Upper Mary River Catchment

Waterwatch Report

2010 – 2013

Upper Mary River, Policemans Spur Road, April 2012

Report prepared by:
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MRCCC Catchment Officers, October 2013 v2

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Introduction

Hello to the Upper Mary River Catchment Waterwatch network volunteers.

Some of the original volunteers of the Upper Mary River Catchment Waterwatch network 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 this valuable water quality information that we have today.

This past year saw the boom-bust weather cycle continue. Between July 2012 and January 2013 the entire catchment experienced severe dry weather with virtually no rainfall recorded during this time with many creeks drying up. Then the late start to the wet season came with a bang on the Australia Day long weekend. The rainfall which fell on the entire catchment on the 27th January resulted in levels of flooding in some districts not seen in many years, causing severe damage to some parts of the catchment. Many families and their properties, including Waterwatch volunteers, were directly affected by the floods and we extend our thoughts and wishes to these people.

The flooding rains early in the year and extended dry period between July 2012 and January 2013 demonstrates clearly the climate extremes that Australia is renowned for. Due to these climatic events some Waterwatch sites have improved while other sites have declined since the last report in 2010. Anecdotal comments written on the datasheets are extremely helpful in determining the conditions the site is now experiencing after these events. Please keep writing notes because we are now compiling this information along with the usual water quality parameters in the database.

Only data from currently active sites are included in this report, which presents the long term data for each site and an indication of change over the past 3 years. There is now enough long-term data from many sites to draw some statistically valid conclusions about differences in general physical and chemical characteristics of water quality between a number of sub-catchments in this area of the catchment.

In the lower Mary catchment, many volunteers have expressed concern about rising electrical conductivity (EC) levels over the winter 2012 period, however this was not an issue in the upper catchment. The extended dry season which gave us an insight into the baseflow conditions of the creeks after all the alluvial aquifers have been recharged due to good rainfall conditions over the past few years. In the upper catchment, volunteers have expressed concern about high sediment concentrations which stem from a number of active landslips high in the catchment which have reactivated following intense rainfall events over the last three wet seasons.

Sediment entering the river from an active landslip far upslope

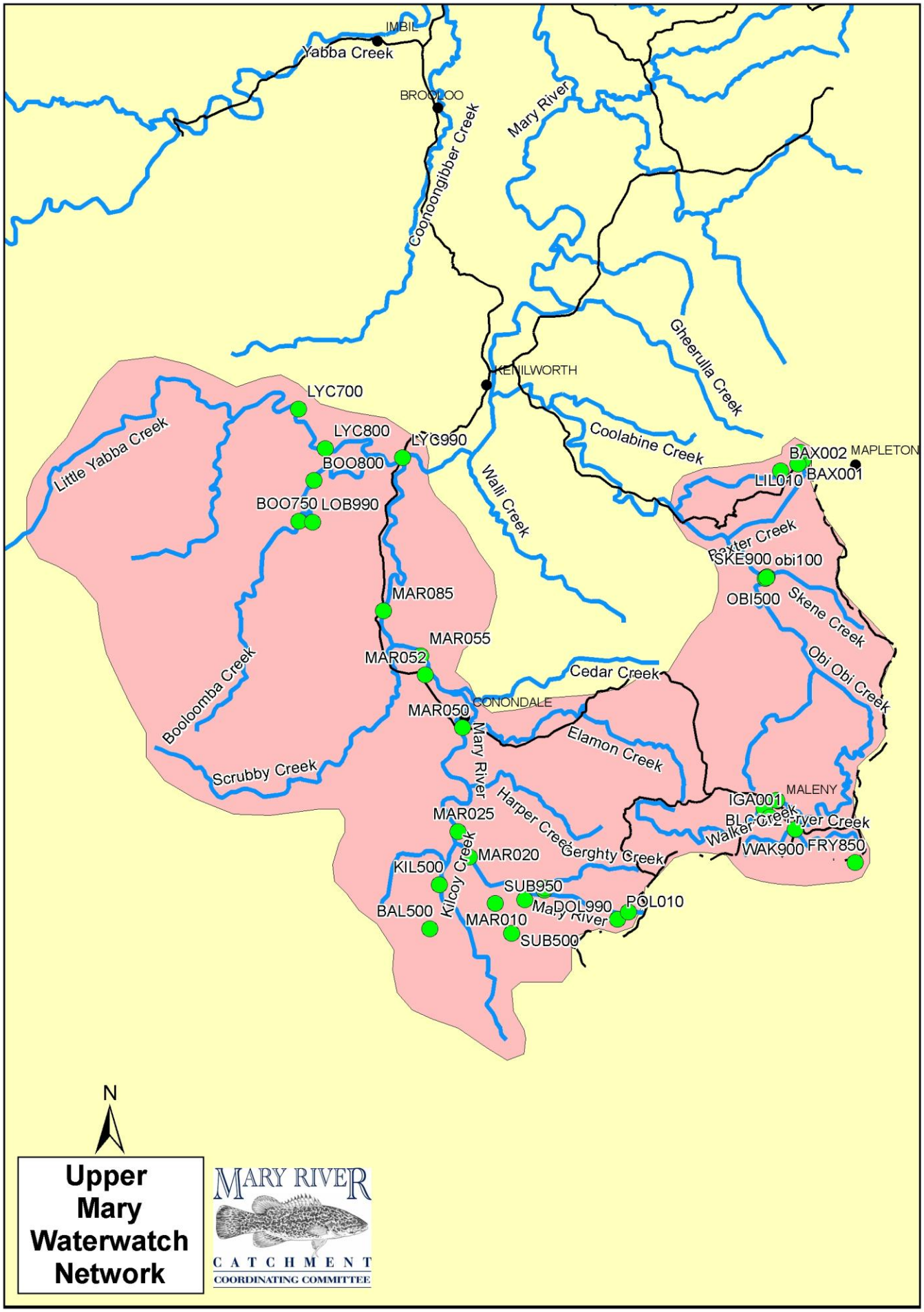
Waterwatch sites monitored in the Upper Mary River Catchment Waterwatch Network

Upper Mary River Catchment Waterwatch Network		
Site Code	**Creek Name**	**Location**
BAX002	Baxter Creek	Billabong Court, Mapleton
LIL005	Mapleton Lilly Ponds	Mapleton township
LOB990	Lobster Creek	Confluence with Booloumba Ck
BOO750	Booloumba Creek	Upstream of campgrounds
BOO800	Booloumba Creek	Downstream of campgrounds
LYC700	Little Yabba Creek	Upstream of campground
LYC800	Little Yabba Creek	Downstream of campground
LYC990	Little Yabba Creek	Confluence with Mary River
KIL500	Kilcoy Creek	Broken Bridge Rd
BAL500	Balgowlah Creek	Balgowlah Ck crossing
MAR020	Mary River	Crystal Waters causeway
MAR085	Mary River	Elsie's Flat, Cambroon
SKE010	Skene Creek	Russell Family Park, Montville
SKE900	Skene Creek	Confluence with Obi Obi Creek
OBI500	Obi Obi Creek	Upstream of Skene Creek

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 2012-13. Contributors to this report are: Sue & John Bailey, Scott & Lyn Woolbank, Joanne Ferrier, Kacey Walker, Eric Anderson, Matt Bateman, Elke Watson, Dominic Tyrrell, Bronwyn McAdam, Spencer Shaw, Christopher Lee, Kath Nash & Di Collier.

Upper Mary Waterwatch Site Map



Summer 2013 floods

The Australia Day long weekend floods in the Mary River Catchment resulted in some statistically significant flood records. At the Bellbird Gauging Station on the Mary River (located between Conondale and Kenilworth) the flood recorded the 6th highest peak in the past 50 years.

Flood Rank	Date	Level (Metres)	Discharge (ML/day)
1	25/04/1989	11	329,156
2	2/04/1989	10.69	304,148
3	9/02/1999	9.76	250,081
4	26/04/1989	9.095	217,131
5	9/01/2011	8.993	211,723
6	27/01/2013	8.775	201,512
7	3/04/1989	8.699	198,577
8	9/01/1968	8.4	185,133
9	8/02/1999	8.323	182,232
10	16/03/1963	7.89	163,241

Table 1: flood peaks recorded at the Mary River, Bellbird gauging station

However, at the Moy Pocket gauging station (located downstream of Kenilworth) the 2013 flood recorded the 10th highest peak on record. Obi Obi Creek recorded only a moderate flood peak, from the Gardners Fall gauging station downstream of Maleny. However, landholders in the lower Obi Obi Creek believe the January 2013 floods were one of the largest in at least 50 years.

Flood Rank	Date	Level (Metres)	Discharge (ML/day)
1	9/02/1999	16.874	312348
2	26/04/1989	16.39	283401
3	3/04/1989	16.29	278229
4	2/04/1989	16.016	263548
5	10/01/2011	15.749	247851
6	27/01/1974	15.47	233678
7	9/01/2011	15.436	231755
8	12/02/1972	15.41	230656
9	25/04/1989	15.323	226276
10	27/01/2013	15.266	223324

Table 2: flood peaks recorded at the Mary River, Moy Pocket gauging station

In January 2013, like the January 2011 floods, the worst flooding occurred in sub-catchments located downstream of Gympie in the middle, western and north-western sections of the Mary River Catchment.

In these catchments downstream of Gympie many long-term flood records were broken. Wide Bay Creek, particularly the townships of Woolooga and Kilkivan, reached record flood peaks again (after creating new records in 2011) and were significantly damaged. The Marodian gauging station located on lower Munna Creek also recorded a new flood peak, while locals in the upper Munna Creek catchment believe this flood was the highest in living memory. The Glastonbury Creek gauging station also recorded a new flood peak, while the Hygait gauging station on Kandanga Creek recorded the 3rd highest flood peak. The Mary River at Miva, downstream of Gympie, recorded its 3rd highest flood peak since 1910, only 30cm below the flood recorded in 1974. Maryborough recorded a flood peak of 10.7m (8am 29/1/13) - its 4th highest flood peak since 1893.

The difference between the 2011 and 2013 floods was the Mary River and creeks started rising from almost cease-to-flow conditions in January 2013. Whereas in early 2011 the catchment was saturated and the river and creeks had considerably higher ambient flows before the floods began.

Rainfall

Leading up the January 2013 floods the Mary River Catchment had experienced an extended dry period from late July 2012 until late January 2013. During this 7 month period very little rainfall was recorded throughout the catchment, apart from isolated and very localised storm cells generating some rainfall. Consequently the catchment was very dry, and groundcover levels were low due to high pasture utilisation from grazing cattle. This was in stark contrast to the January 2011 floods where the catchment was saturated from extensive rainfall during 2010. During the first half of 2012, the Mary River experienced a series of small flood events, with some tributaries on the eastern side of the river recording new flood peaks.

The highest daily rainfall totals recorded at the peak of the rain event (27/1/13) in the Mary River catchment were located in the north-western Munna Creek sub-catchment, with Brooweena (in the upper Munna Creek) recording 336mm and Marodian (in the lower Munna Creek) recording 347mm. Mt Kanigan on the eastern side of the Mary River in the Gutchy Creek sub-catchment, near Gundiah, recorded the highest daily total rainfall of 397mm. Locals recorded in the Widgee Creek catchment rainfall of 735mm for the 5 days (commencing on 24th January).

The Munna Creek sub-catchment is the Mary River catchment's largest sub-catchment with approximately 15% of the total catchment.

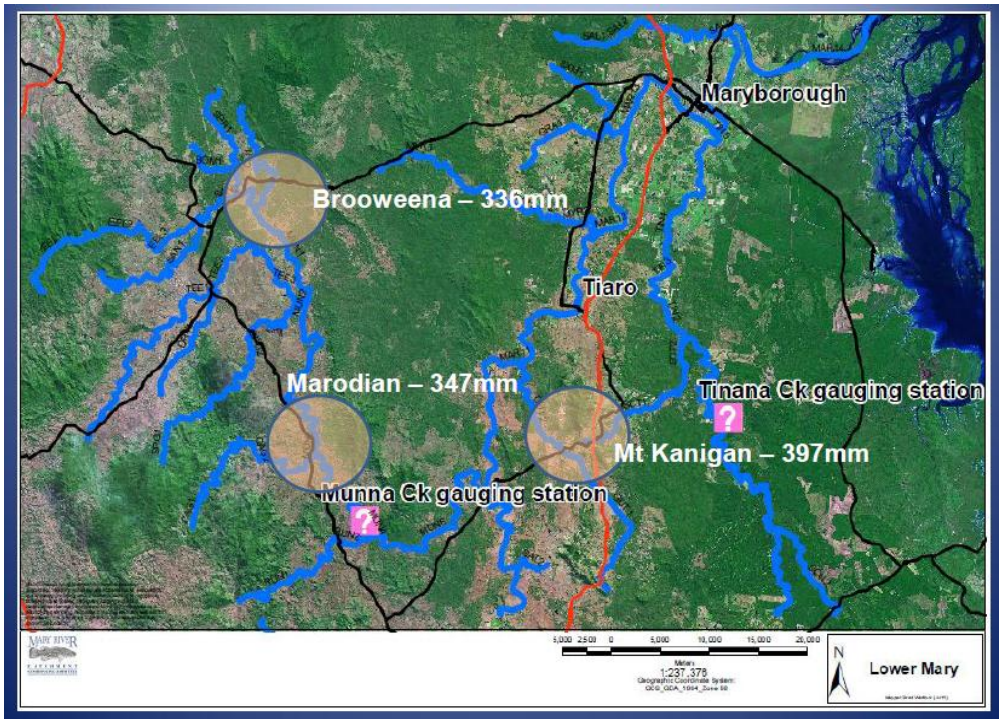


Figure 1 – peak daily rainfall recorded on 27/1/13

Flood heights

Figure 2 shows the 2013 flood height of the Mary River at Moy Pocket (downstream of Kenilworth) increased at the same speed (on average 50cm per hour) as the 2011 flood event. The 2011 and 2013 floods recorded similar in heights at the Moy Pocket gauging station. However rises of 1m per hour were recorded near the peak of flood at some gauging stations in the Mary River catchment.

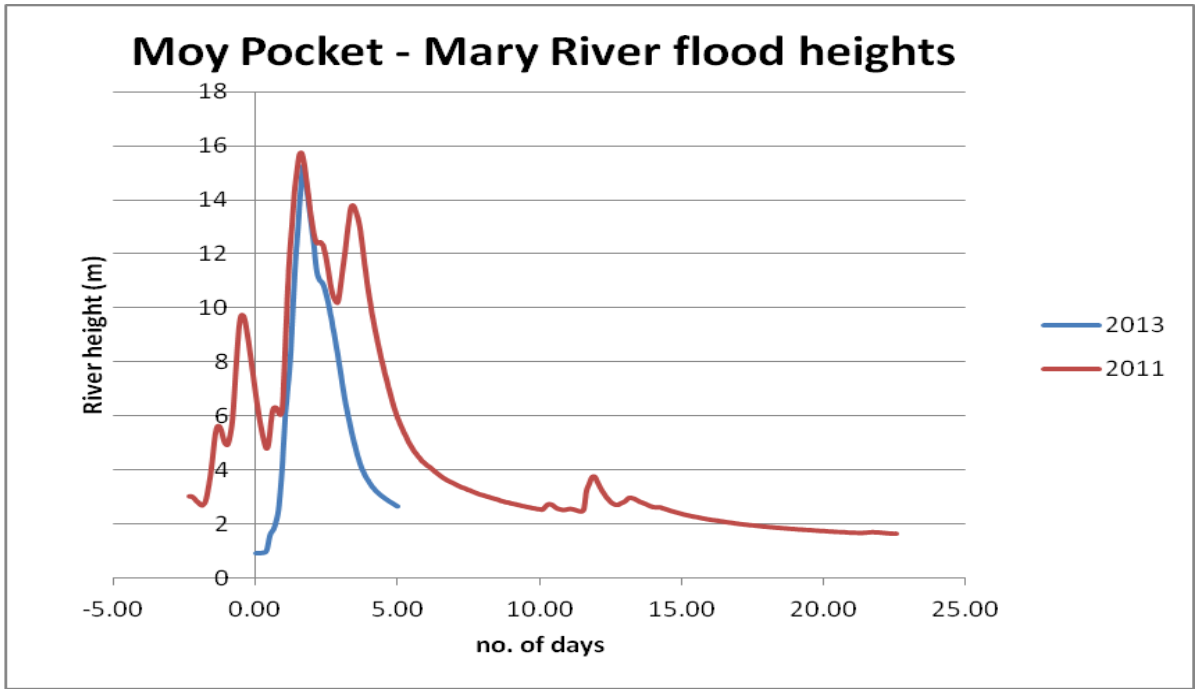


Figure 2 – Moy Pocket, Mary River (downstream of Kenilworth) flood heights

Steep land of the Mary River catchment

New landslips have been reported on the Maleny plateau, the red soils of the Amamoor, Dagun, Glastonbury, Woolooga and Widgee districts and on the steeper land on the eastern-side of the catchment, primarily in the Six Mile Creek sub-catchment e.g. Pinbarren district. These districts are historically prone to landslips following heavy rain, with Maleny located on the basalts and the Eastern catchments located on the phyllitic shales of the Kin Kin beds. Gympie bean-growers using green manure crops on the steeper volcanic-derived soils have experienced very little soil movement.

Landslip at Glastonbury, west of Gympie

January 2011 flooding rainfall, upper Mary River

Monitoring Methods

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

Each of the sub-catchments monitored in the Mary Catchment is unique in terms of its 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.

The sites in the Upper Mary Waterwatch network are compared against the Mary Basin lowland freshwater guidelines for all sites below 150m elevation and the upland freshwater guidelines for all sites above 150m elevation. These two sets of water quality guidelines are listed below. Some long term data is starting to suggest that there may be a case for developing a specific set of pH guideline values for some of the eastern tributaries of the Mary which drain the Maleny /Mapleton plateau .

Water Quality Guideline Values
Lowland (under 150m elevation, above sea level)
Turbidity:0 - 50 NTU**, pH:** 6.5 - 8.0**, Electrical Conductivity :** 0 - 580 uS/cm,
Dissolved Oxygen: 85 - 110% saturation, **Water Temperature (winter)**13 - 21^{o}C,**(summer**)18 - 28^{o}C

Upland (above 150m elevation, above sea level)
Turbidity:0 - 20 NTU**, pH:** 6.5 - 8.2**, EC:** 0 - 580 uS/cm,
Dissolved Oxygen: 90 - 110% saturation, **Water Temperature (winter)**13 - 21^{o}C**,(summer)**18 - 28^{o}C

Mary River, Moy Pocket, May 2013

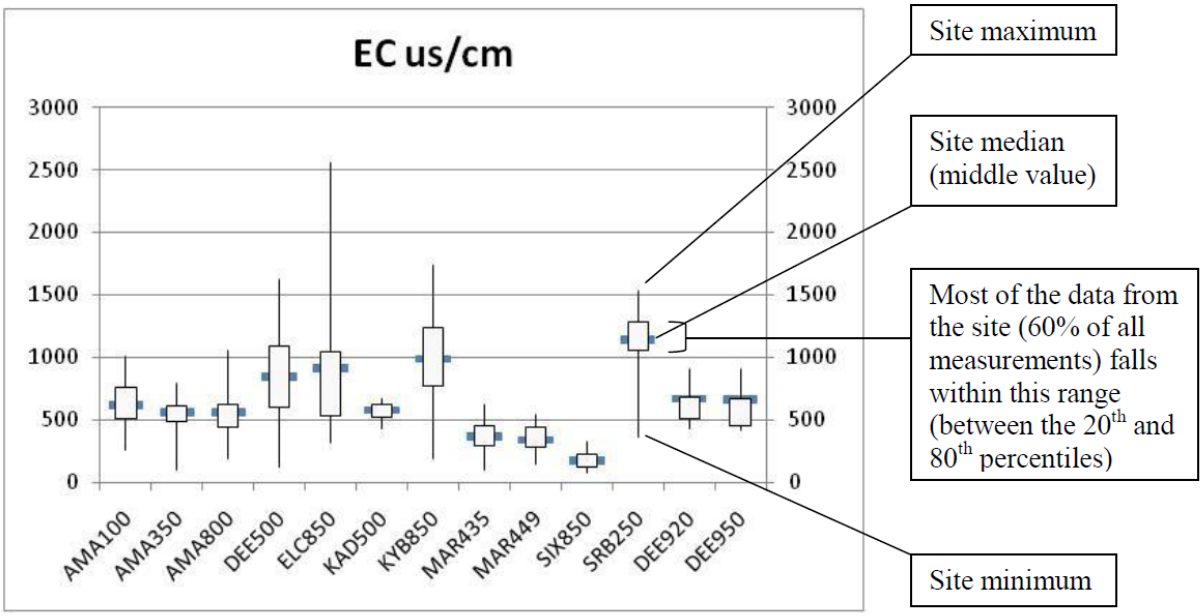
Results- inter-site comparisons

Within each waterwatch network, the spread of pH, EC and dissolved oxygen values are compared across all the sites in the network. 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.

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 20th and 80th percentiles at each site.
- The horizontal bars show the median value (50th percentile) for each site.

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

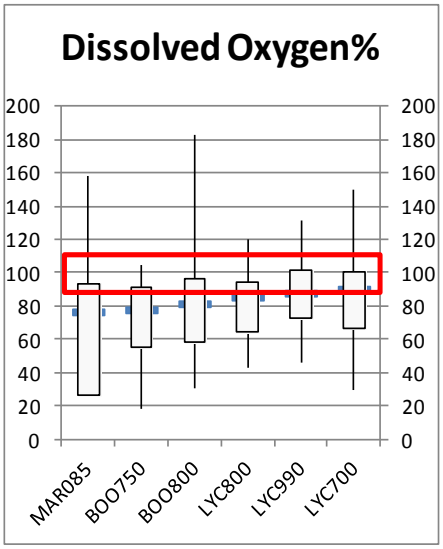


Waterfalls at Moy Pocket quarry, January 2013

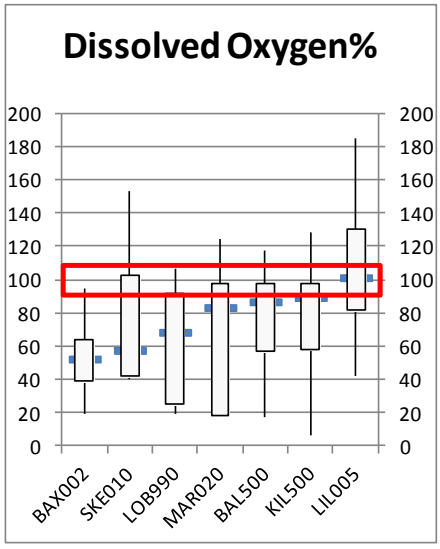
Long-term inter-site comparison of dissolved oxygen levels (all data collected)

in the Upper Mary Catchments Waterwatch Network

Lowland sites (<150m elevation)



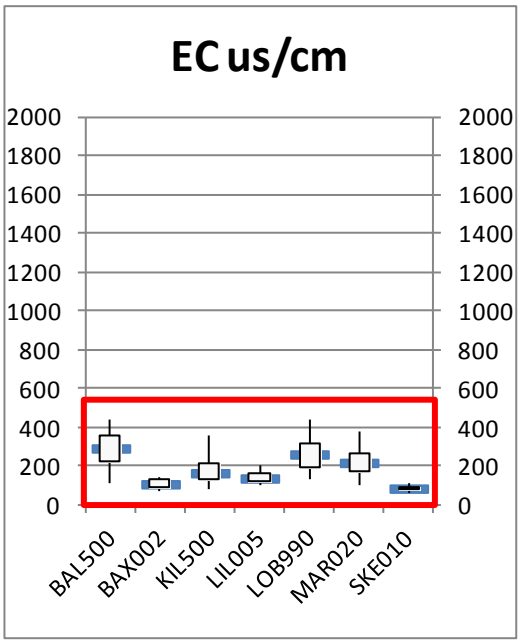
Upland sites (>150m elevation)



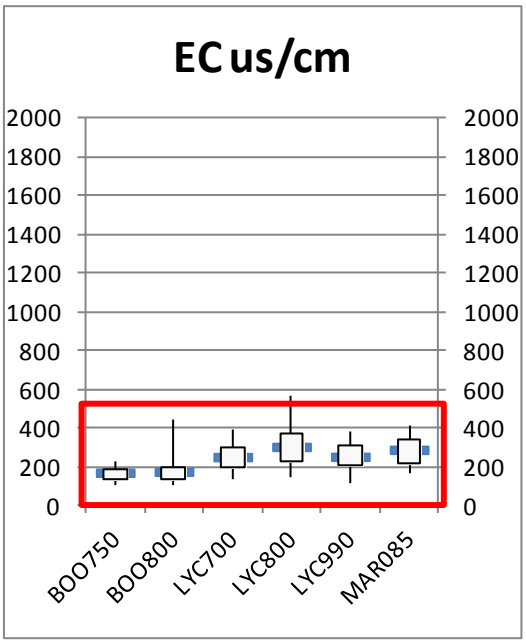
- These graphs illustrate all the long-term data collected from each site, not just the last three year's data – the red rectangle represents the scheduled dissolved oxygen guideline level.
- Dissolved oxygen levels can change remarkably over the course of a day. In disturbed waterways with high nutrient 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 .
- The Mapleton lillyponds (LIL005) show an overall high level of dissolved oxygen, but this is not necessarily an indicator of good stream health . High levels of aquatic weed growth in sunny open conditions will produce high levels of oxygen in the afternoon, and very low levels in the eqarly morning.
- All of these sites tend to sit below the scheduled guidelines, even in relatively undisturbed areas. In most cases, this is due to the ephemeral nature of the creeks, and high inputs of organic matter from vegetation.

Long-term inter-site comparison of electrical conductivity (salinity)

in the Upper Mary Catchments Waterwatch Network



Upland sites (>150 m elevation)

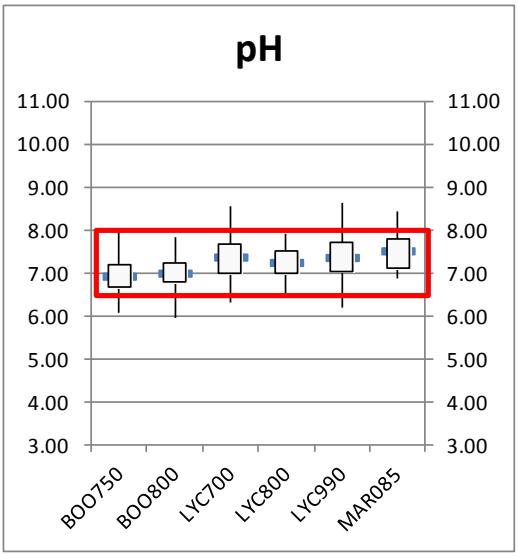


Lowland sites (<150 m elevation)

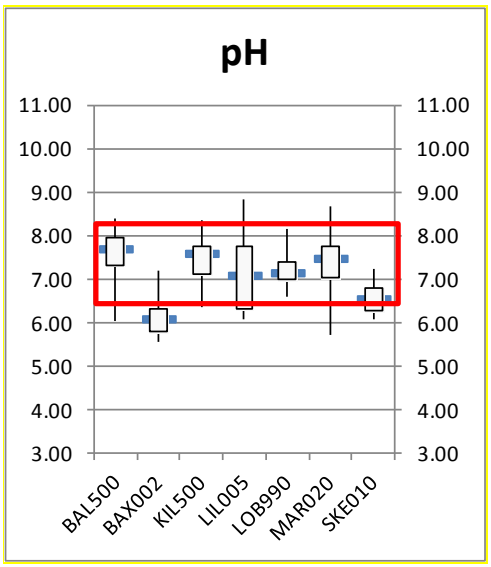
- These graph illustrates all the long-term data collected from each site, not just recent data. The red line represents the electrical conductivity guideline level of 580 us/cm – EC should be below this level to meet guideline values. There is no dissolved oxygen guideline difference between upland and lowland sites.
- Even though the period of time that these data were collected from include some very dry spells, there is no indication of electrical conductivity at any of these sites that lies outside the guideline levels.
- Balgowlah Creek is quite different to Kilcoy Creek, (to which it is a tributary). This may be an indication of a local geological influence.
- The site in Little Yabba Creek downstream of Charlie Moreland campground looks to have slightly higher overall levels of EC than the site upstream. This could be tested with a more detailed statistical analysis of the paired upstream and downstream tests to see if the difference is significant.

Long term inter-site comparison of acidity

in the Upper Mary Catchments Waterwatch Networks



Upland sites (>150 m elevation)



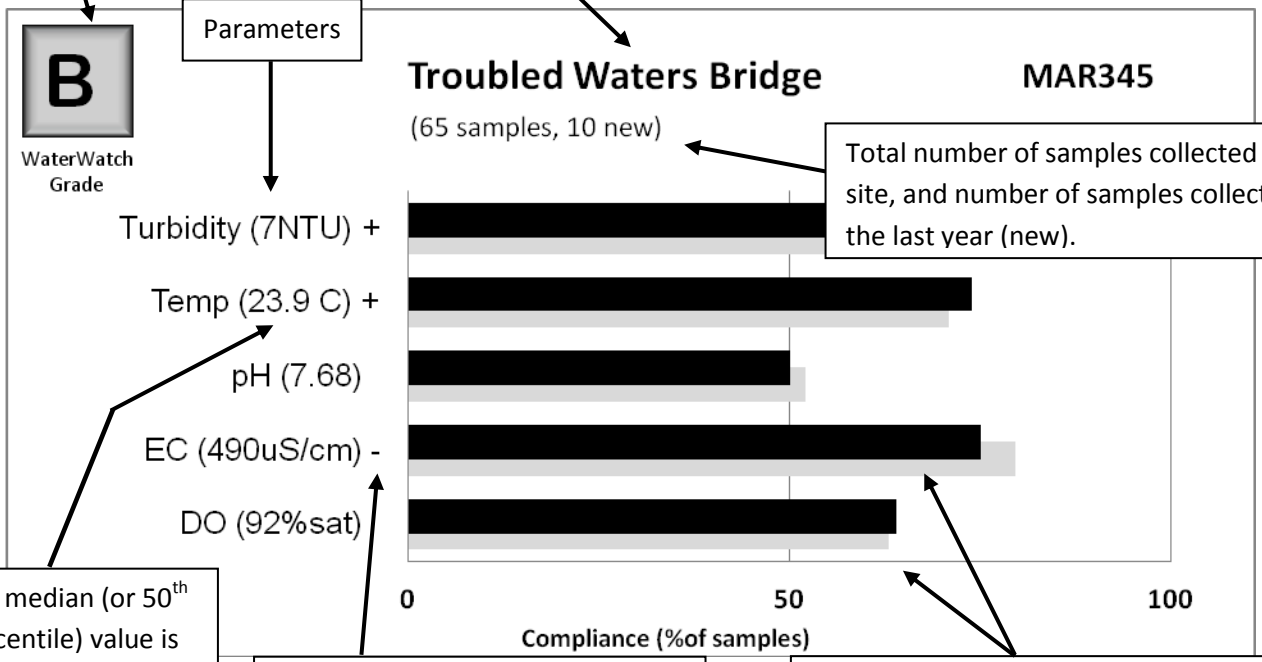
Lowland sites (<150 m elevation)

- This graph illustrates 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)
- All sites show generally good compliance with pH, with the exception of the sites draining the upper parts of the Mapleton plateau.
- The low pH of the Baxter and upper Skene's Creek sites is likely to be the result of underlying geology. It is consistent with other waterwatch data from Fryers Creek on the Maleny plateau. There is probably a case for setting local pH guidelines for creeks draining the deep red soils of the Maleny/Mapleton plateau.
- The large variation in pH in the Mapleton lillyponds is most likely associated with large variations in dissolved oxygen and carbon dioxide levels as a result of profuse aquatic plant growth in the open conditions of the lillyponds. This also contributes to an overall higher pH level recorded because waterwatch samples are taken during the day (on the high side of the diurnal pH cycle)

Mary River, Cambroon, January 2013

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.

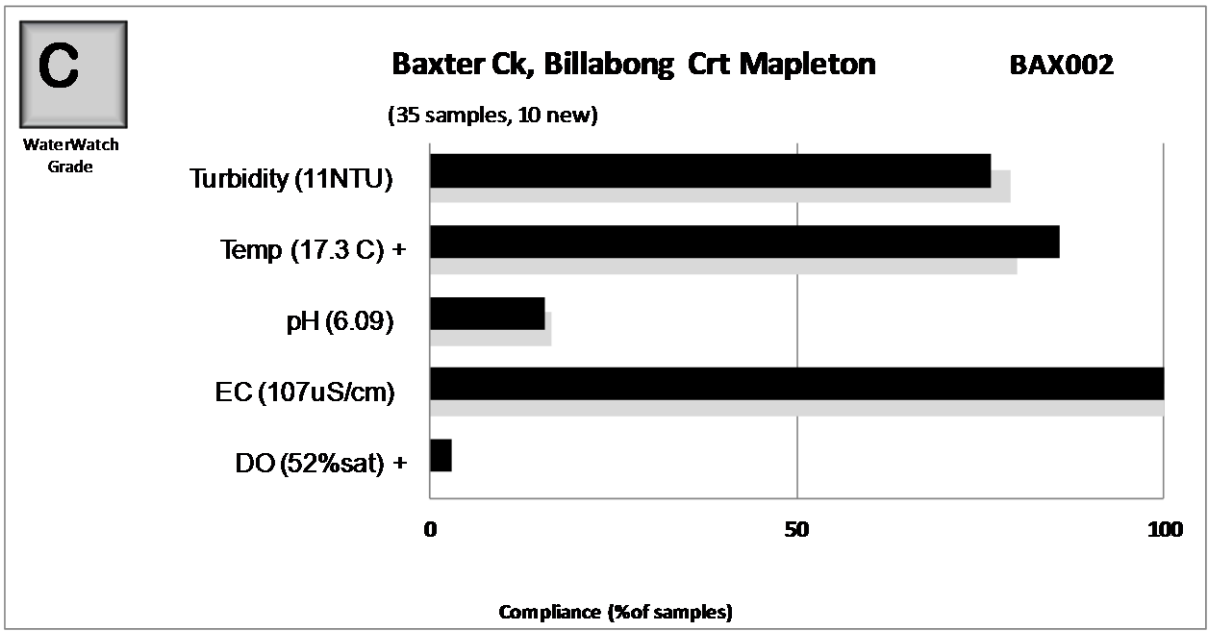


The median (or 50th percentile) value is shown in brackets after each of the parameter names. This is considered the value most representative for the parameter at this site.

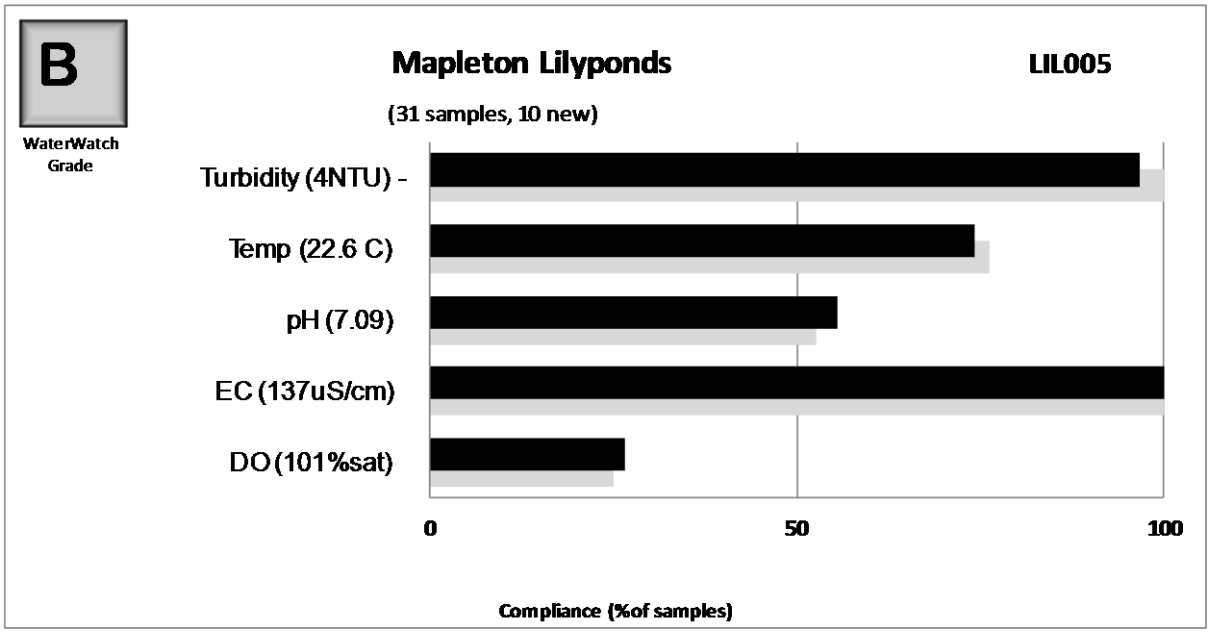
+ or – symbol for each parameter to represent trend in water quality data over the past 12 months. A "+" symbol indicates water quality has significantly improved or stayed the same, a "-" symbol indicates water quality has significantly degraded, during the last 12 months monitoring.

Percent compliance of all data collected to date for each parameter at the site i.e. the percent of samples for which the parameter was within the legally scheduled WQO guidelines. 0% means the parameter was never within the guidelines, 50% means the parameter met the guidelines in half of samples and 100% means the parameter always met the guideline value. The shadowed bar shows where these compliance levels were three years ago.

Mapleton township creek sites

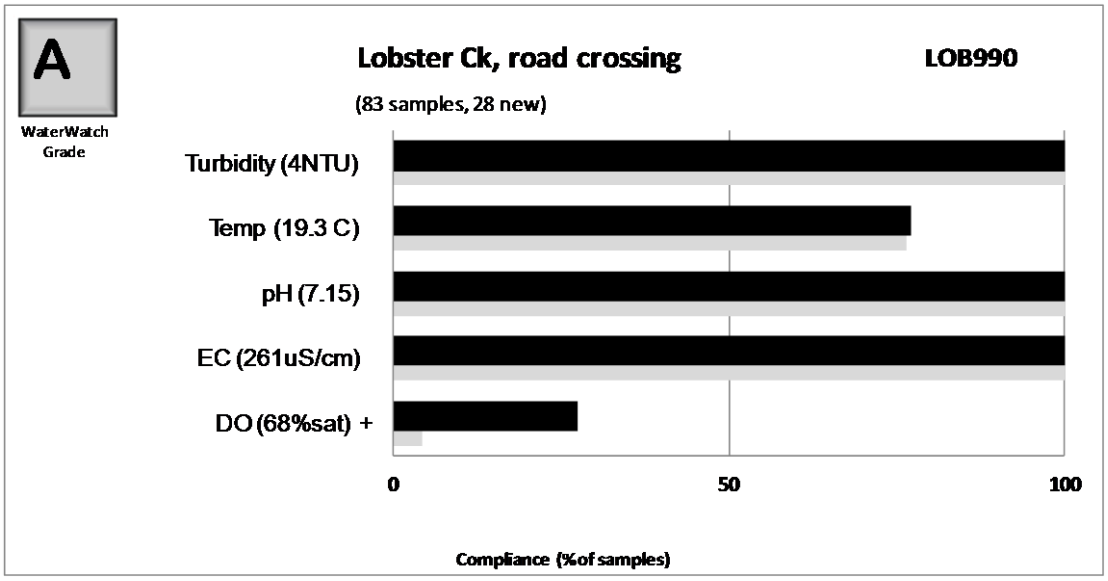


- Good sample size, enough data for analysis
- An improvement in compliance for temperature, electrical conductivity (salinity) & dissolved oxygen over the past 3 years
- Good compliance for turbidity
- Low compliance for pH, as this is an acidic Waterwatch site. In common with all the streams draining from the northern part of the Mapleton Range (Gheerulla, Cedar, Coolabine, Skene Creeks etc) display an acidic ambient water quality character due to the basalt geology of the district.

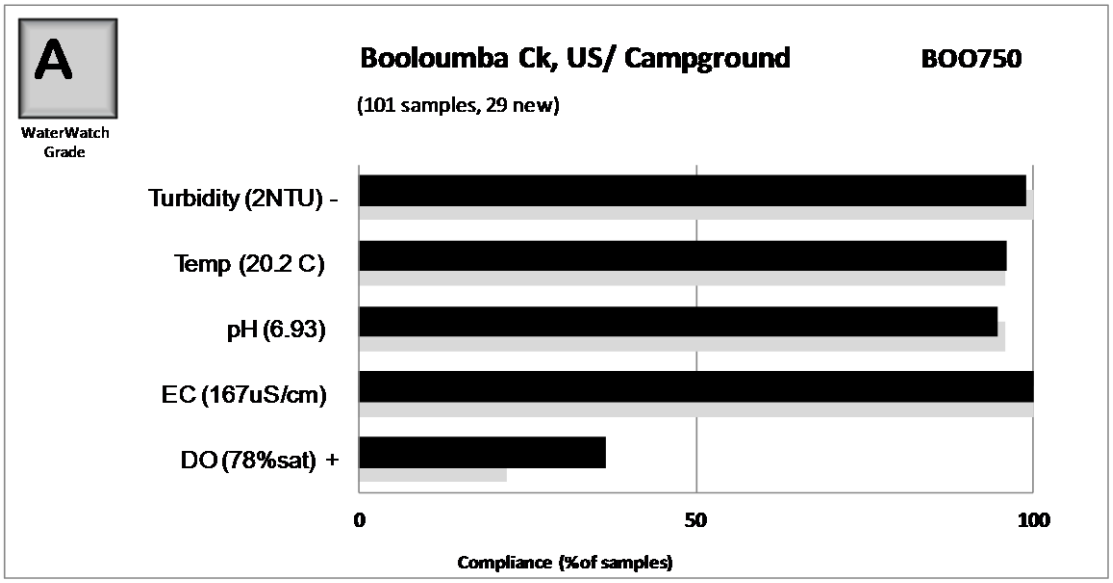


- Good sample size
- Extraordinary variation in dissolved oxygen levels at this site
- Large variation in pH levels at this site – which is consistent with being an open body of water
- Maintaining an overall grade of B (2010 Waterwatch Grade = B)

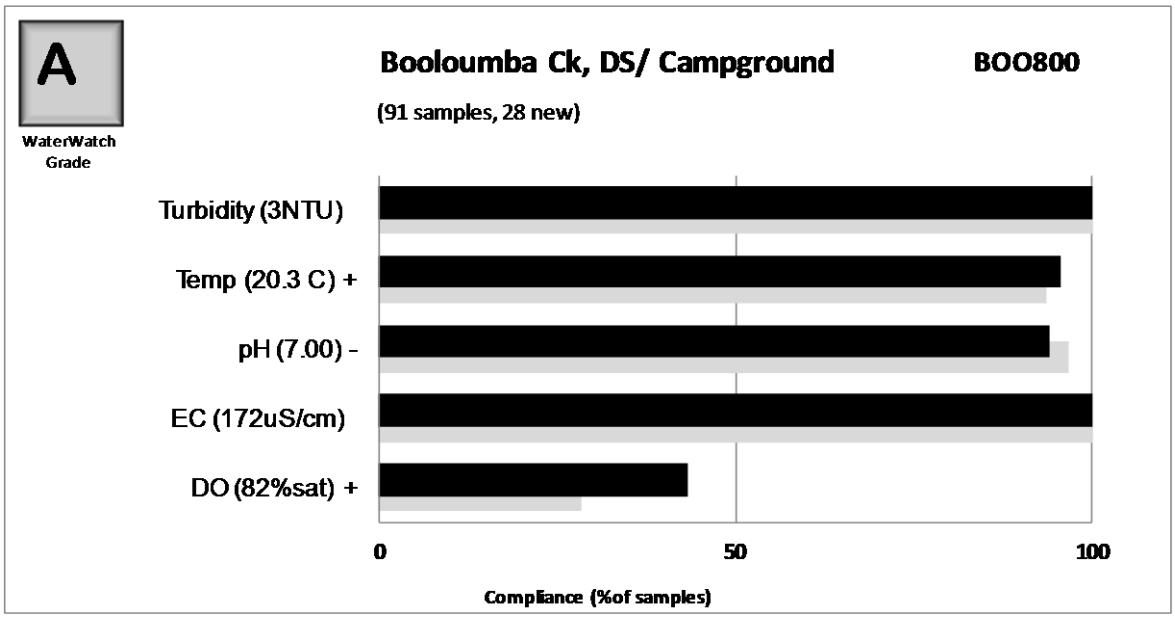
Conondale National Park



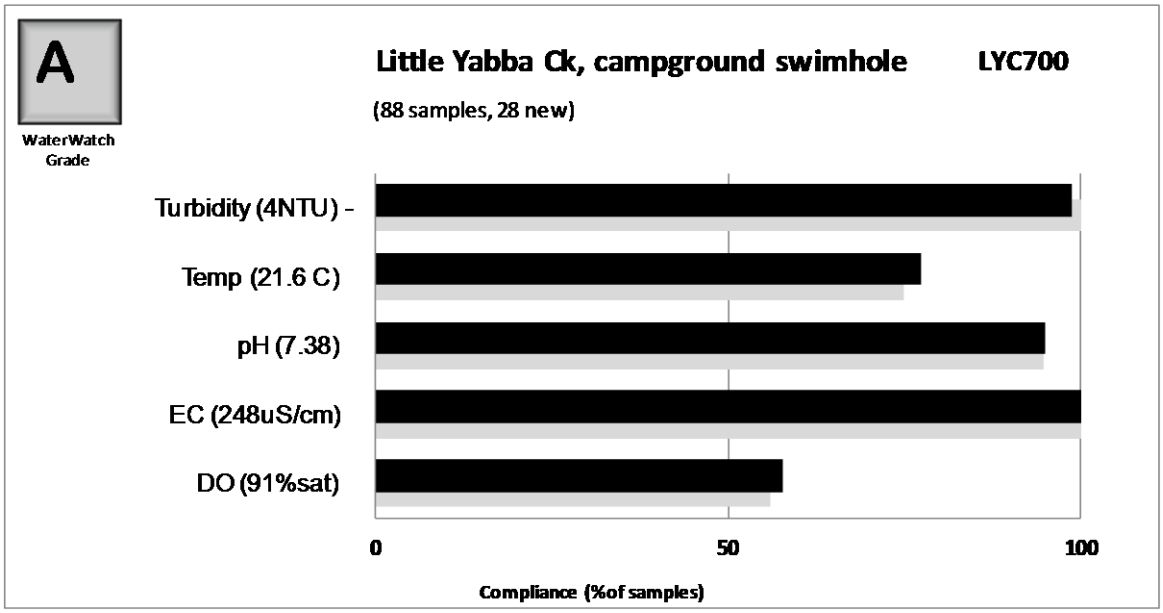
- Good sample size
- Significant improvement in compliance with dissolved oxygen guidelines over the past 3 years
- Maintaining an overall grade of A (2010 Waterwatch Grade = A)



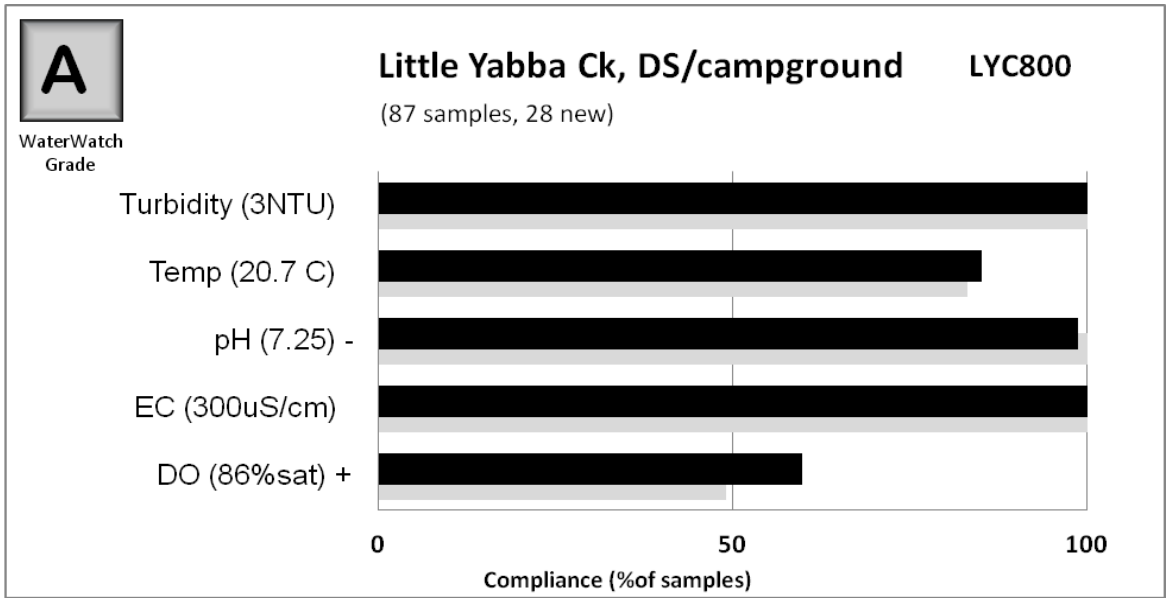
- Excellent sample size (gold star award winner!)
- Significant improvement in compliance with dissolved oxygen guidelines over the past 3 years
- Significant decrease in turbidity compliance over the past 3 years
- Maintaining an overall grade of A (2010 Waterwatch Grade = A)



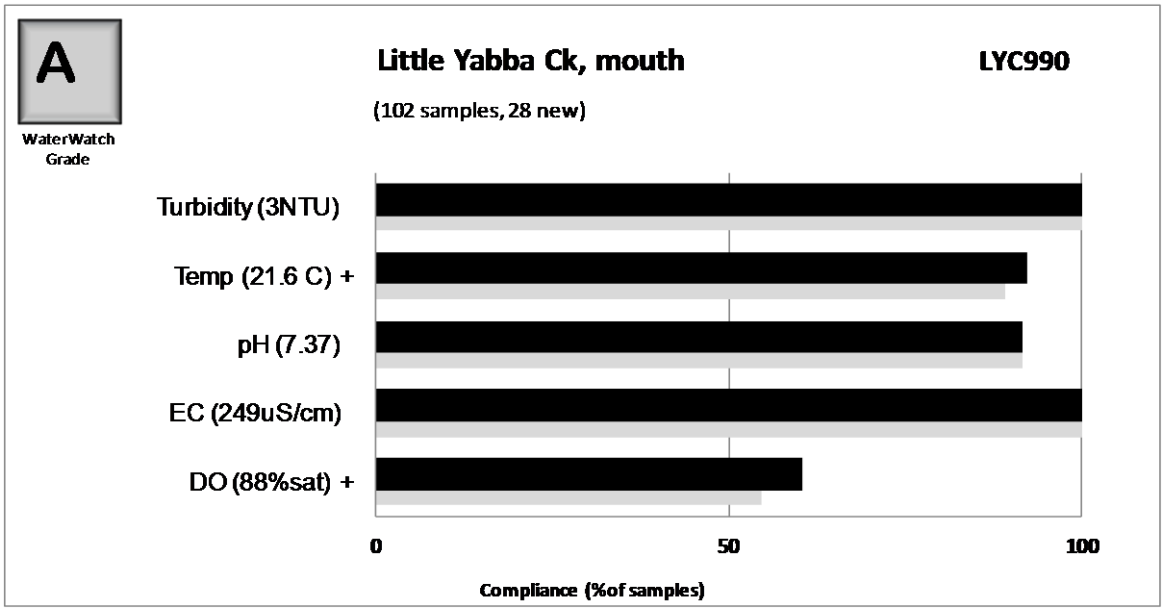
- Good sample size
- Significant improvement in compliance with dissolved oxygen & water temperature guidelines over the past 3 years
- Maintaining an overall grade of A (2010 Waterwatch Grade = A)



- Good sample size
- Significant improvement in compliance with electrical conductivity (salinity) guidelines over the past 3 years
- Significant decline in compliance with turbidity guidelines over the past 3 years
- Maintaining an overall grade of A (2010 Waterwatch Grade = A)

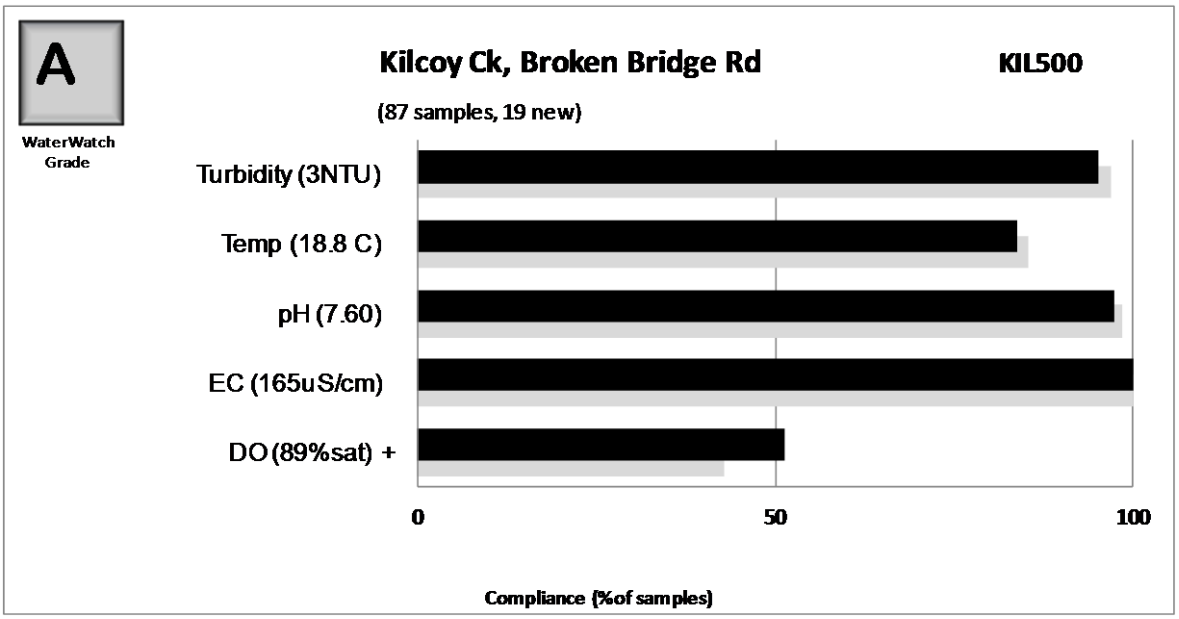


- Good sample size
- Significant improvement in compliance with dissolved oxygen levels over the past 3 years
- Maintaining an overall grade of A (2010 Waterwatch Grade = A)

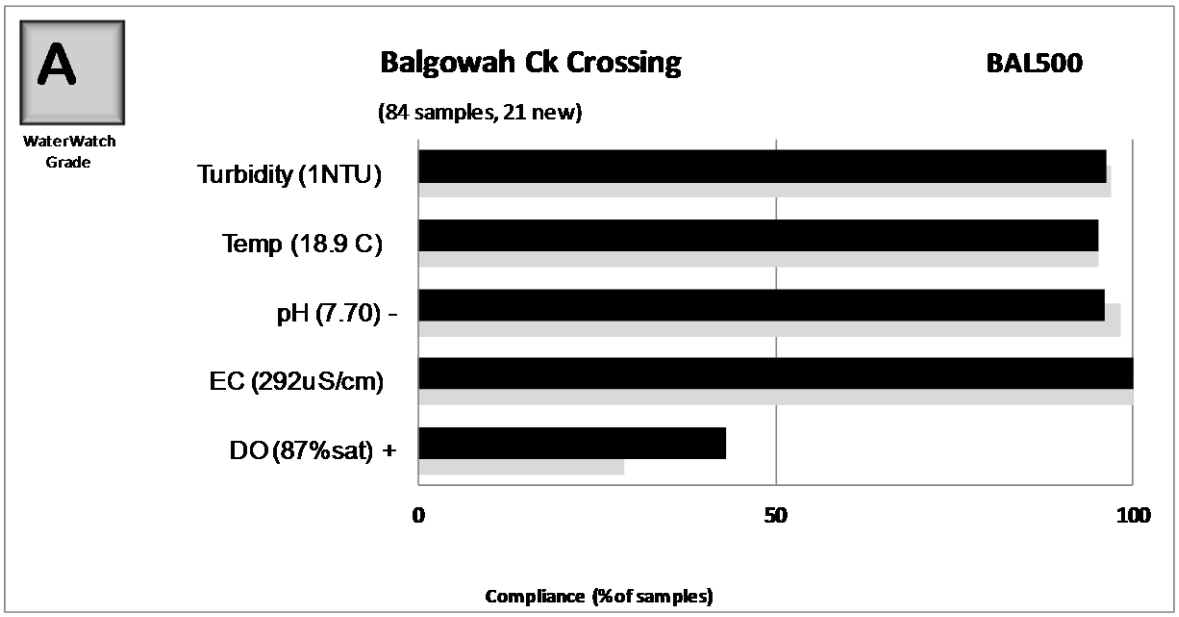


- Excellent sample size (gold star award winner!)
- Significant improvement in compliance with dissolved oxygen levels & water temperature (probably due to increased flow rates ensuring no stagnant, warm water) over the past 3 years
- Maintaining an overall grade of A (2010 Waterwatch Grade = A)

Upper Mary tributaries

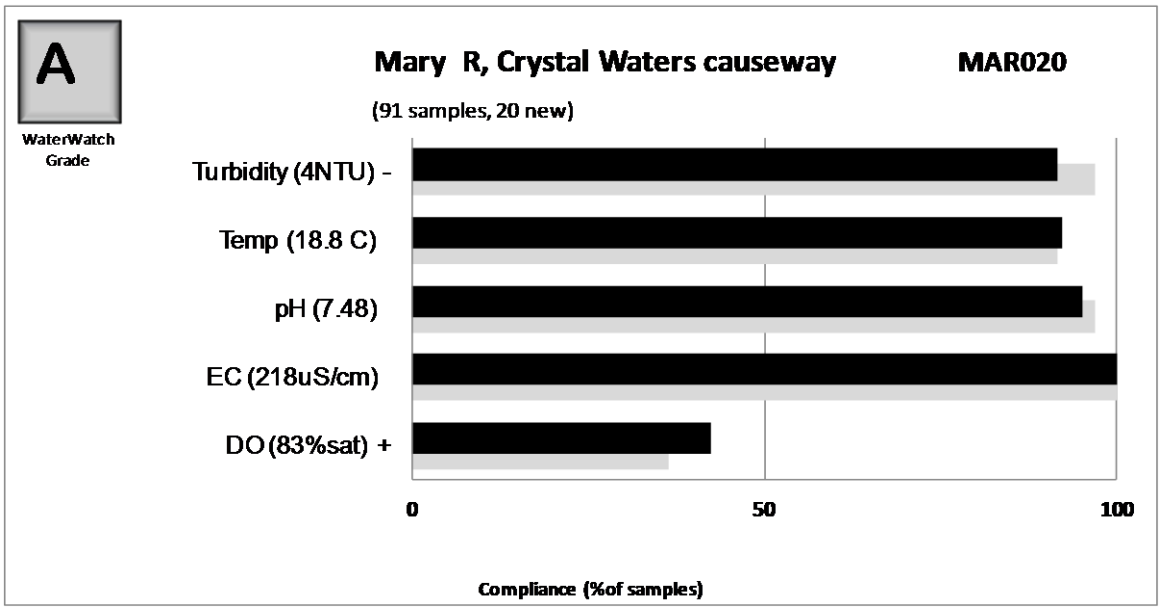


- Good sample size
- Significant improvement in compliance with dissolved oxygen and electrical conductivity (salinity) guidelines over the past 3 years
- Maintaining an overall grade of A (2010 Waterwatch Grade = A)

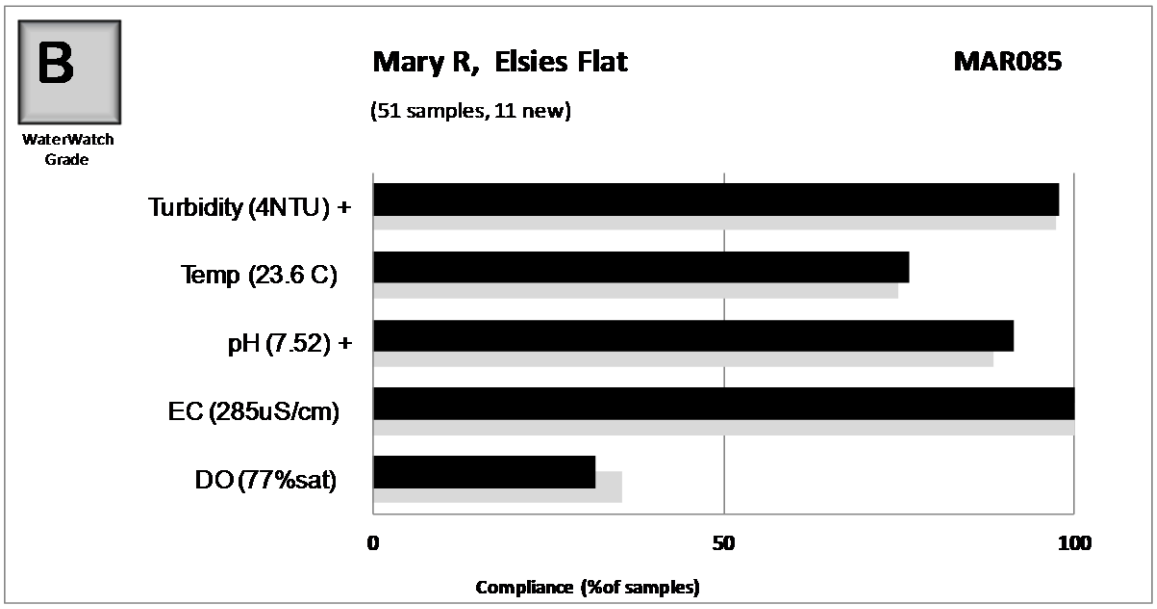


- Good sample size
- Significant improvement in compliance with dissolved oxygen guidelines over the past 3 years
- Excellent compliance with electrical conductivity (salinity) guidelines
- Maintaining an overall grade of A (2010 Waterwatch Grade = A)

Upper Mary River



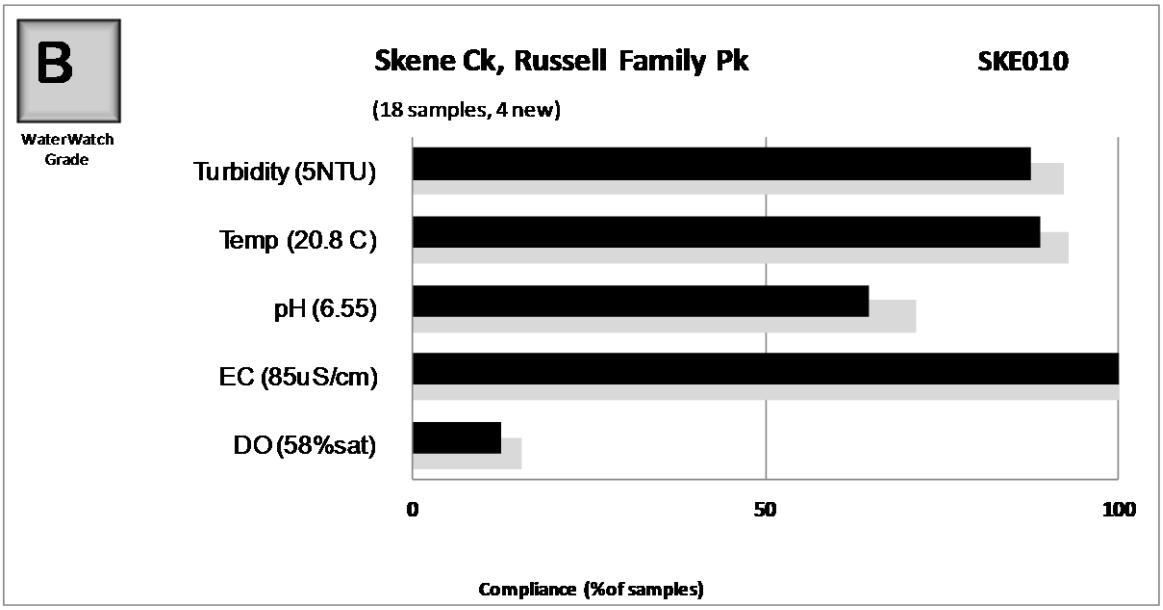
- Good sample size
- Signficant increase in compliance of dissolved oxygen and electrical conductivity (salinity) over the past 3 years
- Significant decrease in compliance for turbidity over the past 3 years
- Maintaining an overall grade of A (2010 Waterwatch Grade = A)



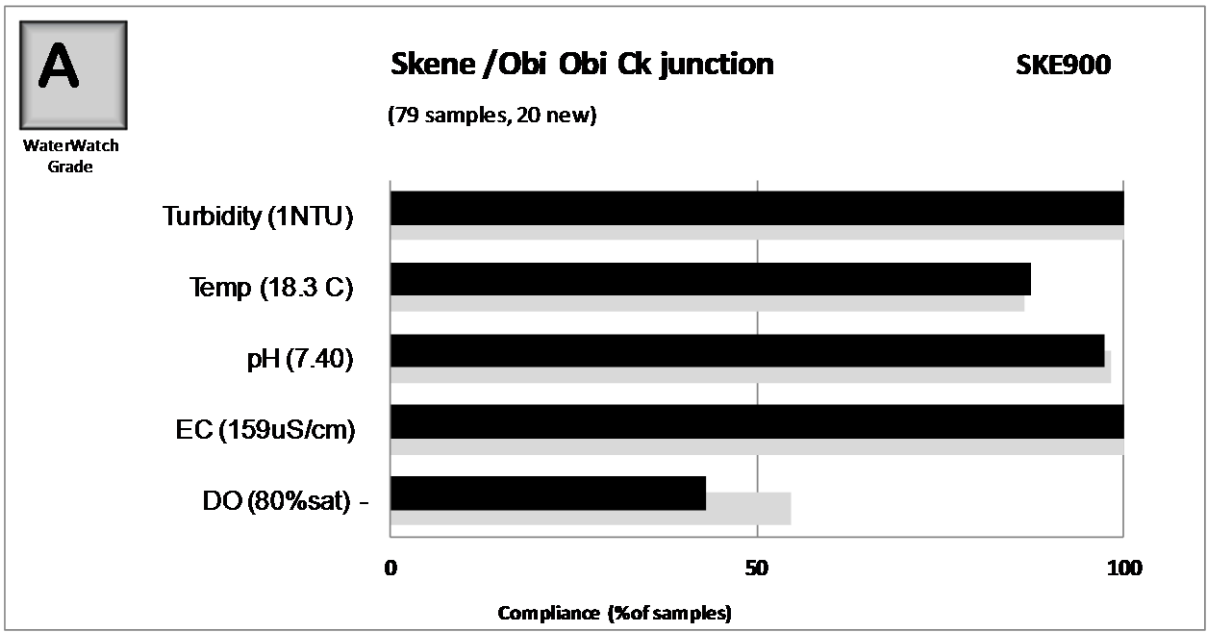
- Good sample size
- Significant increase in compliance for pH and turbidity guidelines over the past 3 years
- Excellent compliance for electrical conductivity guidelines
- The most concerning aspect of this site is the low dissolved oxygen compliance in a regularly flowing section of the river.
- Maintaining an overall grade of B (2010 Waterwatch Grade = B)

Obi Obi Valley

Skene Creek

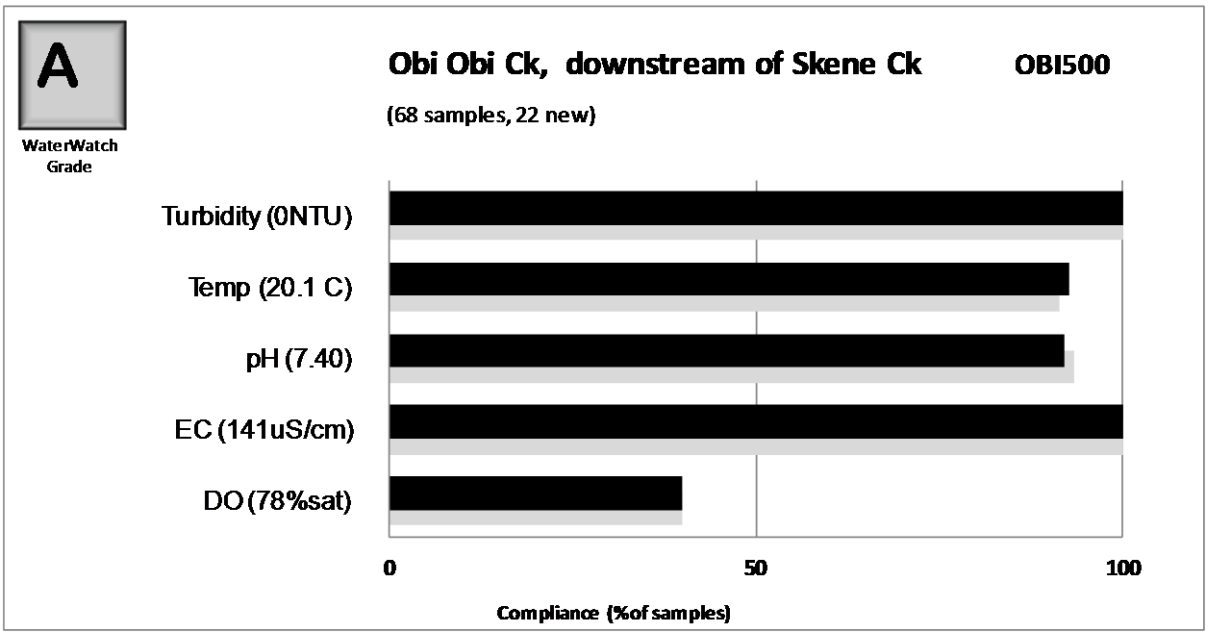


- Maintaining a B grade score
- Excellent compliance for electrical conductivity guidelines – very low EC readings recorded at this site



- Good sample size
- Significant decline in dissolved oxygen levels over the past 3 years
- Maintaining an overall grade of A (2010 Waterwatch Grade = A)

Obi Obi Creek



- Good sample size
- Maintaining an overall grade of A (2010 Waterwatch Grade = A)

Appendix

2013 flood heights from gauging stations

Gauging Station	February 2013 Peak Height	January 2013 Peak Height	Ranking
Bellbird – Mary River (downstream of Conondale)	6.18m 26/2/13 1.50am	8.775m	Jan'13 - 6th highest since gauging commenced in 1959 Record peak – 1989 – 11.0m, 329 097 meg/day
Kenilworth Homestead – Mary River	8.37m 26/2/13 4.19am	10.57m	
Moy Pocket – Mary River (downstream of Kenilworth)	13.60m 26/2/13 5.01am	15.266m	Jan '13 - 10th highest peak since gauging commenced in 1963 Record peak – 1999 – 16.87m, 312 336 meg/day
Fishermans Pocket – Mary River (downstream of Gympie)	19.46m 27/2/13 4.30am	20.954m	Record peak – 1999 – 23.68m
Miva - Mary River	17.69m 27/2/13 3.20pm	20.536m	Jan'13 - 2nd highest peak since gauging commenced in 1910 Record peak – 1974 – 20.8m, 641 606 meg/day
Home Park – Mary River	17.97m 27/2/13 7.00pm	23.565m	Jan'13 – New highest peak since gauging commenced in 1982
Maryborough – Mary River	8.10m 28/2/13 11.00am	10.7m 29/1/13 8.00am	
Wide Bay Ck - Kilkivan	4.63m 26/2/13 1.12am	8.971m	Jan'13 - 2nd highest peak since gauging commenced in 1974 Record peak – 2011, 8.975+ m
Wide Bay Ck – downstream of Woolooga (Brooyar)		13.78m	Jan'13- New highest peak since gauging commenced in 1909 Previous peak – 2011, 12.937m
Munna Creek - Marodian	11.12m 27/2/13 1.00am	16.713 m	Jan'13 - New highest peak since gauging commenced in 1955 Previous peak – 1955 – 16.24m, 274,492 meg/day
Glastonbury Creek	5.18m 25/2/13 9.00pm	8.331m	Jan'13 - New highest peak since gauging commenced in 1955 Previous peak – 1955 @ 81 129 meg/day
Kandanga Ck – Hygait	6.49m 26/2/13 12.20am	8.49m	Jan'13 – 3rd highest peak since gauging commenced in 1970 Record peak – 1989 – 8.77m, 114 566 meg/day
Tinana Ck – Goomboorian	?6.96m+ 25/2/13 12.50pm		Gauging station failed early in February'13 flood
Tinana Ck - Bauple	13.23m 27/2/13 3.00pm	13.043m	Record peak – 2012 – 14.14m, 91 219 meg/day
Six Mile Ck – Cooran	10.35m 26/2/13 6.00am	10.581m	Record peak – 1992 - 11.94m
Amamoor Creek	7.78m 25/2/13 11.04pm	9.67m	Jan'13 - 4th highest peak since gauging commenced in 1984 Record peak – 1989 – 10.96m
Obi Obi Ck – Maleny	1.31m 25/2/13 10.30pm	1.812m	2011 peak – 2.006m Record peak – 2.566m
Deep Creek – Cedar Pocket dam spillway	1.33m over spillway 25/2/13 6.35pm		
Yabba Creek – Borumba Dam spillway	2.96m over spillway 26/2/13 4.50am		Approx. 6 metres over spillway in January 2013

Bureau of Meteorology significant flood heights of the Mary River catchment

River height station	Feb 1893	Mar 1955	Jan 1968	Jan 1974	Apr 1989	Feb 1992	Feb 1999	Jan 2011
Kenilworth Bridge	-	13.67	11.28	12.00	12.06	9.80	11.90	-
Imbil	-	11.73	6.50	9.75	8.80	8.90	10.70	8.20
Cooran	10.69	8.66	8.81	9.58	9.15	10.25	9.65	10.22
Gympie	25.45	21.44	18.75	20.73	19.65	21.40	21.95	19.45
Woolooga	12.04	9.75	4.95	7.54	9.15	5.28	7.40	-
Miva	23.08	21.84	18.92	20.80	18.30	20.45	20.65	19.80
Marodian	-	16.08	9.12	12.36	3.51	9.31	2.55	11.99
Tiaro	21.95	20.75	17.78	20.62	15.95	18.60	18.10	17.10
Bauple East	-	-	15.54	14.88	8.42	14.37	12.73	10.25
Maryborough	12.27	11.23	9.25	10.95	6.60	9.50	8.75	8.20

n.b. this table is a combination of river height (flood) stations and flow gauging stations

Bridge flood heights in the Mary River catchment	Flood height
Kenilworth bridge, Kenilworth (Mary R)	11.2m
Cooroy, Lake Macdonald Drive (Six Mile Ck)	4.95m
Imbil, town bridge (Yabba Creek)	6.1m
Cooran, Victor Giles bridge (Six Mile Creek)	7.2m
Gympie, Six Mile Ck bridge, Bruce Highway	17.96m
Gympie, Inglewood Bridge, Bruce Highway (Deep Ck)	13.56m
Gympie, Pengellys bridge, Brisbane Road (Deep Ck)	15.82m
Gympie, Normanby bridge (Mary R)	15.92m
Gympie, Kidd bridge (Mary R)	9.23m
Bell's bridge, Wide Bay Highway (Mary R)	13.10m
Miva, Dickabram bridge (Mary R)	22m
Tiaro, Tiaro bridge (Mary R)	6.6m
Maryborough, Lamington bridge (Mary R)	5.5m

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^{th} and 10^{th} 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.