Wide Bay – Widgee Creek Waterwatch Network Report

June 2011

Kinbombi Creek, February 2011

Report prepared by:

Brad Wedlock & Steve Burgess

MRCCC Catchment Officers

June 2011

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

Introduction

The volunteers of the Wide Bay Widgee Waterwatch network have now been collecting water quality data for more than 5 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 a La Nina weather cycle which produced unprecedented levels of flooding in Wide Bay Creek, and severe damage in other creeks of the network. Many families and their properties, including Waterwatch volunteers, were directly affected by the floods and we extend our thoughts and wishes to these people.

Flooding in Wide Bay, Widgee & Glastonbury Creeks started in March 2010, and by Christmas 2010 the entire Mary Catchment was saturated and repeated summer floods culminated in the January 2011 floods. In some creeks there was severe scour, erosion and damage to vegetation due to the very rapid stream height rises. However, since the floods, there appears to be a general improvement to the water quality of the creeks within the network. Anecdotal comments written on the datasheets reflect this general improvement in stream health (not withstanding the damage caused by the 2011 floods). However native in-stream aquatic plants and riparian vegetation are taking some time to recover, while weeds have colonised the bare areas created by the floods.

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. At some sites there is also enough data to develop local water quality guidelines in accordance with the Queensland water quality guideline procedures.

Due to the high risk to personal safety we don't encourage Waterwatch volunteers to collect flood water quality data. Consequently the Waterwatch data is does not capture the water quality impacts during the large flood events. MRCCC has commenced recording flood event data using specialised sampling programs and in-stream dataloggers.

The MRCCC water quality report card methodology has been designed for the Waterwatch data (physical-chemical water quality datasets), and does not yet incorporate the flood related water quality data or other aspects of stream health eg. riparian condition. This flood data has to be considered seperately to evaluate the impact of the flood events on the environment.

Brian Thomas on Wide Bay Creek at Running Creek Rd,

January 2011

Waterwatch sites monitored in the Wide Bay & Widgee Waterwatch Network

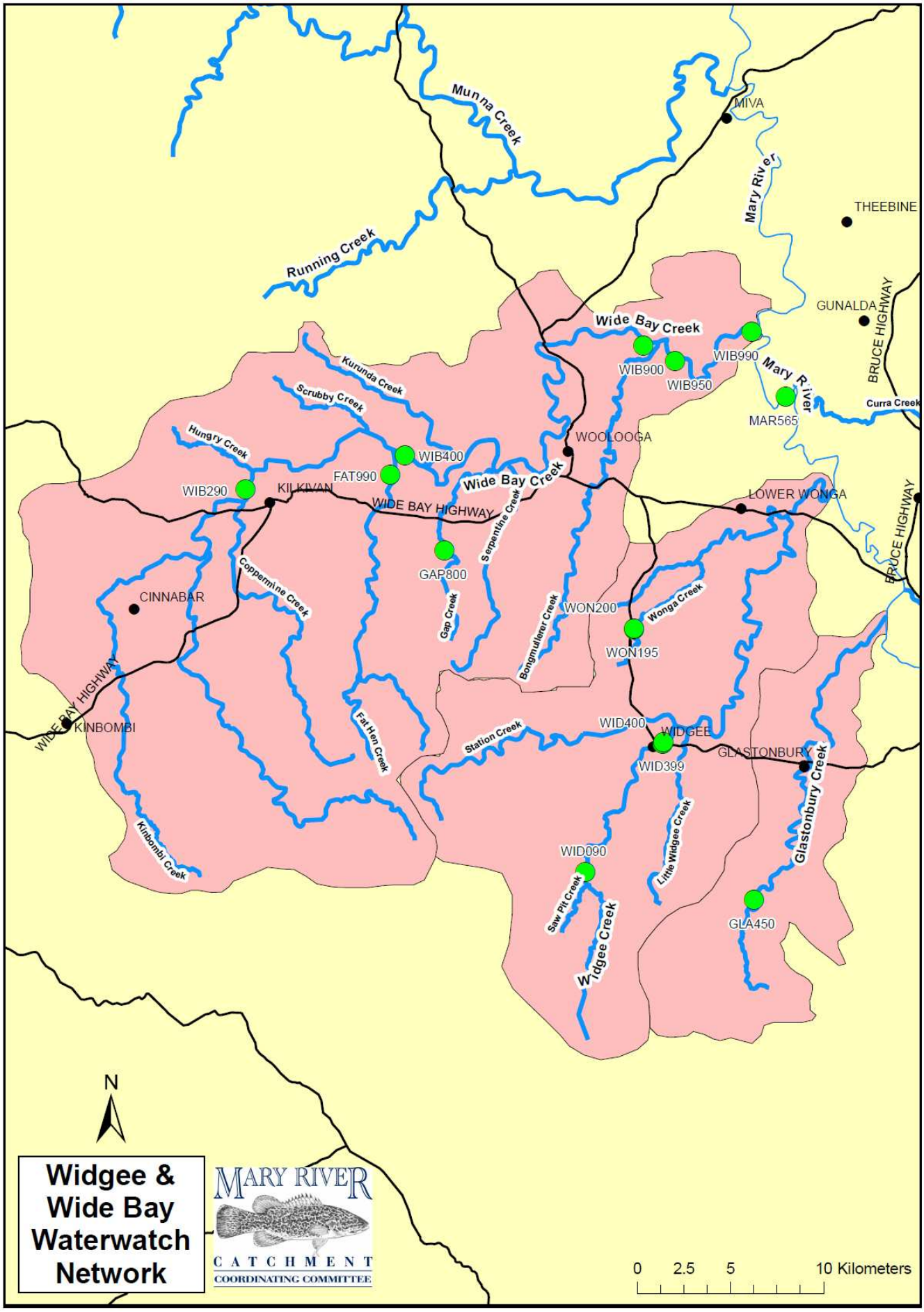
Wide Bay & Widgee Creeks Waterwatch Network		
FAT990	Fat Hen Creek	Bular Rd, Oakview
GAP800	Gap Creek	Sinai Rd, Oakview
GLA450	Glastonbury Creek	Geiger Rd, Upper Glastonbury
MAR565	Mary River	Reibels Crossing, Scotchy Pocket
WIB290	Wide Bay Creek	Kilkivan weir, Kilkivan
WIB400	Wide Bay Creek	Whittaker 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 2010-11. 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 Bagnall, Rob & Cathy Kerle.

Kinbombi Creek, February 2011

Waterwatch Network map



December 2010 & January 2011 floods

The summer of 2010/11 was characterised by a series of rapid rises in the creeks and Mary River culminating in the large extended flood event of January 2011. The earlier events in 2010 had the effect of softening the creek and riverbanks and weakening vegetation in the riparian zone, resulting in extreme damage during and after the extended flood event in January 2011.

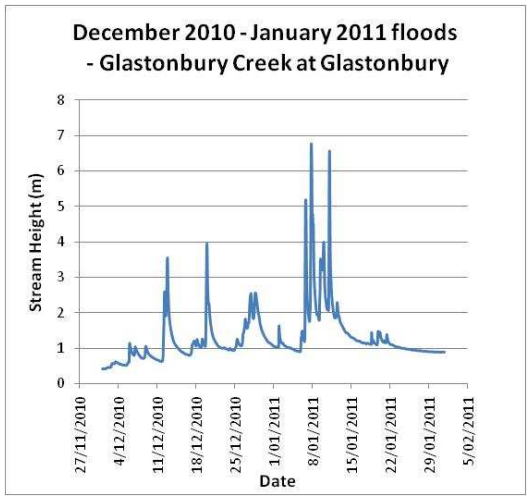
While the Mary River at Gympie and Miva experienced major flood events they were only in the order of a 1 in 20 year flood event (see appendix), however the flood event in Wide Bay Creek at Kilkivan and Woolooga was the highest level yet recorded. The water level at Kilkivan (Wide Bay Creek) was higher than what the gauging station was designed to measure, so the actual volume of water flowing through Kilkivan will never be known.

Water levels recorded during summer of 2010/11 are shown for :

1. Glastonbury Creek, at Glastonbury
2. Wide Bay Creek, at Kilkivan
3. Wide Bay Creek, downstream of Woolooga
4. Mary River, at Miva

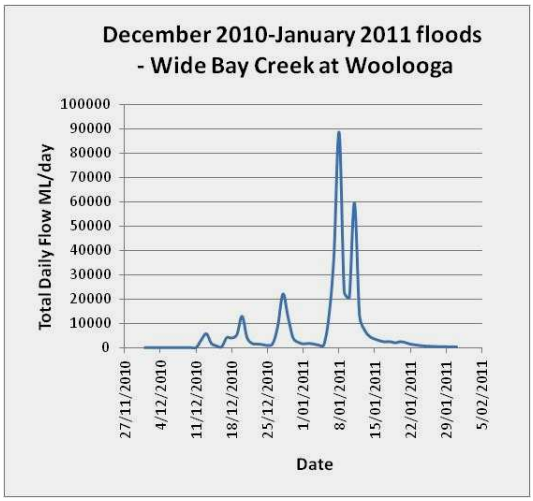
1. Glastonbury Creek, at Glastonbury

Characterised by several extremely fast stream height rises in a short period of time (ie. 2.5 metres per hour) during December and January.



2. Wide Bay Creek, at Kilkivan

The peak water level at Kilkivan (Wide Bay Creek) was higher than what the gauging station was designed to measure (more than 8.2 metres), so the actual volume of water flowing through Kilkivan will never be known. This flood caused an extreme amount of damage to the riparian zone and infrastructure eg. roads & fences.

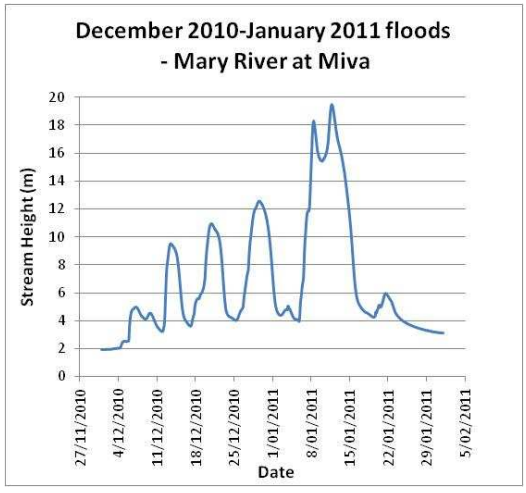


3. Wide Bay Creek, downstream of Woolooga

Following a series of three minor flood events in December 2010, a major flood peak occurred on the 8th January, followed by another distinct flood peak 3 days later. At Woolooga it was possible to measure the volume of flow, and the peak flow was 50% more than the highest ever recorded at this site. For example on the 8th January 2011 alone, approximately twice the volume of Borumba Dam flowed through the town of Woolooga.

4. Mary River, at Miva

Characterised by several rises and falls in the river during December, and an extended double flood peak in early January 2011 which contributed to two separate urban flood events in Maryborough. The flood peak at Miva was the 5th highest recorded since 1910.

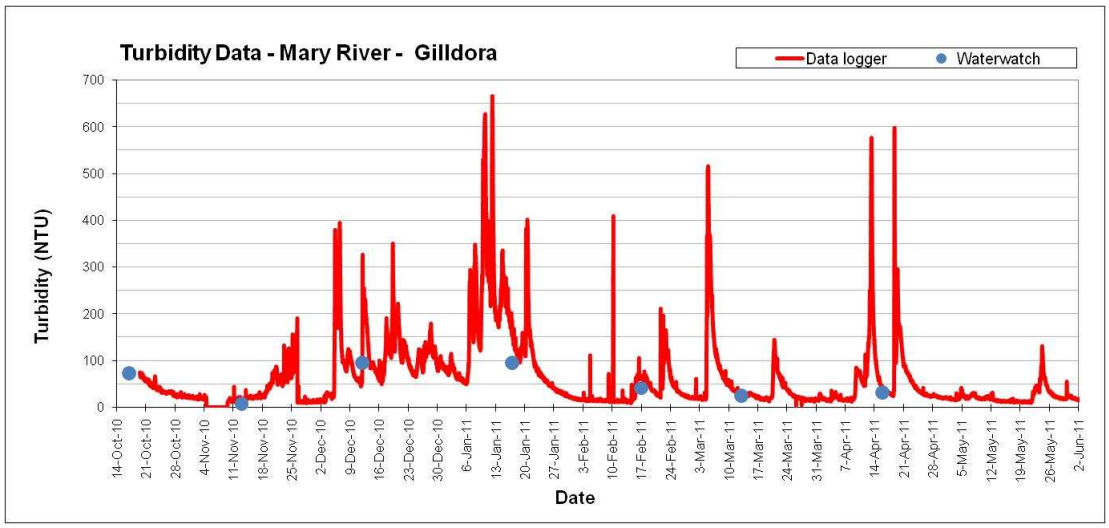


Turbidity in the Mary River during the floods

The graph below shows turbidity data recorded from an automated turbidity data logger installed in the Mary River upstream of Gympie (Gilldora). This clearly shows the extreme turbidity levels (more than 600 NTU's) recorded in the Mary River during the summer 2010/11 flood events. MRCCC's previous data using hand-sampling techniques has not measured any turbidity levels over 500 NTU's. The automated equipment was able to sample during the dirtiest and most dangerous part of the flood, which we would not ordinarily be able to sample safely.

To put this into perspective a turbidity measurement of 600 NTU's combined with the peak flow rate recorded in the Mary River at Miva equates to approximately 237 tonnes of sediment (or seven dump trucks) flowing under the Dickabram bridge every minute.

The ambient turbidity sampling conducted by the volunteers cannot measure this impact on water quality because turbidity measurements are not taken during the peak flood events. The graph below shows the monthly Waterwatch turbidity measurements recorded for the year at a nearby Waterwatch site compared to the turbidity data recorded from the automated turbidity logger installed at Gilldora. This clearly shows that the Waterwatch turbidity data does not capture the peak events.



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 ºC,Winter 16-24ºC)

Station Creek, March 2011

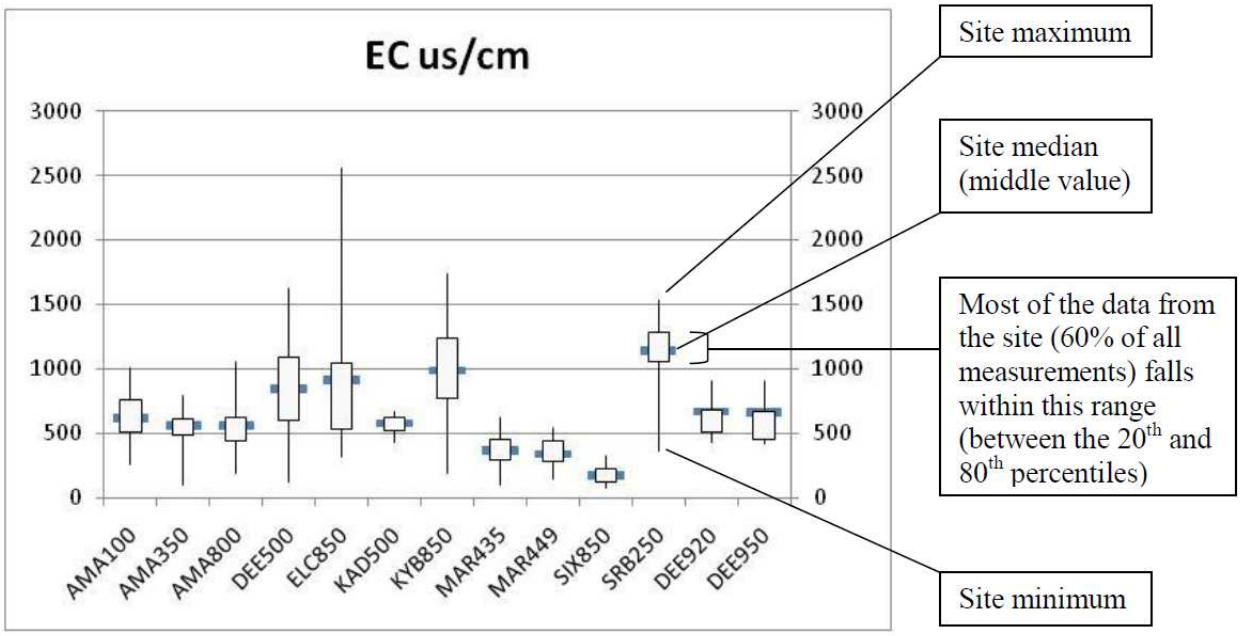
Results- inter-site comparisons

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.

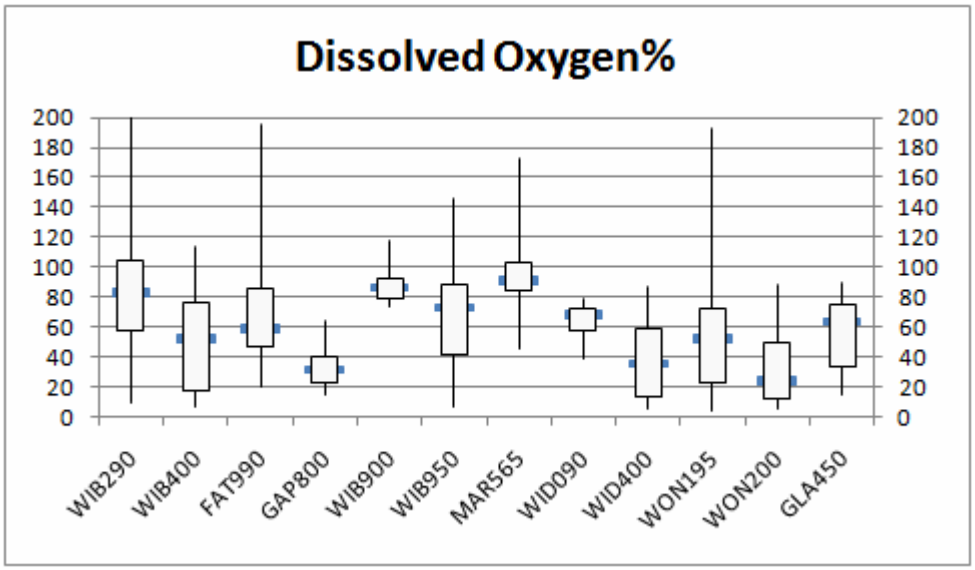
For each site on the graph:

- 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.

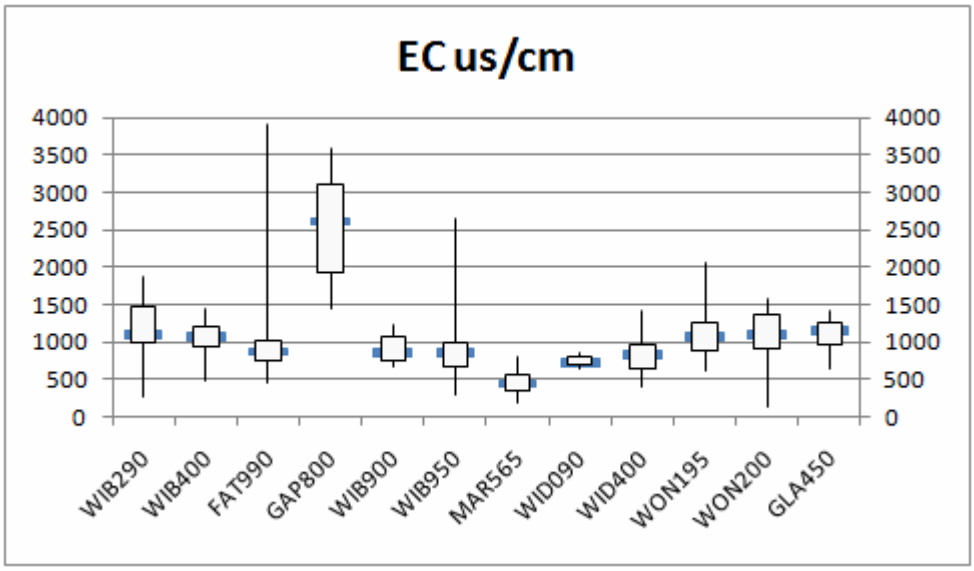


Long-term inter-site comparison of dissolved oxygen levels (all data collected)



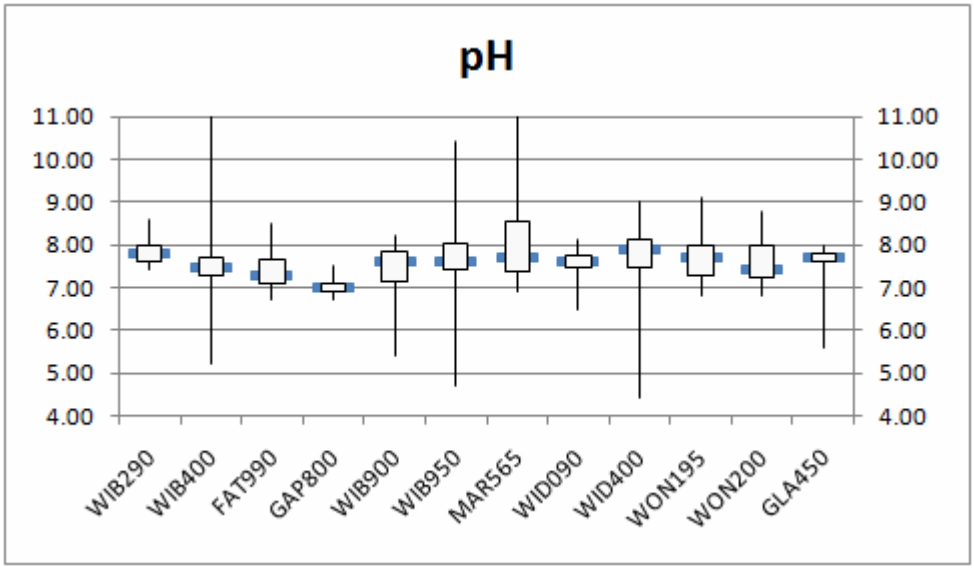
- This graph illustrates all the long-term data collected from each site, not just the last year's data
- Dissolved oxygen levels can change remarkably over the course of a day. In disturbed systems with high nutrient and light levels dissolved oxygen can vary over a wide range during the day, e.g. 30% to 150%. In more undisturbed systems the oxygen levels generally maintained within a smaller range eg. the guidelines for the Mary Catchment are 80% 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 WIB900 & WID090 sites have not been monitored long enough to measure the long-term variability).

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
- 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 EC levels in this network are higher than the levels observed in all the other Waterwatch networks of the Mary River catchment.
- Gap Creek is a statistically different outlier amongst the entire Waterwatch network for electrical conductivity.

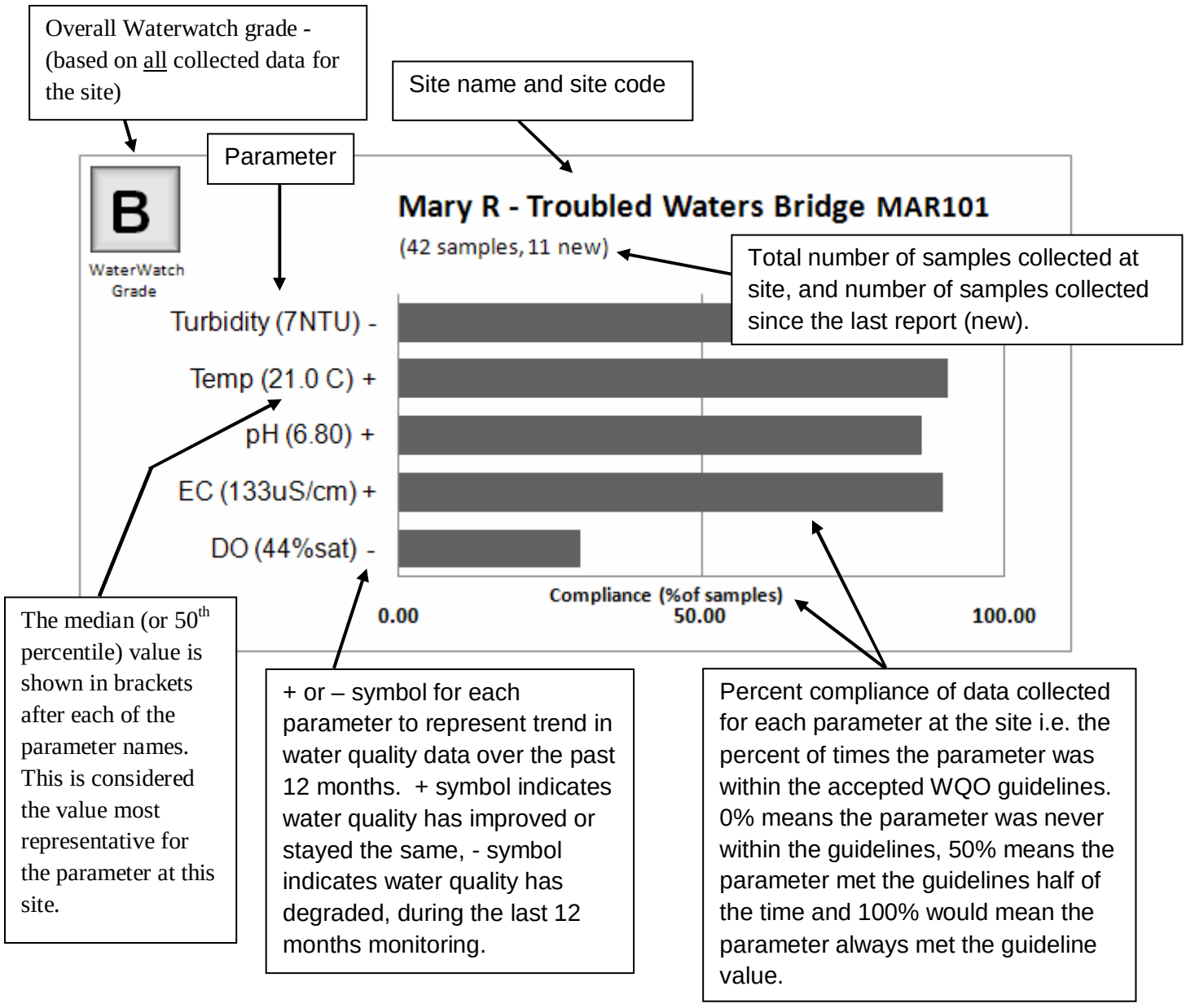
Long term inter-site comparison of acidity



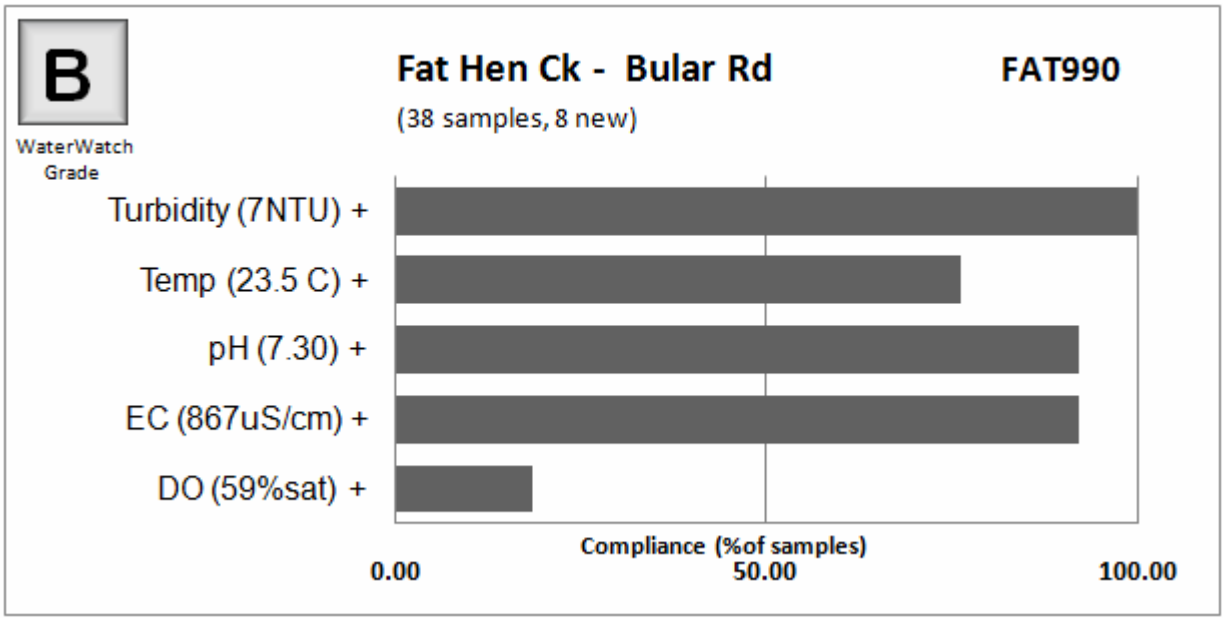
- This graph illustrates all the long-term data collected from each site, not just the last year's data
- All sites show generally good compliance with pH guidelines, but are tending to be alkaline (more than 80% of the measurements are greater than 7).
- The Mary River site shows overall high pH levels with more variation than the creek sites. This pH trend maybe 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.

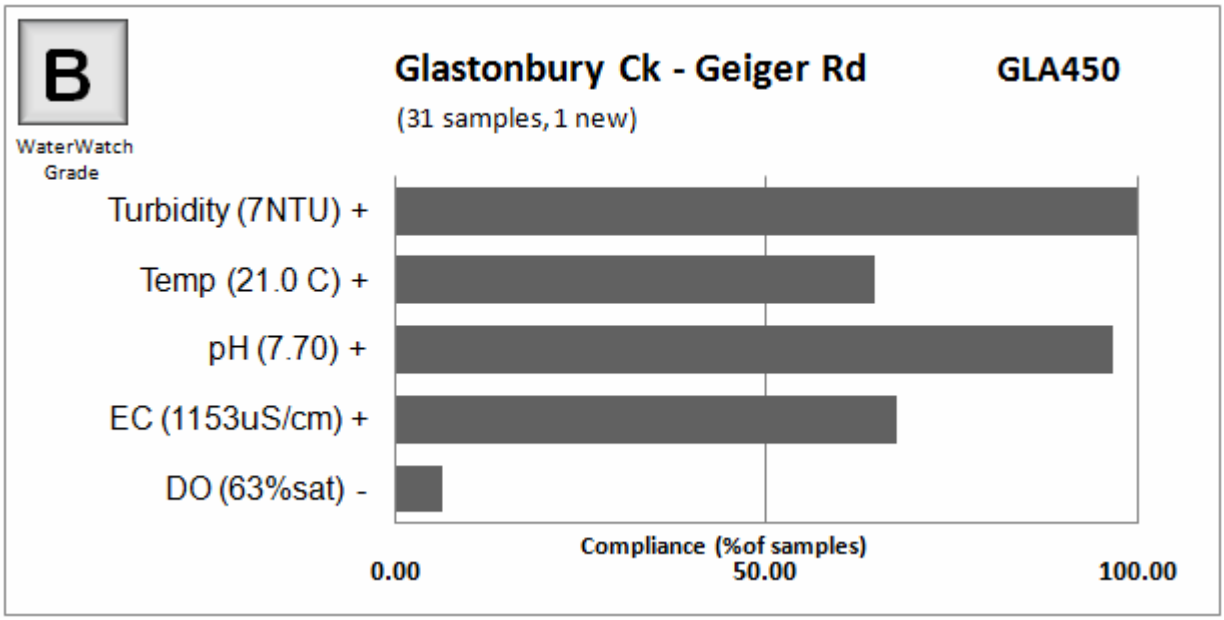


Fat Hen Creek



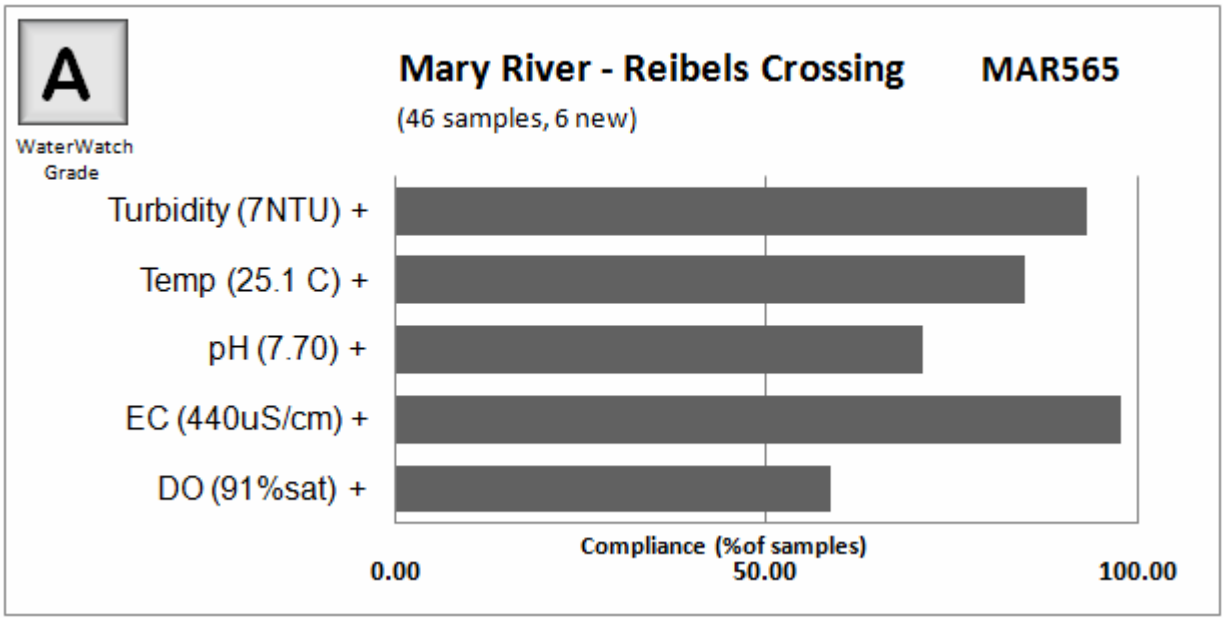
- This year's data shows an improving trend on all 5 phys-chemical water quality parameters for all sites tested in Fat Hen Creek due to generally better flows in the creek.
- 2010 Waterwatch Grade = B

Glastonbury Creek



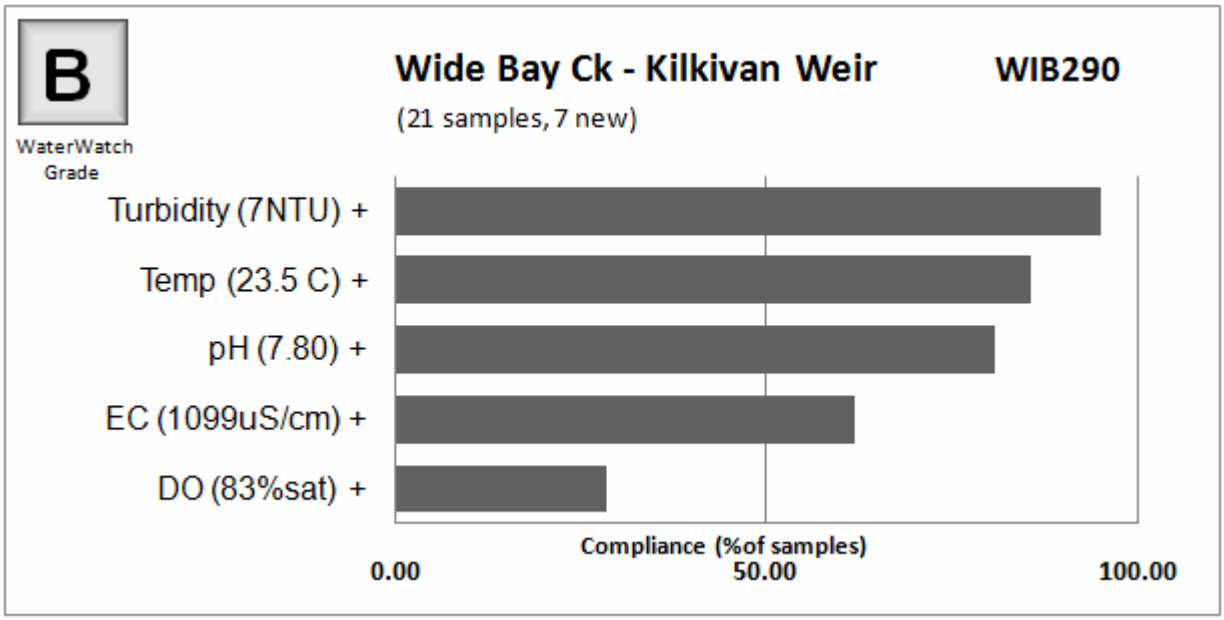
- Flood peaks in Glastonbury Creek were extraordinarily sharp with multiple events occuring during December 2010 & January 2011.
- Ambient sampling was restricted due to the impact of floods
- 2010 Waterwatch Grade = B

Mary River

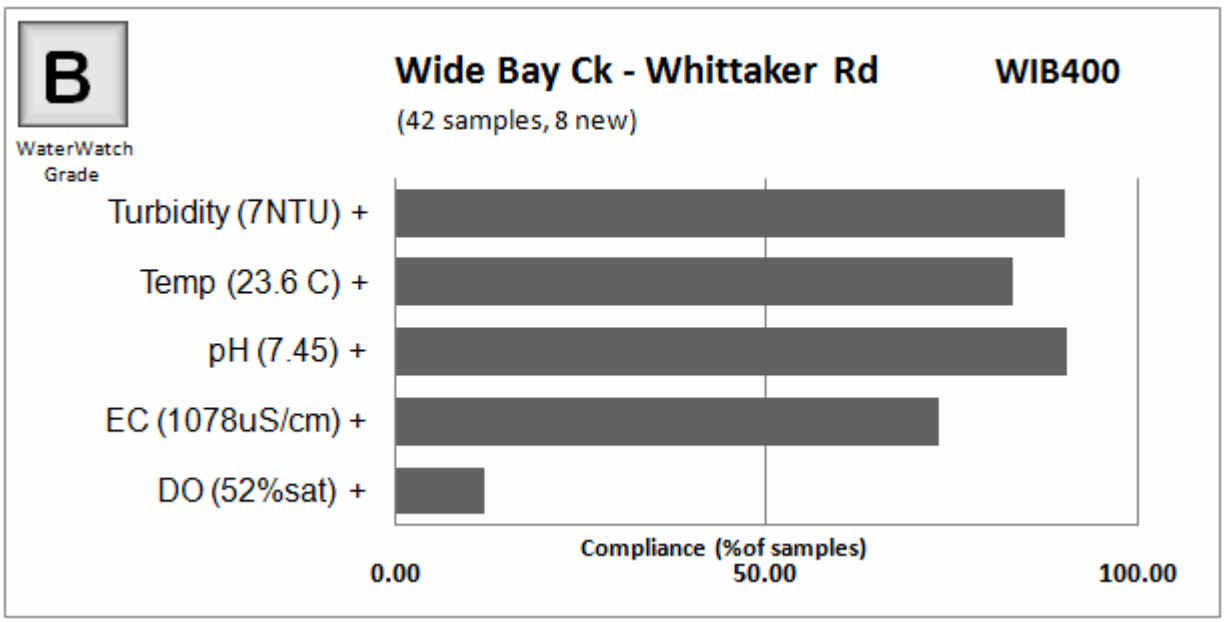


- Good sample size
- Good EC compliance – correlated with regular flows
- This Mary River site has considerably higher water temperature levels and oxygen levels than the sample sites located on creeks, due to the large open pool upstream, and shallow water depth at the sampling site
- This year's data shows an improving trend on all 5 phys-chemical water quality parameters for the Mary River.
- 2010 Waterwatch Grade = A

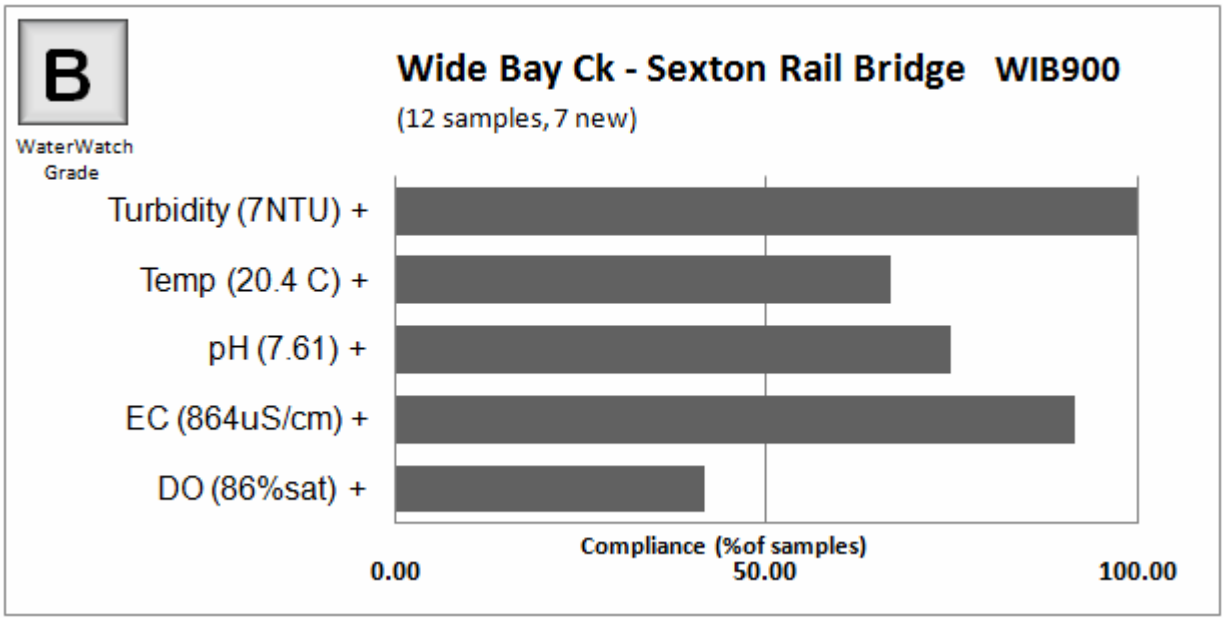
Wide Bay Creek



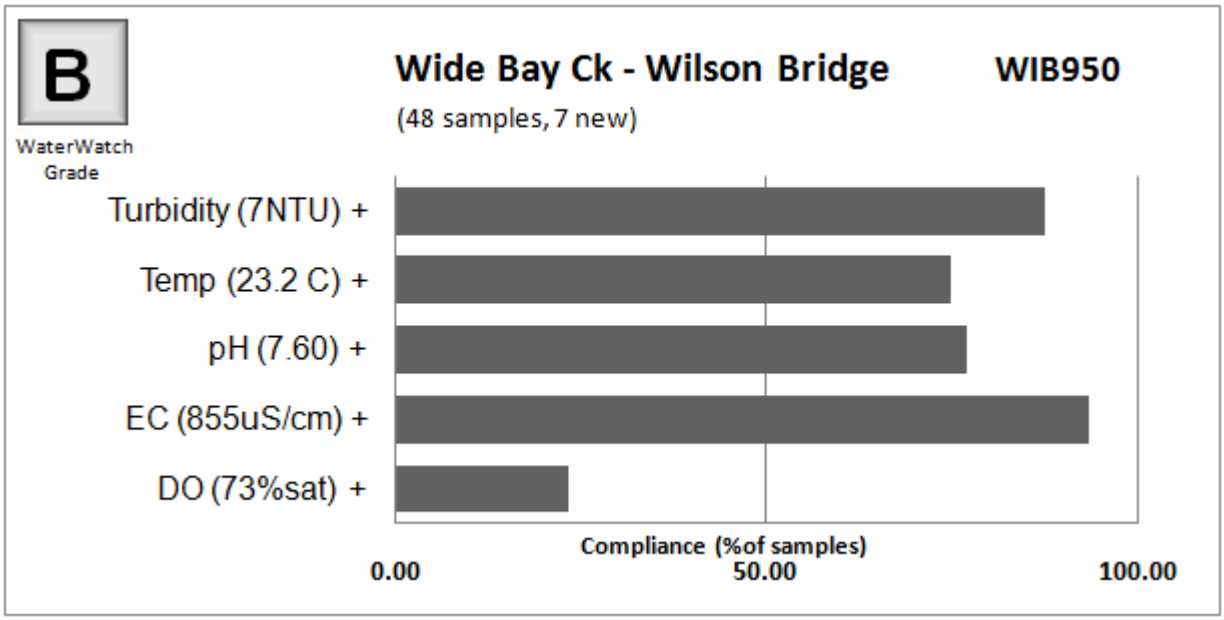
- The creek at this site is wide and open resulting in overall high water temperatures, however temperatures have dropped at this site by almost 1.5 degrees from 2010 (25.1'c)
- High pH levels experienced
- This year's data shows an improving trend on all 5 phys-chemical water quality parameters for all sites tested in Wide Bay Creek due to generally better flows in the creek.
- 2010 Waterwatch Grade = B



- Good sample size
- High water temperature values recorded
- Low compliance with guidelines for dissolved oxygen, but conditions have improved since 2010.
- 2010 Waterwatch Grade = B

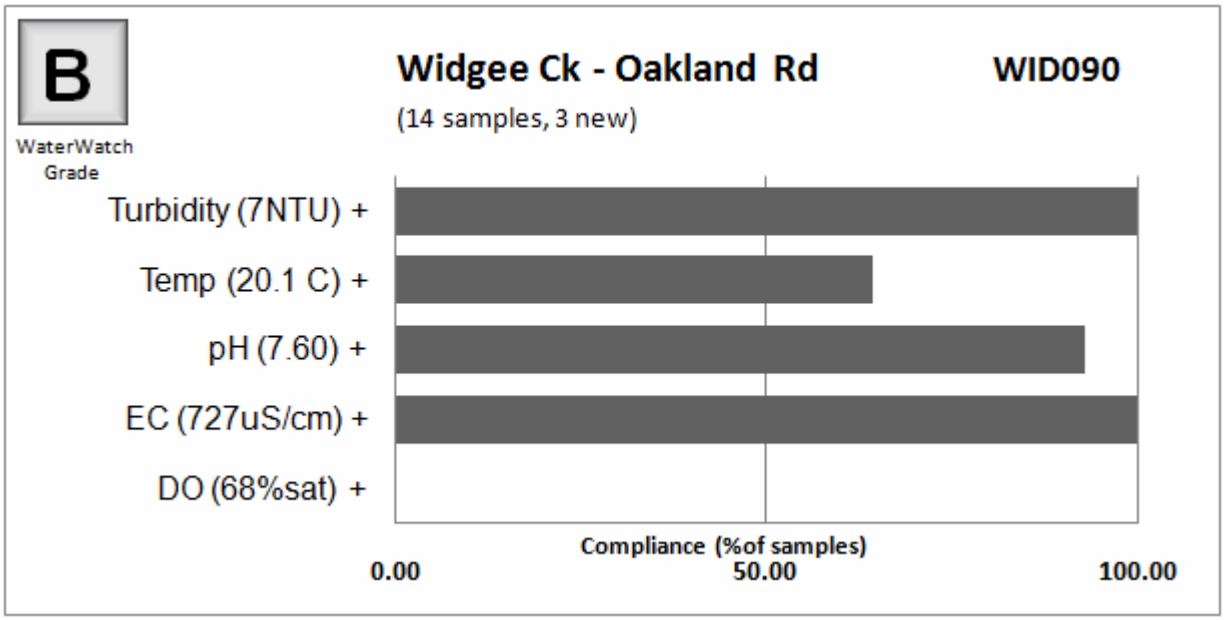


- Sample size is too small to make comments on longer term trends.
- Site is generally reporting good phys-chemical water quality
- This site reports lower water temperatures than other Wide Bay Creek sites
- 2010 Waterwatch Grade = B

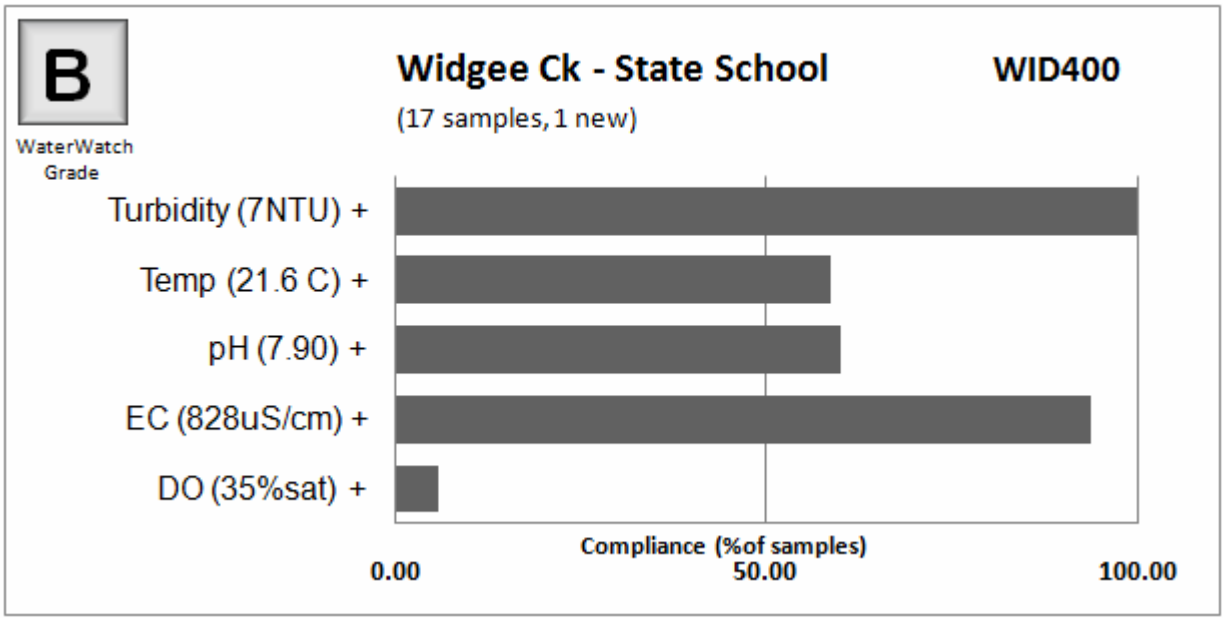


- Good sample size
- High water temperature values recorded
- Low compliance with guidelines for dissolved oxygen, but conditions have improved in the last year.
- 2010 Waterwatch Grade = B

Widgee Creek

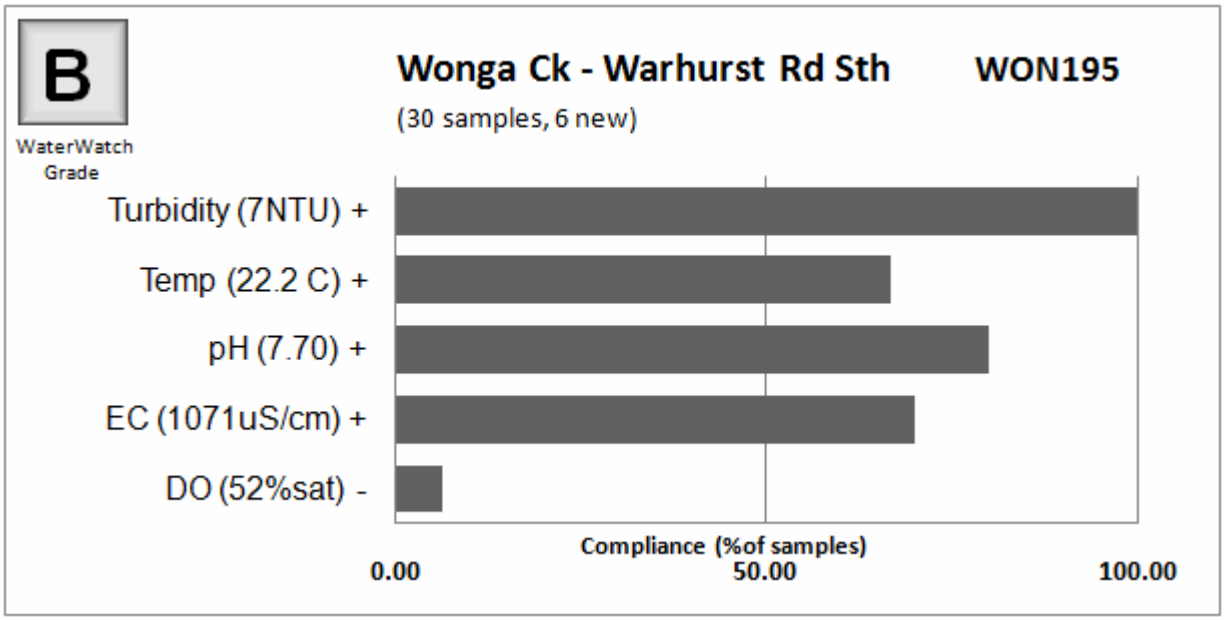


- Sample size is too small to make comments on longer term trends.
- This site reports lower water temperatures due to good riparian shade
- 2010 Waterwatch Grade = B

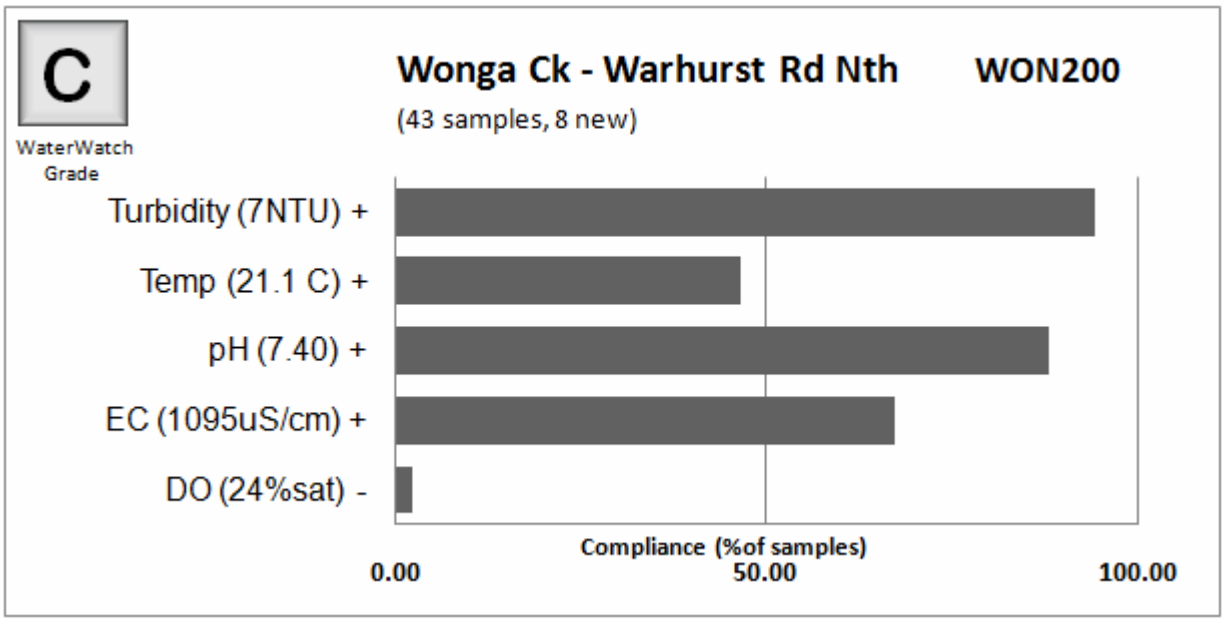


- Sample size is too small to make comments on longer term trends.
- This site reports lower water temperatures due to good riparian shade
- 2010 Waterwatch Grade = C, improvement in grade this year due to improved dissolved oxygen levels.

Wonga Creek

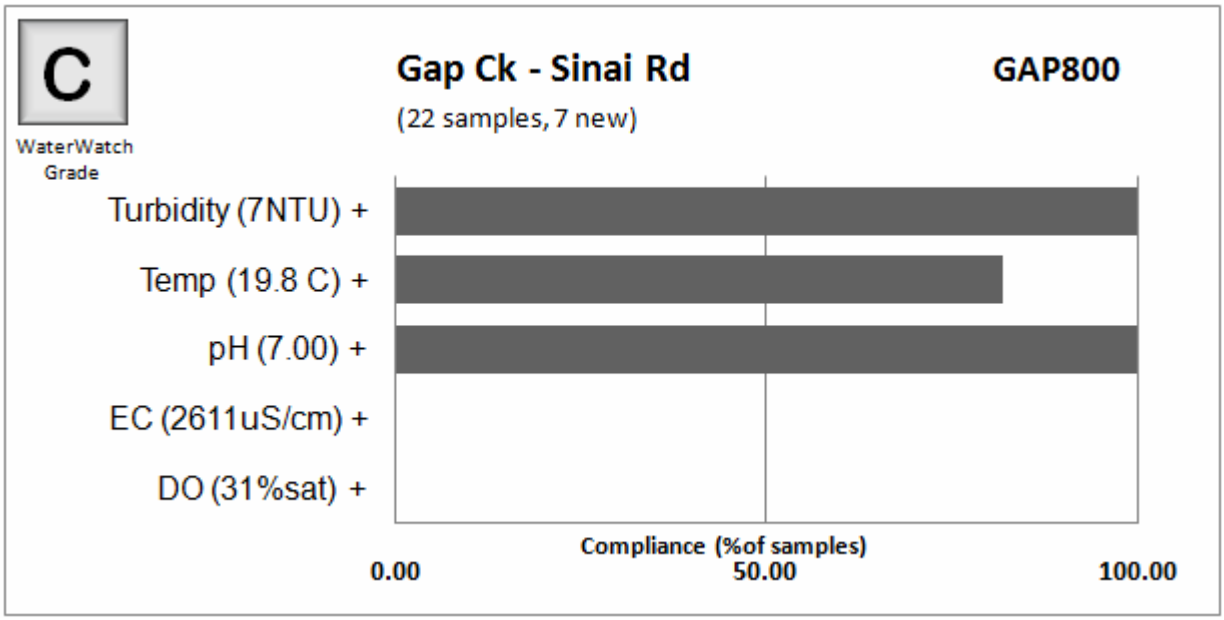


- Wonga Creek at these sites is an intermittent creek
- Electrical conductivity levels at both sites have improved over the 12 months, with improved flows
- Consistently low dissolved oxygen levels have been recorded at this site
- 2010 Waterwatch Grade = C, improvement in grade due to improved dissolved oxygen levels and reduced electrical conductivity levels.



- Consistently low dissolved oxygen levels have been recorded at this site
- 2010 Waterwatch Grade = C

Gap Creek



- Even though sample size is too small to make comments on longer term trends at this site, the EC levels at this site are significantly higher than all other sites within the network.
- 2010 Waterwatch Grade = C

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

Appendix

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.

MARY RIVER CATCHMENT COORDINATING COMMITTEE

January 2011 flood heights

Gauging Station	2011 Peak Flow	2011 Peak Height	Ranking of 2011 flood
Bellbird – Mary River (Conondale)	211 534 meg/day	8.989m	4th highest since 1959 Peak – 1989 – 11.0m 329 097 meg/day
Moy Pocket – Mary River (Kenilworth)	247 798 meg/day	15.748m	3rd highest since 1963 Peak – 1999 – 16.87m 312 336 meg/day
Miva - Mary River	536 554 meg/day	19.46m	5th highest since 1910 Peak – 1974 – 20.8m 641 606 meg/day
Tiaro – Mary River (Home Pk)	524 729 meg/day	18.728m	3rd highest since 1982 Peak – 1992 – 20.61m 730 166 meg/day
Kilkivan – Wide Bay Ck	79 920 + meg/day (discharge larger than recorded)	8.20m (overtopped 8.2m gauge by 0.5m)	Highest since 1974 Previous peak – 1989 @ 74 563 meg/day (7.86m)
Woolooga – Wide Bay Ck	194 793 meg/day	12.937m	Highest since 1909 Previous peak - 1947 @ 126 835 meg/day
Munna Creek	111 451 meg/day	11.992m	10th highest since 1923 Peak – 1955 – 16.24m 274 492 meg/day
Kandanga Ck – Hygait	66 198 meg/day	7.263m	
Glastonbury Creek	47 462 meg/day	6.766m	
Amamoor Creek	54 432 meg/day	8.658m	
Six Mile Ck – Cooran	29 808 meg/day	10.318m	
Obi Obi Ck – Maleny	18 775 meg/day	2.006m	
Tinana Ck - Goomboorian	13 137 meg/day	6.441m	

Flood height information prepared by MRCCC February 2011