Kenilworth & District

Waterwatch Report

2010 – 2013

Waterfalls at Moy Pocket quarry, January 2013

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MRCCC Catchment Officers, October 2013 v2

This report prepared with the assistance of the Queensland Government Everyone's Environment Grant

Introduction

Hello to the Kenilworth & District Waterwatch network volunteers.

Some of the original volunteers of the Kenilworth & District Waterwatch network have now collected over 100 water quality samples from their site which earns them a gold medal for Waterwatching! 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., and 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.

Many volunteers have expressed concern about rising electrical conductivity (EC) levels over the winter 2012 period. During this time we experienced 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. Sampling of the baseflow in the creeks during this time produced some high electrical conductivity (salinity) levels. After a number of queries from volunteers, we have analysed the long term electrical conductivity data at multiple sites to determine whether an increasing or decreasing electrical conductivity trend is now occurring.

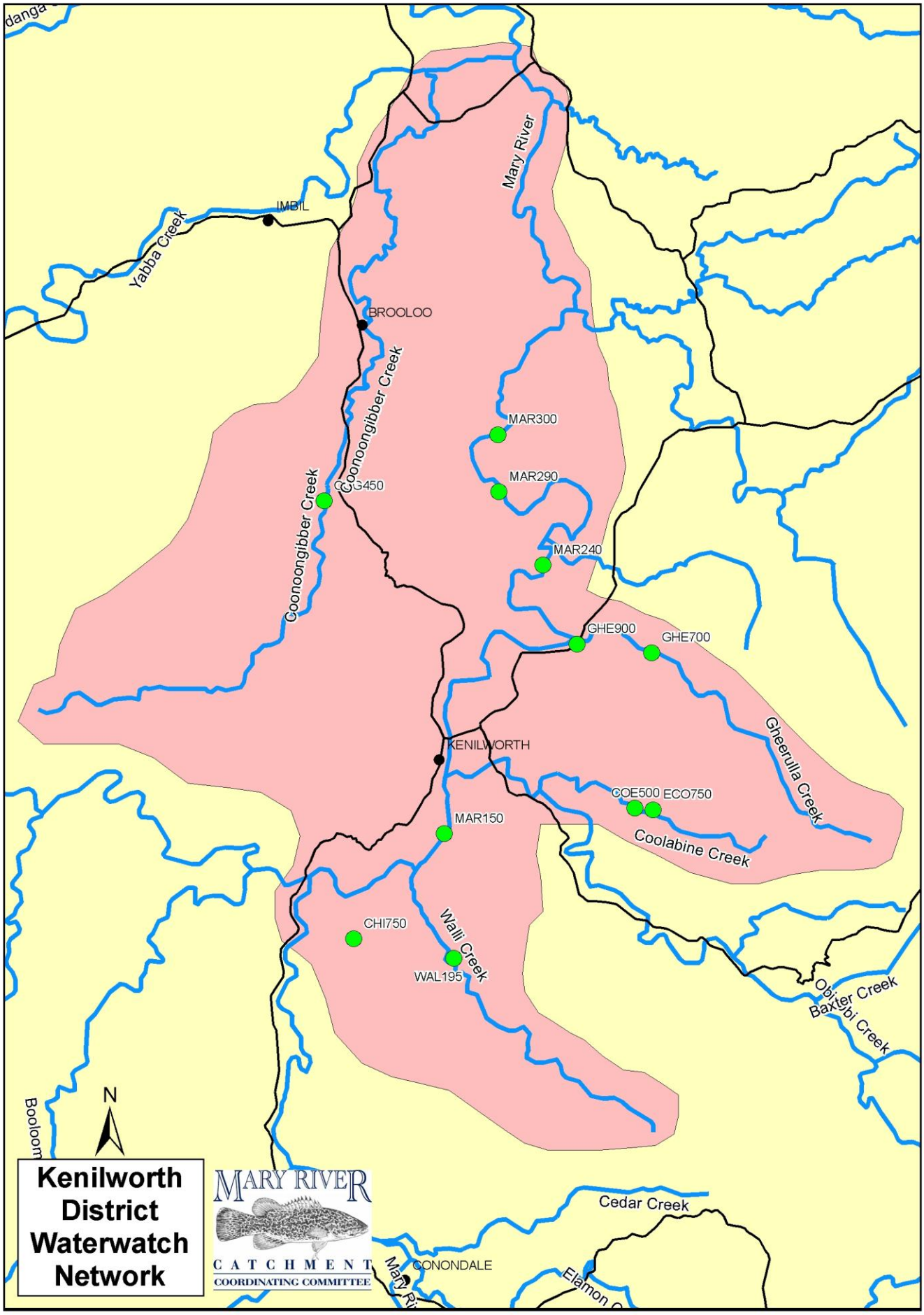
Waterwatch sites monitored in the Kenilworth & District Waterwatch Network

Kenilworth & District Waterwatch Network		
Site Code	**Creek Name**	**Location**
COE500	Coolabine Creek	Hunsley Rd, Coolabine
ECO750	East Coolabine Creek	Coolabine
COG450	Coonoongibber Creek	Callemonda Rd, Brooloo
GHE700	Gheerulla Creek	Campground, National Park
GHE900	Gheerulla Creek	Pioneer Park, Gheerulla
MAR150	Mary River	Upstream of Walli Ck Road, Kenilworth
MAR240	Mary River	Pickering Bridge, Moy Pocket
MAR290	Mary River	Old Moy Pocket Rd, Moy Pocket
MAR300	Mary River	Walker Rd, Moy Pocket
OBI940	Obi Obi Creek	Houston Bridge, Coolabine
OBI500	Obi Obi Creek	Upstream of Skene Creek
WAL195	Walli Creek	End of Walli Creek Rd
BEL200	Belli Creek	Belli Creek Crossing 1, Belli Park
BEL200	Belli Creek	Belli Creek Crossing 2, Belli Park
CED600	Cedar Creek	Murray Rd causeway, Belli Park
YAB680	Yabba Creek	Imbil township

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 2010-13. Contributors to this waterwatch network aret are: Ian Mackay, Kathleen and Steve Dennis, Bec Owens, Mary Ann and Don Law, Geoff and Marie Farr, Matt Baxter, Graeme White, Nina Cox, Des King, Colleen Ryan, Karyn Maher, John Mayze, Phil Grove, Bev Hand, Kenilworth Service Station, Gympie Vet Services and Cooroy Gym

Kenilworth & District Waterwatch Site Map



Summer 2013 floods

The Australia Day long weekend floods in the Kenilworth district 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.

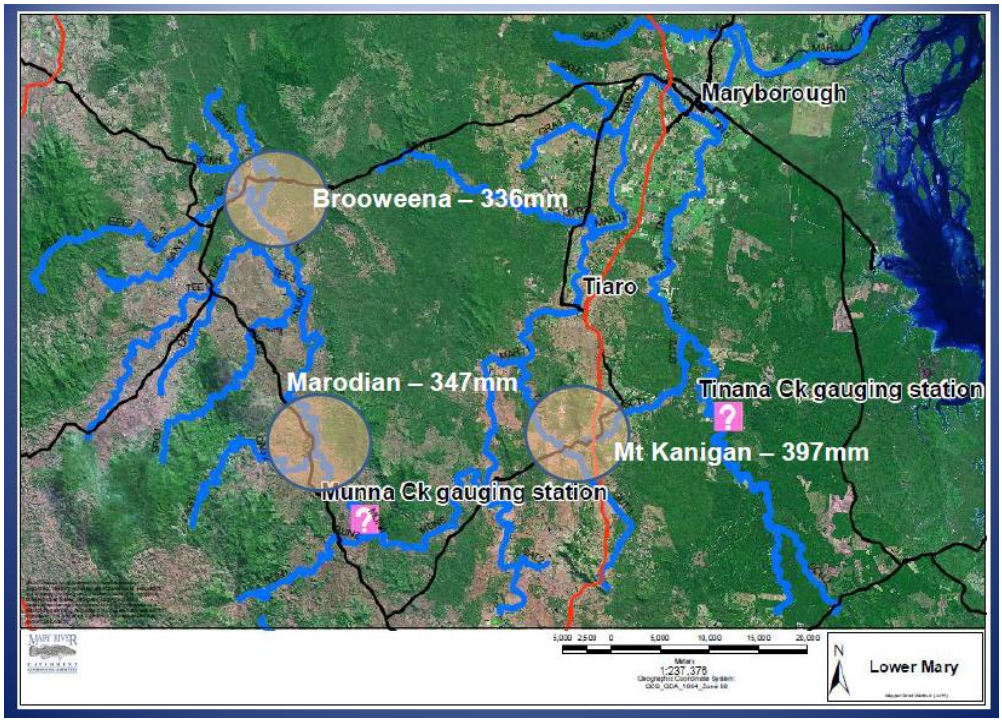


Figure 1 – peak daily rainfall recorded on 27/1/13

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.

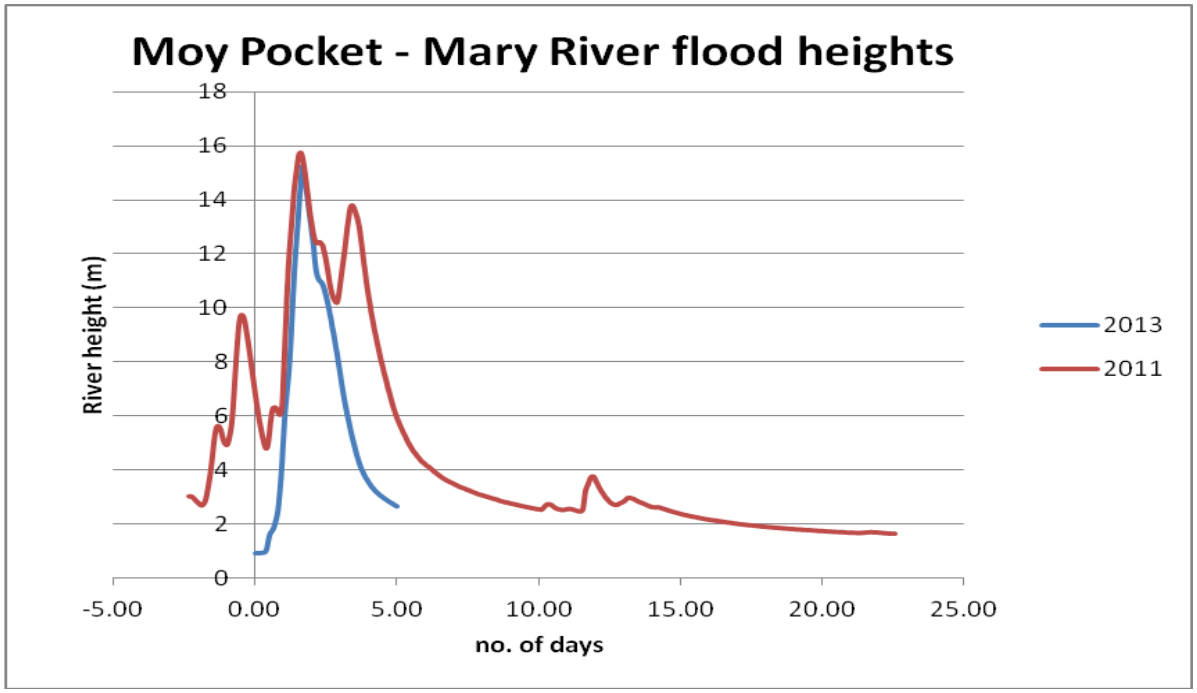


Figure 2 – Moy Pocket, Mary River (downstream of Kenilworth) flood heights

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 Mary Basin guidelines for lowland freshwater are applicable to all sites in this report for the Kenilworth Waterwatch network, although long term data being collected is starting to suggest that there may be a case for developing a specific set of pH guidelinevalues for some of the eastern tributaries of the Mary which drain the 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

Mary River, Moy Pocket, May 2013

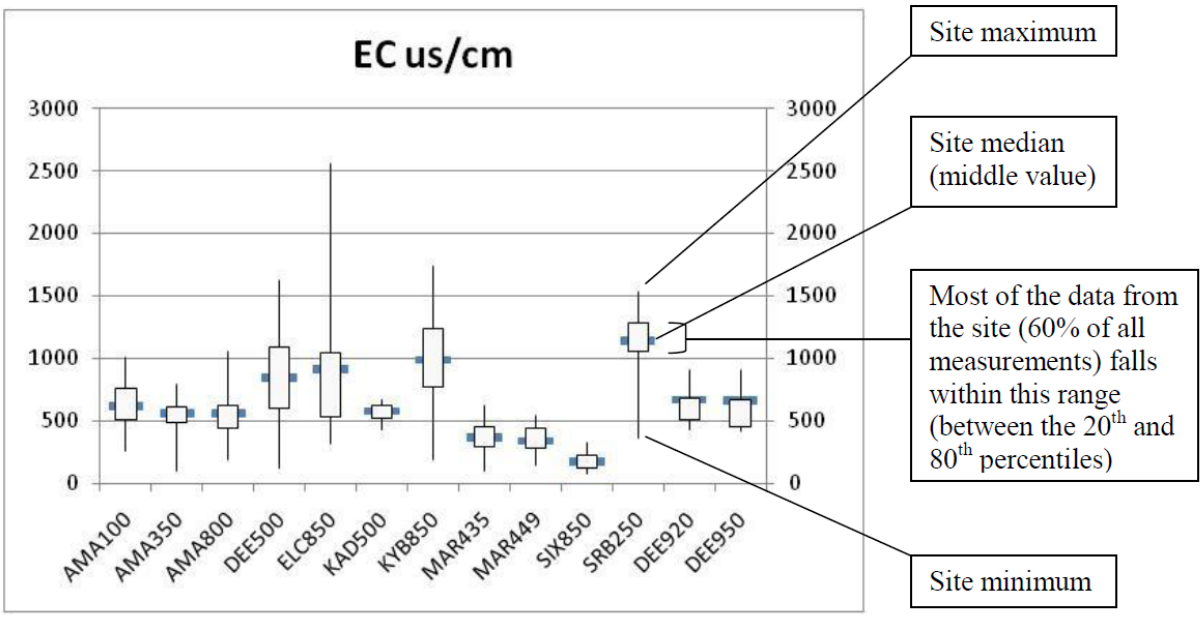
Results- inter-site comparisons

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:

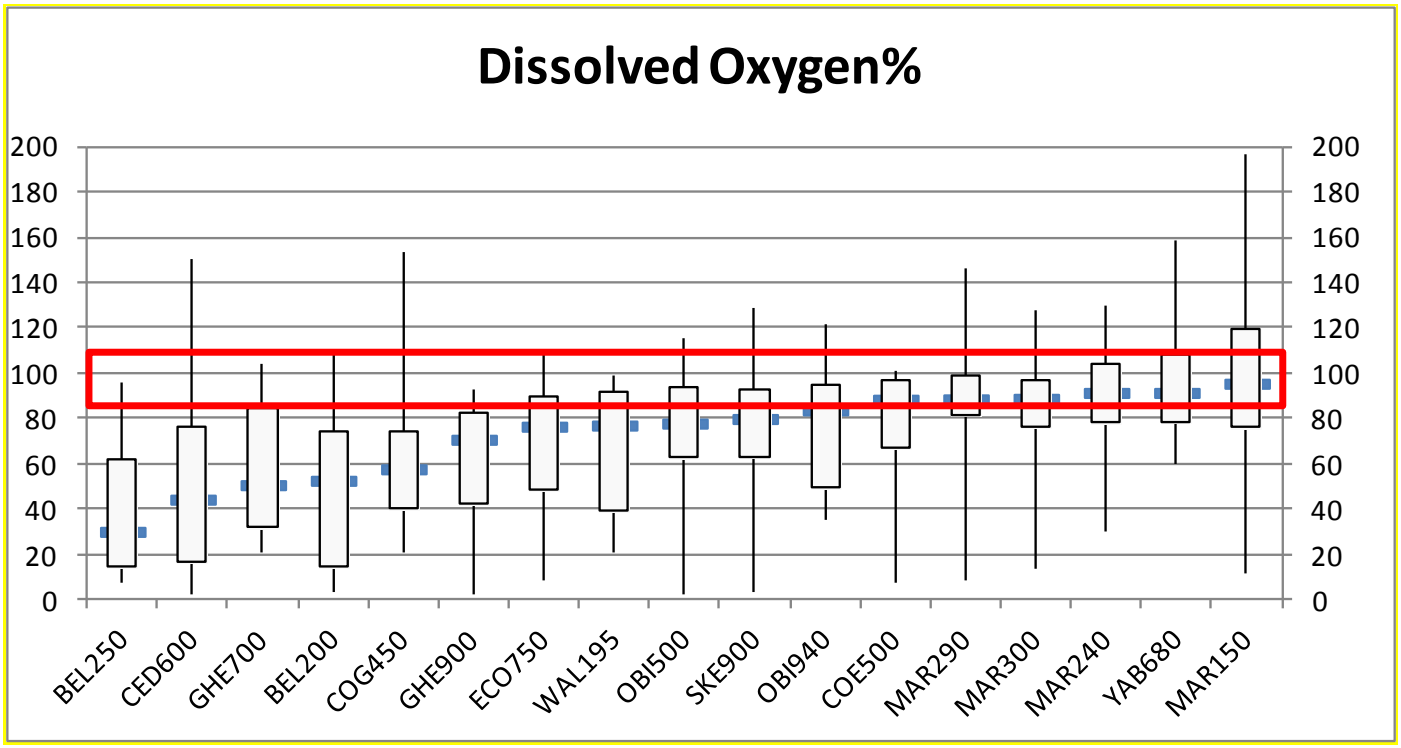
- The vertical line (whiskers) shows the range between the maximum and minimum values recorded at the site.
- The vertical boxes show the range between the 20th and 80th percentiles at each site.
- The horizontal bars show the median value (50th percentile) for each site.

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



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

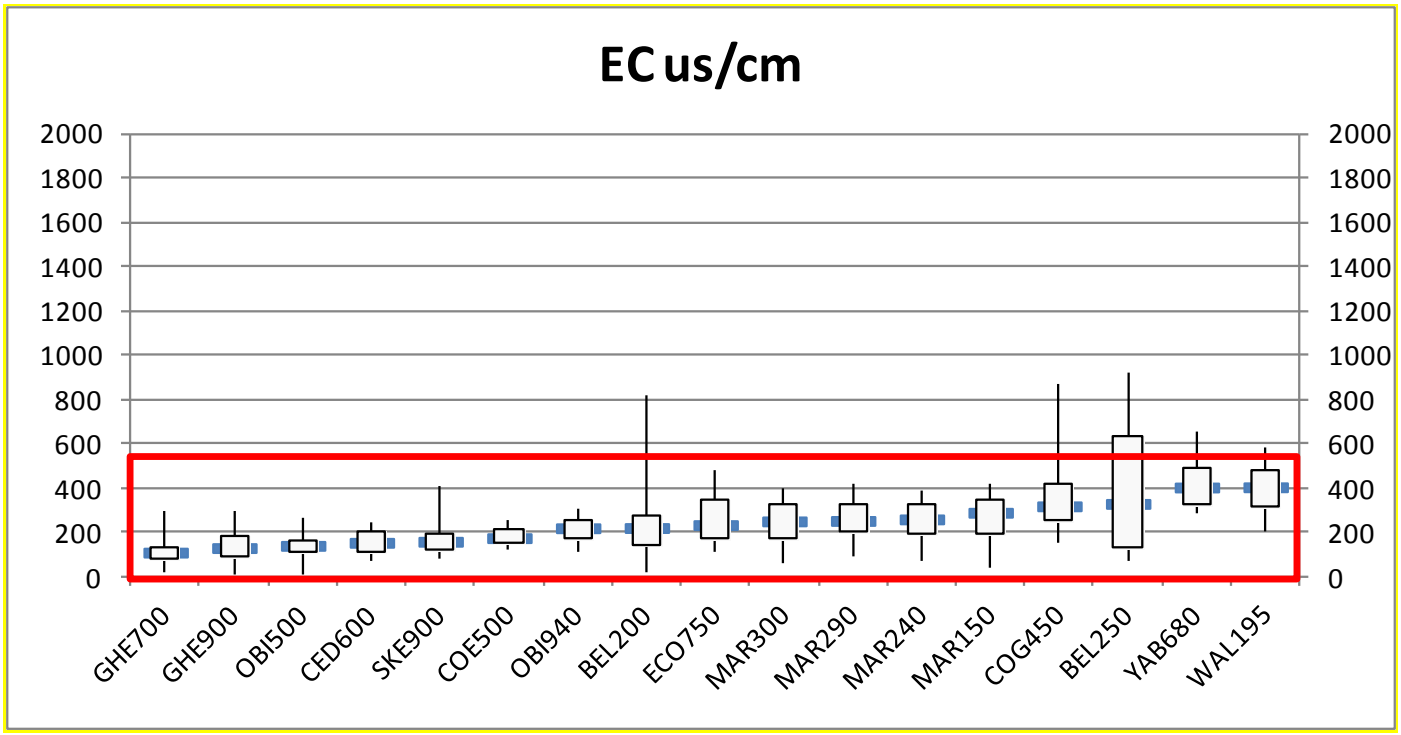
in the Kenilworth & District Waterwatch Network



- This graph illustrates all the long-term data collected from each site, not just the last year's data – the red rectangle represents the dissolved oxygen guideline level of 85% to 110% saturation (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
- The more ephemeral creeks, with high carbon inputs from leaf litter (eg. Belli, Gheerulla, Walli, Cedar, East Coolabine, Coonoon Gibber) have generally lower oxygen levels, accompanied by much more variability in oxygen level.
- Waterways with a more consistent flow regime.generally show higher overall oxygen levels (eg. Obi Obi, Yabba, main trunk of the Mary)
- 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 MAR150)

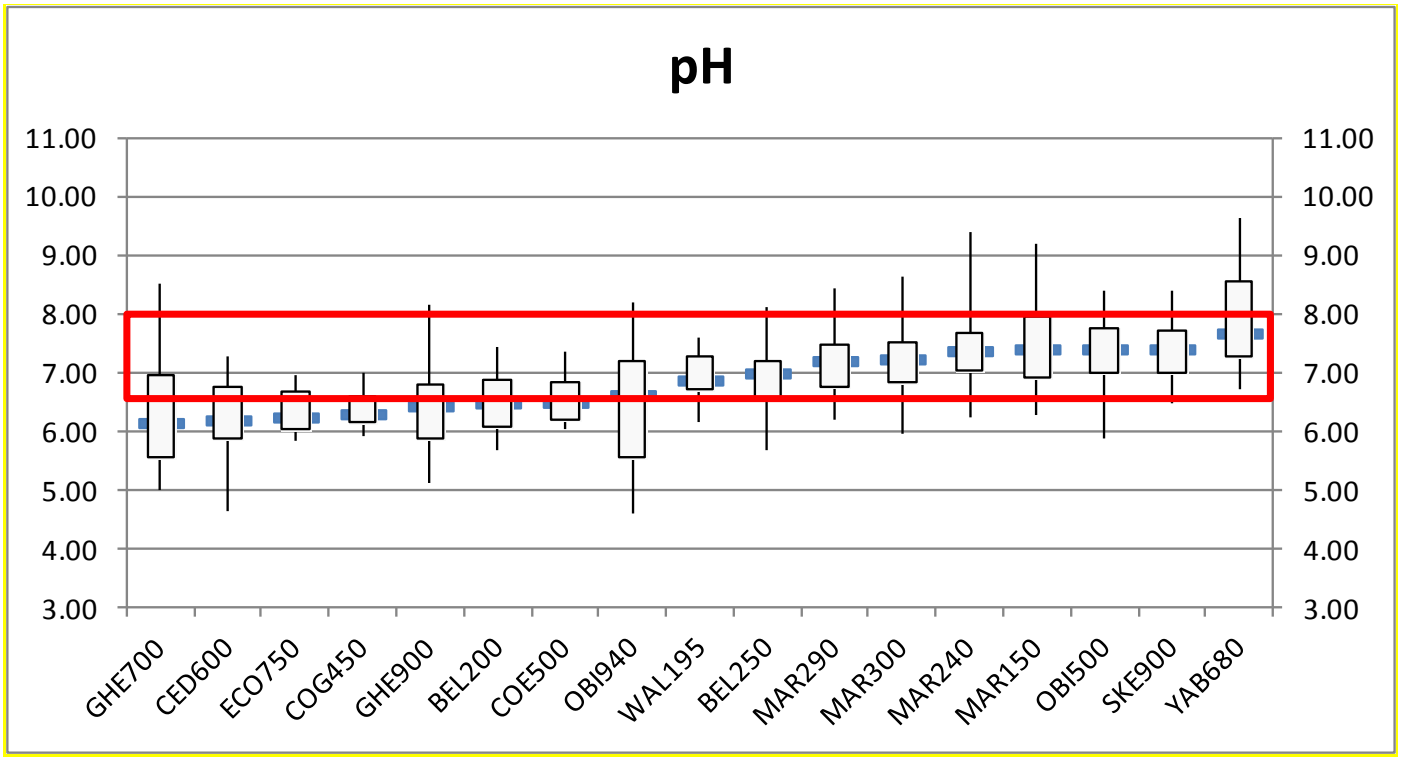
Long-term inter-site comparison of electrical conductivity (salinity)

in the Kenilworth & District Waterwatch Network



- This graph illustrates all the long-term data collected from each site, not just the last year's data. The red line represents the electrical conductivity guideline level of 580 us/cm – EC should be below this level to meet guideline values.
- These graphs reflect 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.
- Waterways throughout this network generally show low levels of EC. However some sites record relatively high values of EC during low flow periods, indicating a contribution from a saline baseflow (Belli and CoonoonGibber Creeks)
- Belli Ck crossing 2 (BEL250) shows a marked tendency towards high EC during periods of low flow - which is not obvious at the Belli Creek Crossing 1 site (BEL200) immediately upstream.

Long term inter-site comparison of acidity in the Kenilworth & District Waterwatch Network

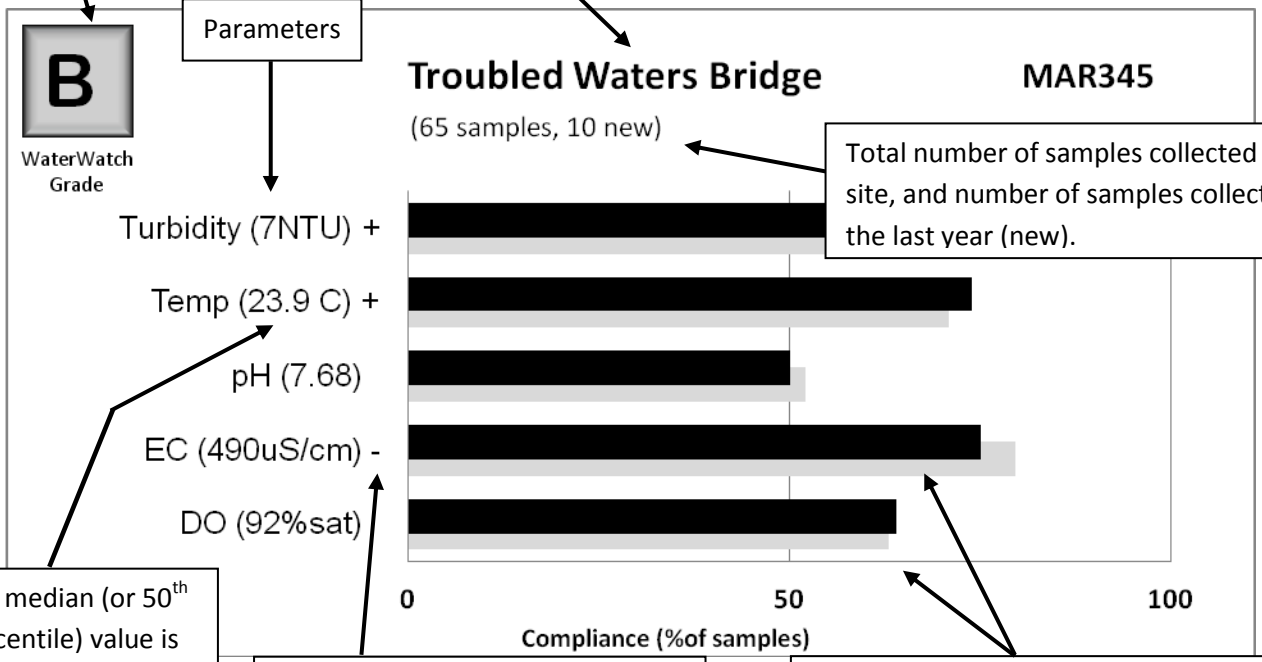


- This graph illustrates all the long-term data collected from each site, not just the last year's data – the red rectangle represents the pH guideline level of 6.5 to 8 (pH should be between these levels to meet guideline values)
- All river sites show generally good compliance with pH guidelines.
- The eastern tributaries which drain the Mapleton plateau (eg. Gheerulla and Cedar Creeks) have a consistent acidic character, which may be a natural consequence of the source geology.
- High variability in pH can indicate eutrophication causing algae and weed growth (YAB680 and OBI940).

Mary Valley Link Road bridge, Traveston Crossing, 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.

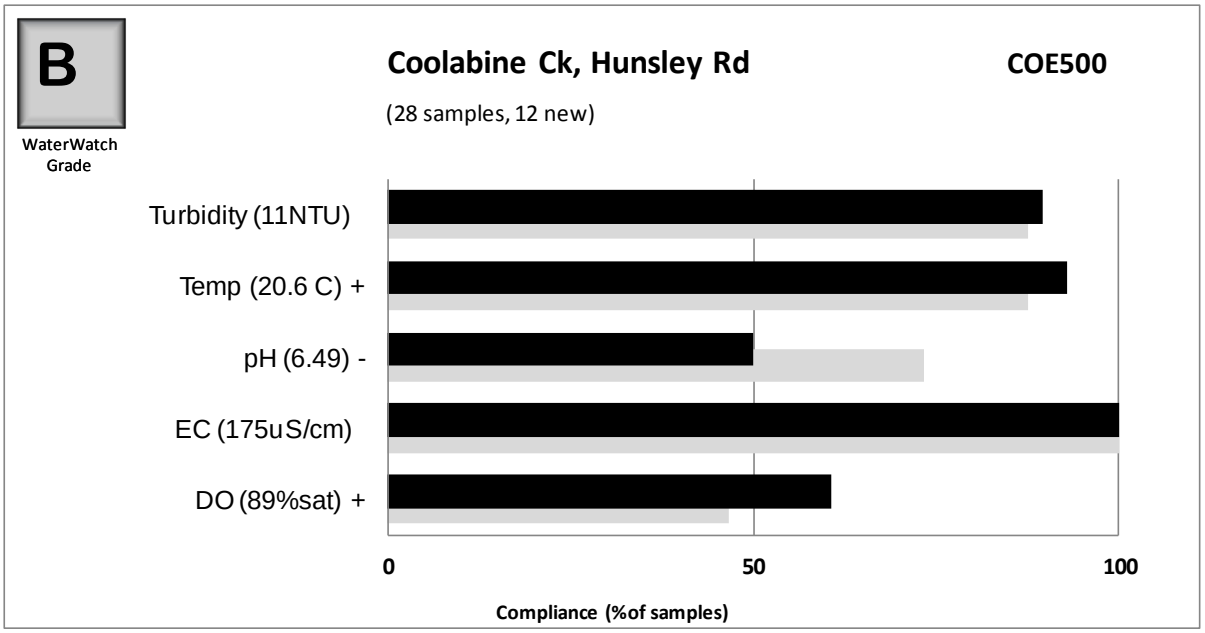


The median (or 50th percentile) value is shown in brackets after each of the parameter names. This is considered the value most representative for the parameter at this site.

+ 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.

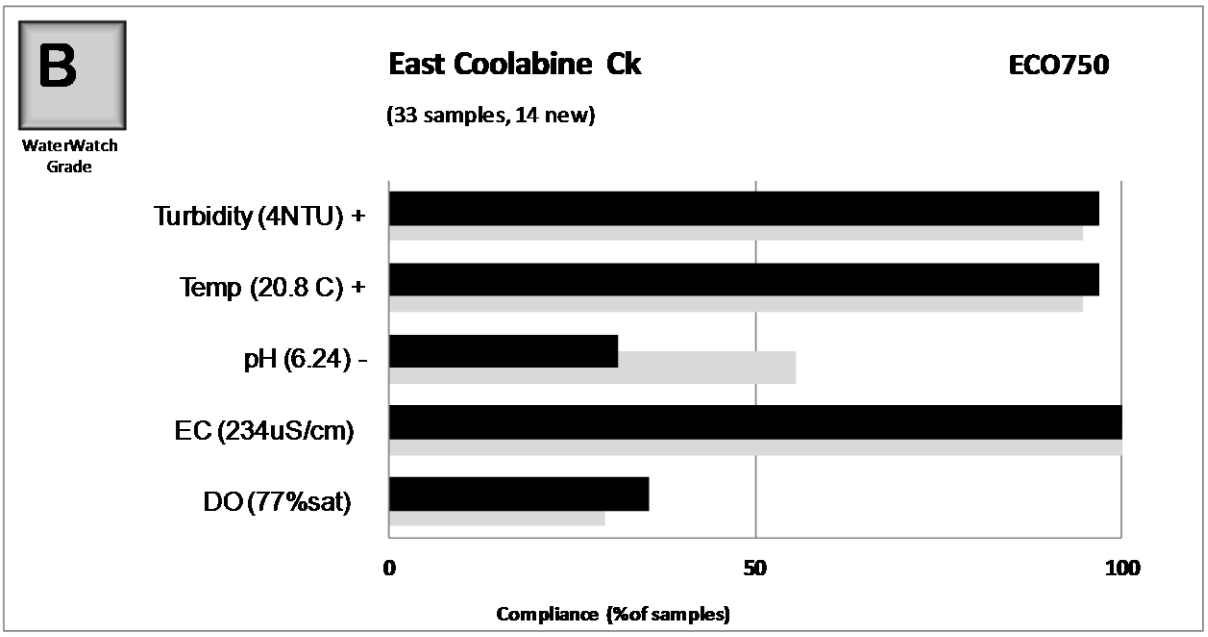
Percent compliance of all data collected to date for each parameter at the site i.e. the percent of samples for which the parameter was within the legally scheduled WQO guidelines. 0% means the parameter was never within the guidelines, 50% means the parameter met the guidelines in half of samples and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

Coolabine Creek



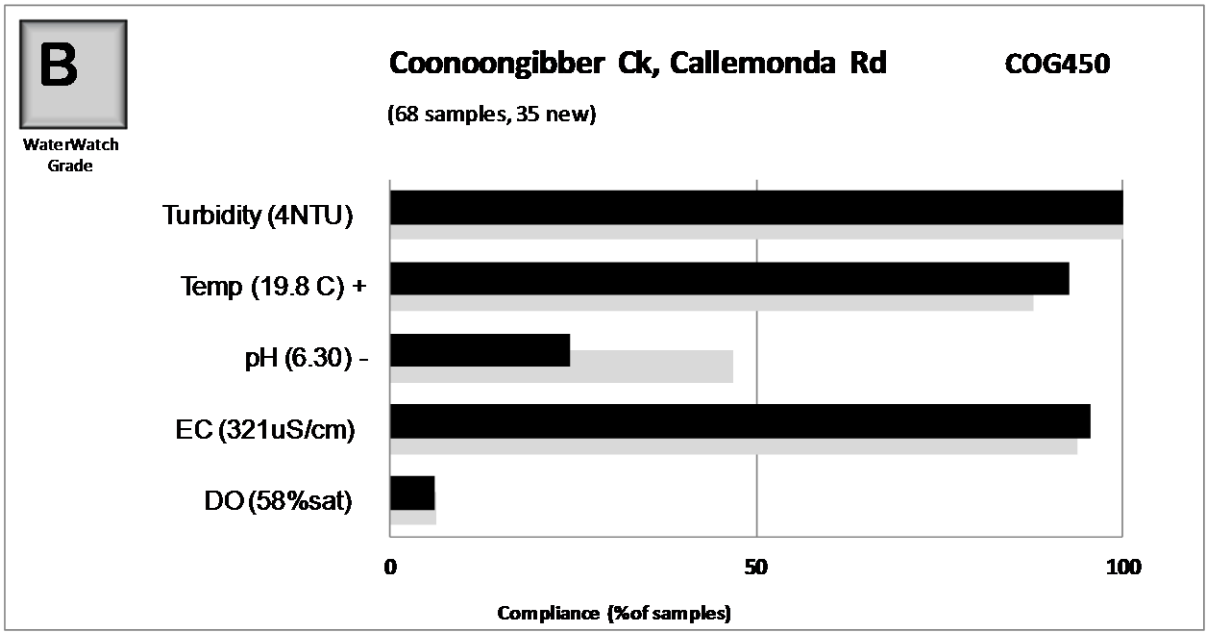
- A significant improvement in compliance for dissolved oxygen & temperature over the past 3 years
- Excellent compliance for electrical conductivity (salinity) levels since sampling commenced
- A significant decline in compliance with pH guidelines over the past 3 years– however this is likely to reflect the natural chemistryof this creek
- Declined in overall grade to a B in 2013 (2010 Waterwatch Grade = A)

East Coolabine Creek



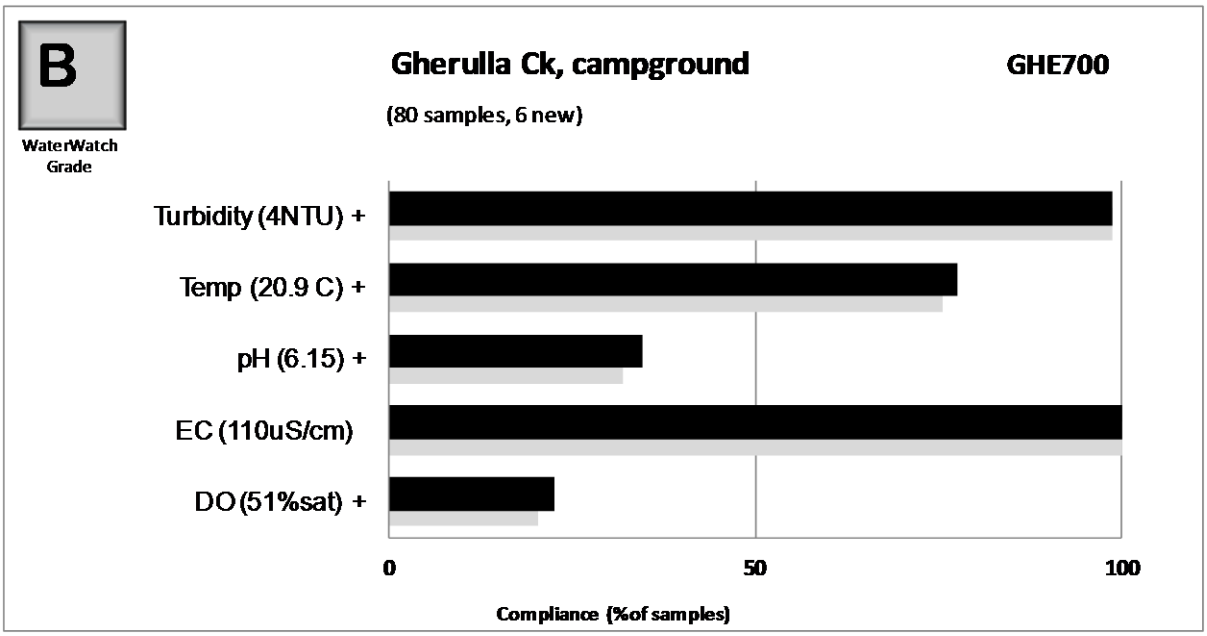
- Good sample size
- Significant improvement in water temperature and turbidity compliance with guidelines over the past 3 years
- Excellent electrical conductivity (Salinity) compliance with guidelines
- Good compliance for turbidity and temperature
- Significant decline in compliance with pH guidelines overthe past 3 years – however this is likely to reflect the natural chemistryof this creek
- Maintaining an overall grade of B (2010 Waterwatch Grade = B)

Coonoon Gibber Creek

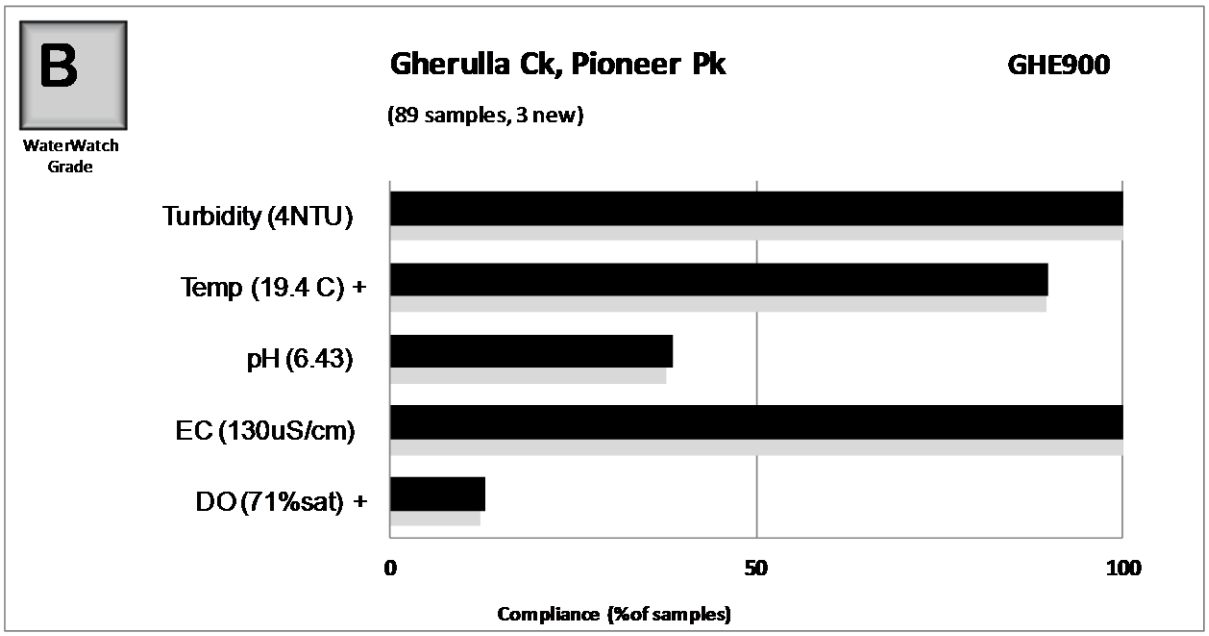


- Very good sample size
- Significant improvement in water temperature compliance over the past 3 years
- Significant decline in compliance with pH guidelines overthe past 3 years – however this is likely to reflect the natural chemistryof this creek
- Maintaining an overall grade of B (2010 Waterwatch Grade = B)

Gheerulla Creek

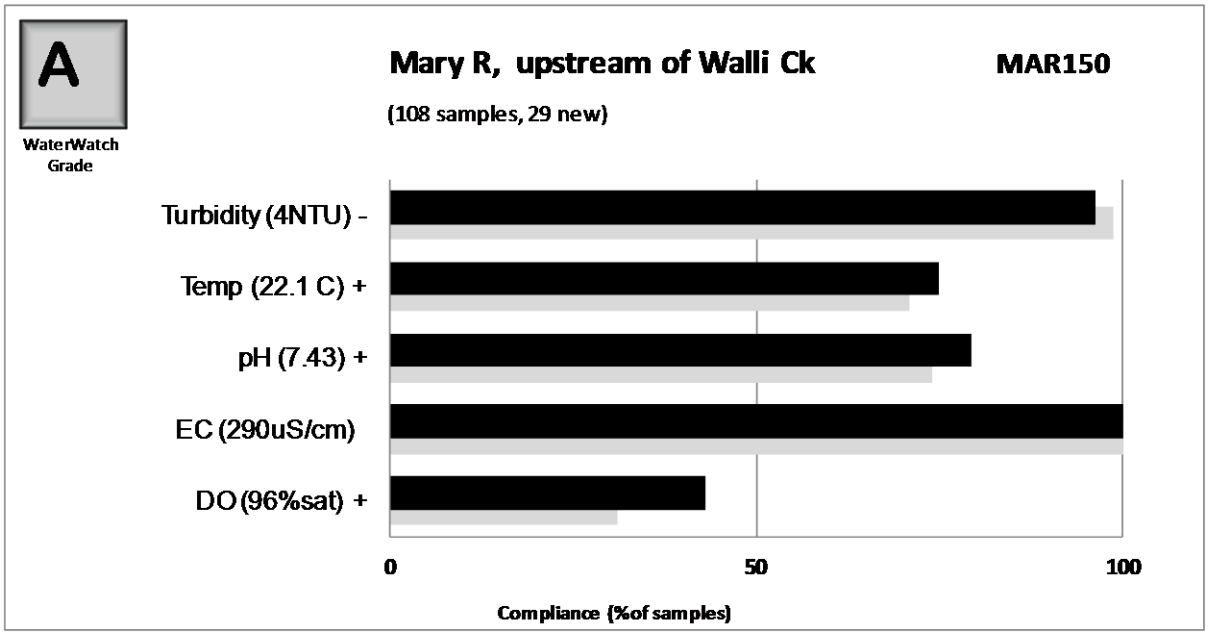


- Very good sample size to make comments on trends.
- Significant improvement in compliance with pH guidelines overthe past 3 years – however low pH appears to be natural chemistryof this creek
- Excellent compliance with electrical conductivity compliance
- Significant improvement in compliance in all water quality measures over the past 3 years
- Maintaining an overall grade of B (2010 Waterwatch Grade = B)

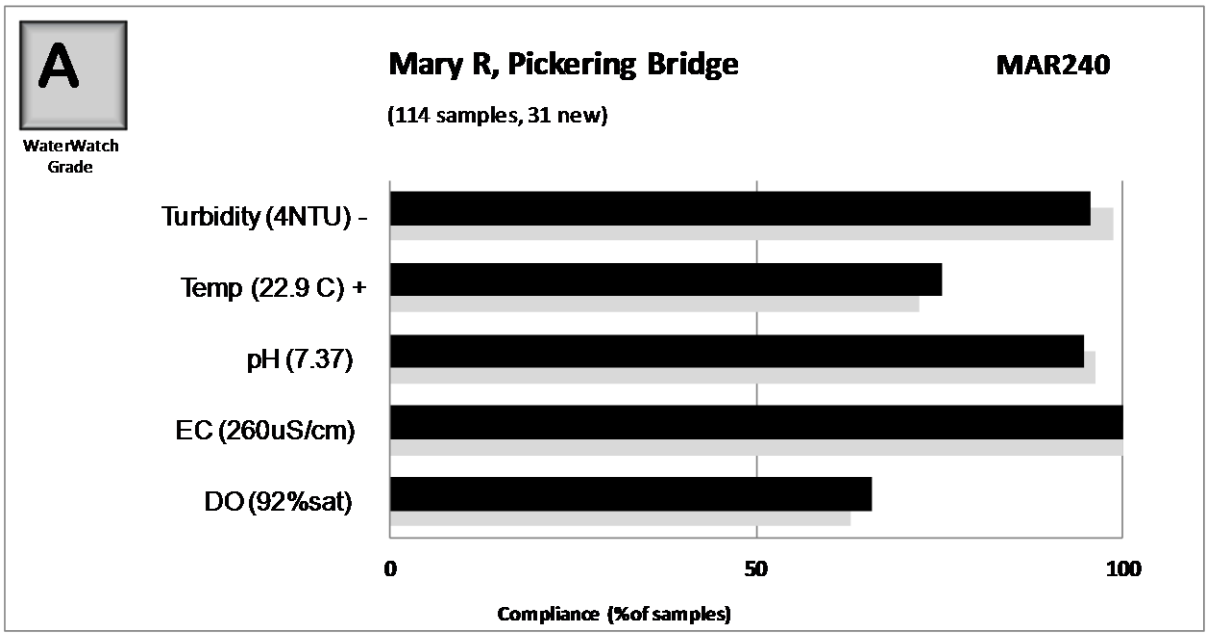


- Very good sample size
- Excellent electrical conductivity (salinity) compliance
- Significant improvement in water temperature and dissolved oxygen over the past 3 years
- Maintaining an overall grade of B (2010 Waterwatch Grade = B)

Mary River

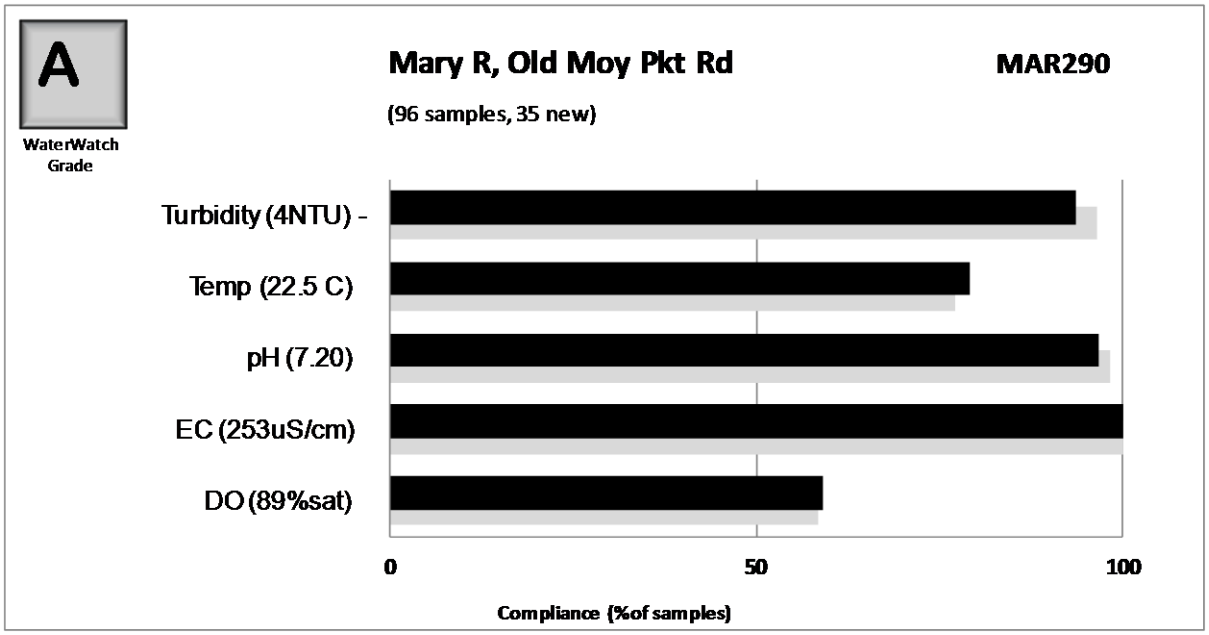


- Excellent sample size (gold medal award winner!)
- Significant improvement in water temperature, pH and dissolved oxygen compliance over the past 3 years
- Excellent electrical conductivity compliance
- Significant decrease in compliance for turbidity over the past 3 years
- Improved overall grade to an A in 2013 (2010 Waterwatch Grade = B)

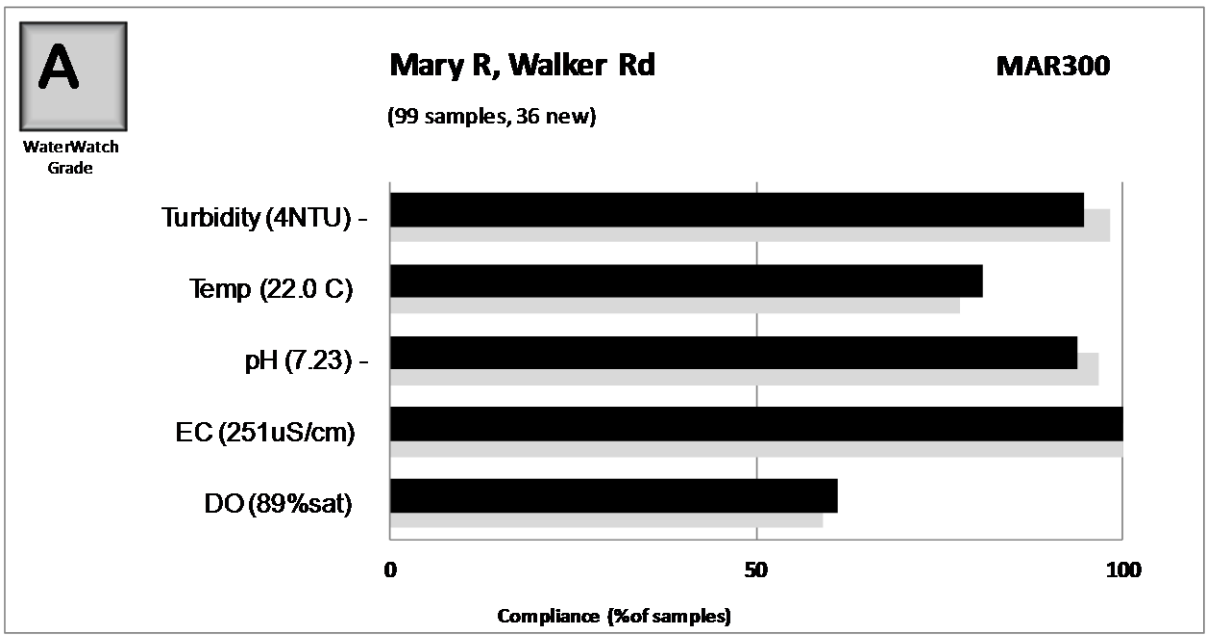


- Excellent sample size (gold medal award winner!)
- Significant improvement in water temperature over the past 3 years
- Excellent electrical conductivity compliance
- Significant decrease in compliance for turbidity over the past 3 years
- Maintained an overall grade of an A in 2013 (2010 Waterwatch Grade = A)

Mary River

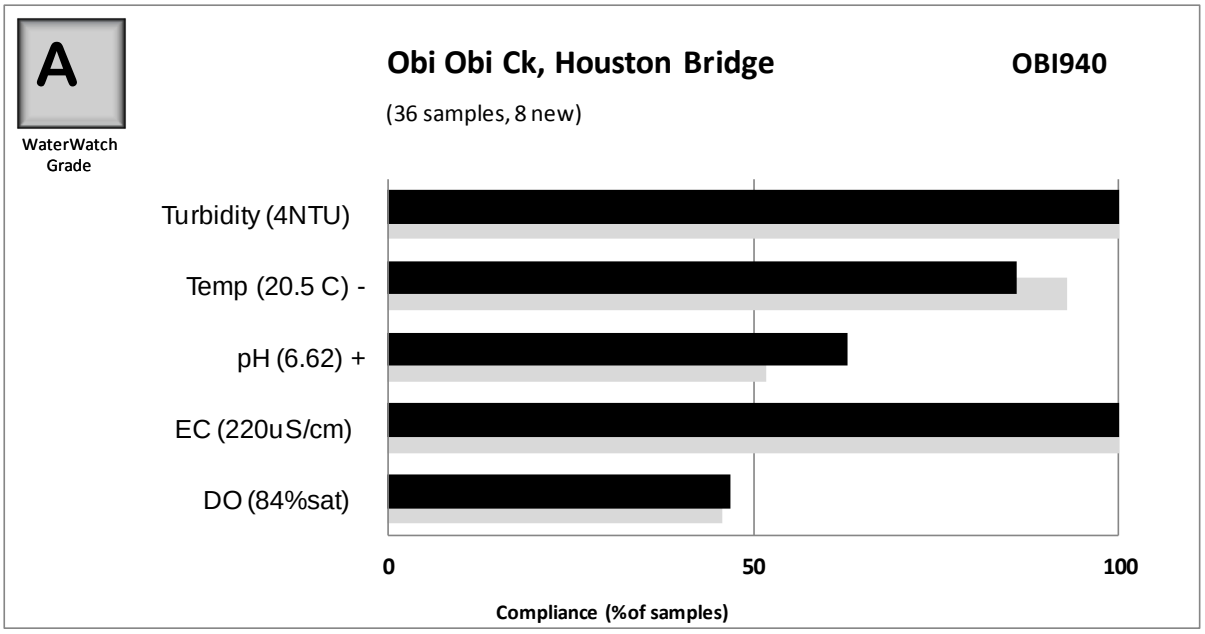


- Very good sample size
- Excellent electrical conductivity compliance
- Significant decrease in compliance for turbidity over the past 3 years
- Maintained an overall grade of an A in 2013 (2010 Waterwatch Grade = A)

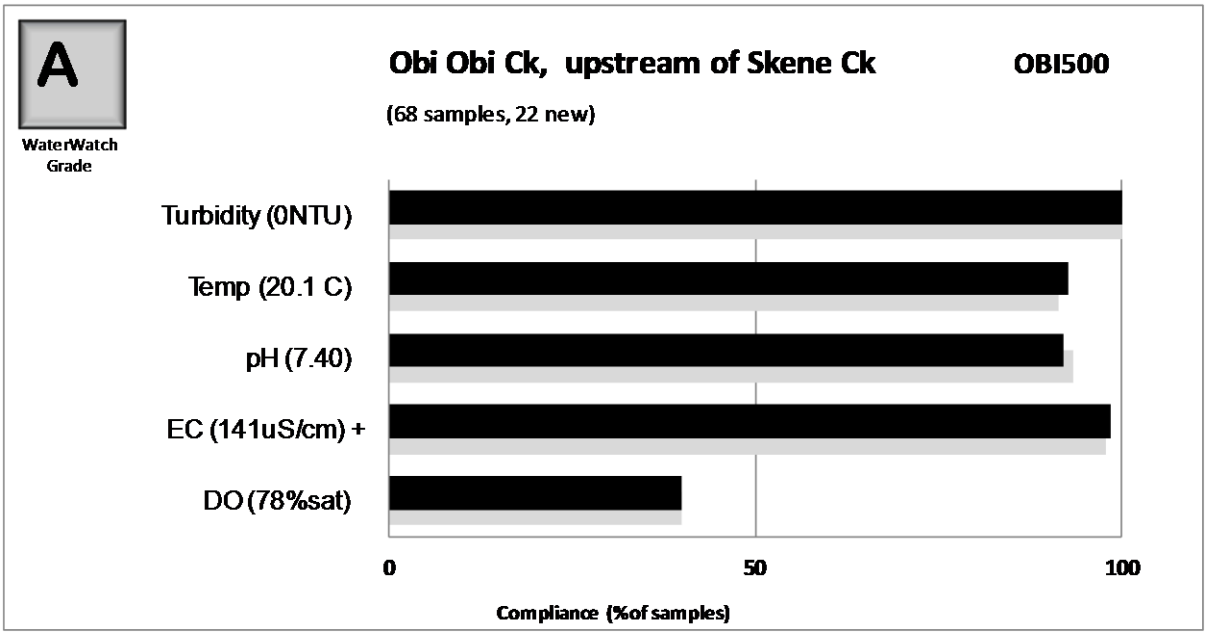


- Very good sample size
- Excellent electrical conductivity compliance
- Significant decrease in compliance for turbidity and pH over the past 3 years – interestingly a series of low pH values were recorded during flood events which can be attributed for the decline in pH compliance.
- Maintained an overall grade of an A in 2013 (2010 Waterwatch Grade = A)

Obi Obi Creek

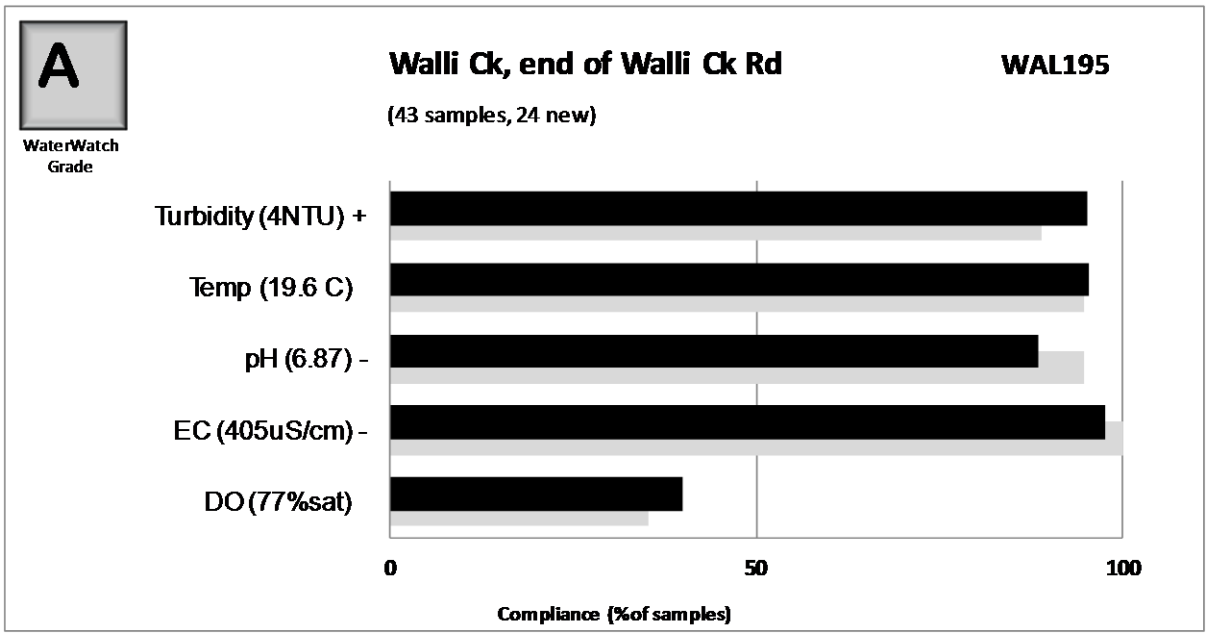


- Significant decline in water temperature over the past 3 years
- Excellent electrical conductivity & turbidity compliance
- Significant increase in compliance for pH over the past 3 years
- Maintained an overall grade of an A in 2013 (2010 Waterwatch Grade = A)



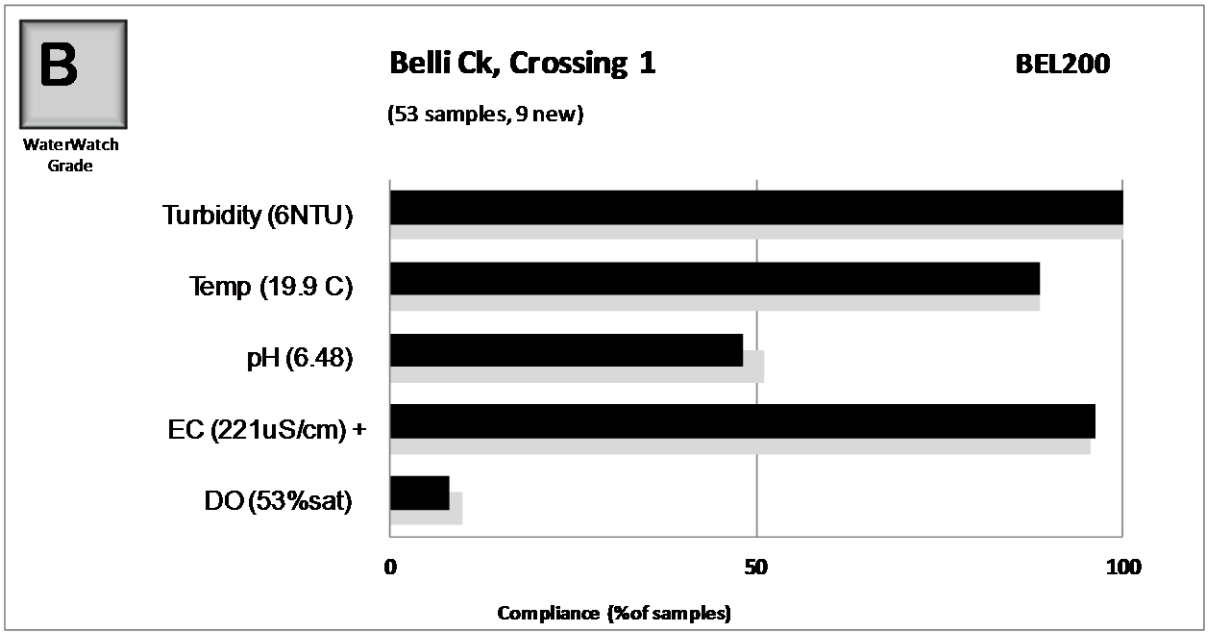
- Good sample size
- Significant increase in compliance for electrical conductivity (salinity) over the past 3 years
- Maintained an overall grade of an A in 2013 (2010 Waterwatch Grade = A)

Walli Creek

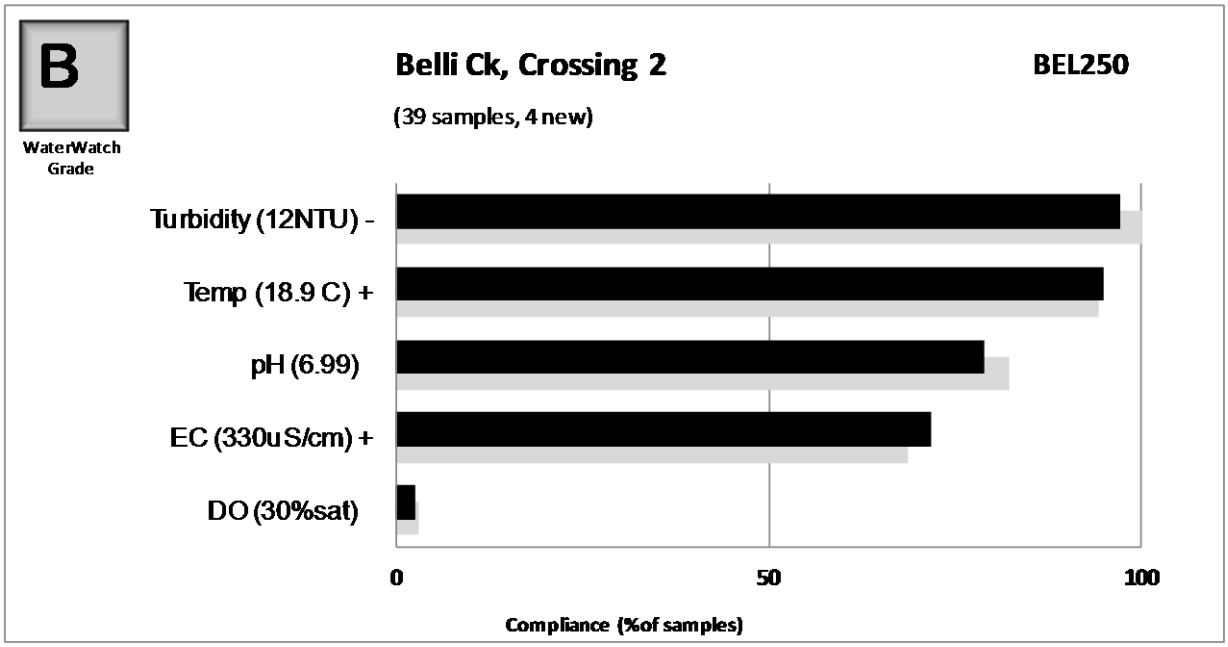


- Good sample size
- Significant decline in compliance for pH over the past 3 years
- Significant improvement in turbidity compliance over the past 3 years
- Maintained an overall grade of an A in 2013 (2010 Waterwatch Grade = A)

Belli Creek

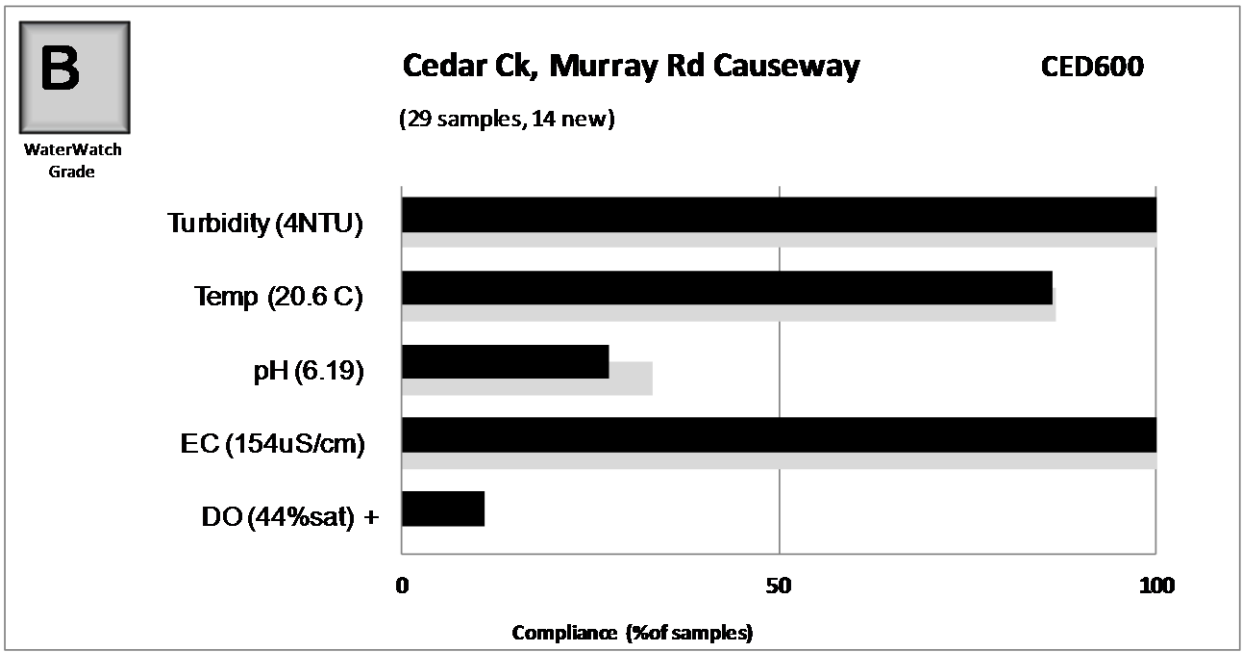


- Good sample size
- Significant improvement in compliance for electrical conductivity (salinity) over the past 3 years
- Excellent compliance for turbidity
- Low compliance with guidelines for dissolved oxygen



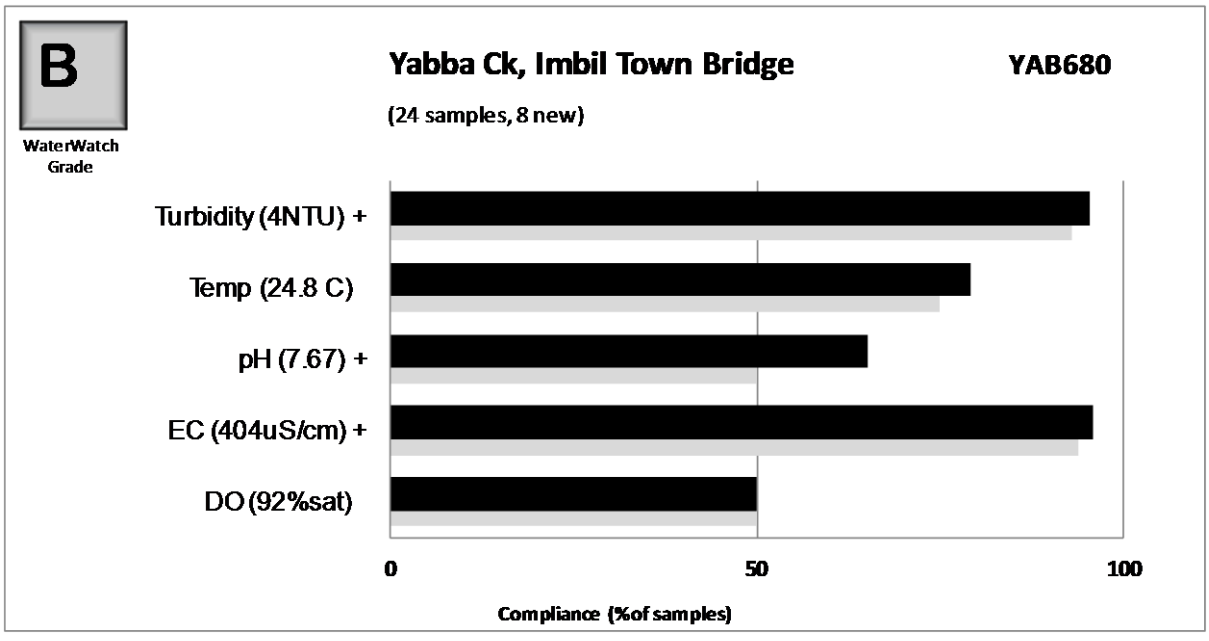
- Good sample size
- Significant improvement in compliance for water temperature & electrical conductivity (salinity) over the past 3 years
- Significant decline in compliance for turbidity over the past 3 years
- Low compliance with guidelines for dissolved oxygen
- Less compliance with guidelines for electrical conductivity than the upstream Belli Creek site (BEL200), possibly due to a specific saline source between BEL200 and BEL250.

Cedar Creek



- Good sample size
- Significant improvement in compliance for dissolved oxygen over the past 3 years, however DO results are still very low
- Excellent compliance with electrical conductivity (salinity) levels – very freshwater
- Ambient water quality at this site is quite acidic

Yabba Creek



- This site has just become a regular Waterwatch site in the past 12 months, however there were a number of old water quality measurements taken over previous years which have been included in this report.
- In the past this site has shown high pH levels (alkaline) because of profuse growth of aquatic plants and algae. However pH compliance has improved significantly in the past 12 months.
- In the past dissolved oxygen levels have been highly variable at this site.

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.