Wide Bay – Widgee Creek Waterwatch Network Report

2012 / 2013

Wide Bay Creek, Woolooga township, January 2013

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Introduction

The volunteers of the Widgee Wide-Bay Waterwatch network have collected water quality data for more than 9 years which is now providing the community, scientists and government agencies with a better understanding of the characteristics of the waterways in this part of the Mary River catchment. Without this committed volunteer effort we would not have access to this valuable information.

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 Wide Bay Creek catchment at Woolooga, broke the January 2011 flood peak record again by almost 1 metre with a flood peak of 13.87m. Glastonbury Creek reported a new flood peak breaking the record set in 1955, and locals in the Widgee district reported levels of flooding unprecedented in living memory.

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 Munna Creek sub-catchment, with Brooweena recording 336mm and Marodian recording 347mm. This rainfall resulted in record levels of flooding in the upper and lower Munna Creek catchment. The Munna Creek Marodian gauging station broke the 1955 flood record by approximately ½ metre on the 27th January with a flood peak of 16.7m. Many families and their properties, including Waterwatch volunteers, were directly affected by the floods and we extend our thoughts and wishes to these people.

Even though the Bureau of Meteorology indicates that we are moving into a neutral ENSO weather phase (neither La Nina or El Nino), they point out that many significant summer flooding events in the Mary Catchment have occurred during similar large scale and long-term weather conditions in the past.

Even though the network experienced an extended dry season breaking in January 2013 with a large flood, some Waterwatch sites have improved their grade since the last report in 2012, while other sites have declined in water quality. Generally the sites that declined in water quality were those most affected by rising electrical conductivity (salinity) levels experienced between July 2012 and January 2013. Anecdotal comments written on the datasheets are exceptionally helpful to interpret water quality trends, particularly when the creeks were dropping or stopped flowing and retreated back to waterholes or pools.

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 since the last report in 2010. 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.

Due to the high risk to personal safety we don't encourage Waterwatch volunteers to collect flood water quality data. Consequently the Waterwatch data does not capture the water quality impacts of large flood events, and do not represent the impact of sediment loads during these events. These sediment loads are generally only measured by specialized monitoring programs using automated equipment. Using such equipment, sediment loads in the Mary during the peak of the 2013 floods were calculated to be greater than the equivalent of ten 35 tonne dump trucks of sediment passing under Dickabram bridge every minute.

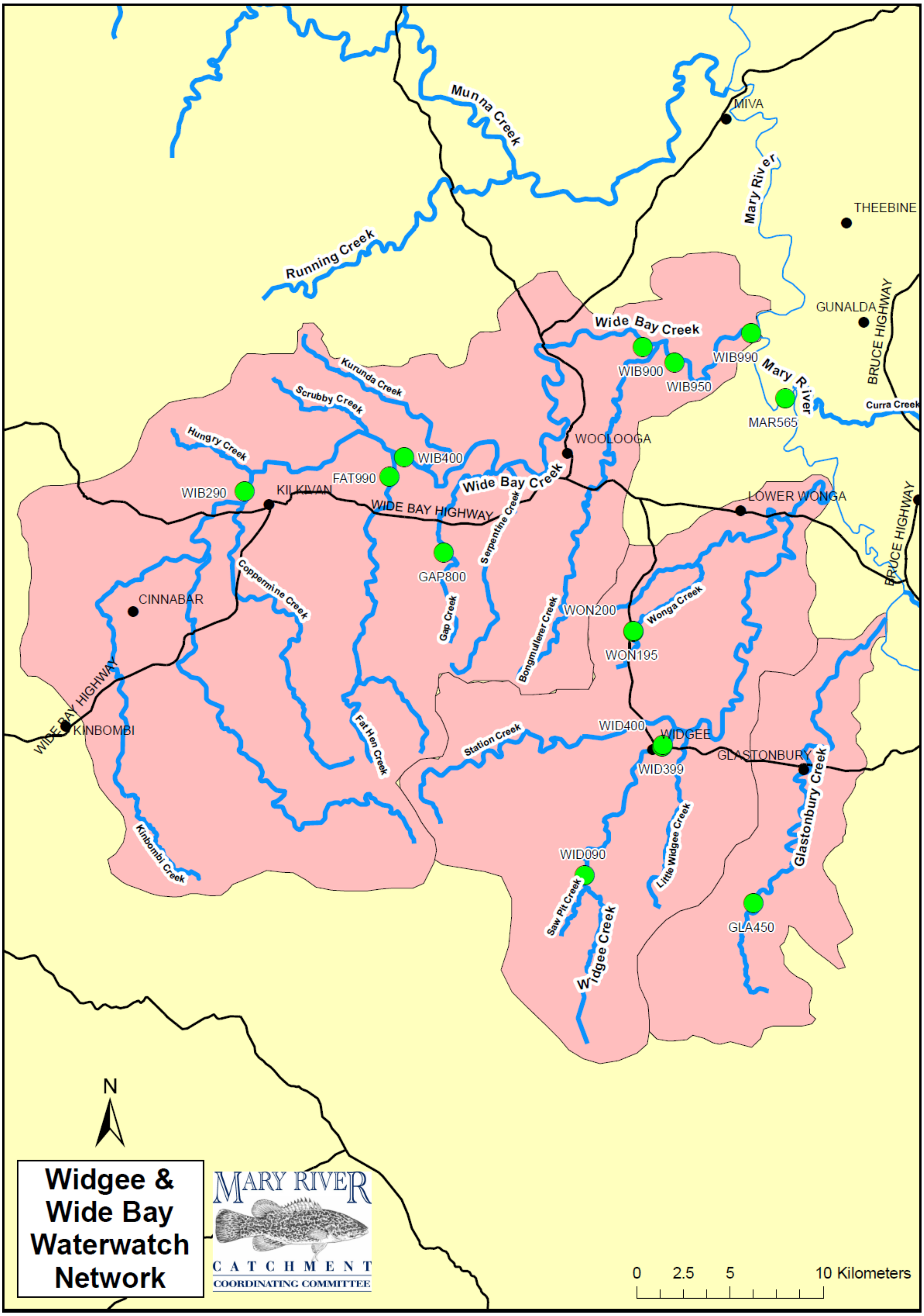
Waterwatch sites monitored in the Wide Bay & Widgee Waterwatch Network

Wide Bay & Widgee Creeks Waterwatch Network		
FAT990	Fat Hen Creek	Bular Rd, Oakview
GAP800	Gap Creek	Sinai Rd, Oakview
GLA450	Glastonbury Creek	Geiger Rd, Upper Glastonbury
MAR565	Mary River	Reibels Crossing, Scotchy Pocket
WIB290	Wide Bay Creek	Kilkivan weir, Kilkivan
WIB400	Wide Bay Creek	Whittaker Rd, Oakview
WIB900	Wide Bay Creek	Sexton rail bridge, Sexton
WIB950	Wide Bay Creek	Wilson bridge, Sexton
WID090	Widgee Creek	Oakland Rd, Upper Widgee
WID400	Widgee Creek	Widgee School, Widgee
WON195	Wonga Creek	Warhurst Rd (south), Lower Wonga
WON200	Wonga Creek	Warhurst Rd (north), Lower Wonga

Volunteers

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: Brian Thomas, Errol Janke, Yvonne, John & Gillian Crossley, Dave & Janet Golding, Narelle Hall & Stephen Horseman, Mick Bambling, Anette Bambling, Rosemary & David Burnett, Widgee State School, Keith & Christine Bagnall, Max Landsberg, Rob & Cathy Kerle.

Waterwatch Network map



2013 Floods

The Wide Bay - Widgee Creek districts has experienced the La Nina weather cycle since 2010 which has produced unprecedented levels of flooding in some districts leading to severe damage in some parts of the catchment.

In 2013, like the January 2011 floods, the worst flooding occurred in sub-catchments located downstream of Gympie in the middle reaches around Miva, Tiaro, western section (Wide Bay Creek - Kilkivan, Woolooga & Glastonbury Creek) and north-western sections (Munna Creek - Brooweena, Teebar) of the Mary River Catchment.

The highest daily rainfall totals recorded at the peak of the January 2013 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.

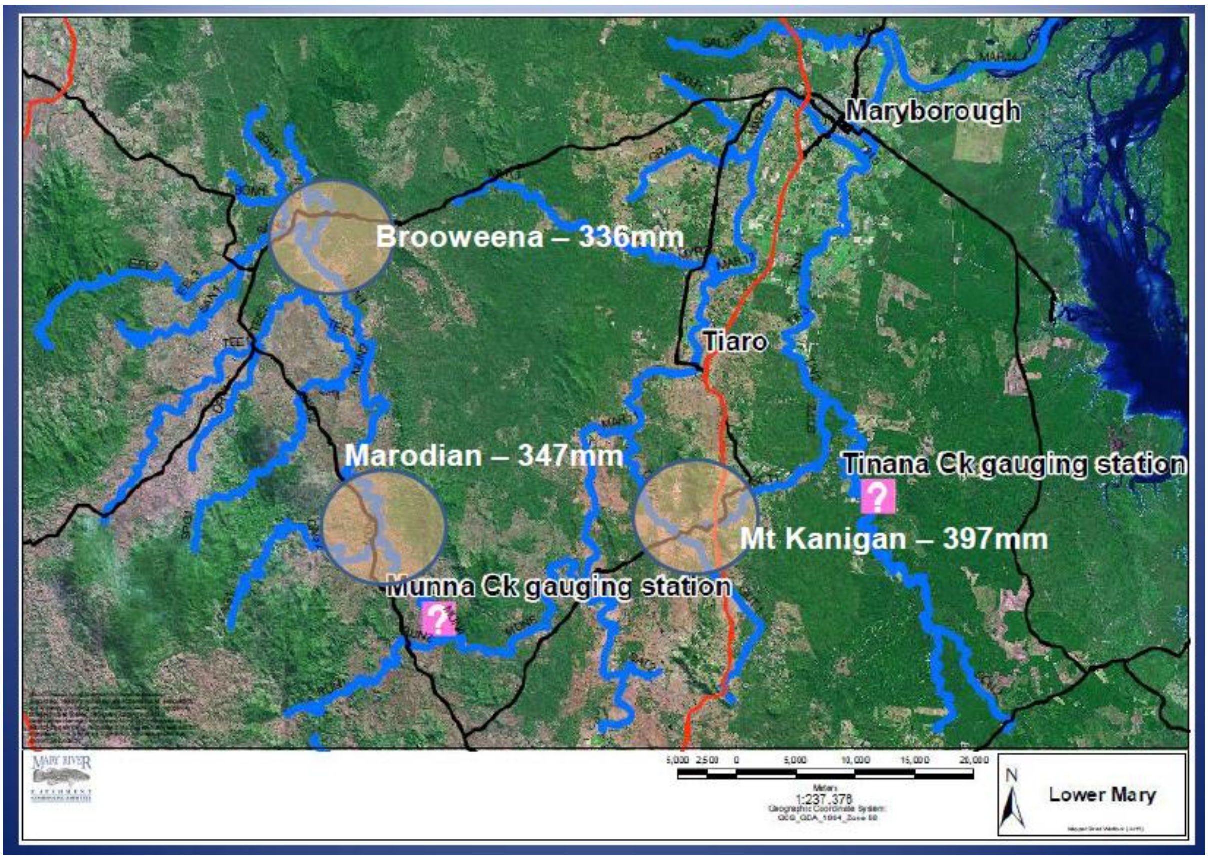


Figure 2 – peak daily rainfall recorded on 27/1/13

Flood peaks

In 2013 a new record flood peak was recorded on Wide Bay Creek at Woolooga, surpassing the record set in January 2011. Figure 5 compares the flood peaks and rises from the 2011 and 2013 floods from the Wide Bay Creek (Brooyar) gauging station near Woolooga. The graph shows that the two floods displayed very similar rate of rise, although the 2013 flood started from a much lower point in the creek. The creek height increased at a rate of approximately 50cm per hour. Considerable damage was sustained in Wide Bay Creek at Kilkivan with a new possible flood peak record.

Munna Creek at Marodian recorded a new flood in January 2013. Locals in the Upper Munna Creek catchment near Teebar reported this was one of the largest floods in living memory with floodwaters reported under the Teebar Hall. Calgoa Creek recorded the highest flood level in living history.

Widgee Creek experienced significant flooding and flood damage, with significant road damage, creekbank and streambed erosion. Glastonbury Creek recorded a new flood peak, with the previous peak recorded in 1955.

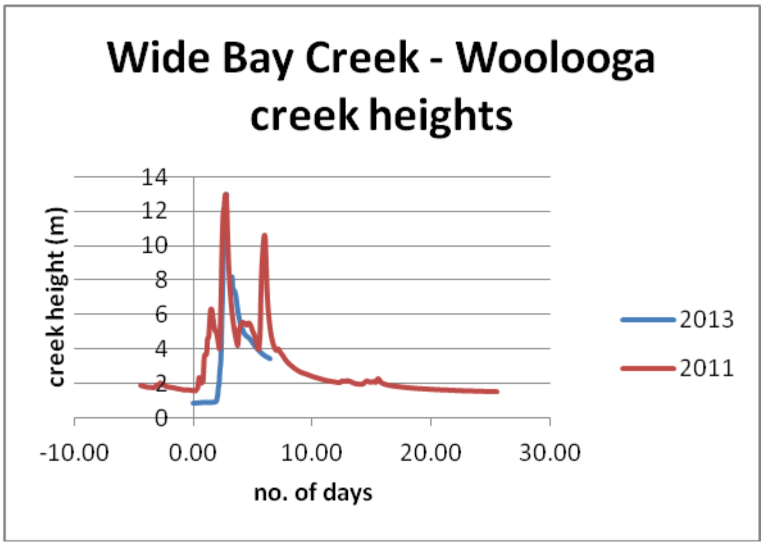


Figure 5 – 2011 & 2013 flood comparisons at Wide Bay Creek, Woolooga

In 2013 the Mary River at Miva 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 Mary River at Home Park recorded a new peak height of 23.565m, the highest since recording began at this location in 1982. Figure 3 compares the flood peaks on the Mary River at Miva from 1974 and 2013. Comparing the 2013 flood to the 1974 flood at Miva, the 2013 flood increased to approximately the same height, but rose much quicker from a significantly lower initial river height.

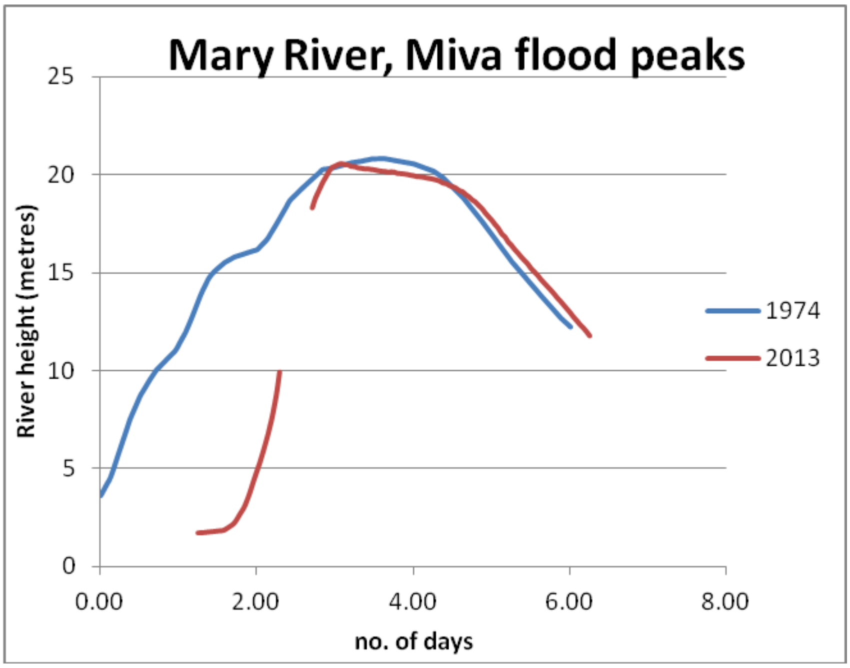


Figure 4 – comparison of 1974 & 2013 flood peaks on the Mary River at Miva

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 due to the extended dry period experienced from July 2012 until late January 2013. Whereas in early 2011 the catchment was saturated and the river and creeks had considerably higher ambient flows before the floods began.

Peak discharges of the Mary River Tributaries

The tributaries of the Mary River discharged an enormous volume of water over the Australia Day long weekend, particularly in the Mary River downstream of Gympie. Munna Creek, Wide Bay Creek and Glastonbury Creek all recorded new flood peaks. These tributaries flow into the Mary River between Gympie and Tiaro, and resulted in Maryborough recording its 4th highest flood event since 1893.

Figure 5 displays the daily peak discharges of the main tributaries contributing to flooding of the Mary River between Gympie and Maryborough, for comparison, the full supply level of Borumba Dam (the Mary Catchment largest dam) is shown at 42,000 megalitres of storage.

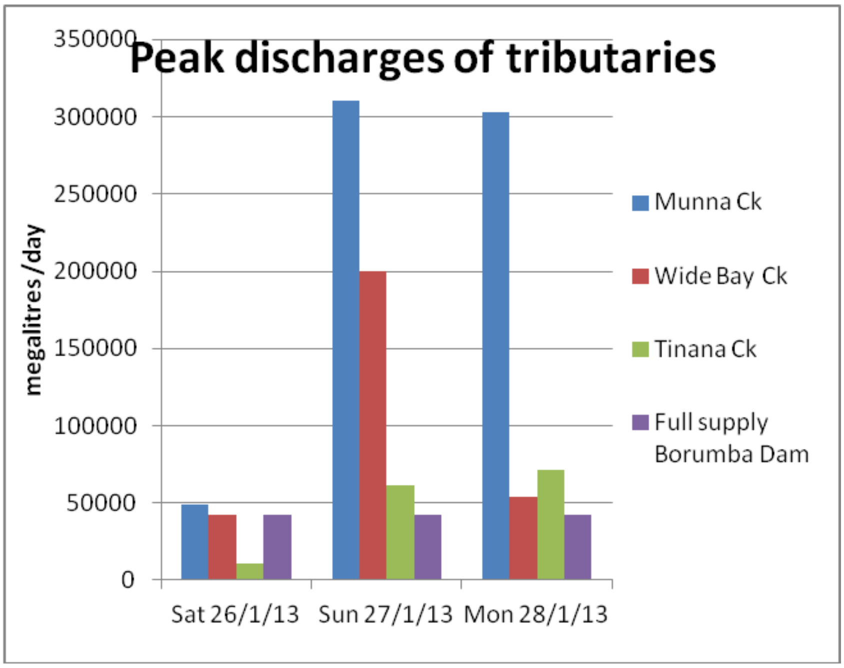


Figure 5: comparison of peak discharges of creeks compared to the full supply level of Borumba Dam

Flood heights

Figure 6 shows the heights of the creeks and the Mary River downstream of Gympie increased at the same time and speed (on average 50cm per hour). However rises of 1m per hour were recorded near the peak of flood at some gauging stations.

Information at the Mary River (Miva) and Wide Bay Creek (Brooyar) gauging stations was lost on the rising limb of this flood.

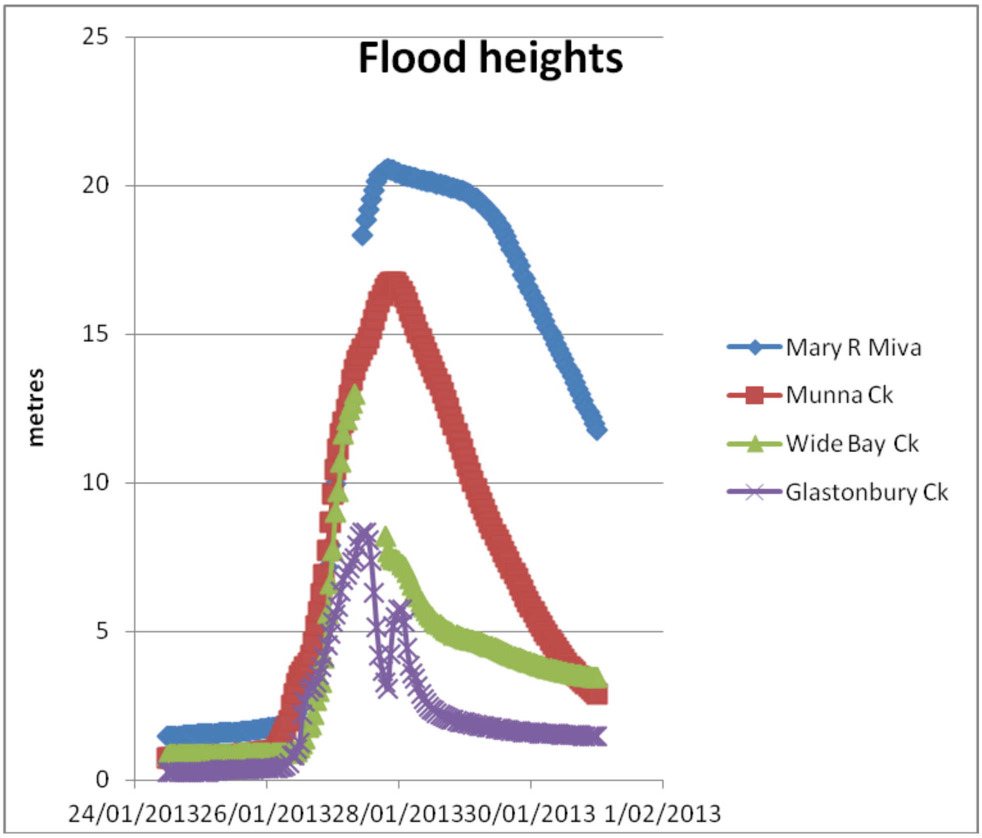


Figure 6 – flood heights, and rate of rise.

Station Creek streambed erosion, Upper Thornside

Widgee Creek flood flows

Sediment Loads

Using analysis of flood turbidity data and comparing with the peak flows experienced at the Mary River at Miva (Dickabram bridge) in January 2013 (assuming a turbidity peak of 800 NTU's, which is conservative as more than 1000 NTU's was recorded in 2012) equates to approximately 368 tonnes of sediment (or more than ten 35-tonne dump trucks) flowing under the Dickabram bridge at Miva every minute during the 2013 flood peak.

In 2011 the flood peak flow at the Mary River at Miva equated to approximately 237 tonnes of sediment (or seven dump trucks) flowing under the Dickabram bridge every minute during the flood peak.

SedNET studies for the Mary River Catchment indicate the majority of sediment sources in the Mary River is generated from riverbank erosion. Figure 1 illustrates how frequent the flood events over 10 metres have been in the lower catchment in recent years. These repeated flood events at this height are very damaging to riverbanks, and contribute large sediment loads to the estuary.

In 1992 a large flood plume from the mouth of the Mary River caused significant losses of the sea-grass beds in the Great Sandy Strait due to sediment smothering. The sea-grass beds in the Great Sandy Strait are important feeding grounds for dugongs. This led to large populations of dugongs starving to death and washing up on the beaches near Hervey Bay. Dugongs radio-tagged from the Great Sandy Strait were also found travelling as far south as Sydney trying to find suitable sea-grass beds.

Figure 7: sediment plume in Mary River estuary, January 2013

Monitoring Methods

Sites monitored by the network are visited monthly and 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 therefore, it is 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 are recognized in the Qld Water Quality Guidelines

Report Card grades are based on Waterwatch data compliance with Aquatic Ecosystems guideline values outlined in the Qld Water Quality Guidelines.

(Environmental Protection Agency, 2006 and Department of Environment and Resource Management 2009): Different guidelines are applicable to different sub-catchments of the Mary Catchment

Parameter	**Wide Bay, Widgee & Glastonbury Creek guidelines**
pH:-	6.5 – 8.0
Electrical Conductivity (EC): -	<1200 uS/cm
Dissolved Oxygen (DO): -	85 – 110 % Saturation
Turbidity: -	< 50 NTU
Temperature: -	(Summer 22-30 °C,Winter 16-24°C)

Maryborough CBD, Adelaide St near Catholic Church

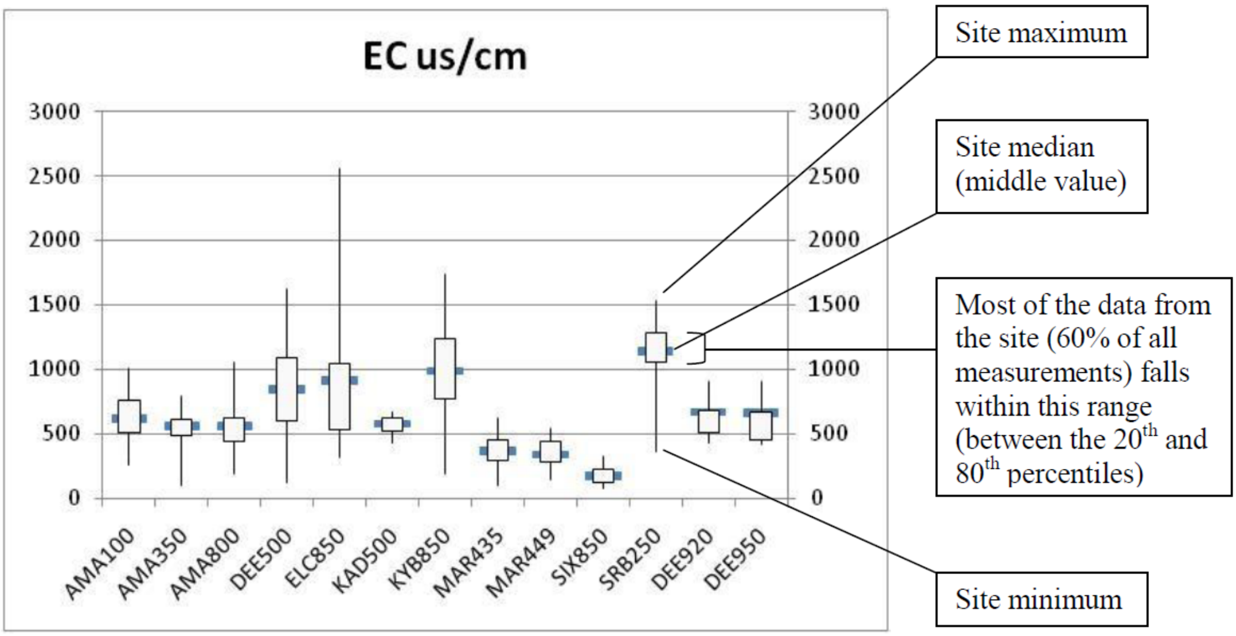
Results- inter-site comparisons

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.

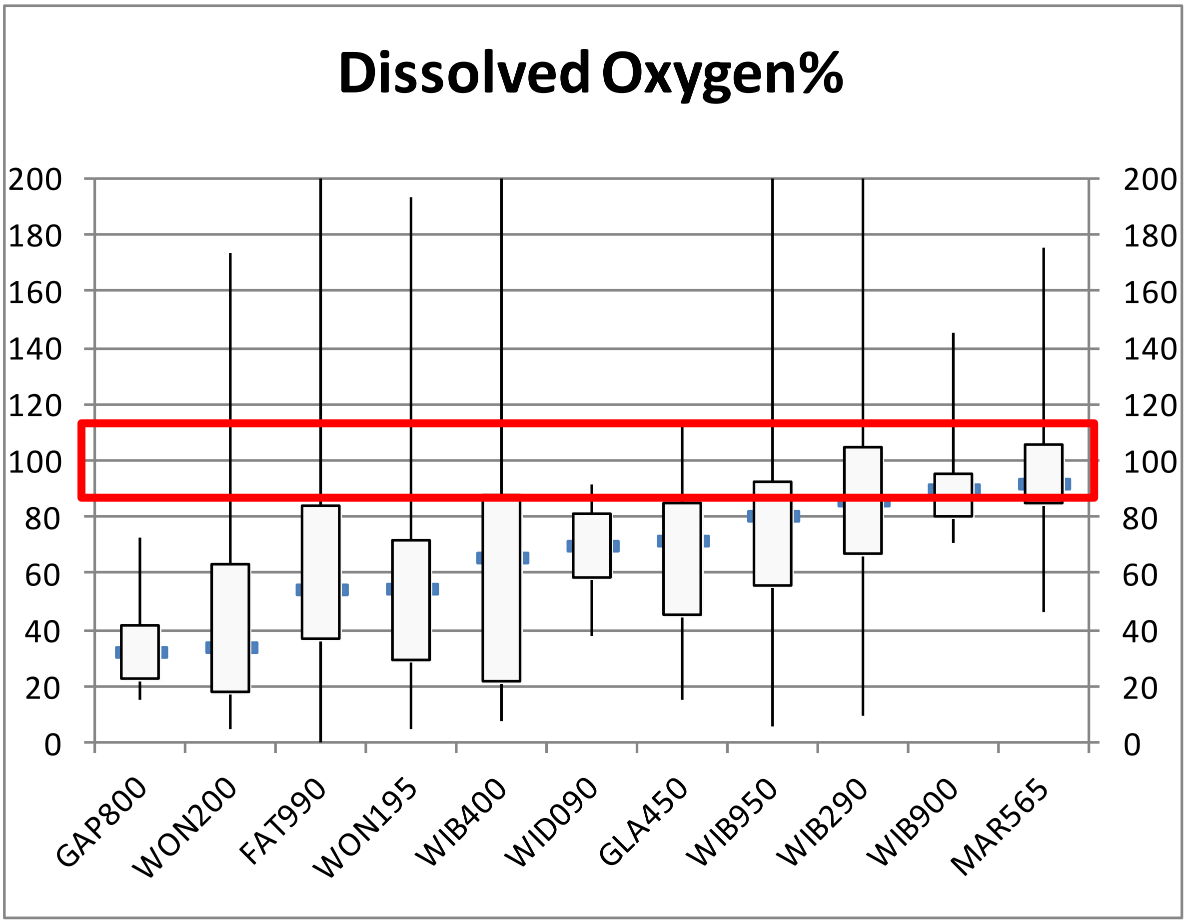
For each site on the graph:

- 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.

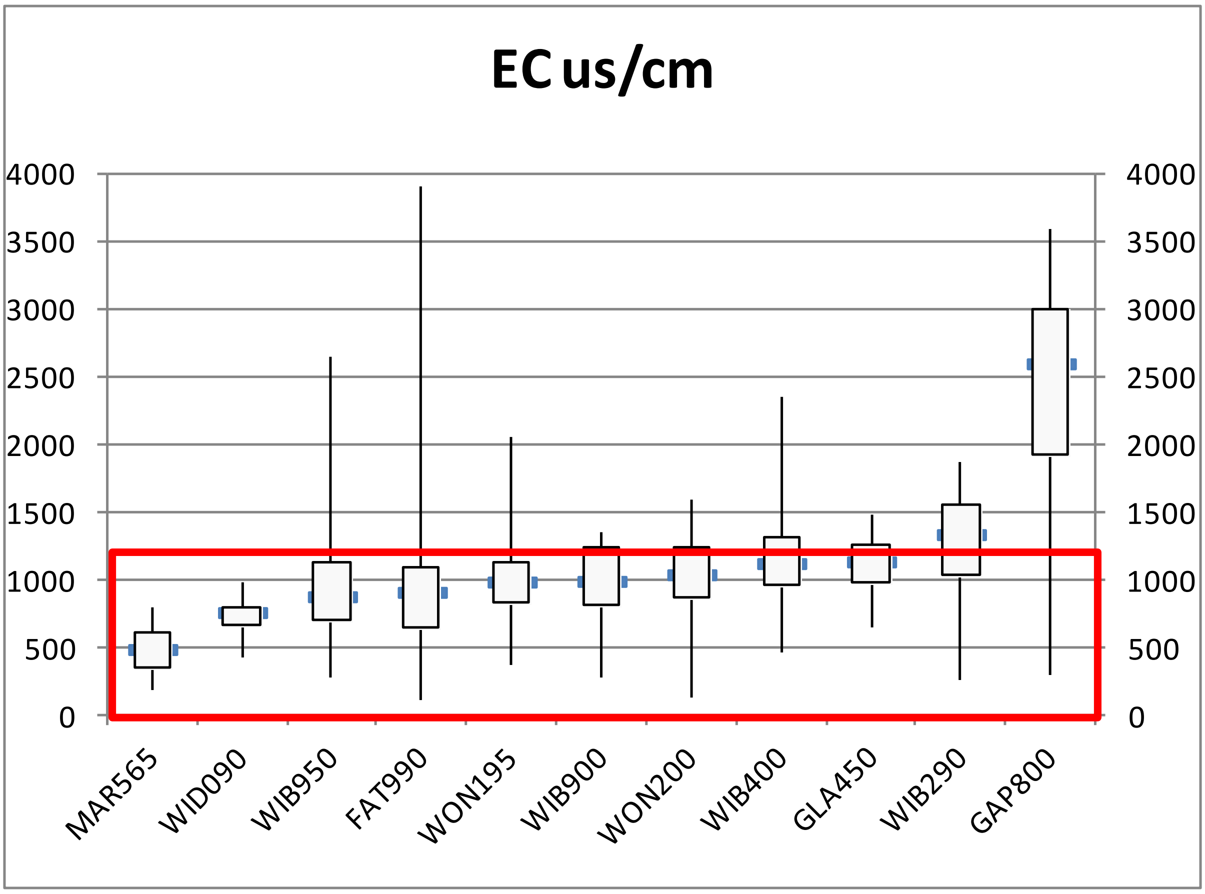


Long-term inter-site comparison of dissolved oxygen levels (all data collected)



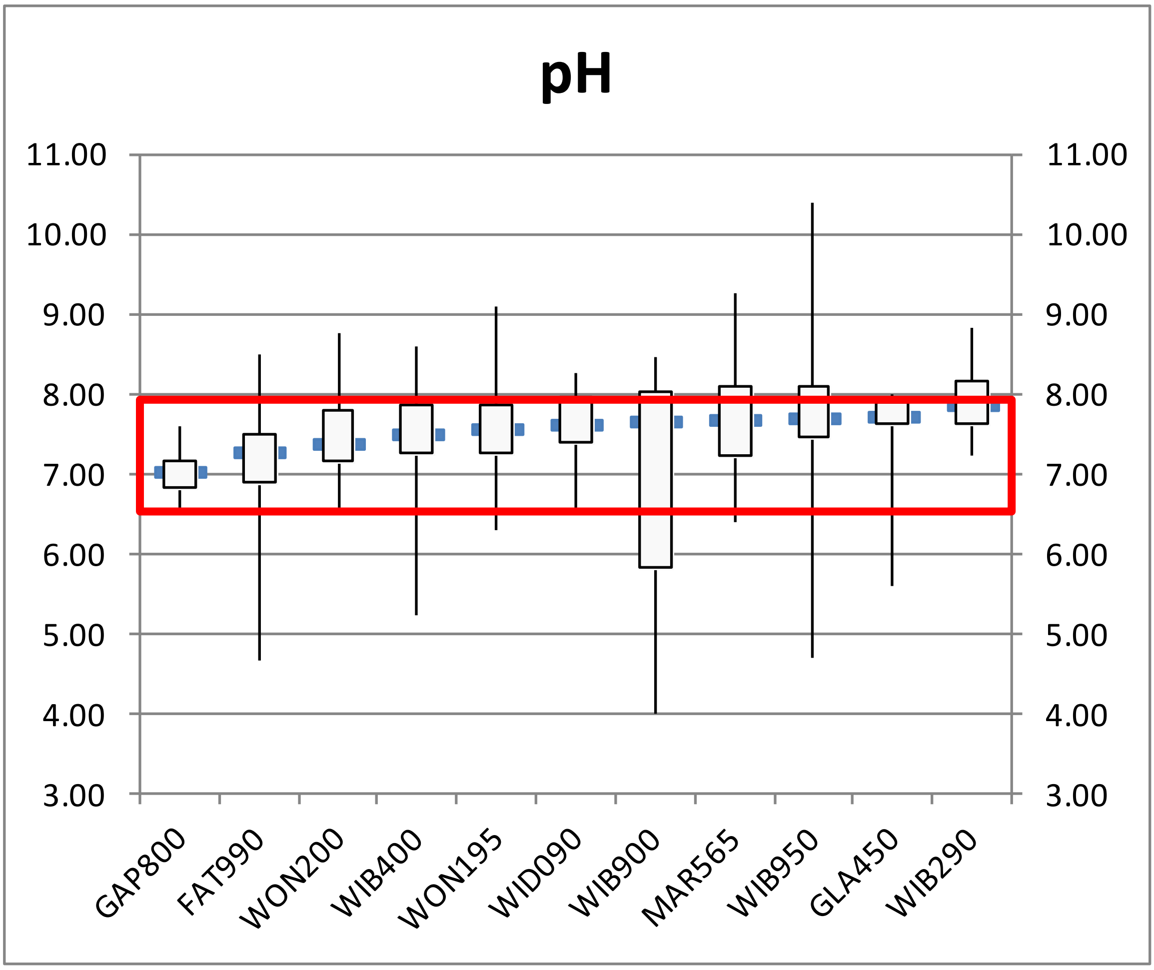
- This graph illustrates all the long-term data collected from each site, not just the last year's data.
- The red bar represents the dissolved oxygen guideline levels for the Waterwatch network.
- Dissolved oxygen levels can change remarkably over the course of a day. In disturbed systems with high nutrient and light levels dissolved oxygen can vary over a wide range during the day, e.g. 30% to 150%. In more undisturbed systems the oxygen levels generally maintained within a smaller range eg. the guidelines for the Mary Catchment are 85% to 110%.
- The Mary River site is consistently within the water quality guidelines with less overall variation for dissolved oxygen – this is because of reasonably constant flow and mixing of water down the river.
- Generally all creeks within the network display large dissolved oxygen fluctuations due to intermittent flows over the monitoring period
- The Wide Bay Creek, Sexton rail bridge site (WIB900) has recorded low dissolved oxygen variation and good compliance – similar to the Mary River site. The WIB900 sample site has a large pool which may help to mitigate fluctuations in dissolved oxygen. In comparison the Wide Bay Creek, Wilson bridge site immediately downstream (WIB950) has large variation in dissolved oxygen levels associated with high aquatic plant growth due to exposure to light, and small pool volume.

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



- This graph illustrates all the long-term data collected from each site, not just the last year's data.
- The red bar represents the electrical conductivity (salinity) guideline levels for the Waterwatch network.
- These graphs reflect the variation in conditions experienced at these sites over the time the water quality data has been collected. Data at some of these sites has been collected over a long time (ie. many years), which includes a long period of drought and subsequent low flows. However sites that have only been recently included in the network does not include these long drought periods, eg. at the Widgee Creek site (WID090), consequently there is little variation in the data due to the majority of data being collected during relatively good seasons.
- Overall electrical conductivity levels in this network are higher than the levels observed in all the other Waterwatch networks of the Mary River catchment. However compliance is good for most sites with median levels falling within guidelines, except Wide Bay Creek, Kilkivan weir (WIB290) which just exceeds the guideline level and Gap Creek.
- Gap Creek is a statistically different outlier in this Waterwatch network for electrical conductivity.
- We have used the Electrical Conductivity guidelines which apply for the North-Western Mary Catchments.

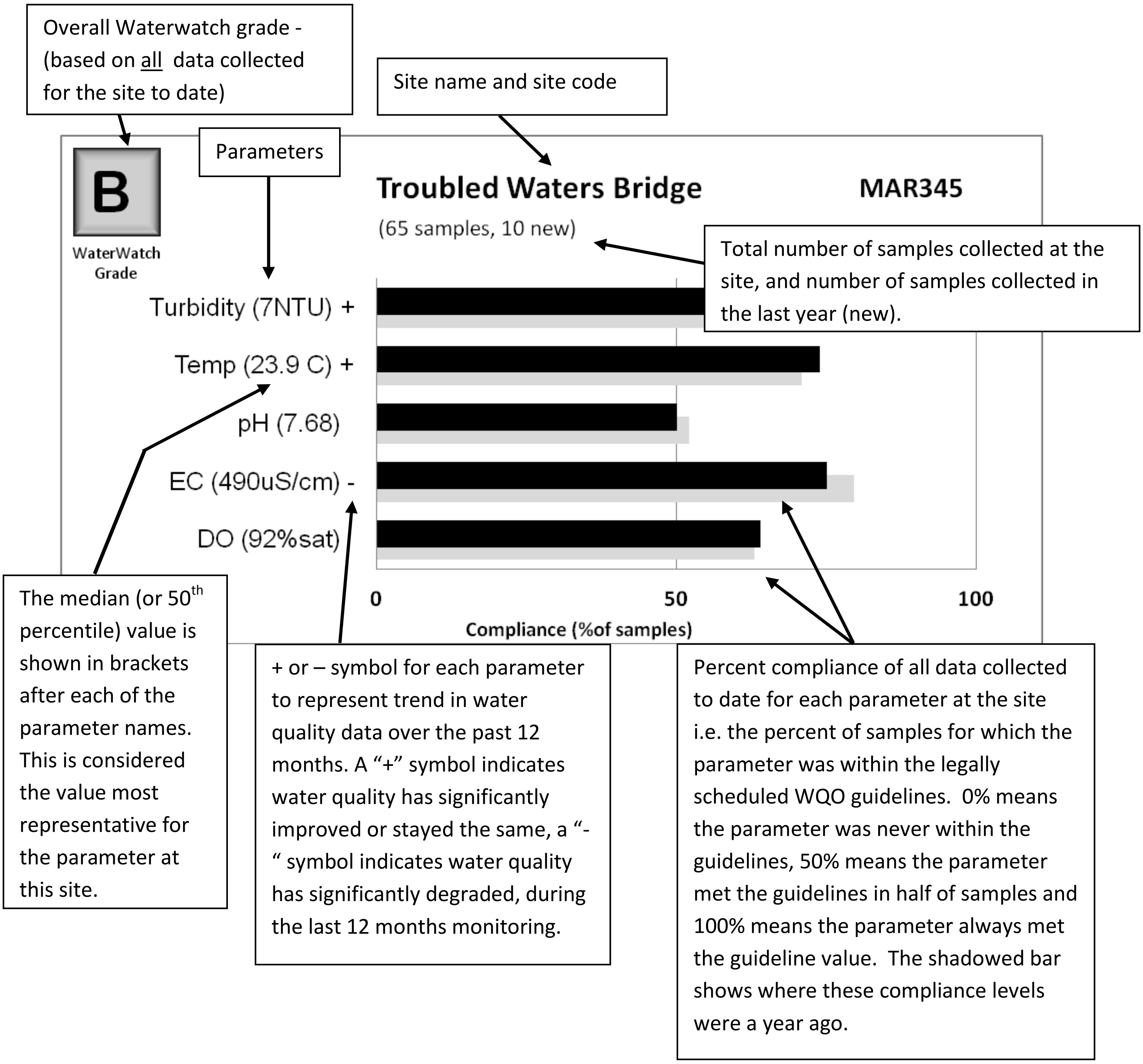
Long term inter-site comparison of acidity



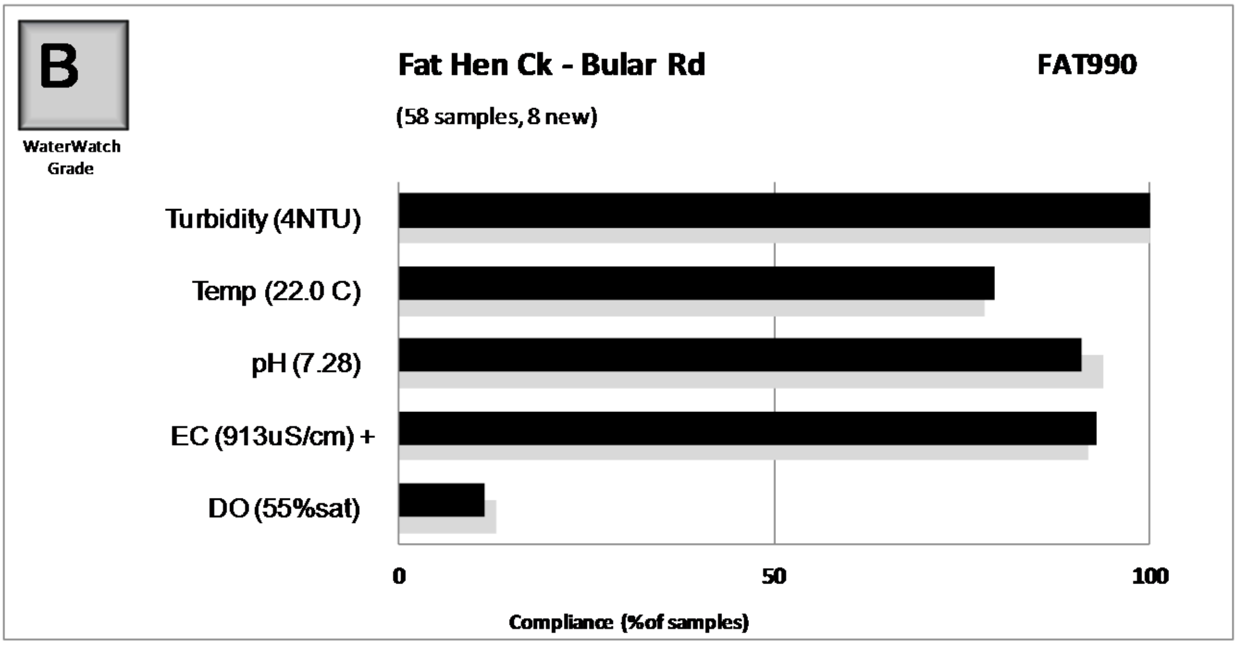
- This graph illustrates all the long-term data collected from each site, not just the last year's data
- The red bar represents the pH guideline levels for the Waterwatch network.
- All sites show generally good compliance with pH guidelines, but are tending to be alkaline (more than 80% of the measurements are greater than 7).
- Gap Creek (GAP800) is consistently different from the other sample sites (with consistently neutral pH).
- Wide Bay Creek, Sexton rail bridge (WIB900) has recorded some unusual acidic pH levels over the past 12 months for which there is no explanation to date.
- The Mary River site shows overall high pH levels with more variation than the creek sites. This pH trend may be due to algal activity generated as a consequence of high light penetration into the large pools of the river.

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.

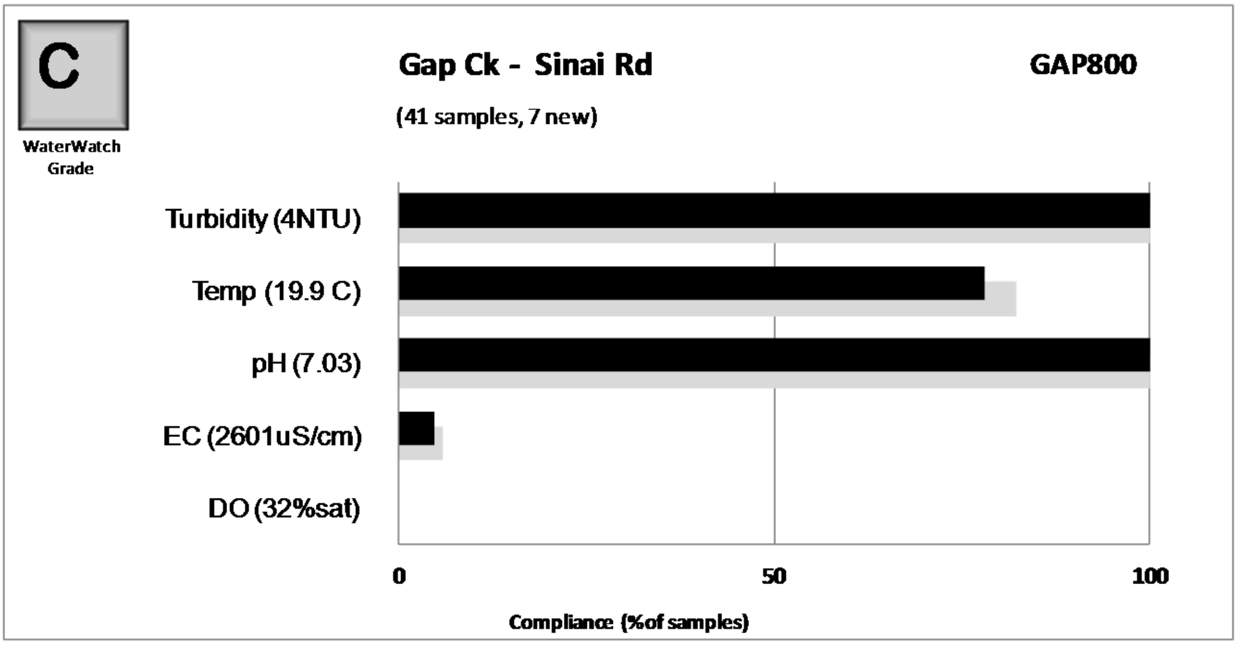


Fat Hen Creek, Oakview



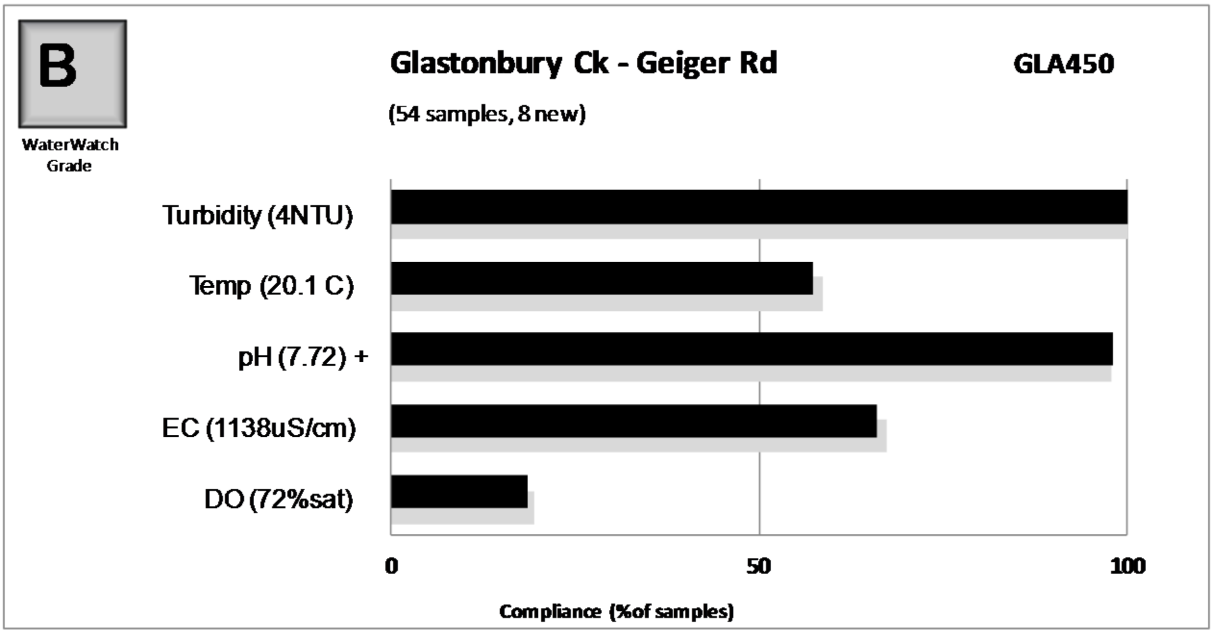
- Over the past 12 months there has been a siginficant improvement in electrcial conductivity (Salinity)
- Sample size is good
- Maintaining an overall grade of B (2011 & 2012 Waterwatch Grade = B)

Gap Creek, Oakview



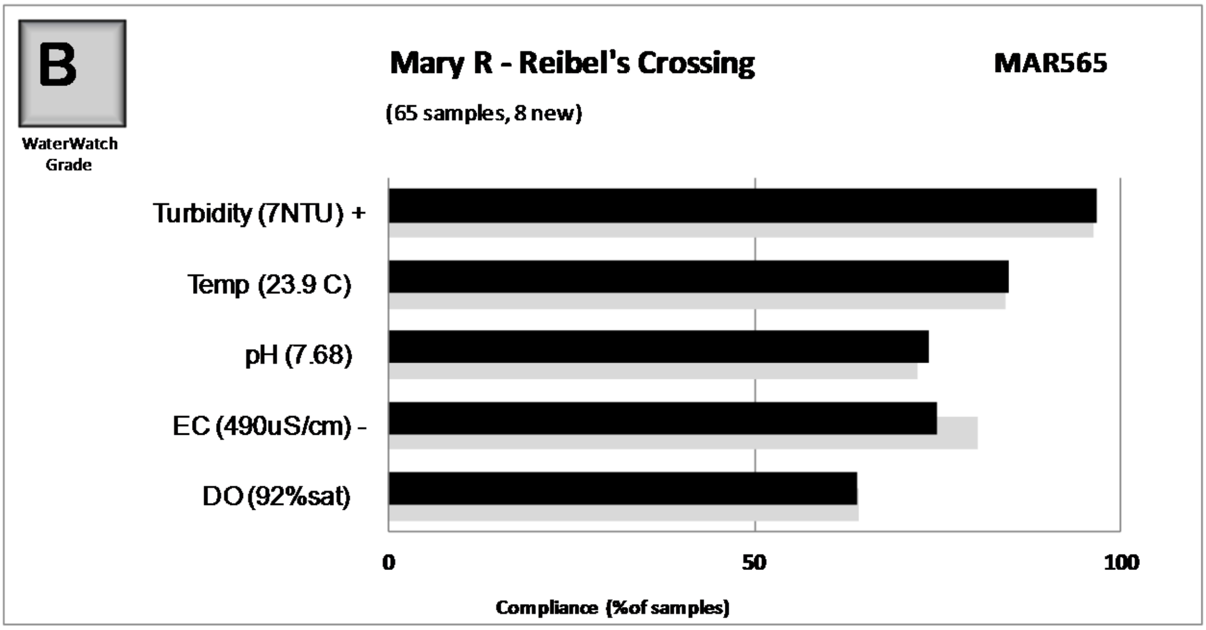
- Sample size good, very interesting site.
- The EC levels at this site are significantly higher than all other sites within the network - one of the highest EC sample site in the entire Mary River Catchment Waterwatch program.
- Good compliance with turbidity, temperature and pH
- Exceptionally very little variance in pH - with a neutral pH.
- Consistently very low dissolved oxygen levels recorded, which do not comply with guidelines.
- Consistently constrained to an overall grade of C (2011 & 2012 Waterwatch Grade = C)

Glastonbury Creek



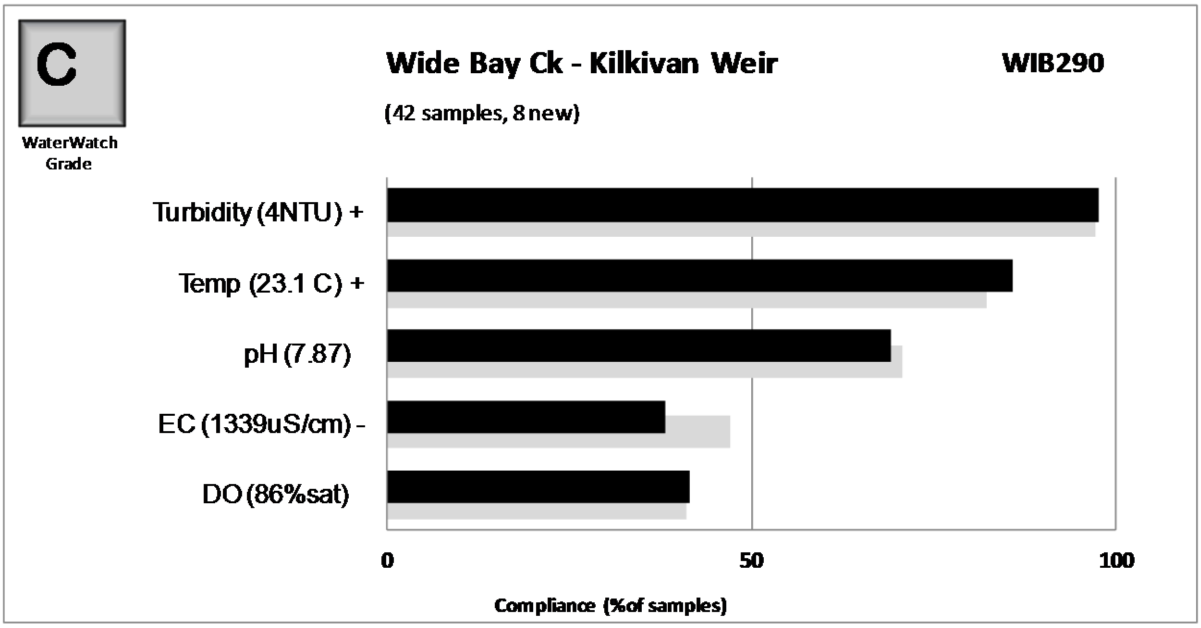
- Good sample size
- Relatively high pH levels (alkaline), but still complies well with guidelines
- Maintaining an overall grade of B (2011 & 2012 Waterwatch Grade = B) over the past 12 months

Mary River

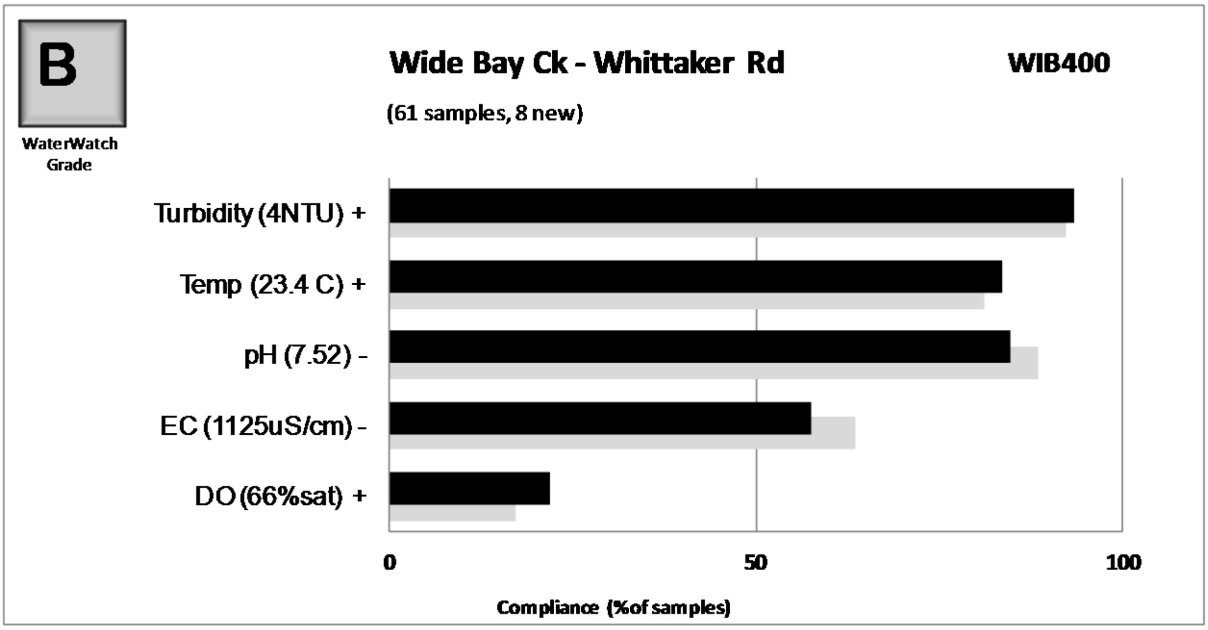


- Good sample size
- Dissolved oxygen levels are reasonably good, correlated with regular river flows and the water passing through a series of riffles / cobble beds
- Relatively high pH levels (alkaline), but still complies well with guidelines
- The overall water quality dropped at this site to a “B” (2012 grade = A) as a result of high electrical conductivity readings during the dry period in late 2012 to January 2013.

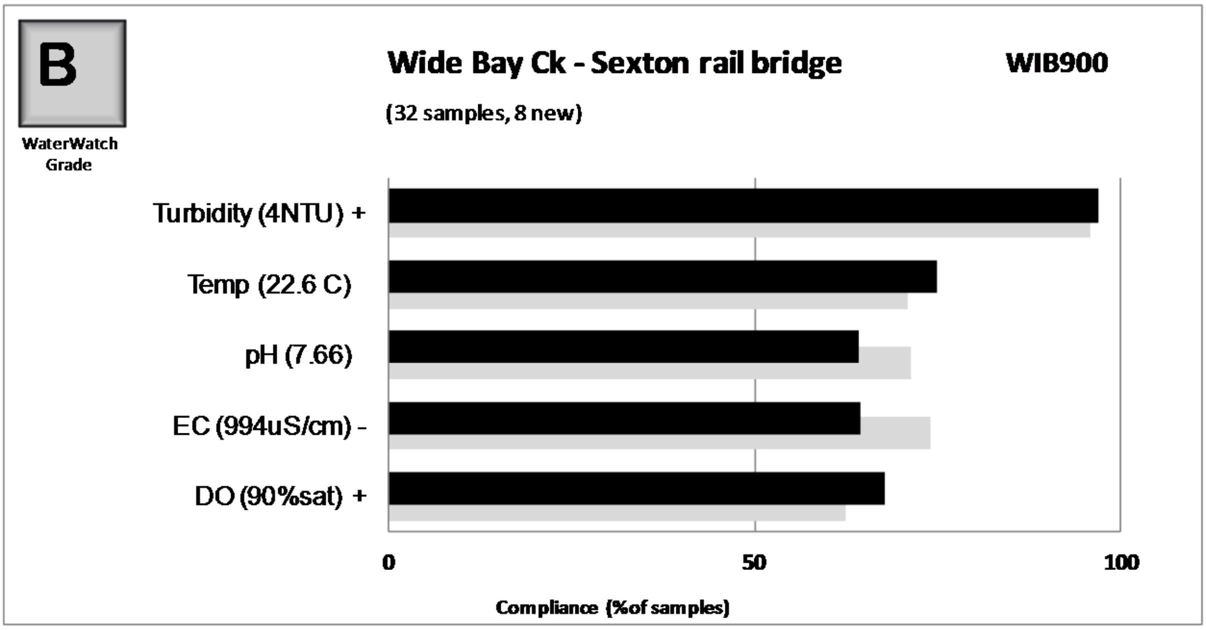
Wide Bay Creek



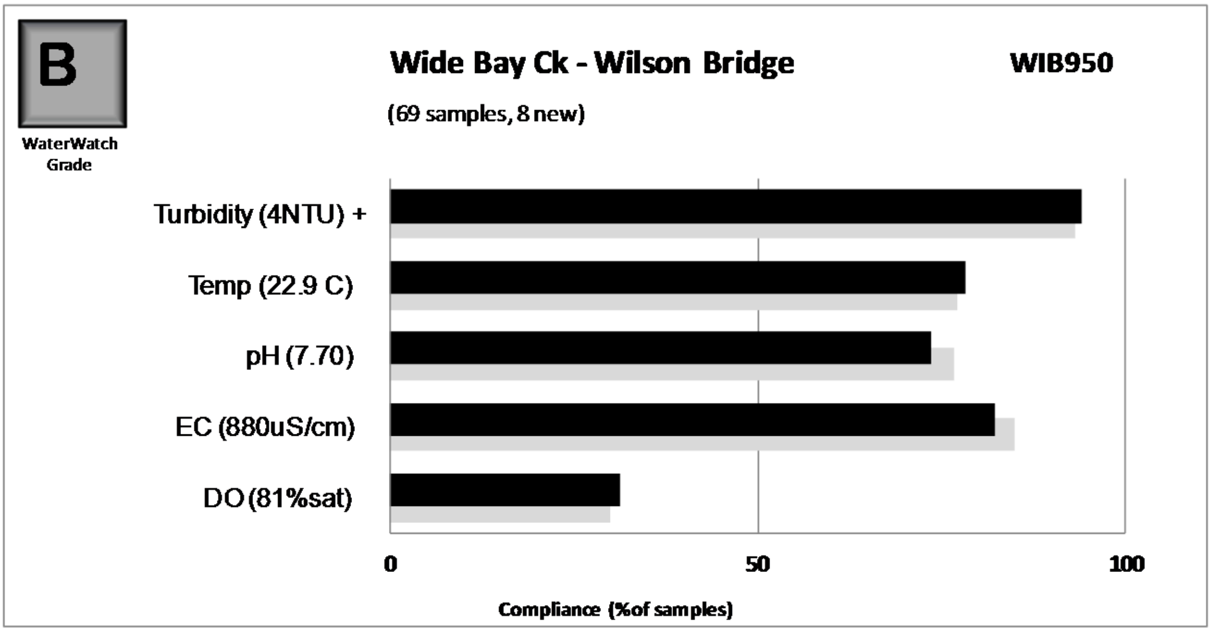
- Good sample size
- Significant improvement in turbidity and water temperature
- Relatively high pH levels (alkaline), but still complies well with guidelines
- The overall water quality dropped at this site to a "C" (2012 grade = B) as a result of high electrical conductivity readings during the dry period in late 2012 to January 2013.



- Good sample size
- Electrical conductivity (salinity) compliance levels have dropped siginficantly over the past 12 months due to the dry period between July 2012 and January 2013.
- Maintaining an overall grade of B (2011 & 2012 Waterwatch Grade = B) over the past 12 months

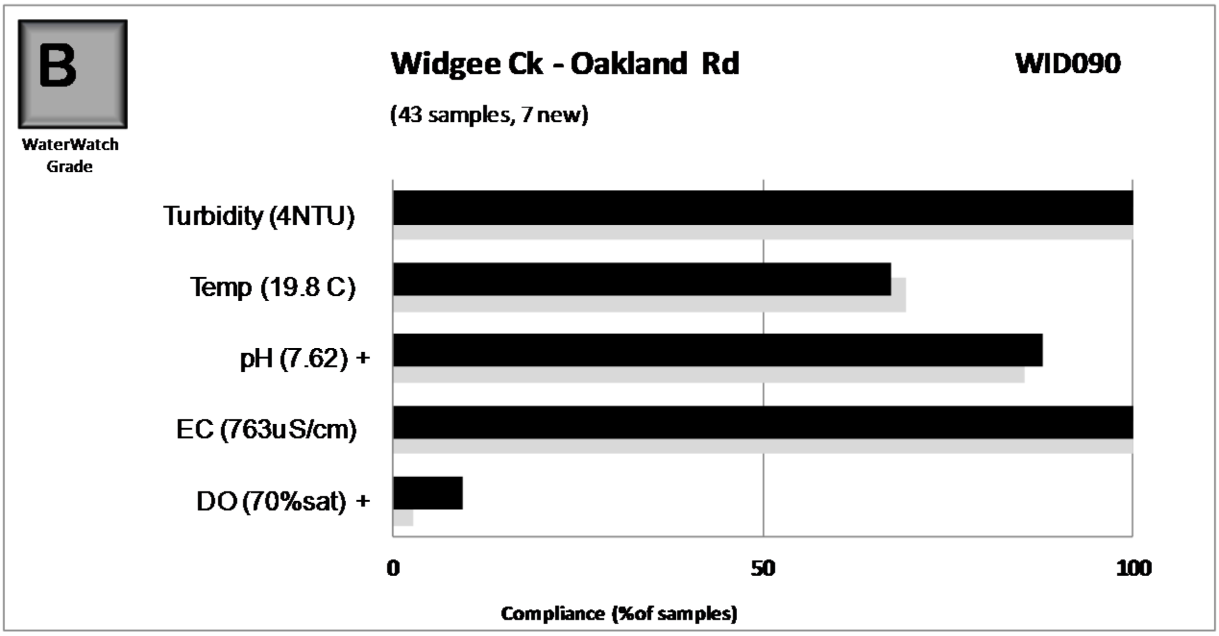


- Sample size good.
- Electrical conductivity (salinity) compliance levels have dropped siginficantly over the past 12 months due to the dry period between July 2012 and January 2013.
- pH has varied significantly during the past 12 months, with some unusually acidic readings for which there is currently no explanation.
- Maintaining an overall grade of B (2011 & 2012 Waterwatch Grade = B) over the past 12 months



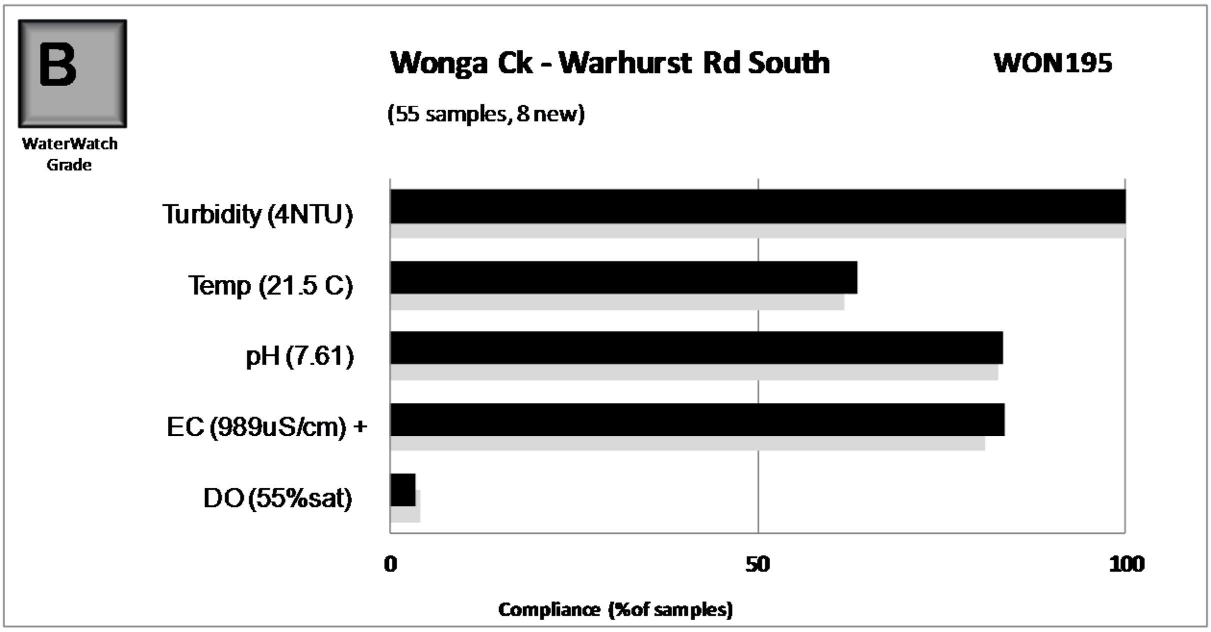
- Good sample size
- Some improvement in compliance for dissolved oxygen and turbidity
- Maintaining an overall grade of B (2011 & 2012 Waterwatch Grade = B) over the past 12 months

Widgee Creek

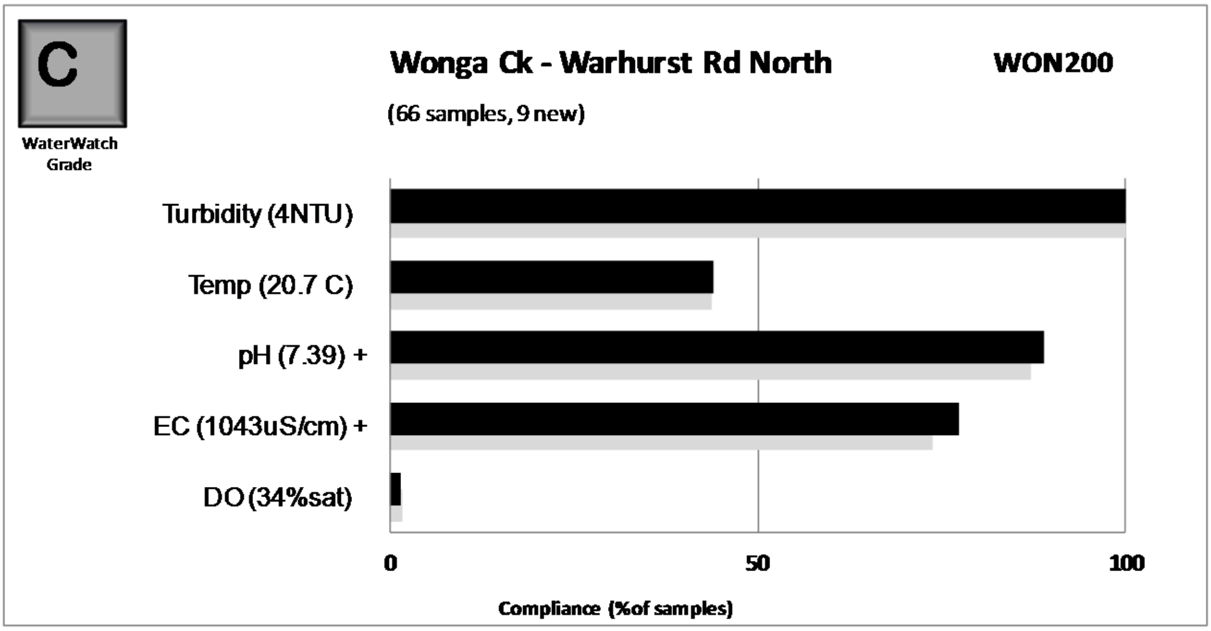


- Good sample size
- Significant improvement in compliance for dissolved oxygen over the past 12 months,
- This site experiences very little variation in dissolved oxygen levels - nearly all the readings are between 60 and 80% saturation which is just below guideline levels but is still indicative of a healthy creek.
- Excellent compliance for electrical conductivity (salinity)
- Exceptionally very little variance in pH - with a consistently neutral pH.
- Maintaining an overall grade of B (2011 & 2012 Waterwatch Grade = B) over the past 12 months

Wonga Creek



- Good sample size
- Both Wonga Creek sites are on a borderline between a "B" and "C" rating
- Significant improvement in electrical conductivity (salinity) levels at both sites has continued over the last 3 years, with improved flows
- Wonga Creek at these sites is an intermittent creek which effects dissolved oxygen levels
- Consistently low dissolved oxygen levels have been recorded at this site
- Maintaining an overall grade of B (2011 & 2012 Waterwatch Grade = B) over the past 12 months



- Good sample size
- Significant improvement in compliance of pH and electrical conductivity at this site over the past 12 months
- Interestingly, water temperature at this site is often colder than the guideline winter temperature suggest.
- Maintaining an overall grade of C (2011 & 2012 Waterwatch Grade = C) over the past 12 months

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

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- **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 more 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/chemicalwater 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, a percent compliance was calculated by comparing the results with data from an Upper Obi Obi Creek reference site, taking into account the season (i.e. higher expected temperatures in summer than in winter).

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 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 *below* 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.

This report prepared with the assistance of the Gympie Regional Council Environment Levy