

# Broken River

## WATER MONITORING REPORT 1995 - 2007



A monitoring program is important as:

- An educational tool that introduces water quality issues to the general community;
- A means of gathering base datasets to allow useful discussion of issues and provide some direction for future works;
- A method of assessing the value of works completed.



*This project is funded by the Australian Government through the National Action Plan for Salinity & Water Quality and the Community Stream Sampling Project*

**FRONT COVER :**

**BROKEN RIVER AT BYRNES ROAD FORD- 1999**

## TABLE OF CONTENTS

<b>INTRODUCTION .....</b>	<b>4</b>
<b>DATA REPRESENTATION.....</b>	<b>6</b>
<b>TURBIDITY .....</b>	<b>10</b>
<b>SALINITY .....</b>	<b>16</b>
<b>DISSOLVED OXYGEN .....</b>	<b>21</b>
<b>PH.....</b>	<b>23</b>
<b>PHOSPHORUS .....</b>	<b>27</b>
<b>SEPP COMPLIANCE .....</b>	<b>31</b>
<b>SEPP (WOV) ENVIRONMENTAL QUALITY OBJECTIVES FOR RIVERS AND STREAMS – WATER QUALITY .....</b>	<b>31</b>
<b>2007 RESULTS IN THE BROKEN RIVER COMPARED TO SEPP OBJECTIVES ABOVE – WATER QUALITY .....</b>	<b>32</b>
<b>GENERAL COMMENTS FOR THE BROKEN RIVER CATCHMENT .....</b>	<b>34</b>
<b>APPENDIX A.....</b>	<b>35</b>
Chemical Test Ratings .....	35
<b>APPENDIX B.....</b>	<b>36</b>
Broken River Report For Samples from 01 Jan 2007 to 12 Nov 2008.....	36

## Introduction

Waterwatch is a community water quality monitoring program that assists the community in monitoring their local waterway. The Program aims to:

- Increase community awareness and understanding of water quality issues;
- Increase community involvement in water management decisions; and,
- Generate useful data for community and agency use which complements that collected by Agency monitoring networks.

There are many reasons why people are prepared to become involved in a water monitoring program. **In fact, there are as many different reasons as there are people participating in a program!**

The challenge for Waterwatch as a community monitoring program is to help monitoring networks gather the information that **they** want. In the process, the data collected can be extremely valuable to waterway management agencies that are committed to improving the condition of our rivers and streams.

Monitoring networks across the Goulburn Broken Catchment have been formed to study water quality in their local areas. The networks are able to test a local stream for a range of parameters using equipment supplied by the Waterwatch Program. The parameters selected for testing in each area depend upon the water quality issues identified by the monitoring network. Monitors also record the date, time and rainfall to assist in the interpretation of the data.

Waterwatch has monitored a number of sites along the Broken River and its tributaries since 1995.

During both 2007 and 2008 to date, a total of 20 sites were monitored on a monthly basis for the following parameters:

1. Electrical Conductivity (Salinity)
2. Turbidity
3. Dissolved Oxygen
4. pH
5. Temperature; and
6. Total Phosphorus (at selected sites).

This report contains the following information:

1. Monitoring Plan
2. Information about water quality parameters
3. A tabular summary of data collected at all sites year by year. This table includes historical data collected by Waterwatch coordinators and volunteers dating back to 1996
4. Graphical representation of the medians of each parameter along the length of the waterway
5. Comparisons of local water quality data with State Environment Protection Policy (SEPP) guidelines
6. Raw Data for 2007 and 2008 to date

The report provides a summary of testing results since 1996 and should be used to stimulate discussion on the state of water quality in the Broken River, and potential actions to improve water quality. There is the potential to use water quality data collected in the program to discover trends in water quality over time and to measure the effects of improvement works carried out in the sub-catchment.

### Definitions

Median	Middle number in a series
Mean	Average calculated by adding all data points and dividing by the number of data points

## Data Representation

Water quality data in this report is represented and interpreted using a number of methods of presentation:

1. Individual data points (see Appendix B).  
*Individual monitoring results are arranged in tabular form according to site and date.*
2. Overall median where the median is calculated using all data collected at the site during the monitoring project.  
*This gives an overall indication of water quality at that site during the monitoring program. The overall median is compared to a Waterwatch rating scale.*
3. Annual median where a median is calculated year by year  
*This shows the changes or trend in water quality over time.*
4. Comparison of annual medians in this region with the SEPP guideline for water quality.  
*The SEPP objectives identify the 'ideal' result range for environmental data at a particular location in a waterway.*

# Monitoring Plan

Name of Project Activity Area: Broken River

Monitoring Coordinators: David Hodgkins and Tamara Bruce

## Why are you monitoring ?

Waterwatch has an on-going objective to encourage the community to become involved in monitoring local waterways to learn more about water quality issues. In addition, during 2006/08, an intensive monitoring project that targeted salinity was being undertaken across the Goulburn Broken Catchment. This Community Stream Sampling Project aims to identify areas in the Murray Darling Basin where salt stores are negatively affecting river quality and discharging saline water into the rivers. Data from this project will be used to prioritise areas for on-ground mitigation works and future investment in salinity management.

## Who will use the data?

The community is the main user of Waterwatch data. However, the data is available to other organisations and individuals that have an interest in catchment water quality. These interest groups include the Australian Government, State Government agencies, local government, Catchment Management Authorities (CMAs), Natural Resource Management (NRM) bodies and managers, community groups and local farmers and landholders.

## How will the data be used?

Waterwatch data is used by the community to understand issues regarding water quality in waterways. The data is then available for use in developing local action plans to improve water quality and to measure the effectiveness of these plans.

## Community Stream Sampling Objectives include:

- *Identifying areas in the Murray Darling Basin where salt stores 'hot spots' are negatively affecting river quality and discharging saline water into the rivers;*
- *Providing information to assist community groups, Catchment Management Authorities and regional Natural Resource Management (NRM) bodies and NRM managers make decisions on prioritising areas for on ground works and future investment in salinity management.*
- *Establishing a web-based database to allow community groups, Catchment Management Authorities and regional Natural Resource Management bodies and NRM managers to access stream salinity data, salinity mapping and other geophysical and hydrological data to aid in decision-making for future investment*

## Where will you monitor?

See Site lists in tables throughout document, and also map taken from Goulburn Broken Waterwatch website ([www.qbwaterwatch.org.au](http://www.qbwaterwatch.org.au)) on page 9.

## Who will be involved and how?

Waterwatch Coordinators and Volunteer Monitors by taking regular samples at nominated sites.

## What will be monitored?

Electrical Conductivity is one parameter that is used to gauge the quality of water in a waterbody. It is one of the parameters monitored to develop the Water Quality sub-index of the Index of Stream Condition in Victoria and it is the parameter required for the Community Stream Sampling project.

Other parameters to be measured include total phosphorus, turbidity and temperature. Dissolved oxygen, pH and E coli are also able to be monitored where these are of interest to the community monitors.

**Data quality controls?**

*See Data Confidence Plan*

**What methods will you use?  
When and how often will you monitor?**

See Community Monitoring Manual for the methods and procedures used in the Waterwatch Program and the Community Stream Sampling Project.

**How will the data be managed and reported?**

All water quality data is sent to the local Waterwatch Coordinator for checking prior to being sent to the Data Management Coordinator for entry into the Regional Waterwatch Database. Conductivity data has been forwarded to the Bureau of Rural Sciences on a three monthly basis.



Water quality sites monitored in Broken River Region



This Map is taken from the Goulburn Broken Waterwatch Website, ([www.gbwaterwatch.org.au](http://www.gbwaterwatch.org.au)) and shows all the water quality monitoring sites in the Broken River region.

## Turbidity

Turbidity is the cloudiness in water and is the result of suspended material in the water. This suspended material decreases the ability of light to pass through and thus can limit plant growth. This in turn affects the fish and invertebrate communities which feed on and live in the plants. Turbidity may be caused by silt, micro-organisms, plant material, algae and chemicals. However, the most frequent cause of turbidity in rivers and other water bodies is inorganic material from soil weathering and erosion.

High levels of turbidity have a two-fold effect on water:

- The water loses its ability to support a large variety of aquatic organisms. Where there is less light penetrating the water, there will be less photosynthesis occurring and therefore a lower level of oxygen in the water.
- The water becomes warmer because the suspended material absorbs heat from the sun. This also decreases the amount of oxygen dissolved in water.

Turbidity can be controlled by the retention of vegetation along streams and farming practices such as contouring and stubble retention.

### Turbidity in the Broken River

Many sites on the Broken River and tributaries have been tested for turbidity by Waterwatch and the community since 1996. The tables and graphs below summarise the data collected.

Site code	Site Description	TURBIDITY MEDIANS (NTU)												
		1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008
<i>BOB005</i>	<i>Bob's Creek</i>	10	8	7	5	16	5	5	8	8	14	13*	8	10*
<b>BRO005</b>	<b>Broken River at Barragunda</b>	5	5	8	5	8	5	5	6	8	14	8	2	5*
<i>STY005</i>	<i>Stony Creek Tributary at Byrnes Rd Ford</i>	10	5	8	10	6	6	8	13	5	29	5*	5	6.5*
<b>BRO008</b>	<b>Broken River at Byrnes Rd Ford</b>	8	5	5	2	5	5	5	5	2	14	5*	3	5*
<i>BRI010</i>	<i>Bridge Creek before entering Broken River at Whitfield Rd</i>	11	7	6	5	6	5	2	10	8	25	5	6	-
<b>BRO010</b>	<b>Broken River at Whitfield Rd</b>	8	5	5	4	5	4	5	8	5	15	8	5	2*
<i>HAL005</i>	<i>Hall's Creek at Shamrock Lane</i>	8	5	7	5	18	5	5	5	5	8	8	6.5	5*
<b>BRO018</b>	<b>Broken River Ford at O'Hallorans</b>	8	11	6	5	5	5	5	10	18	11*	2	5	3*
<b>BRO028</b>	<b>Broken River after Nillahcootie at Williams Rd</b>	11	7	12	43	37	27	21	48	20	18	-	40	52
<b>BRO030</b>	<b>Broken River at Evans Bridge</b>	8	-	6	-	20	-	-	-	-	12	-	31	-
<i>LEC010</i>	<i>Lima East Creek at Bridge on Midland Hwy</i>	15	11	17	16	18	20	15	18	21	24*	-	20	-
<i>LIM010</i>	<i>Lima Creek at bridge on Midland Hwy</i>	11	8	10	13	16	19	13	12	13	14*	-	14	-

Table 1

**Ratings:**

The Upper Broken River and its tributaries are rated for Valley.

<10NTU Excellent <12.5NTU Good <15NTU Fair <22.5NTU Poor >22.5NTU Degraded

**Note: results with \* indicate <5 data sets used to interpret results**

Results in italic without colour coding indicate a 1 off 'snapshot' type sample

Site code	Site Description	TURBIDITY MEDIANS (NTU)												
		1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008
<i>HOL020</i>	<i>Holland's Creek at Shrills Bridge Benalla</i>	-	19	20	-	28	30	-	24	-	-	-	14	11
<b>BRO048</b>	<b>Broken River at Footbridge in Benalla</b>	-	-	-	-	-	-	-	-	-	25	-	26	28
<b>BRO050</b>	<b>Lake Benalla</b>	24*	20	22	44*	33	45	-	-	-	29	20	20	10
<b>BRO055</b>	<b>Broken River at Benalla in Faithful St</b>	19	19	23	40	40	33	26	35	18	24	25*	22	16
<i>MOK020</i>	<i>Mokoan outlet into Broken River</i>	36	28	63	82	47	106	120	150	140	88	97	189	-
<b>BRO070</b>	<b>Broken River at Gowangardie</b>	37	32	58	48	52	52	54	95	100	72*	-	163	-
<b>BRO085</b>	<b>Broken River at Archer St Shepparton</b>	38	32	50	50	48	42	57	78	77	56	44	92	-
<b>BRO095</b>	<b>Broken River at confluence with Goulburn River</b>	42	28	45	48	50	47	55	57	55	46	-	-	-

Table 1 continued

**Ratings:**

The Lower Broken River and its tributaries are rated for Plains.

<15NTU Excellent <17.5NTU Good <20NTU Fair <30NTU Poor >30NTU Degraded

**Note: results with \* indicate <5 data sets used to interpret results**

Results in italic without colour coding indicate a 1 off 'snapshot' type sample

Turbidity results in the Broken River in 2007 deteriorate significantly after Nillahcootie, with results changing from being rated as "Excellent" to "Degraded". Although there is not as much data for 2008, the trend looks similar when looking at Table 1 above.

Because of the prolonged drought, flows in many waterways have been low for significant periods of time during the last few years. This can explain some of the variability in results. Some of the sites have only a small number of data points (also because of the drought) which also adds to the variability of medians.

Figure 1 below shows the median turbidity over the last 12 years in the Upper region of the Broken River. A significant increase in turbidity can be observed at site BRO028, which is the first site monitored downstream of Lake Nillahcootie. This level has recovered by the time it reaches Broken River at Evan's Bridge.

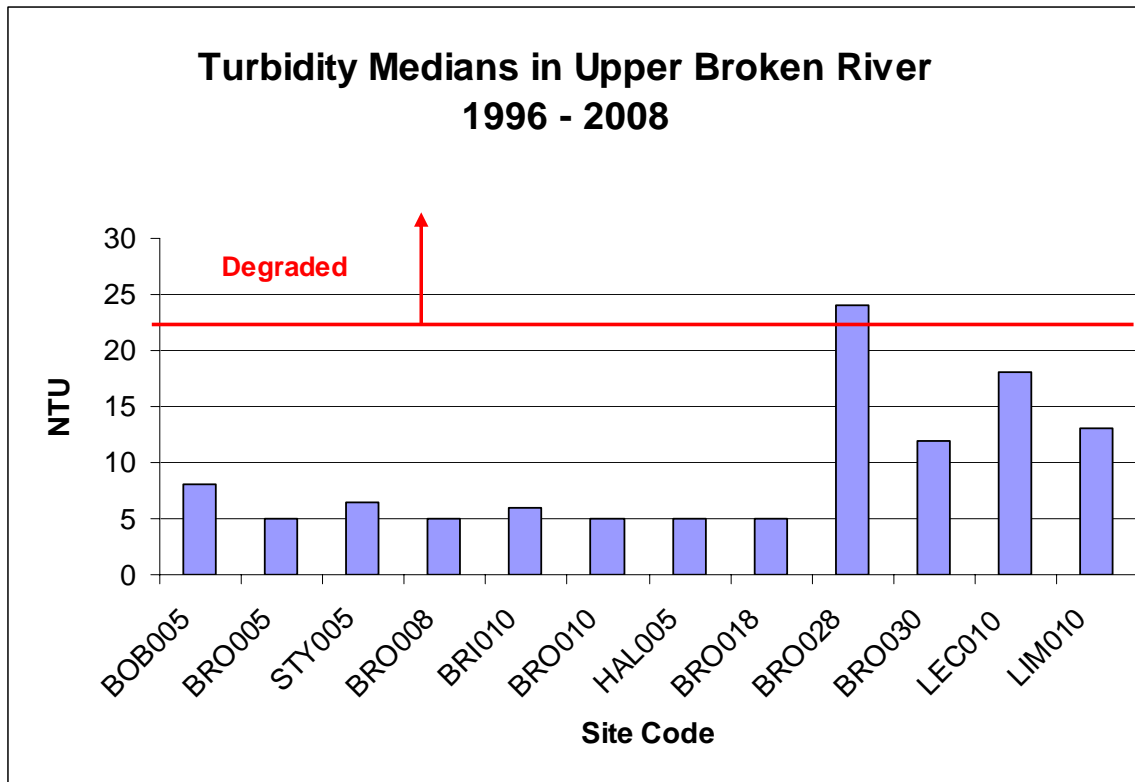


Figure 1

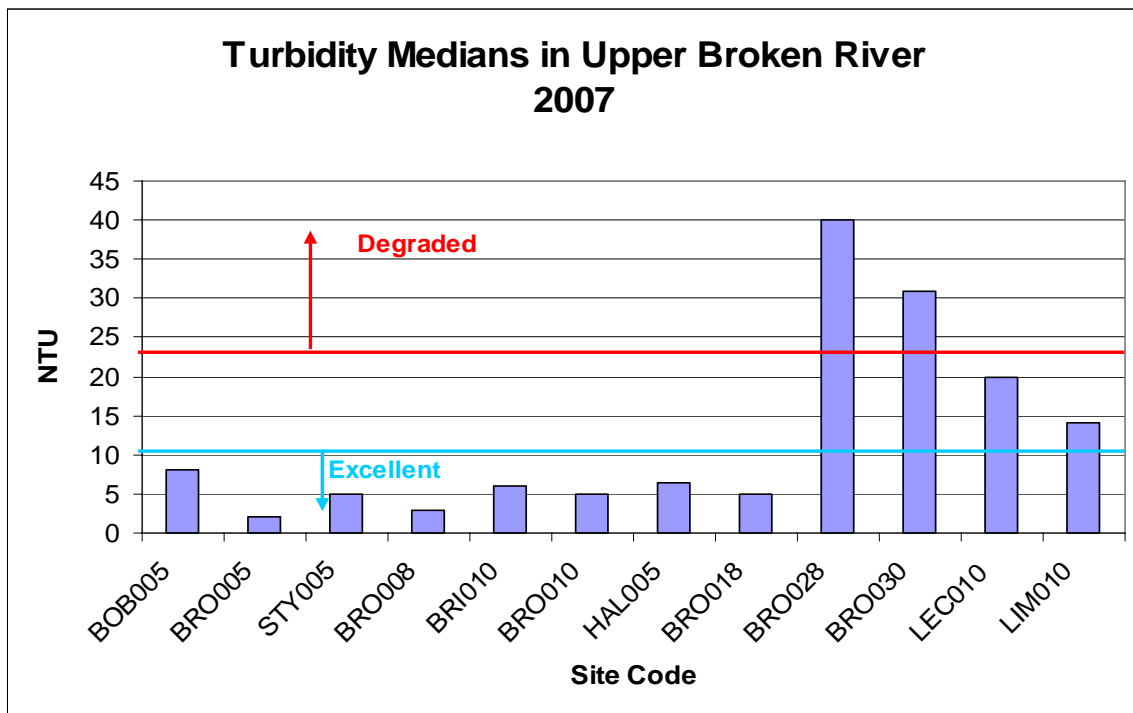


Figure 2

Figure 2 shows the median turbidity at each site in 2007, which reflects the long term median shown in Figure 1.

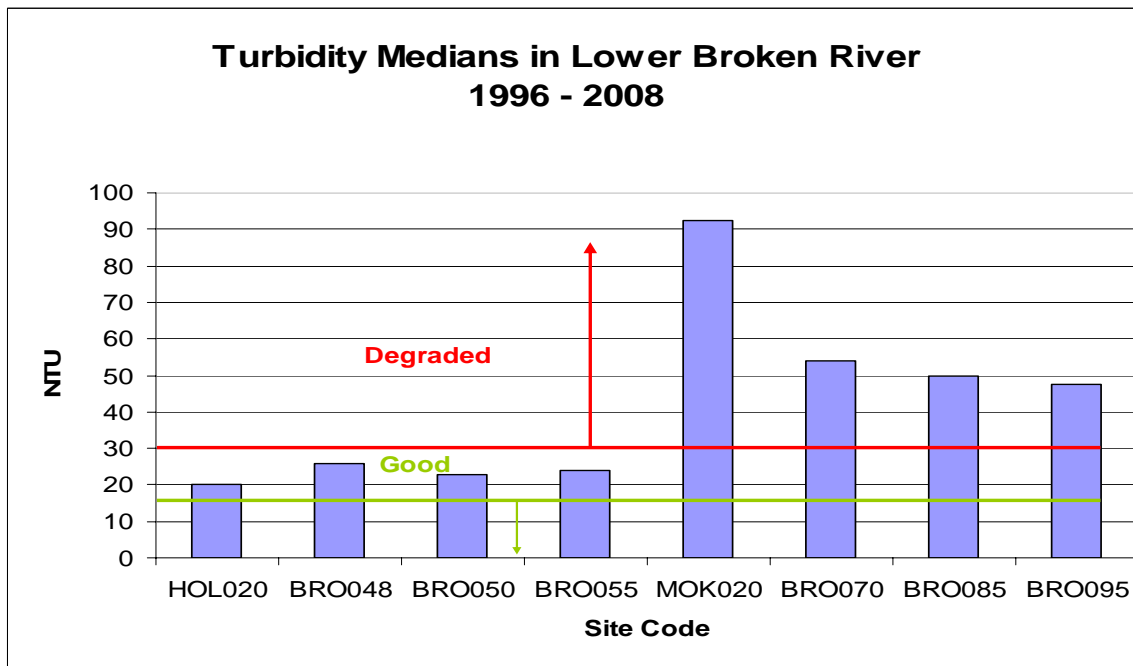
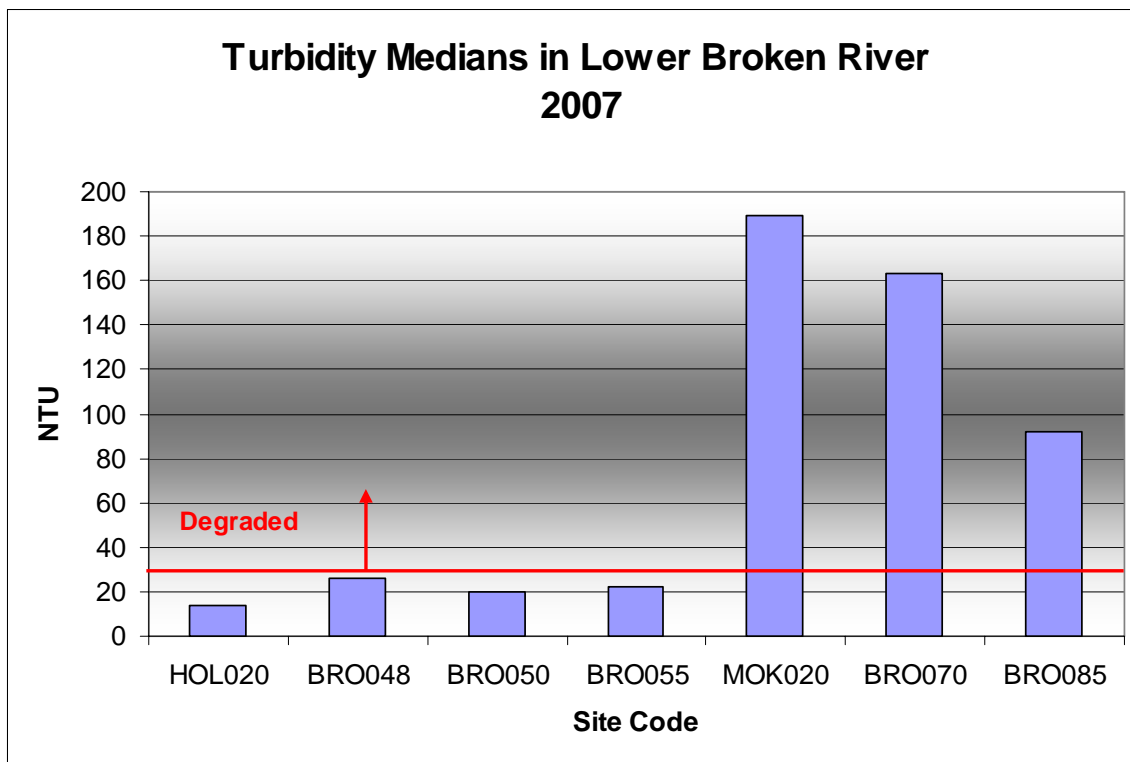


Figure 3

Figure 3 above shows long term medians in the lower section of the Broken River and its tributaries shows Lake Mokoan has extremely high turbidity, resulting in elevated levels in the Broken River downstream from this site.



**Figure 4**

Turbidity results for 2007 shown in Figure 4 reflect the long term water quality shown in figure 3.

## Salinity

Just as excess salt in our diets can be bad for our health, high salt levels in the environment negatively affect plants, animals and soils in and near waterways. Salinity is potentially the largest environmental problem facing Australia and is a major problem in northern and western Victoria. The most concentrated problem area is in the Murray-Goulburn Irrigation District, but dryland salting problems also occurs around and to the west of Seymour.

Dryland salinity is caused when deep rooted trees are replaced with seasonal crops or grasses that do not pump the water into the atmosphere as efficiently. If trees are cleared higher up in a catchment, this can lead to dramatic rises in watertables. Solutions to salinity include revegetation of recharge areas and buffer strips along local streams.

Use the breakdown over page to get salt levels into perspective.

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### 0-800 EC

If you tested the water from your tap at home it would be within this range. This is good drinking water for people and suitable for all animals

When water of 300EC is used in overhead sprinklers by irrigation farmers plants that are sensitive to salt may develop leaf scorch.

### 800-2500 EC

People can drink water within this range but it would start to taste very salty. This water is still suitable for all animals.

Peas, apricots and grapes can't be grown with water over 1,500 EC. If this water is used for irrigation farming, special care must be taken with drainage and choosing plants that are tolerant to salt. For example, lucerne can be irrigated with water of 2,000 EC and white clover with water of 1,000 EC, provided they are grown on sandy soil with good drainage.

### 2,500-10,000 EC

Water in this range is not suitable for people and should only be drunk in an emergency. When water over 4,000 EC is given to laying hens it causes their eggs to crack. Water over 6,000 EC is unsuitable for pigs and poultry. Highly saline water may also contain a high level of magnesium which can be harmful to stock. A water sample should be sent to a laboratory for analysis and specific advice obtained. This water is generally not used for irrigation farming except on some crops that have a very high tolerance to salt.

Pears, apples and tomatoes could not be grown with water in this range.

### Over 10,000 EC

Don't drink this water! Water over 10,000 EC has an extremely high salinity. This water is unsuitable for people and for most animals. Only beef cattle and adult sheep can survive on water in this range. Irrigation farming is not possible with such highly saline water. In dryland areas only salt tolerant pastures will survive.

At 50,000 EC water has the same salinity as the sea. This water can be used for making concrete and flushing toilets as long as they are able to resist corrosion.

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### Salinity in the Broken River

Sites in the Broken River and its tributaries have been monitored by Waterwatch for Salinity since 1996. The tables and graphs below summarise the data collected.

Site code	Site Description	MEDIAN ELECTRICAL CONDUCTIVITY (EC)												
		1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008
<i>BOB005</i>	<i>Bob's Creek</i>	490	660	850	735	830	625	915	521	960	380	900	744	1008*
<b>BRO005</b>	<b>Broken River at Barragunda</b>	40	85	35	75	75	85	110	138	150	35	170	98	118*
<i>STY005</i>	<i>Stony Creek Tributary at Byrnes Rd Ford</i>	40	185	60	190	150	190	560	80	210	60	-	218	406*
<b>BRO008</b>	<b>Broken River at Byrnes Rd Ford</b>	50	300	630	500	460	275	540	170	970	70	760	250	775*
<i>BRI010</i>	<i>Bridge Creek before entering Broken River at Whitfield Rd</i>	100	205	890	640	430	1140	1580	188	1440	80	1510	244	-
<b>BRO010</b>	<b>Broken River at Whitfield Rd</b>	120	340	1170	495	490	330	650	259	1230	90	940	343	723*
<i>HAL005</i>	<i>Hall's Creek at Shamrock Lane</i>	1020	1270	1645	1675	1670	1970	1770	1750	1715	2000	2000	1561	2035*
<b>BRO018</b>	<b>Broken River Ford at O'Hallorans</b>	120	220	485	455	140	280	490	247	350	125	990	385	831*
<b>BRO028</b>	<b>Broken River after Nillahcootie at Williams Rd</b>	60	85	140	92	110	110	136	140	125	113	-	155	197
<b>BRO030</b>	<b>Broken River at Evans Bridge</b>	110	-	150	-	265	140	-	-	-	131	-	162	201*
<i>LEC010</i>	<i>Lima East Creek at Bridge on Midland Hwy</i>	50	60	70	60	70	67	74	81	84	78*	-	88	109*
<i>LIM010</i>	<i>Lima Creek at bridge on Midland Hwy</i>	60	75	80	74	80	78	94	80	93	77*	-	81	97*

Table 2

#### Ratings:

The Upper Broken River and its tributaries are rated for Valley.

<80 EC Excellent <240 EC Good <400 EC Fair <600 EC Poor >600 EC Degraded

Note: results with \* indicate <5 data sets used to interpret results

Results in italic without colour coding indicate a 1 off 'snapshot' type sample

Site code	Site Description	MEDIAN ELECTRICAL CONDUCTIVITY (EC)													
		1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	
<i>HOL020</i>	<i>Holland's Creek at Shrills Bridge Benalla</i>	-	160	120	-	190	168*	-	207	-	-	-	145	179	
<b>BRO048</b>	<b>Broken River at Footbridge in Benalla</b>	-	-	-	-	-	-	-	-	-	124	122*	160	190	
<b>BRO050</b>	<b>Lake Benalla</b>	90*	120	135	*115	109	190	-	-	-	139	132	160	190	
<b>BRO055</b>	<b>Broken River at Benalla in Faithful St</b>	110	130	135	110	120	140	144	164	124	136	127*	160	170	
<i>MOK020</i>	<i>Mokoan outlet into Broken River</i>	165	140	170	130	136	220	263	110	266	214	237	330	-	
<b>BRO070</b>	<b>Broken River at Gowangardie</b>	140	200	220	170	140	218	190	160	280	148*	-	233	-	
<b>BRO085</b>	<b>Broken River at Archer St Shepparton</b>	165	210	170	141	145	150	182	200	220	186	221	287	-	
<b>BRO095</b>	<b>Broken River at confluence with Goulburn River</b>	180	180	115	132	130	150	190	180	180	165	-	-	-	

Table 2 continued

**Ratings:**

The Lower Broken River and its tributaries are rated for Plains.

<100 EC Excellent <250 EC Good <500 EC Fair <750 EC Poor >750 EC Degraded

**Note: results with \* indicate <5 data sets used to interpret results**

Results in italic without colour coding indicate a 1 off 'snapshot' type sample

Salinity levels in the Upper part of the Broken River Catchment are elevated when compared with the lower catchment. This can be seen in Table 2 above.

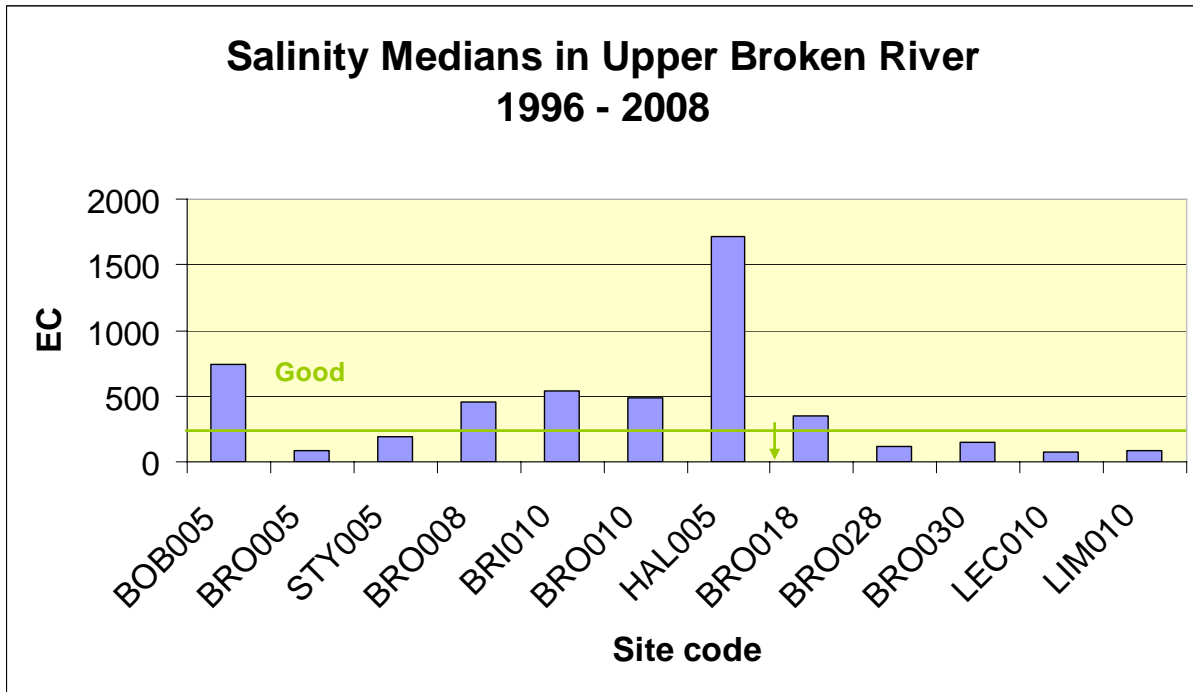


Figure 5

Figure 5 shows long term salinity levels in the Upper part of the Catchment over the last 12 years. Bobs Creek and Halls Creek appear to be making significant contributions to the salinity levels. This is also reflected in the 2007 results below in Figure 6.

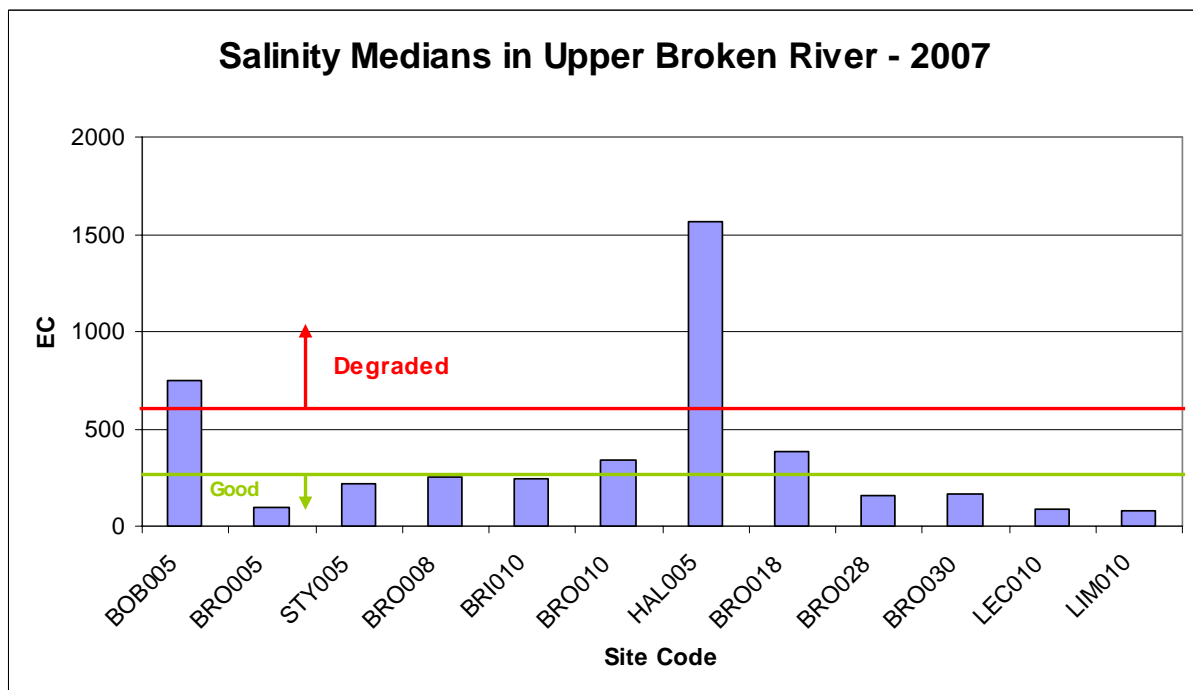


Figure 6

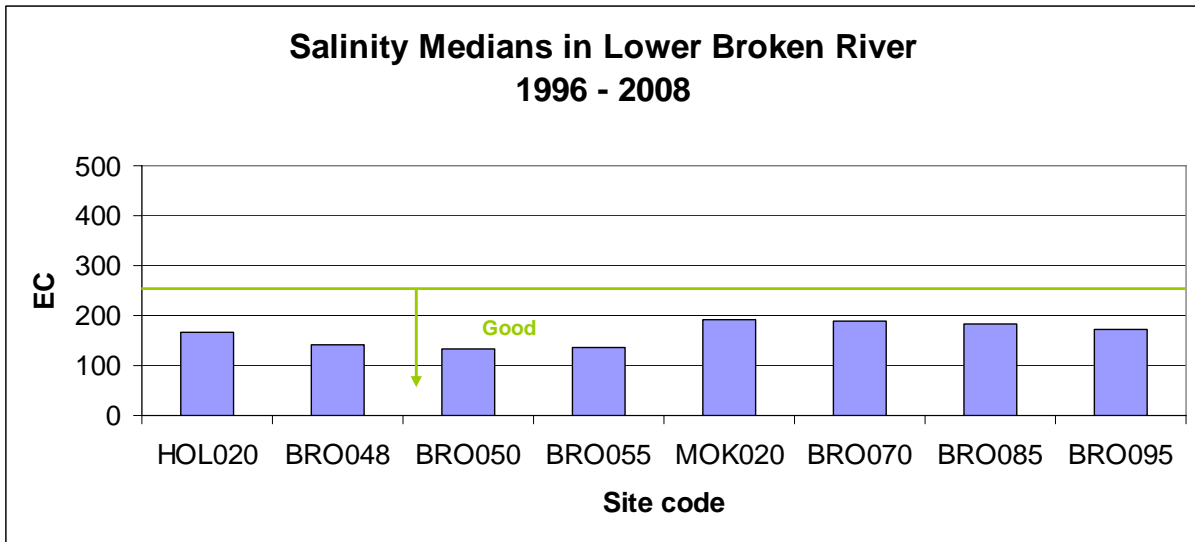


Figure 7

Figure 7 shows long term salinity levels in the Lower part of the Broken River Catchment. As for turbidity, Lake Mokoan is elevated in relation to the other sites in this region. This is also reflected in the 2007 results below in Figure 8.

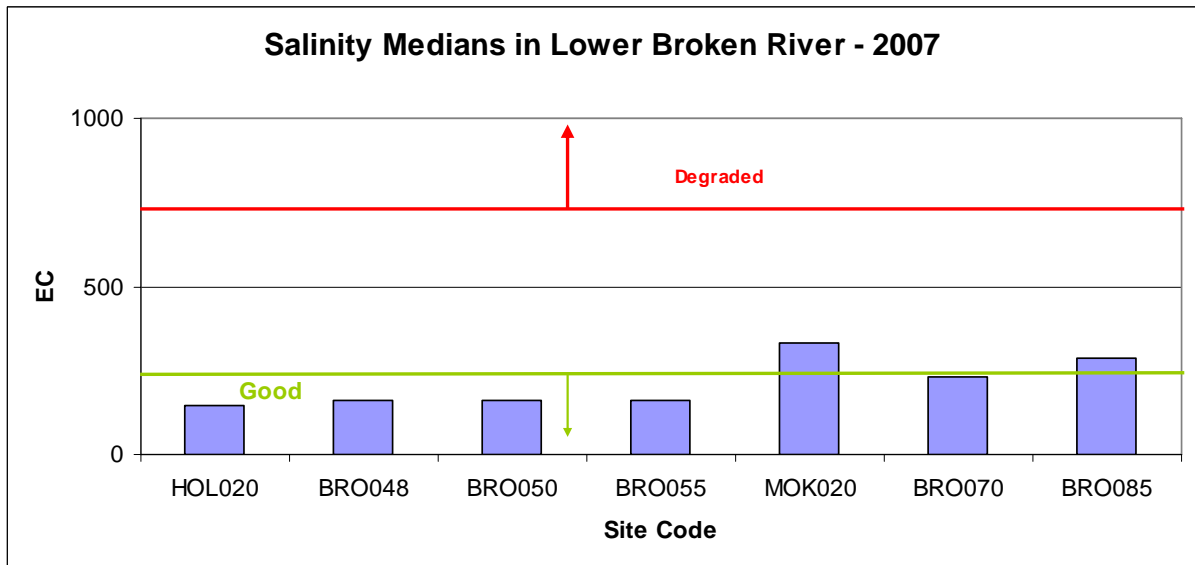


Figure 8

When interpreting water quality data, care must be taken to ensure that representative data is used to produce statistics such as medians. It is important to have a sufficient number of data points to have some confidence in drawing some conclusions about the water quality.

## Dissolved Oxygen

Dissolved oxygen (DO) is the small amount of oxygen gas dissolved in the water. It is essential for the respiration of fish, aquatic animals, micro-organisms and plants. To maintain a healthy and diverse aquatic ecosystem, the dissolved oxygen must be maintained at high levels. If DO falls, there will be reductions or losses in the more sensitive species. At low DO levels, only a very few hardy species may be present. So DO levels are a useful indicator of general water quality.

DO levels in natural waters depend on three factors:-

1. **Speed of uptake of oxygen into the water from air.** This depends on agitation at the water's surface. Shallow flowing streams usually have high oxygen levels while stagnant pools have reduced oxygen.
2. **Speed that oxygen is used up in the water.** Bacteria will use up oxygen in water. If large amounts of organic matter enter the water course from point sources such as sewage plants and animal feedlots, there will be a high bacterial population and so greater oxygen usage.
3. **Photosynthesis of plants and algae.** Aquatic plants and algae release large amounts of oxygen into the water in daylight hours as a by-product of photosynthesis. Peak DO levels occur in early afternoon and minimum levels before sunrise.

Since plants produce oxygen during the day through photosynthesis and use it up at night with respiration, the time of the day when the sample is taken should be kept fairly constant and noted on the record sheet. Oxygen levels are also affected by the temperature of the water. Scientific studies suggest that 4.5mg/L DO is the minimum amount that will support a large and diverse fish population. The DO level in good fishing waters generally averages about 9mg/L. When DO levels drop below about 3mg/L, even the hardy fish die.

A dissolved oxygen test tells us precisely how much oxygen is dissolved in water, but it does not indicate how much DO the water is capable of holding at the temperature of the test. The percentage saturation is a better measure of the availability of oxygen to aquatic organisms.

### Dissolved Oxygen in the Broken River

Some sites in the Broken River and its tributaries have been monitored by Waterwatch for Salinity in the Broken River since 2003. The tables below summarises the data collected. Graphs have not been prepared as results vary little.

Site code	Site Description	MEDIAN DISSOLVED OXYGEN (mg/L)													
		1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	
<b>BRO005</b>	<b>Broken River at Barragunda</b>	-	-	-	-	-	-	-	7.0	5.0	-	-	-	-	
<b>BRO010</b>	<b>Broken River at Whitfield Road</b>	-	-	-	-	-	-	-	7.5	-	-	-	-	-	
<b>BRO018</b>	<b>Broken River Ford at O'Hallorans</b>	-	-	-	-	-	-	-	7.0	6.5*	-	-	-	-	
<b>BRO028</b>	<b>Broken River after Nillahcootie at Williams Rd</b>	-	-	-	-	-	-	-	10	8.9	10.7	-	8.9	8.2	
<i>LEC010</i>	<i>Lima East Creek at Bridge on Midland Hwy</i>	-	-	-	-	-	-	-	10.1	8.5	9.7*	-	6.9	7.8*	
<i>LIM010</i>	<i>Lima Creek at bridge on Midland Hwy</i>	-	-	-	-	-	-	-	10.2	9.4	-	-	7.4*	8.4*	
<b>BRO030</b>	<b>Broken River at Evans Bridge</b>	-	-	-	-	-	-	-	-	-	9.8	-	8.7	8.9*	
<i>HOL020</i>	<i>Holland's Creek at Shrills Bridge Benalla</i>	-	-	-	-	-	-	-	-	-	-	-	6.2	3.4	
<b>BRO055</b>	<b>Broken River at Benalla in Faithful St</b>	-	-	-	-	-	-	-	9.5*	8.8*	8.8	-	-	-	
<i>MOK020</i>	<i>Mokoan outlet into Broken River</i>	-	-	-	-	-	-	-	-	9.3	7.7*	6.8*	8.0	-	
<b>BRO070</b>	<b>Broken River at Gowangardie</b>	-	-	-	-	-	-	-	-	9.2*	-	-	6.1*	-	
<b>BRO085</b>	<b>Broken River at Archer St Shepparton</b>	-	-	-	-	-	-	-	9.9	9.1	9.3	7.6*	7.5	-	

Table 3

**Ratings:**

There are no Waterwatch ratings for medians for Dissolved Oxygen (DO) as used for the other parameters in this report however, as mentioned above, scientific studies suggest that 4.5mg/L DO is the minimum amount that will support a large and diverse fish population. The DO level in good fishing waters generally averages about 9mg/L, and when DO levels drop below about 3mg/L, even the hardy fish will not survive. Based on these figures, with the exception of the two results highlighted in Table 3 above, all sites monitored for Dissolved Oxygen have fair to good results.

## pH

The pH of a stream is a measure of how acid or alkaline (basic) the water is on a scale from 0 to 14. It is a measure of the hydrogen ion ( $H^+$ ) concentration. Water contains both  $H^+$  and  $OH^-$  ions. Pure distilled water contains equal numbers of H and OH ions and is considered neutral (pH 7).

pH measurements between 7 and 0 indicate the solution is acidic and the solution contains more  $H^+$  ions than  $OH^-$  ions. Measurements from 7 to 14 indicate alkalinity and the water contains more  $OH^-$  ions than  $H^+$  ions. From pH 7 to pH 0, water becomes more acidic and from pH 7 to 14, water becomes increasingly alkaline. pH is a logarithmic scale so that for every one unit change (eg from 5 to 4), there is a ten-fold increase in acidity.

The pH of fresh waters usually lies in the range 6.5 to 8.2 although wide variations can occur because of catchment geology. The pH can also be affected by a range of factors including industrial runoff and sewage.

### **pH Changes in Water**

Changes in pH outside the normal range of a water body will cause loss of the more sensitive species. Extremely high and low pH values will lead to the death of all aquatic life.

The most common cause of unnatural changes in pH occurs in catchments which have acid sulphate soils that have been exposed to the atmosphere by mining or urban development. During high rainfall events, these acids can be washed into streams causing sharp rises in pH values for short periods of time. Nutrient pollution can cause excessive growth of algae and other plants and lift the pH values to quite high levels at certain times of the day. These sometimes large variations in pH can reduce the number of species of aquatic organisms normally present in the water body.

### pH in the Broken River

Some sites in the Broken River and its tributaries have been monitored by Waterwatch for pH since 1995. The tables and graphs below summarise the data collected.

Site code	Site Description	MEDIAN pH												
		1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008
<b>BRO005</b>	<b>Broken River at Barragunda</b>	5.5	6.0	5.5	6.0	5.8	6.0	6.0	6.0	6.0	-	-	-	-
<b>BRO008</b>	<b>Broken River at Byrnes Rd Ford</b>	-	6.5	-	-	-	-	-	-	-	-	-	-	-
<i>BRI010</i>	<i>Bridge Creek before entering Broken River at Whitfield Rd</i>	6.0	6.8	6.8	6.8	6.6	7.0	7.5	6.0	7.8*	-	-	-	-
<b>BRO010</b>	<b>Broken River at Whitfield Rd</b>	6.0	7.0	7.0	7.0	7.0	7.0	7.5	6.5	-	-	-	-	-
<b>BRO018</b>	<b>Broken River Ford at O'Hallorans</b>	6.0	6.0	6.5	7.3	6.5	7.0	7.3	6.5	7.6*	-	-	-	-
<b>BRO028</b>	<b>Broken River after Nillahcootie at Williams Rd</b>	6.5	6.9	7.2	7.1	7.2	7.9	-	7.4	7.7	-	-	7.4	7.8
<i>LEC010</i>	<i>Lima East Creek at Bridge on Midland Hwy</i>	6.5	6.6	6.9	7.0	6.9	7.5	-	7.1	7.1	7.0*	-	6.6	7.4*
<i>LIM010</i>	<i>Lima Creek at bridge on Midland Hwy</i>	6.5	6.8	6.8	6.8	7.1*	7.5	-	7.0	7.2	-	-	6.7	7.2*
<i>BRO030</i>	<b>Broken River at Evans Bridge</b>	-	-	-	-	-	-	-	-	-	7.3	-	7.4	7.7*

Table 4

**Ratings:**

Ratings for pH are the same for Valley and Plains.

6.0 - 7.5 Excellent 5.5 - 6 or <8.0 Good 8.0 - 8.5 Fair 5.0 - 5.5 or 8.5 - 9.0 Poor < 5.0 or > 9.0 Degraded

Note: results with \* indicate <5 data sets used to interpret results

Site code	Site Description	MEDIAN pH												
		1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008
HOL020	<i>Holland's Creek at Shrills Bridge Benalla</i>	-	7.1*	7.1	-	7.1	-	-	-	-	-	-	7.6	7.4
BRO048	Broken River at Footbridge in Benalla	-	-	-	-	-	-	-	-	-	7.4	7.7*	7.8	-
BRO050	Lake Benalla	-	6.9	6.9	-	-	-	-	-	-	7.3	7.6	8.0	-
BRO055	Broken River at Benalla in Faithful St	-	7.0	6.9	6.6	7.1	7.3	-	7.0	-	7.4	7.7*	7.8	-
MOK020	<i>Mokoan outlet into Broken River</i>										7.5	7.3	7.3	-
BRO070	Broken River at Gowangardie	6.8*	7.1	7.1	7.5	7.2	6.3	6.9	7.5	7.9	7.2*	-	7.0*	-
BRO085	Broken River at Archer St Shepparton	6.5	6.5	6.0	6.0	6.0	6.0	6.3	6.3	7.0	6.5	7.3	7.4	-
BRO095	Broken River at confluence with Goulburn River	6.3	6.0	6.0	5.5	6.0	6.0	6.0	6.0	6.4	6.0	-	-	-
HAL005	Hall's Creek at Shamrock Lane	7.4	7.5	7.0	7.0	7.0	7.5	7.3	7.3	7.5	-	-	-	-
BOB005	Bob's Creek	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5	-	-	-	-	-

Table 4 continued

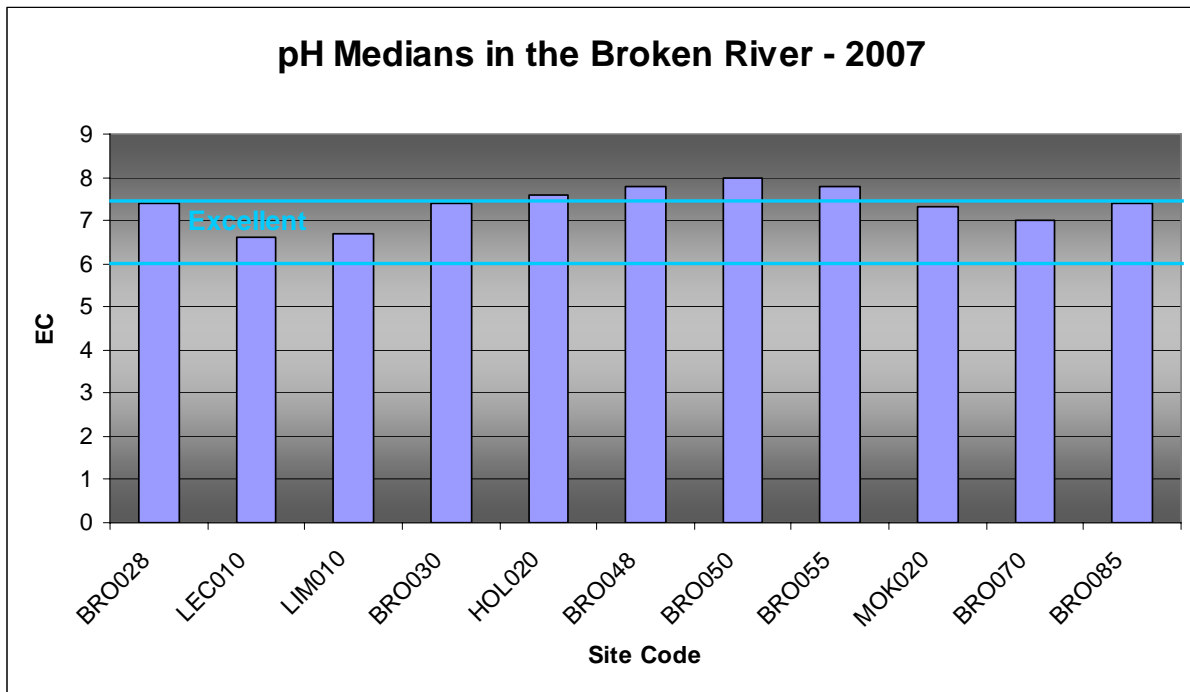
**Ratings:**

Ratings for pH are the same for Valley and Plains.

6.0 - 7.5 Excellent 5.5 - 6 or < 8.0 Good 8.0 - 8.5 Fair 5.0 - 5.5 or 8.5 - 9.0 Poor < 5.0 or > 9.0 Degraded

**Note: results with \* indicate <5 data sets used to interpret results**

*Results in italic without colour coding indicate a 1 off 'snapshot' type sample*



**Figure 8**

As can be seen in Figure 8 above, the majority of the pH results for the Broken River and its tributaries in 2007 are within the "Excellent" range, and are therefore not of concern.

## Phosphorus

Phosphorus is a nutrient that occurs naturally at low concentrations in water and it is essential for all forms of life. It comes from processes like the weathering of rocks and from the decomposition of organic matter such as plant litter. Other sources of phosphorus entering river systems include:

- sewage treatment works
- runoff from agricultural land
- stormwater drains
- runoff from forests
- irrigation drains intensive agricultural industries

An increase in phosphorus levels in streams may result from erosion, discharge of sewage, detergents, urban stormwater and rural runoff that contains fertilisers and animal and plant material. When the phosphorus concentration becomes too high, problems such as algal blooms, excessive growth of aquatic weeds and the loss of species diversity can occur.

Nutrients in waterways (particularly phosphorus) became an important parameter to monitor when deciding the quality of water in a waterway when the Water Quality Strategy was produced for the Goulburn Broken Catchment. Phosphorus is also a parameter included in the chemical sub-index as part of the Victorian Index of Stream Condition rating system for measuring the condition of a waterway. Total phosphorus is used rather than soluble (reactive) phosphorus, as it includes all forms of phosphorus present in a waterway rather than the soluble component.

## Phosphorus in the Broken River

A number of sites along the Broken River have been tested for total phosphorus between since 1996. Due to restraints in time and resources, Goulburn Broken Waterwatch now only monitors the most downstream site of a waterway for total phosphorus. The table and graph below summarise the data collected.

Site Description	MEDIAN TOTAL PHOSPHORUS (TP mg/L)												
	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008
<i>BOB005</i> <i>Bob's Creek</i>	0.05	0.04	0.05	0.04	0.06	0.08	0.07	0.04	0.02	0.04	0.02*	0.03*	-
<b>BRO005</b> Broken River at Barragunda	0.04	0.03	0.03	0.04	0.05	0.05	0.04	0.11	0.03	0.03	0.03	-	-
<i>BRI010</i> <i>Bridge Creek before entering Broken River at Whitfield Rd</i>	0.03	0.04	0.03	0.05	0.06	0.05	0.07	0.02	0.02	0.04	0.02	0.02	-
<b>BRO010</b> Broken River at Whitfield Rd	0.03	0.02	0.03	0.03	0.05	0.03	0.04	<0.02	0.02	0.04	0.03	0.02	-
<b>BRO018</b> Broken River Ford at O'Hallorans	0.03	0.02	0.04	0.03	0.04	0.03	0.04	<0.02	0.03	0.04	0.02	0.02	0.02*
<b>BRO028</b> Broken River after Nillahcootie at Williams Rd	0.05	0.03	0.05	0.09	0.09	0.06	*0.06	0.07	0.04	0.03	-	0.05	0.04
<i>LEC010</i> <i>Lima East Creek at Bridge on Midland Hwy</i>	0.09	0.06	0.1	0.12	0.12	0.16	*0.14	0.08	0.09	-	-	0.09	0.09*
<i>LIM010</i> <i>Lima Creek at bridge on Midland Hwy</i>	0.08	0.06	0.08	0.12	0.13	0.15	*0.15	0.09	0.07	-	-	0.07	0.08*

Table 5

**Ratings:**

Phosphorus ratings are the same for the Valleys and the Plains.

<0.01 mg/L Excellent <0.025 mg/L Good <0.05 mg/L Fair <0.1 mg/L Poor >0.1 mg/L Degraded

**Note: results with \* indicate <5 data sets used to interpret results**

Results in italic without colour coding indicate a 1 off 'snapshot' type sample

Site Description	MEDIAN TOTAL PHOSPHORUS (TP mg/L)												
	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008
<b>BRO030</b> Broken River at Evans Bridge	<i>0.06</i>	-	<i>0.02</i>	-	<i>0.08</i>	<i>0.04</i>	-	-	-	<b>0.03</b>	-	<b>0.05</b>	-
<i>HOL020</i> <i>Holland's Creek at Shrills Bridge Benalla</i>	-	<b>0.08</b>	<b>0.05</b>	-	<b>0.08</b>	<b>0.05</b>	-	<i>0.09</i>	-	-	-	<b>0.05</b>	<b>0.03</b>
<b>BRO048</b> Broken River at Footbridge in Benalla	-	-	-	-	-	-	-	-	-	<b>0.06</b>	<b>0.06*</b>	<b>0.04</b>	<b>0.04</b>
<b>BRO050</b> Lake Benalla	<i>*0.09</i>	<b>0.05</b>	<b>0.08</b>	<i>*0.09</i>	<i>0.18</i>	-	-	-	-	<b>0.06</b>	<b>0.03</b>	<b>0.04</b>	<b>0.03</b>
<b>BRO055</b> Broken River at Benalla in Faithful St	<b>0.06</b>	<b>0.05</b>	<b>0.07</b>	<b>0.10</b>	<b>0.1</b>	<b>0.09</b>	<b>0.09</b>	<b>0.08</b>	<i>0.05*</i>	<b>0.07</b>	<b>0.05*</b>	<b>0.04</b>	<b>0.05</b>
<i>MOK020</i> <i>Mokoan outlet into Broken River</i>	<b>0.18</b>	<b>0.11</b>	<b>0.23</b>	<b>0.17</b>	<b>0.14</b>	<b>0.18</b>	<b>0.19</b>	<b>0.22</b>	<b>0.19</b>	<b>0.15</b>	<b>0.14</b>	-	-
<b>BRO070</b> Broken River at Gowangardie	<b>0.13</b>	<b>0.12</b>	<b>0.15</b>	<b>0.18</b>	<b>0.16</b>	<b>0.14</b>	<b>0.19</b>	<b>0.18</b>	<b>0.13</b>	<b>0.15*</b>	-	-	-
<b>BRO085</b> Broken River at Archer St Shepparton	<b>0.16</b>	<b>0.15</b>	<b>0.17</b>	<i>0.16*</i>	<b>0.14</b>	-	<b>0.18</b>	<b>0.19</b>	<b>0.14</b>	<b>0.09</b>	<b>0.11*</b>	<b>0.12</b>	-

Table 5 continued

**Ratings:**

Phosphorus ratings are the same for the Valleys and the Plains.

<0.01 mg/L Excellent <0.025 mg/L Good <0.05 mg/L Fair <0.1 mg/L Poor >0.1 mg/L Degraded

**Note:** results with \* indicate <5 data sets used to interpret results

Results in italic without colour coding indicate a 1 off 'snapshot' type sample

It can be seen from Table 5 above, and Figure 9 below, that Total Phosphorus results range from "Good" to "Degraded" over the years of testing. Lake Mokoan and Broken River downstream from Lake Mokoan all show "Degraded" results. Lima East Creek and Lima Creek also show elevated Total Phosphorus levels.

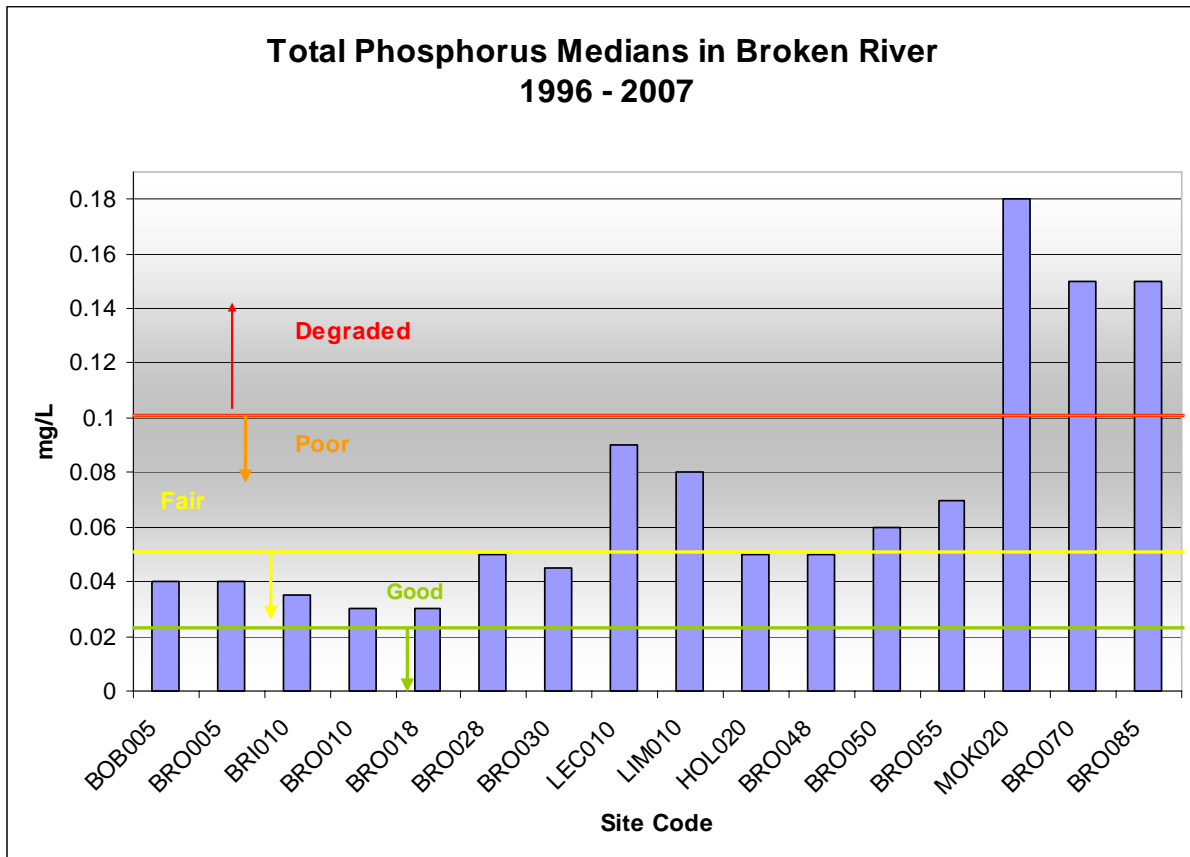


Figure 9

### SEPP Compliance

The State Environment Protection Policy (SEPP) Waters of Victoria (WoV) water quality objectives identify the 'ideal' result range for environmental data at a particular location in a waterway. If a site fails a SEPP objective for one parameter, it indicates a possible problem for the whole system, not just for the one parameter and not just for the one site). It is recommended that an ecological risk assessment (ERA) be undertaken to determine if there is a risk to the values (or "beneficial uses") associated with that stream.

Basically, any set of results that fails the objective is a red flag to look more closely at what's going on. This differs from aiming for a particular turbidity or total phosphorus result, as an ERA may determine that it is acceptable to exceed the SEPP objectives for some parameters depending on the use/value of the waterway.

### SEPP (WoV) Environmental Quality Objectives for Rivers and Streams – water quality

Colours highlight the SEPP (WoV) segments and objectives applicable within the Goulburn Broken CMA region.

SEGMENT	INDICATOR						
	Total phosphorus (ug/L)	Dissolved oxygen % saturation		Turbidity (NTU)	Electrical conductivity (uS/CM)	pH (pH units)	
	75 <sup>th</sup> percentile	25 <sup>th</sup> percentile	maximum	75 <sup>th</sup> percentile	75 <sup>th</sup> percentile	25 <sup>th</sup> percentile	75 <sup>th</sup> percentile
• mid-reaches of Ovens, Goulburn and Broken catchments	≤25	≥85	110	≤10	≤500	≥6.4	≤7.7
• lowlands of Kiewa, Ovens, Goulburn & Broken catchments	≤45	≥85	110	≤30	≤500	≥6.4	≤7.7

Table 6

2007 results in the Broken River compared to SEPP objectives above – water quality

SEGMENT	INDICATOR						
	Total phosphorus (ug/L)	Dissolved oxygen % saturation		Turbidity (NTU)	Electrical conductivity (uS/CM)	pH (pH units)	
	75 <sup>th</sup> percentile	25 <sup>th</sup> percentile	maximum	75 <sup>th</sup> percentile	75 <sup>th</sup> percentile	25 <sup>th</sup> percentile	75 <sup>th</sup> percentile
<i>BOB005 - Bob's Creek</i>				15	861		
<b>BRO005 - Broken River at Barragunda</b>				4	113		
<i>STY005 - Stony Creek Tributary at Byrnes Rd Ford</i>				8	800		
<b>BRO008 - Broken River at Byrnes Rd Ford</b>				7	1185		
<i>BRI010 - Bridge Creek before entering Broken River at Whitfield Rd</i>	20			12	359		
<b>BRO010 - Broken River at Whitfield Rd</b>	20*			5	1365		
<i>HAL005 - Hall's Creek at Shamrock Lane</i>				16	1783		
<b>BRO018 - Broken River Ford at O'Hallorans</b>	20			7	2325		
<b>BRO028 - Broken River after Nillahcootie at Williams Rd</b>	60			44	165	7.3	7.6
<b>BRO030 - Broken River at Evans Bridge</b>	60			33	193	7.3	7.6
<i>LEC010 - Lima East Creek at Bridge on Midland Hwy</i>	90	65	92	21	102	6.5	6.6
<i>LIM0010 - Lima Creek at bridge on Midland Hwy</i>	90*	71	102	16	87	6.6	6.8

Table 7

SEGMENT	INDICATOR						
	Total phosphorus (ug/L)	Dissolved oxygen % saturation		Turbidity (NTU)	Electrical conductivity (uS/CM)	pH (pH units)	
	75 <sup>th</sup> percentile	25 <sup>th</sup> percentile	maximum	75 <sup>th</sup> percentile	75 <sup>th</sup> percentile	25 <sup>th</sup> percentile	75 <sup>th</sup> percentile
<i>HOL020 - Holland's Creek at Shrills Bridge Benalla</i>	60	44	80	20	170	7.2	7.6
<b>BRO048 - Broken River at Footbridge in Benalla</b>	50			28	162	7.8	7.9
<b>BRO050 - Lake Benalla</b>	50			20	170	7.9	8.2
<b>BRO055 - Broken River at Benalla in Faithful St</b>	60			25	170	7.6	8.2
<i>MOK020 - Mokoan outlet into Broken River</i>		78	102	281	419	7.0	7.5
<b>BRO070 - Broken River at Gowangardie</b>		40	102	176	310	6.6*	7.5*
<b>BRO085 - Broken River at Archer St Shepparton</b>	180	74	88	135	308	7.3	7.6
<b>BRO095 - Broken River at confluence with Goulburn River</b>							

Table 7 continued

Note: results with \* indicate <5 data sets used to interpret results

Three quarters of the readings taken should fall below the 75<sup>th</sup> percentile. As can be seen by those results highlighted in yellow, total phosphorus is well above the SEPP guidelines for the majority of sites monitored, and none of the sites tested meet the 25<sup>th</sup> percentile for dissolved oxygen. Various sites also fail to meet SEPP guidelines for turbidity and electrical conductivity. It must be noted that SEPP objectives are long term theoretical goals for water quality. It is not expected that waterways will comply at this stage.

## General Comments for the Broken River Catchment

Dissolved oxygen and pH do not appear to be of concern in the Broken River Catchment.

Turbidity appears to be a water quality issue downstream of Lake Nillahcootie and both in and downstream of Lake Mokoan.

Elevated levels of salinity (electrical conductivity) show up as a water quality issue in the Upper part of the catchment.

Total Phosphorus is elevated in both Lima East Creek, and Lima Creek, as well as Lake Mokoan, and the Broken River downstream from here.

As a result, it is recommended that monitoring should continue into the future to:

- Measure any changes in trends up or down in all waterways;
- Gauge the effectiveness of any waterway or riparian works undertaken to improve water quality;
- Monitor values in all waterways in "normal" climatic conditions other than drought conditions.

## Chemical Test Ratings

The figures below are a guide for each of the water quality tests to help you interpret your results in terms of water quality.

*Index of Stream Conditions (ISC) Ratings for each of the parameters.*

<b>Parameter</b>	<b>Excellent</b>	<b>Good</b>	<b>Fair</b>	<b>Poor</b>	<b>Degraded</b>
Conductivity (uS/cm EC) mountain	<30	<90	<150	<225	>225
Conductivity (uS/cm EC) valley	<80	<240	<400	<600	>600
Conductivity (uS/cm EC) plain	<100	<250	<500	<750	>750
Turbidity (NTU) mountain	<5.0	<7.5	<10	<12.5	>12.5
Turbidity (NTU) valley	<10	<12.5	<15	<22.5	>22.5
Turbidity (NTU) plain	<15	<17.5	<20	<30	>30
pH	6.0 - 7.5	5.5 - 6 or <8.5	8.0 - 8.5	5.0 - 5.5 or 8.5 - 9.0	< 5.0 or > 9.0
Reactive Phosphorus (mg/L)	< 0.008	< 0.02	< 0.04	< 0.08	> 0.08
Total Phosphorus (mg/L)	< 0.01	< 0.025	< 0.05	< 0.10	> 0.10
Nitrates (mg/L)	< 0.05	< 0.1	< 0.2	< 0.4	> 0.4

## Appendix B

### Broken River Report

For Samples from 01 Jan 2007 to 12 Nov 2008

**SiteNo:** BAD025    **Baddaginnie Crk-Baddaginnie Rd**

Parameters:

<u>Date:</u>	<u>Time:</u>	<u>Sample Type:</u>	EC μS/cm	DO mg/L	TPhos mg/L P	Flow ML/day	Rainfall mm	Temp ° C	Turb NTU	% O2 Sat %	pH pH Units
09-May-07	3:15 PM					Dry	0				
31-May-07	4:05 PM	Grab	102	7.4		stagna	31.6	10.1	38	67	7.4
13-Jun-07	2:50 AM	Grab	70	5.4				9.7	36	47	8.3
15-Jul-07	3:00 PM	Grab	73	6.7		high	0.2	8.5	59	58	7.5
18-Jul-07	3:05 PM	Grab	73	8.4		high	15.6	6.7	61	69	8.4
31-Aug-07	12:15 PM	Grab	104	5.4		low	0	11.9	26	50	7.2
23-Sep-07	1:10 PM	Grab	108	4.7		LOW	0	13.8	27	47	7.5
22-Nov-07	2:35 PM	Grab	118	0.8		low	0	18.2	20	9	7.4
23-Dec-07	5:35 PM	Grab	111	1.1		high	65	18	70	13	7.2
23-Jan-08	4:20 PM	Grab	91	7.2			50	26	50	90	7.7
01-Apr-08	2:55 PM					dry	0				
01-May-08	4:10 PM					dry	0				
23-Jul-08	5:25 PM	Grab	49	7.7		low	20	9.1	183	77	6.7

**SiteNo:** BOB005    **Bobs Creek**

Parameters:

<u>Date:</u>	<u>Time:</u>	<u>Sample Type:</u>	EC μS/cm	DO mg/L	TPhos mg/L P	Flow ML/day	Rainfall mm	Temp ° C	Turb NTU	% O2 Sat %	pH pH Units
14-Feb-07	1:05 PM	Grab	1130			stag	1.5	18.8	8		
21-Mar-07	1:35 PM	Grab	510			falling	21	16.4	40		
20-Apr-07	10:00 AM	Grab	920			falling	0	9.5	8		
16-May-07	1:10 PM	Grab	970		0.05	falling	2.0	18.6	8		
12-Jun-07	2:00 PM	Grab	590		0.03	falling	1	11	20		
18-Jul-07	1:00 PM	Grab	240		0.02	steady	17	6.5	14		
14-Aug-07	4:05 PM	Grab	310			steady	2	12.7	15		
19-Sep-07	9:50 AM	Grab	673			steady	0	11.1	6		
16-Oct-07	10:10 AM	Grab	744	7.8		falling	0	14	15	79	
21-Nov-07	3:00 PM	Grab	802	5.4		steady	0	20	6	61	7.7
18-Dec-07	6:05 PM	Grab	788	7.3		falling	0	20	7	82	7.8
19-Mar-08	11:00 AM	Grab	1128			falling	0	16	12		

Report Date: 12 Nov 2008Field60:

1 of 13 Pages.

## Waterwatch Victoria Application (WVA) - Site Report

### Parameters:

<u>Date:</u>	<u>Time:</u>	<u>Sample Type:</u>	EC µS/cm	DO mg/L	TPhos mg/L P	Flow ML/day	Rainfall mm	Temp ° C	Turb NTU	% O2 Sat %	pH pH Units
16-Apr-08	11:20 AM	Grab	1031			trickle	0	17.6	8		
21-May-08	5:30 PM	Grab	985			vlow		11.4	8		
18-Jun-08	12:15 PM	Grab	920			vlow		8.1	15		

### SiteNo: BRI010 Bridge Creek before entering Broken River at Whitfield Road.

### Parameters:

<u>Date:</u>	<u>Time:</u>	<u>Sample Type:</u>	EC µS/cm	DO mg/L	TPhos mg/L P	Flow ML/day	Rainfall mm	Temp ° C	Turb NTU	% O2 Sat %	pH pH Units
14-Feb-07	1:30 PM	Grab				Dry					
21-Mar-07	2:20 PM	Grab	240			stag	21	23.7	20		
20-Apr-07	8:50 AM	Grab	1700			falling	0	9.8	5		
16-May-07	1:25 PM	Grab	380		0.09	stagna	2.0	18.6	14		
12-Jun-07	2:35 PM	Grab	1200		<0.02	stag	1	10	5		
18-Jul-07	1:50 PM	Grab	170		0.02	steady	17	5.7	16		
14-Aug-07	4:40 PM	Grab	120		<0.02	steady	0	9.4	5		
19-Sep-07	10:35 AM	Grab	202		<0.02	steady	0	12.2	3		
16-Oct-07	11:00 AM	Grab	294	6	0.02	falling	0	15	5	62	
21-Nov-07	3:50 PM	Grab	247	3.6		steady	0	20	6	40	6.8
19-Dec-07	4:30 PM	Grab	232	3		falling	0	22	6	34	6.7
19-Mar-08	11:45 AM	Grab				dry					
16-Apr-08	12:25 PM					dry	0				
25-May-08	4:05 PM	Grab	743			stagna	7	9.8	5		
18-Jun-08	1:20 PM	Grab	1340			stagna	0	8.4	2		

### SiteNo: BRO005 Broken River at Barragunda

### Parameters:

<u>Date:</u>	<u>Time:</u>	<u>Sample Type:</u>	EC µS/cm	DO mg/L	TPhos mg/L P	Flow ML/day	Rainfall mm	Temp ° C	Turb NTU	% O2 Sat %	pH pH Units
14-Feb-07	1:15 PM	Grab				Dry					
21-Mar-07	1:45 PM	Grab				Dry					
19-Apr-07	9:00 AM	Grab				Dry					
16-May-07	1:45 PM	Grab				Dry					
12-Jun-07	2:10 PM	Grab	130		<0.02	steady	1	11	2		

Report Date: 12 Nov 2008Field60:

2 of 13 Pages.

## Waterwatch Victoria Application (WVA) - Site Report

### Parameters:

<u>Date:</u>	<u>Time:</u>	<u>Sample Type:</u>	EC µS/cm	DO mg/L	TPhos mg/L P	Flow ML/day	Rainfall mm	Temp ° C	Turb NTU	% O2 Sat %	pH pH Units
18-Jul-07	1:15 PM	Grab	90		0.02	steady	17	6.7	5		
14-Aug-07	4:15 PM	Grab	60			steady	2	9.6	2		
19-Sep-07	10:00 AM	Grab	98			steady	0	11.1	6		
16-Oct-07	10:25 AM	Grab	109	10		falling	0	15	3	107	
21-Nov-07	3:15 PM	Grab	116	5.4		steady	0	20	2	84	6.8
18-Dec-07	5:55 PM	Grab	95	8.4	<0.02	falling	0	22	2	94	7.2
19-Mar-08	11:15 AM	Grab	125			falling	0	19	5		
16-Apr-08	11:35 AM	Grab	111			vlow	0	15.2	5		
21-May-08	5:15 PM	Grab	106			low	7	11.4	5		
18-Jun-08	12:30 PM	Grab	126			low	0	8.6	5		

### SiteNo: BRO008 Broken River at Byrnes Road Ford

### Parameters:

<u>Date:</u>	<u>Time:</u>	<u>Sample Type:</u>	EC µS/cm	DO mg/L	TPhos mg/L P	Flow ML/day	Rainfall mm	Temp ° C	Turb NTU	% O2 Sat %	pH pH Units
14-Feb-07	2:27 PM	Grab	1370			falling	1.5	26	5		
21-Mar-07	2:05 PM	Grab	1260			falling	21	30.8	8		
20-Apr-07	8:30 AM	Grab	1140			falling	0	9	8		
16-May-07	1:30 PM	Grab	1230			falling	2	21.5	2		
12-Jun-07	2:24 PM	Grab	250			steady	1	11	5		
18-Jul-07	1:30 PM	Grab	130			steady	17	6.2	25		
14-Aug-07	4:30 PM	Grab	100			steady	2	9.6	2		
19-Sep-07	10:20 AM	Grab	185			steady	0	13	2		
16-Oct-07	10:45 AM	Grab	256			falling	0	16	3		
21-Nov-07	3:30 PM	Grab	189	7.9		steady	0	23	2	92	7.5
19-Dec-07	4:50 PM	Grab	141	8.4		falling	0	25	2	102	8.5
19-Mar-08	11:30 AM	Grab	824			falling	0	20	5		
16-Apr-08	11:55 AM	Grab	972			vlow	0	18.1	2		
25-May-08	3:50 PM	Grab	725			low	7	12.0	5		
18-Jun-08	12:50 PM	Grab	500			low	0	9.4	5		

Report Date: 12 Nov 2008Field60:

3 of 13 Pages.

**Waterwatch Victoria Application (WVA) - Site Report**

**SiteNo: BRO010 Broken River at Whitfield Road**

Parameters:

<u>Date:</u>	<u>Time:</u>	<u>Sample Type:</u>	EC µS/cm	DO mg/L	TPhos mg/L P	Flow ML/day	Rainfall mm	Temp ° C	Turb NTU	% O2 Sat %	pH pH Units
14-Feb-07	1:50 PM	Grab	1370			falling	1.5	22.8	8		
21-Mar-07	2:30 PM	Grab	1350			falling	21	20.5	5		
20-Apr-07	9:00 AM	Grab	1550			falling	0	11.4	5		
16-May-07	2:00 PM	Grab	1500		0.03	falling	2.0	18.4	5		
12-Jun-07	2:50 PM	Grab	340		0.02	steady	1	8.0	5		
18-Jul-07	2:05 PM	Grab	150		0.02	steady	17	6.6	15		
14-Aug-07	4:50 PM	Grab	130			steady	2	9.7	2		
19-Sep-07	10:50 AM	Grab	245			steady	0	12.8	2		
16-Oct-07	11:15 AM	Grab	345	9.8	<0.02	falling	0	17	2	101	
19-Dec-07	4:15 PM	Grab	177	8.3	<0.02	falling	0	26	2	104	7.6
19-Mar-08	11:50 AM	Grab	594			falling	0	20	2		
16-Apr-08	12:35 PM	Grab	686			vlow	0	11.3	2		
25-May-08	4:20 PM	Grab	760			low	7	10.1	2		
18-Jun-08	1:35 PM	Grab	793			low	0	8.1	2		

**SiteNo: BRO018 Broken River ford at O'Hallorans**

Parameters:

<u>Date:</u>	<u>Time:</u>	<u>Sample Type:</u>	EC µS/cm	DO mg/L	TPhos mg/L P	Flow ML/day	Rainfall mm	Temp ° C	Turb NTU	% O2 Sat %	pH pH Units
14-Feb-07	2:05 PM	Grab	3400			stag	1.5	28.6	5		
21-Mar-07	2:45 PM	Grab	3100			stagna	21	24.4	15		
20-Apr-07	9:15 AM	Grab	2400			stag	0	11.7	5		
16-May-07	2:10 PM	Grab	2100		<0.02	stag	2.0	18.3	27		
12-Jun-07	3:00 PM	Grab	360		<0.02	steady	1	8	5		
18-Jul-07	2:25 PM	Grab	200		0.03	steady	17	6.6	8		
14-Aug-07	5:05 PM	Grab	150		<0.02	steady	2	10.9	2		
19-Sep-07	11:00 AM	Grab	287		<0.02	falling	0	13	1		
16-Oct-07	11:30 AM	Grab	410	11	<0.02	falling		16	3	114	
19-Dec-07	3:23 PM	Grab	218	8.6	<0.02	falling	0	25	2	104	8.6

Report Date: 12 Nov 2008Field60:

4 of 13 Pages.

## Waterwatch Victoria Application (WVA) - Site Report

### Parameters:

<u>Date:</u>	<u>Time:</u>	<u>Sample Type:</u>	EC µS/cm	DO mg/L	TPhos mg/L P	Flow ML/day	Rainfall mm	Temp ° C	Turb NTU	% O2 Sat %	pH pH Units
30-Jan-08	12:20 PM	Grab	285		<0.02	fall	0	27	2		
20-Feb-08	12:00 PM	Grab			0.03						
19-Mar-08	12:00 PM	Grab	722		<0.02	stag	0	20	3		
21-May-08	1:45 PM	Grab	1354		<0.02	low	7	12	5		
18-Jun-08	1:55 PM	Grab	940		<0.02	low	0	8.1	2		

### SiteNo: BRO028 Broken River after Nillahcootie at Williams Road.

### Parameters:

<u>Date:</u>	<u>Time:</u>	<u>Sample Type:</u>	EC µS/cm	DO mg/L	TPhos mg/L P	Flow ML/day	Rainfall mm	Temp ° C	Turb NTU	% O2 Sat %	pH pH Units
17-Jan-07	4:30 PM	Grab	146	7.5	0.06	steady		23.1	45	93	7.3
21-Feb-07	4:30 PM	Grab	148	7.5	0.04	steady	0	24.0	40	94	7.6
19-Apr-07	10:30 AM	Grab	155	8.7	0.03	steady	0	16.0	40	90	7.5
16-May-07	4:45 PM	Grab	154	9.1	0.05	steady	5	15.7	44	94	7.4
19-Jun-07	4:30 PM	Grab	162	10.4	0.07	steady	0	8.7	43	95	7.1
14-Aug-07	4:30 PM	Grab	167			steady	0	9.0	35		7.2
11-Sep-07	3:00 PM	Grab	183	10.8	0.04	steady	10	12.8	34	103	7.6
30-Jan-08	3:30 PM	Grab	184	7.7	0.03	High	0	23.9	64	98	7.2
21-Feb-08	10:00 AM	Grab	192	8.1	0.08	Low	0	19.5	67	91	7.3
19-Mar-08	4:15 PM	Grab	200	8.2	<0.02	Mediu	0	19.9	52	91	7.9
16-Apr-08	4:00 PM	Grab	196		0.07	High	0	15.8	52	83	8.0
21-May-08	4:45 PM	Grab	200	10.1	0.05	steady	30	12.0		94	8.0
18-Jun-08	4:30 PM	Grab	197	10.0	0.02	steady	0	10.6	15	98	7.7

### SiteNo: BRO030 Broken River at Evans Bridge

### Parameters:

<u>Date:</u>	<u>Time:</u>	<u>Sample Type:</u>	EC µS/cm	DO mg/L	TPhos mg/L P	Flow ML/day	Rainfall mm	Temp ° C	Turb NTU	% O2 Sat %	pH pH Units
17-Jan-07	4:45 PM	Grab	151	6.7	0.05			26	34	85	7.3
17-Jan-07	10:10 AM	Grab	162		0.04			27			7.8
19-Apr-07	10:40 AM	Grab	155	8.5	0.06		0	15.4	42	86	7.5
16-May-07	5:00 PM	Grab	159	8.7	0.04		5	16.3	31	90	7.4
19-Jun-07	4:45 PM	Grab	191	10.3	0.06		0	8.1	31	90	7.3

Report Date: 12 Nov 2008Field60:

5 of 13 Pages.

## Waterwatch Victoria Application (WVA) - Site Report

### Parameters:

<u>Date:</u>	<u>Time:</u>	<u>Sample Type:</u>	EC µS/cm	DO mg/L	TPhos mg/L P	Flow ML/day	Rainfall mm	Temp ° C	Turb NTU	% O2 Sat %	pH pH Units
14-Aug-07	4:45 PM	Grab	200				0	10.6	28		7.3
11-Sep-07	5:00 PM	Grab	195	10.2	0.03		0	13.6	23	101	7.6
21-Feb-08	10:00 AM	Grab	192	7.5	0.07	Low	0	19.5	59	84	7.1
19-Mar-08	4:30 PM	Grab	202	7.9	0.04	Mediu	0	21.1	47	84	7.7
21-May-08	5:30 PM	Grab	202	9.9	0.04	steady	30	13.2		95	8.0
18-Jun-08	5:00 PM	Grab	199	10.5		steady	0	10.4	35	94	7.7

### SiteNo: BRO048 Broken River at footbridge in Benalla

### Parameters:

<u>Date:</u>	<u>Time:</u>	<u>Sample Type:</u>	EC µS/cm	DO mg/L	TPhos mg/L P	Flow ML/day	Rainfall mm	Temp ° C	Turb NTU	% O2 Sat %	pH pH Units
17-Jan-07	10:10 AM	Grab	162		0.04			27	32		7.8
18-Apr-07	2:20 PM	Grab	132		0.06		0	18.1	28		7.8
16-May-07	3:20 PM	Grab	132		0.02		5	16.8	30		7.9
19-Jun-07	10:15 AM	Grab	144		0.07		1	8.4	23		7.8
18-Jul-07	3:10 PM	Grab	160		0.05		0	6.6	28		7.6
14-Aug-07	9:10 AM	Grab	160		0.03		0	10.3	21		7.9
19-Sep-07	9:55 AM	Grab	160		<0.02		0	12.1	24		
16-Oct-07	8:50 AM	Grab	170		0.02		0	16.5	25		
22-Nov-07	10:00 AM	Grab	190				10	18.3	26		
30-Jan-08	11:10 AM	Grab	170		0.08	Low	0	26.1	37		
20-Feb-08	10:30 AM	Grab	200		0.02	Low	0	23.2	28		
18-Mar-08	6:30 PM	Grab	210		0.06	stagna	0	27.2	25		8.1
16-Apr-08	12:15 PM	Grab	190		0.03	Very	0	16.4	25		7.5
21-May-08	5:00 PM	Grab	170		0.04	stagna	30	12.0	30		7.7

### SiteNo: BRO050 Lake Benalla

### Parameters:

<u>Date:</u>	<u>Time:</u>	<u>Sample Type:</u>	EC µS/cm	DO mg/L	TPhos mg/L P	Flow ML/day	Rainfall mm	Temp ° C	Turb NTU	% O2 Sat %	pH pH Units
17-Jan-07	10:00 AM	Grab	173		0.03			27.7	20		8
18-Apr-07	2:00 PM	Grab	146		0.06		0	19.8			8.2
16-May-07	3:00 PM	Grab	136		0.04		5	18.7	20		8.2

Report Date: 12 Nov 2008Field60:

6 of 13 Pages.

## Waterwatch Victoria Application (WVA) - Site Report

### Parameters:

Date:	Time:	Sample Type:	EC µS/cm	DO mg/L	TPhos mg/L P	Flow ML/day	Rainfall mm	Temp ° C	Turb NTU	% O2 Sat %	pH pH Units
19-Jun-07	9:50 AM	Grab	170		0.04		1	7.8	25		7.9
18-Jul-07	2:50 PM	Grab	160		0.05		0	7.9	20		7.6
14-Aug-07	8:50 AM	Grab	160		0.07		0	10.0	18		
19-Sep-07	9:00 AM	Grab	150		0.03		0	13.1	20		
16-Oct-07	8:38 AM	Grab	170		<0.02		0	17.2	20		
22-Nov-07	9:20 AM	Grab	180		0.02		10	18.9	14		
30-Jan-08	10:40 AM	Grab	160		0.08		0	26.6	16		
20-Feb-08	10:20 AM	Grab	200		0.05	Low	0	24.2	10		
18-Mar-08	6:10 PM	Grab	210		0.02	steady	0	27.7	8		8.9
16-Apr-08	12:00 PM	Grab	190		<0.02	steady	0	19.0	18		7.5
22-May-08	11:00 AM	Grab	170		0.03	steady	30	13.0	8		7.6

### SiteNo: BRO055 Broken River after Benalla at Pump station in Faithful St.

### Parameters:

Date:	Time:	Sample Type:	EC µS/cm	DO mg/L	TPhos mg/L P	Flow ML/day	Rainfall mm	Temp ° C	Turb NTU	% O2 Sat %	pH pH Units
17-Jan-07	9:50 AM	Grab	170		0.03			26.1	20		8.3
18-Apr-07	2:10 PM	Grab	138		0.07		0	19.5	30		7.9
16-May-07	2:40 PM	Grab	133		0.03		5	17.1	33		8.3
19-Jun-07	10:00 AM	Grab	176		0.06		1	8.5	22		7.6
18-Jul-07	3:00 PM	Grab	160		0.07		0	7.2	25		7.6
14-Aug-07	9:00 AM	Grab	160		0.04		0	11.3	20		
11-Sep-07	3:50 PM	Grab	155	8.9	0.03		0	13.1	17	88	7.1
19-Sep-07	9:05 AM	Grab	150		<0.02		0	13.8	20		
16-Oct-07	8:40 AM	Grab	160		0.02		0	16.4	25		
02-Nov-07	4:30 PM	Grab	173	6.4			5	22.9	22	85	
22-Nov-07	9:40 AM	Grab	170		0.05		10	18.7	22		
30-Jan-08	10:50 AM	Grab	160		0.07		0	26.0	20		
20-Feb-08	10:30 AM	Grab	190		0.03	steady	0	23.5	18		
18-Mar-08	6:10 PM	Grab	200		0.05	steady	0	25.6	16		7.8
16-Apr-08	12:05 PM	Grab	170	7.6	0.06	steady	0	17.3	16	79	7.5
21-May-08	4:35 PM	Grab	170		0.03	steady	30	12.4	13		7.7
06-Nov-08	6:30 PM	Grab	168	9.5		steady	0	21	8	110	7.6

Report Date: 12 Nov 2008Field60:

7 of 13 Pages.

## Waterwatch Victoria Application (WVA) - Site Report

**SiteNo:** BRO065 Broken River at Casey's Weir

			<u>Parameters:</u>								
<u>Date:</u>	<u>Time:</u>	<u>Sample Type:</u>	EC µS/cm	DO mg/L	TPhos mg/L P	Flow ML/day	Rainfall mm	Temp ° C	Turb NTU	% O2 Sat %	pH pH Units
01-Dec-07	12:00 PM	Grab			0.14						

**SiteNo:** BRO070 Broken River at Gowangardie. VCAH pump site.

			<u>Parameters:</u>								
<u>Date:</u>	<u>Time:</u>	<u>Sample Type:</u>	EC µS/cm	DO mg/L	TPhos mg/L P	Flow ML/day	Rainfall mm	Temp ° C	Turb NTU	% O2 Sat %	pH pH Units
19-Apr-07	12:00 PM	Grab	233	7.6	0.13		0	17.1	97	80	7.4
27-Apr-07	10:30 AM	Grab				Dry	0				
23-May-07	9:55 AM	Grab	77	3.0		Stagna		11.0	176	28	6.6
26-Jun-07	11:25 AM					Stagna					
26-Jul-07	8:55 AM	Grab	137	4.6		Stagna		8.4	36	40	6.4
27-Sep-07	10:15 AM	Grab				stagna					
31-Oct-07	5:00 PM	Grab	310	8.0			0	21.0	163	92	7.9
02-Nov-07	6:00 PM	Grab	312				5	25.7	178	102	
29-Jan-08	10:20 AM	Grab				dry					

**SiteNo:** BRO085 Broken River at Archer Street

			<u>Parameters:</u>								
<u>Date:</u>	<u>Time:</u>	<u>Sample Type:</u>	EC µS/cm	DO mg/L	TPhos mg/L P	Flow ML/day	Rainfall mm	Temp ° C	Turb NTU	% O2 Sat %	pH pH Units
17-Jan-07	10:45 AM	Grab	348	5.1	0.25	steady		27.1	159	65	7.3
18-Apr-07	10:45 AM	Grab	316	7.9	0.19	steady	0	16.3	170	82	7.7
16-May-07	10:45 AM	Grab	191	8.5	0.07	steady	5	15.0	72	86	7.3
19-Jun-07	9:15 AM	Grab	160	10.7	0.08	steady	0	6.8	63	88	7.1
18-Jul-07	9:30 AM	Grab	170	11.0	0.12	steady	7	5.8	75	87	6.7
22-Oct-07	10:30 AM	Grab	305	7.0	0.08	steady	0	19.8	96	77	7.7
21-Nov-07	10:00 AM	Grab	271	5.8	0.11	steady	0	23.7	87	66	7.4
18-Dec-07	9:00 AM	Grab	302	6.7	0.17	steady	0	22.8	127	77	7.5

Report Date: 12 Nov 2008Field60:

8 of 13 Pages.

## Waterwatch Victoria Application (WVA) - Site Report

### Parameters:

<u>Date:</u>	<u>Time:</u>	<u>Sample Type:</u>	EC µS/cm	DO mg/L	TPhos mg/L P	Flow ML/day	Rainfall mm	Temp ° C	Turb NTU	% O2 Sat %	pH pH Units
19-Mar-08	8:40 AM	Grab	540	6.8	0.14	Mediu	0	22.2	222	77	7.7
16-Apr-08	10:05 AM	Grab	474	10.1	0.18	Mediu	0	14.1	158	98	7.9
18-Jun-08	9:00 AM	Grab	317	10.6	0.09	steady	0	8.9	91	92	7.7

### SiteNo: BRO095 Broken River at confluence with Goulburn River

### Parameters:

<u>Date:</u>	<u>Time:</u>	<u>Sample Type:</u>	EC µS/cm	DO mg/L	TPhos mg/L P	Flow ML/day	Rainfall mm	Temp ° C	Turb NTU	% O2 Sat %	pH pH Units
24-Dec-07	12:00 PM	Grab			0.15						
20-Oct-08	2:00 PM	Grab	308	8.3		steady	0	7.5	212	95	7.5

### SiteNo: HAL005 Halls Creek at Shamrock Lane

### Parameters:

<u>Date:</u>	<u>Time:</u>	<u>Sample Type:</u>	EC µS/cm	DO mg/L	TPhos mg/L P	Flow ML/day	Rainfall mm	Temp ° C	Turb NTU	% O2 Sat %	pH pH Units
14-Feb-07	2:20 PM	Grab	1470			falling	1.5	18.7	5		
21-Mar-07	2:55 PM	Grab	1840			stag	21	28.4	40		
20-Apr-07	9:30 AM	Grab	1530			stag	0	7.8	16		
16-May-07	2:15 PM	Grab	1610		0.03	stag	2.0	23.2	14		
12-Jun-07	3:15 PM	Grab	1080		<0.02	falling	1	5	5		
18-Jul-07	2:40 PM	Grab	430		0.04	steady	17	5.4	29		
14-Aug-07	5:15 PM	Grab	1060			steady	2	6.1	2		
19-Sep-07	11:10 AM	Grab	2010			steady	0	9.8	1		
16-Oct-07	11:35 AM	Grab	2200	10		falling	0	16	8	102	
19-Dec-07	3:45 PM	Grab	1591	1.4		falling	0	16	3	15	7.1
19-Mar-08	12:15 PM	Grab	1710			stag	0	15	2		
16-Apr-08	1:10 PM	Grab	1655			stagna	0	8.7	5		
21-May-08	2:00 PM	Grab	2360			stagna	7	13.2	15		
18-Jun-08	2:10 PM	Grab	2420			trickle	0	6.1	5		

# Waterwatch Victoria Application (WVA) - Site Report

**SiteNo:** HOL020 **Holland Creek at Sherwill's Bridge Benalla**

Parameters:

<u>Date:</u>	<u>Time:</u>	<u>Sample Type:</u>	<u>EC</u> µS/cm	<u>DO</u> mg/L	<u>TPhos</u> mg/L P	<u>Flow</u> ML/day	<u>Rainfall</u> mm	<u>Temp</u> ° C	<u>Turb</u> NTU	<u>% O2 Sat</u> %	<u>pH</u> pH Units
17-Jan-07	12:00 PM					Stagna					
21-Feb-07	12:00 PM					Stagna					
21-Mar-07	12:00 PM					Stagna					
18-Apr-07	12:00 PM					Stagna					
16-May-07	1:30 PM					Stagna	5				
31-May-07	12:30 PM	Grab	123	4.6		steady	30	11	61	43	7.2
18-Jun-07	3:00 PM	Grab	231	7.9	0.03	low	8.4	8.1	19	69	7.4
19-Jun-07	9:40 AM	Grab	191		0.05		1	7.8	15		8.2
06-Jul-07	11:30 AM	Grab	166	8.4	0.03	low	21	8.7	16	77	7.8
10-Jul-07	11:40 AM	Grab	135	8.0	0.07	STEADY	24.6	8.5	44	70	7.6
18-Jul-07	2:40 PM	Grab	150		0.05		0	7.4	<10		7.4
19-Jul-07	11:15 PM	Grab	156	9.9	0.04	med	8.4	6.1	14	80	7.9
29-Jul-07	12:10 PM	Grab	253	7.9		low	0.3	8.3	9	69	7.6
14-Aug-07	8:40 AM	Grab	140		<0.02		0	8.5	<10		
31-Aug-07	2:15 PM	Grab	135	8.0	0.06	med	0	12.7	66	79	7.0
19-Sep-07	8:50 AM	Grab	130		<0.02		0	11.7	2		
23-Sep-07	3:00 PM	Grab	14	7.7	0.04	MED	0	13.8	3.9	77	7.2
16-Oct-07	8:15 AM	Grab	170		0.02		0	15.4	4		
07-Nov-07	10:15 AM	Grab	119	4.7	0.05		1.7	17.3	30	50	7.7
15-Nov-07	4:30 PM	Grab	134	4.2	0.06		0	23.4	13	51	7.1
22-Nov-07	9:20 AM	Grab	170		0.1		10	18.8	13		
01-Dec-07	11:00 AM	Grab	187	2.1	0.11	LOW	20	23	7.9	25	7.1
04-Dec-07	11:30 AM	Grab	97	3.2	0.06	low	16	22.2	21	38	7.5
04-Dec-07	5:30 PM	Grab	100	3.8	0.06		16	23.4	20	45	7.6
06-Dec-07	11:40 AM	Grab	109	3.1	0.18		16	23.2	96	38	7.3
20-Dec-07	11:10 AM	Grab	152	3.3	0.03	LOW	0	21.7	9	38	7.6
03-Jan-08	8:30 AM	Grab	128	2.9	0.03		0	24.5	7.6	35	7.7
03-Jan-08	9:05 AM	Grab	103	3.3			0	23.3	6.5	39	7.9
22-Jan-08	10:45 AM	Grab	203	3.2	0.12		60	20.5	11	39	7.7

Report Date: 12 Nov 2008Field60:

10 of 13 Pages.

## Waterwatch Victoria Application (WVA) - Site Report

### Parameters:

<u>Date:</u>	<u>Time:</u>	<u>Sample Type:</u>	EC μS/cm	DO mg/L	TPhos mg/L P	Flow ML/day	Rainfall mm	Temp ° C	Turb NTU	% O2 Sat %	pH pH Units
30-Jan-08	10:30 AM	Grab	130		0.08	Low	0	24.7	22		
14-Feb-08	10:30 AM	Grab	174	3.4	0.05	low	0	18.8	12	37	6.3
20-Feb-08	10:00 AM	Grab	180		0.05	stagna	0	21.5	11		
05-Mar-08	10:45 AM	Grab	179	3.3	0.03	low	0	18.5	9	35	6.7
18-Mar-08	5:40 PM	Grab	180		0.07	stagna	0	25.2	13		7.5
02-Apr-08	9:30 AM	Grab	183	3.2	0.03	low	0	14.5	7	32	7.3
16-Apr-08	11:40 AM	Grab	180		0.03	Very	0	15.7	20		7.4
30-Apr-08	9:55 AM	Grab	172	4.7	0.02	LOW	8	10.3	4	42	7.3
17-May-08	10:25 AM	Grab	227	6.2		MED	12	11	13	57	7.5
21-May-08	4:20 PM	Grab	200		0.03	stagna	30	12.2	14		7.5
10-Jun-08	11:30 PM	Grab	179	5.8		steady	25	11	8	57	6.8
22-Jul-08	8:00 AM	Grab	84	9.5		med	21	7.9	167	80	6.8
04-Sep-08	8:55 AM	Grab	111	8.2		slow	3	10	25	74	6.7
03-Oct-08	10:00 AM	Grab	99	7.4		low	0	15	13	76	7.1
06-Nov-08	10:35 AM	Grab	151	4.2		low	0	17.4	12	44	6.8

### SiteNo: LEC010 Lima East Creek on Midland Highway

### Parameters:

<u>Date:</u>	<u>Time:</u>	<u>Sample Type:</u>	EC μS/cm	DO mg/L	TPhos mg/L P	Flow ML/day	Rainfall mm	Temp ° C	Turb NTU	% O2 Sat %	pH pH Units
17-Jan-07	4:50 PM	Grab	143	3.5	0.09	steady		25.6	21	44	6.6
19-Apr-07	11:00 AM	Grab	106	6.4	0.06	steady	0	14.8	18	65	6.5
16-May-07	5:05 PM	Grab	87	6.9	0.10	steady	5	15.8	21	71	6.4
19-Jun-07	5:00 PM	Grab	87	9.8	0.09	steady	0	8.5	20	86	6.6
14-Aug-07	5:00 PM	Grab	88			steady	0	10.1	19		6.5
11-Sep-07	3:15 PM	Grab	83	9.1	0.05	steady	0	14.1	20	92	7.0
21-Feb-08	9:50 AM	Grab	128	4.0	0.08	Low	0	19.5	29	45	6.2
19-Mar-08	4:30 PM	Grab	143	7.1	0.14	Mediu	0	21.4	24	82	7.4
21-May-08	5:10 PM	Grab	89	8.2	0.10	steady	30	12.6		76	8.1
18-Jun-08	5:00 PM	Grab	87	9.5	0.04	steady	0	10.0	19	90	7.4

Report Date: 12 Nov 2008Field60:

11 of 13 Pages.

**Waterwatch Victoria Application (WVA) - Site Report**

**SiteNo: LIM010 Lima Creek Bridge on Midland Highway**

Parameters:

<u>Date:</u>	<u>Time:</u>	<u>Sample Type:</u>	EC µS/cm	DO mg/L	TPhos mg/L P	Flow ML/day	Rainfall mm	Temp ° C	Turb NTU	% O2 Sat %	pH pH Units
17-Jan-07	4:55 PM	Grab	95	5.9	0.11	steady		25.1	13	73	6.7
19-Apr-07	11:10 AM	Grab	73	6.4	0.02	steady	0	14.6	8.1	65	6.8
16-May-07	5:10 PM	Grab	76	8.4	0.05	steady	5	15.4	12	86	6.6
19-Jun-07	5:10 PM	Grab	79		0.08	steady	0		83		
14-Aug-07	5:05 PM	Grab	89			steady	0	9.4	15		6.6
11-Sep-07	3:20 PM	Grab	82	10.3		steady	0	13.3	16	102	7.2
21-Feb-08	9:45 AM	Grab	108	7.1	0.09	Low	0	19.2	9.3	83	6.3
19-Mar-08	4:45 PM	Grab	105	7.5	0.08	Mediu	0	22.0	16	86	7.2
21-May-08	5:15 PM	Grab	89	9.3	0.07	steady	30	12.2		87	7.3
18-Jun-08	5:05 PM	Grab	83	10.5	0.03	steady	0	10.2	17	96	7.1

**SiteNo: MOK020 Lake Mokoan Outlet into Broken River**

Parameters:

<u>Date:</u>	<u>Time:</u>	<u>Sample Type:</u>	EC µS/cm	DO mg/L	TPhos mg/L P	Flow ML/day	Rainfall mm	Temp ° C	Turb NTU	% O2 Sat %	pH pH Units
27-Apr-07	10:55 AM	Grab	462	7.7		steady	0	15.2	233	78	7.5
23-May-07	10:25 AM	Grab	257	8.3		steady		12.5	145	79	7.0
26-Jun-07	11:50 AM	Grab	153	9.2		steady		8.5	107	83	7.3
26-Jul-07	9:20 AM	Grab	110	6.9		steady		9.7	83	64	6.5
31-Oct-07	1:15 PM	Grab	424	8.5	0.38	steady	0	23.1	310	102	8.2
02-Nov-07	5:00 PM	Grab	402	7.6		steady	5		297	93	
21-Dec-07	12:00 PM	Grab			0.26						
29-Jan-08	10:40 AM	Grab	437	6.6		steady		28.4	368	88	7.3
19-Jun-08	1:20 PM	Grab	213	10.9	0.05	steady	0	11.6	40	112	7.8
06-Nov-08	7:00 PM	Grab	505	9.6		steady	0	23	796	112	8.1

**Waterwatch Victoria Application (WVA) - Site Report**

**SiteNo: STY005 Stony Creek - Tributary to Broken River at Byrnes Road Ford.**

Parameters:

<u>Date:</u>	<u>Time:</u>	<u>Sample Type:</u>	EC μS/cm	DO mg/L	TPhos mg/L P	Flow ML/day	Rainfall mm	Temp ° C	Turb NTU	% O2 Sat %	pH pH Units
14-Feb-07	1:30 PM	Grab				Dry					
21-Mar-07	2:10 PM	Grab	920			Stagna	21	30.4	20		
16-May-07	1:33 PM	Grab	880			falling	2.0	17.5	8		
20-May-07	8:33 AM	Grab				Dry					
12-Jun-07	2:28 PM	Grab	800			falling	1	11	5		
18-Jul-07	1:35 PM	Grab	110			steady	17	8.4	8		
14-Aug-07	4:33 PM	Grab	80			steady	2	11.7	8		
19-Sep-07	10:23 AM	Grab	156			steady	0	14	4		
16-Oct-07	10:50 AM	Grab	236			falling	0	18	4		
21-Nov-07	3:35 PM	Grab	218	7.2		steady	0	22	2	82	7.1
19-Dec-07	4:55 PM	Grab	218	9.6		Stagna	0	29	3	123	7.4
19-Mar-08	11:35 AM	Grab	512			stag	0	17	12		
16-Apr-08	12:00 PM	Grab	337			stagna	0	17	2		
25-May-08	3:55 PM	Grab	382			minute	7	11.3	5		
18-Jun-08	1:00 PM	Grab	430			minute	0	8.1	8		