

# SAVE the BARWON RIVER LAWROC & Otway Water

## Fish Kill, Upper Reach of the Barwon River June 2016.

10 NEWS

WEDNESDAY JUNE 22 2016 GEELONGADVERTISER.COM.AU

**WHAT'S HAPPENING?**  
In 67 years at his Birregurra property farmer Dennis Phillips has never seen the Barwon River in the state it's in now.  
Picture: MITCH BEAR



### Something fishy going on

**DEATH RIVER**

**GREG DUNDAS**

OTWAYS farmers are seeking answers as to why fish and eels are dying in the Barwon River upstream from Geelong and Winchelsea.

They say the water in the river became abnormally clean and clear late last week, and warned whatever was killing the fish could wash down towards Geelong and the river mouth at Barwon Heads.

The Environment Protection Authority has tested the water and blamed the spate of deaths on temporary changes to its natural acid content.

Beef farmer Dennis Phillips, 66, has pulled dozens of dead eels and fish from the river on his property, and says hundreds more are washing up a

short way downstream at Birregurra.

"I've lived here my whole life, and it's just a shock to see it like this," he said. "It's so clear you can see 10 feet deep, you can usually only see the top six inches at this time of year. We're all worried about what it might do to our cattle."

EPA acting South West regional manager Carolyn Francis said her organisation was "aware of a fish and eel death incident that has occurred in the Barwon River, upstream of Winchelsea".

"An EPA officer investigated the site (on Monday) and confirmed about 10 to 15 dead eels and carp along two stretches of the river," she said.

"The officer measured low pH (acidic) water in the Barwon River and Boundary Creek; no direct dis-

charge point was determined. It is likely that water quality is due to natural causes; in this case run-off from acid-containing soils in the area."

Ricketts Marsh farmer Gary Battye said landowners needed to know what had caused the water to change so dramatically.

"It's super-clean and super-clear ... it might look great but it's not right," he said. "I've never seen it like this in my 35 years (on the farm); there's something wrong that is causing the silt to drop out of the water."

"We don't know if it's safe for our stock to drink."

Malcolm Gardiner, vice-president of the Land And Water Otway Ranges Catchment group, attributed the heightened acid levels in the water to groundwater extraction years ago.

**BARWON DEAD FISH MYSTERY** P10

The Appendixes to this book have been compiled as a separate book(s). The pages in the Appendix book(s) start at page 99.

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November 2016

Save the Barwon River, LAWROC Landcare Group & Otway Water Book 32.

# FOREWORD

Our LAWROC Landcare members come from all over Victoria, and through their love of the Otway Ranges continue to support both the practical on ground conservation work, as well as the advocacy for sustainable water management of our Otway Catchments.

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I am proud in the knowledge and leadership shown by LAWROC to question and tackle those land and water management issues many are loathe to attempt.

The preparation of this Fish Kill Report is one such example. Dedicated members carefully researched and collated this data. There is a wealth of information and detail in this report, unfortunately more questions than answers have eventuated.

Tricia Jukes

(President, Land And Water Resources Otway Catchments)



# INTRODUCTION

Up until the 1980s minor episodes of pumping had taken place from the deep water aquifers in the Barwon Downs area of the Otway Ranges. During the drought of 1982-1983 Barwon Water began serious groundwater extraction from the Gerangamete Borefield at Barwon Downs, supplying Geelong with 50% of its requirements. Periodic extractions followed with a groundwater mining\* period from the late 1990s. This groundwater mining operation eventually led to the upper layers of the Big Swamp peat wetlands at Yeodene drying out.

This peat wetland has virtually no acid buffering or neutralising capacity and as a result volumes of sulphuric acid and other environmentally unfriendly toxins were produced waiting to be flushed from the swamp. By June 2016 Boundary Creek and the Barwon River had not flowed for 6 months. Then the winter rains started. As Boundary Creek flowed past and over this wetland these toxins were picked up and passed down the creek and eventually finished flowing into the Barwon River.

Early in June 2016 low flows in the Barwon River were no longer able to dilute and disguise the pollution coming into the river from Boundary Creek. As the Barwon River flows increased this toxic water was sent down a 30 km stretch of the Barwon killing large numbers of fish. Local identities, attest to this being a “first” time event.

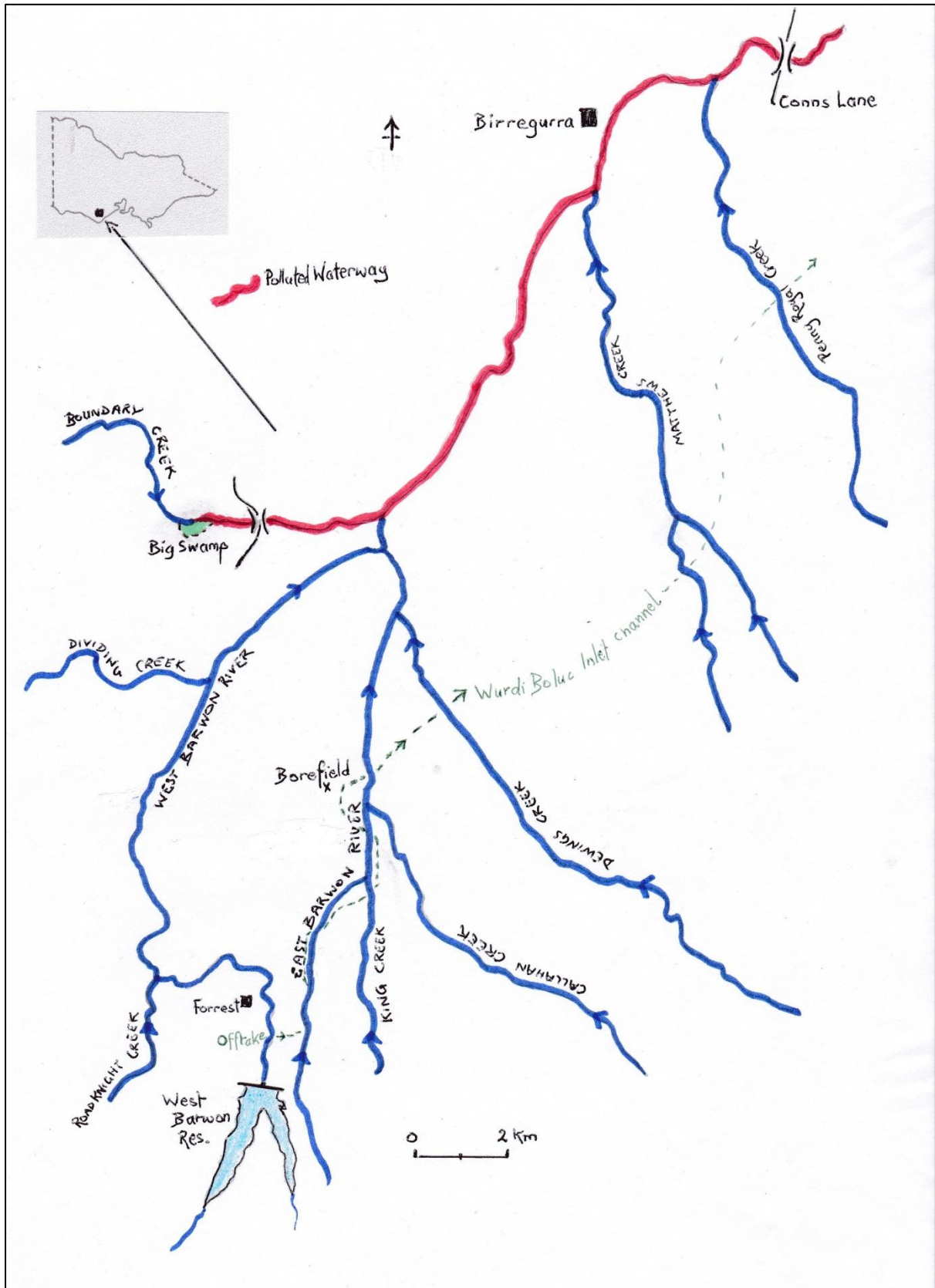
This Otway Water Book has been commissioned by Save the Barwon River and the LAWROC Landcare Groups. The payment for the preparation, collection and presentation of data in this book has been made by concerned community members.

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\*Groundwater mining or unsustainable groundwater extraction is when the removal or withdrawal of water from an aquifer over a period of time exceeds the recharge of the supply to that aquifer. Groundwater mining may impact on another area of the aquifer, surface water features and or ecosystems.



# Location Map.



**Background.**

As far back as 1984 it had been stated that the extraction of groundwater at the levels Barwon Water has been drawing water out at the Barwon Downs Borefield, would have serious detrimental impacts. After the very last truly independent and comprehensive study, it was determined that 1500 ML/year extraction was sustainable. Any extractions over this level and impacts would be noticeable. Extractions over 4000 ML/year would require injection of water back into the aquifers during high/normal surface flow periods. Despite this and the determination of a Permissible Annual Volume extraction being set at 4000 ML/year, Barwon Water was allowed to exercise a licence with an extraction limit of 12600 ML/year. By 2004 this extraction limit was raised to 20 000 ML/year, with no more than 80 000 ML in 10 years and no more than 400 000 ML over 100 years. Needless to say the detrimental impacts predicted decades before have come about.

In 2008 not one authority wanted anything to do with the acid problems flowing down Boundary Creek. Members of the LAWROC Landcare Group found the source but could find no support from nine Victorian Government authorities. Not one authority was prepared to do anything other than comment that the problem belonged to one of the other authorities. Alarming levels of acid water and toxic metal analysis could not prompt any action. At great expense to the members of LAWROC a Southern Cross University study was commissioned to look at wetland sites in the Barongarook, Yeodene and Kawarren area . The results found the Big Swamp to be one of the top three worst Actual Acid Sulfate Soil site in Australia. Not only was this disturbing enough, the swamp was unique in that it was the highest upland freshwater acid sulfate site studied. Other sites visited also had the potential to follow the fate of the Big Swamp.

After the Southern Cross University report was completed confirming LAWROC's worst fears, a Corangamite Inland Acid Sulfate Soils Multi-Agency Steering Committee was formed. This committee of State Government Authorities commissioned La Trobe University to implement an acid sulfate soil study in the Colac Otway Shire area. The Big Swamp was included in this study. Even though unable to enter the swamp due to OH&S issues it was confirmed that the Big Swamp was indeed an Actual Acid Sulfate Soil site.

Scientific data confirms groundwater extraction at the Barwon Downs Borefield is a mining operation, and that by definition is not a sustainable

operation. One consequence of this is instream biological disaster including fish kill.

### Symptoms of a Problem.

1. The Big Swamp has been known to be producing and discharging heavy metals and acid water since 2008. Page | 6
2. In June 2016 local identities reported to the Corangamite Catchment Authority a fish kill in the upper reaches of the Barwon River.
3. The pollution appeared to be emanating from Boundary Creek.



### State Government Authorities' Response.

1. In 2008 LAWROC Landcare Group had Big Swamp water testing analysis done at Deakin University Warrnambool in the NATA accredited laboratory.
2. In this same year nine state government authorities that were approached and presented with the test results wanted nothing to do with the Big Swamp dilemma.



3. The LAWROC Landcare Group funded an expensive investigation into the source of pollution coming from the Big Swamp, confirming it as an Actual Acid Sulfate Soil site of considerable potency.
4. The state government authorities previously showing little concern, then set up a Multi Agency Acid Sulfate Soils Steering Committee.
5. LAWROC representation on this committee was denied and information regarding its functioning had to be gained through the Freedom Of Information process.
6. Fiona Glover of La Trobe University was commissioned by this multi-agency committee to carry out an Acid Sulfate Soil study in the Colac Otway Shire. The margins of the Big Swamp were included in this study.
7. Fiona confirmed the results of the Southern Cross University study.
8. In June 2016 an officer of the Corangamite Catchment Management Authority called in the EPA to investigate the Barwon River fish kill.
9. The EPA carried out an inspection on 20 June 2016 (see Appendix One pages **101-108**).
10. No fish samples collected or water analysed other than for pH.
11. The EPA concluded "*Fish death likely due to natural event.*" (see Appendix One page **106**).
12. The EPA still has not visited the swamp to this day.

### **Colac Otway Shire Advice to the EPA.**

These two statements found in the EPA report and furnished by a Colac Otway Shire representative, require some examination.

*"Studies have been done to investigate the cause, scale of the issue and possible solutions."*

*"All remedial options previously considered were determined to be cost prohibitive."*

It is accepted that the acid is generated in the Big Swamp and that this has happened because the swamp has dried up. What the state government authorities have not done is determine why the swamp has dried up. No investigation into the cause of the swamp drying has been conducted by the authorities; nor is the scale of the problem been investigated. Possible solutions or remedial actions cannot be determined until these things are known.

- What caused the Big Swamp to dry out.
- What is the reason the swamp remains dry despite years of reasonable winter rains.
- What toxins are being produced.
- What is the potential to produce more.



Only after these things are answered can remediation strategies or solutions to the problem be considered. Treating symptoms without knowing the cause of the problem is counterproductive.

### **Extensive Studies.**

During the protracted course of attempting to gain some clarity on the statement made by 8 State Government authorities that this fish kill was a natural occurrence, the following statement was written.

*“Extensive studies in the area have been unable to determine the reason why the swamp has dried.”* (see Appendix Fifteen page 142).

This was a very similar notion put forward by the Colac Otway Shire representative as reported in the EPA document (see Appendix One page 104). In fact, both statements appear to be based on conjecture, wishful thinking and or hearsay. When pressed to provide these extensive studies the final result was...

*“...I can confirm that we are not aware of any studies that have been undertaken to determine the cause of the Big Swamp drying out. The Corangamite Catchment Management Authority also confirm this.”* (see Appendix Fifteen page 153 ).

### **The EPA and the Big Swamp.**

The EPA has not and will not visit the Big Swamp giving the reason that it is not designated a contaminated area. When asked who designates sites as a contaminated area, the answer was “The EPA does.”

### **Why So Long to Write this Report?**

Besides there being many aspects to consider and information to collect and process there are two other reasons for the delay.

1. Gaining information from Barwon Water is a long and protracted process. Freedom Of Information requests made for the pH readings along Boundary Creek and the daily flow rates down the West and East Barwon River branches did not arrive until 54 days after the request and cheques were received by Barwon Water.
2. Gaining an answer to the request made of the Water Minister to provide the sequence of events and data substantiating the statements being made by 8 State Government Authorities, that the fish kill was a natural occurrence, took around the same number of days to reach a conclusion. The conclusion being no evidence or data can be provided.

## Is the Fish Kill a Natural Occurrence?

After the EPA representative made the one visit to the fish kill site and declared the kill was “...*most likely due to a natural acid water event.*” (DELWP Response, Ref: MIN019454, 31 August 2016) eight government authorities then made a gigantic leap with factoids in their media releases declaring it as fact that the fish kill was a natural occurrence (see Appendix 3-7 Pages **110-115**).

(Factoids have no existence before appearing in a newspaper or media release and are not so much lies as products attempting to manipulate the “Silent Majority.”)

Even the ANSA and VRFish, Victorian recreational fishing bodies, were prepared to accept the notion of a natural occurring fish kill echoing the position taken by the Corangamite Catchment Management Authority, the Country Fire Authority, the Colac Otway Shire, Southern Rural Water, Barwon Water, the Department of Environment, Land Water and Planning, the Department of Health and Human Services and Agriculture Victoria (see Appendix Eight Page **116**).

To “blindly” accept the media releases of these authorities and the word of a Barwon Water friend is a practice the LAWROC Landcare Group has found on many occasions to be unreliable. Too often this Landcare Group found such bland statements to be groundless. As a consequence, on the 6<sup>th</sup> July 2016, the Water Minister was asked...“*Can you provide me with the procedure undertaken, and the evidence collected on which this decision was made?*” (see Appendix Fifteen page **140**).

This request set in motion a series of emails (see Appendix Fifteen Page **140-157**). As at November 2016 there is still no reply to either the procedure undertaken, nor the evidence on which the definitive statement is based other than to say replies have been based on information gained from the Barwon Water web site.

## The Merry Go Round.

What can be said about the contents of the emails in Appendix Fifteen is that the Water Minister is extremely difficult to gain access to in person and authorities such as Southern Rural Water and Barwon Water are believed unconditionally while the community they represent are kept at a distance. The water management Merry Go Round goes round and the community is kept outside the safety fence looking in.

## June 2016 and the Fish Kill, or was it March?

Appendix Two, page **109**, dates the first DELWP media release as 22 March 2016. Is this a mistake or did DELWP know of the kill starting much earlier than in June?

After the inspection that the EPA conducted on the 20<sup>th</sup> of June 2016 members of Save the Barwon and the LAWROC Landcare Group took it upon themselves to gain as clear a picture as possible of the circumstances surrounding the deaths of fish in the Barwon River. What really incensed the community was the statement that this was a natural occurrence and nothing could be done about it. To “grin and bear it” was not an option the local community was prepared to accept.



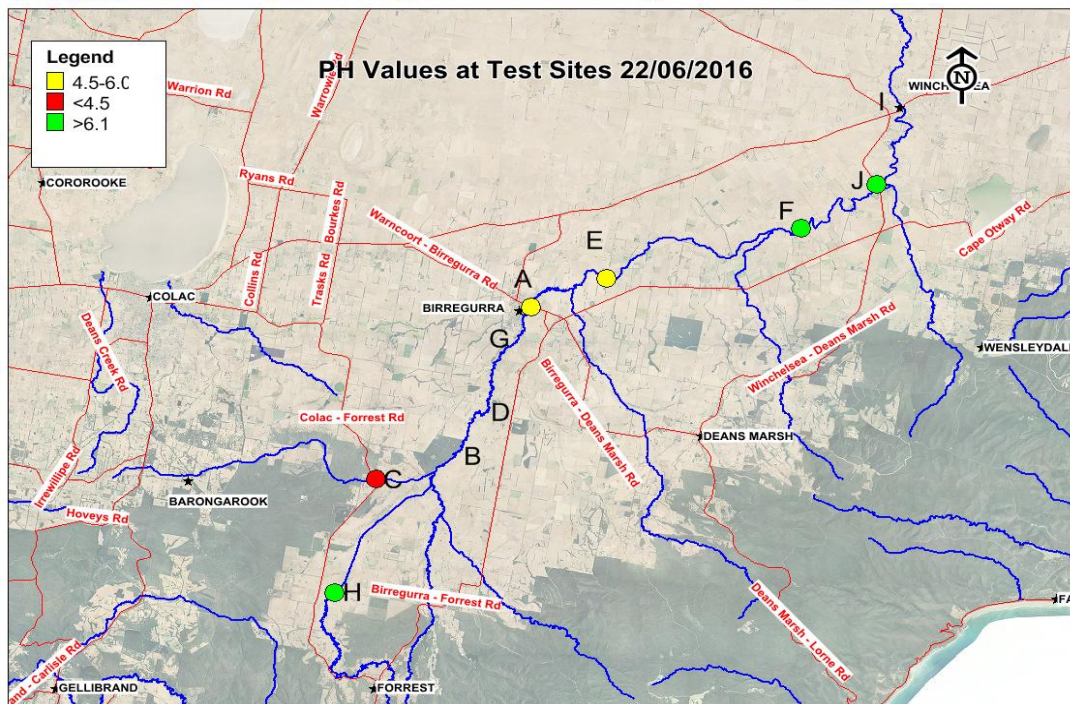
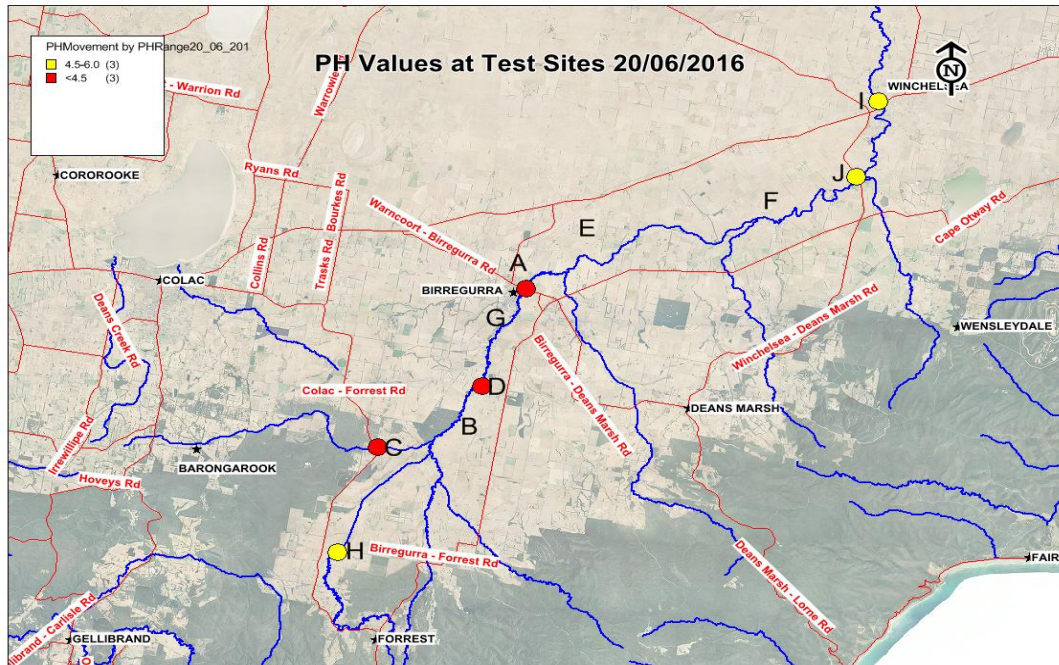
The dry Barwon River at Winchelsea June 2016.

### **What Actually Killed the Fish?**

The EPA representative stated it most likely that the high acid water levels killed the fish. In an attempt to gain a better understanding of what was happening regarding the quality of the water, Save the Barwon funding allowed 15 water samples to be collected and sent to the Southern Cross University (SCU) Environmental Analysis Laboratory (EAL) for testing. For a copy of the data collection sheets see Appendix Fourteen pages **125-139**. Unfortunately the container with sample 5 was broken during delivery. For the analysis results sheet see Appendix Eleven, page **122**.



The maps and data found on this page were supplied by the Corangamite Catchment Management Authority.

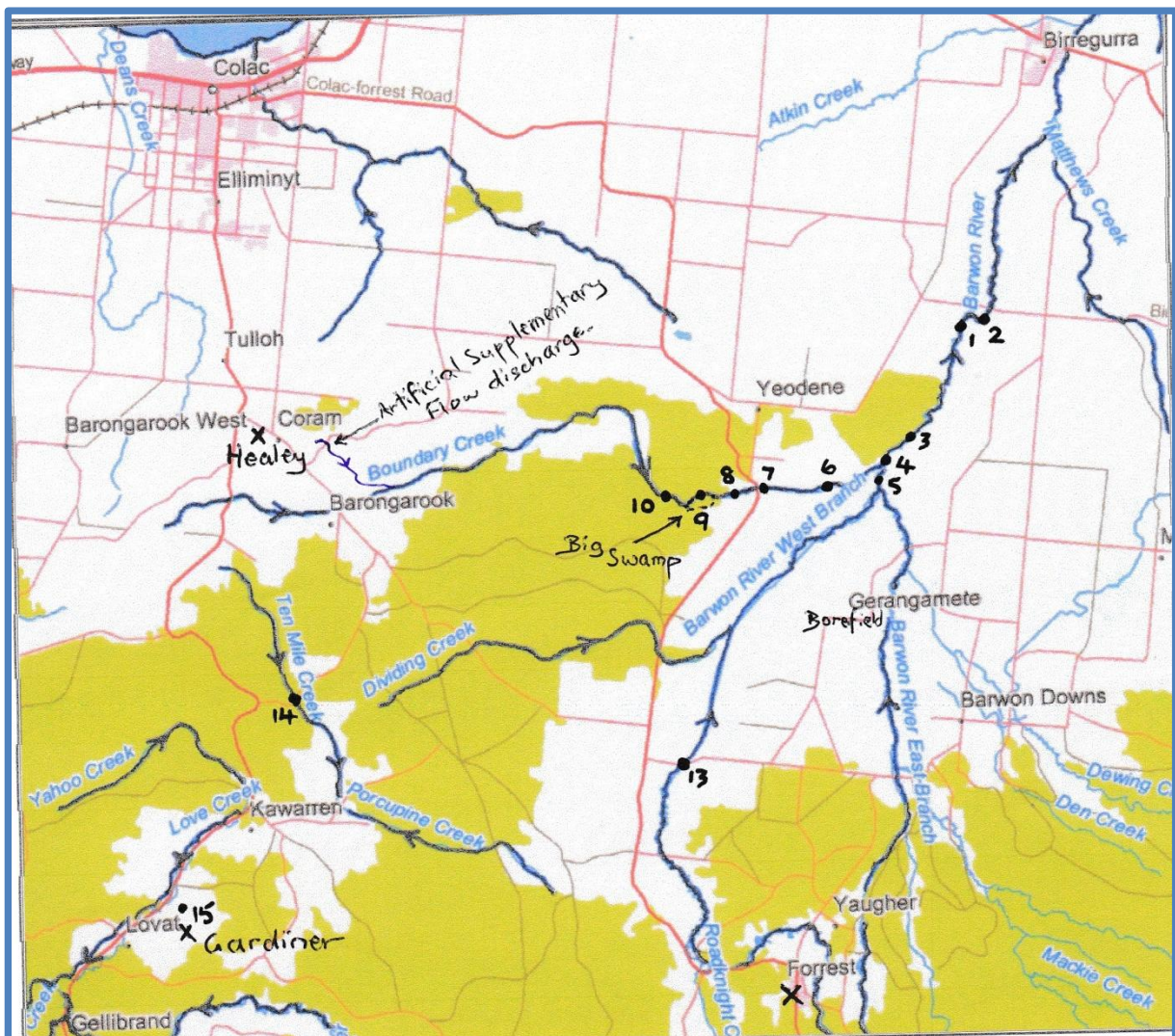


Upper Barwon River pH Event Monitoring

Code	Site	20/06/2016	22/06/2016	23/06/2016	24/06/2016	25/06/2016	26/06/2016	27/06/2016	28/06/2016	29/06/2016	30/06/2016	1/07/2016	4/07/2016	6/06/2016	12/07/2016	20/07/2016
H	Seven Bridges Rd	5.31	6.50	6.40	6.60	7.50	6.40	6.5	6.3	6.50	6.30				5.7	6.8
C	Boundary Creek @ Colac-Forrest Rd	2.75	3.50	3.60	3.60	3.20	3.30	3.4	3.4	3.50	3.50	3.5	3.4		3.4	3.4
D	Colac-Murroon Rd	4.02		5.00	4.80	4.60	5.00	4.9	4.9	4.90	4.80	4.8	4.7	4.8	4.4	5
A	Birregurra	4.35	5.00	5.10	5.30	5.60	6.10	5.3	4.8	5.00	4.90	5	4.9	6.2	5.9	5.9
E	Conns Lane		5.50	5.30	5.40	5.30	6.20	6.4	5.3	4.90	4.80		5.1	6.3		
F	Kildean Rd		6.50	5.90	5.90	5.90	6.40	6.1	6	6.00	6.40	5.2	5.1	6		
J	Winchelsea-Deans Marsh Rd	5.57	7.10	6.40	6.40	6.70	6.40	6.7	6.1	6.20	6.60	6.1	5.2	5.3		
I	Winchelsea	5.88	6.40	6.70	6.70	6.90	7.10	7.1	6.3	6.30	6.80	6.00	5.70	5.3	6.70	
	Bells Bridge (Inverleigh)									7.20			6.8	6.5		
	McMillians Lane (Inverleigh)										6.90	6.5	6.5	6.6		



**Rainfall Collection Sites and Rive Water Collection Sites for Analysis at the Southern Cross University's NATA accredited laboratory.**

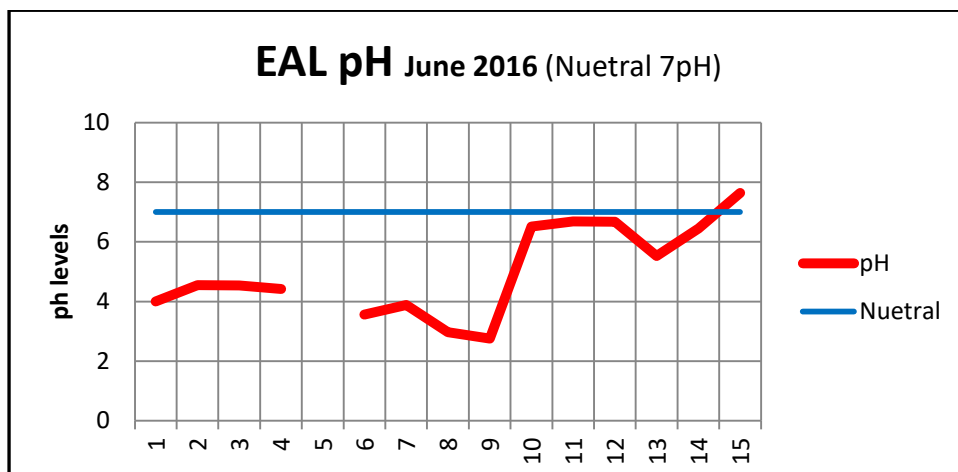


Approximate locations of ..... ● Water Sample Sites. X Rainfall Stations.

Water for analysis from Sites 1, 2, 3 and 4 was taken from contaminated sites in the Barwon River where dead fish were observed.

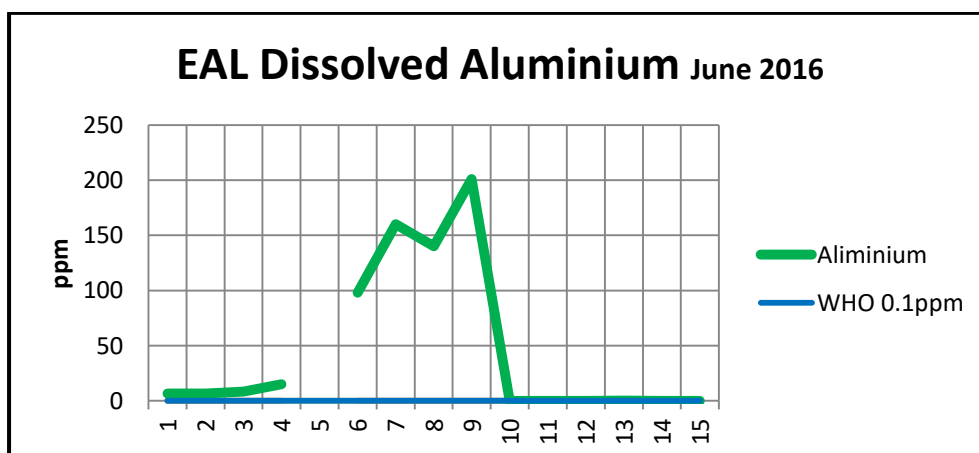
Sites 6, 7 and 8 are located at Boundary Creek below the Big Swamp wetland. Nothing dead or alive has been observed in this reach of Boundary Creek for years. Site 9 is within the Big Swamp. Site 10 is at Boundary Creek above the Big Swamp. Site 11 is at Kildean Road Crossing and Site 12 is at the Winchelsea Deans Marsh Road. Sites 11 and 12 are south west of Winchelsea. Site 13 is at the West Branch of the Barwon River at the Seven Bridges Road bridge. Site 14 is at Ten Mile Creek at Cashins Road. Site 15 is on Pompa Bill Creek on the Gardiner property at Kawarren.

There was no surprise with the pH levels of the water samples.

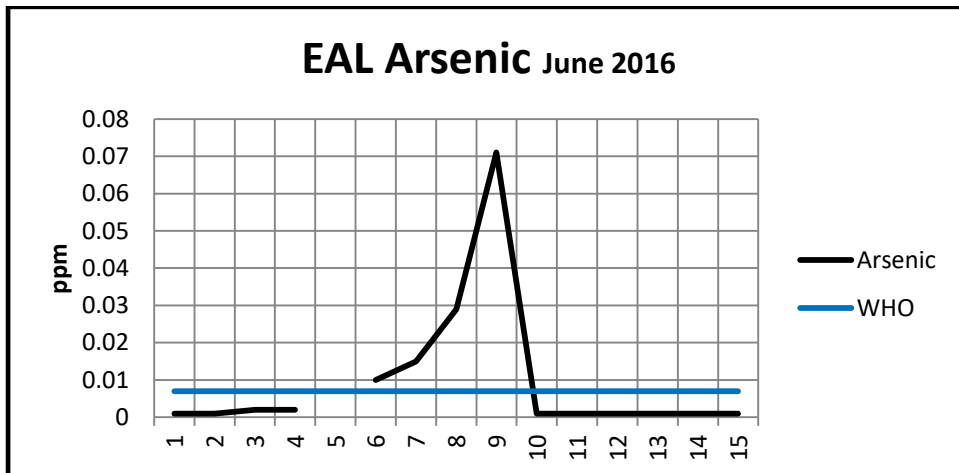


All sites downstream of the Big Swamp had toxic levels of acidity. Sites outside the influence of the contamination proved to be very close to neutral. There is no doubt that the water coming out of Boundary Creek is extremely acidic and would cause biota not used to these levels considerable stress. Levels of pH above 4 is regarded as the critical level for biotic life to be sustained in the streams of the Otway Ranges.

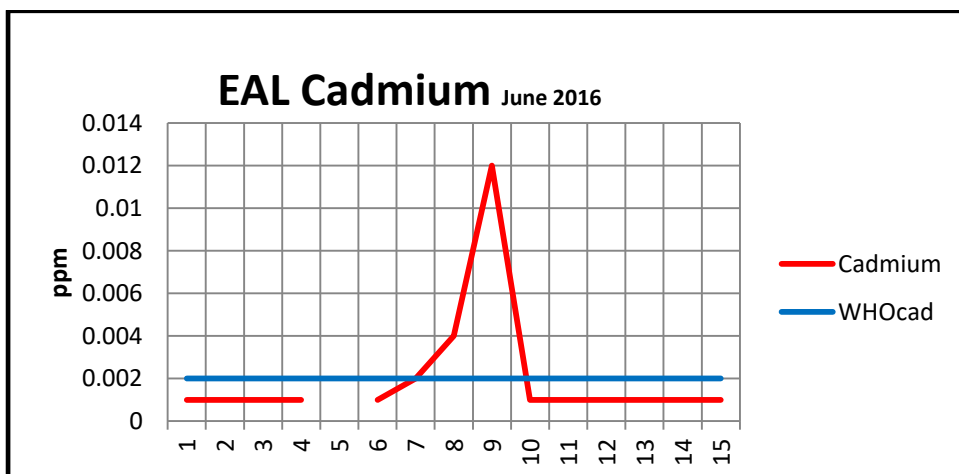
It is possible the real killer was the aluminium levels in the water. At the least having such massive amounts of dissolved aluminium could be a contributing factor if not the primary cause. Levels such as these could quite easily have clogged up gills suffocating the fish. What is known, is the World Health Organisation level for drinking water is 0.1ppm and aluminium levels at 200 ppm or up to 2000 times this, would clog up any human dialysis machine.



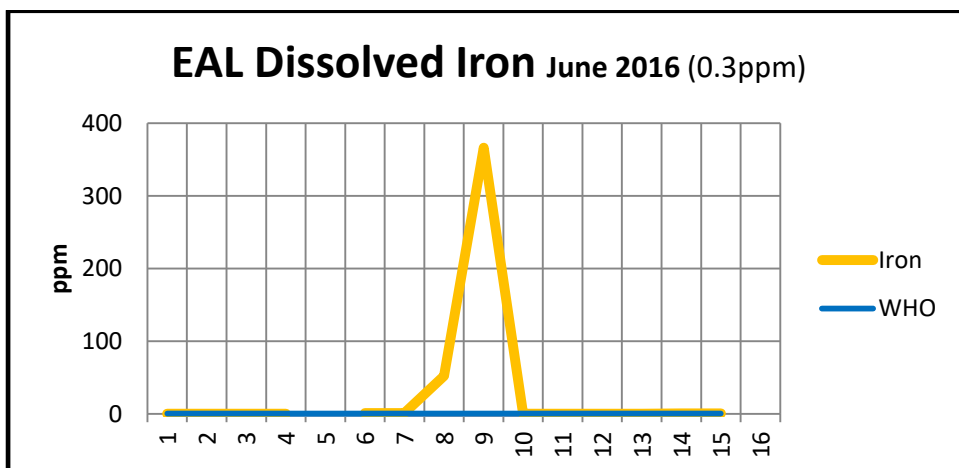
It is also possible that arsenic played a role in the deaths.



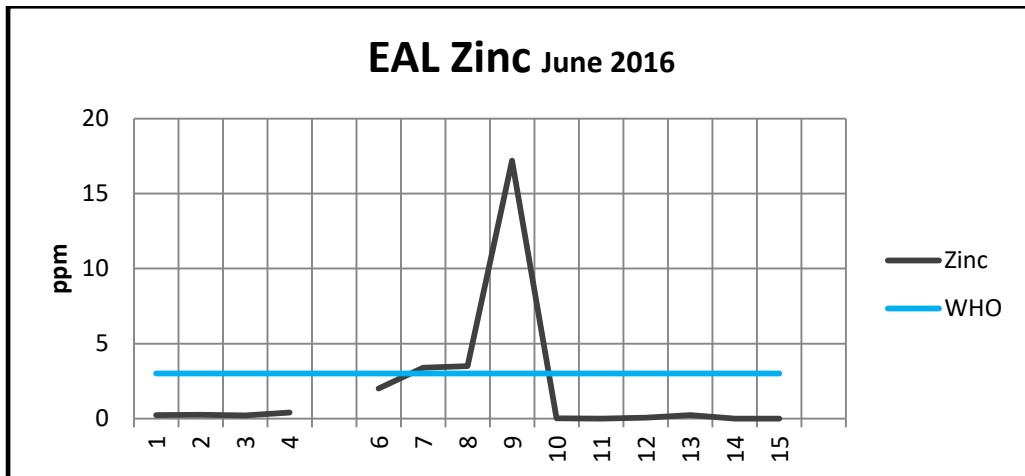
Or perhaps it was cadmium.



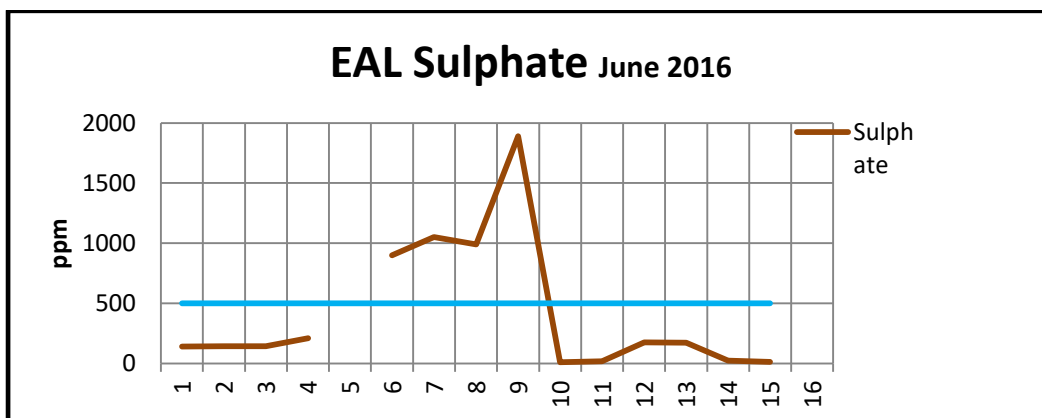
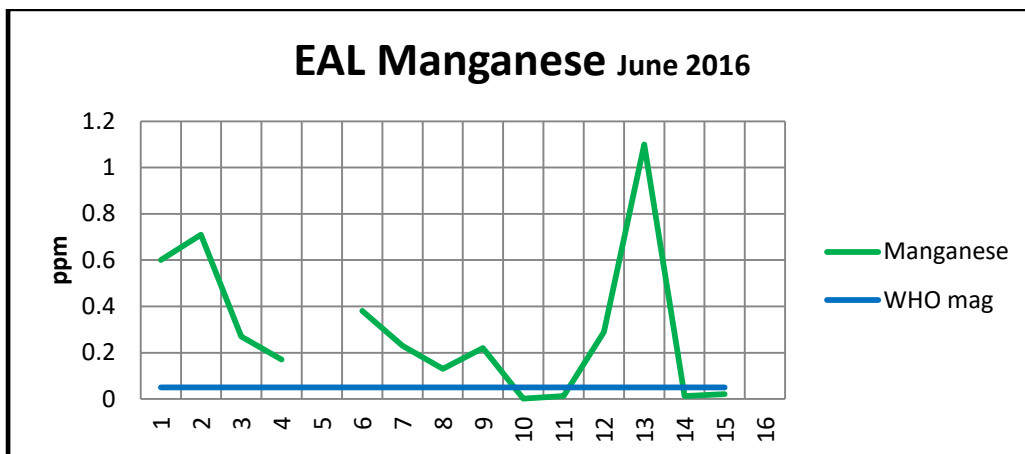
Or maybe it was dissolved iron.



Zinc may have contributed as well.



Manganese seems to also be at unnatural levels at several sites. Site 12 being in front of and downstream of the fish kill and site 13 being upstream of the kill, poses an interesting question of why this is so.





It is clear that the Big Swamp is generating the toxins responsible for the fish kills down the Barwon River. Whether it is a correct call to say that large flows in the Barwon dilute and allow the following press release to be made is arguable (see below 18 July 2016). All that the Barwon River flows achieve is to mask the underlying problem and give the State Government authorities an excuse to do very little. The band-aid effect from large flushing flows have made obvious symptoms disappear and presents the notion that the problem no longer exists .

## River's water quality improving

**Corangamite Catchment Management Authority says the acidic water in the Barwon River has "largely dissipated".**

CCMA chief executive officer Gareth Smith said the increased rainfall and river flow has caused the pH levels in a majority of the affected stretch of river to return to normal.

The acidic water environment caused multiple fish deaths in the upper Barwon River and Boundary Creek, upstream of Winchelsea in late June.

Mr Smith said the pH levels in the upper Barwon River, from Birregurra to Winchelsea, had returned to normal but Boundary Creek still had acidic water levels.

"pH levels in Boundary Creek, which has history of acidic water quality events due to natural sources of acid in the catchment, remains low and continues to affect the upper Barwon River for a short stretch downstream from the Boundary Creek confluence," he said.

Mr Smith said people could identify stretches of the river still affected by acidity by unusually clear water.

"Where river water is still displaying low pH it is advised to avoid contact with the water and source alternative supplies of drinking water for stock and pets," he said.

Landowners who are concerned about the acidity in the river can take samples of water into the Corangamite CCMA office in Colac for testing.

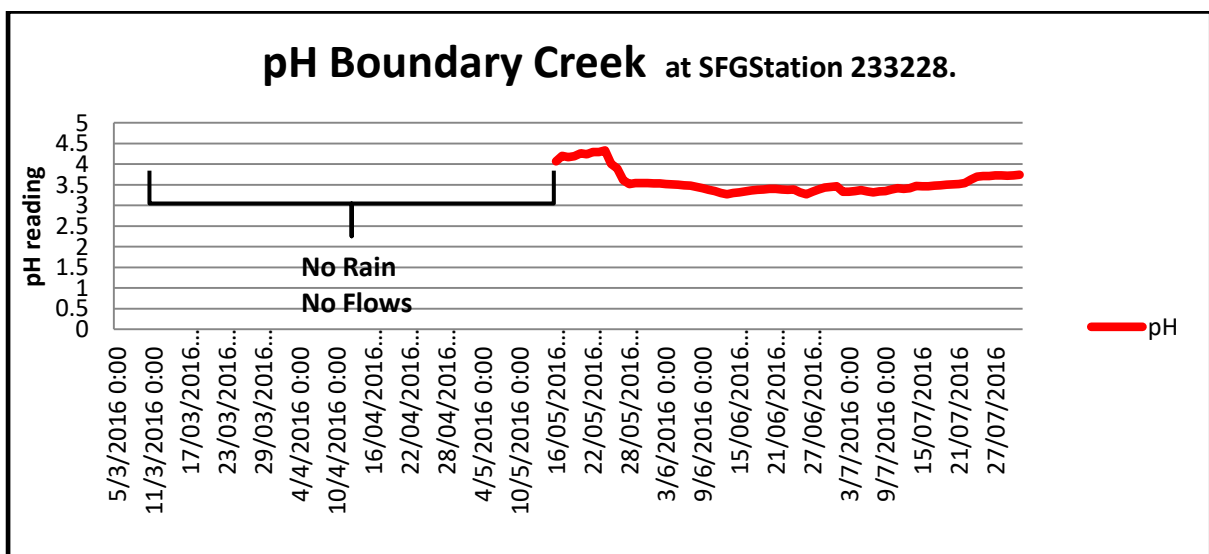
Colac Herald, Monday, July 18, 2016 | 3

What is normal?

Boundary Creek fish dead & gone long ago.

pH testing only.

The water pH levels of water coming out of Boundary Creek into the Barwon River are still significantly high as is the volume of water flowing (see page 21 for flows). Boundary Creek continues to pick up contaminants as it flows past and over the Big Swamp. This should be of concern to the state authorities and those people downstream of the contamination. Accepting the masking of the problem as a satisfactory solution and continuing to maintain the stance acid levels " *...are due to natural sources..*" is a bury your head in the sand stance..

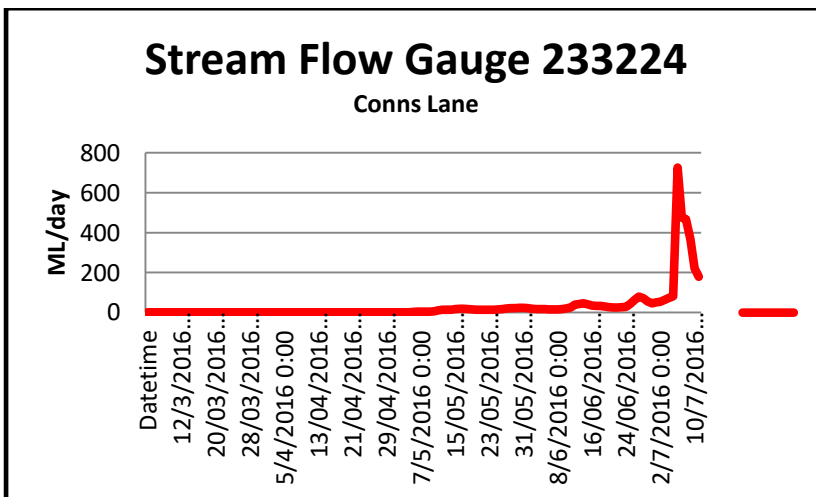


Data Provided by Barwon Water: FOI Ref: F087261.(see Barwon Water Qualification doc. Appendix 16 page 158)

This is a photograph taken at the Stream Flow Gauging Station No. 233224 on the Barwon River at Conn Lane, March 2016 (see page 12 & 18).



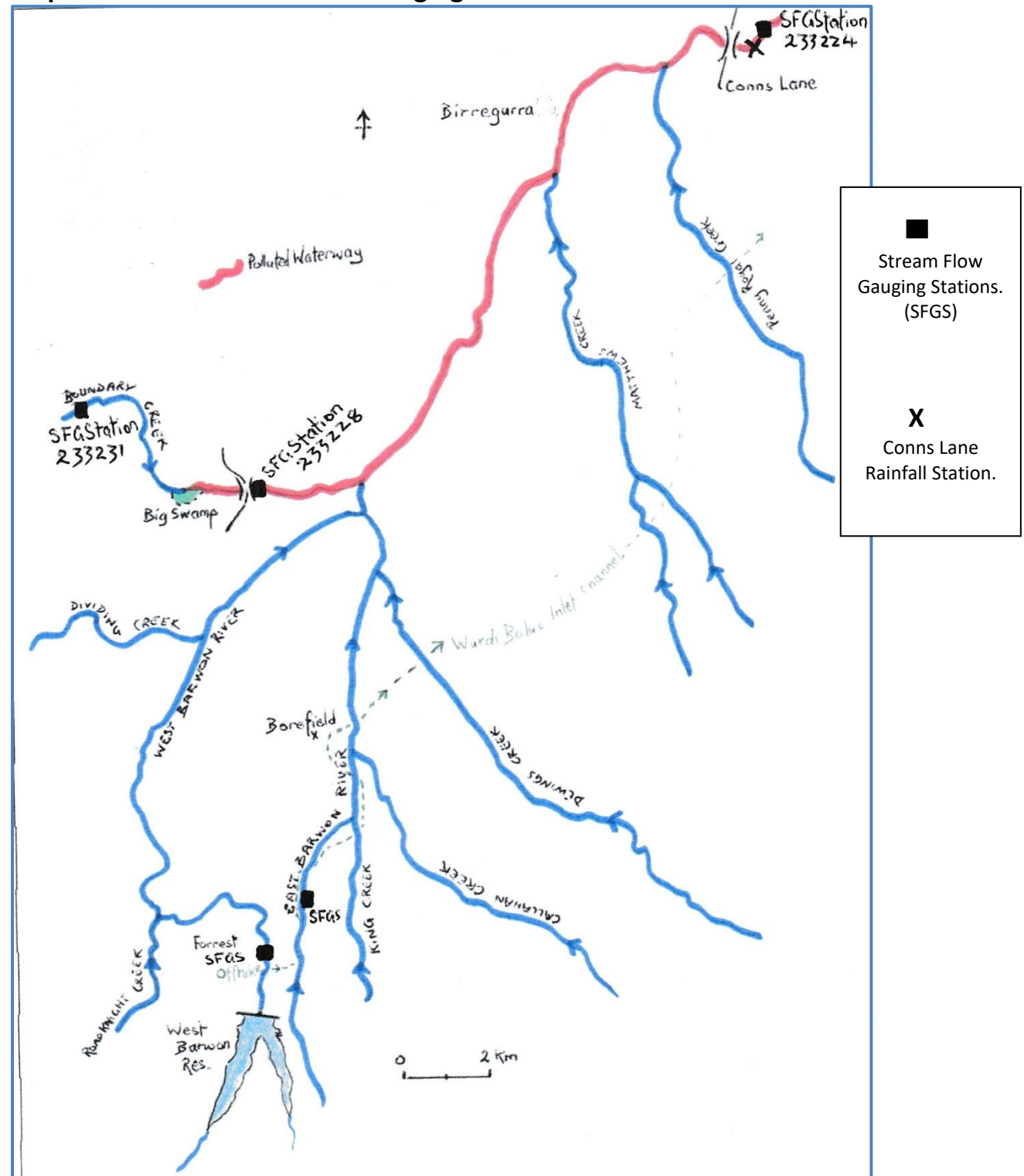
In March it was quite obvious that things were not progressing well in regard to flows down the Barwon River. Then when the fish kill took place memories of this photograph prompted a look at the Vic. Water Warehouse data site for stream flows, and in particular the flows at Conns Lane. Amazingly the flow at Conns Lane went from 80 ML/day to 700ML/day overnight on 3 July. By the middle of July a newspaper announcement declared that the river's water was no longer a problem (see page 16).



5-7-16. 80 ML flow
6-7-16. 728 ML
7-7-16. 482 ML
8-7-16. 474 ML
9-7-16. 374 ML
10-7-16. 230 ML
11-7-16. 187 ML
12-7-16 146 ML

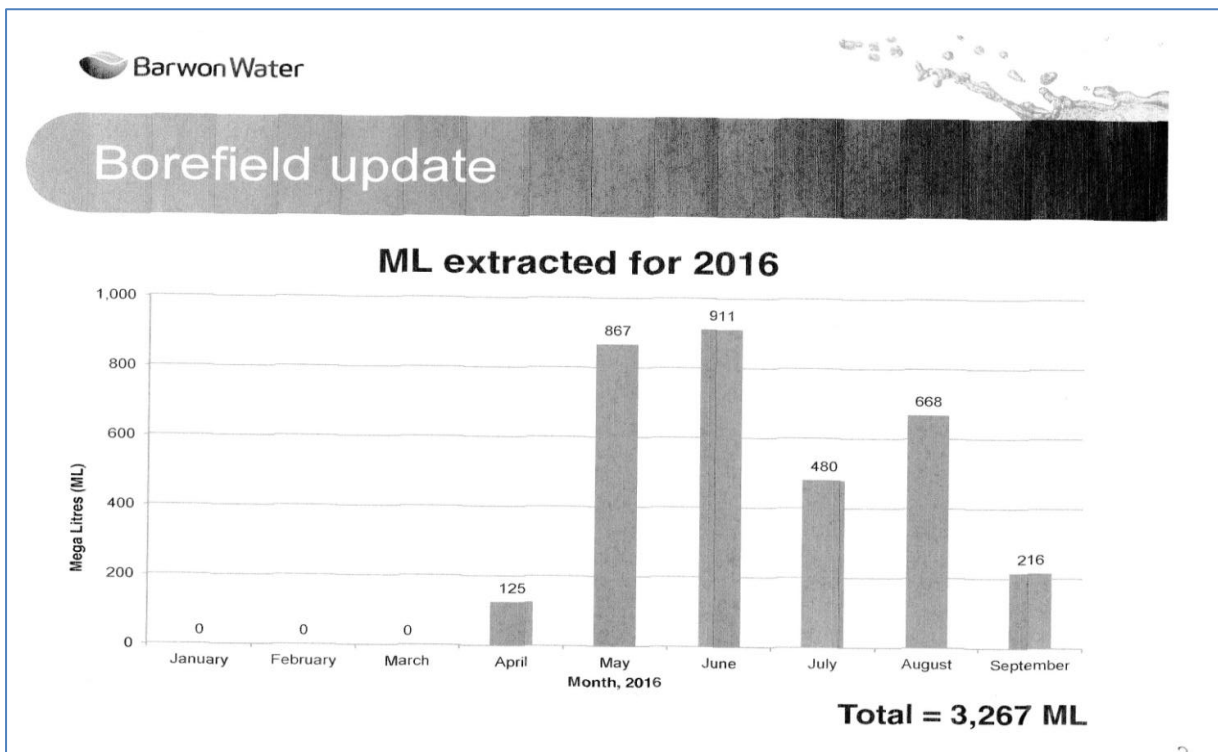
This 700 ML daily flow was not a one off data collecting error because other high flows followed over the next few days. Being no substantial rainfall to account for this massive increase in flows prompted a line of investigation attempting to discover where the flows originated. Data was then collected from several Stream Flow Gauging Stations; groundwater extractions and rainfall station locations.

**Map Location of Stream Flow Gauging Stations & Conns Lane Rainfall Station.**

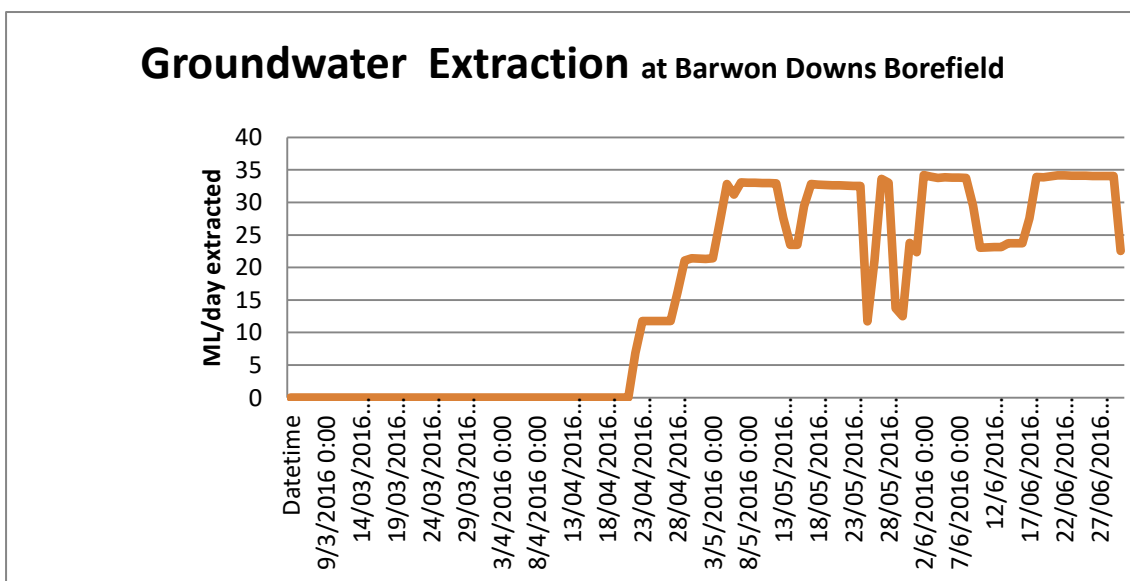




Geelong was not on any water restrictions but for some reason the Barwon Water Borefield was put back into operation extracting groundwater from the 22<sup>nd</sup> April 2016 until the end of September.

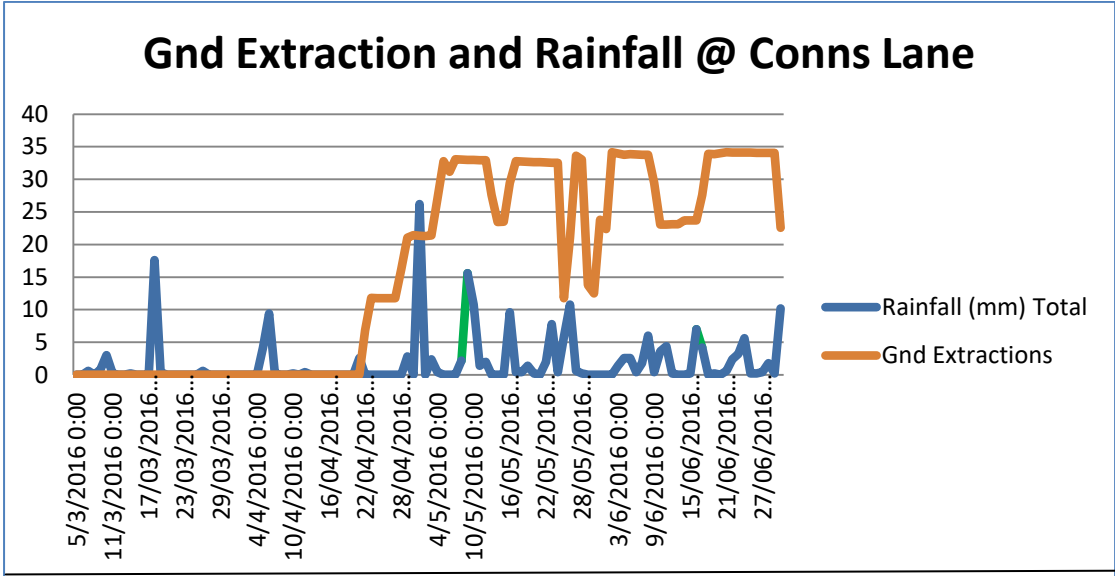


This water is usually processed and then discharged into the Wurdee Boluc Inlet Channel. However, there is a means of releasing this water into the East Branch of the Barwon River. The extractions amounted to approximately 34 ML/day during the fish kill period and could not account for the massive increase in flow at Cons Lane in July.



Source: Barwon Water 2015-2016 Gerangamete Groundwater Report to SRW.



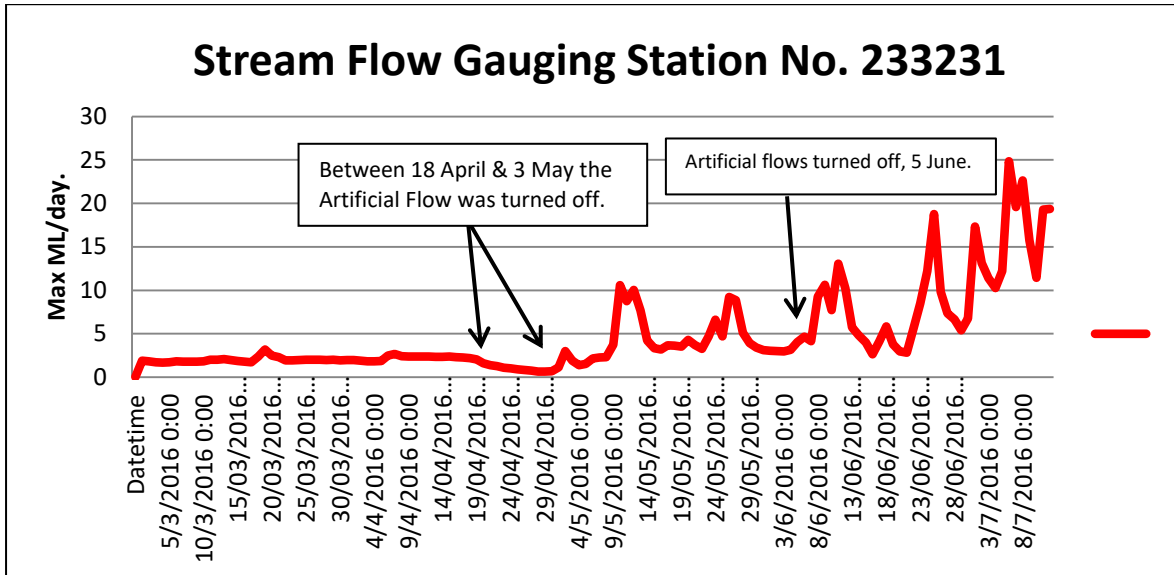


Persistent rain started to fall from late in April. It was not until late in September that there was enough rain to cause creeks and river to flood.

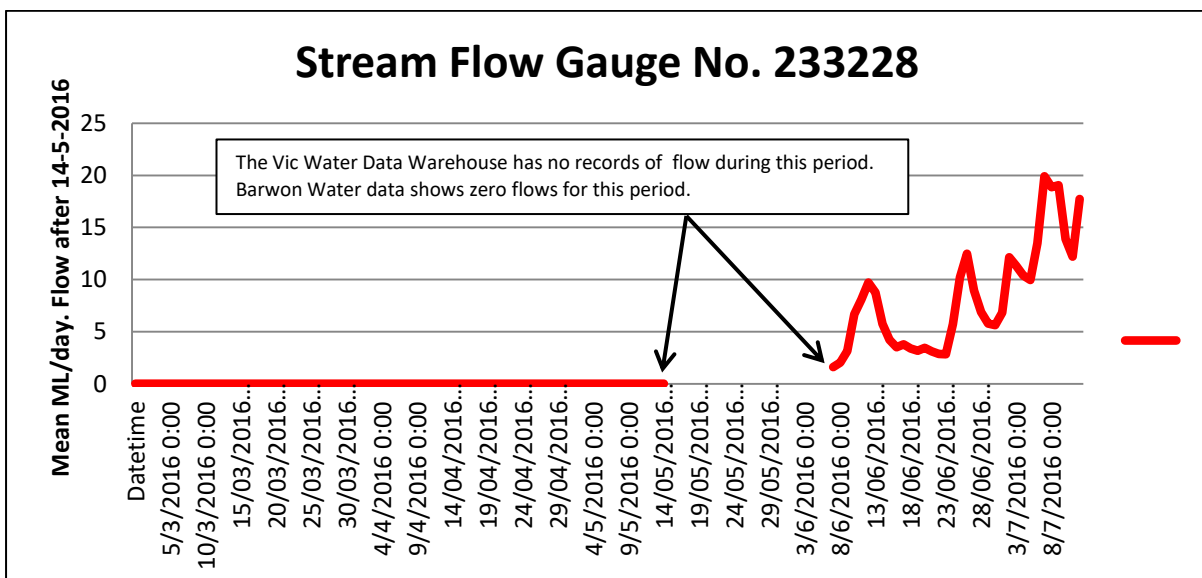


Loves Creek – KAWARREN September 2016..

When the Stream Flow Gauging Station (SFGS) on Boundary Creek at the Colac Forrest Road Bridge, SFGS Number 233228, has flows less than 1 ML/day Artificial Supplementary Flows are released from the Otway to Colac Pipeline on Bushbys Road into a small tributary of Boundary Creek (see Map, page 12). This water then flows down into Boundary Creek and past SFGStation Number 233231 and is reflected in the following graph. Not massive flows.

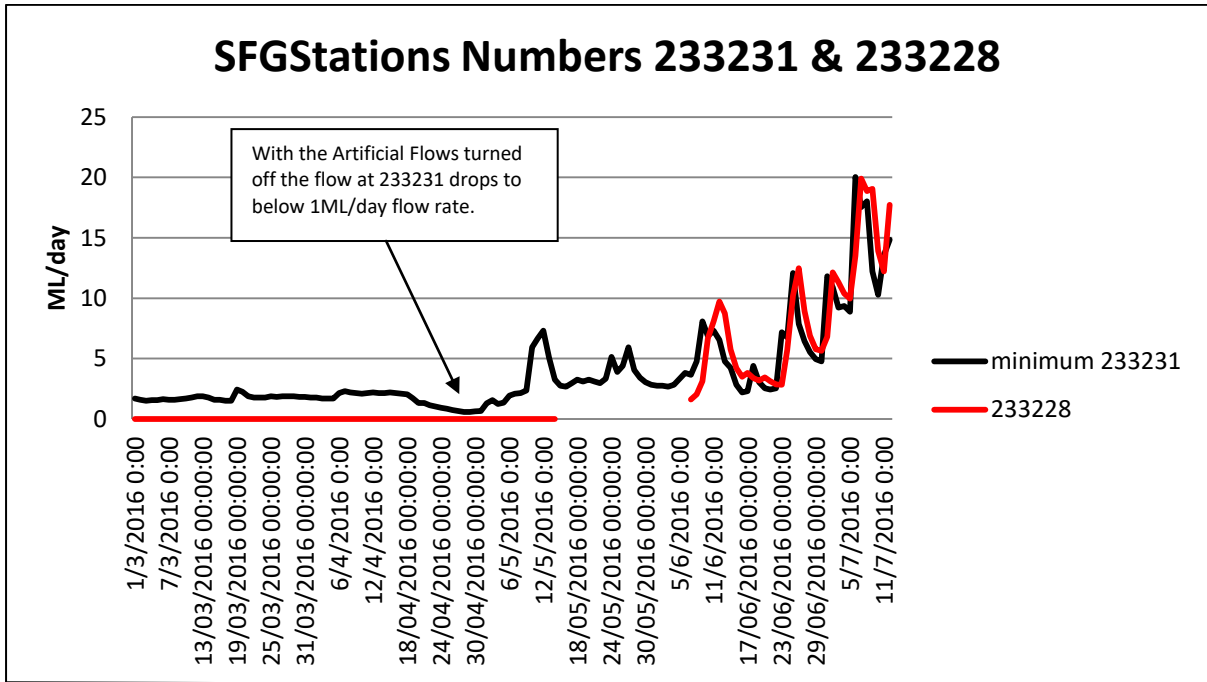


Once the flows at the Stream Flow gauging Station Number 233228 reach 1 ML/day the Artificial Supplementary Flows can be turned off.

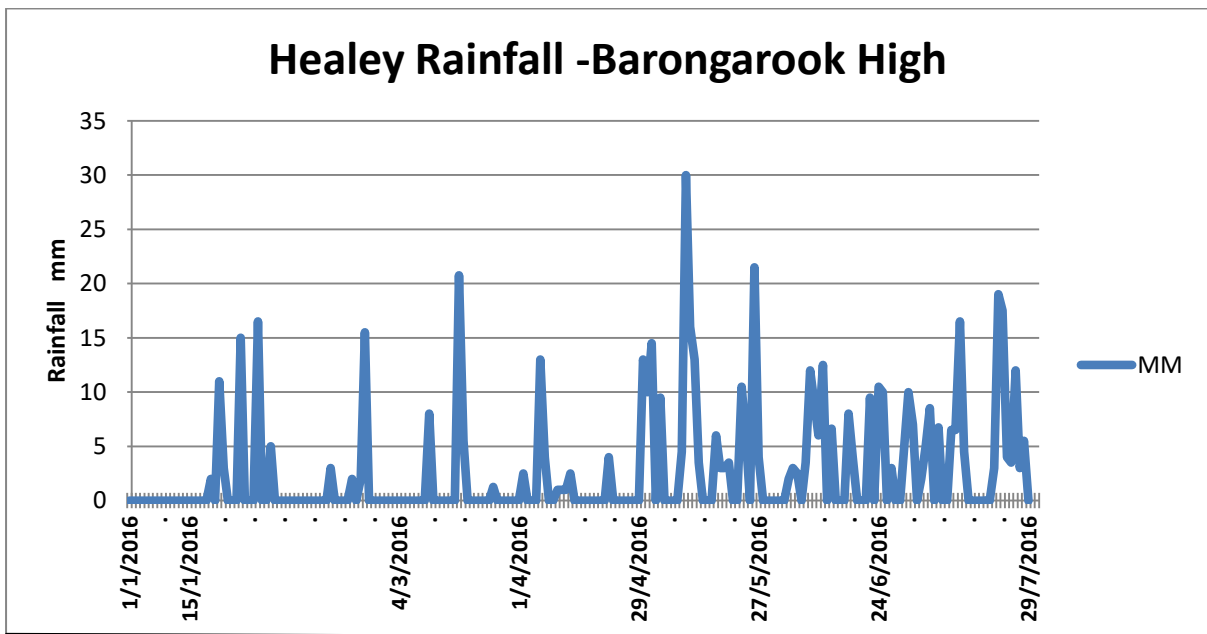


Flows at the SFGStation Number 233228 were first recorded from 6 June 2016 at the same time that pH levels were first recorded (see page 16).

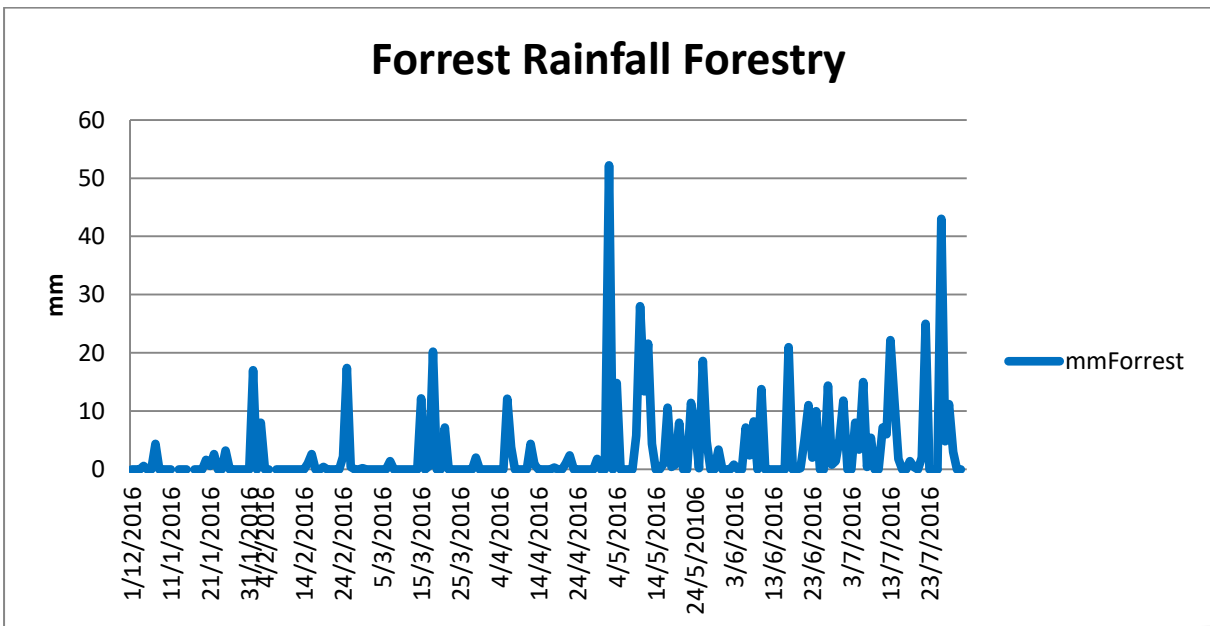
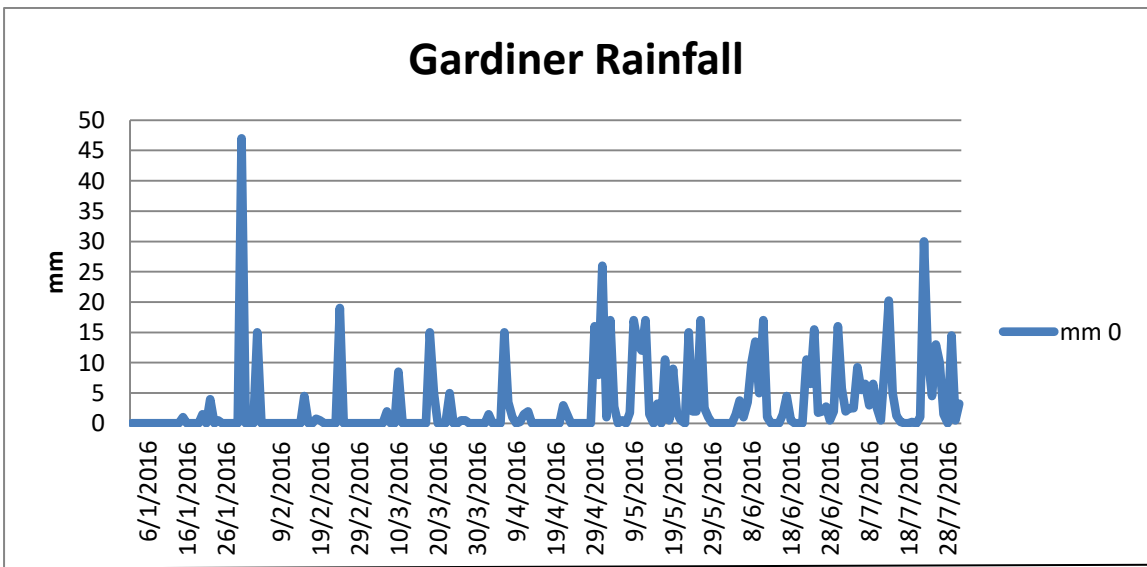
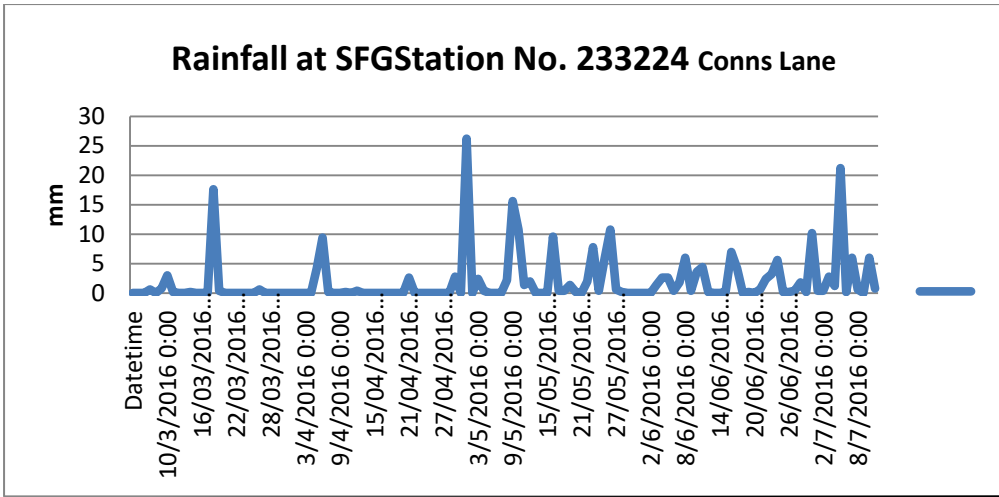
Once consistent rain began to fall the two graphs of SFGS 233231 and SFGS 233228 on Boundary Creek show a similar pattern.



The Healey Rainfall Station (see page 12) graph shows persistent rainfall.

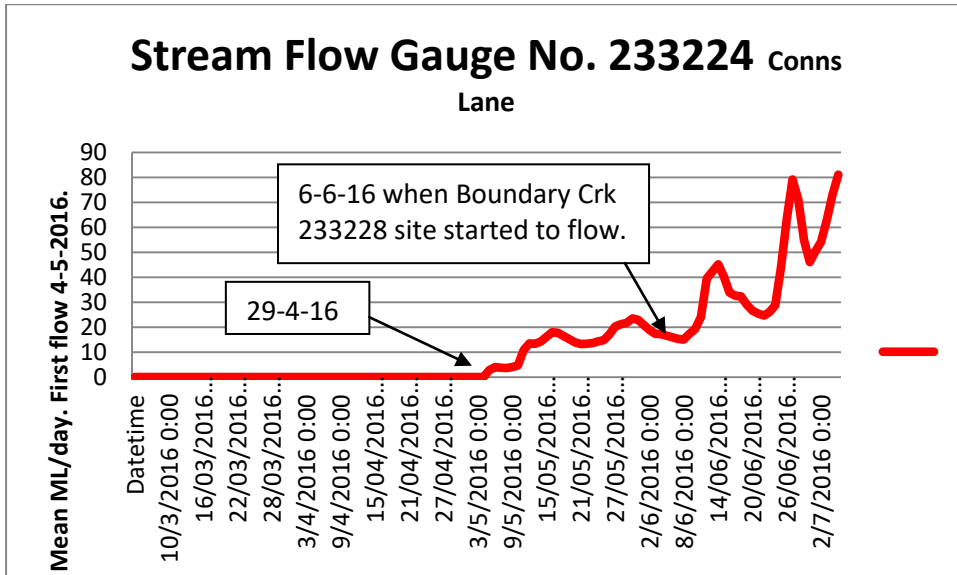


This rainfall graph follows a very similar trend to the Conns Lane, Gardiner and Forrest rainfall graphs.



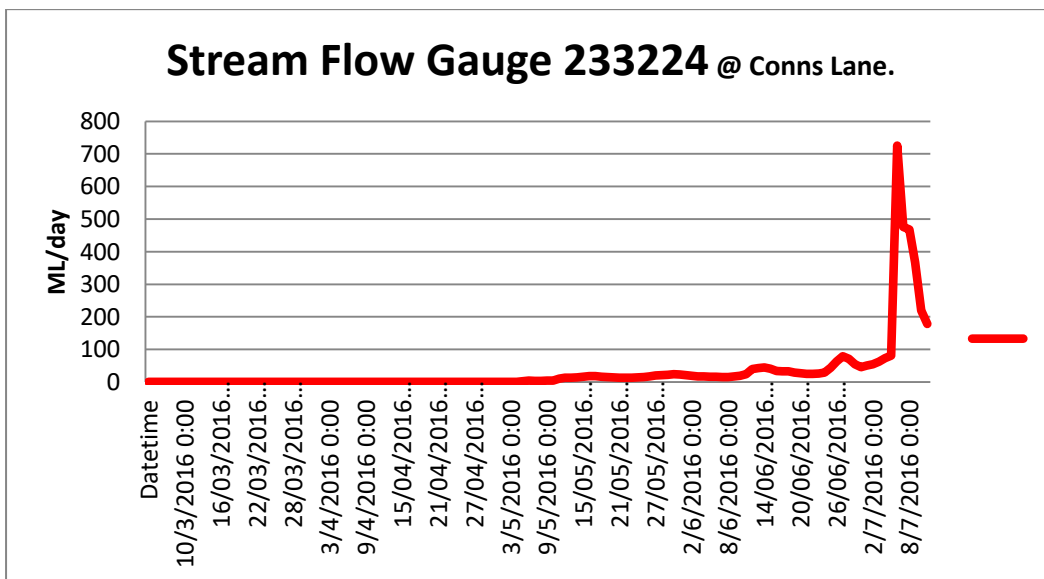


These four rainfall stations display a variation of recordings as expected.. The falls from least rainfall to the highest were the Conns Lane site, Healey, Gardiner to the heaviest of the four, at Forrest. During the fish kill episode the rainfall in the district was consistent, above average and was reflected in the stream and river flows with one exception. There appeared to be no accounting for a massive increase at Conns Lane on the 6<sup>th</sup> of July.



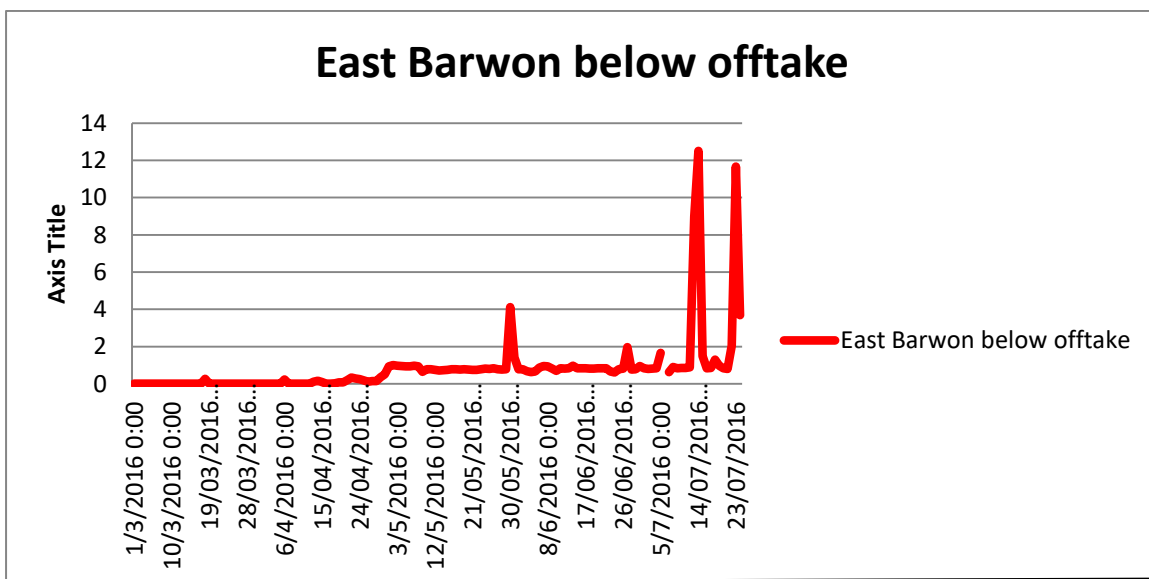
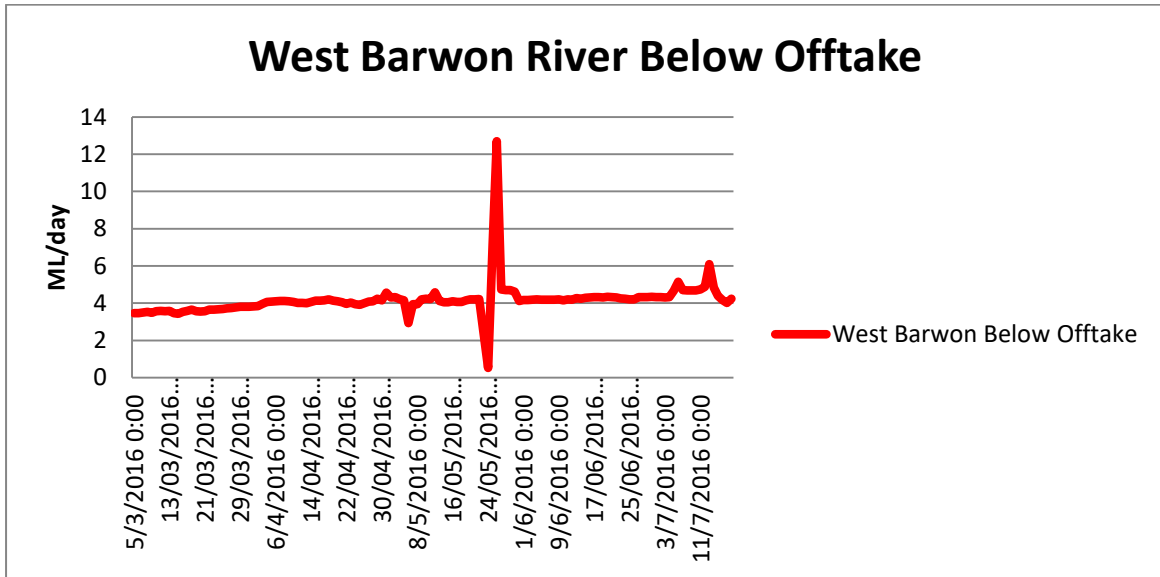
Flows at Cons Lane up to 2-07-2016.

This graph shows a pattern of river flow increase and when viewed with the rainfall charts, is a reasonable depiction of flows at Conn Lane up to the 5<sup>th</sup> of July. The numerous feeder tributaries that enter the Barwon River before Conns Lane contribute to this steady increase. The graph above stops at 84 ML/day flow on 5 July 2016. The next graph below tells a different story. The very next day the flow at Conns Lane jumps to over 700 ML.



Considering the rainfall patterns for the same period this is difficult to explain. Could it be that a cleansing flush was being released from the West Barwon Dam?

In an effort to answer this question and through a lengthy Freedom Of Information process, flows below the Wurdee Boluc Inlet Channel diversions in both the West and East branches of the Barwon River, were obtained. Page | 25



Neither of the releases from the West Barwon Reservoir into these branches of the Barwon River, could account for a 620 ML increases in flows at Conns Lane. During the same period the West Barwon Reservoir was still well below capacity.



Daily Water Releases from West Barwon Reservoir - 1 Jan 2016 to 1 October 2016  
 (Result of FOI to BW Ref: F08726) - A11473210

Real-time Operational Data (as recorded at the time)	
29/05/2016 0:00	25.3
30/05/2016 0:00	56.6
31/05/2016 0:00	90.1
1/06/2016 0:00	69.2
2/06/2016 0:00	89.5
3/06/2016 0:00	89.3
4/06/2016 0:00	89.0
5/06/2016 0:00	87.5
6/06/2016 0:00	88.9
7/06/2016 0:00	90.1
8/06/2016 0:00	89.9
9/06/2016 0:00	89.9
10/06/2016 0:00	82.3
11/06/2016 0:00	69.0
12/06/2016 0:00	69.1
13/06/2016 0:00	69.1
14/06/2016 0:00	79.9
15/06/2016 0:00	90.4
16/06/2016 0:00	90.3
17/06/2016 0:00	90.1
18/06/2016 0:00	89.8
19/06/2016 0:00	89.5
20/06/2016 0:00	89.3
21/06/2016 0:00	89.2
22/06/2016 0:00	89.0
23/06/2016 0:00	76.7
24/06/2016 0:00	55.1
25/06/2016 0:00	45.2
26/06/2016 0:00	45.2
27/06/2016 0:00	65.1
28/06/2016 0:00	90.0
29/06/2016 0:00	89.9
30/06/2016 0:00	81.7
1/07/2016 0:00	81.7
2/07/2016 0:00	70.1
3/07/2016 0:00	60.4
4/07/2016 0:00	60.1
5/07/2016 0:00	64.4
6/07/2016 0:00	35.1
7/07/2016 0:00	4.83
8/07/2016 0:00	4.81
9/07/2016 0:00	4.80
10/07/2016 0:00	4.80
11/07/2016 0:00	4.85
12/07/2016 0:00	4.98
13/07/2016 0:00	6.21
14/07/2016 0:00	4.96



And, huge volumes were being released from the Reservoir, despite the fact that other storages in the Otway Ranges were all but full.



The Colac storages were overflowing in August.



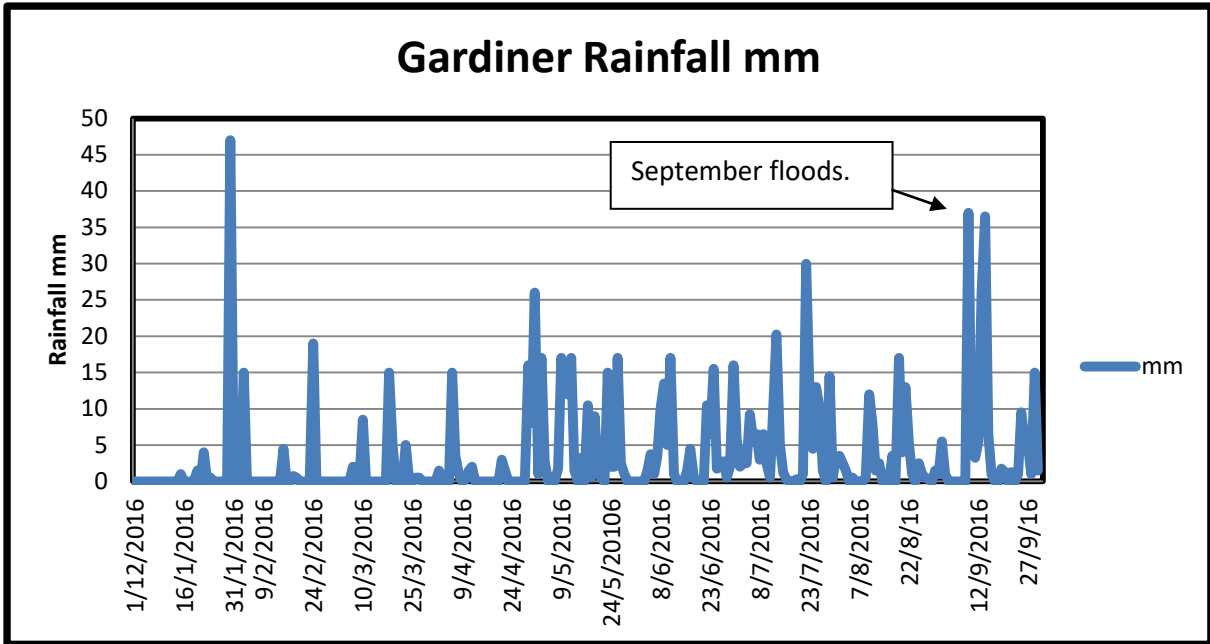


The majority of the water being released from the West Barwon Reservoir was being diverted into the Wurdee Boluc Inlet Channel.

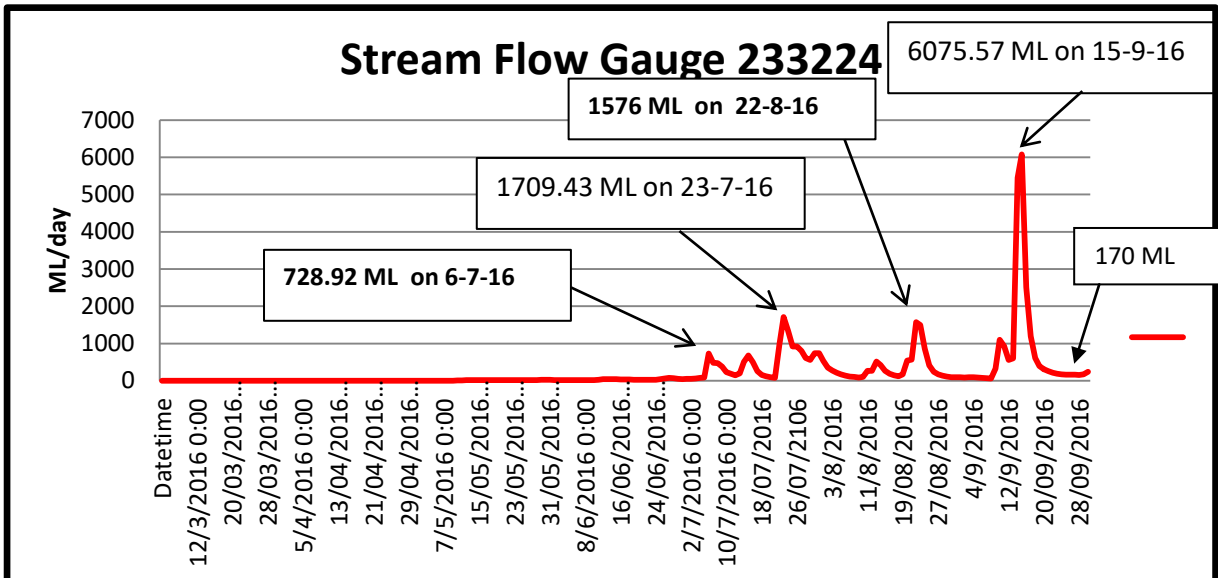
The Conns Lane 728 ML/day and the 1896 ML over the next few days had to be coming from somewhere. It would be little consolation to the landholders who had endured months of no flows in the Barwon River if this massive increase was originating from the West Barwon Reservoir in an effort to flush out the Big Swamp toxins. If this amount of water had been released during the summer months, the fish kill may have been averted and farmers would have had a Stock and Domestic supply rather than a dry Barwon River bed.



The Conns Lane Stream Flow Gauging Station weir on the Barwon River with no overflow. This situation has become a regular occurrence.



This Gardiner rainfall chart shows the falls to the end of September. Falls were persistent and consistent up to the flood of September. It took huge downpours of rain in a very short period to cause this flood and this is reflected in the huge flows at Conn Lane of over 6000 ML/day. However, the 6 July jump from 80 to over 600 ML in a day cannot be explained as easily nor can the other huge spikes of flow at Conns Lane.



Then there are the low flows recorded between the first and the eighth of September when they ranged from just under 100 ML/day down to 60 ML/day. A closer investigation into the Conns Lane flows needs to be undertaken.

It is quite feasible that the seven days of 2624 ML flow past the Conns Lane SFGStation in early July 2016 could have come from a combination of flows. The groundwater extraction could have been released into the East Branch of the Barwon River. Releases out of the Wurdee Boluc Inlet Channel could be diverted into the Dewings, Matthews and Pennyroyal Creeks all of which join the Barwon River before Conns Lane.

### **Macro-invertebrate Studies.**

The Corangamite Catchment Management Authority (CCMA) conducted two macro invertebrate surveys in the Barwon River in July 2016.(see Appendix Eighteen pages **160-168**). The CCMA readily provided the results of these surveys but was unable to complete any sort of discussion or report on the findings (see Appendix Seventeen Page **159**). As a consequence and wanting to gain as much knowledge as possible regarding the impacts of the fish kill, Peter Servo of Stygoecologia was commissioned to look at and write up a report as best he could,from the CCMA macro-invertebrate survey data sheets.

Peter’s preliminary environmental assessment of the status of the aquatic ecosystems of the Barwon River below the confluence of Boundary Creek and upstream on the Barwon River, has been reproduced in full in Appendix Nineteen pages **169-181**.

Peter did find that the site below the confluence of Boundary Creek and the Barwon River was quite different to the one upstream and that the lower site was the “*..most depauperate.*” (Depauperate – is an ecosystem lacking in numbers or variety of species.) His report is well worth a read and does indicate a multitude of work that should be done from two aspects.

One, better base line data needs to be collected for future comparative work, and two, things that need to be included if there is another fish kill.

## **CONCLUSION.**

There is no doubt the Big Swamp at Yeodene is the source of the toxins that killed fish in the upper reach of the Barwon River in June 2016. The statement made by eight state government authorities that this kill was a naturally occurring episode, cannot be substantiated. Neither can the statement that says there are extensive studies that have been done to determine why the Big Swamp has dried out.

The Big Swamp continues to produce very high levels of acidic water that is flushed out of the swamp by Boundary Creek sending this into the Barwon River.

Larger flows in the Barwon River have a masking effect by diluting the toxic water to levels regarded by the authorities as acceptable, consequently not warranting further investigation.

No reasonable explanation is given as to why the Borefield at Barwon Downs extracted 3267 ML between April and October other than the licence conditions allowed it.

A thorough, comprehensive and adequate response to the fish kill by the state government authorities appears to be hamstrung by a lack of personnel, funding. There also appears to be a readiness to attribute this kill to a natural cause that does not question the role played by human water management.

Many questions remain regarding the flows recorded at the Conns Lane Stream Flow Gauging Station. Why were there no flows at Conns Lane for such an extended period when Barwon Water was releasing 4 ML/day from the West Barwon Reservoir? Where did the massive flow originate when the flow jumped from 80 ML/day to 700 ML/day? And why, considering the amount of rainfall did it take the Barwon River so long to respond to these rainfall events?

Why doesn't the East Branch of the Barwon River have water released into it during dry periods? There are so many conundrums that the whole water resource management of the area appears long overdue.

The Water Minister, Lisa Neville, is extremely reluctant to discuss this matter or any other matter relating to water resource management in the Barwon Downs/Gellibrand River Catchments with anyone other than the representatives of the various government authorities.

As a collective the state government authorities when dealing with the Barwon River fish kill, have relied on suspect hearsay, conjecture and limited data.

## **Is something fishy going on?**



## Recommendations.

- A.** A solution stopping the pollution coming out of the Big Swamp has to be found.
1. In the mean time decommission the Barwon Downs Borefield.
  2. The EPA need to visit the Big Swamp site.
  3. Determine the causal factor(s) why the Big Swamp has dried out.
  4. Determine the reason why the swamp remains dry despite years of reasonable winter rains.
  5. Ascertain the toxins being produced.
  6. Determine what potential there is to produce more.
  7. Once the parameters of the problem are known develop a plan of mitigation/remediation.
- B.** Environmental and Stock & Domestic flows must be allocated to the Barwon River and the unsustainable extraction of surface and groundwater from the Otway Ranges stopped.
1. Ensure that the West Barwon Reservoir releases at least 3 ML/day throughout the year into the West Branch of the Barwon River.
  2. Ditto for the East Branch of the Barwon River.
  3. Pipe the entire length of the 50 odd kilometres of the extremely wasteful, leaky, earthen and open Wurdee Boluc Inlet Channel.
  4. Cover the West Barwon Reservoir with aqua cones saving 90% of water evaporation.





5. Cover sections of the Wurdee Boluc Reservoir.



6. Cease the diversion of tributary waters from Callahan, Dewings, Matthews and the Pennyroyal Creeks into the Wurdee Boluc Inlet Channel.
  7. Utilise the Geelong to Melbourne water pipeline connection to compensate the closing of the borefield and the 6 ML/ day flow from the West Barwon Reservoir into the two branches of the Barwon River.
- C.** Place a greater value on potable water by raising the price of water and make the collection of rainfall compulsory for all Geelong urban households.
- All new homes to include rainwater tanks.
  - As part of the sale process of all homes sold from this date, rainwater tanks have to be included.
  - All other homes without a tank be given X number of years to have them installed.
- D.** Plan a better method of investigation in the event of another fish kill.
1. Establish permanent macro invertebrate monitoring sites.
  2. Conduct regular surveys.
  3. Conduct the surveys as per Peter Servo's recommendations and suggestions.
  4. Collect water samples for a full analysis as per the EAL testing and include testing for Nitrite, Boron and Fluoride.
  5. Collect water samples at varying depths.
  5. Take and analyse "fresh" dead fish for cause of death.
- E.** Other considerations.
1. Investigate the source of manganese at water sampling sites 12 & 13.
  2. Determine where the 700 ML/day flush of water at the Conns Lane Stream Flow Gauging Station came from.
  3. Investigate the cause of the other huge increases in daily flows at the Conns Lane Stream low Gauging Station.
- F.** Instigate a Parliamentary Inquiry into the management of the Upper Barwon River Catchment.

# Letter to the Editor

Dear Editor

October 17, 2016 Barwon water Media Release Ref: 061/16.

"The Barwon River water is heavily allocated and any substantial increase in water harvesting for drinking water use would impact on other water users, such as agriculture diverters, and the environment," Mr. Bicknell said.

Perhaps it would have been more accurate to say the waters of the Barwon River catchment have been over allocated. Both groundwater and surface waters have been unsustainably harvested. Just ask the agriculture diverters how difficult it is to run their operations when the river stops running for months on end. The environment fails no better. Platypus, fish and other instream biota cannot survive when their habitat disappears.

Why has this been allowed to happen? I can think of three reasons. The change from a healthy thriving Barwon River to the "drain" it now has become, has been so gradual that each little impact has virtually gone unnoticed. Another reason being, extremely poor environmental and water resources management. And the third, the over arching objective of the Barwon Water organisation to provide cheap potable water.

A headline in the Geelong Business News of June 2002, stated...

"Geelong's water resources far exceed the city's current and future requirements."

The then Barwon Water CEO, Dennis Brockenshire, was quoted as saying, "One of the myths I have had to deal with is that Geelong is short of water."

Kevin McCarthy, the interviewer, was concerned that most of the rain that fell on Geelong city was flowing into the sea. If the water could be captured each year, there was enough rain falling to satisfy Geelong's annual water needs several times over. Kevin wrote in his article, "...several times Geelong's annual water requirements actually falls on the city each year as rain and virtually none of this water is utilised." But, supporting an option whereby

households capture their own rainwater is of little financial benefit to Barwon Water. The consequences of this attitude amounts to the plundering of, and extremely poor management of the Otway Ranges water resources: dropping the watertable 60 metres; drying up springs & streams; damming of a major river and the creation of a Vapour Deficiency Syndrome – the start of desertification.

Dennis Brockenshire is quoted in the article as saying, "Barwon Water does not have the responsibility for stormwater nor rainwater nor greywater." This is the responsibility of the council of the City of Greater Geelong.

Kevin also states, "Barwon Water must ensure its investment returns are maximised. It therefore selects options that provide the greatest financial and strategic benefit to the community and organization." This is all well and good for the water users in the Greater Urban City Sprawl of Geelong, and the coffers of the Barwon Water Authority, but not so beneficial to the farmers, landholders and environment to the west.

McCarthy also wrote, "While most of the country must face up to serious water shortage problems, Geelong's fortunate water resource position allows Barwon Water the luxury of selecting which particular water source it will not be needing over the next 30 years." A very urban based attitude that has persisted up to the present time. Bad water resources management.

What can be done to turn things around and take the pressure off the Barwon River Catchment?

1. Make the collection of rainfall compulsory for all households.
- All new homes to include rainwater tanks.
- As part of the sale process of all homes sold from this date, rainwater tanks have to be included.
- All other homes without a tank be given X number of years to have them installed.

2. Ensure that the West Barwon Reservoir releases at least 3 ML/ day throughout the year into the West Branch of the Barwon River.
3. Ditto for the East Branch of the Barwon River.
4. Pipe the entire length of the 50 odd kilometres of the extremely wasteful, leaking, earthen and open Wurdee Boluc Inlet Channel.
5. Cover the West Barwon Reservoir with aqua cones saving 90% of water evaporation.
6. Cover sections of the Wurdee Boluc Reservoir.
7. Decommission the Barwon Downs Borefield.
8. Cease the diversion of tributary water of the Barwon River into the Wurdee Boluc Inlet Channel. Callahan, Dewings, Matthews and the Pennyroyal Creeks.
9. Utilise the Geelong to Melbourne water pipeline connection to compensate the closing of the borefield and the 6 ML/ day flow from the West Barwon Reservoir into the two branches of the Barwon River.
10. Raise the price of urban water.

Benefits of these management decisions.

- A. Urban users will place a higher value on the water flowing from their taps.
- B. Urban tank water users will play a more active role in water conservation and use.
- C. The Barwon River will come back to life.
- D. The tributaries will prosper.
- E. Farmers will regain reliable stock and domestic supply.
- F. The environment will start to recover.
- G. Fish kills down the Barwon River will become a thing of the past.

**Malcolm Gardiner.**  
(Member of Save the Barwon)