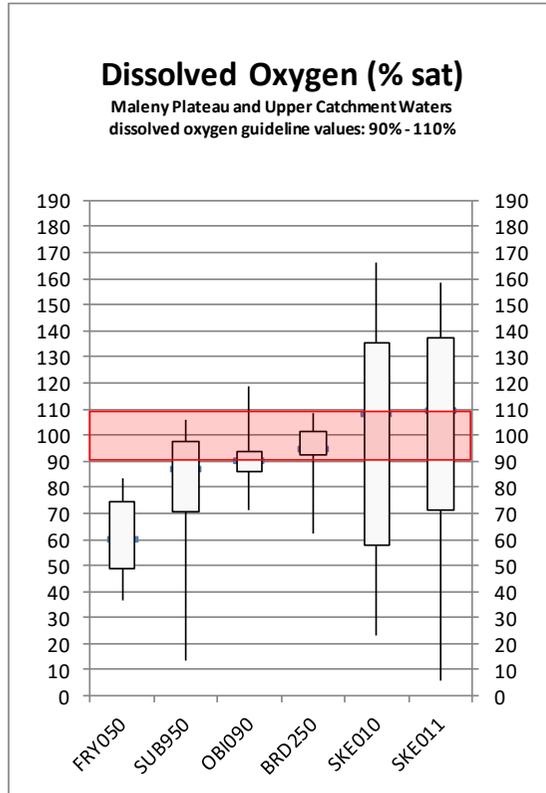
For each site on the graph:

- The vertical line (whiskers) shows the range between the maximum and minimum values recorded at the site.
- The vertical boxes show the range between the 20<sup>th</sup> and 80<sup>th</sup> percentiles at each site.
- The horizontal bars show the median value 50<sup>th</sup> percentile for each site.

The comparison is useful for identifying sites that are unusually variable or have generally higher or lower values than other sites in the network.



Long-term inter-site comparison of dissolved oxygen levels (all data collected) in the Upper Mary Catchment and Kenilworth District Waterwatch Networks



## Long-term inter-site comparison of dissolved oxygen levels (all data collected) in the Upper Mary Catchment and Kenilworth District Waterwatch Networks

- These graphs illustrate not only the last three years worth of data, but all of the long-term data collected from each site since data collection commenced (start dates vary between sites). The red rectangle represents the scheduled dissolved oxygen guideline level. Southern Upland Acid Waters and Southern Upland Waters dissolved oxygen guideline values are: 90% - 100%. Southern Lowland Waters dissolved oxygen guideline values are: 85% - 110% (Dissolved Oxygen should be between these levels to meet guideline values).
- Dissolved oxygen levels can change remarkably over the course of a day. In disturbed waterways with high nutrient and light levels, dissolved oxygen can vary over a wide range eg. 30% to 150%. In undisturbed waterways the oxygen levels are generally maintained within a smaller range between 80 to 110% oxygen saturation.
- These results are similar to the observations observed during the 2013 – 2016 report.

### Maleny Plateau and Upper Catchments Dissolved Oxygen results

- Both Skene Creek sites (SKE010 and SKE011) located in Russell park lagoons, Mapleton, demonstrate extremely high levels of dissolved oxygen variation with levels fluctuating between 10% to 160% saturation. Both median values for Skene Creek sites are just within the upper limit guideline values however, this may not be a true representation of normal dissolved oxygen levels in this creek. High levels of aquatic weed growth in sunny open conditions will produce high levels of oxygen in the afternoon.
- Fryers Creek (FRY050) upstream of Mary Cairncross Rainforest reserve and Scrub Creek (SUB950) near Crystal Waters, Conondale median values are below guideline values with SUB950 getting as low as 15% saturation during no flow periods.
- At a majority of these sites the median levels tend to sit at the lower end of the scheduled dissolved oxygen guidelines, even in relatively undisturbed areas. In most cases, this is likely to be due to the ephemeral (temporary stream that only flows for a brief period of time) nature of the creeks, and high inputs of organic matter from vegetation. As a whole, the waterways in the Upper Mary, while still ephemeral, comply better than other tributaries throughout the Mary River catchment.

### Mary River Dissolved Oxygen results

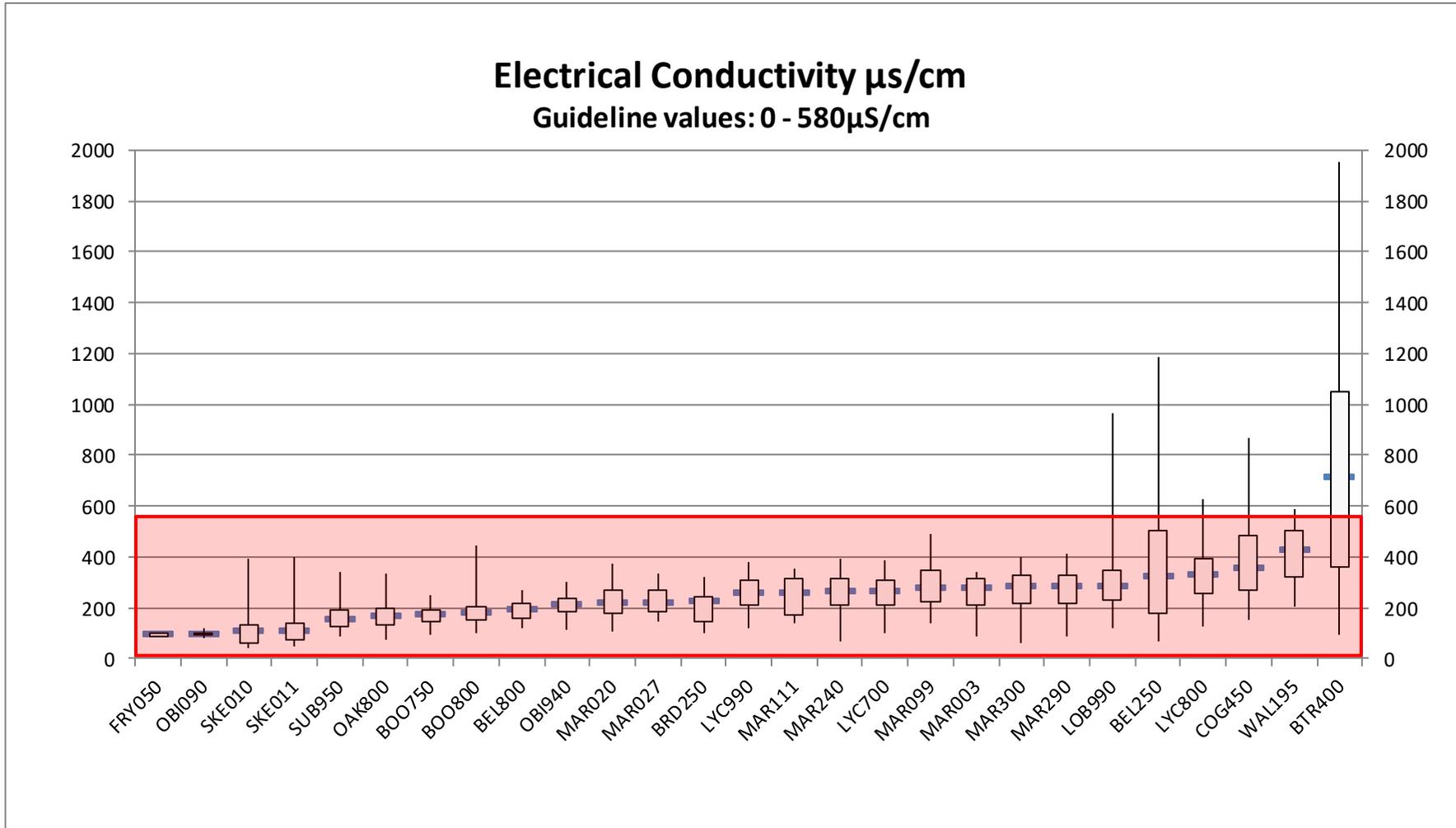
- All upper catchment Mary River sites (MAR020 Crystal Waters, MAR003 Booroobin and MAR027 downstream of Crystal Waters) median values are within guideline values with some variation, due to consistent stream flows.
- Mary River sites are consistently within the dissolved oxygen water quality guidelines with less overall variation for dissolved oxygen, however Mary River sites can still experience extreme fluctuations in dissolved oxygen levels (eg MAR290 and MAR300) Walker Rd, Moy Pocket. MAR290 and MAR300 are approximately 60% of the time compliant with guideline values.

### Lowland Waters Dissolved Oxygen results

- Obi Obi Creek (OBI090) Maleny median value is compliant with the lower end of of the guideline values. More data is required at this site to confirm dissolved oxygen trends.

- Lobster (LOB990) and Booloumba (BOO750 and BOO800) Conondale National Park sites sit just below guideline values this is due to low to no flows.
- Little Yabba Creek sites (LYC700 upstream of Charlie Moreland campground and LYC800 downstream of Charlie Moreland campground) Conondale National Park sites are within guidelines values however, LYC700 can vary from 30% to almost 190% saturation. These sites are only compliant half the time with the guideline values.
- The more ephemeral creeks, with high carbon inputs from leaf litter (eg. Belli, Oakey, Walli, Coonoon Gibber creeks) have generally lower dissolved oxygen levels, accompanied by much more variability in oxygen level.

Long-term inter-site comparison of electrical conductivity (salinity)  
in the Upper Mary Catchment and Kenilworth District Waterwatch Networks



## Long-term inter-site comparison of electrical conductivity (salinity) in the Upper Mary Catchment and Kenilworth District Waterwatch Networks

- This graph illustrates all the long-term data collected from each site, not just recent data. The red line represents the electrical conductivity guideline values of 0 - 580 $\mu$ S/cm. Electrical conductivity (salinity) should be between these levels to meet guideline values. There is no scheduled electrical conductivity guideline difference between upland acid, upland and lowland sites.
- This graph reflects the variation in conditions experienced at these sites over the time the data has been collected. Some of these sites have a long history of data, including a long period of drought and low flows.

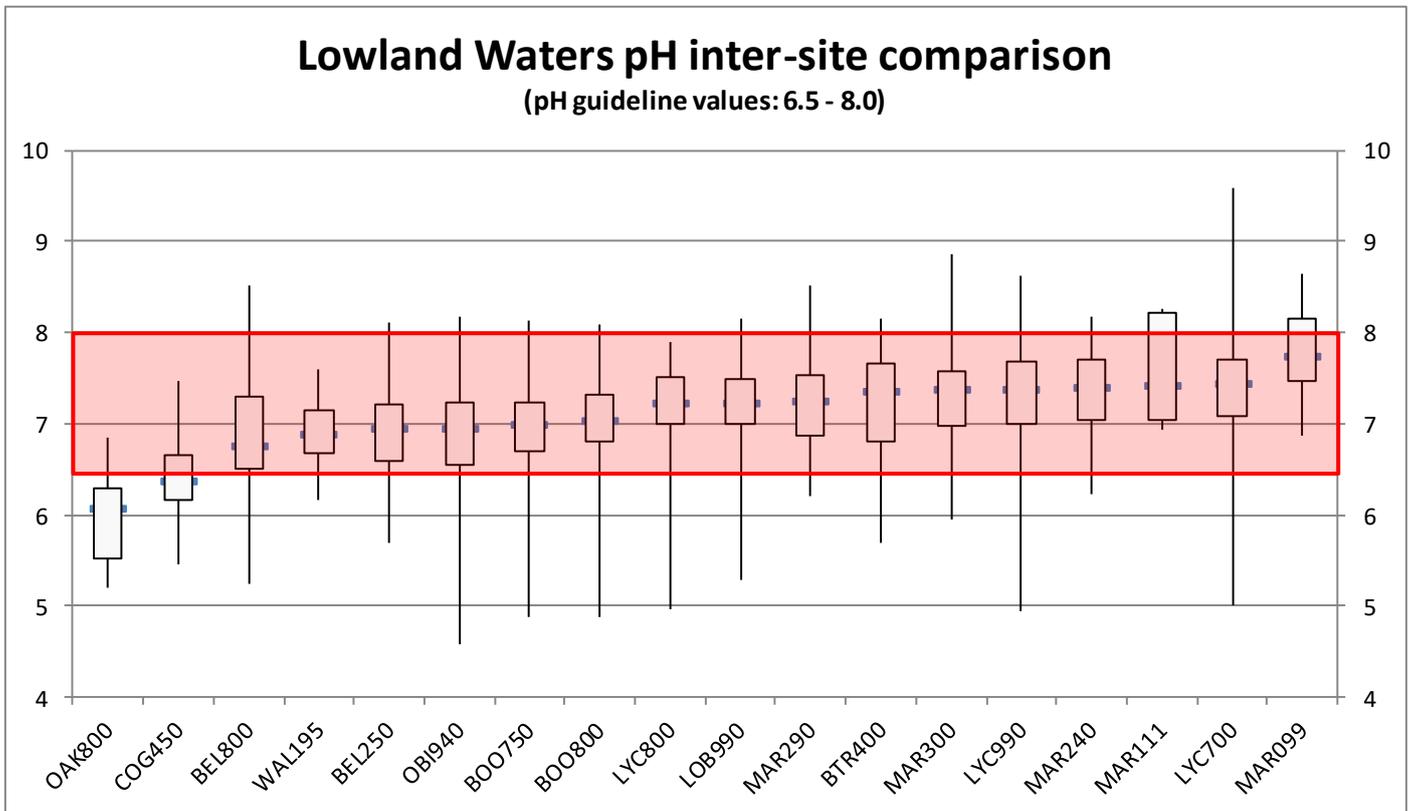
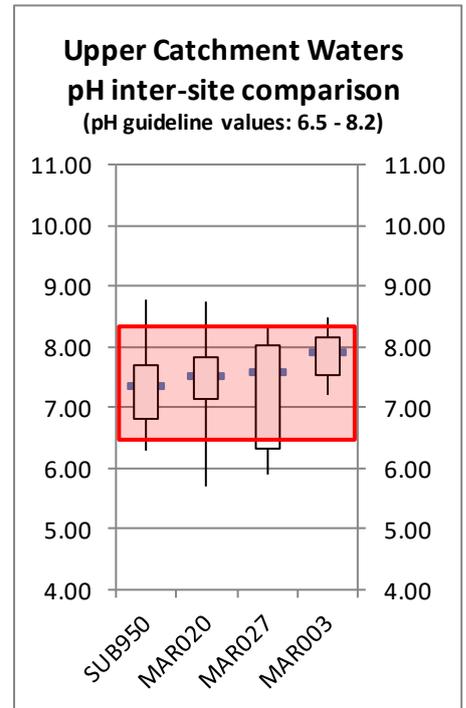
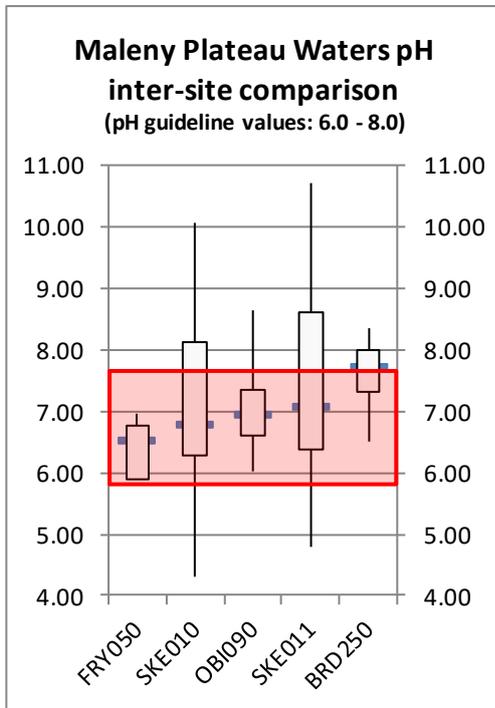
### Upper Mary Catchment Waterwatch Network Electrical Conductivity (salinity) results

- The site in Little Yabba Creek (LYC800) downstream of Charlie Moreland campground appears to have slightly higher overall levels of electrical conductivity than the upstream site (LYC700) and the downstream Little Yabba Creek site (LYC990). It is recommended that a catchment crawl of tributaries surrounding the LYC800 site should occur to determine whether they are discharging water with high salinity.
- Lobster Creek (LOB990) median value is within guidelines. However, it can reach almost 1000 $\mu$ S/cm.

### Kenilworth District Waterwatch Network Electrical Conductivity (salinity) results

- Waterways throughout this network generally show low levels of electrical conductivity. However some sites record relatively high values of electrical conductivity during low flow periods, indicating a contribution from a saline baseflow (Wali, Belli and Coonoongibber Creeks).
- The tributary on Browns Rd, Belli Park (BTR400) has high variation for electrical conductivity ranging from approximately 100 to almost 2000 $\mu$ S/cm. This result could be a natural occurrence influenced by the underlying geology. This may contribute to higher salinity records for BEL250 at Belli Creek Crossing No.2 compared to BEL800 (downstream site) located at Newspaper Hill Rd.

Long-term inter-site comparison of pH  
in the Upper Mary Catchment and Kenilworth District Waterwatch Networks



## Long-term inter-site comparison of pH in the Upper Mary Catchment and Kenilworth District Waterwatch Networks

- These graphs illustrate all the long-term data collected from each site, not just the last year's data. The red rectangle represents the pH guideline levels (pH should be between these levels to meet guideline values).

### Upper Mary Catchment Waterwatch Network pH results

- The low pH of the Skene Creek (SKE010 and SKE011) and Fryers Creek (FRY050) sites is likely to be the result of underlying geology which has an acidic background due to its recent volcanic nature. It is consistent with current and previous Waterwatch data from the Maleny plateau. Local pH guidelines have been developed for creeks draining the deep red soils of the Maleny/Mapleton plateau (southern upland acid waters >150m).
- Skene Creek lagoon sites (SKE010 and SKE011) at Russell Family Park, Mapleton, can exhibit high pH readings when taken late afternoon. This is expected in an open and still waterbody such as a lagoon.
- Bridge Creek (BRD250) median value is in the upper limits of the guideline values. More data is required to confirm this trend.

### Kenilworth District Waterwatch Network pH results

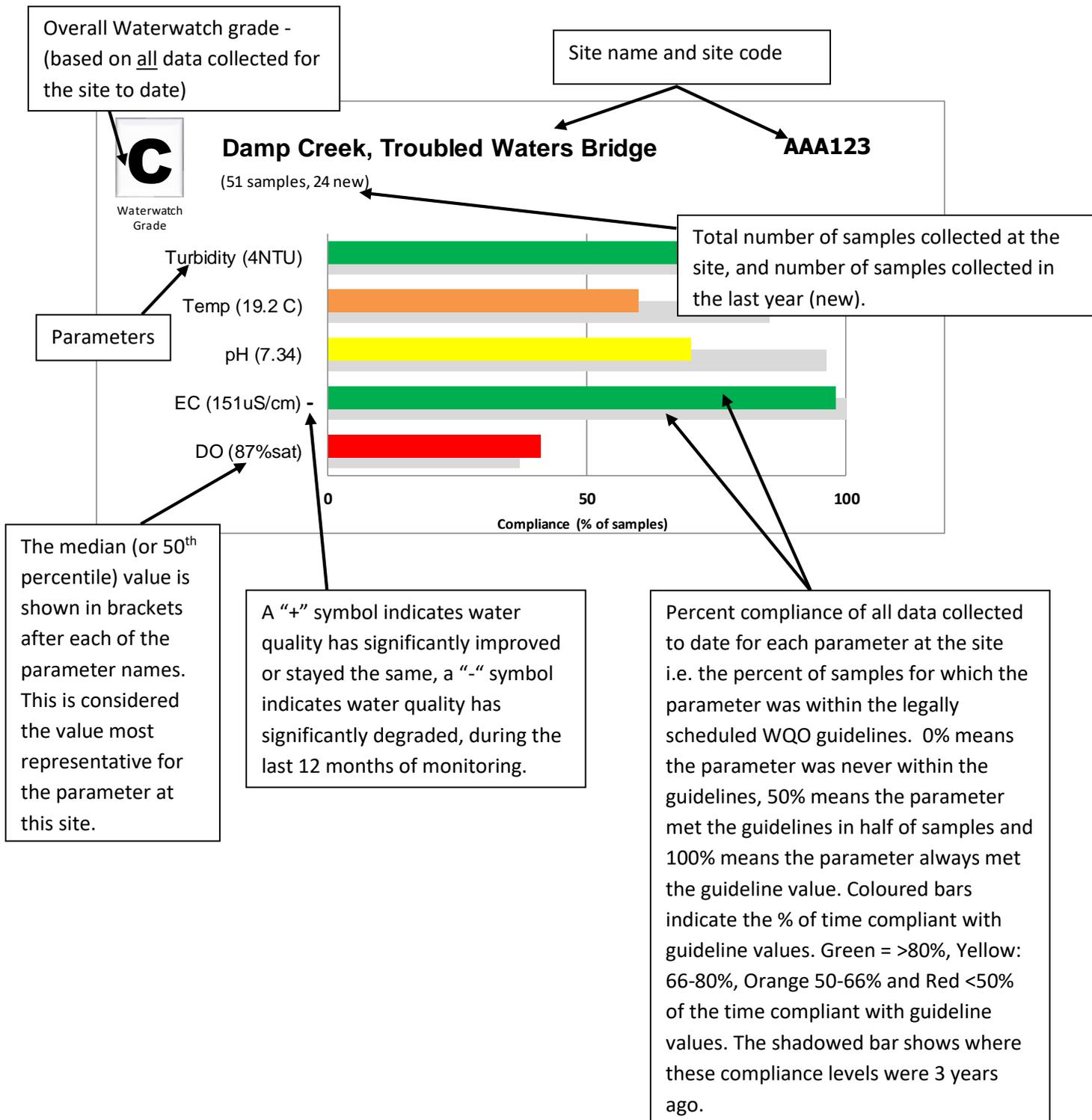
- The Mary River sites all show generally good compliance with pH guidelines.
- The eastern tributaries which drain the Mapleton plateau (eg. Oakey Creek OAK800) have a consistent acidic character, which may be a natural consequence of the source geology.
- Coonoongibber Creek (COG450) is just below guideline values tending to be more acidic.
- High variability in pH in Little Yabba Creek sites (LYC700, LYC800 and LYC990), could indicate eutrophication (excess nitrogen entering the system), causing algae and weed growth.



*Figure 1 Fryers Creek South, June 2017*

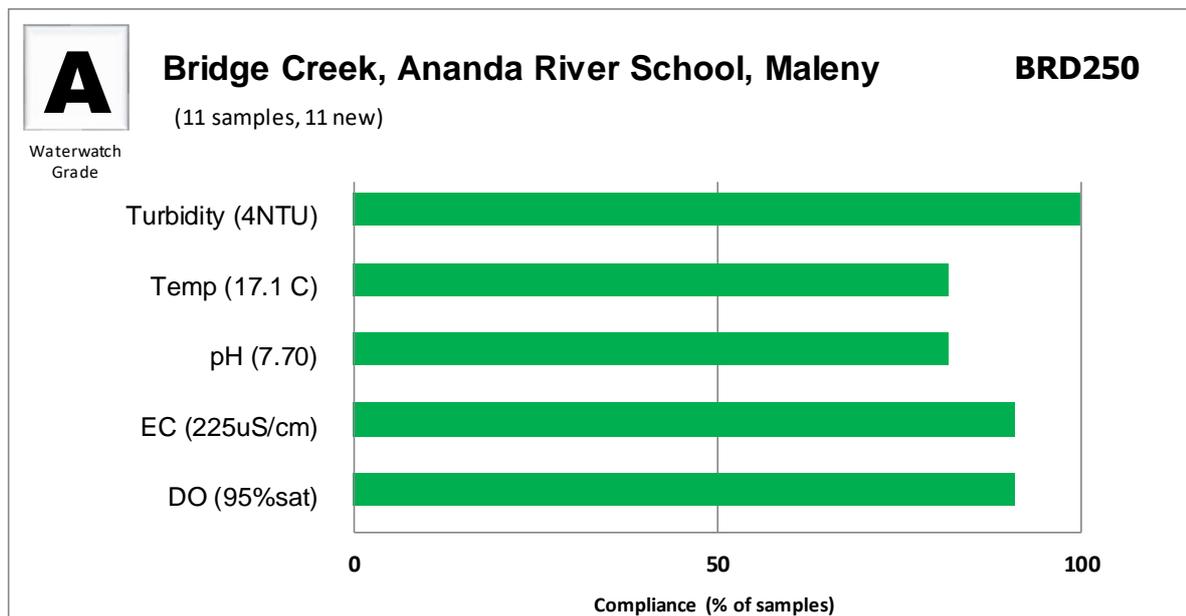
## Results - site report cards

The long-term data from each site is analysed and presented as a graphical report card. These graphs present the long-term median value of each parameter and the level of compliance with the relevant guidelines across all the individual samples from that site. The illustration and descriptions below show where this information can be found on the report cards and how to interpret the graphs.



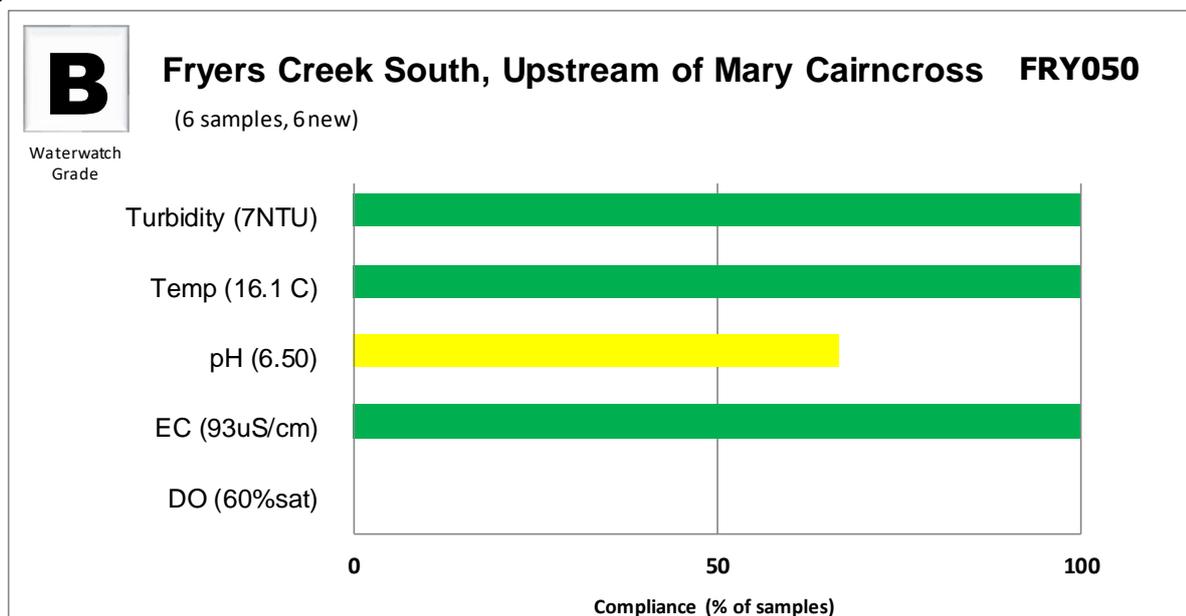
## Maleny Plateau Waters (Southern Upland Acid) sites (>150m)

### Bridge Creek



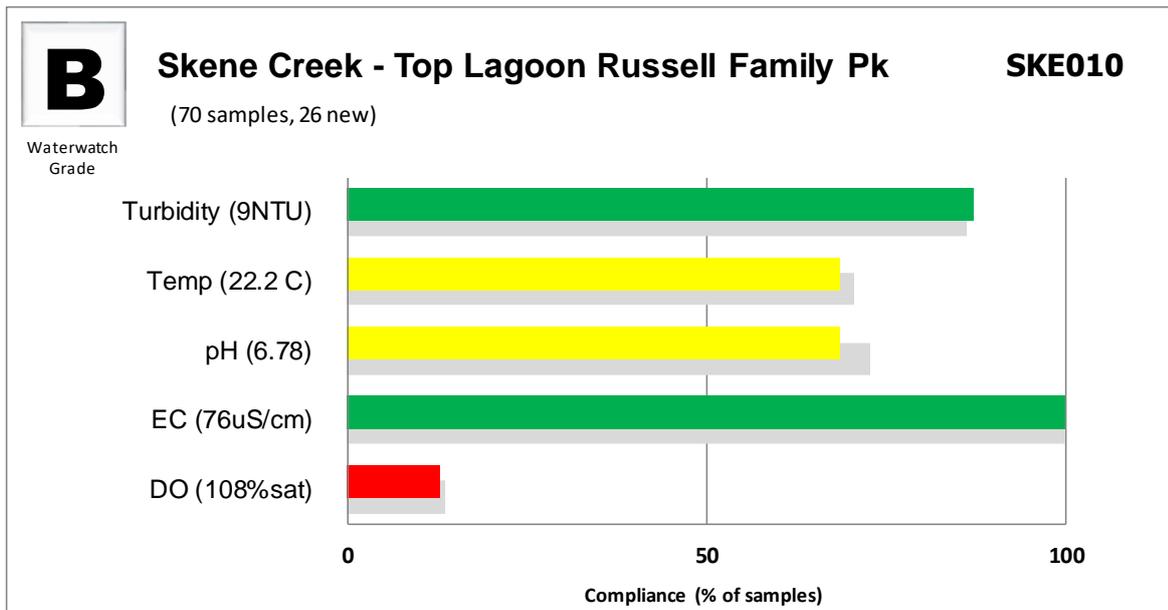
- New site with good water quality results to date.
- Southern Upland Acid Waters.
- Sample size is not yet sufficient to make definitive comments on trends.

### Fryers Creek South

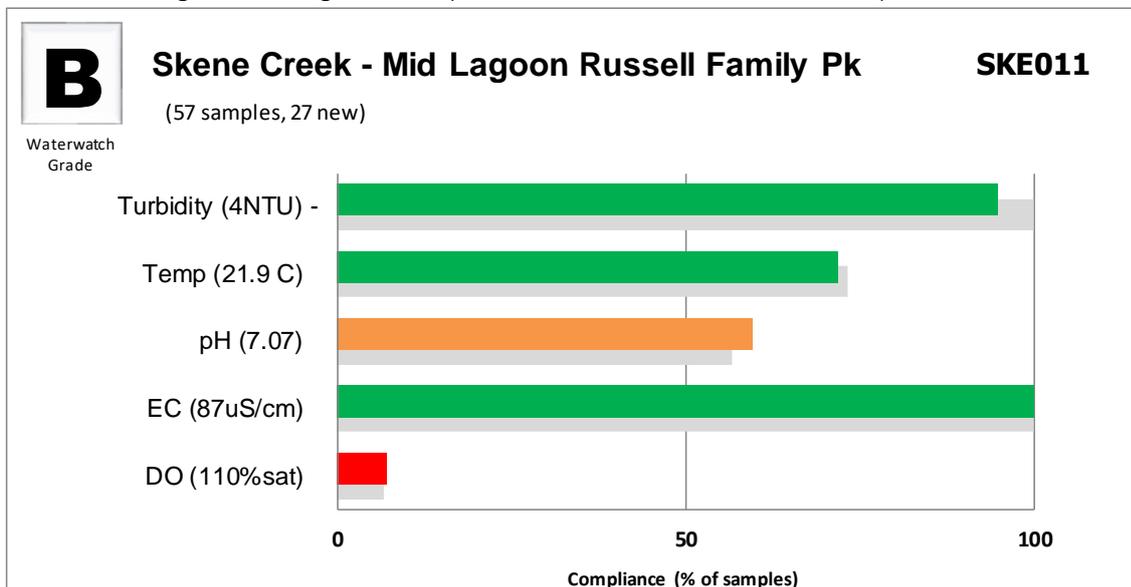


- New site with extremely low electrical conductivity (salinity) levels – good.
- Sample size is not yet sufficient to make definitive comments on trends.

Skene Creek



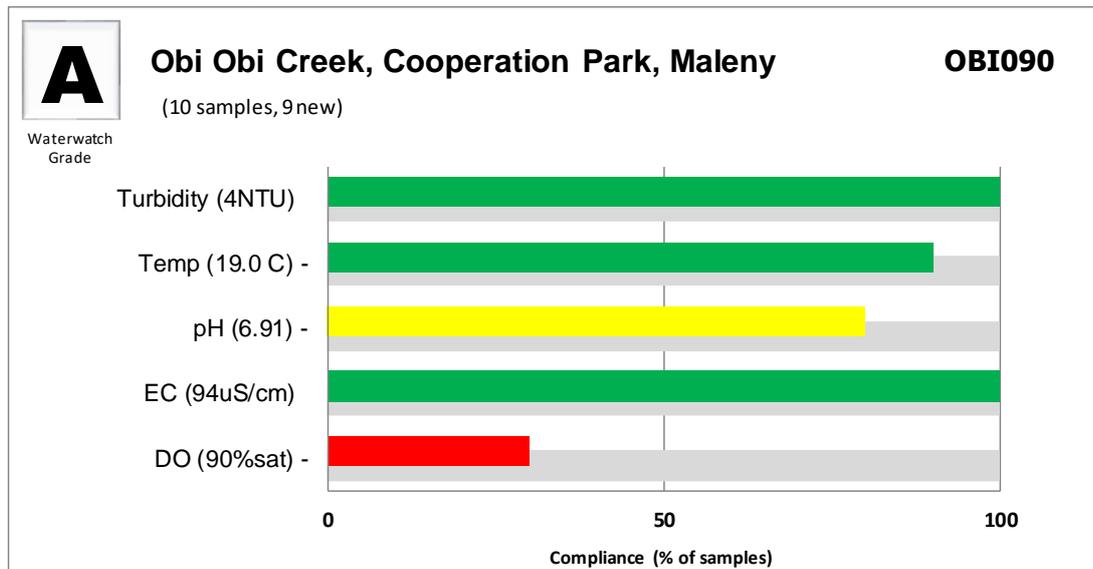
- Good sample size.
- Southern Upland Acid Waters.
- Excellent compliance for electrical conductivity (salinity) guidelines – very low EC readings recorded.
- Low, yet stable temperature and pH compliance.
- The median dissolved oxygen value (108%sat) makes this site appear well oxygenated however, dissolved oxygen levels fluctuate widely, possibly due to stormwater input, high temperatures etc.
- Ongoing monitoring of this site is required.
- Maintaining an overall grade of B (2013 – 2016 Waterwatch Grade = B).



- Good sample size.
- Southern Upland Acid Waters.
- Excellent compliance for electrical conductivity (salinity very low readings recorded at this site).
- Good turbidity although has significantly decreased in compliance.
- The median dissolved oxygen value (110%sat) makes this site appear well oxygenated however, dissolved oxygen levels fluctuate widely, possibly due to stormwater input, high temperatures etc.
- Ongoing monitoring of this site is required.
- Maintaining an overall grade of B (2013 – 2016 Waterwatch Grade = B).

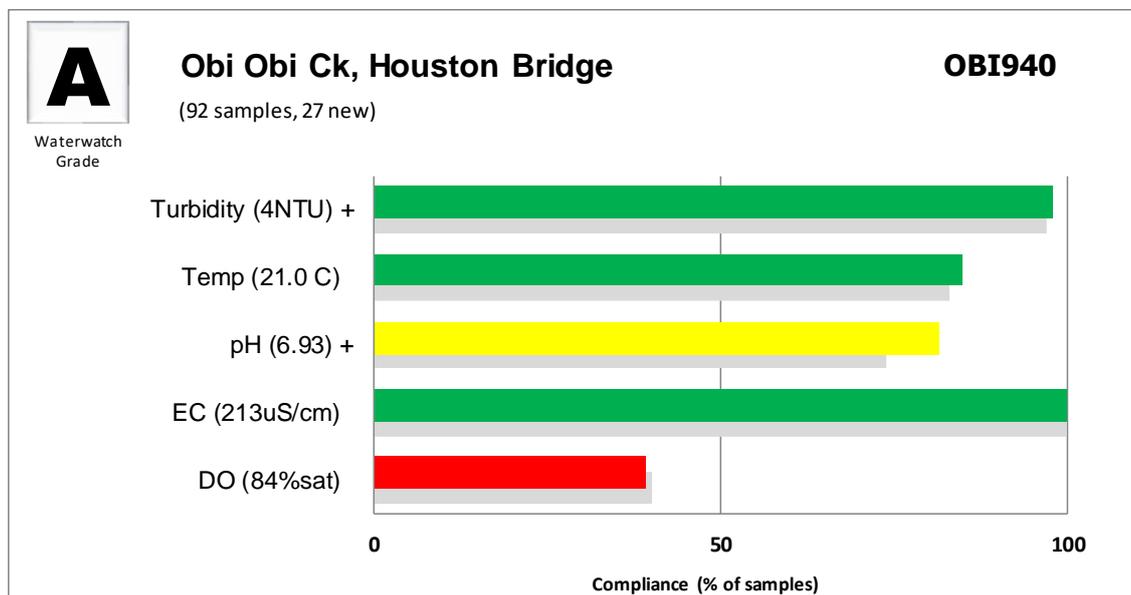
## Tributaries of the Mary River (<150 m above sea level)

### Obi Obi Creek, Maleny



- New site.
- Southern Upland Acid waters.
- Dissolved oxygen level compliance appears to be low – more data is required.
- Sample size is not yet sufficient to make definitive comments on trends.

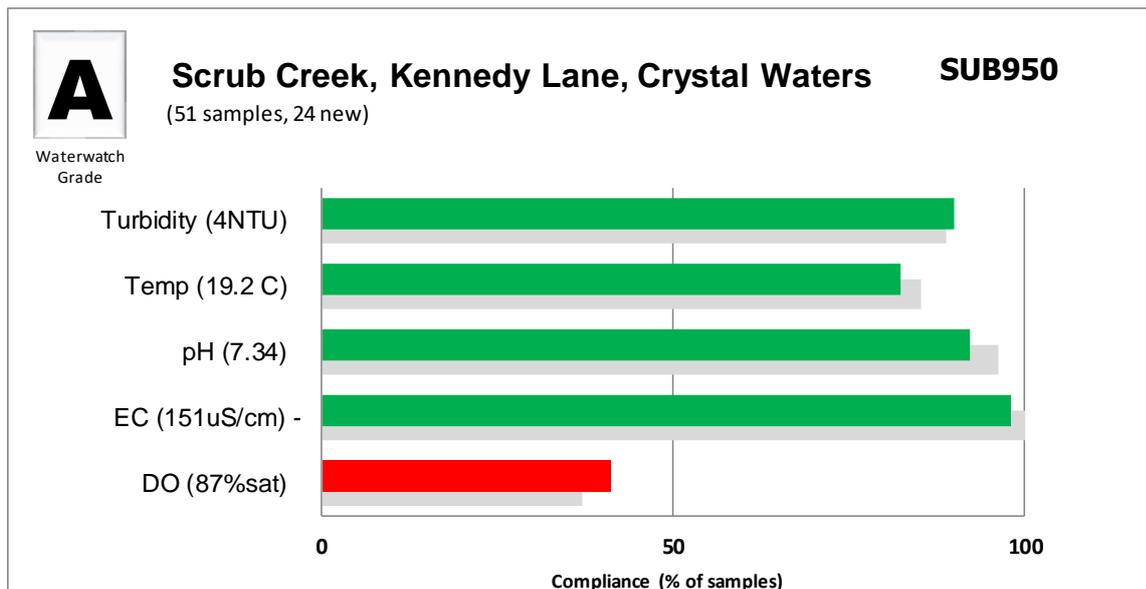
### Obi Obi Creek, Kenilworth



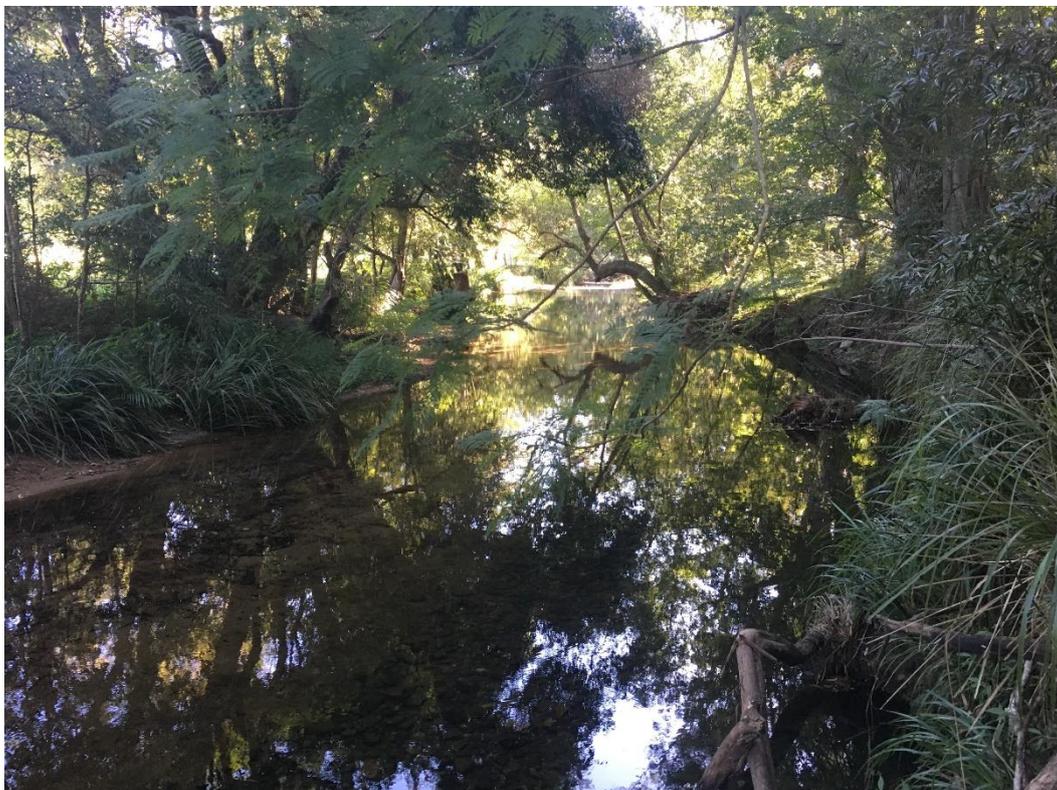
- Great sample size
- Southern Lowland Waters (<150m)
- Excellent electrical conductivity (salinity) and turbidity compliance
- Significant increase in compliance for pH and turbidity over the past 3 years.
- The median dissolved oxygen value (84%sat) makes this site appear well oxygenated however, dissolved oxygen levels fluctuate widely, possibly due to nutrient input, high temperatures etc.
- Maintained an overall grade of an A (2010 – 2013 and 2013 – 2016 Waterwatch Grade = A).

## Upland tributaries of the Mary River (>150m)

### Scrub Creek



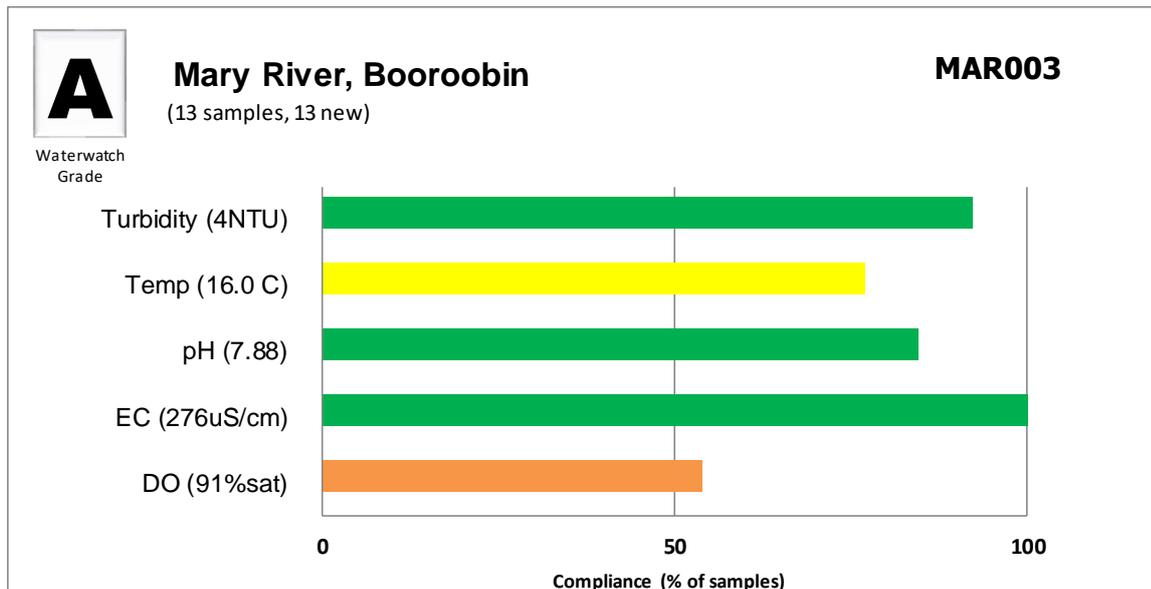
- New site, good sample size
- Significant decrease in compliance with electrical conductivity (salinity) over the past 3 years.
- The median dissolved oxygen value (87%sat) makes this site appear well oxygenated however, dissolved oxygen levels fluctuate widely, possibly due to the ephemeral nature of the stream.
- Ongoing monitoring of this site is required.
- Maintained an overall grade of an A (2010 – 2013 and 2013 – 2016 Waterwatch Grade = A).



Scrub Creek, Crystal Waters, June 2017

## Upper Mary River Upland sites (>150 m above sea level)

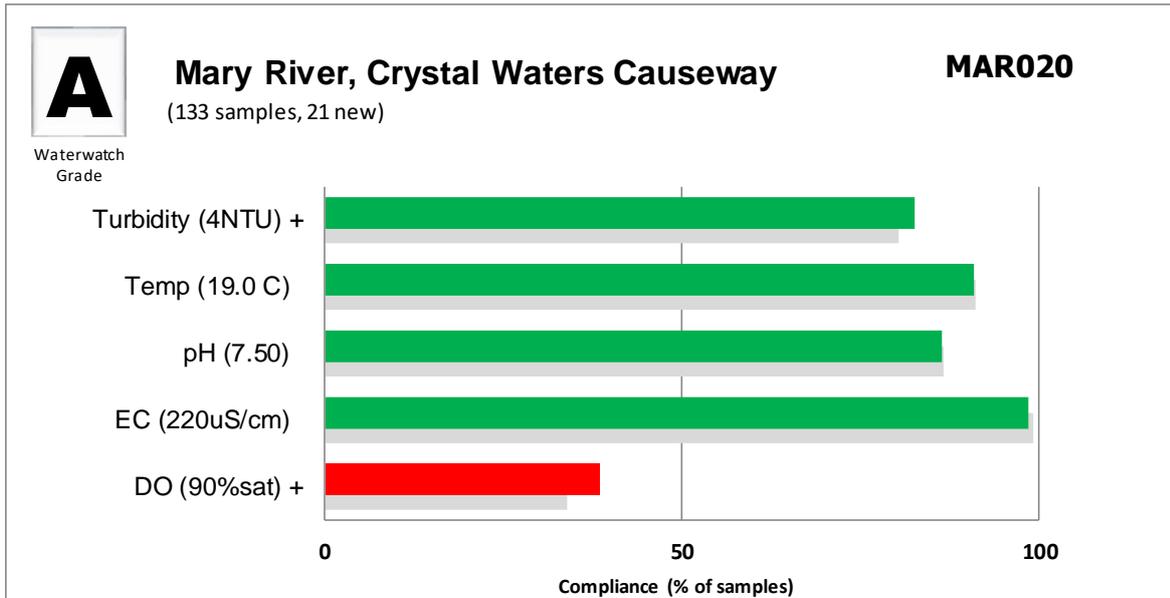
### Mary River



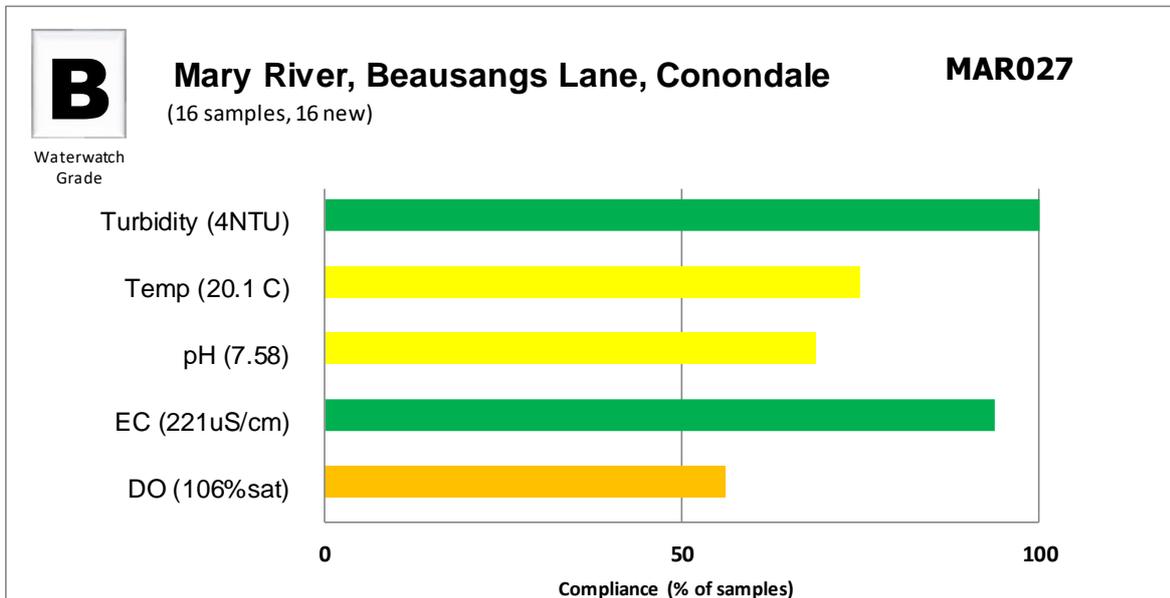
- New site with very low temperature (good), possibly the lowest median temperature in the catchment.
- Interesting electrical conductivity (salinity) results for an upper catchment site (not expected to be that high compared to e.g. Scrub Creek (SUB950).
- Southern Upland Waters (>150m).
- Sample size is not yet sufficient to make definitive comments on trends.



*Mary River, Crystal Waters, June 2017*



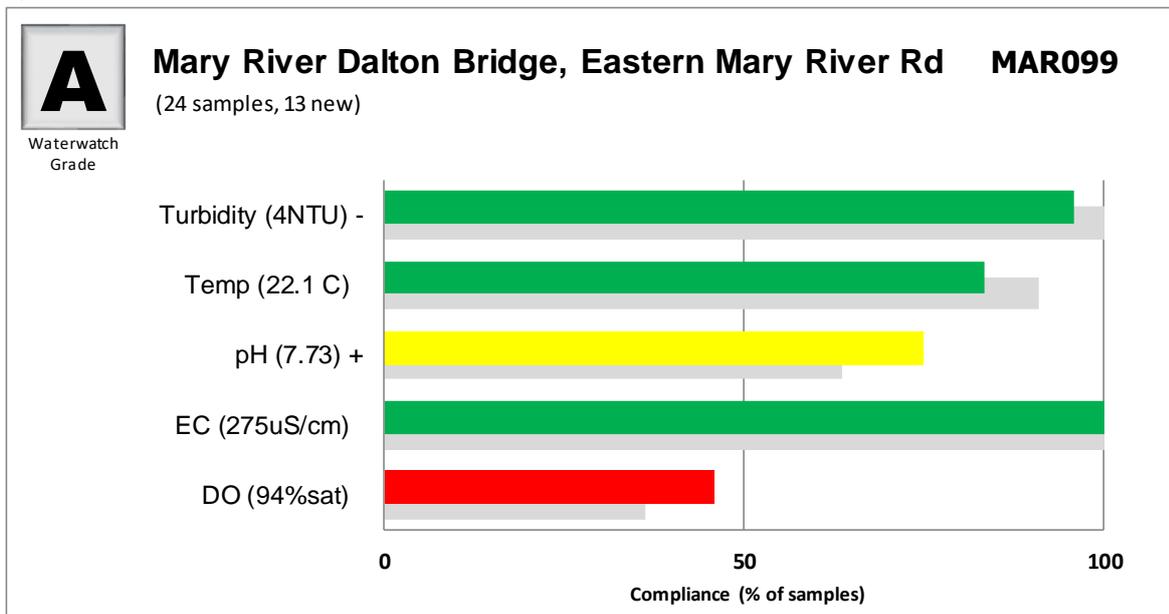
- Excellent sample size (gold medal award winner!).
- Southern Upland Waters (>150m).
- Good compliance for electrical conductivity (salinity).
- Significant increase in compliance for turbidity over the past 3 years (good).
- The dissolved oxygen level compliance has significantly increased in the past 3 years and is similar to Obi Obi Creek and the streams tested in the Conondale National Park.
- This site has the coolest median stream temperature out of all Mary River Waterwatch sites.
- Maintaining an overall grade of A (2010 – 2013 and 2013 – 2016 Waterwatch Grade = A).



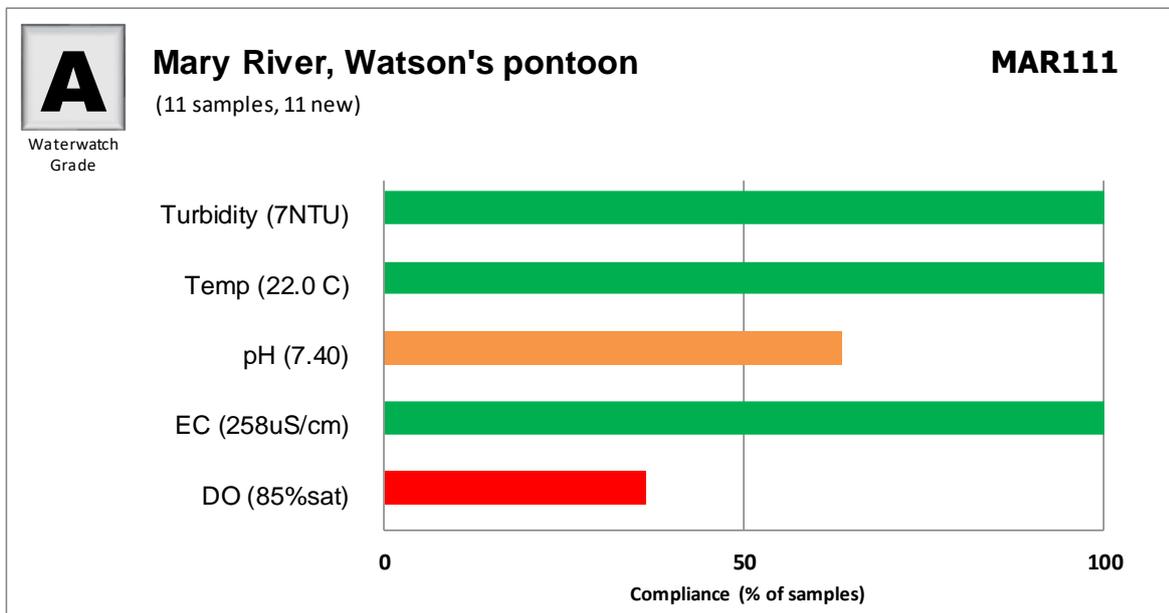
- New site.
- Southern Upland Waters (>150m).
- Sample size is not yet sufficient to make definitive comments on trends.

## Upper Mary River Lowland sites (<150 m above sea level)

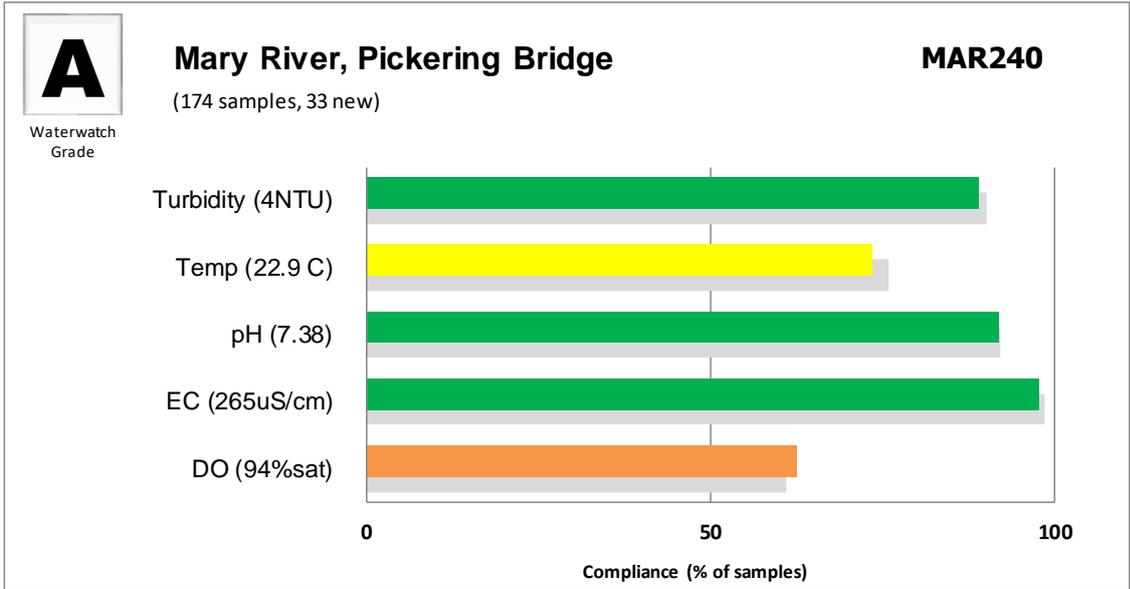
### Mary River



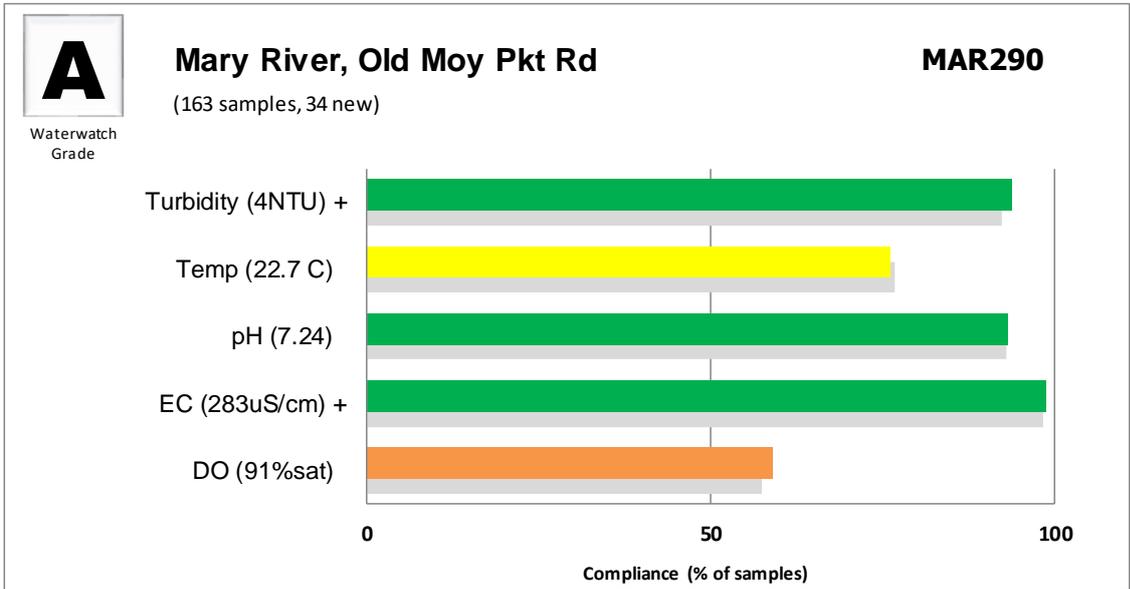
- This new site has sufficient samples to make comments on trends.
- Southern Lowland Waters (<150m).
- Turbidity has significantly decreased in compliance in the last 2 years.
- pH has significantly increased in compliance.
- Excellent electrical conductivity (salinity) compliance.



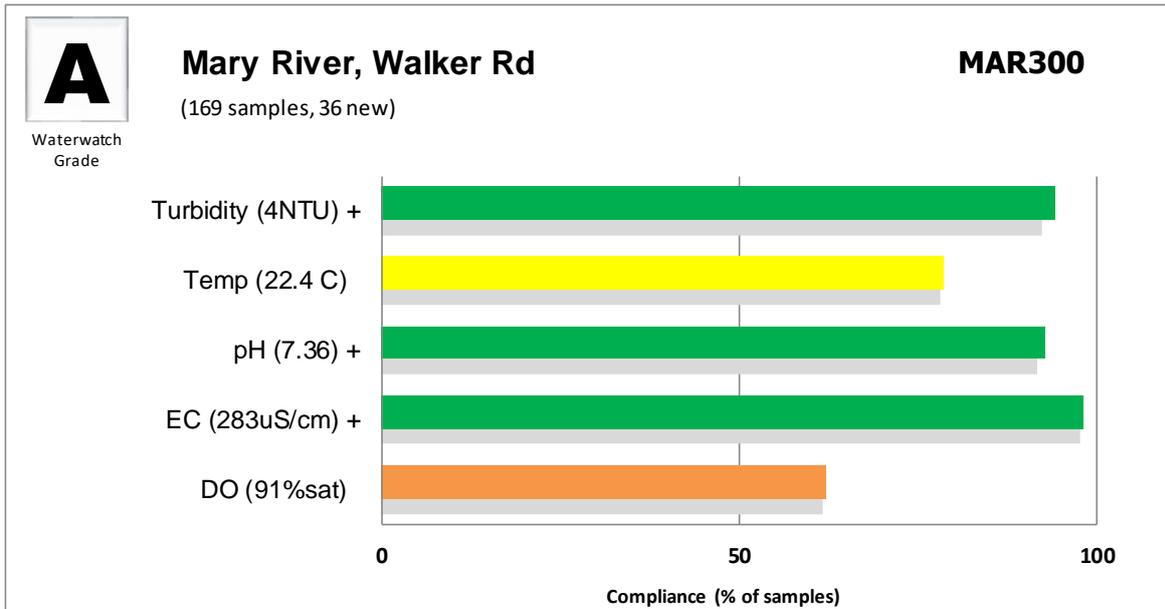
- New site – turbidity is higher compared to the MAR099 site upstream, more data is required to validate this.
- Southern Upland Waters (>150m).
- Sample size is not yet sufficient to make definitive comments on trends.



- Excellent sample size (gold medal award winner!).
- Southern Lowland Waters (<150m).
- Excellent electrical conductivity compliance over the past three years.
- The good dissolved oxygen levels at this site have been maintained since monitoring began in 2002.
- Maintaining an overall grade of A (2010 – 2013 and 2013 - 2016 Waterwatch Grade = A) over the past 6 years.



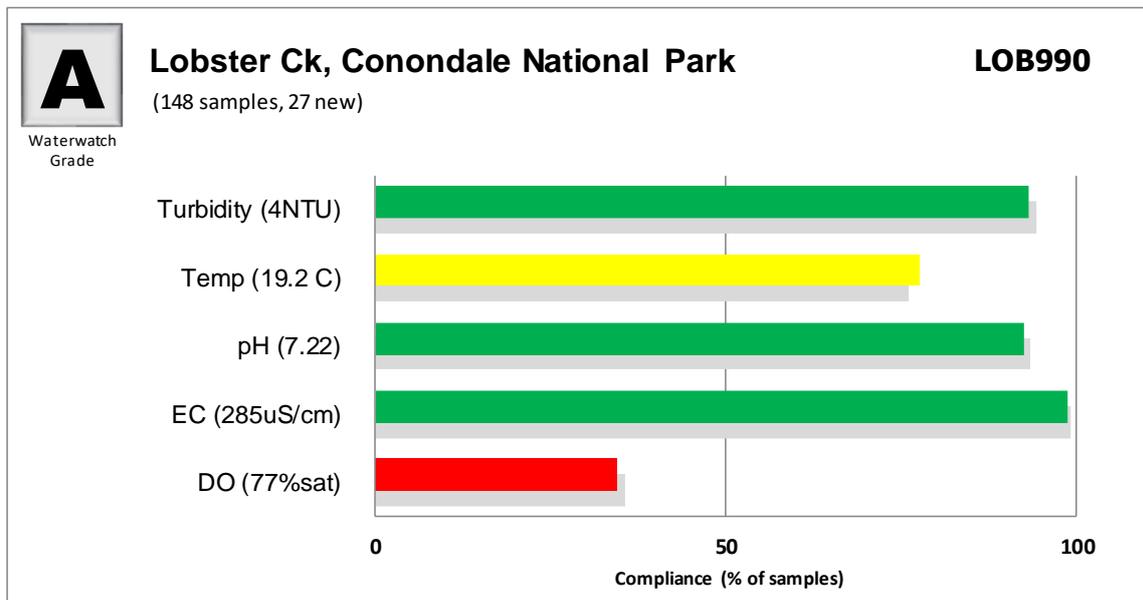
- Excellent sample size (gold medal award winner!).
- Southern Lowland Waters (<150m).
- Significant increase in electrical conductivity (salinity) and turbidity over the past 3 years.
- The good dissolved oxygen levels at this site have been maintained since monitoring began in 2002.
- Maintaining an overall grade of A (2010 – 2013 and 2013 – 2016 Waterwatch Grade = A) over the past 6 years



- Excellent sample size (gold medal award winner!).
- Southern Lowland Waters (<150m).
- Significant increase in electrical conductivity (salinity), pH and turbidity over the past 3 years.
- The good dissolved oxygen levels at this site have been maintained since monitoring began in 2002.
- Maintaining an overall grade of A (2010 – 2013 and 2013 – 2016 Waterwatch Grade = A) over the past 6 years.

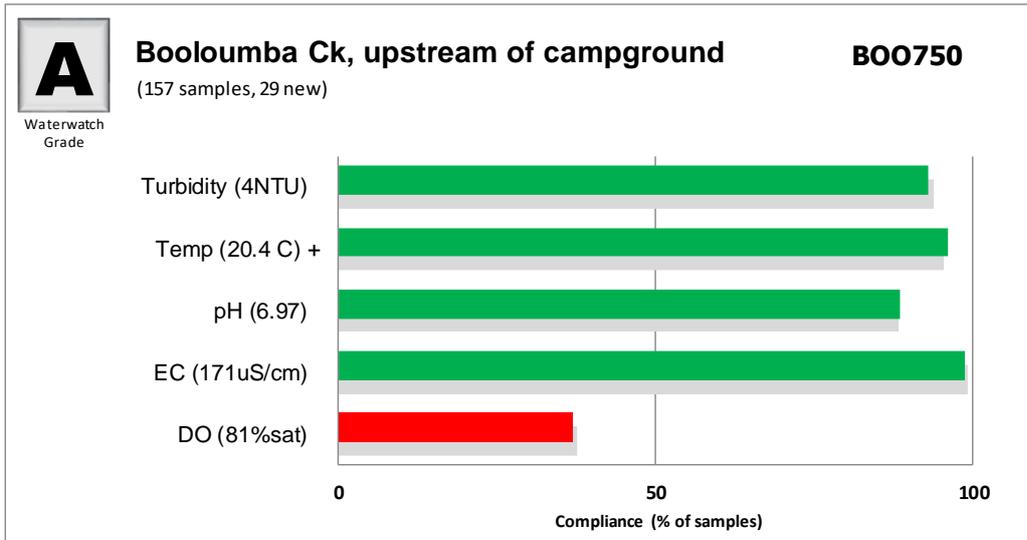
## Conondale National Park sites (Lowland <150 metres above sea level)

### Lobster Creek

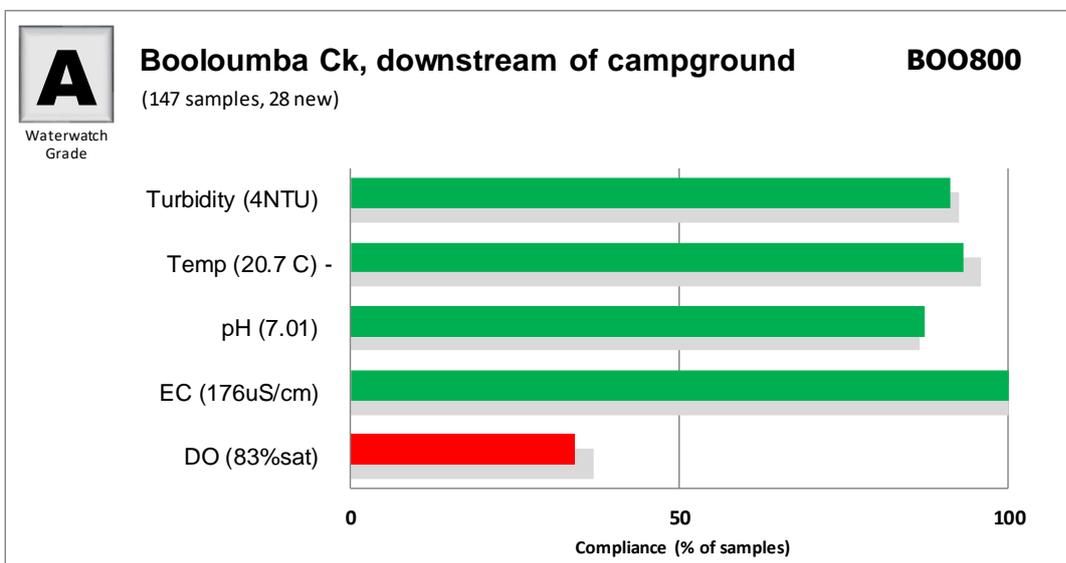


- Excellent sample size (gold medal award winner!).
- Southern Lowland Waters (<150m).
- Great electrical conductivity (salinity) compliance.
- Consistently coolest water temperature sampling site in Conondale National Park.
- Dissolved oxygen readings seem to only comply with guideline levels approximately 40% of the time. This is likely due to the lower than normal summer rainfall and creekflows during the 2013-2019 reporting period – however, this is not seriously detrimental to aquatic life.
- Maintaining an overall grade of A (2010 – 2013 Waterwatch Grade = A).

## Booloumba Creek

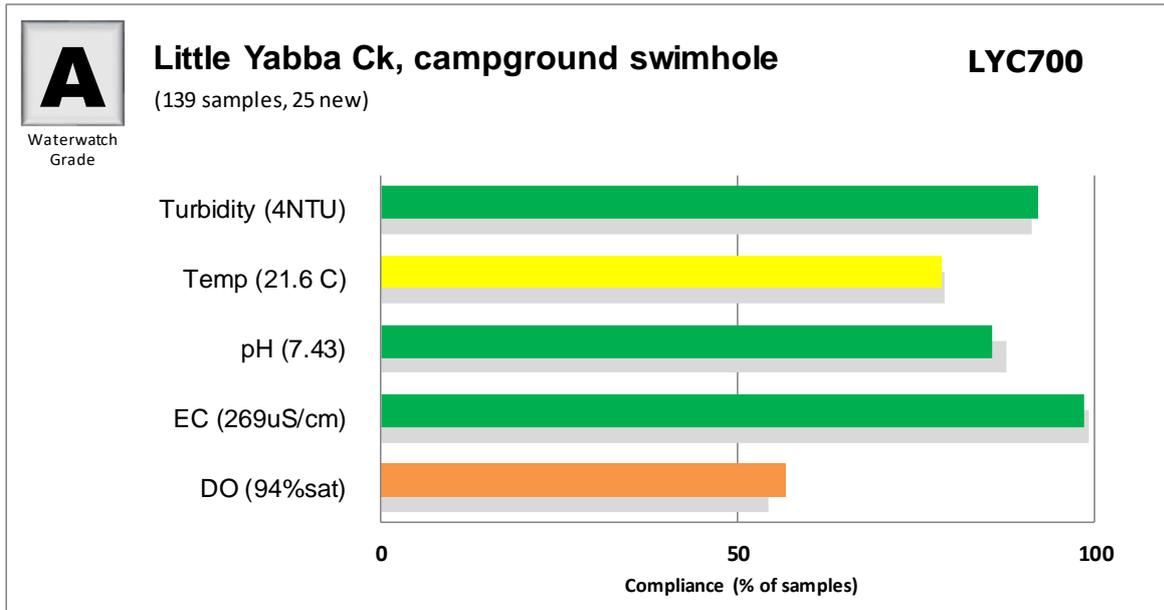


- Excellent sample size (gold medal award winner!).
- Southern Lowland Waters (<150m)
- Significant improvement with temperature guideline values over the past 3 years.
- Good electrical conductivity compliance.
- Dissolved oxygen readings seem to only comply with guideline levels approximately 40% of the time. This, is likely due to the lower than normal summer rainfall and creekflows during the 2013-2019 reporting period – however, this is not seriously detrimental to aquatic life.
- During the last reporting period (2013 – 2016) there was a significant decrease in turbidity. There is no significant change in turbidity during this reporting period.
- Maintaining an overall grade of A (2010 – 2013 and 2013 - 2016 Waterwatch Grade = A).

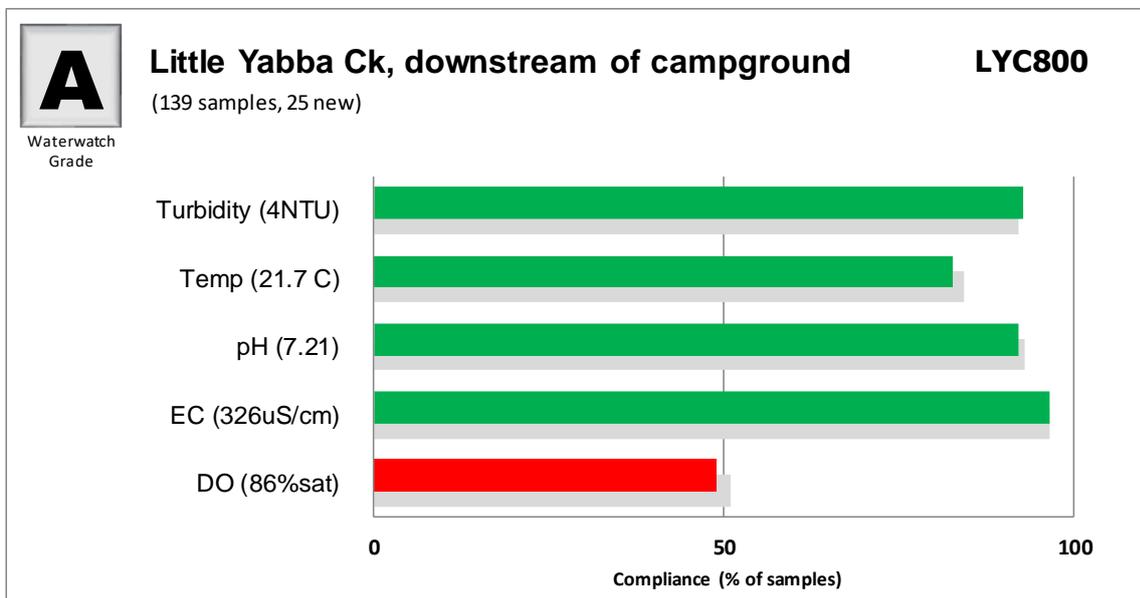


- Excellent sample size (gold star award winner!).
- Southern Lowland Waters (<150m).
- Excellent compliance with electrical conductivity (salinity).
- Like the BOO750 site upstream, the dissolved oxygen readings seem to only comply with guideline levels approximately 40% of the time. This is likely due to the lower than normal summer rainfall and creekflows during the 2013-2019 reporting period – however, this is not seriously detrimental to aquatic life.
- Maintaining an overall grade of A (2010 – 2013 and 2013 - 2016 Waterwatch Grade = A).

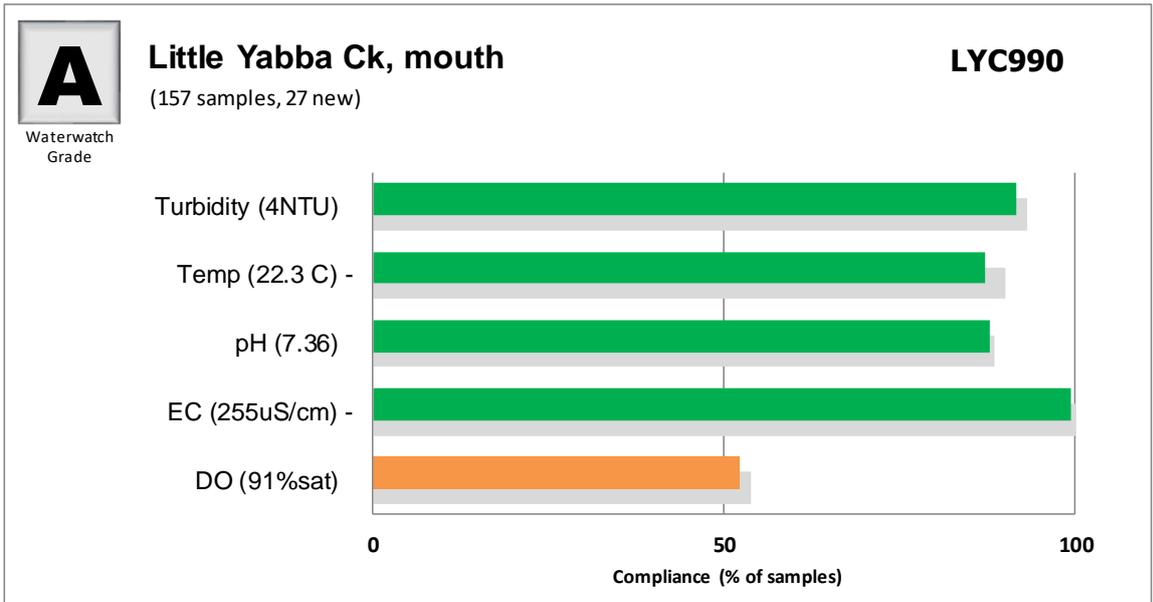
Little Yabba Creek



- Excellent sample size (gold medal award winner!).
- Southern Lowland Waters (<150m).
- Good electrical conductivity (salinity) compliance.
- Dissolved oxygen compliance levels for this Little Yabba Creek site is better than the Booloumba Creek sites. However stream temperatures are approximately the same as Booloumba Creek.
- Maintaining an overall grade of A (2010 – 2013 and 2013 – 2016 Waterwatch Grade = A)



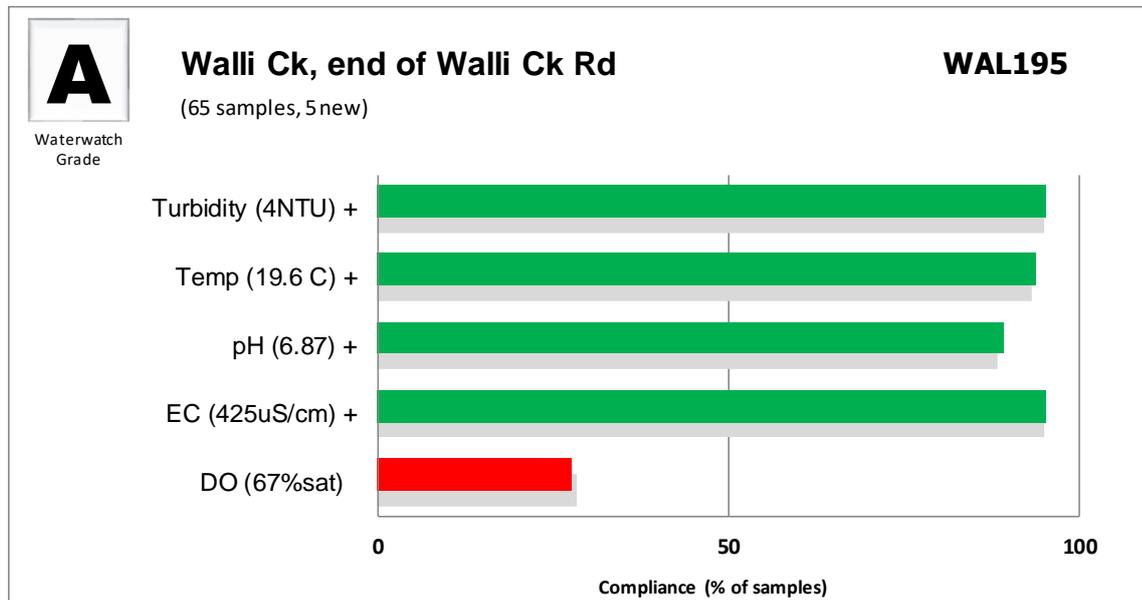
- Excellent sample size (gold medal award winner!).
- Southern Lowland Waters (<150m).
- Dissolved oxygen readings seem to only comply with guideline levels approximately 50% of the time, this is likely to be due to the lower than normal summer rain and creekflows during the 2013-2019 reporting period – however, this is not seriously detrimental to aquatic life.
- Maintaining an overall grade of A (2010 – 2013 Waterwatch Grade = A).



- Excellent sample size (gold star award winner!)
- Southern Lowland Waters (<150m)
- Significant decrease in compliance for electrical conductivity (salinity) and temperature over the past 3 years.
- Maintaining an overall grade of A (2010 – 2013 and 2013 – 2016 Waterwatch Grade = A).

## Tributaries of the Mary River

### Walli Creek

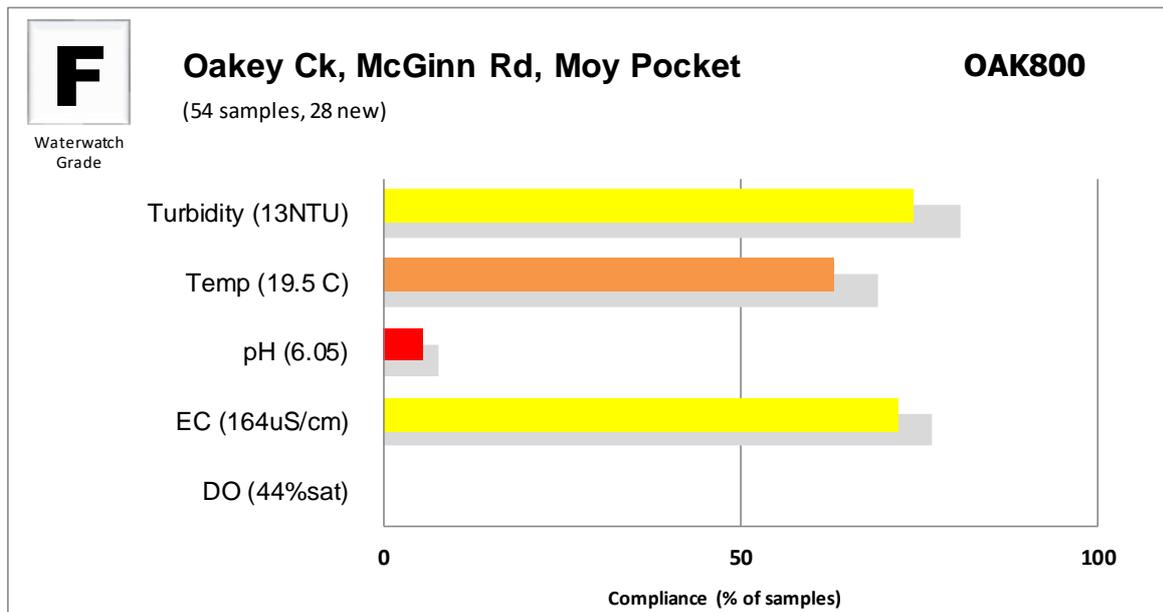


- Great sample size
- Southern Lowland Waters (<150m)
- Significant improvement in turbidity, temperature, pH and electrical conductivity (salinity) compliance over the past 3 years.
- The median dissolved oxygen value (67%sat) makes this site appear oxygenated however, dissolved oxygen levels fluctuate widely, possibly due to the ephemeral nature of the stream.
- Maintained an overall grade of an A (2010 – 2013 and 2013 – 2016 Waterwatch Grade = A).



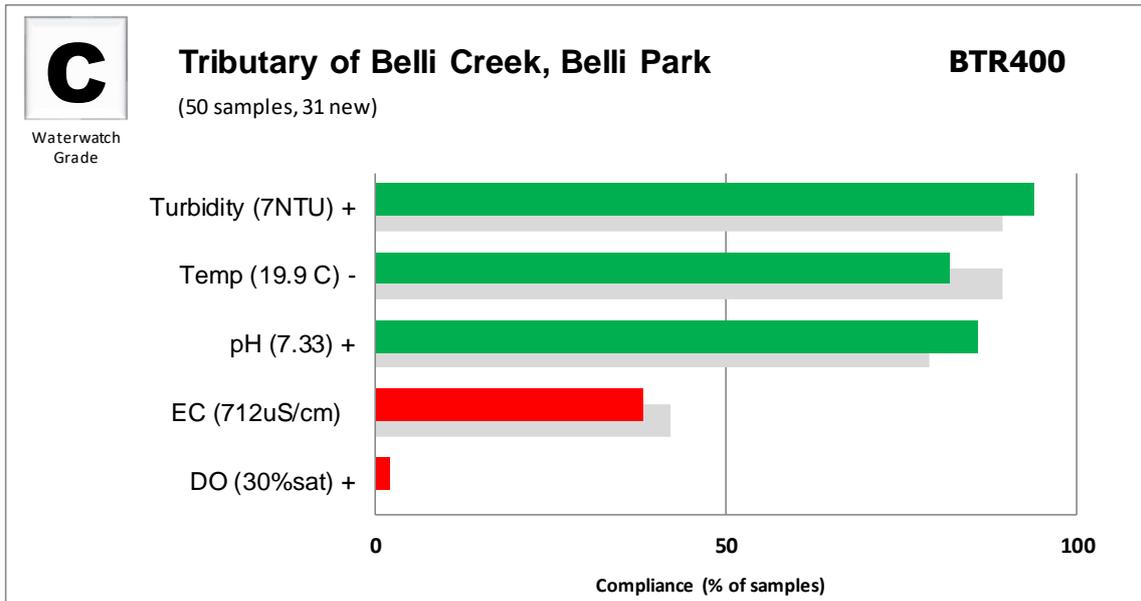
Walli Creek revegetation works, 2014 & 2018

## Oakey Creek, Moy Pocket



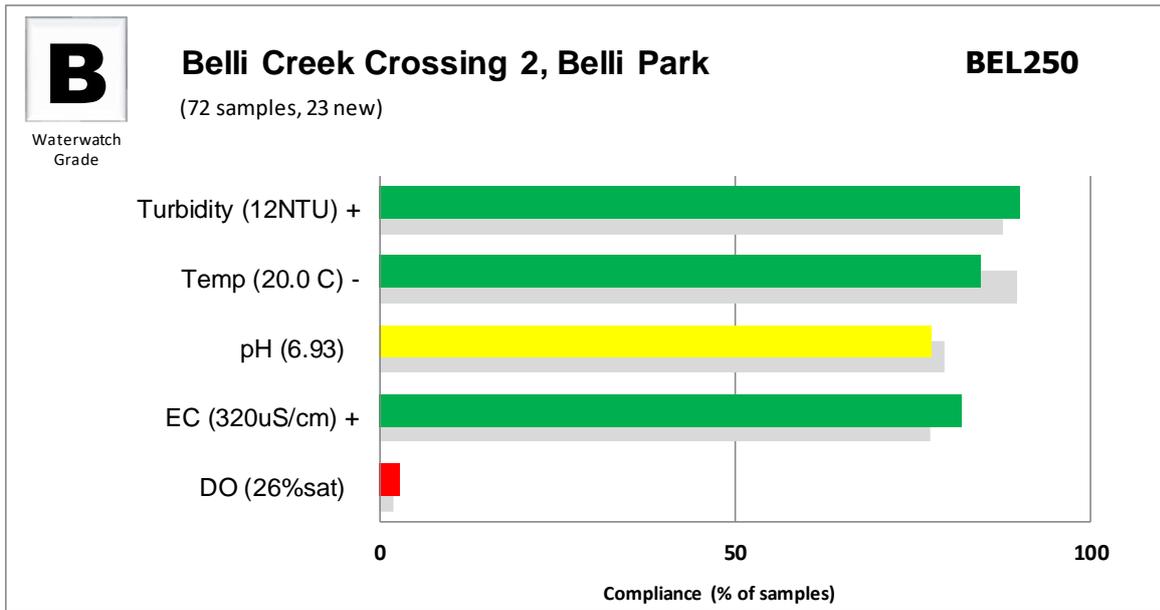
- Good sample size
- Southern Lowland Waters (<150m)
- Ephemeral Creek with low to no flows, mostly dry/shallow stagnant pools throughout dry periods of the year
- pH is tending to acidic
- Good low electrical conductivity (salinity)
- Low dissolved oxygen due to the stagnant nature of the stream
- Turbidity generally low, however becomes highly turbid during rain events.
- 2013 – 2016 Waterwatch Grade = C, limited data were available during 2013 – 2016 reporting period.

## Tributary of Belli Creek, Belli Park

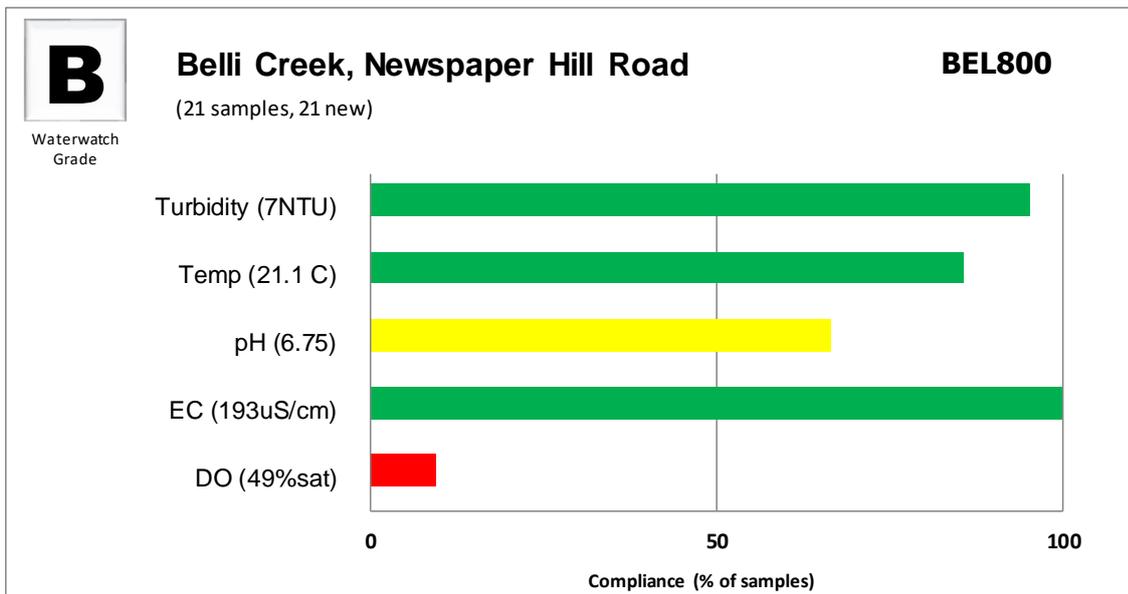


- Good sample size.
- Southern Lowland Waters (<150m).
- Significant increase for turbidity and pH
- Improved dissolved oxygen compliance over the past 3 years however, very low dissolved oxygen is recorded at this site – likely due to ephemeral nature of the stream, which generally only flows after good rain.
- Significant decrease with temperature compliance over the past 3 years however, water temperature is getting cooler which is beneficial to aquatic life and is likely a result of the extensive revegetation program.
- Contributor of salinity to Belli Creek (may be a natural occurrence due to underlying geology).
- Maintaining an overall grade of an C (2010 – 2013 and 2013 - 2016 Waterwatch Grade = C).

Belli Creek

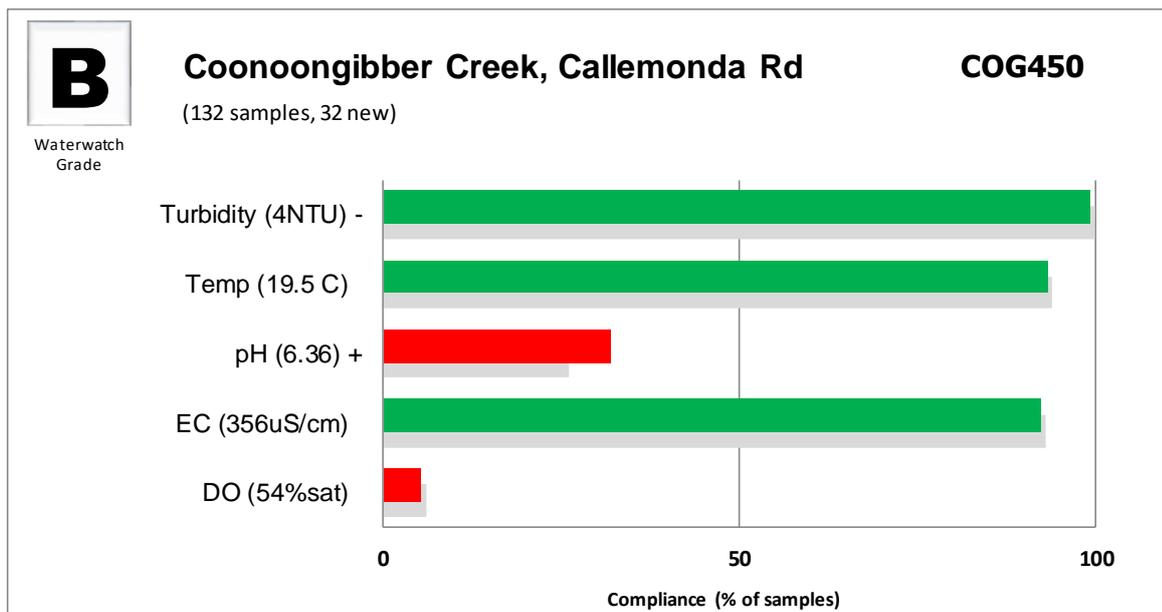


- Good sample size.
- Southern Lowland Waters (<150m)
- Significant improvement in compliance for electrical conductivity (salinity) over the past 6 years.
- Significant increased in compliance for turbidity over the past 3 years.
- Significant decline in compliance for temperature over the past 6 years.
- Maintaining a very low compliance with guidelines for dissolved oxygen – which may be difficult to support aquatic life.
- Maintaining an overall grade of an B (2010 – 2013 and 2013 - 2016 Waterwatch Grade = B).



- New site.
- Southern Lowland Waters (<150m).
- BEL800 has significantly lower EC (salinity) results compared to BEL250 site. This is likely due to inflows from upstream tributaries feeding into this site.
- Preliminary dissolved oxygen results are low at this site. More data is required.
- Sample insufficient to make definitive comment on trends.

## Coonoongibber Creek, Imbil



- Excellent sample size (gold medal award winner!).
- Southern Lowland Waters (<150m).
- Excellent turbidity, although compliance has significantly decreased over the past 3 years.
- Dissolved oxygen rarely compliant however this is not detrimental to aquatic life.
- Although pH has improved slightly in the last period, this site is maintaining low pH results over the past 10 years – which was not expected when sampling commenced.
- Maintaining an overall grade of B (2010 – 2013 and 2013 - 2016 Waterwatch Grade = B)

## Data Analysis

The MRCCC Waterwatch Report Card assessment is based on all data collected for each site. Using the Waterwatch data, we have developed a report card grade from an A to F for each of the Waterwatch sites. The report card grade is derived from the physical and chemical parameters monitored by the Waterwatch volunteers and is not a grade that represents the holistic health of the site or stream. To obtain a comprehensive overall rating of health we would need to collect data on other processes such as macroinvertebrates, nutrients, fish species, riparian zone health, etc. This is a future goal of the MRCCC. However, the MRCCC Waterwatch Report Card Grade provides us with an excellent general rating of the physical/chemical water quality of our sites.

The Report Card grade for each site is determined by comparing the Waterwatch data results to the QLD Water Quality Objectives (WQO's) developed by the Environmental Protection Agency. For the parameters pH, DO, EC and turbidity, the number of times the parameters complied with the WQO's was calculated. This was then converted to a percentage to give a "percent compliance" figure for each parameter at each site. For example, if 100 pH samples were taken, and 85 of them were within the accepted limits of the WQO guidelines, the site would score 85 percent compliance for pH. For temperature, percent compliance was calculated by comparing the results with the 90<sup>th</sup> and 10<sup>th</sup> percentile data from reference sites at Obi Obi Creek and Home Park, taking into account the season (i.e. higher expected temperatures in summer than in winter) and location in the catchment

A weighted average of percent compliance of the 5 measured parameters was then taken. DO was only given a half weighting due to the variable nature of spot DO measurements. Turbidity was also given a half weighting, as it is more informative if regular records are collected throughout high flow events. This average was then classed as an A, B, C or F based on the following:

**A** – Greater than 80 percent compliance. The water quality at this site is within the accepted WQO guidelines more than 80% of the time and is considered to have **excellent water quality** compared to a reference site in excellent condition.

**B** – Between 66 and 80 percent compliance. The water quality at this site is within the accepted WQO guidelines more than two thirds of the time, and is considered to have **good water quality** compared to a reference site in excellent condition.

**C** – Between 50 and 66 percent compliance. The water quality at this site was within accepted WQO guidelines more than half of the time, and is considered to have **average water quality** compared to a reference site in excellent condition.

**F** – Less than 50 percent compliance. The water quality at this site was *outside* the accepted WQO guidelines more than half of the time, and is considered to have **poor water quality** compared to a reference site in excellent condition.

## References

Department of Environment and Resource Management (2010), Environmental Protection (Water) Policy, Mary River environmental values and water quality objectives Basin No. 138, including all tributaries of the Mary River, Department of Environment and Resource Management. Water Quality & Ecosystem Health Policy Unit.