

## Wide Bay – Widgee Creek Waterwatch Network Report

2011 / 2012



*Image courtesy of Rosemary Burnett*

**Mary River Sexton, February 2012**

Report prepared by:

Brad Wedlock & Steve Burgess

MRCCC Catchment Officers

June 2012

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

## Introduction

The volunteers of the Widgee-Wide Bay Creeks Waterwatch network have collected water quality data for more than 6 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 La Nina weather cycle continue which produced levels of flooding, which some districts such as Goomboorian, East Deep Creek, Traveston and Mothar Mountain, had 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.

Flooding in Wide Bay, Widgee and Glastonbury Creeks continued throughout 2011 and 2012 - not to the same extent as the massive January 2011 floods, but on some properties the clean-up continues. As a consequence of these small freshes our creeks have continued to flow well again throughout 2011 and 2012. The Mary River even experienced a rare flood event in June 2012!

Due to the sustained river and creek flows throughout the year there appears to be a general improvement to the water quality of the waterways within the network. Anecdotal comments written on the datasheets reflect this general improvement in stream health. However native in-stream aquatic plants and riparian vegetation are taking some time to recover.

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 2011. 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. This rise in EC is to be expected as we transition out of La Nina weather pattern and back into 'normal' weather patterns (whatever that is!).



**Serpentine Creek June 2011, with water!**

## Waterwatch sites monitored in the Wide Bay and Widgee Waterwatch Network

Wide Bay and 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

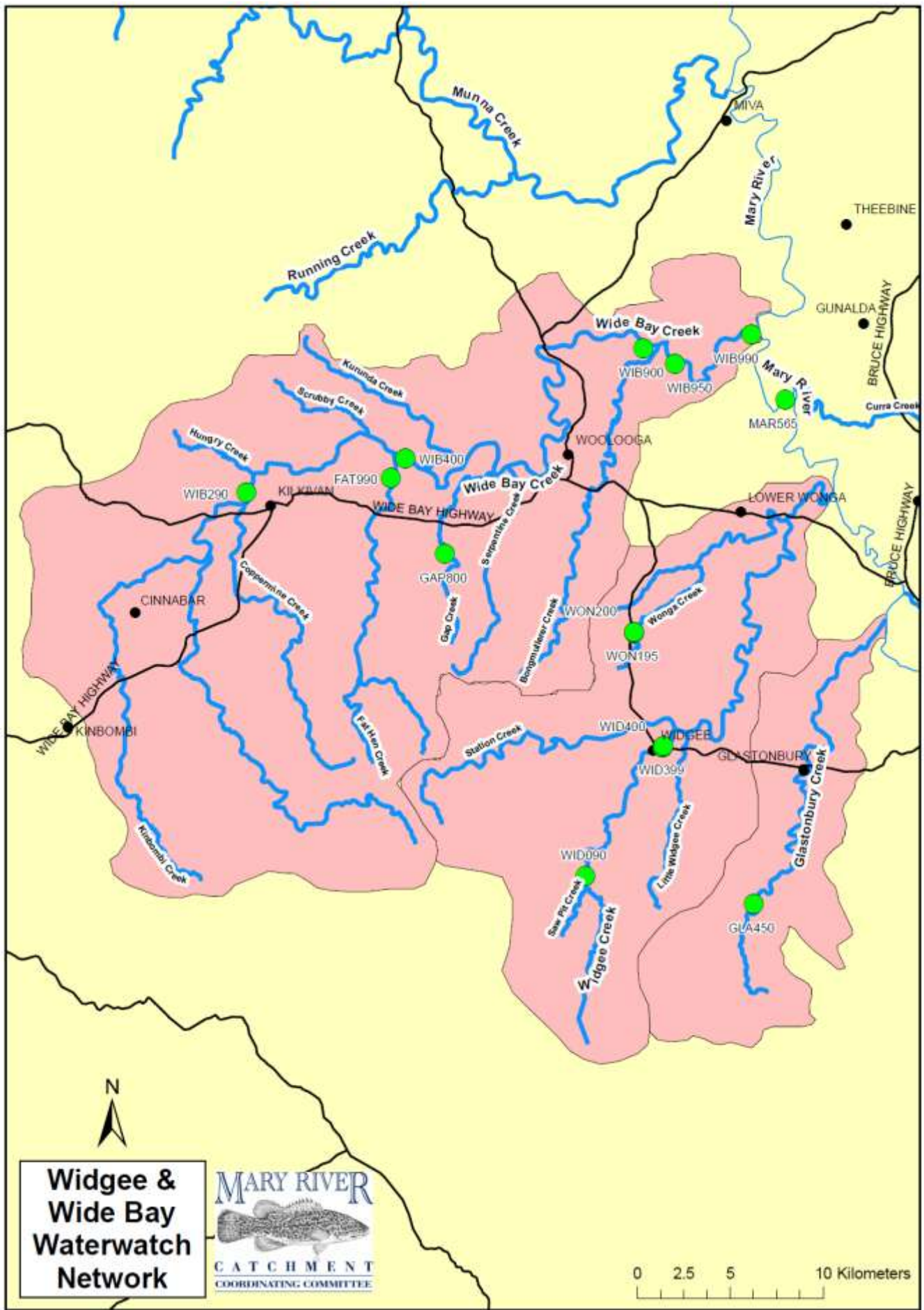
### Volunteers

Thanks to the dedicated Waterwatch volunteers past and present for their continued effort, assistance and involvement in the Waterwatch network during 2011-12. Contributors to this report are: Brian Thomas, Errol Janke, Yvonne, John and Gillian Crossley, Dave and Janet Golding, Narelle Hall and Stephen Horseman, Mick Bambling, Anette Bambling, Rosemary and David Burnett, Widgee State School, Keith Bagnall, Rob and Cathy Kerle.



Upper Widgee Creek, February 2012 following a flood.

Waterwatch Network map



## Summer of 2012 floods

The summer of 2011/12 was characterised by a series of small rises in the creeks and Mary River compared to the large extended flood event of January 2011.

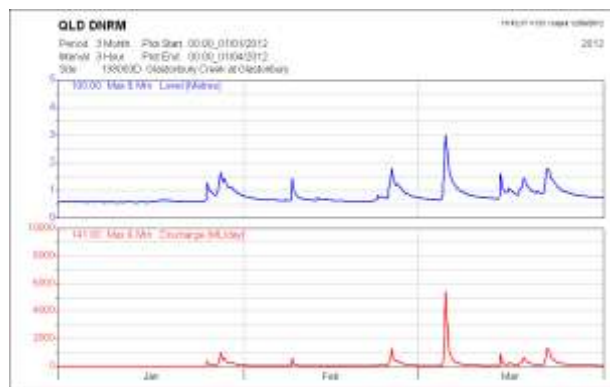
Water levels recorded during summer of 2011/12 are shown for :

1. Glastonbury Creek, at Glastonbury
2. Wide Bay Creek, at Kilkivan
3. Wide Bay Creek, downstream of Woolooga

### 1. Glastonbury Creek, at Glastonbury

This summer Glastonbury Creek is characterised by several extremely fast stream height rises in a short period of time that taper off slowly - particularly in early March 2012. The flow peak reached 6000 meg/day – the equivalent storage in Lake Macdonald near Cooroy.

### Glastonbury Creek – Jan'12 to Apr'12



### 2. Wide Bay Creek, at Kilkivan

The Wide Bay Creek at Kilkivan experienced a number of small floods in early 2012, punctuated by a large flood in early January 2012. This significant flood peaked at over 25,000 meg/day flow (approx half the storage in Borumba Dam). The January 2012 flood was dwarfed by the huge January 2011 flood.

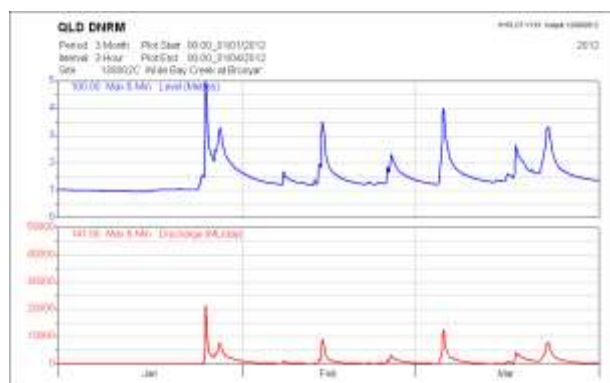
### Wide Bay Creek, Kilkivan – Jan'11 to Aug'12



### 3. Wide Bay Creek, downstream of Woolooga

The Wide Bay Creek downstream of Woolooga experienced a number of small floods in early 2012, similar to Kilkivan, with a significant peak in late January, but not to the same extent as the January 2011 floods.

### Wide Bay Creek, Woolooga – Jan'12 to Apr'12



## 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 recognised 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)



Wide Bay Creek, Kilkivan 2011

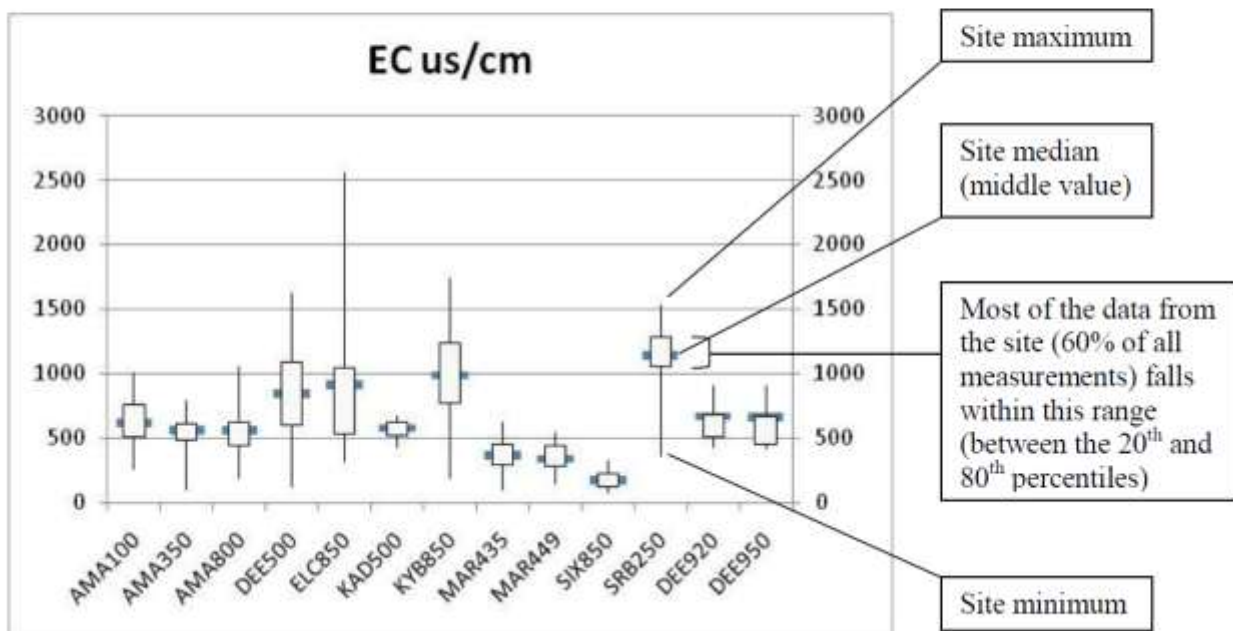
## Results- inter-site comparisons

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:

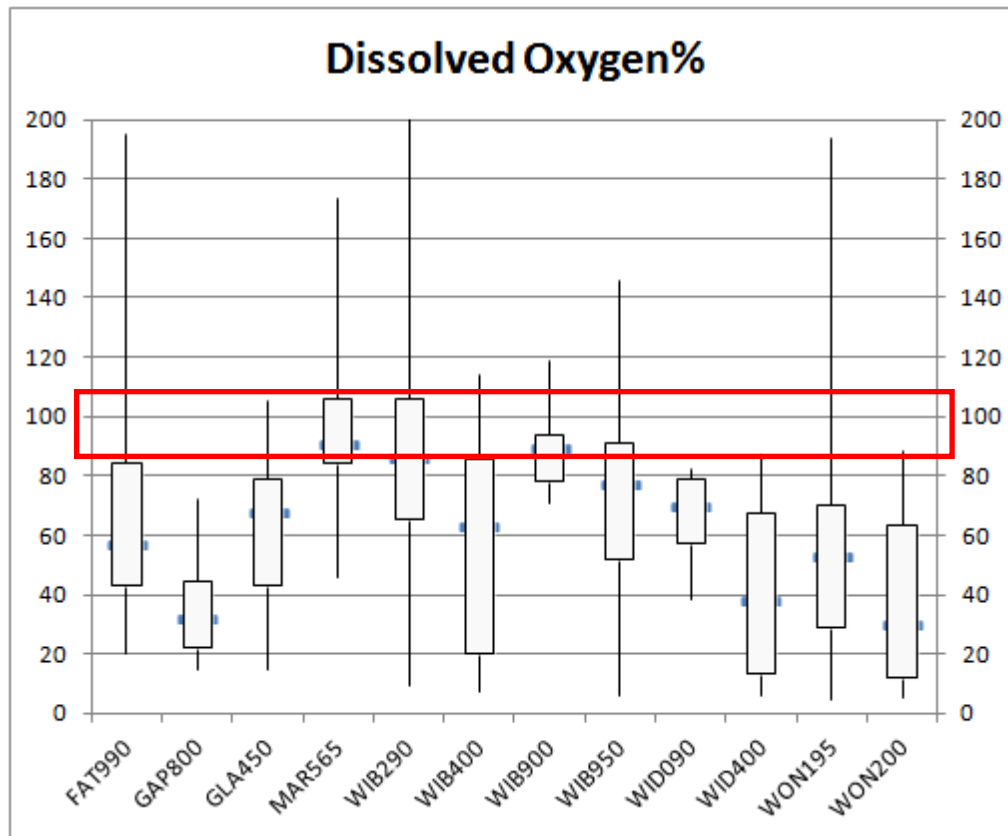
- The vertical line (whiskers) shows the range between the maximum and minimum values recorded at the site.
- The vertical boxes show the range between the 20<sup>th</sup> and 80<sup>th</sup> percentiles at each site.
- The horizontal bars show the median value (50<sup>th</sup> percentile) for each site.

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)

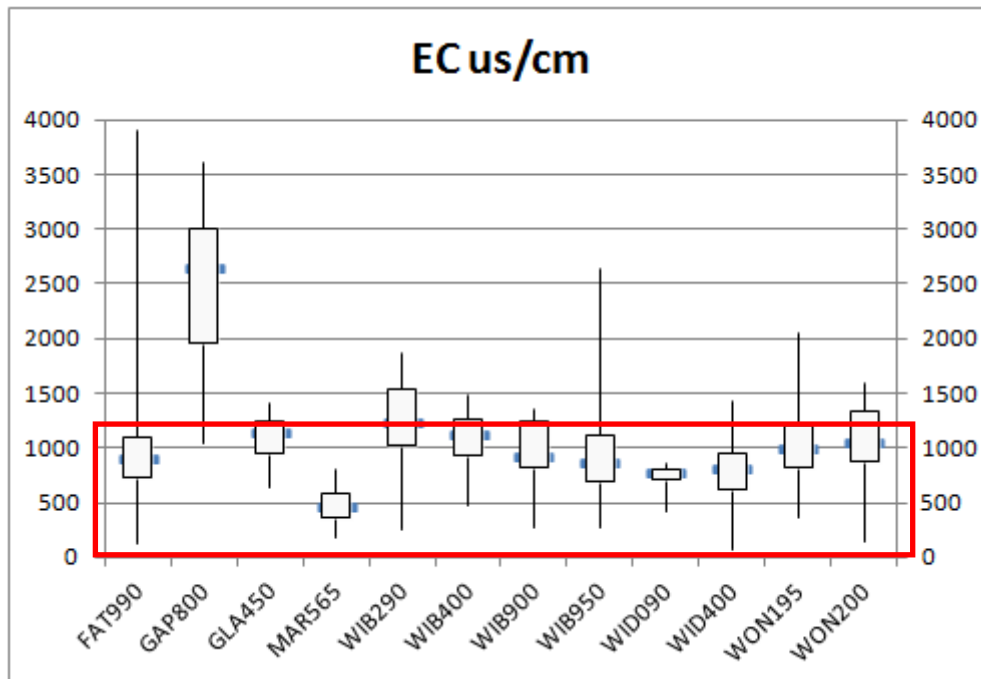
### in the Wide Bay – Widgee Waterwatch Network



- 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 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.

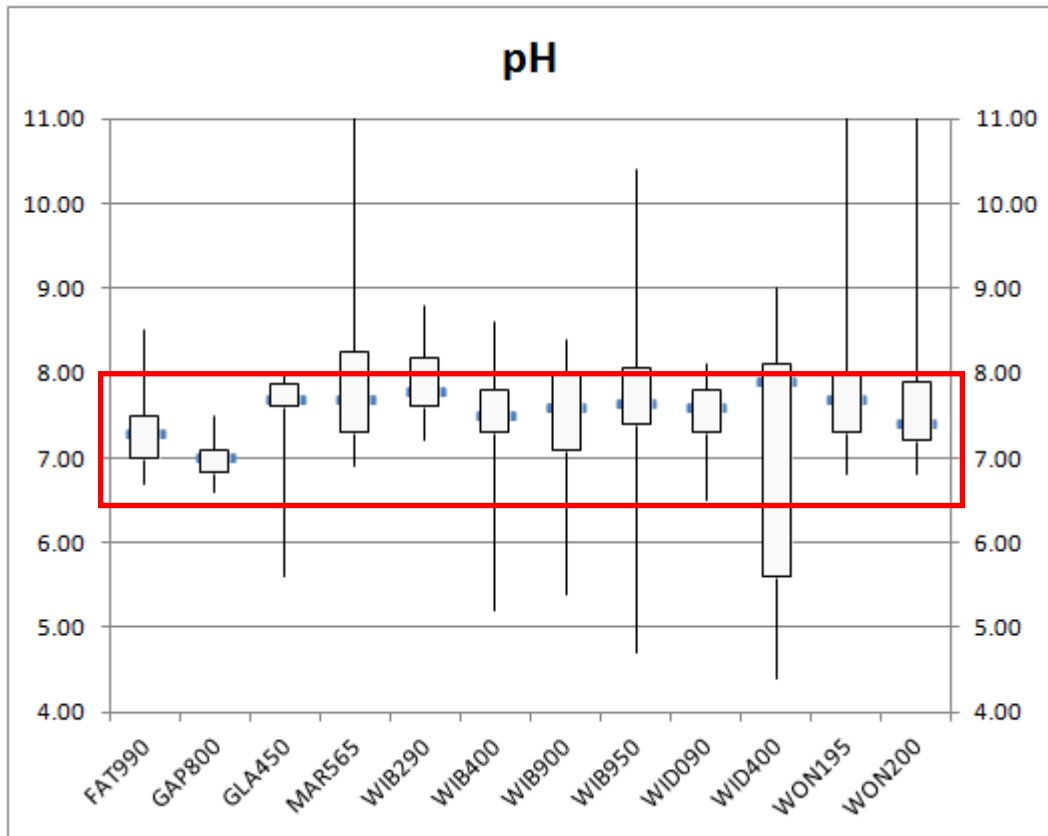


**Long-term inter-site comparison of electrical conductivity (salinity)  
in the Wide Bay – Widgee Waterwatch Network**



- 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 1200 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 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.
- We have used the EC guidelines which apply for the Western Mary Catchments

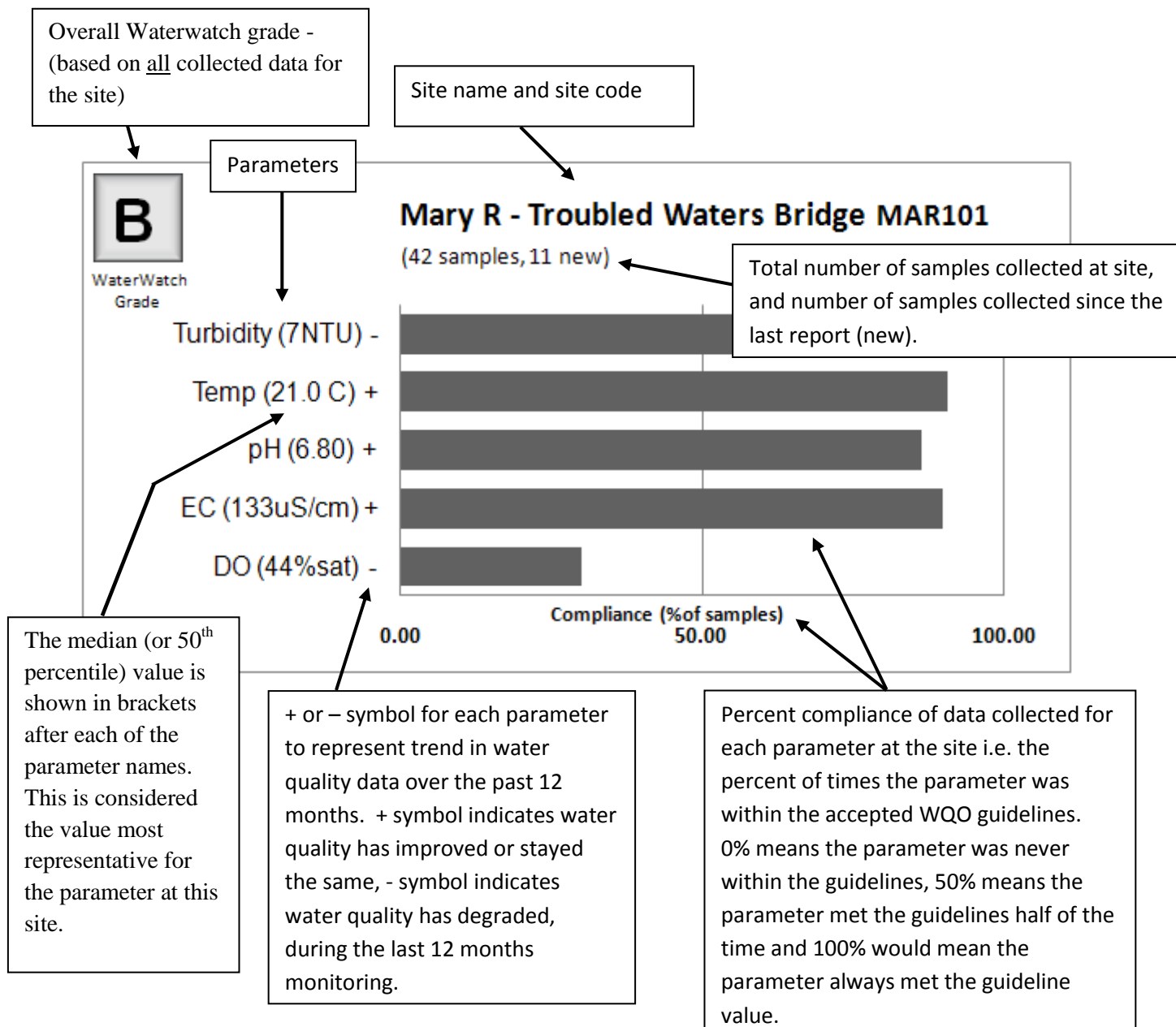
**Long term inter-site comparison of acidity (pH)  
in the Wide Bay Widgee Waterwatch Network**



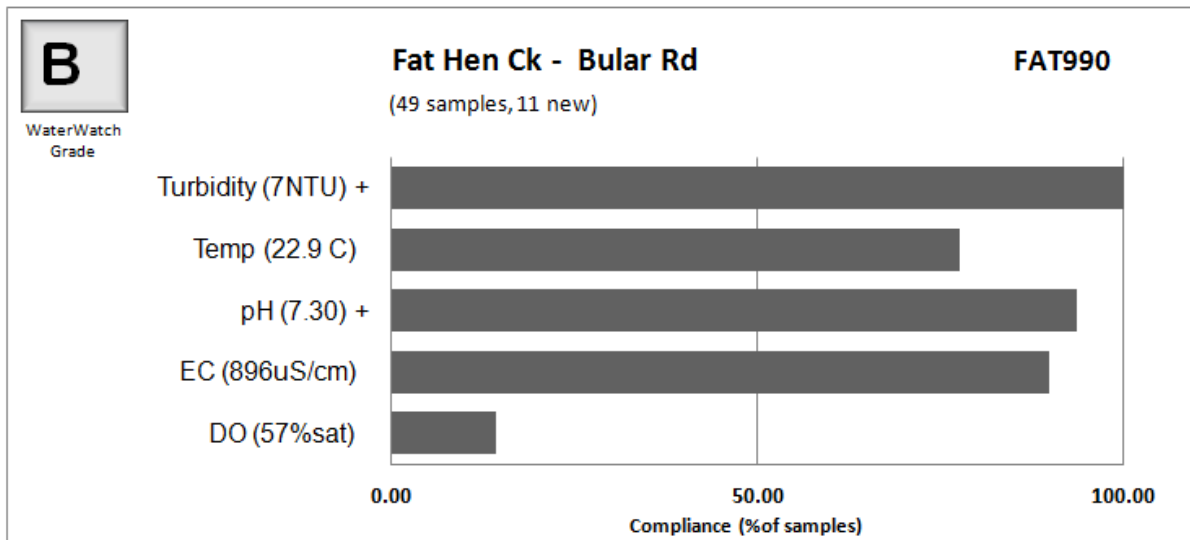
- This graph illustrates all the long-term data collected from each site, not just the last year's data – the red rectangle represents the pH guideline level of 6.5 to 8 (pH should be between these levels to meet guideline values)
- All sites show generally good compliance with pH guidelines, but are tending to be alkaline (more than 80% of the measurements are greater than 7).
- We now have enough pH data for Gap Creek to show that it is consistently different from the other samples sites (being consistently neutral pH).
- 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.

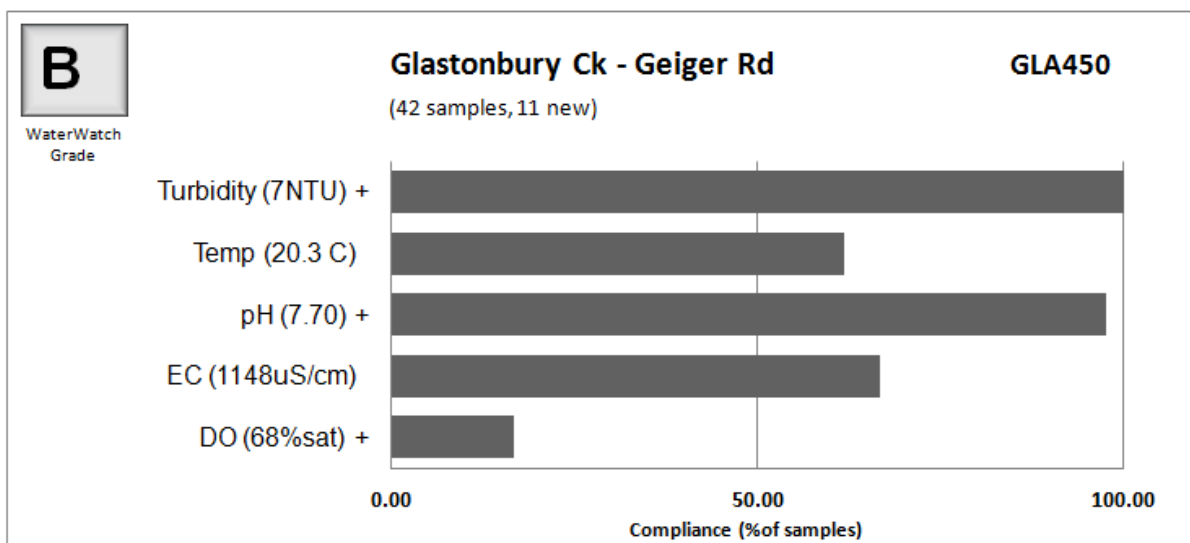


## Fat Hen Creek



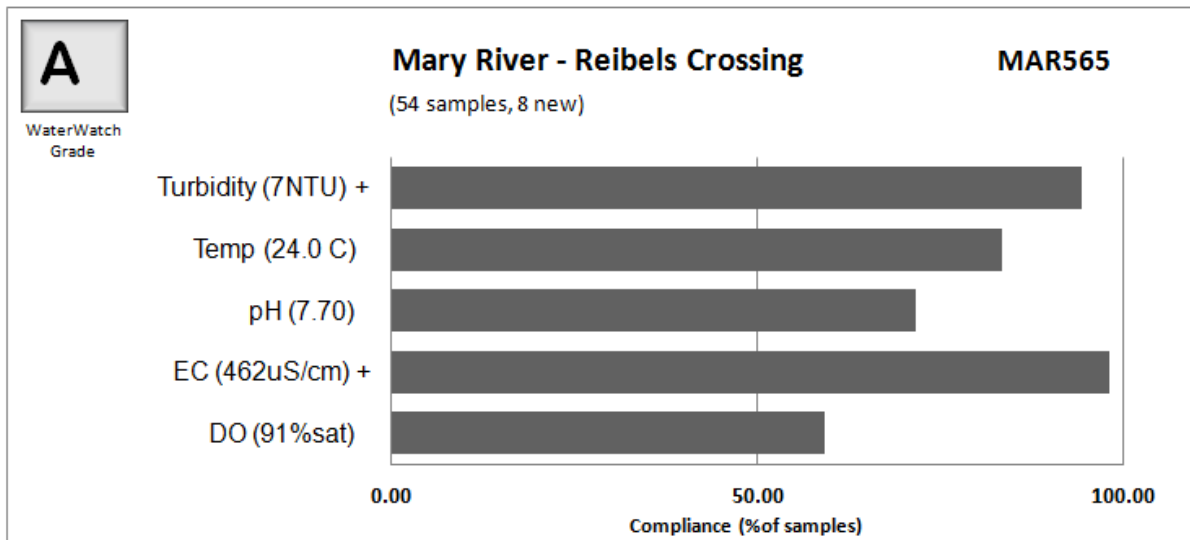
- This year's data has maintained a similar condition to last year on all 5 phys-chemical water quality parameters due to continued creekflows throughout the year
- Sample size is good, and we now have a clearer picture of water quality at this site
- 2011 Waterwatch Grade = B

## Glastonbury Creek



- Good sample size
- Dissolved oxygen at this site, low and variable. However extent of compliance over the past 12 months has improved.
- 2011 Waterwatch Grade = B

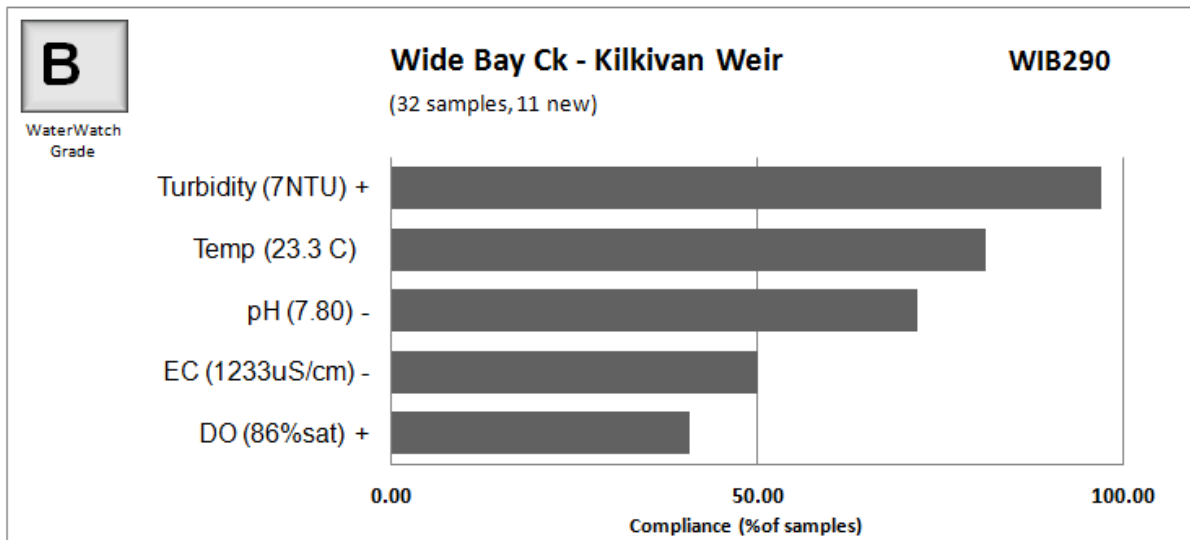
## Mary River



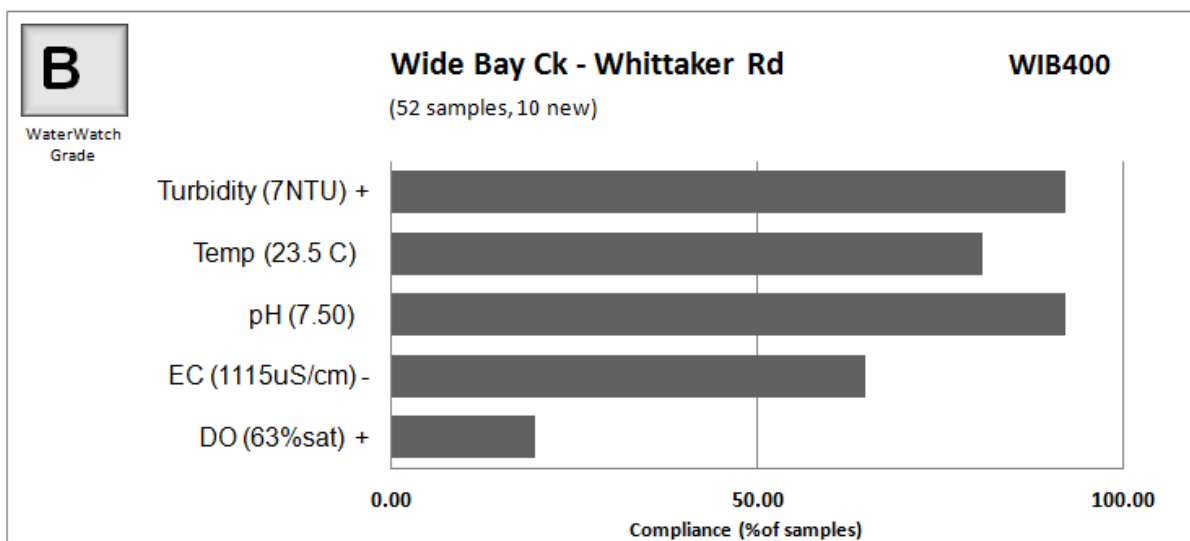
- Good sample size
- Good EC compliance – correlated with regular flows
- This Mary River site has considerably higher water temperature levels than the sample sites located on creeks, due to the large open pool upstream.
- Dissolved oxygen levels are reasonably good, correlated with regular river flows and the water passing through a long series of riffles / cobble beds
- The good phys-chemical water quality parameters recorded from last year has been maintained at this site.
- 2011 Waterwatch Grade = A



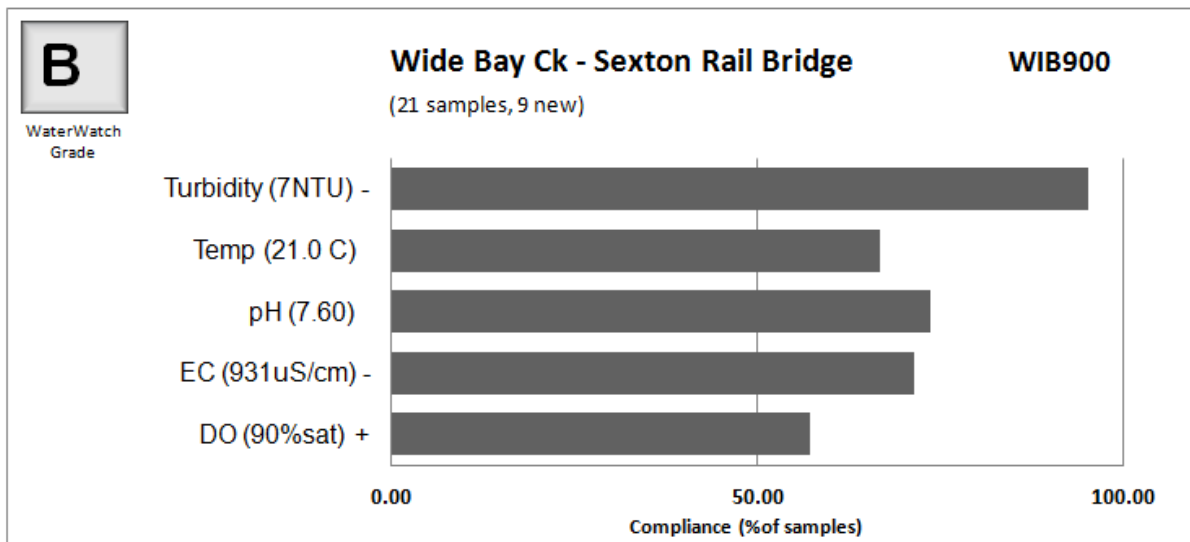
## Wide Bay Creek



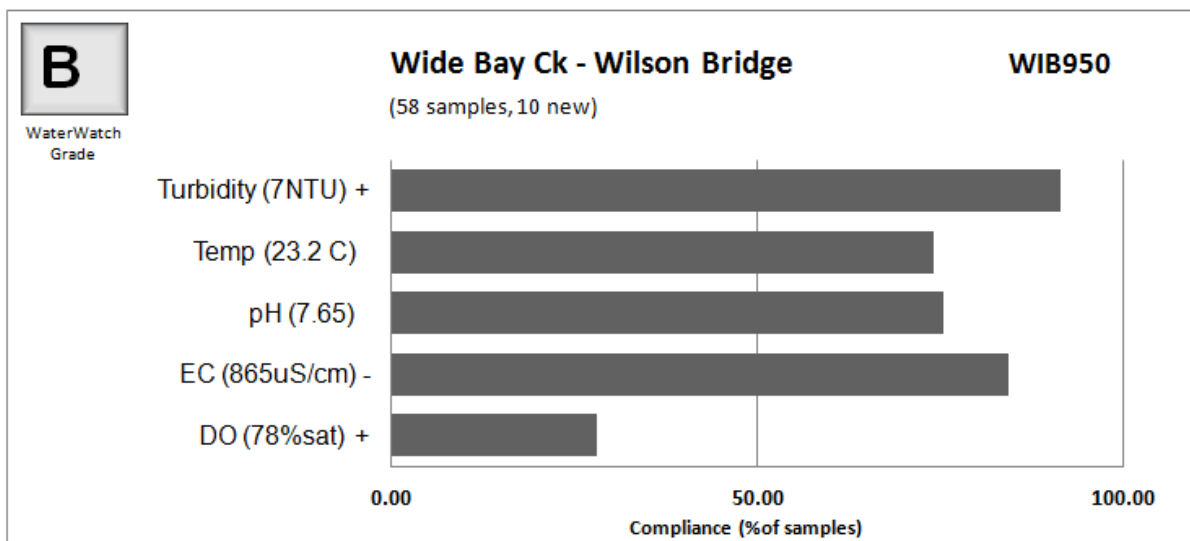
- Good sample size
- Consistently high pH levels (alkaline) experienced again
- This year's EC levels have increased this year (increasing salinity levels).
- This site shows the largest variation in dissolved oxygen levels of all sites.
- 2011 Waterwatch Grade = B



- Good sample size
- Consistently high water temperature values recorded
- An improvement in dissolved oxygen compliance since 2011
- 2011 Waterwatch Grade = B

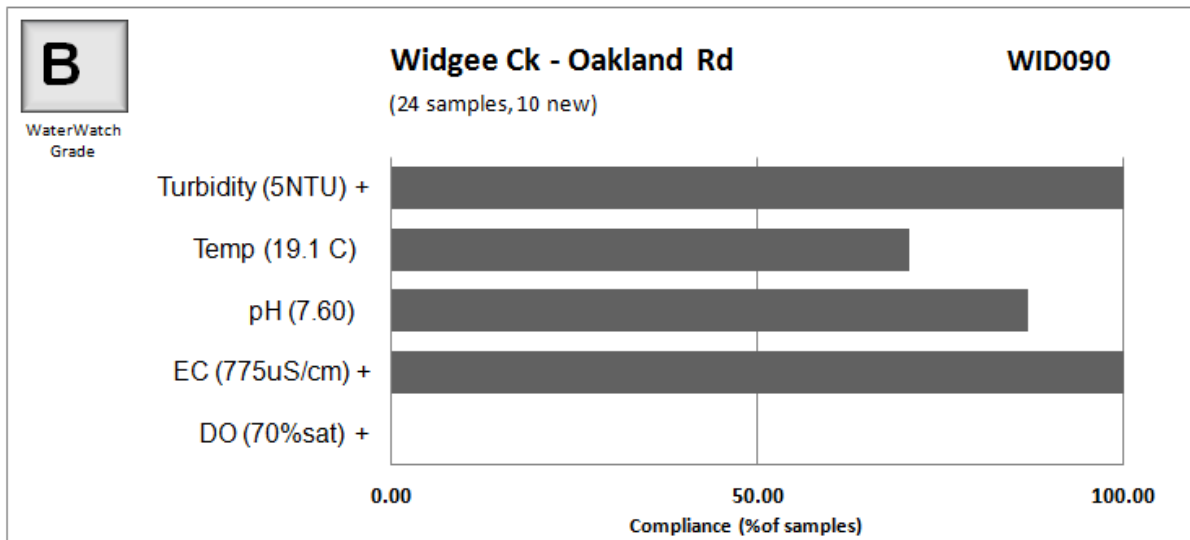


- Sample size good.
- Site is generally reporting good physical-chemical water quality
- This site reports lower water temperatures than other Wide Bay Creek sites
- 2011 Waterwatch Grade = B



- Good sample size
- High water temperature values recorded
- Low compliance with guidelines for dissolved oxygen, but conditions have continued to improve over the last year.
- 2011 Waterwatch Grade = B

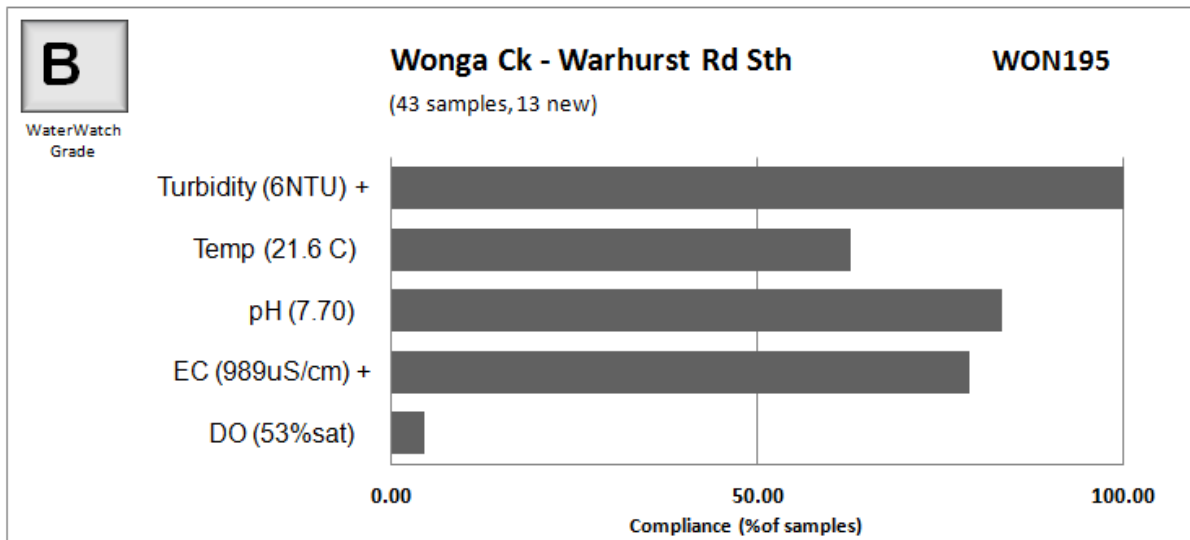
## Widgee Creek



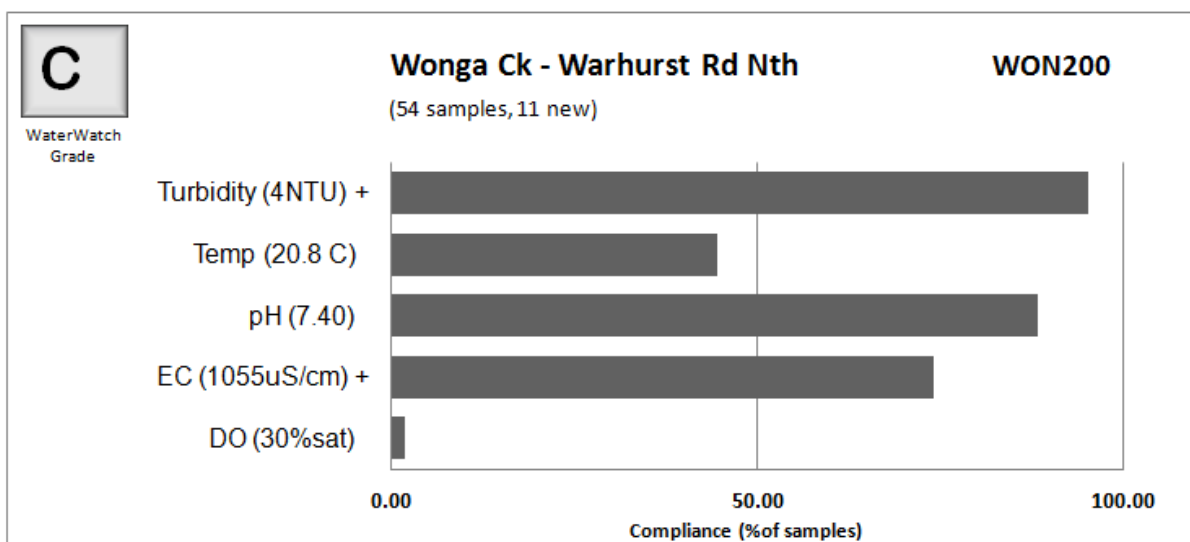
- Good sample size .site in good condition.
- This site has a relatively stable dissolved oxygen level, that is just below the compliance level.
- This site reports lower water temperatures due to good riparian shade (water temperature has dropped 1 degree since last year).
- 2011 Waterwatch Grade = B



## Wonga Creek

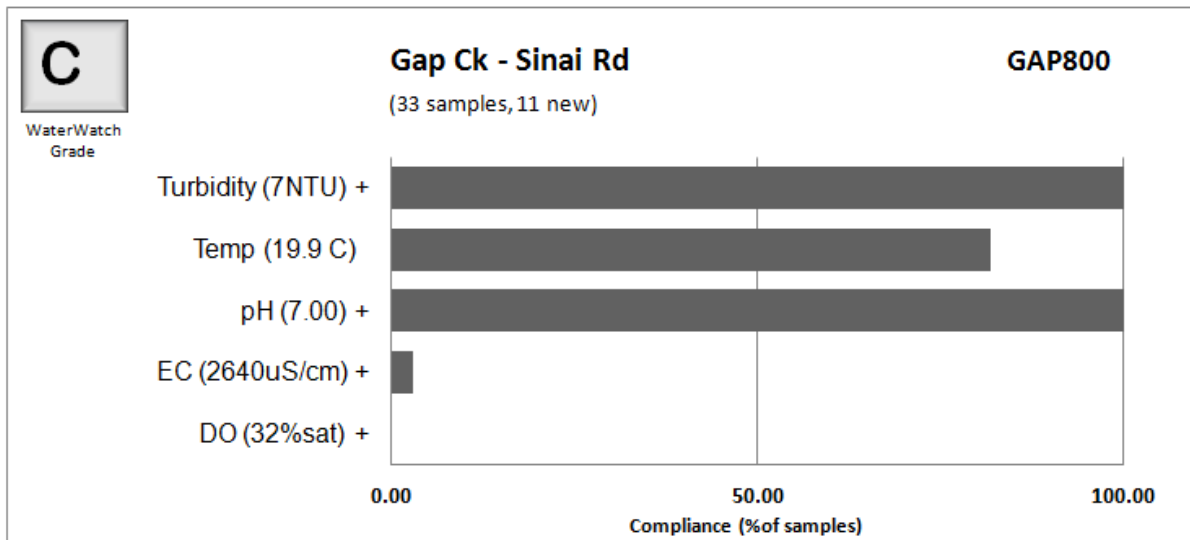


- Good sample size
- Both Wonga Creek sites are on a borderline between a “B” and “C” rating
- Wonga Creek at these sites is an intermittent creek which effects dissolved oxygen levels
- Electrical conductivity levels at both sites has continued to improve over the last 2 years, with improved flows
- Consistently low dissolved oxygen levels have been recorded at this site
- 2011 Waterwatch Grade = B,.



- Good sample size
- Consistently lower dissolved oxygen levels have been recorded at this site compared to WON195
- 2011 Waterwatch Grade = C

## Gap Creek



- Sample size good, very interesting site.
- The EC levels at this site are significantly higher than all other sites within the network – possibly the highest EC sample site in the entire Mary River Catchment Waterwatch .
- Good compliance with turbidity, temperature and pH
- Exceptionally very little variance in pH - with a neutral pH.
- Consistently very low dissolved oxygen levels recorded.
- 2011 Waterwatch Grade = C

# 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/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, 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.