



# Banyule Water Quality Snapshot

## January-June 2010



Welcome to your Banyule water quality snapshot! This biannual 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.

### Data highlights

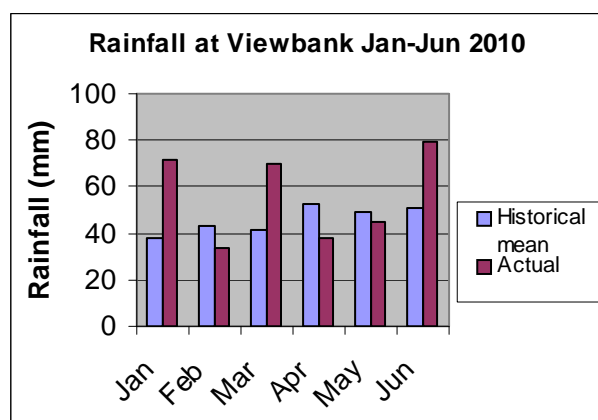
21 sites in the Banyule Council area have been monitored at least 3 times in the first half of 2010. Most of these sites are on the Darebin Creek and on the Plenty River. The remainder include a number of sites at Wilson Reserve in Ivanhoe and one site at Salt Creek in Rosanna.

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

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

### Rainfall

The first half of 2010 has seen mostly above average rainfall in Banyule as shown in the graph below.



Rainfall data source: <http://www.bom.gov.au/>

Rainfall averages source: <http://www.melbournewater.com.au/>

*Whilst all due skill and attention has been taken in collecting, validating and providing the attached data, Melbourne Water Corporation shall not be liable in anyway for loss of any kind including damages, costs, interest, loss of profits or special loss or damage, arising from any error, inaccuracy, incompleteness or other defect in this information. 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.*

### Stream flows January-June 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. Plenty River and Darebin Creek have been close to historical average stream flow, whereas the Yarra is well below the historical average, reflecting its role as the main source of Melbourne's water supply, and that, Catchment wide, we are still not out of drought conditions.

	Mean flow rate (ML/day)		Level (m)	
	2010	Historical	2010	Historical
Yarra River (Heidelberg) (1975-2010)	384	1143	1.21	1.65
Plenty River (Greensborough) (1980-2010)	41	37	0.14	0.11
Plenty River (Lower Plenty) (1977-2010)	40	52	0.41	0.35
Darebin Creek (Bundoora) (1977-2010)	20	24	0.26	0.50
Darebin Creek (Ivanhoe) (1999-2010)	28	29	0.21	0.20

Stream flow data source: [http://www.melbournewater.com.au/content/rivers\\_and\\_creeks/rainfall\\_and\\_river\\_level\\_data/](http://www.melbournewater.com.au/content/rivers_and_creeks/rainfall_and_river_level_data/)

### 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.)

## Turbidity

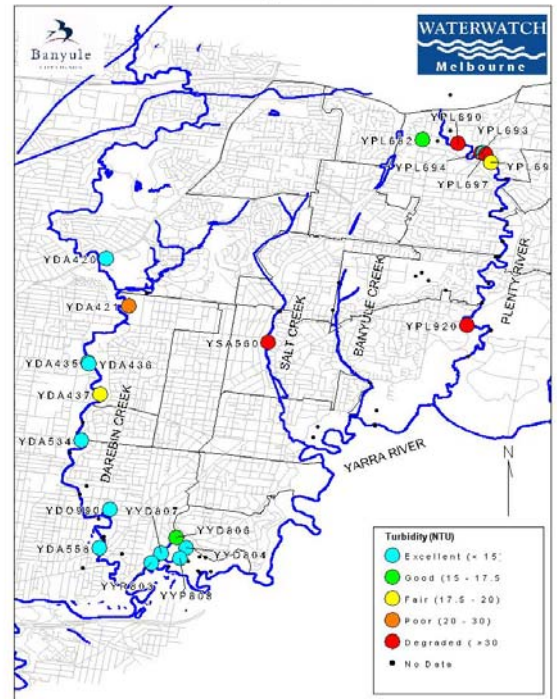
Turbidity is a measure of water clarity or cloudiness caused by suspended material. Very high (poor) turbidity readings can result in:

- 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 in Banyule tends to be highest in the Plenty River and the middle to lower reaches of Salt Creek, whereas it is much lower in the ponds and billabongs of Wilson Reserve and along the Darebin Creek. The degraded results for Salt Creek and the Plenty River are likely to be due to a combination of the above average rainfall and associated high stream flows as well as the lack of protection (eg vegetation) of the creek banks against erosion. Salt Creek is a prime example. In high rainfall events, rainwater from residential areas flows quickly into Salt Creek, resulting in undercutting and unstable creek banks.

### Turbidity (NTU)

January to June 2010



## Electrical conductivity (Salinity)

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

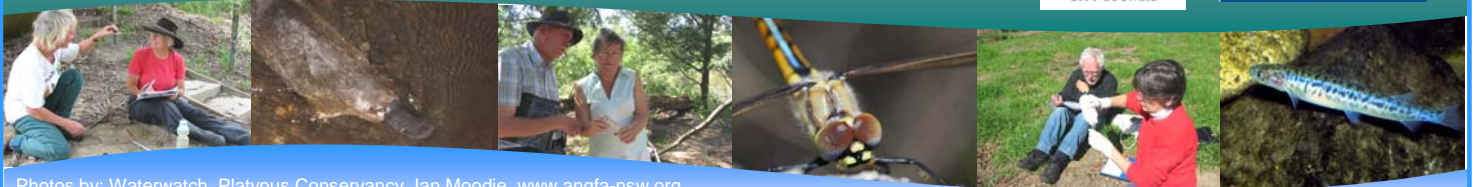
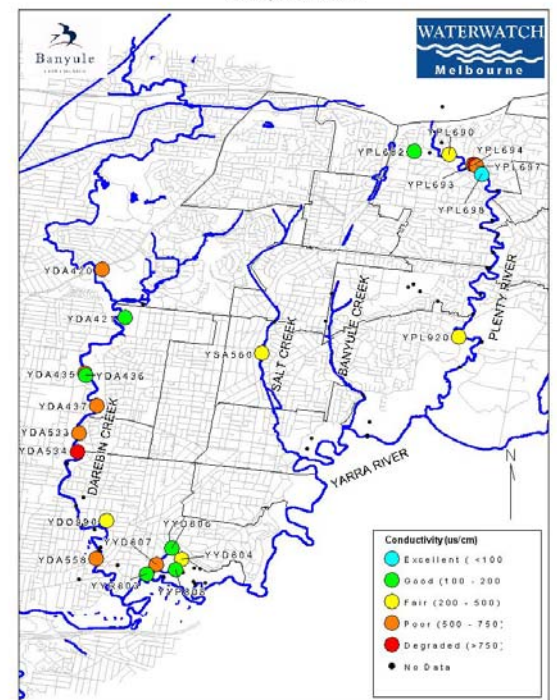
Very high (poor) salinity readings can result in:

- 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.

EC in Banyule is highest in Darebin Creek and has been historically. The cause is naturally saline groundwater which flows into the creek at certain points, particularly in the Bundoora area. Further downstream towards Ivanhoe high EC is suspected to have originated from stormwater drain inflows. Throughout the rest of Banyule, EC ranges mostly between fair and poor. These readings would have originated from stormwater drain inflows. The wetland readings in Wilson Reserve are mainly good, this is because saline water would have a chance to settle out salt loads when the water slows down in still water.

### Conductivity (us/cm)

January to June 2010



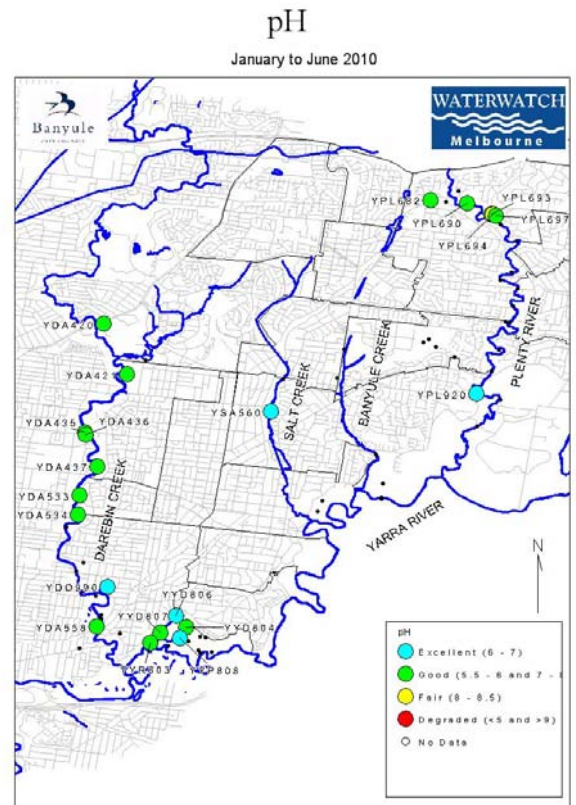
## pH

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.

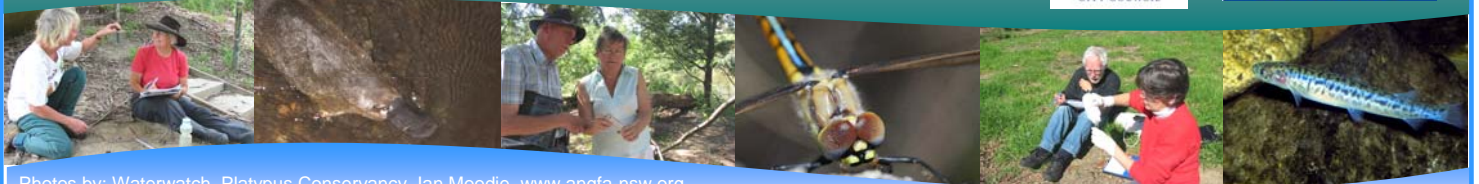
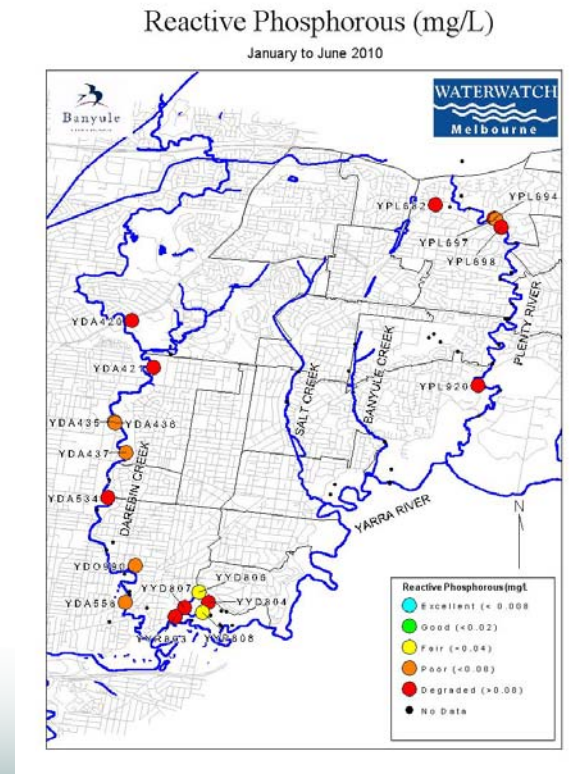
pH is probably the parameter of least concern in Banyule, with values very rarely falling outside the range of good to excellent.



## Reactive phosphorous

Phosphorous 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 Phosphorous is the parameter of most concern in Banyule with values in the poor to degraded range, common in all of Banyule's waterways. The wetlands and drains in Wilson reserve receive phosphates from the surrounding urban areas, for example, after fertilisers have been applied and a high rainfall event occurs. High phosphorous levels in the Plenty River and Darebin Creek are derived from stormwater flows into these waterways. Both waterways' riparian (or verge) zones are highly urbanised and have a high density of impervious, hard surfaces. Rainfall events carry all substances that were in surrounding drains, pits and roadsides straight into the waterway. If the rain is heavy, soil from river banks can be added to the waterway by erosion processes. Soil also contains phosphorous, so this can also increase phosphorous levels.



## 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 D.O. is an important indicator of river health. Because low D.O. over a period of time will harm most aquatic life. Water containing too much oxygen through aeration or photosynthesis can cause damage to fish through bubbles of oxygen forming in their blood as they return to water that has less D.O.

D.O. is affected by factors such as:

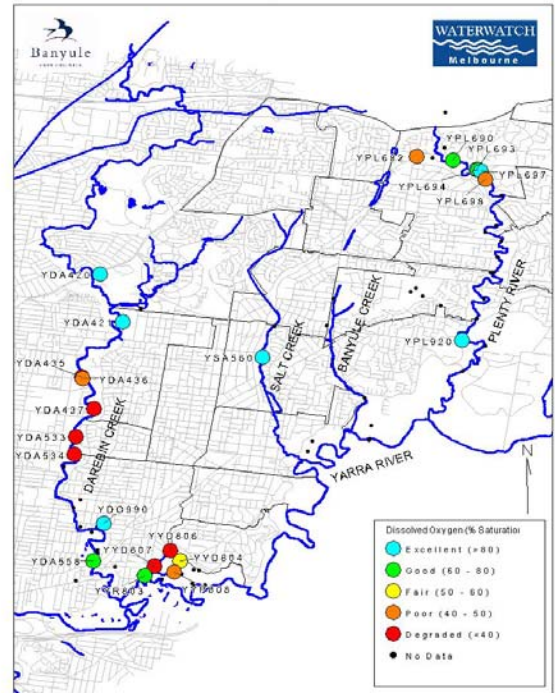
- water temperature, thermal contamination
- photosynthesis by aquatic plants
- respiration by aquatic plants and animals
- breakdown of organic materials in the water
- water movement and mixing, flow and depth
- Salinity, nutrients, chemicals and altitude
- daily and seasonal cycles
- removal of vegetation

D.O. is quite variable across Banyule. The lowest values are found in stormwater drains on the middle reaches of Darebin Creek, at Wilson Reserve in Ivanhoe and Plenty River.

Higher values were found in each of the major waterways in Banyule. The most probable cause for low D.O. readings in drains are the contents of these drains, which include waste material, such as sewage, organic matter (leaves, soil) industrial discharges, oils and detergents. As these inputs are broken down, they consume oxygen, thus reducing D.O. levels in the drain. If the water is reduced to a slow flow or trickle, the water will not be flowing as quickly, thus less oxygen can dissolve into the water from the air.

## Dissolved Oxygen (% Saturation)

January to June 2010



## How can I get involved?

There are many existing sites that are currently not being monitored. We are always on the lookout for volunteers to monitor at these and other sites throughout Banyule City Council.

If you would like to volunteer as a Waterwatch water quality monitor, please contact Julia Vanderoord, North East Melbourne Waterwatch Coordinator, on 9457 9885 or email [julia.vanderoord@banyule.vic.gov.au](mailto:julia.vanderoord@banyule.vic.gov.au) for more information.

If you own your home you may consider putting in a raingarden. A raingarden is a designed to receive, slow down and filter rain runoff from roofs or impervious ground level surfaces such as driveways or paving. This ultimately means that the rainwater is cleaner and will slowly infiltrate your local waterway, reducing pollution and erosion of your local creek. For more information on raingardens visit:

[www.melbournewater.com.au/raingardens](http://www.melbournewater.com.au/raingardens)

## References

Environment Australia (2002) *Waterwatch Australia National Technical Manual: Module 4 Physical and Chemical Parameters*. Published by Environment Australia.

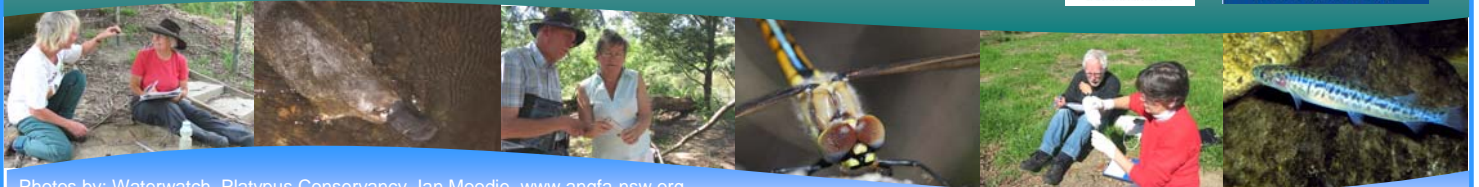
Melbourne Water (2011) *10,000 Raingardens Program* information sheet.

Waterwatch Victoria (2009) *Interpreting River Health Data*.

*Thank you to Jess Egan from Melbourne Water for flow and river level data*

J. McGuckin.(2002) *Water Quality of Darebin Creek*. Melbourne Water

*Thank you to Babor Kaemmerling for constructing the digital maps used in this report.*



Photos by: Waterwatch, Platypus Conservancy, Ian Moodie, [www.angfa-nsw.org](http://www.angfa-nsw.org)