# Banyule Water Quality Snapshot
## July-December 2010

Welcome to your Banyule water quality snapshot! This half-yearly bulletin presents data collected by Waterwatch volunteers at Banyule's most frequently monitored sites, providing an update on the health of Banyule's precious waterways.

Banyule CITY COUNCIL
WATERWATCH Melbourne

## Data highlights

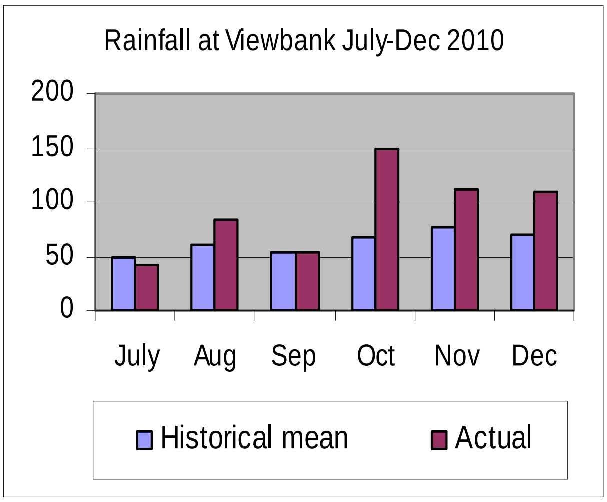
21 sites in the Banyule Council area have been monitored from 3 times to monthly in the second half of 2010. Most of these sites are on the Darebin Creek and on the Plenty River. There are also a number of drains monitored on both waterways as well as drains and wetlands monitored at Wilson Reserve in Ivanhoe.

**Darebin Creek:** Overall turbidity is excellent, with poor salinity, good pH, poor to degraded phosphorous and excellent to degraded Dissolved oxygen (D.O.) results.

**Plenty River:** Overall mostly fair to degraded turbidity and salinity, good to poor pH, poor to degraded phosphorous and excellent to fair D.O. results.

## Rainfall

The second half of 2010 has seen mostly well above average rainfall in Banyule as shown in the graph below, especially from October to December.




Rainfall averages source: http://www.bom.gov.au/
Rainfall data source: http:www.melbournewater.com.au/

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## Stream flows July 2010-Dec 2010

Stream flows for major Banyule Waterways are shown in the table below. The range in brackets in the left column is the period over which the historical average has been calculated. Mostly the main waterways in Banyule have been well above average in stream flow and water level in the second half of 2010. This corresponds with the above average rainfall during this period.

| | Mean flow rate (ML/day) | | Level (m) | |
|---|---|---|---|---|
| | 2010 | Historical | 2010 | Historical |
| Yarra River (Heidelberg) (1975-2010) | 2152 | 1143 | 2.32 | 1.65 |
| Plenty River (Greensborough) (1980-2010) | 150 | 37 | 0.25 | 0.11 |
| Plenty River (Lower Plenty) (1977-2010) | 125 | 52 | 0.60 | 0.35 |
| Darebin Creek (Bundoora) (1977-2010) | 50 | 24 | 0.34 | 0.50 |
| Darebin Creek (Ivanhoe) (1999-2010) | 54 | 29 | 0.28 | 0.20 |

Stream flow data source: http://www.melbournewater.com.au/content/rivers_and_creeks/rainfall_and_river_level_data/

*In utilising this information the recipient acknowledges that Melbourne Water Corporation makes no representations as to the accuracy or completeness of this information and the recipient ought carry out its own investigations if appropriate.*

## Water quality guidelines

**The parameters in this report are measured against the Waterwatch water quality guidelines. These guidelines, developed by Waterwatch Victoria, give a descriptive, general idea of ecological health for waterways, Victoria wide. Each map in this report includes a legend showing the range of values for each parameter, and a rating from 'excellent' to 'degraded'. Waterwatch monitors also monitor aquatic macro-invertebrate populations and diversity. For macro-invertebrate results please contact Banyule's Waterwatch Coordinator (refer to page 4 for contact details.)**

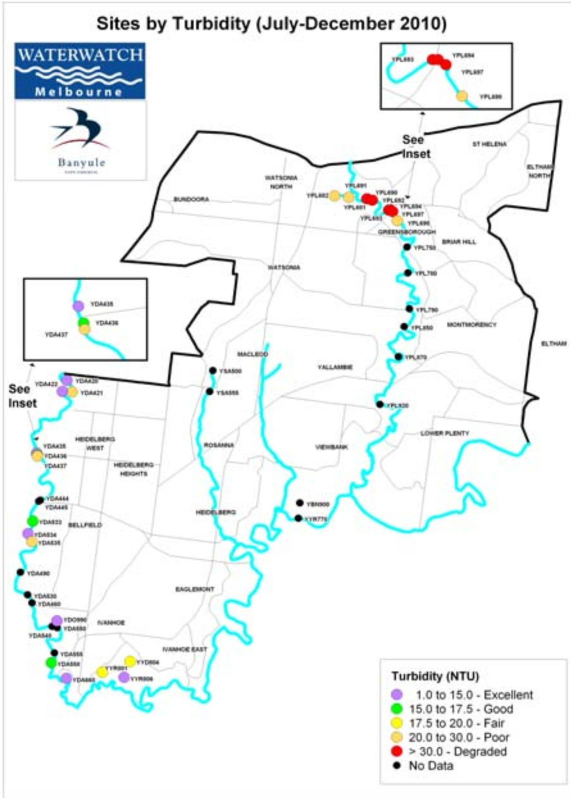
Photos: Waterwatch, Platypus Conservancy, Ian Moodie, John Wardzynski

## Turbidity

Turbidity is a measure of water clarity or cloudiness caused by suspended material. Very high (poor) turbidity readings can result in:

- Low dissolved oxygen. Suspended particles absorb heat, so water temperature rises faster in turbid water. Warm water holds less dissolved oxygen than cold water.
- If penetration of light is restricted, photosynthesis of green plants in the water is restricted, limiting food sources and oxygen available for aquatic animals.
- Suspended particles can clog fish gills.

Turbidity varies greatly in Banyule's waterways, from "excellent" and "good" in much of Darebin Creek to poor and degraded in the Plenty River. High flows have more power to erode stream banks and cause higher levels of turbidity. The data suggests erosion is a much greater problem for the Plenty River than it is for Darebin Creek. This is due to the sodicity (soil expands and breaks apart easily when wet) of the predominantly clay soils on the Plenty River. If banks on the Plenty River are not covered with vegetation and receive a large load of stormwater the turbidity will increase, which is what has been occurring in this time period.



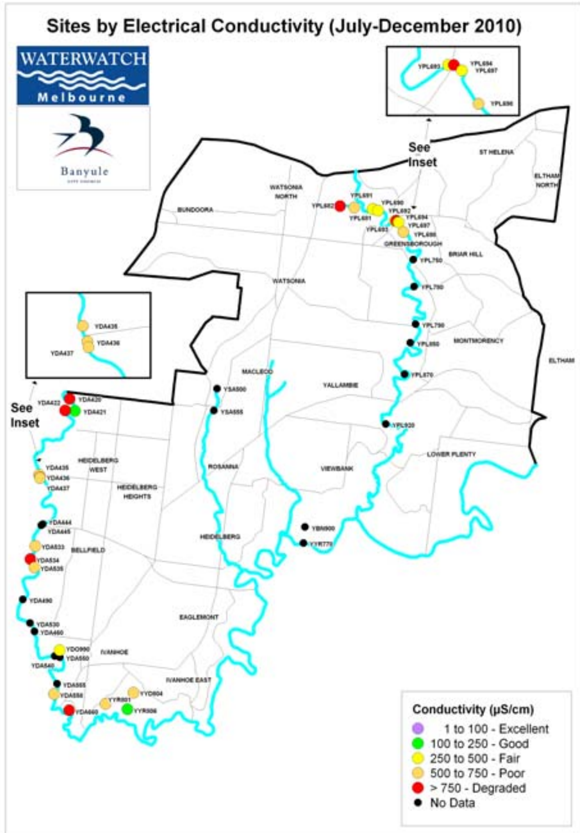

## Electrical conductivity

Electrical conductivity detects the presence of salts or ions in the water. Electrical conductivity is routinely used to measure salinity, as salty water conducts electricity more readily than more pure water. The types of salts (ions) causing the salinity are usually chlorides, sulphates, carbonates, sodium, magnesium, calcium and potassium.

Very high (poor) salinity readings can result in:

- Decreased availability of nutrients to plant roots.
- Salinity beyond the normal range for any species of organism will cause stress or event death to that organism.
- Depending on the type of salts present, salinity can
- increase water clarity. This is very apparent in groundwater.

Conductivity tends to be "degraded" in both the Plenty River and Darebin Creek, apart from one "good" reading on the Darebin Creek, which is from a drain flowing into the Creek. A major cause of the degraded results is groundwater inputs. Darebin Creek has a saline groundwater intrusion in the Bundoora area, so this impacts on salinity readings downstream. Often urban stormwater drains are isolated from the saline groundwater so that the stormwater flows aren't very salty. The Lillimur Drain in West Heidelberg is a good example of this. Other drains such as the Bell St Main Drain in Thornbury and the Circuit St Drain in Greensborough have had very high conductivity, which may be due to groundwater.

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Photos: Waterwatch, Platypus Conservancy, Ian Moodie, John Wardzynski

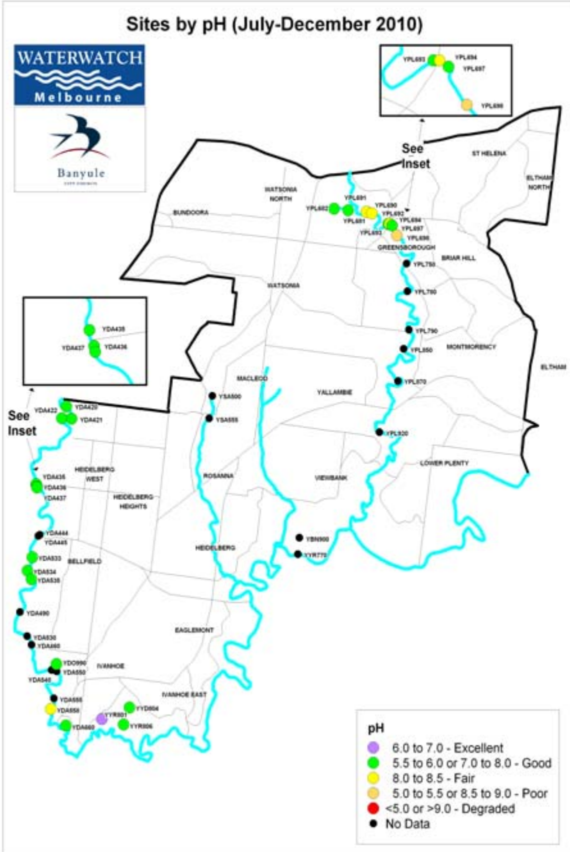
## pH

pH is a measure of the acidity (or alkalinity) of the water. Pure water has a pH of 7; acidic solutions have lower pH values, and alkaline solutions have higher pH values. One pH unit represents a ten-fold change, e.g. a change in pH from 7 to 6 represents a ten-fold increase in acidity.

Changes in pH can affect waterways in a number of different ways:

- Many compounds are more soluble in acidic waters.
- The pH of the wet area around roots affects nutrient uptake by the plants.
- pH affects the solubility of heavy metals in water and the concentration of total dissolved solids in rivers.
- All animals and plants are adapted to specific pH ranges, generally between 6.5 and 8. If the pH of a waterway or water body is outside the normal range for an organism it can cause stress or even death.
- The pH of a water body varies throughout the course of the day as the balance between photosynthesis and respiration changes with light intensity and temperature.

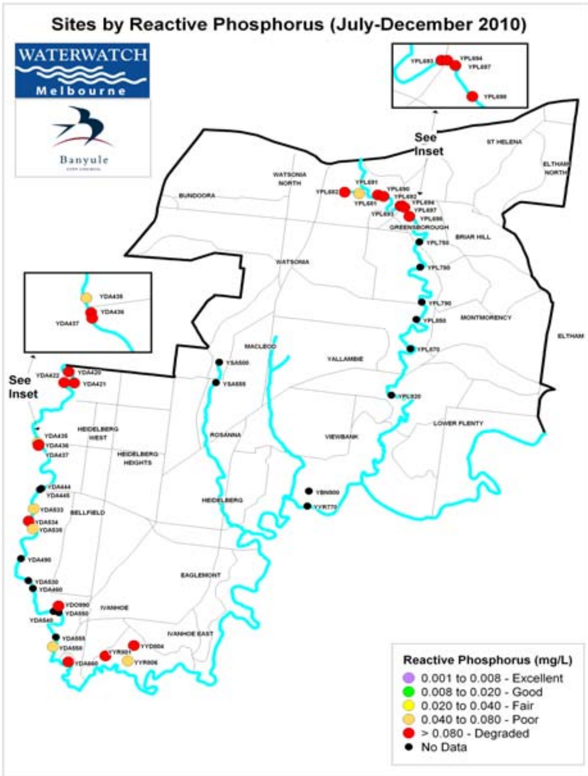
pH is mostly "good" throughout Banyule's waterways, although the Plenty River around Greensborough has had higher pH levels at a couple of sites, mainly from the stormwater drains.




## Reactive phosphorus

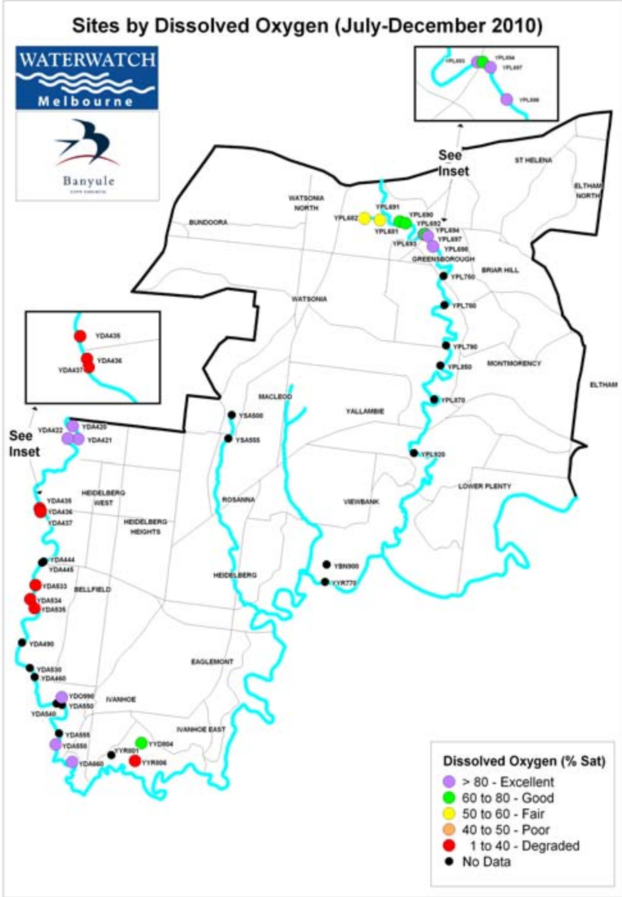
Phosphorus is a mineral nutrient essential for all forms of life; the reactive phosphorus parameter measures the phosphorus readily available for use, i.e. the phosphorus not bound to soil particles. The phosphorus found in both surface water and groundwater is in a form called phosphate ($PO_4$). It is naturally derived from the weathering of rocks and the decomposition of organic material, but can also enter waterways in runoff or discharges, e.g. soil and fertiliser particles can carry phosphorus, and sewage is also rich in phosphorus.

Reactive Phosphorus was "poor" to "degraded" at all Waterwatch sites monitored during July-December 2010. Highest values were found nearby stormwater drains or in the drains themselves. Stormwater flushes decaying organic matter, such as soil, leaves, litter and animal wastes, which build up alongside roadways, into drains into our creeks. This increases concentrations of nutrients including Phosphorus. In many instances if turbidity is "degraded" phosphorous will be also, because phosphate is bound into soil particles. Most "degraded" turbidity readings are caused by an increase of soils and other organic matter in the waterway being tested.




Photos: Waterwatch, Platypus Conservancy, Ian Moodie, John Wardzynski

## Dissolved oxygen




Dissolved oxygen (D.O.) measures the quantity of oxygen present in water. Aquatic animals, plants and most bacteria require it for respiration and some chemical reactions. The concentration of dissolved oxygen is an important indicator of river health, as low dissolved oxygen over a period of time will harm most aquatic life.
Dissolved oxygen is affected by factors such as:

- water temperature, thermal contamination
- photosynthesis by aquatic plants
- respiration by aquatic plants and animals
- breakdown of organic materials in the water
- water movement and mixing, flow and depth
- Salinity, nutrients, chemicals and altitude
- daily and seasonal cycles
- removal of vegetation

D.O. has been "excellent" at most sites in Banyule during this period. High rainfall and stream flows ensures that D.O. is regularly replenished. However on the Darebin Creek in the Heidelberg West and Bellfied area, D.O. is "degraded". This area has many stormwater inputs from main roads and Industrial Estates, which may be causing an oxygen demand from bacteria in the stormwater.
The only other site where D.O. has been "degraded" this period has been at Bailey's Billabong in Ivanhoe.

## Did you know?

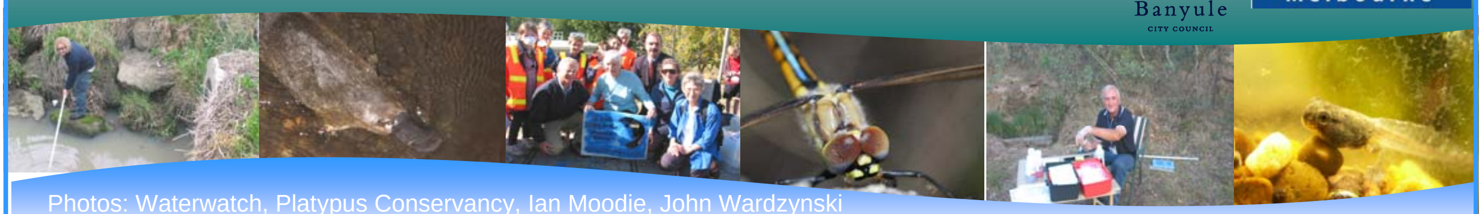
Low dissolved oxygen (D.O.) levels can lead to fish deaths. A level below 4mg/L (30%) of D.O .will likely cause stress, particularly in large-bodied fish (such as Murray Cod). When D.O. drops below 3mg/l, fish deaths may occur (though smaller-bodied fish can tolerate worse conditions, while other fish may find a suitable place such as a water hole, where conditions can sustain them until the water quality improves). Fish kills can also result from low levels of water in reservoirs or low flows in rivers and the consequent poor quality water, such as high temperatures, low D.O. or high nutrients. When rainfall events occur after a long period of dry weather, large amounts of organic matter (leaf litter, woody debris etc) are washed from the floodplain, river banks and dry river beds into the water, and can cause a black water event. This gives the water a dark, soupy appearance and an unpleasant, sewage-like smell. D.O. levels in black water are often below 1-2mg/l, and very few things can live in it. The low oxygen level is caused by the breakdown of organic matter. Low D.O. may also result from the first rains after bushfires, the decay of a blue-green algal bloom, or as a result of pollution.

## How can I get involved?

You may notice a number of sites without data on the maps. These are existing sites no longer being monitored. We are always on the lookout for volunteers to monitor at these and other sites throughout the City of Banyule.
If you would like to volunteer as a Waterwatch monitor, please contact Julia Vanderoord, North East Melbourne Waterwatch Coordinator, on 9457 9885 or email julia.vanderoord@banyule.vic.gov.au

## References

Environment Australia (2002) *Waterwatch Australia National Technical Manual: Module 4 Physical and Chemical Parameters.* Published by Environment Australia.
Waterwatch Victoria (2009) *Interpreting River Health Data.*
Cass Davis and Phil Slesser, North Central Catchment Management Authority 2011



Photos: Waterwatch, Platypus Conservancy, Ian Moodie, John Wardzynski