Gympie – Amamoor Waterwatch Report

2011 – 2012

Amamoor National Park, Dagun, March 2012

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

Introduction

The volunteers of the Gympie-Amamoor Waterwatch network have collected water quality data for more than 10 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 in some districts such as Goomboorian, East Deep Creek, Traveston and Mothar Mountain 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.

This year has seen our creeks flowing well again with consistent flood events in most sub-catchments throughout 2011 and 2012. Interestingly, while the Mary River received a series of smaller flood events - well below record flood levels - quite a few of the creeks reached record flood peaks during 2012 – particularly Tinana Creek (at the gauging stations at Goomboorian and Bauple), lower Deep Creek (anecdotal evidence), Gutchy Creek (anecdotal evidence at Gundiah), Skyring and Middle Creeks at Federal (anecdotal) . 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 this!). After a number of queries from volunteers, we have analysed the long term EC data at multiple sites to determine whether an increasing or decreasing EC trend is now occurring.

Above: Skyring Creek, Amamoor, March 2012

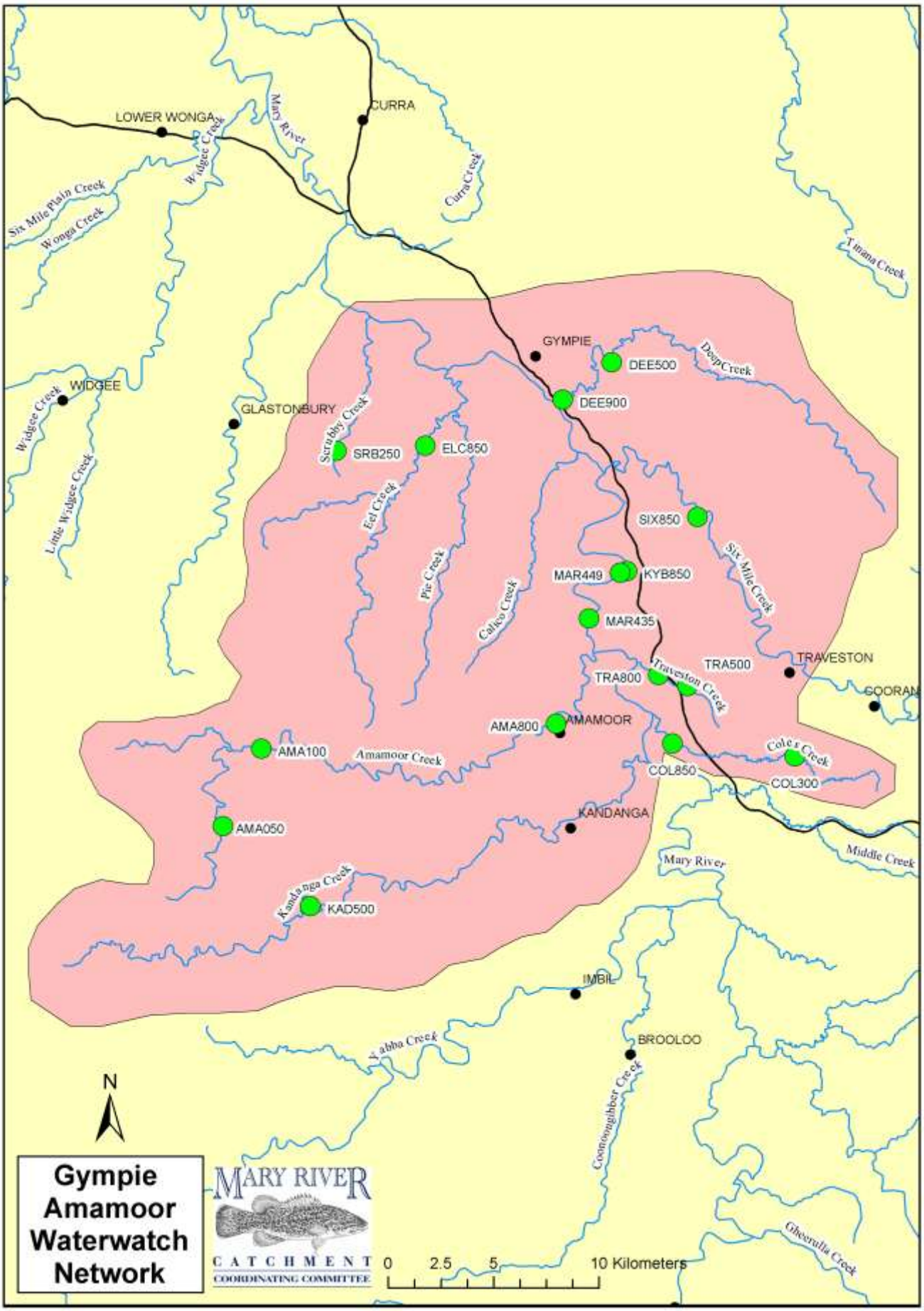
Waterwatch sites monitored in the Gympie - Amamoor Waterwatch Network

Gympie and Amamoor Waterwatch Network		
Site Code	**Creek Name**	**Location**
AMA050	Amamoor Creek	South branch
AMA100	Amamoor Creek	Bluebell
AMA800	Amamoor Creek	Amamoor township
COL300	Coles Creek	Coles Creek Road
COL850	Coles Creek	Carlson Road bridge
DEE500	Deep Creek	Randwick Rd, East Deep Creek
DEE920	Deep Creek	Bruce Highway, Gympie
DEE950	Deep Creek	Mouth with Mary River, Gympie
ELC850	Eel Creek	Long Rd, Pie Creek
KAD500	Kandanga Creek	Upper Kandanga
MAR435	Mary River	Gilldora
SRB250	Scrubby Creek	Scrubby Creek Rd, Scrubby Creek
SIX850	Six Mile Creek	Woondum bridge, Mothar Mt
TRA500	Traveston Creek	Traveston Rd, Traveston
TRA800	Traveston Creek	Traveston Crossing Rd, Traveston
SKY900	Skyring Creek	Old Bruce Highway bridge

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 2011-12. Contributors to this report are: Col and Kath Robinson, Craig and Lesley Hanson, Bob and Lorraine Hood, Kent Hutton, Bob Fredman, Lorne and Ross Maitland, Noo Dye, Will Kingham, Jason Buckley, Shane Litherland, Graeme Draper and the Amamoor Store.

Gympie Amamoor Waterwatch Site Map



Summer 2012 floods

The summer of 2012 was characterised by a series of rapid rises in the creeks and Mary River. The earlier flood events in 2011 had the effect of softening the creek and riverbanks and weakening vegetation in the riparian zone, resulting in continued damage throughout 2012. The Mary River had a series of smaller flood events during 2012, with an unusual flood event occurring in the middle reaches of the Mary River in June 2012.

Deep Creek also incurred a major flood in early March 2012, apparently one of the biggest floods ever recorded this in sub-catchment. Anecdotally this flood in Deep Creek was as big as the 1 in 100 year 1999 flood when the Mary River backed-up into the lower Deep Creek reaches. But in this instance the Mary River was hardly flooding, while the Deep Creek was flowing a 'banker'.

Tinana Creek recorded unprecedented flood heights at the Goomboorian and Bauple flow gauging stations after a huge amount of rainfall (upwards of 400mm in 1 day) in early March 2012.

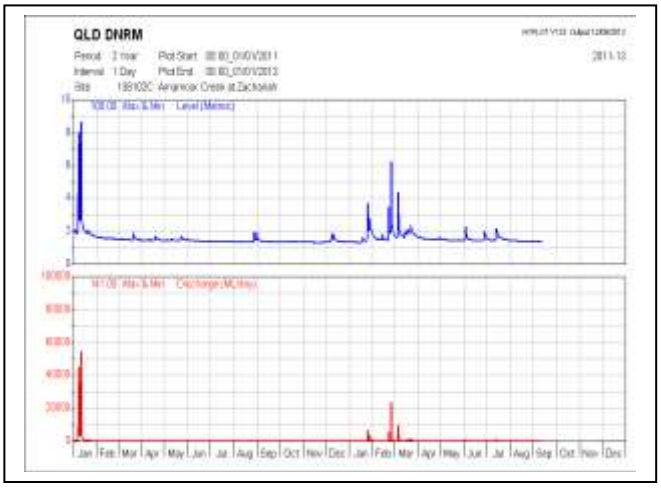
Water levels recorded during 2011/12 are shown for :

1. Amamoor Creek, at Zachariah
2. Six Mile Creek, at Cooran

1. Amamoor Creek, at Zachariah

Characterised by several highly erosive flood events during summer 2011/12, with several very rapid rises, but not to the same extent as the district experienced in January 2011.

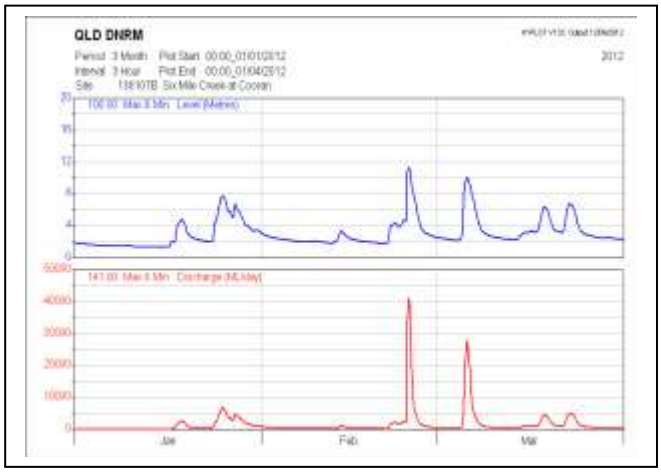
Amamoor Ck - January 2011 to August 2012



2. Six Mile Creek, at Cooran

Six Mile Creek flow is characterised by two significant peaks in late February and early March 2012. Of particular note was the violent flood of late February 2012 which caused significant damage in the Six Mile Creek catchment (with flows up to 40,000 meg/day – almost the equivalent of the Borumba Dam storage). In this instance, locals observed that the floodwater in the Six Mile Creek caused the Mary River to back-up as far as 10km upstream from the junction of the Six Mile Creek. This flood in Six Mile Creek was marginally smaller than the highest flood peak recorded on Six Mile Creek at the Cooran gauging station.

Six Mile Ck - January 2012 to April 2012



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 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	**Gympie – Amamoor Waterwatch water quality guidelines**
pH:-	6.5 – 8.0
Electrical Conductivity (EC): -	<580 uS/cm
Dissolved Oxygen (DO): -	85 – 110 % Saturation
Turbidity: -	< 50 NTU
Temperature: -	(Summer 18-28 ºC, Winter 13-21ºC)

Mary River, Sexton, 2012

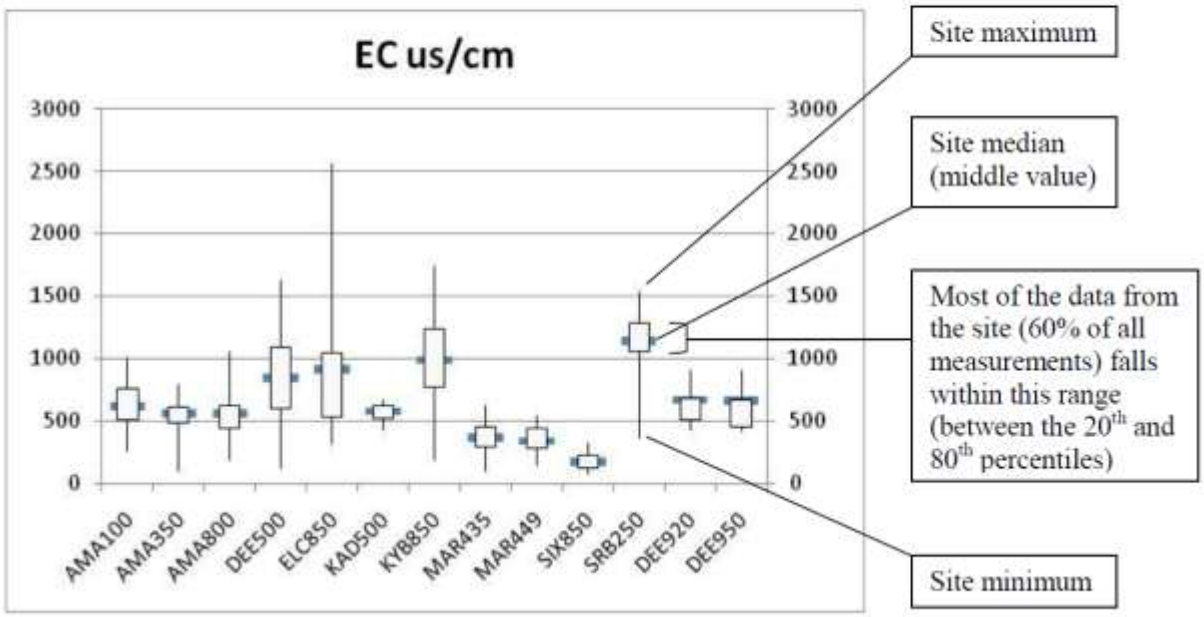
Results- inter-site comparisons

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.

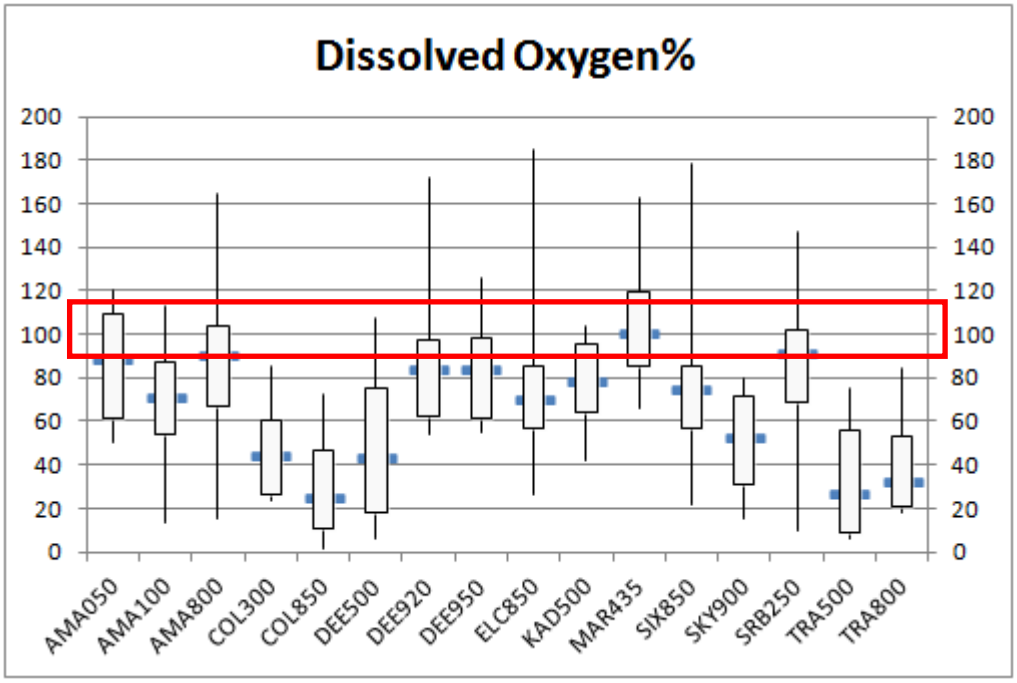
This comparison is useful for identifying sites that are unusually variable or have generally higher or lower values than other sites in the network.



Amamoor Creek at the shop – February 2012

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

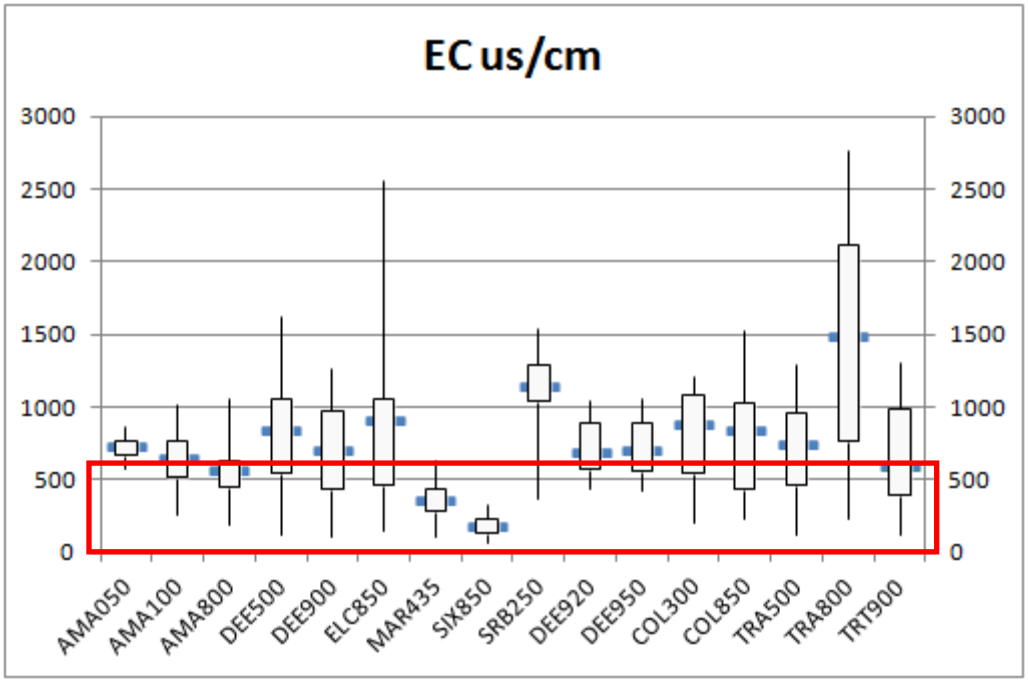
in the Gympie Amamoor Waterwatch Network



- 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 eg. the guidelines for the Mary Catchment are 80% to 110%.
- Mary River sites are consistently within the dissolved oxygen water quality guidelines with less overall variation for dissolved oxygen, however Mary River sites can experience extreme fluctuations in dissolved oxygen levels.
- Of the long-term monitoring sites, Deep Creek has the greatest variation, combined with levels generally below the water quality guidelines for dissolved oxygen in a healthy aquatic ecosystem. This could be due to a combination of low flows, increased light levels and possible nutrient inputs from creekbank erosion in particular.
- Traveston and Coles Creeks consistently record very low dissolved oxygen levels compared to the other sites in the Waterwatch network.

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

in the Gympie Amamoor 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. However, it may be more appropriate to apply the Western Catchments EC guideline of 1200 us/cm (outlined in the Qld Water Quality Guidelines) for this network.

- 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. More recent data does not include these long drought periods, eg. the Kandanga Creek site (KAD500) has only had data collected during relatively good seasons.

- Mary River and Six Mile Creek have consistently complied with EC guidelines - lowest EC values

- The more intermittently flowing creeks such as Scrubby, Eel, Coles and Traveston Creeks generally record higher EC values, and larger variation. Traveston Creek (TRA800) has the highest EC level and shows exceptional variation in electrical conductivity.

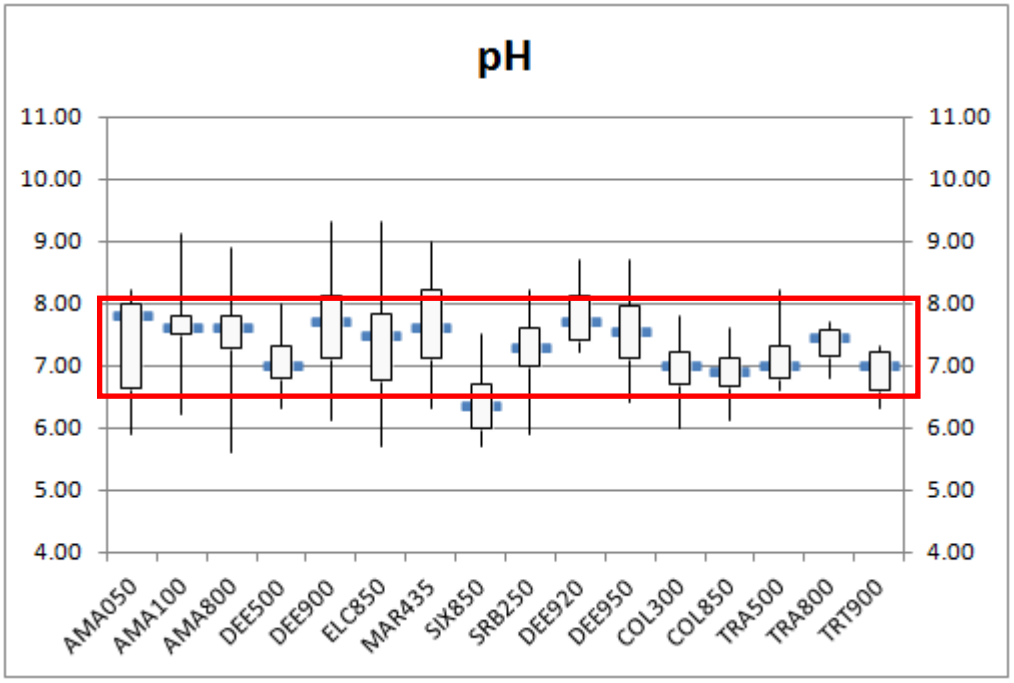
- Deep Creek displays similarly high EC values and large variations, although Deep Creek has more reliable flow than the intermittently flowing creeks within the Waterwatch network (as above).

- The majority of sites in the Gympie – Amamoor Waterwatch network has consistently recorded higher than the electrical conductivity (salinity) guideline for many years. Based on past experience salinity issues (e.g. salt-scalds) crop up after good seasons when the water-table is recharged and groundwater has moved up the soil profile closer to the soil surface. Consequently the district could experience salinity outbreaks over the next few years.

- Further analysis of the long-term trends for electrical conductivity is being conducted.

Long term inter-site comparison of acidity

in the Gympie Amamoor Waterwatch Network

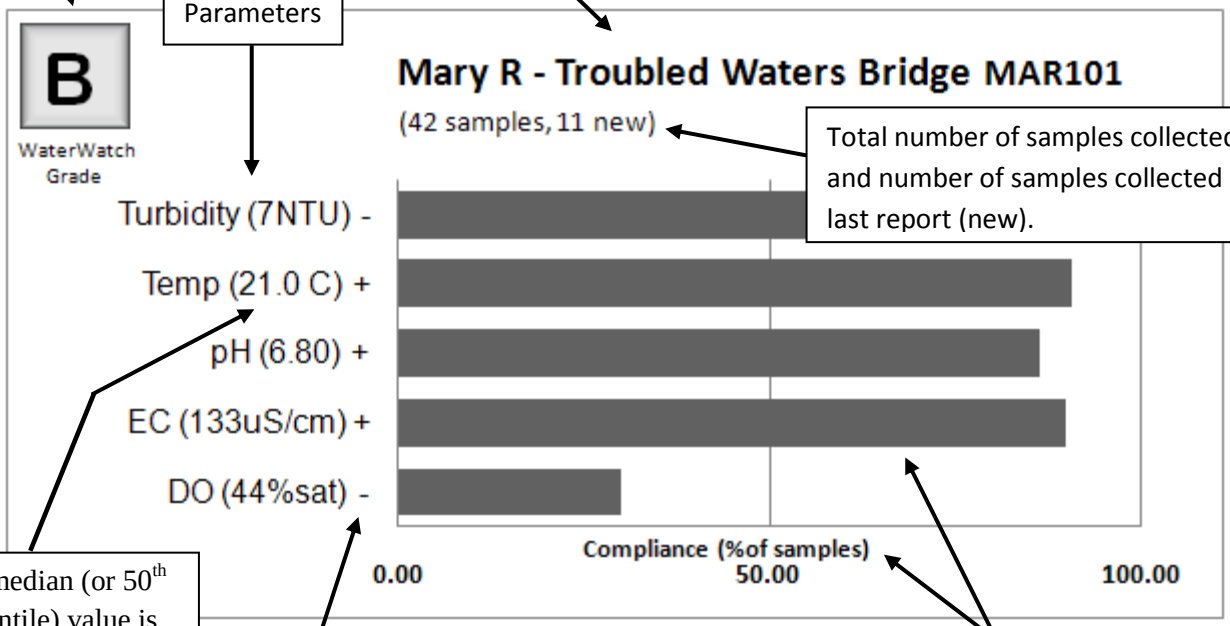


- This graph illustrates all the long-term data collected from each site, not just the last year's data – the red rectangle represents the pH guideline level of 6.5 to 8 (pH should be between these levels to meet guideline values)
- All sites show generally good compliance with pH.
- Six Mile Creek has displayed low pH (acidic) levels, which is consistent with the nature of the sub-catchment.
- With the exception of Six Mile, the majority of the data from the sites is above pH 7.

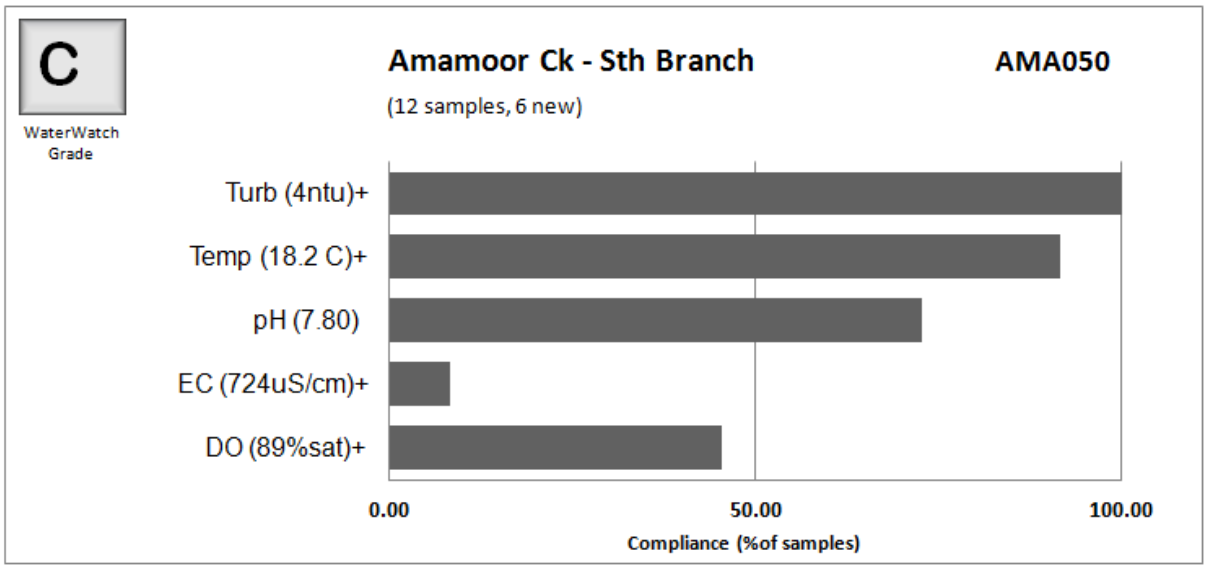
Mary River, Kybong, April 2012

Results - site report cards

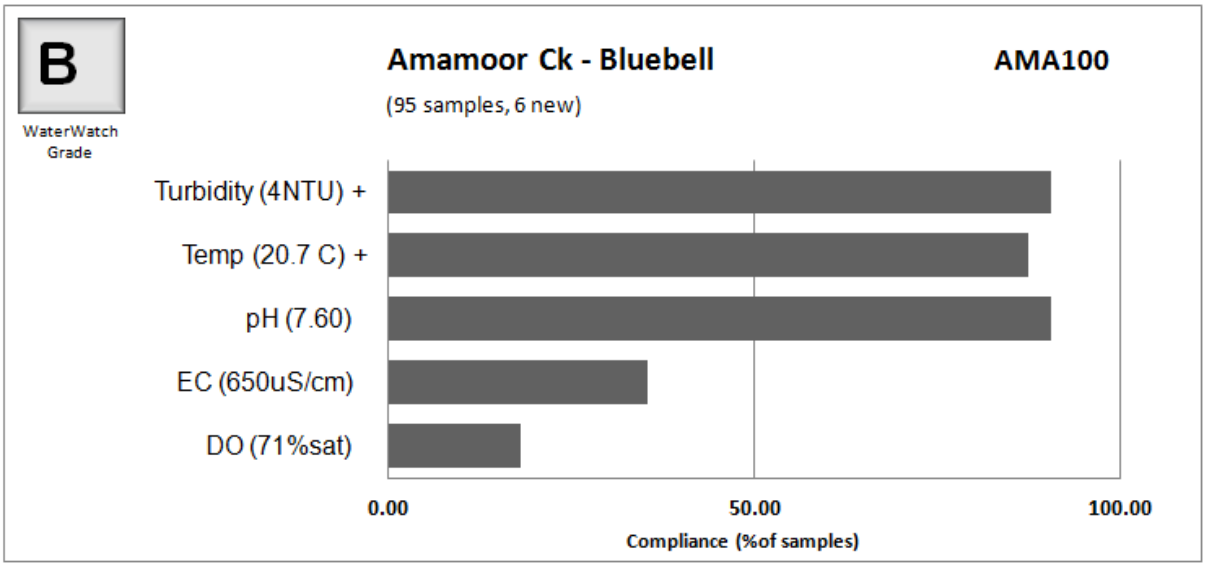
The long-term data from each site is analysed and presented as a graphical report card. These graphs present the long-term median value of each parameter and the level of compliance with the relevant guidelines across all the individual samples from that site. The illustration and descriptions below show where this information can be found on the report cards and how to interpret the graphs.



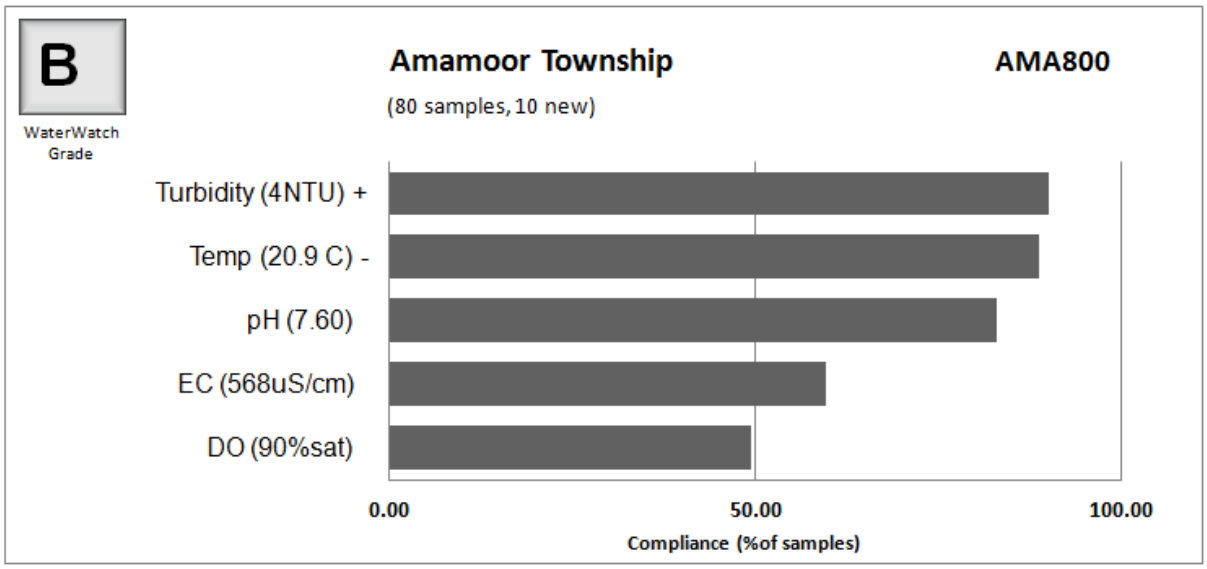
Amamoor Creek



- Enough data collected now to analyse this site
- Consistently high salinity readings in a relatively nature waterway, perhaps consider using “Western Mary salinity water quality guidelines”.



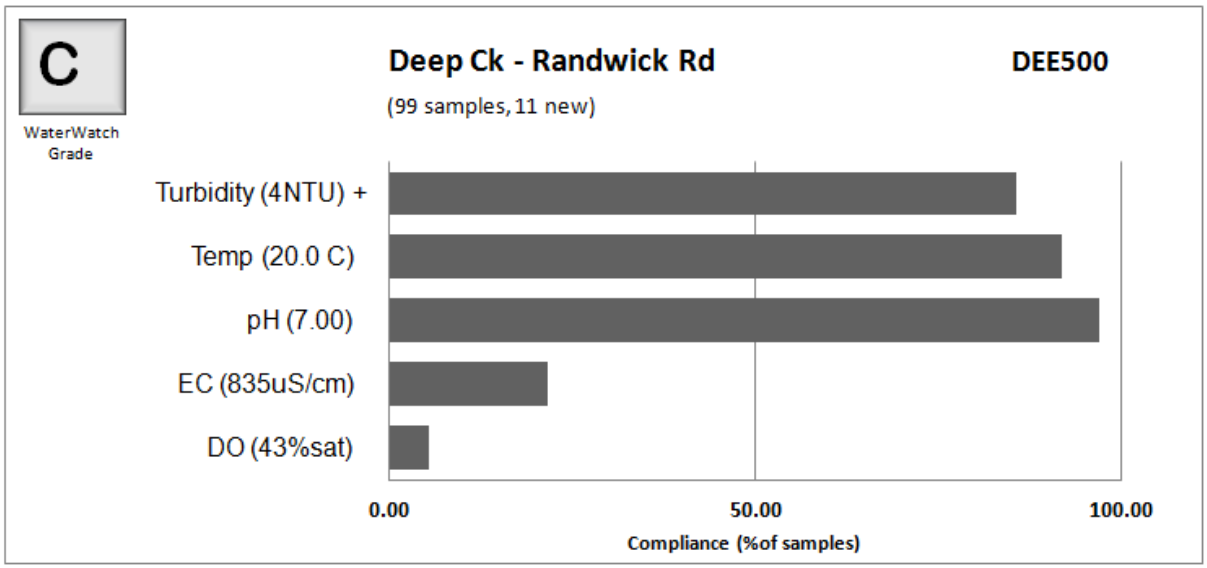
- Dissolved oxygen levels are very variable
- Good sample size
- Electrical Conductivity (EC) levels rarely comply with guidelines - which is consistent with the nature of the sub-catchment
- Very good turbidity results, reflected in low sediment loads of the sub-catchment



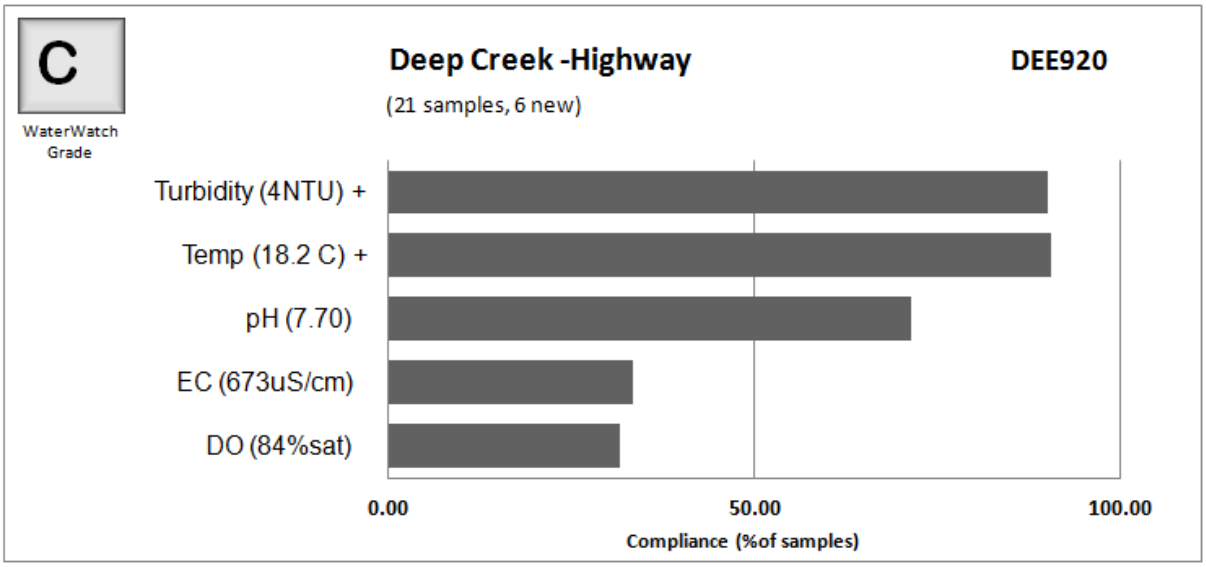
- Good sample size
- Better EC and dissolved oxygen compliance than Amamoor Creek, Bluebell – most likely due to more reliable creekflows because the site is located lower in the sub-catchment.

Mary River, Traveston Crossing, February 2012

Deep Creek

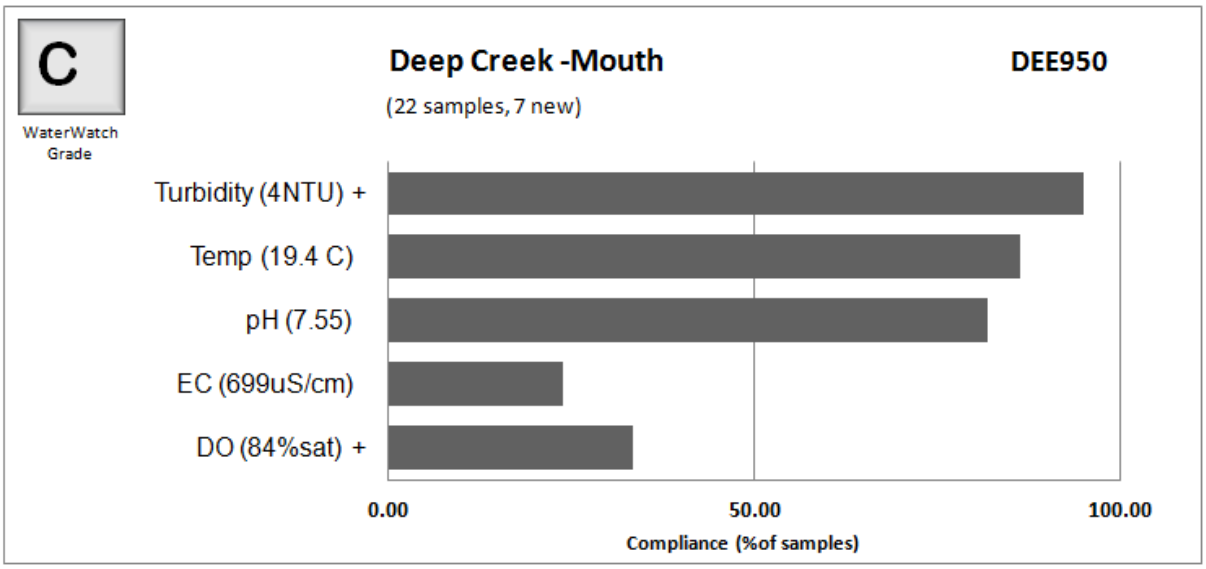


- Good sample size, and good compliance for turbidity, temperature and pH.
- Consistently higher EC levels than other sub-catchments – higher EC levels than Amamoor Creek



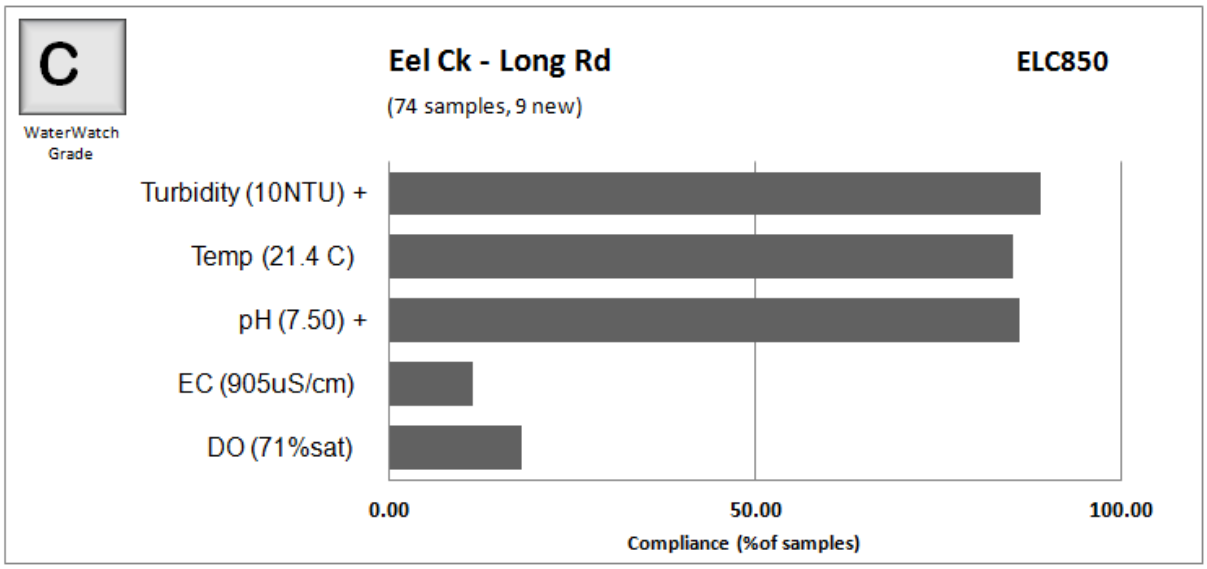
- Continued low compliance with guidelines for dissolved oxygen.

- Sample size is not yet sufficient to make definitive comments on trends.
- Better EC compliance than upstream sample site on Randwick Rd, Deep Creek, due to the influence from the Mary River.
- Improved dissolved oxygen compliance than upstream sample site on Deep Creek at Randwick Rd
- Temperature levels consistent with those at Randwick Road, Deep Creek.



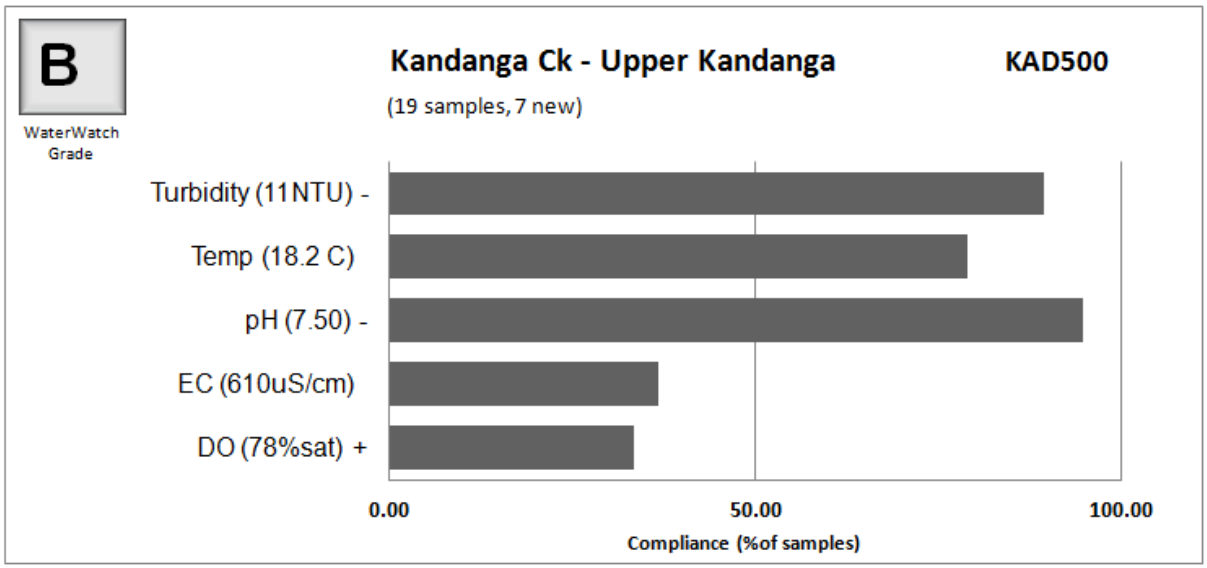
- Sample size is not yet sufficient to make definitive comments on trends.
- Salinity levels are slightly higher between this site and the above site

Eel Creek



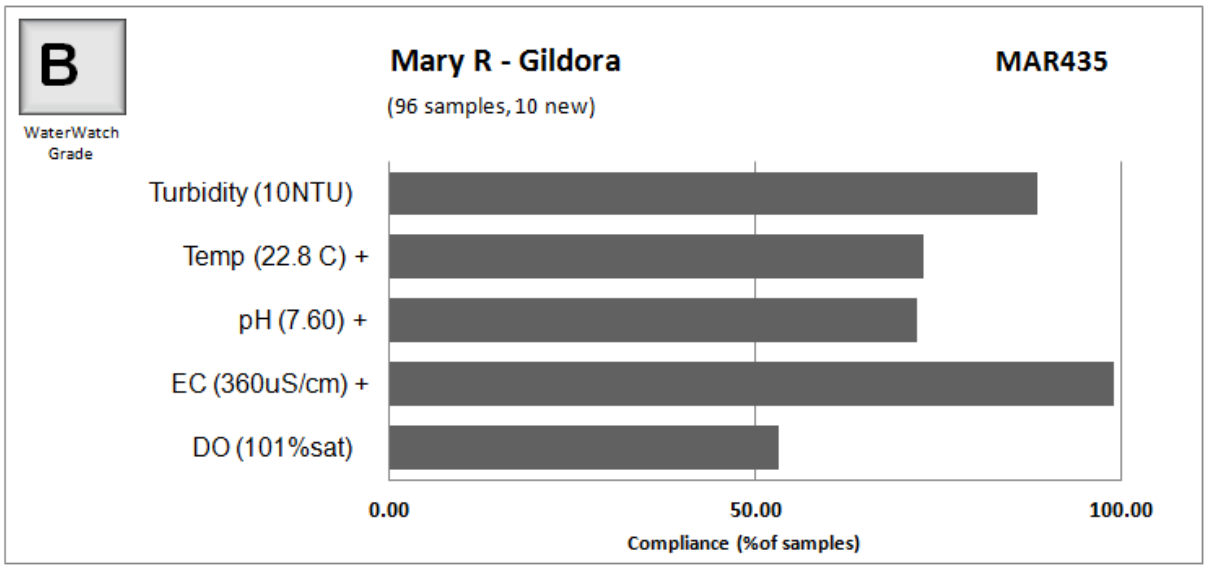
- Good sample size
- Consistently higher EC levels than Amamoor and Deep Creeks
- This year turbidity, temperature and pH values were all compliant with guidelines

Kandanga Creek



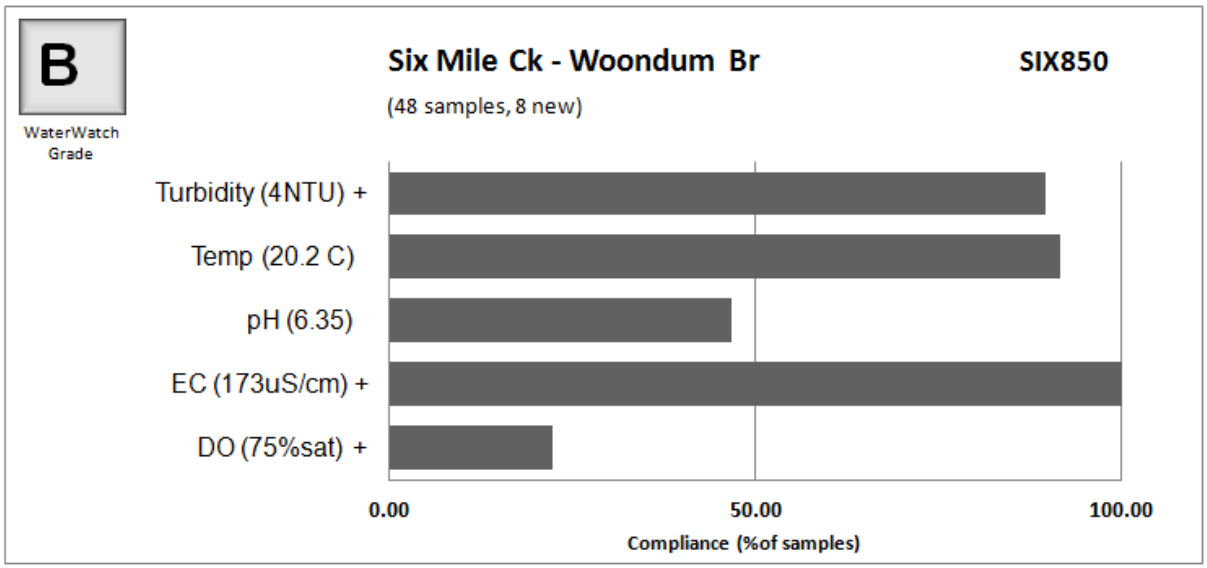
- Sample size now provides a reasonable picture of the ambient water quality of this site
- This year's data indicates some improvement to dissolved oxygen levels on past years

Mary River



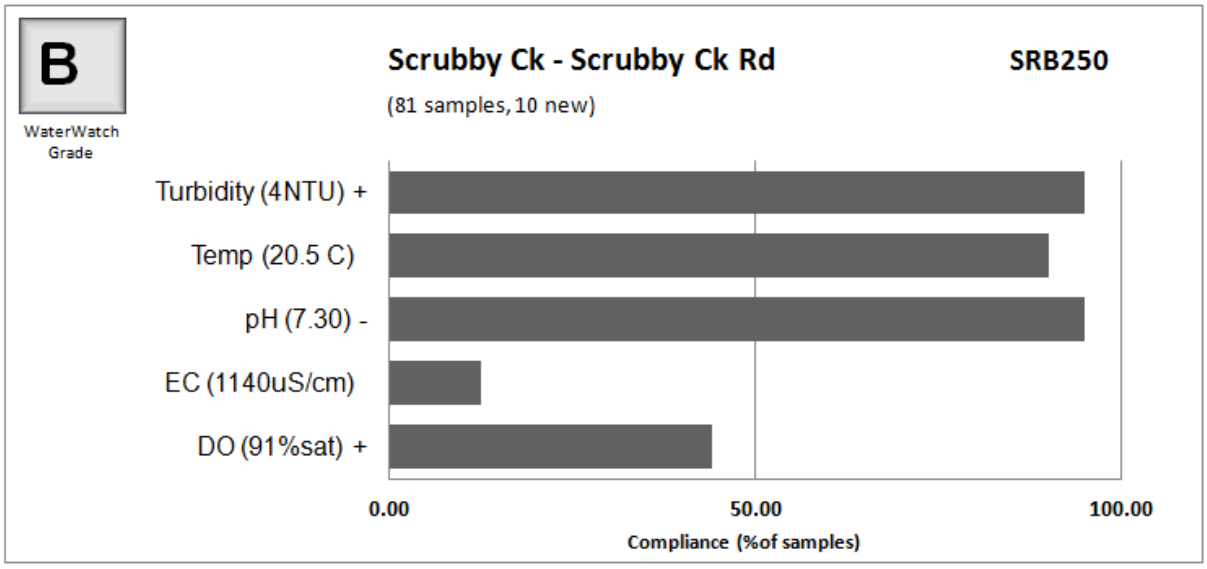
- Good sample size
- This year turbidity, temperature and pH values improved compared with previous years
- Good EC compliance – correlated with regular river flows
- Mary River sites have considerably higher water temperature levels than the sample sites located on creeks, possibly due to less riparian vegetation shading the water

Six Mile Creek



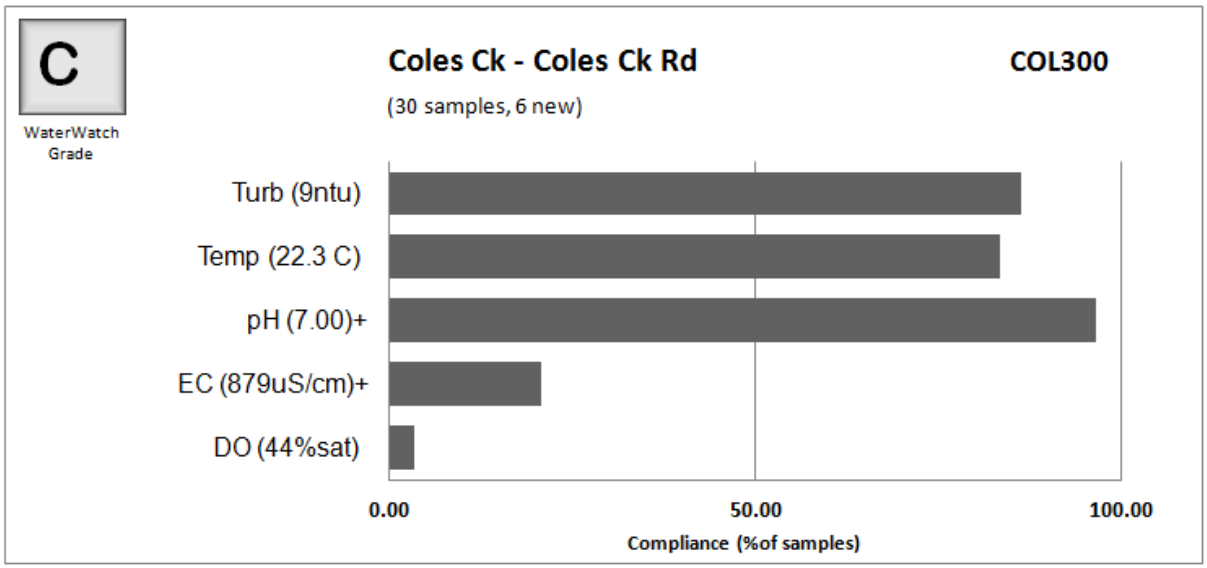
- Naturally acidic sub-catchment
- Good EC compliance – lowest EC level of all sub-catchments sampled in this Waterwatch network
- The low level of compliance for dissolved oxygen, compared to the guideline values, may not reflect poor stream health, as the aquatic ecosystem is quite healthy in Six Mile Creek. The dissolved oxygen levels recorded are just below the minimum DO guideline levels.

Scrubby Creek

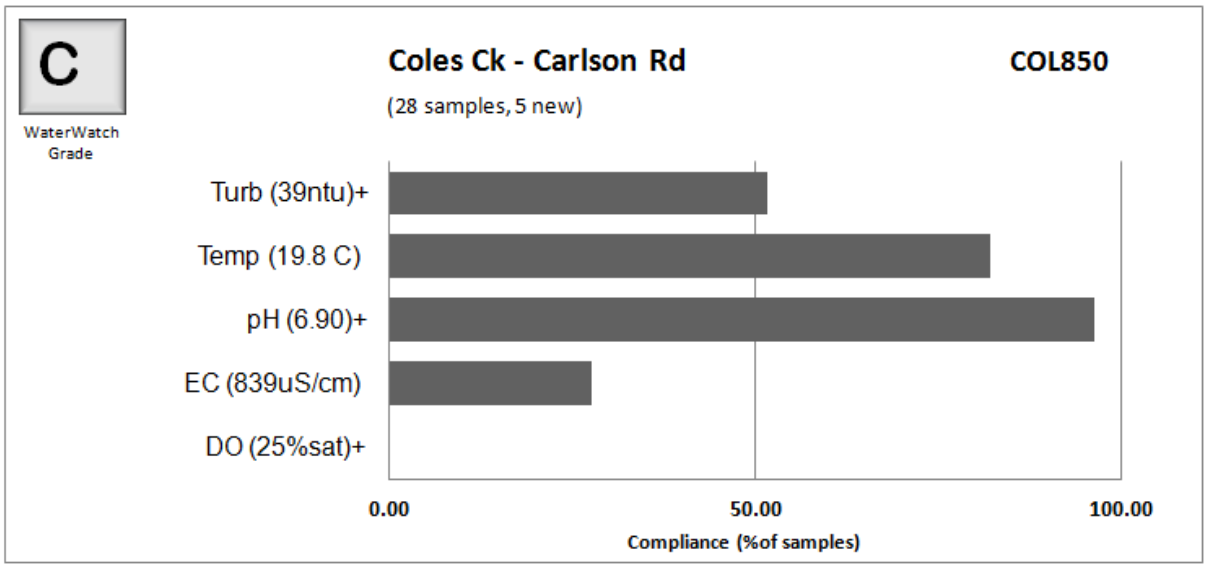


- Good sample size
- Low EC compliance – a very high EC level is consistently recorded at this site
- Dissolved oxygen compliance is improving

Coles Creek

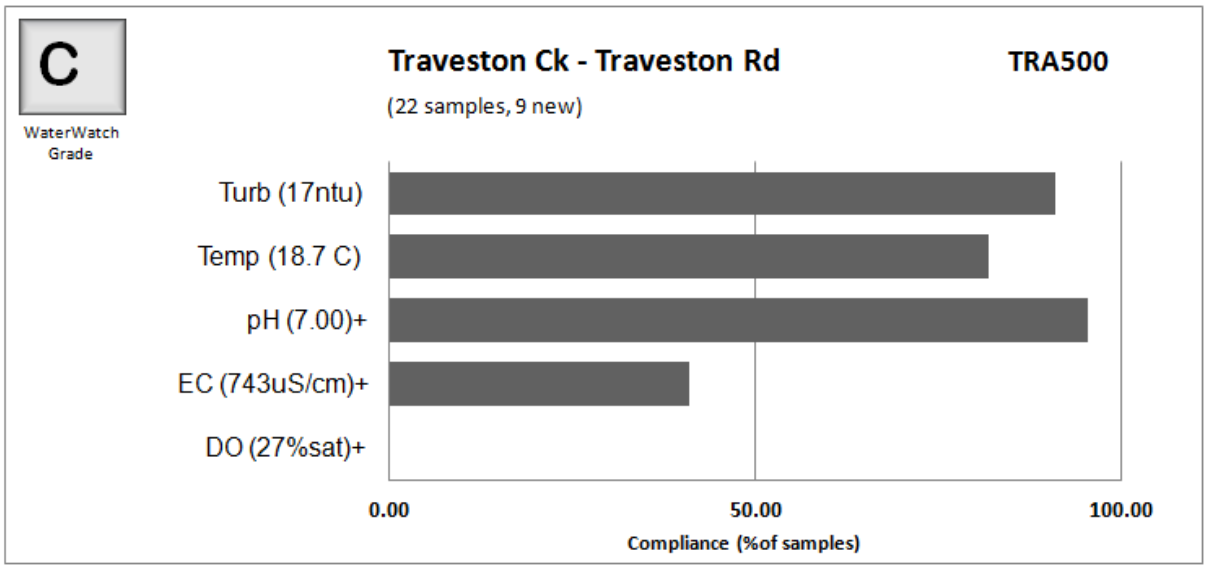


- At the Coles Creek sites the low compliance with dissolved oxygen guidelines is due to very low overall levels of dissolved oxygen during the period sampled. Generally Coles Creek has low to nil flows coupled with high leaf litter inputs from the shaded riparian zone.
- At the Coles Creek (COL300) site EC is consistently above the guideline level

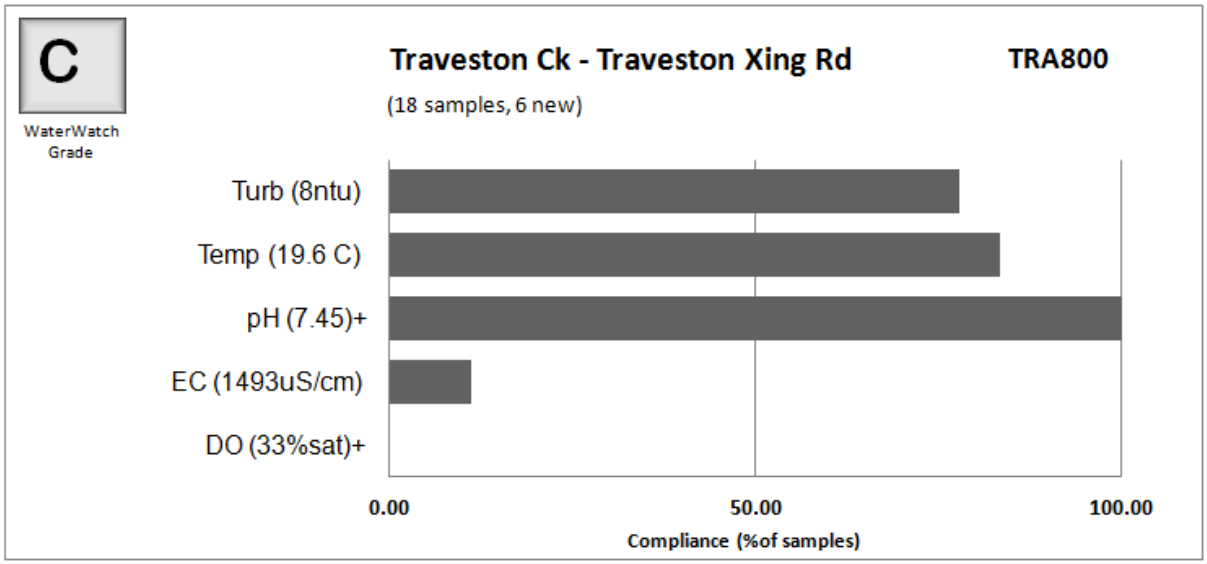


- Significant improvement in turbidity compliance – overall turdity levels have decreased.
- Consistently not complying with dissolved oxygen guidelines. Deciduous Chinese Elm dominate the creek edge, low DO compliance possibly due to high organic matter (leaf) input.
- Good temperature regulation possibly from riparian shade cover

Traveston Creek

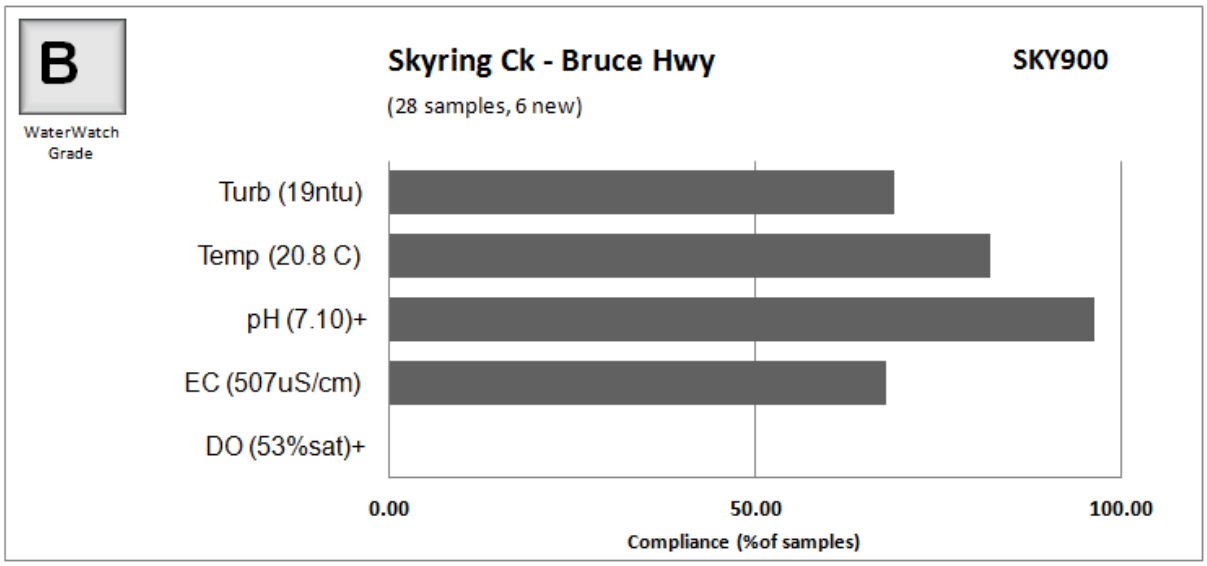


- Site consistently not complying with dissolved oxygen guidelines. Generally Traveston Creek has low to nil flows coupled with high leaf litter inputs from the shaded riparian zone.
- Good temperature regulation due to riparian zone shading



- Site consistently not complying with dissolved oxygen guidelines
- A localised high EC level has been detected in this vicinity, with the cause as yet unknown – highest median EC level recorded in this Waterwatch network.

Skyring Creek



- This site on Skyring Creek is consistently not complying with dissolved oxygen guidelines
- Electrical conductivity levels (salinity) compared to Traveston Creek are significantly lower

Six Mile Creek, Traveston, February 2012

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 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, 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 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 *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.