Ancona Report

WATER MONITORING REPORT 1997 - 2010

WATERWATCH
Goulburn/Broken Catchment

GOULBURN-MURRAY WATER

GOULBURN VALLEY WATER

GOULBURN BROKEN CATCHMENT MANAGEMENT AUTHORITY

Goulburn Murray Landcare

Front Page: **Brankeet Creek at Ancona-Woodfield Road (BKT025), looking upstream. February 2011.**

Table of Contents

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;
- generate useful data for community, and agency, use which complements Agency monitoring; and,
- assist in assessing the value of river restoration programs.

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.

Monitoring commenced in the Ancona Landcare Group area in 1997. There is a five year gap in the data before monitoring recommenced in 2006 which makes interpretation difficult. A total of five sites are regularly tested for:

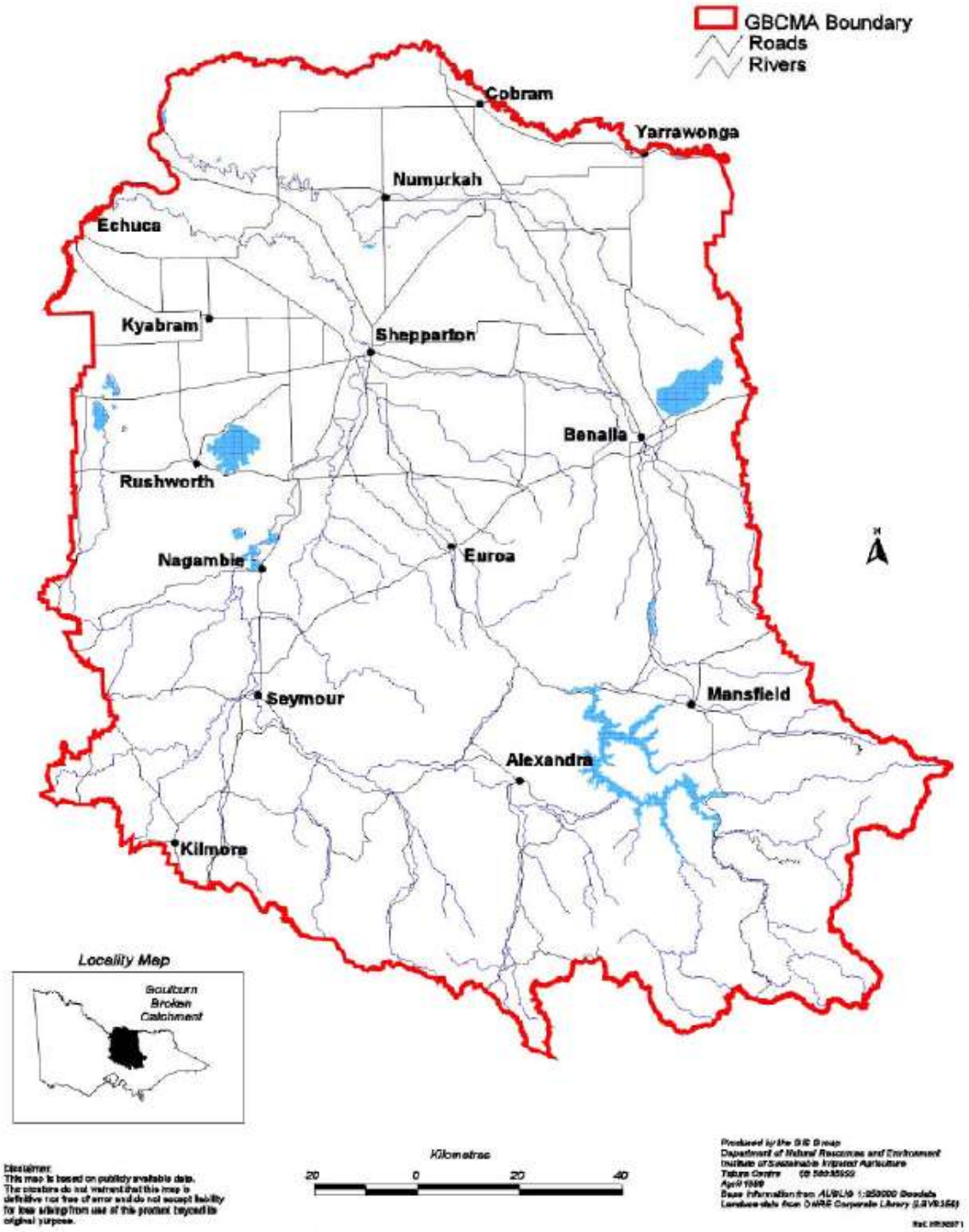
1. Electrical Conductivity (Salinity),
2. Turbidity,
3. Temperature,
4. pH (not all sites),
5. Total Phosphorus (not all sites), and
6. *E.coli* (not all sites)

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,
4. Graphical representation of parameters along the length of a waterway,
5. Graphical representation of parameters over the period of the monitoring program,
6. Comparisons of local water quality data with State Environment Protection Policy (SEPP) guidelines,
7. Raw data for 2010.

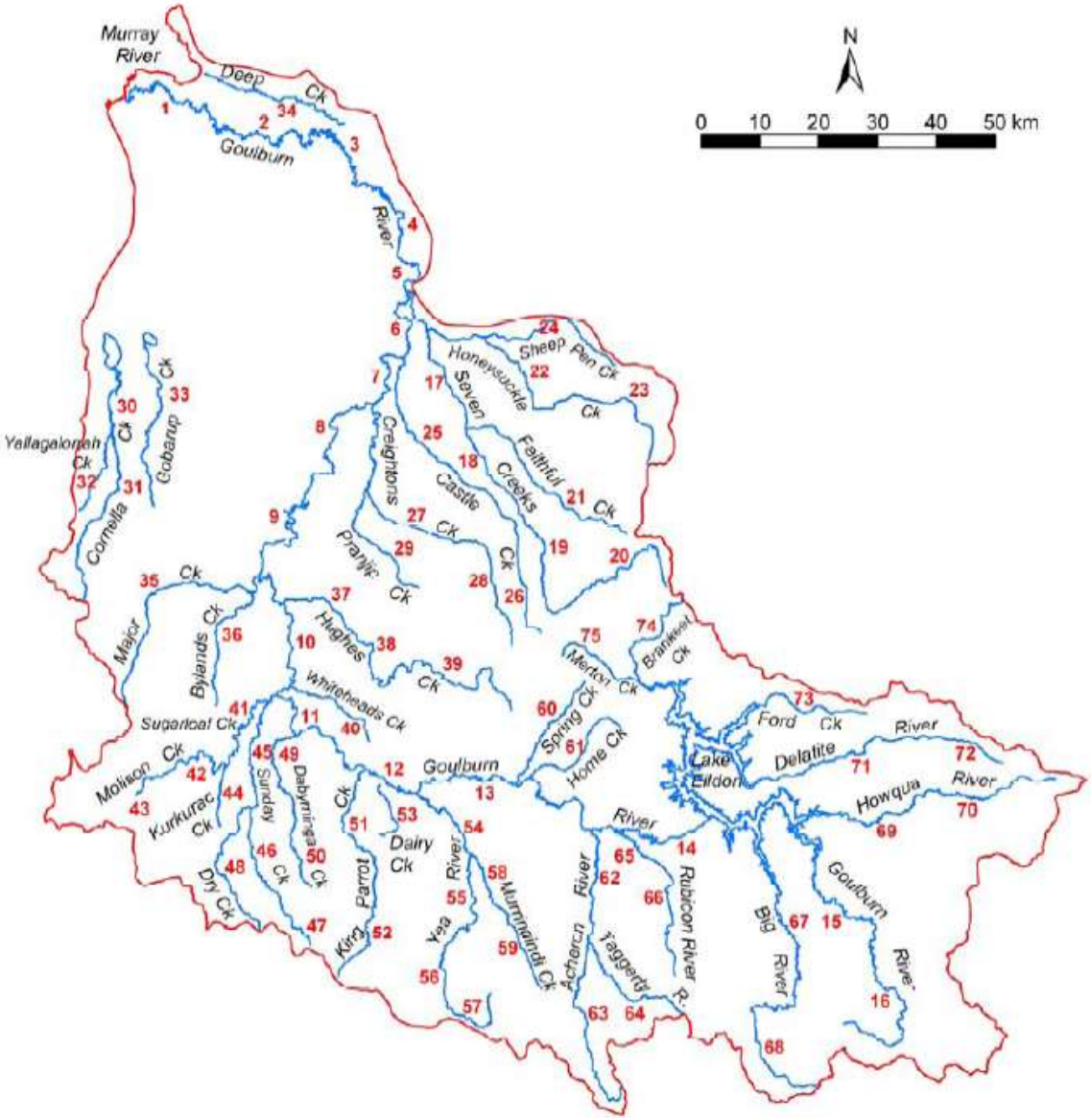
The report provides a summary of testing results since 1997 and should be used to stimulate discussion on the state of water quality in the Ancona Region and potential actions to improve water quality. There is the potential to use water quality data collected in the program to discover trends in water quality over time and to measure the effects of improvement works carried out in the sub-catchment.

Figure 1. Goulburn Broken Catchment



(GBCMA, 2005)

Figure 2. Goulburn River Basin
Red numbers show river reaches



GBCMA, 2005

Monitoring Plan

Name of Project Activity Area: Ancona Monitoring Group

Monitoring Coordinator: Jill Breadon

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. The data that is collected through this monitoring program can be used to target on-ground works to improve water quality.

Who will use the data?

The data is primarily collected for the benefit of the community. The data is also available to other organisations and individuals that have an interest in catchment water quality. These include Federal and 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 to develop local action plans to improve water quality and to measure the effectiveness of these plans.

Goulburn Broken Waterwatch integrates our monitoring programs into the Goulburn Broken Catchment Management Authority's Regional River Health Strategy. The Goulburn Broken Catchment Management Authority can utilise the data to assess actions to improve river health against targets and objectives.

Who will be involved and where will you monitor?

HEATHER INGPEN

BKT006 – MAP 8024 E 391724 N 5908117	Brankeet Creek at Ancona.
BKT010 – MAP 8024 E 392653 N 5906033	Brankeet Creek at Mitchell Road Crossing.
HEY010 – MAP 8024 E 391432 N 5908472	Upper Heyfield Creek (Tributary to Brankeet Creek).
NTH010 – MAP 8024 E 392619 N 5910005	North Creek before Brankeet Confluence.

DANIELLE BEISCHER

BKT025 – MAP 8024 E 393642 N 5902454	Brankeet Creek at Ancona Woodfield Road.

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BKT005 – MAP 8024 E 394271 N 5909877	Upper Brankeet Creek at Brankeet.
BKT020 – MAP 8024 E 393264 N 5903178	Brankeet Creek downstream at Black's Pump.

See Map on page 9 also.

Which parameters will be monitored?

- Turbidity,
- Electrical Conductivity,
- Temperature,
- pH (at BKT025 only),
- Total Phosphorus (at BKT025 only),
- *E.coli* (at BKT025 only).

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.

A statistical analysis of water quality data requires monthly monitoring as a minimum.

How will the data be managed and reported?

All water quality data is sent to the local Waterwatch Coordinator for quality assurance checking prior to being sent to the Data Management Coordinator for entry into the Regional Waterwatch Database.

Periodically, raw data reports and written reports are prepared by the Data Management Coordinator and distributed to the volunteer monitoring network, and agencies or groups who have requested the data.

Raw data is also loaded monthly onto the Goulburn Broken Waterwatch website (www.gbwaterwatch.org.au).

Map of Monitoring Sites

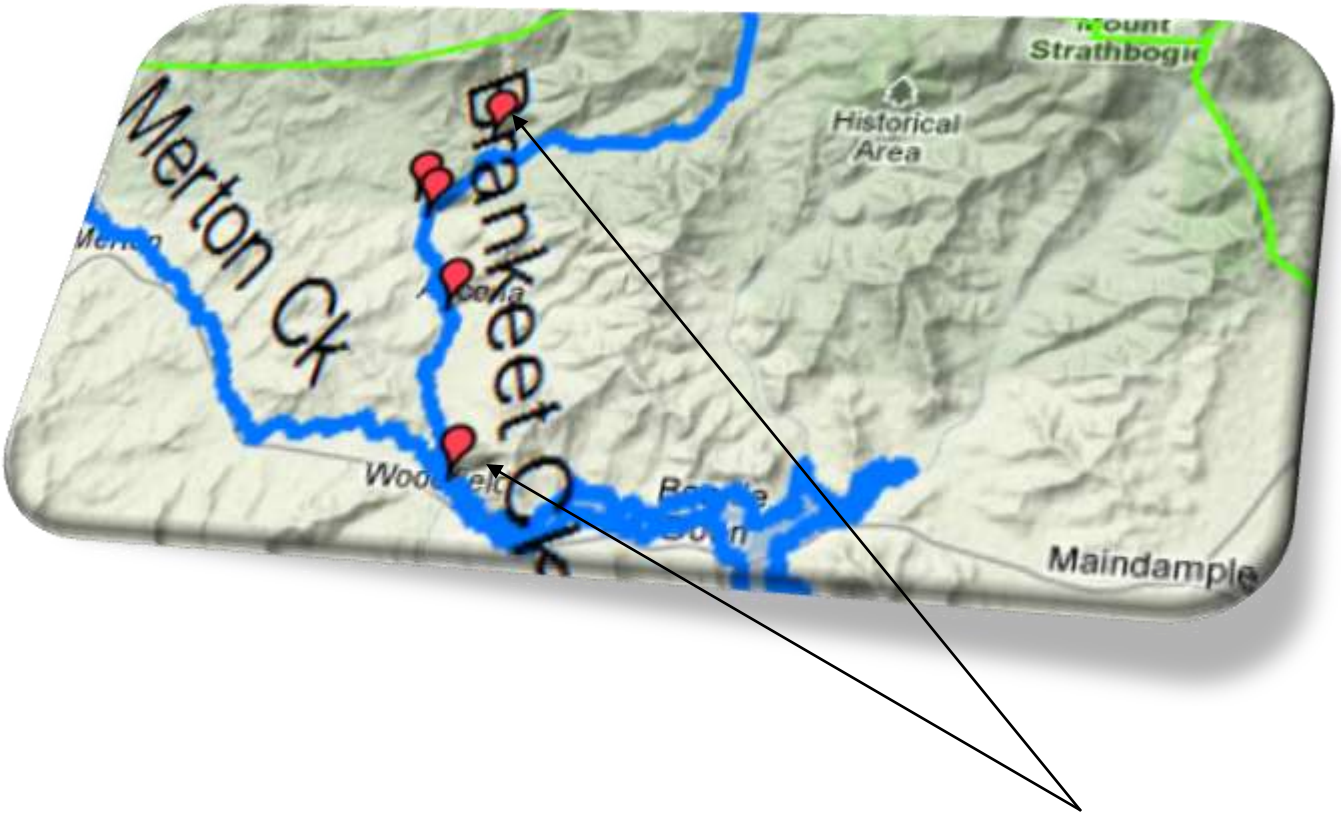


Figure 3: This map is taken from the Goulburn Broken Waterwatch Website, (www.gbwaterwatch.org.au) and shows the water quality monitoring sites along Brankeet, North and Heyfield Creeks.

Turbidity

Turbidity is a measure of the clarity of water which is caused by suspended material in the water. As suspended material increases, the clarity decreases, and water appears cloudy or muddy.

As water becomes more turbid, the ability of light to pass through the water decreases. This can limit the growth of submerged plants. This affects the fish and invertebrate communities which feed on and live in the plants. The lack of light also makes it difficult for predatory fish and birds to hunt successfully (Tiller and Newall, 2009).

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

Turbidity can be caused by silt, clay, micro-organisms, plant material, sewage or industrial effluent discharges, algae and chemicals, however most of the sediment comes from erosion of the surrounding catchment or stream bank (Tiller and Newall, 2009). Soil weathering and erosion are a natural process, but human land use such as agriculture, forestry or housing development can result in significant quantities entering waterways.

Presence of riparian vegetation along the waterways can reduce the amount of suspended material entering waterways. It acts as a filter for rainfall runoff therefore reducing, or maintaining, the turbidity of the water.

Levels of turbidity will vary over time. Rain events inevitably cause an increase in turbidity in a waterway, as apart from transporting sediment into the waterways from the surrounding catchment, they also result in an increased flow, which may stir up the water body. Bushfires also have a detrimental effect on the turbidity levels in waterways due to the decimation of vegetation, riparian and other, resulting in exposure of soil, and lack of filtering the runoff to a waterway in the case of a rain event.

Turbidity in the Ancona Landcare Group Region

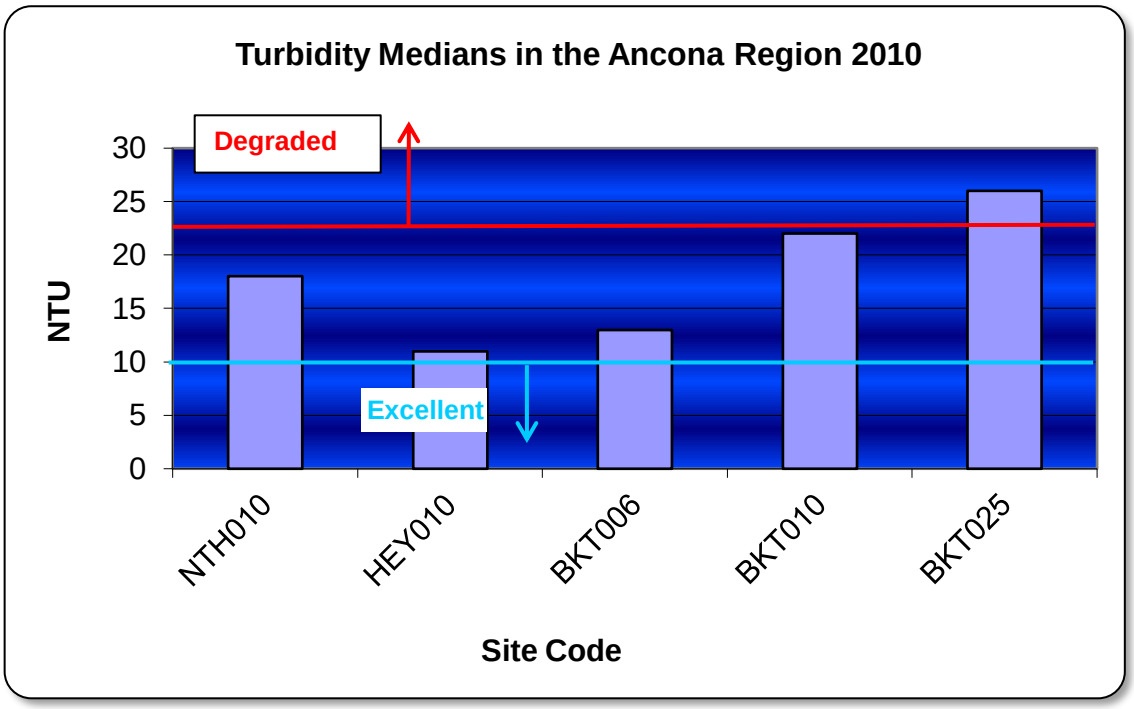
Waterwatch has monitored a number of sites in the Ancona region for turbidity since 1997. The table below shows median results for each calendar year.

Site Code	Site Description	Turbidity Medians (NTU)													
		1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
NTH010	North Creek before Brankeet Confluence	-	-	-	-	-	-	-	-	-	9*	23*	10	15	18
HEY010	Upper Heyfield Creek (Tributary to Brankeet Ck)	-	11	13	-	-	-	-	-	-	9*	27*	19	9.5	11
BKT006	Brankeet Ck at Ancona	6	6	9	-	-	-	-	-	-	-	9*	29*	9	13
BKT010	Brankeet Ck at Mitchell Road Crossing	-	15	-	17	-	-	-	-	-	10*	22	10	11	22
BKT025	Brankeet Ck at Ancona Woodfield Road	-	-	-	-	-	-	-	-	-	19	17	15	15	26
Annual Rainfall Total (mm) BoM Bonnie Doon Garage Station (88007)		499	645	687	683	-	480	-	-	-	-	-	521	~555	~1140

Ratings for Valleys:
<10NTU Excellent <12.5NTU Good <15NTU Fair <22.5NTU Poor >22.5NTU Degraded
*Note: results with * indicate <5 data sets used for interpretation.*

Table 1

- Turbidity in Upper Heyfield Creek continues to be varied. More frequent monitoring needs to occur to determine anything solid about this site.
- All sites on Brankeet Creek show slightly elevated turbidity results for 2010.
- High rainfall in 2010 may have contributed to higher turbidities in 2010.

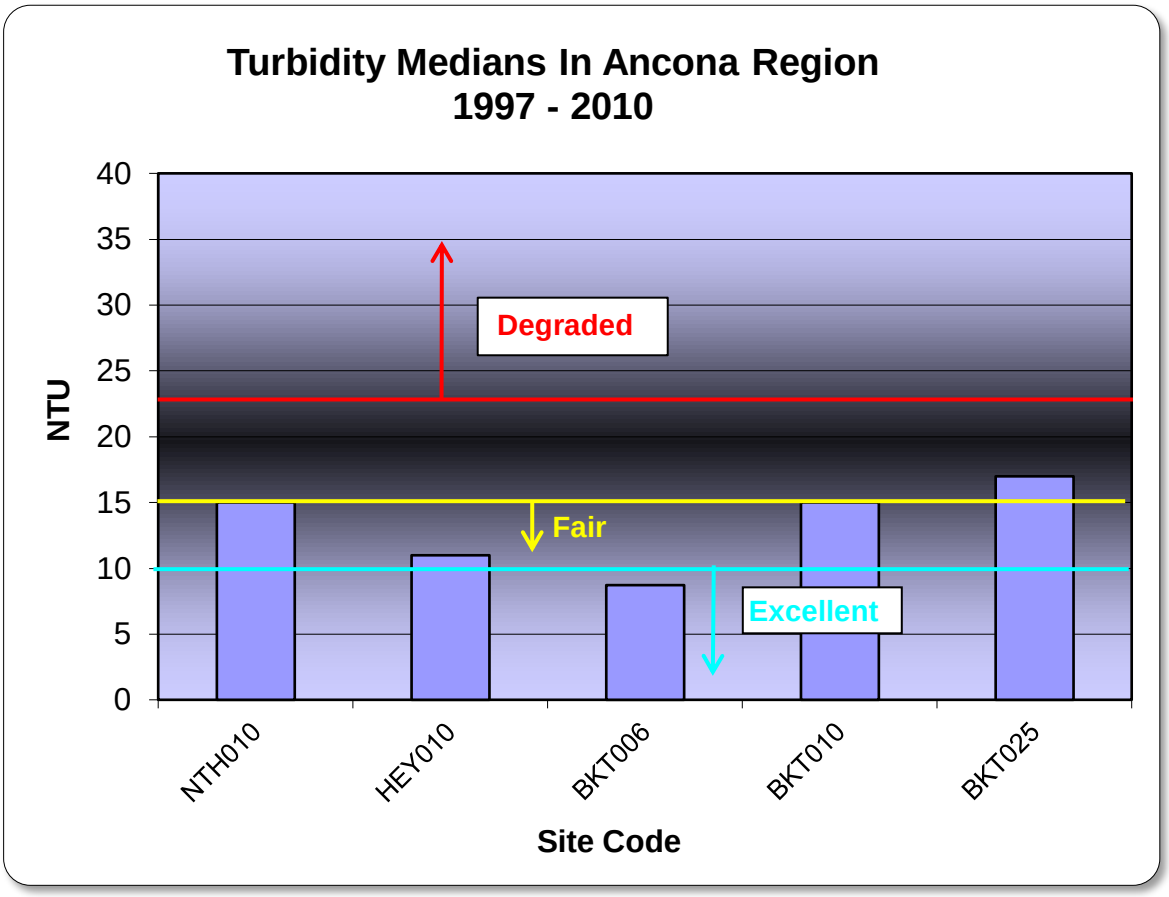


Note: Ratings shown on this graph are for the Valleys

Figure 4

Figure 4 above shows annual median results for the 2010 calendar year only.

Figure 5 below shows the overall LONG TERM medians for the sites in the Ancona Region over the fourteen years of monitoring.



Note: Ratings shown on this graph are for the Valleys

Figure 5

Electrical Conductivity (Salinity)

Electrical conductivity (EC) measures the flow of electricity in a solution (Tiller and Newall, 2009). As the amount of dissolved salts in the water increase, the conductivity increases. This relationship is used as a measure of salinity, and is recorded as micro Siemens per centimetre (µS/cm) (Tiller and Newall, 2009).

Salts are necessary for aquatic organisms to survive, but excessive amounts may be toxic to some. Different organisms have different tolerance levels to salt, but most freshwater aquatic organisms will not tolerate high levels. In general, EC levels less than 1500 µS/cm are considered to have little short term effect (Tiller and Newall, 2009). As salinity rises, the number of species decline.

Geology, urban and agricultural runoff, industrial and sewage runoff, proximity to the coast, and groundwater all affect salinity levels. Naturally salinity levels are higher in dry periods, as evaporation concentrates the salt levels. During these dry times, groundwater maybe the major contributor of water to waterways. Groundwater can have very high salt concentrations, and rising groundwater tables are known to have elevated salinity levels in many rivers in Victoria (Tiller and Newall, 2009). Once there is runoff again from rainfall, the salt concentrations will decrease.

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 groundwater tables. Revegetation of recharge areas and buffer strips along local streams can help to reduce salinity.

The following summary can assist in interpretation of salt levels in surface waterways.

0-800 µS/cm

- Water from your tap at home would be within this range.
- This is good drinking water for people and suitable for all animals.
- When water of 300 µS/cm is used in irrigation through overhead sprinklers, plants that are sensitive to salt may develop leaf scorch.

800-2500 µS/cm

- 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 µS/cm.
- 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 µS/cm and white clover with water of 1,000 µS/cm, provided they are grown on sandy soil with good drainage.

2,500-10,000 µS/cm

- Water in this range is not suitable for people and should only be drunk in an emergency.
- When water over 4,000 µS/cm is given to laying hens it causes their eggs to crack.
- Water over 6,000 µS/cm is unsuitable for pigs and poultry.
- Highly saline water may also contain a high level of magnesium which can be harmful to stock.
- 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 µS/cm

- Water over 10,000 µS/cm 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 µS/cm water has salinity similar to the sea.

Electrical Conductivity (Salinity) in the Ancona Landcare Group Region

Waterwatch has monitored salinity in the Ancona region in recent times only, with the exception of Brankeet Creek at Ancona, which was monitored from 1997 to 2000 also.

Site Code	Site Description	Electrical Conductivity Medians (µS/cm)													
		1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
NTH010	North Creek before Brankeet Confluence	-	-	-	-	-	-	-	-	-	-	85*	90	90	85
HEY010	Upper Heyfield Creek (Tributary to Brankeet Ck)	-	-	-	-	-	-	-	-	-	-	155*	130	155	140
BKT006	Brankeet Ck at Ancona	98	110	91	100	-	-	-	-	-	-	110*	105*	110	95
BKT010	Brankeet Ck at Mitchell Road Crossing	-	-	-	-	-	-	-	-	-	-	120	115	125	110
BKT025	Brankeet Ck at Ancona Woodfield Road	-	-	-	-	-	-	-	-	-	146	161	204	198	162
Annual Rainfall Total (mm) BoM Bonnie Doon Garage Station (88007)		499	645	687	683	-	480	-	-	-	-	-	521	~555	~1140

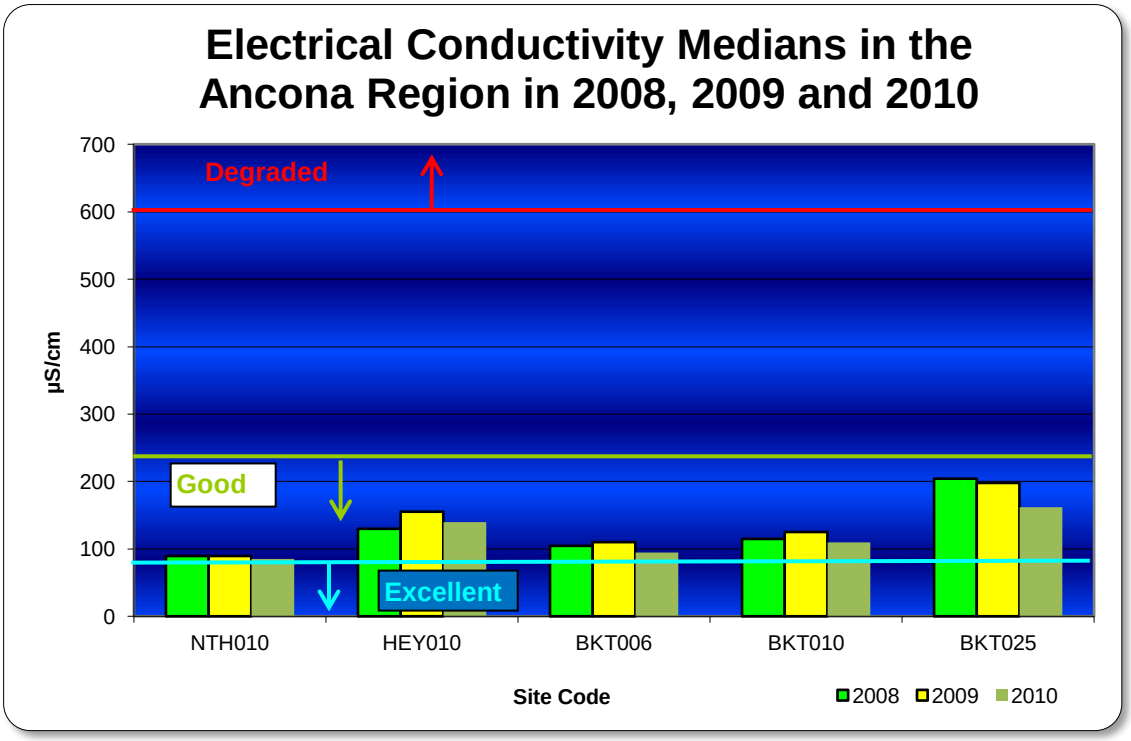
Ratings for the Valleys:

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

Note: results with * indicate <5 data sets used for interpretation.

Table 2

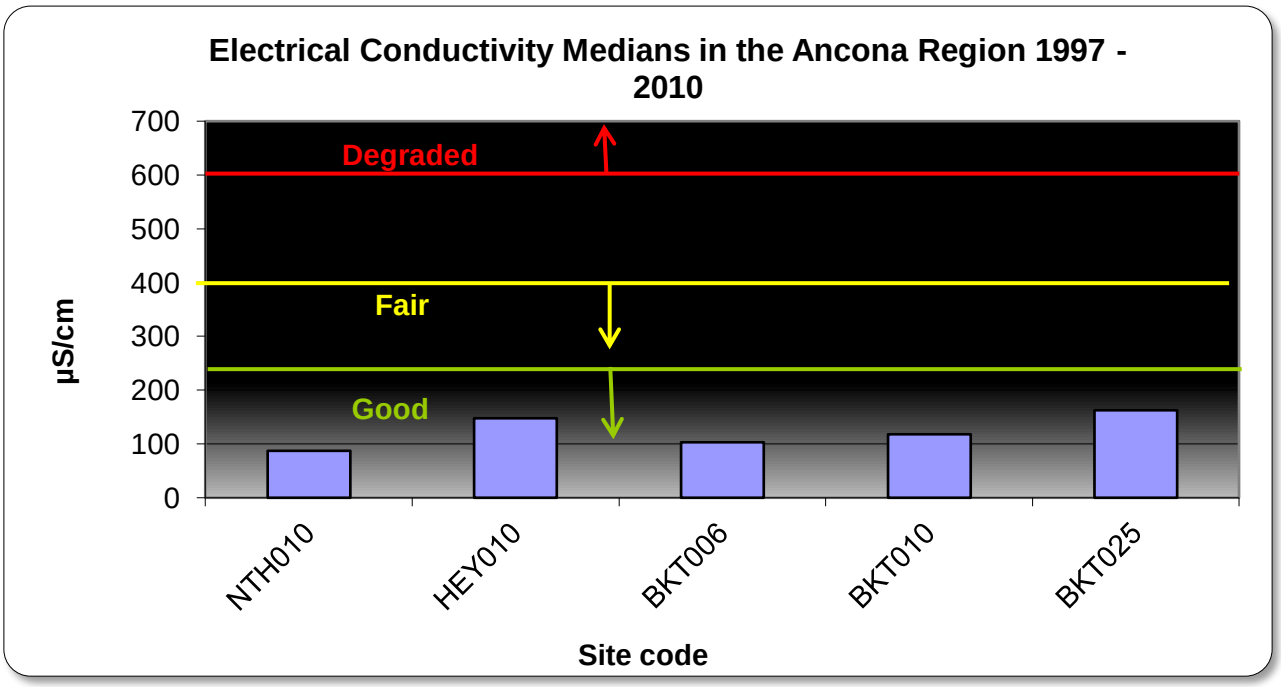
- Electrical conductivity (Salinity) has consistently rated as "GOOD" at all sites in the Ancona Landcare Group Region during the time that they have been monitored.



Note: Ratings shown on this graph are for the Valleys

Figure 6

Figure 6 above shows annual median electrical conductivity results for the 2008, 2009 and 2010 calendar years.



Note: Ratings shown on this graph are for the Valleys

Figure 7

Figure 7 above shows the overall LONG TERM median Electrical Conductivity for the sites in the Ancona Region over the fourteen years of monitoring.

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 (e.g. 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 8.0 (Tiller and Newall, 2009) although wide variations can occur because of catchment geology. Granitic rock, or soil high in organic acids tend to lower the pH of groundwater, and basaltic rock, or soils high in salts have the reverse effect, typically increasing the pH (Tiller and Newall, 2009). The pH can also be affected when plants consume carbon dioxide (CO_2) during photosynthesis. The reduction in CO_2 reduces the acidity of the water, therefore increasing the pH. The reverse is true at night when respiration is occurring and CO_2 levels increase (Tiller and Newall, 2009). A range of other factors can affect pH, including industrial runoff and sewage discharges.

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 Ancona Landcare Group Region

One site in the Ancona Region has been monitored by Waterwatch for pH since 2006. The table below summarises the data collected.

Site code	Site Description	MEDIAN pH				
		2006	2007	2008	2009	2010
BKT025	**Brankeet Ck at Ancona Woodfield Road**	**7.2**	**6.9**	**7.1**	**7.4**	**7**
Annual Rainfall Total (mm) BoM Bonnie Doon Garage Station (88007)		**-**	**-**	**521**	**~555**	**~1140**

Table 3

Ratings 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

- pH in 2010 continues to fall within the "Excellent" rating.
- These results are useful baseline data and continue to contribute to an overall long term "picture" of pH in the catchment.

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 (inorganic phosphorus) and from the decomposition of organic matter such as plant litter (organic phosphorus).

Other sources of phosphorus entering river systems include:

- Organic material from animals such as waste and decaying tissue
- Wastewater treatment plants
- Stormwater runoff
- Runoff or discharge from intensive agricultural or dairy industry
- Forest runoff

Phosphorus is one of the nutrients required by aquatic plants and animals, however it is often the one in shortest supply, therefore limiting plant growth. If phosphorus levels are high enough they can contribute to algal blooms and excessive growth of aquatic plants. This can result in smothering of aquatic habitat, and also cause severely high oxygen peaks and low oxygen troughs due to excess photosynthesis during the day, and respiration at night. These extreme highs and lows can be enough to severely stress or kill stream fauna (Tiller and Newall, 2009).

There can be seasonal variation in phosphorus levels. High flows generally result in higher phosphorus concentrations, as runoff carries sediment containing phosphorus into waterways. As for turbidity, bushfire and resultant devastation of riparian, and other, vegetation can result in extremely high levels of phosphorus. This is due to the massive sediment and ash inputs to the waterways after storm events.

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 (ISC) 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. It will generally increase from headwaters to the lower part of a waterway.

Phosphorus in The Ancona Landcare Group Region

Two sites from the Ancona region have been tested intermittently for phosphorus by Waterwatch since 1997.

Site Code	Site Description	Total Phosphorus MEDIANS (µg/L)													
		1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
BKT006	Brankeet Ck at Ancona	40	40	50	-	-	-	-	-	-	-	-	-	-	-
BKT025	Brankeet Ck at Ancona Woodfield Road	-	-	-	-	-	-	-	-	-	40	60	60	60	75
Annual Rainfall Total (mm) BoM Bonnie Doon Garage Station (88007)		499	645	687	683	-	480	-	-	-	-	-	521	~555	~1140

Ratings for the Mountains, Valleys and Plains:
<10 µg/L Excellent, <25 µg/L Good, <50 µg/L Fair, <100 µg/L Poor, >100 µg/L Degraded

Table 4

- Total phosphorus results continue to be poor in the Ancona Region.

E.coli

Microbiological quality of a water-body is generally measured by testing for bacteria that are indicators of faecal pollution. Water intended for human consumption should contain none of these bacteria.

Indicator organisms are bacteria whose presence in water gives a simple and meaningful indication that faecal contamination has occurred. Such organisms are always present in high numbers in the faeces of humans (and other warm blooded animals and birds). Their presence in a water body indicates faecal contamination which may lead to potential health risks from disease causing pathogens, such as *Salmonella*, Hepatitis A, and *Giardia* (Tiller and Newall, 2009).

One of the major indicator organisms of faecal pollution is *Escherichia coli (E. coli).* When indicator bacteria are detected in water, their presence indicates that excrement from birds, animals or humans has recently polluted the water and that all types of pathogens (bacteria, viruses, protozoans and parasites) may also be present.

E. coli is a member of the coliform group of bacteria found naturally in the intestines of all warm-blooded animals. It is the predominant coliform in fresh faeces and so its presence in water is indicative of recent faecal contamination. The *E. coli* count does not differentiate between bacteria of bird, animal or human origin but, as animals and birds can act as carriers of human intestinal pathogens, the presence of *E. coli* should always be considered to have sanitary significance.

State Environment Protection Policy *E coli* Objectives for Waterways are shown in the table below.

Beneficial Use	Description	*E.coli* (orgs/100ml) Median of 5 samples at regular intervals within 30 days
Primary Contact	Swimming, bathing and other direct water-contact sports	≤150
Secondary Contact	Boating and fishing	≤1,000

Table 5

Some generalisations to help with interpretation:

- *E.coli* can fluctuate widely even to the extent of increases from "tens" to "hundreds" without necessarily indicating contamination from a pollution source;
- If this magnitude of increase occurred regularly between two sampling sites and a known possible source was implicated, then there is some evidence of contamination;
- Normally, *E.coli* levels will greatly increase after rainfall;
- Potential sources include sewage overflows, leaking sewerage systems, illegal sewerage connections to stormwater, septic tanks, and runoff from contaminated areas.

E.coli in Brankeet Creek

Brankeet Creek has been tested for E.coli by Waterwatch and the community since 2006. The table below shows median results.

Site Code	Site Description	*E.coli* MEDIANS (orgs/100ml)								
		2002	2003	2004	2005	2006	2007	2008	2009	2010
BKT025	**Brankeet Ck at Ancona Woodfield Road**	**-**	**-**	**-**	**-**	**79***	**46**	**41**	**88***	**-**

Note: - results with * indicate <5 data sets used for interpretation.

Table 6

- SEPP Guidelines suggest *E.coli* less than 150 organisms/100 ml sample for primary contact such as swimming or bathing.
- Results at Brankeet Creek at Ancona- Woodfield Road have previously fallen within this guideline, but it must be noted that SEPP Guidelines use five samples within a 30 day period, much more frequent sampling than performed for these given medians. *E.coli* was not tested in 2010.

State Environment Protection Policy (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.

A minimum of 11 samples collected from monthly monitoring over a one-year period is required to assess against SEPP (WoV) water quality objectives. Colours refer to the SEPP (WoV) segments that apply to the site.

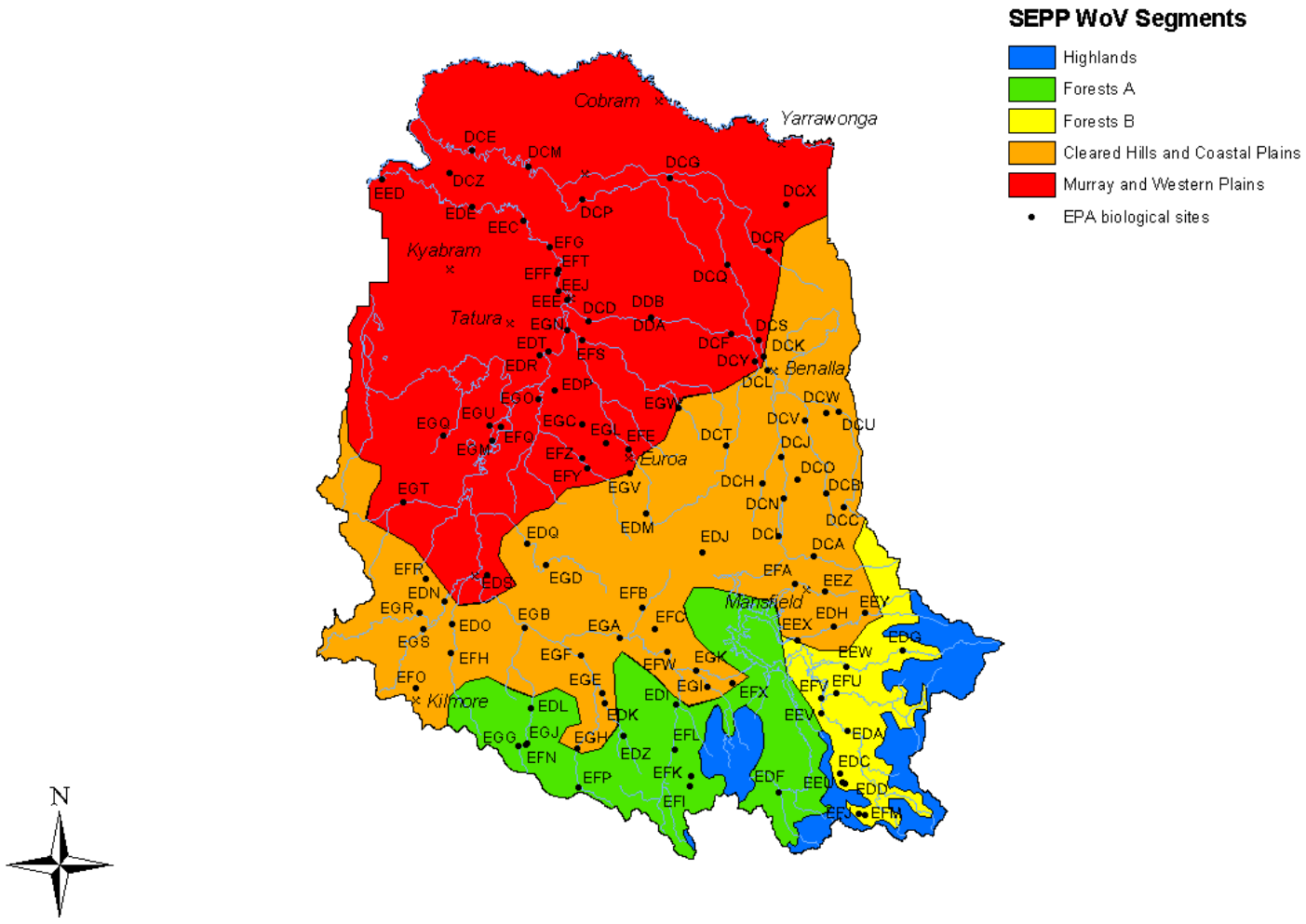


Figure 8: Goulburn Broken Catchment Management Authority - SEPP (WoV) segments (EPA,2003).

State Environmental Protection Policy (Waters of Victoria) Environmental Quality Objectives for Rivers and Streams – water quality

The State Environment Protection Policy (Waters of Victoria) segment and objectives applicable within the Goulburn Broken CMA region for the tests of relevance to the Ancona Region are shown in Table 7. This table has been reproduced from the State Environment Protection Policy Waters of Victoria (Victorian Environment Protection Authority 2003).

SEGMENT	INDICATOR							
	Total phosphorus (ug/L)	Total nitrogen (ug/L)	Dissolved oxygen % saturation		Turbidity (NTU)	Electrical conductivity (uS/CM)	pH (pH units)	
	75th percentile	75th percentile	25th percentile	maximum	75th percentile	75th percentile	25th percentile	75th percentile
Cleared Hills and Coastal Plains								
• mid-reaches of Ovens, Goulburn and Broken catchments	≤25	≤600	≥85	110	≤10	≤500	≥6.4	≤7.7

Table 7

Note: SEPP objectives are long term theoretical goals for water quality. It is not expected that waterways will comply at this stage

2010 results in the Ancona Region (Table 8), compared to SEPP objectives – water quality (Table 7)

SEGMENT	INDICATOR							
	Total phosphorus (ug/L)	Total nitrogen (ug/L)	Dissolved oxygen % saturation		Turbidity (NTU)	Electrical conductivity (uS/CM)	pH (pH units)	
	75th percentile	75th percentile	25th percentile	maximum	75th percentile	75th percentile	25th percentile	75th percentile
HEY010 Upper Heyfield Creek (Tributary to Brankeet Ck)					18	150		
NTH010 North Creek before Brankeet Confluence					25	98		
BKT006 Brankeet Ck at Ancona					15	123		
BKT010 Brankeet Ck at Mitchell Road Crossing					27	178		
BKT025 Brankeet Ck at Ancona Woodfield Road	100		88	99	32	187	6.9	7.1

Table 8

- When comparing with SEPP objectives, three quarters of the readings taken should fall below the 75th percentile.
- All sites in the Ancona region failed to meet the SEPP objective for turbidity in 2010.
- All sites met the Electrical conductivity objective.
- Brankeet Creek at Ancona - Woodfield Road is the only site tested for total phosphorus, dissolved oxygen and pH. Of these, it failed to meet the phosphorus objective.
- It must be noted that SEPP objectives are long term theoretical goals for water quality and it is not expected that waterways will comply at this stage.

Summary for the Ancona Region

In the Ancona Landcare Group Region in 2010 we found:

- Turbidity has deteriorated in Brankeet Creek in 2010, possibly due to increased rainfall during 2010.
- North Creek and Upper Heyfield Creek have similar tubidity results to that of 2009.
- All sites still failed to meet the SEPP Guidelines for turbidity in 2010.
- Electrical conductivity remains consistent with previous years, continuing to be rated as "Good" in 2010, with all median results less than 200 µS/cm.
- pH continues to be excellent at Brankeet Creek at Ancona-Woodfield Road and should not be of concern.
- Phosphorus continues to be rated as "Poor" and failed to meet the SEPP Objective for Total Phosphorus at Brankeet Creek at Ancona – Woodfield Road (BKT025) in 2010.

It is recommended that testing continue in 2011 as these results provide excellent data to build up further baseline knowledge of these waterways.

These results have so far been distributed to

- Goulburn Broken Catchment Management Authority
- Waterwatch State Office

References

EPA (2003) Goulburn Broken Catchment Management Authority SEPP (WoV) Segments and environmental quality objectives. Environment Protection Authority, Macleod.

GBCMA (2005). *Regional River Health Strategy 2005-2015*. Goulburn Broken Catchment Management Authority, Shepparton.

GBCMA (2005). *Regional River Health Strategy 2005-2015*. *Status of the Riverine System – Regional Overview.* Goulburn Broken Catchment Management Authority, Shepparton.

Tiller, D. and Newall, P. (2009). *Interpreting River Health Data – Waterwatch Victoria.* Mulqueen Printers Pty Ltd.

Glossary

DO	Dissolved Oxygen – a measure of the concentration of oxygen in the water
EC	Electrical Conductivity – measures the flow of electricity in a solution in µS/cm
EPA	Environment Protection Authority
EPT	Ephemeroptera, Plecoptera and Trichoptera
GBCMA	Goulburn Broken Catchment Management Authority
ISC	Index of Stream Condition
Median	Numbers in a series are sorted into ascending order, and the middle number is the median
Mean	Average calculated by adding all data points and dividing by the number of data points
pH	Acidity or alkalinity of the water – 0 being acidic, 14 being alkaline
Photosynthesis	Process where plants produce oxygen during daylight hours
Respiration	Process where plants consume oxygen during non daylight hours
RRHS	Regional River Health Strategy
SEPP	State Environment Protection Policy
SIGNAL	Stream Invertebrate Grade Level
Turbidity	A measure of the clarity of water, measured in NTU

Appendix A

Ancona Report

For Samples from 01 Jan 2010 to 31 Dec 2010

SiteNo: BKT006 Brankeet Creek at Ancona

Date:	Time:	Sample Type:	Parameters: Temp ° C	TPhos mg/L P	EC µS/cm	Turb NTU	% O2 Sat %	Ecoli orgs/100 mL	pH pH Units	Flow ML/day	Rainfall mm	DO mg/L
18-Jan-10	10:30 AM	Grab	14.7		130	6				low		
17-Feb-10	10:30 AM	Grab	21.0		170	16				just		
13-Jun-10	10:10 AM	Grab	8.2		100	11				good		
21-Aug-10	12:00 PM	Grab	9		90	17				steady		
16-Nov-10	11:45 AM	Grab	16.4		90	12				modhigh	0	
15-Dec-10	4:50 PM	Grab	19.1		90	13				modera	0	

SiteNo: BKT010 Brankeet Creek at Mitchell Road Crossing

Date:	Time:	Sample Type:	Parameters: Temp ° C	TPhos mg/L P	EC µS/cm	Turb NTU	% O2 Sat %	Ecoli orgs/100 mL	pH pH Units	Flow ML/day	Rainfall mm	DO mg/L
18-Jan-10	10:30 AM	Grab	15.5		340	28				low		
17-Feb-10	10:30 AM	Grab	19.3		200	25				good		
13-Jun-10	10:20 AM	Grab	7.9		110	9				good		
21-Aug-10	12:00 PM	Grab	10		100	30				steady		
16-Nov-10	11:00 AM	Grab	16.1		110	18				modhigh	0	
15-Dec-10	4:30 PM	Grab	19.7		100	16				himod	0	

SiteNo: BKT025 Brankeet Creek at Ancona Woodfield Road

Date:	Time:	Sample Type:	Parameters: Temp ° C	TPhos mg/L P	EC µS/cm	Turb NTU	% O2 Sat %	Ecoli orgs/100 mL	pH pH Units	Flow ML/day	Rainfall mm	DO mg/L
11-Jan-10	1:40 PM	Grab	27.6	0.08	263	23	72		7	mediu	0	5.6
17-Mar-10	3:45 PM	Grab	23.8	0.03	214	29	95		7.2	normal	0	8.1
20-May-10	2:25 PM	Grab	12.1	0.07	187	12	86		6.0	normsl		9.3
17-Jun-10	2:45 PM	Grab	10.1		179	17	88		7.2	normal		9.8
19-Aug-10	1:45 PM	Grab	9.5	0.12	106	69	95		7.1	hifast	11	10.6
16-Sep-10	4:00 PM	Grab	12.2	0.07	159	25	99		6.9	fastme		10.6
11-Nov-10	3:25 PM	Grab	21.1	0.06	141	32	92		7.0	fastnorm		8.1
29-Nov-10	5:00 PM	Grab	17.9	0.15	96	61			6.9	hifast	75	
16-Dec-10	3:45 PM	Grab	21	0.09	162	26	94		7.0	hifast	0	8.4

Waterwatch Victoria Application (WVA) - Site Report

SiteNo: HEY010 Upper Heyfield Creek (Tributary to Brankeet Creek)

Date:	Time:	Sample Type:	Temp ° C	TPhos mg/L P	EC µS/cm	Turb NTU	% O2 Sat %	Ecoli orgs/100 mL	pH pH Units	Flow ML/day	Rainfall mm	DO mg/L
			Parameters:									
18-Jan-10	**10:30 AM**	Grab	13.8		270	21				low		
17-Feb-10	**10:30 AM**									stagna	nosam	
13-Jun-10	**9:50 AM**	Grab	9		90	9.6				good		
21-Aug-10	**12:00 PM**	Grab	9.5		130	9				steady		
16-Nov-10	**11:30 AM**	Grab	18.2		150	18				NNF	0	
15-Dec-10	**5:00 PM**	Grab	20.6		140	11				modera	0	

SiteNo: NTH010 North Creek before Brankeet Confluence

Date:	Time:	Sample Type:	Temp ° C	TPhos mg/L P	EC µS/cm	Turb NTU	% O2 Sat %	Ecoli orgs/100 mL	pH pH Units	Flow ML/day	Rainfall mm	DO mg/L
			Parameters:									
18-Jan-10	**10:30 AM**	Grab	12.7		140	7				low		
17-Feb-10	**10:30 AM**	Grab	19.8		100	10.5				good		
13-Jun-10	**10:00 AM**	Grab	7.5		80	15				good		
21-Aug-10	**12:00 PM**	Grab	8.5		90	26				steady		
16-Nov-10	**11:40 AM**	Grab	16.1		80	30				modera	0	
15-Dec-10	**4:50 PM**	Grab	18.6		80	21				high	0	