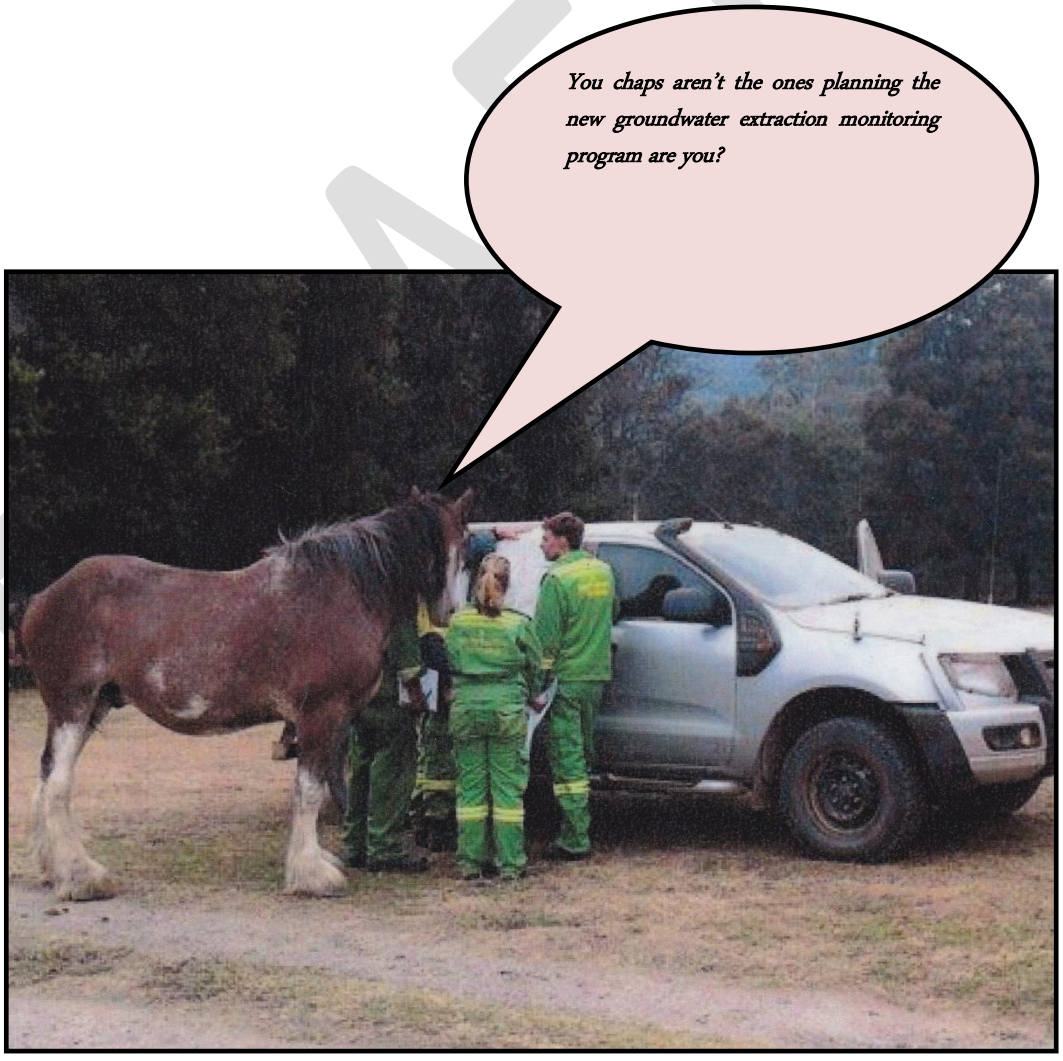
OTWAY WATER BOOK 39

Review of Barwon Water's Boundary Creek Aquatic Ecology Investigation of 2017.



NOTE: See page 33

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November 2017 (See page 33)

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"*The new monitoring program will increase understanding of the Barwon Downs groundwater system in its normal state.*"
(SKM 2015)

"***No evidence was found that declining groundwater levels caused by groundwater extraction at Barwon Downs had a negative impact on vegetation health in the catchment.***"
(Jacobs 2016)

"***...water table drawdown occurs during pumping, but no long-term environmental impacts have been linked to borefield operation.***"
(Barwon Water, February 2012:Water Supply Demand Strategy 2012-2062, Draft.)

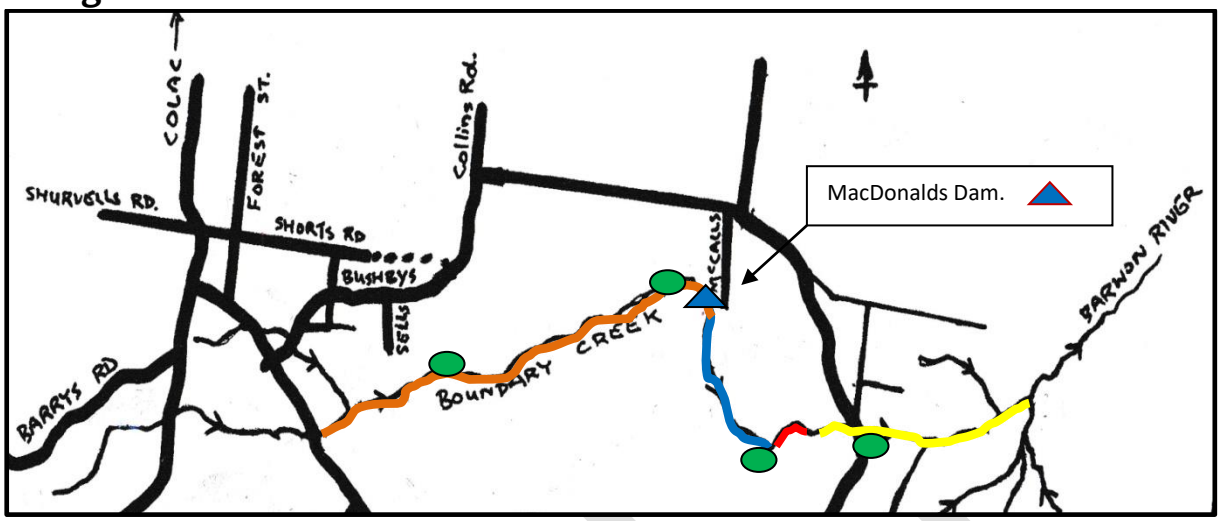
Introduction

This Otway Water Book 39 discusses Barwon Water's 17 March 2017 60 page report prepared by consultants Jacobs - titled "*Boundary Creek aquatic ecology investigations.*"

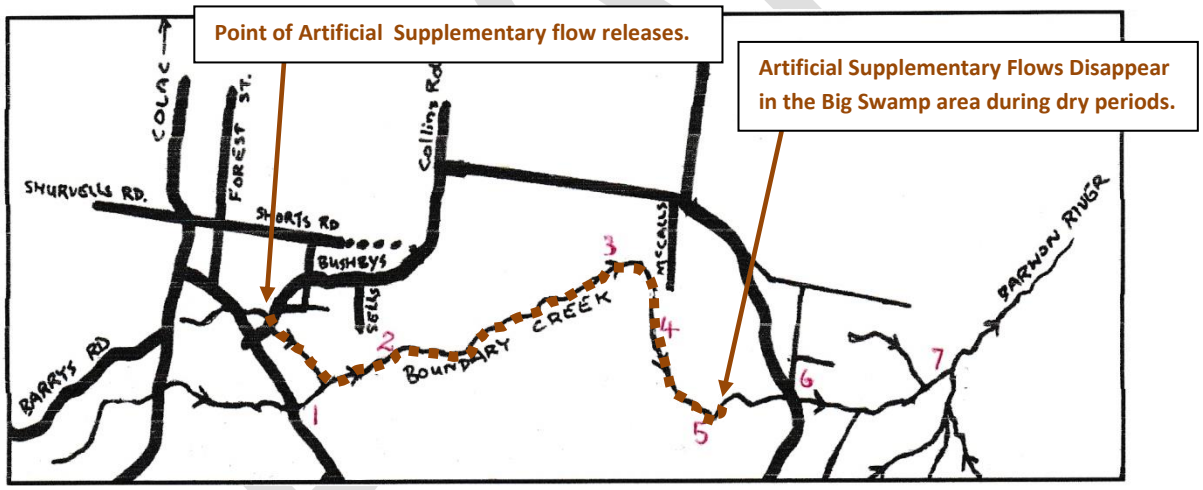
It is noted that Page iii of the Jacobs' report acknowledges that this report relies upon the accuracy of information sourced from Barwon Water, members of the public and/or available information found in the public domain. However, this should not, cannot be accepted as an excuse for conducting such a poorly constructed review of the aquatic ecology of Boundary Creek.

Barwon Water's 2017 Aquatic Ecology Investigation Report.

Background Information.



Reach 1, Reach 2, Big Swamp, Reach 3, and Macroinvertebrate Assessment sites, surveyed in 2017 and referred to in the Jacobs' Aquatic Ecology Study.



Fish survey sites 1-7, 1986-2013.

1960s to late 1980s. Nellie Shalley's family fished blackfish & trout; observed platypus and freshwater crayfish between points 6 & 7. (see Appendix F, page 43 for Nellie's statutory declaration.)

After the Early 1970s. With the exception of two events very little Land Use Changes have taken place in the Boundary Creek area.

In 1979 or there abouts, MacDonald's Dam was constructed across Boundary Creek disrupting flows for a short period (see graph page 8). **In 2006** the top end of the Damplands caught fire (see page 10).

1979. The Day family purchased land below point 6. Part of this decision being a year round reliable supply of flowing water in Boundary Creek. The Day's also made similar observation to the Shalley family regarding the biota in Boundary Creek. (see Appendix E, page 42 for John Day's statutory declaration.))

1982-1983. Up to 50% of Geelong's drinking water came from the extraction of groundwater from the Barwon Downs Borefield.

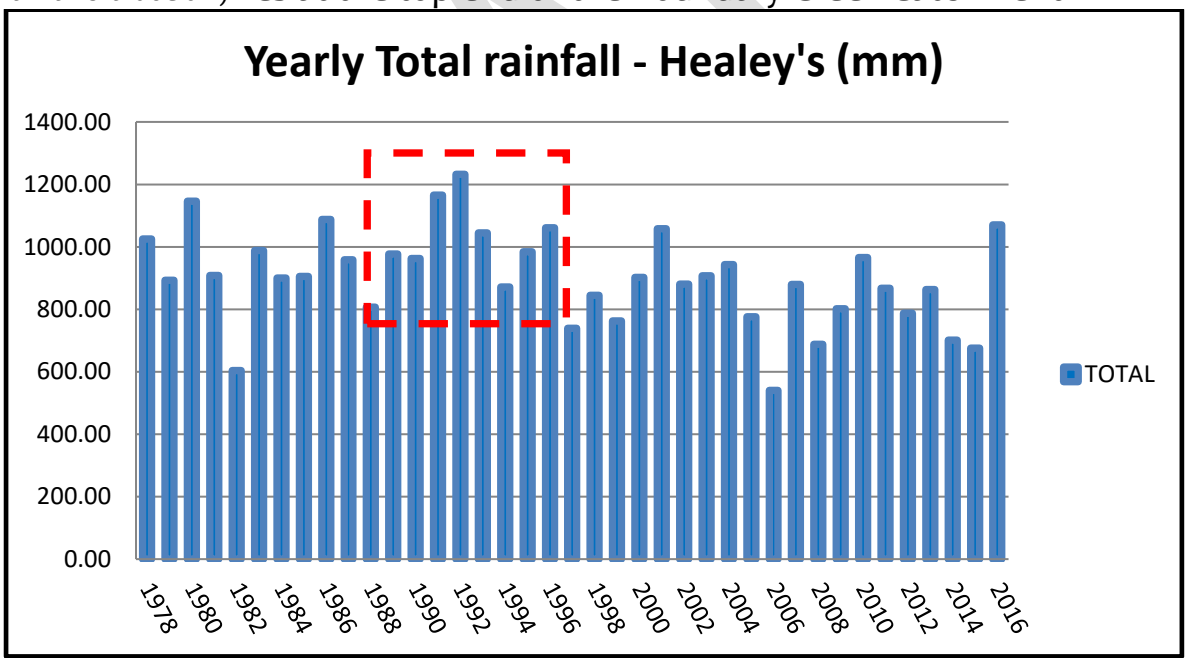
1986. Barry Tunbridge of Arthur Rylah Institute surveyed Reach 3 between points 6 & 7. He wrote in his 1988 report that of all the tributaries of the Barwon River where he had conducted fish surveys, Boundary Creek was the only one that contained river blackfish.(2)

This report was part funded by Barwon Water.

1986-1991. During this period a test pump was conducted at the Barwon downs Borefield extracting huge volumes of water (see page 8).

1992-1993. Saddlier conducted three fish surveys for Barwon Water as part of a Barwon Downs groundwater extraction licences.(4)(5)(6) (see Appendix D, page 41)

1990 to 1997. This was an extremely wet period. The Healey property (see rainfall chart below) lies at the top end of the Boundary Creek Catchment.



Summer of 1997/98. The top end of the Big Swamp caught fire on two occasions.

1997-2002. During this dry period large scale groundwater extraction took place (see pages 8 and 9).

2001. Arthur Rylah Institute conducted a fish survey(7) for Barwon Water as part of the groundwater extraction licence renewal. Saddlier was also involved with this survey. This was the 5th fish survey spread over 16 years.

Table 3. Summary of fish species captured from sites 1-6 in Boundary Creek on four sampling occasions from May 1992 to December 2001.

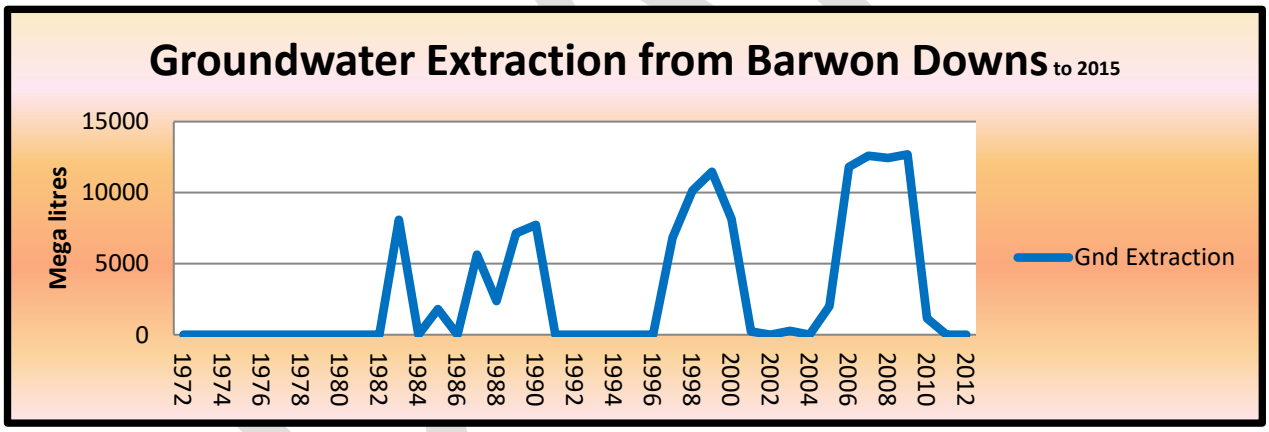
Site	Species captured	Sampling date			
		May 1992	Oct 1992	June 1993	Oct /Dec 2001
1	Anguilla australis		2		1
	Galaxias olidus	14	19	51	2
	Nannoperca australis	6	1	46	16
	Engaeus sp.	6	~70	5	30
2	Galaxias olidus	49	21	98	12
	Nannoperca australis	10			
	Engaeus sp.	4	~35	9	25
3	Galaxias olidus	48	10	90	36
	Nannoperca australis				20
	Engaeus sp.	1			8
	Paratya australiensis	~50			
4	Anguilla australis	1	5	1	8
	Galaxias olidus	1		91	12
	Perca fluviatilis	1	9	4	49
	Paratya australiensis	~50			
5	Anguilla australis	1	1		
	Galaxias olidus	3	1	42	1
	Perca fluviatilis				1
	Engaeus sp.		17		29
6	Anguilla australis	1	2		
	Galaxias olidus		1	58	
	Engaeus sp.	3	14		1

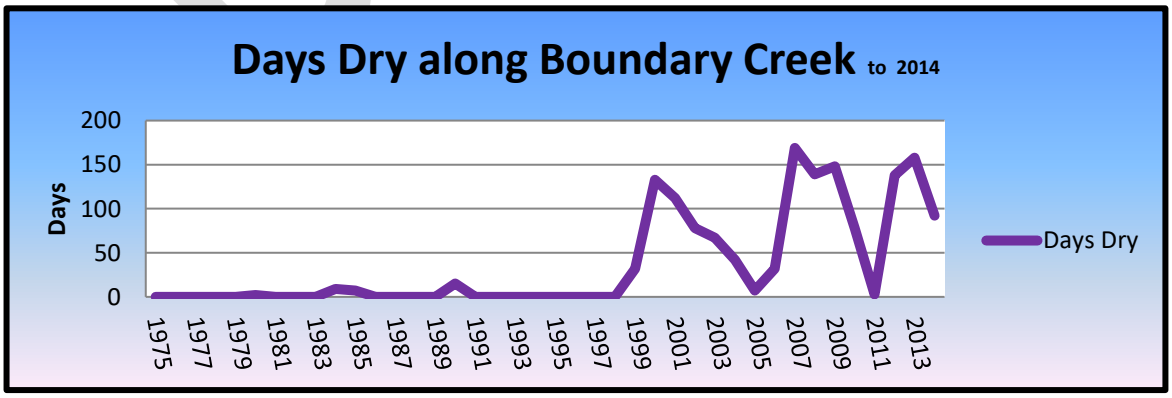
Results of Fish Surveys between 1992-2001.

Only four native freshwater fish species have ever been recorded in Boundary Creek.

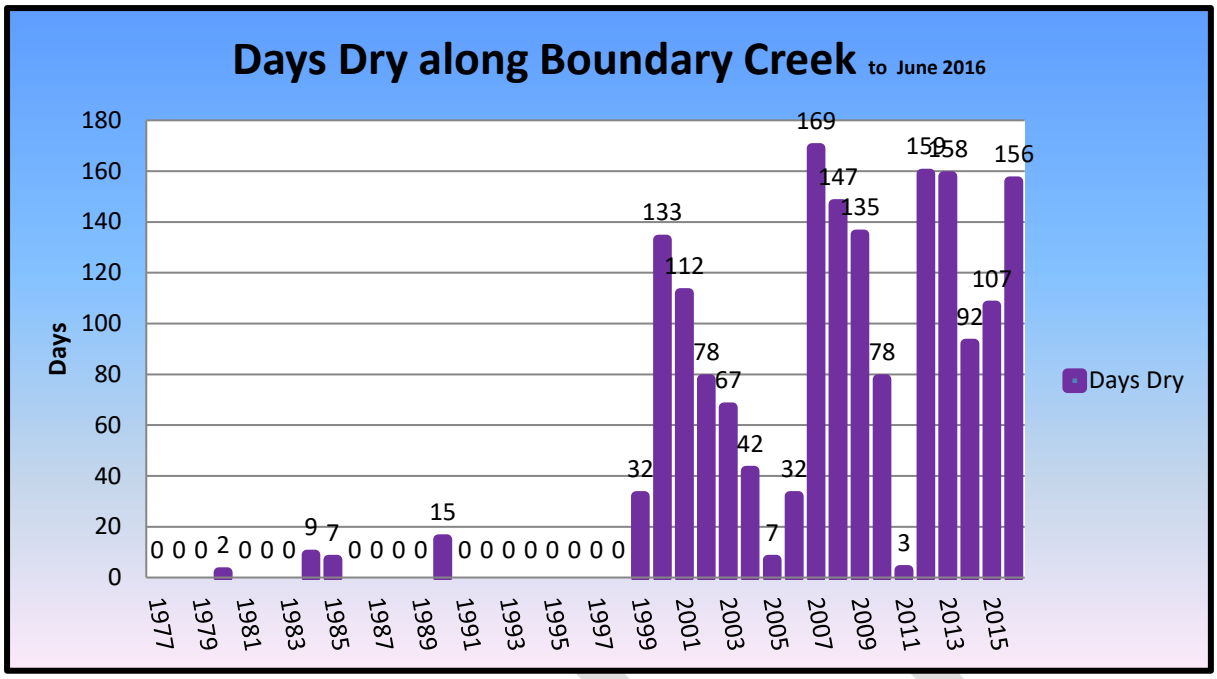
1. **River Blackfish** (Gadopsis marmoratus). Recorded by Tunbridge in 1986. None have been recorded since 1986.
2. **Mountain Galaxias** (Galaxias olidus). Recorded by Sadlier on three occasions between May 1992 and June 1993, AND by the Freshwater Ecology Section of the Arthur Rylah Institute in December 2001.
3. **Southern Pigmy Perch** (Nannoperca australis). Recorded by Sadlier on three occasions between May 1992 and June 1993, AND by the Freshwater Ecology Section of the Arthur Rylah Institute in December 2001.
4. **Short Finned Eel** (Anguilla australis). Recorded by Sadlier on three occasions between May 1992 and June 1993, AND by the Freshwater Ecology Section of the Arthur Rylah Institute in December 2001.

By 1992 Blackfish were no longer found in Boundary Creek.
The introduced species, **Redfin** (Perca fluviatilis) were found at sites 4 & 5.
Tunbridge captured **brown trout** during his 1986 survey.
Land yabbies (Enfaneus sp.) and **freshwater shrimps** (Paratya australiensis) were also located.
Sadlier carried out his surveys using a bank mounted electroshocker which Tunbridge states is an efficient method for sampling in small shallow streams such as in Boundary Creek.
2006-2010. The period of the Millennium Drought, and, up to 70% of Geelong's water came from groundwater extraction.
2006. The top end of the Damplands caught fire. This came as quite a shock as the McDonald family had attempted to drain this area for generations without any success. For it to catch fire was seen as impossible. However the aquifers under this area had been lowered by some considerable metres (see page 9 for observation bore 109130 hydrograph & page 11 for bore location).
This area of the Damplands was cleared of all vegetation back to what the Country Fire Authority calls "mineral earth." The idea being that if the peat in this section of the Damplands that had caught fire was to re-emerge there would be no vegetation to burn and fire control would be so much easier.



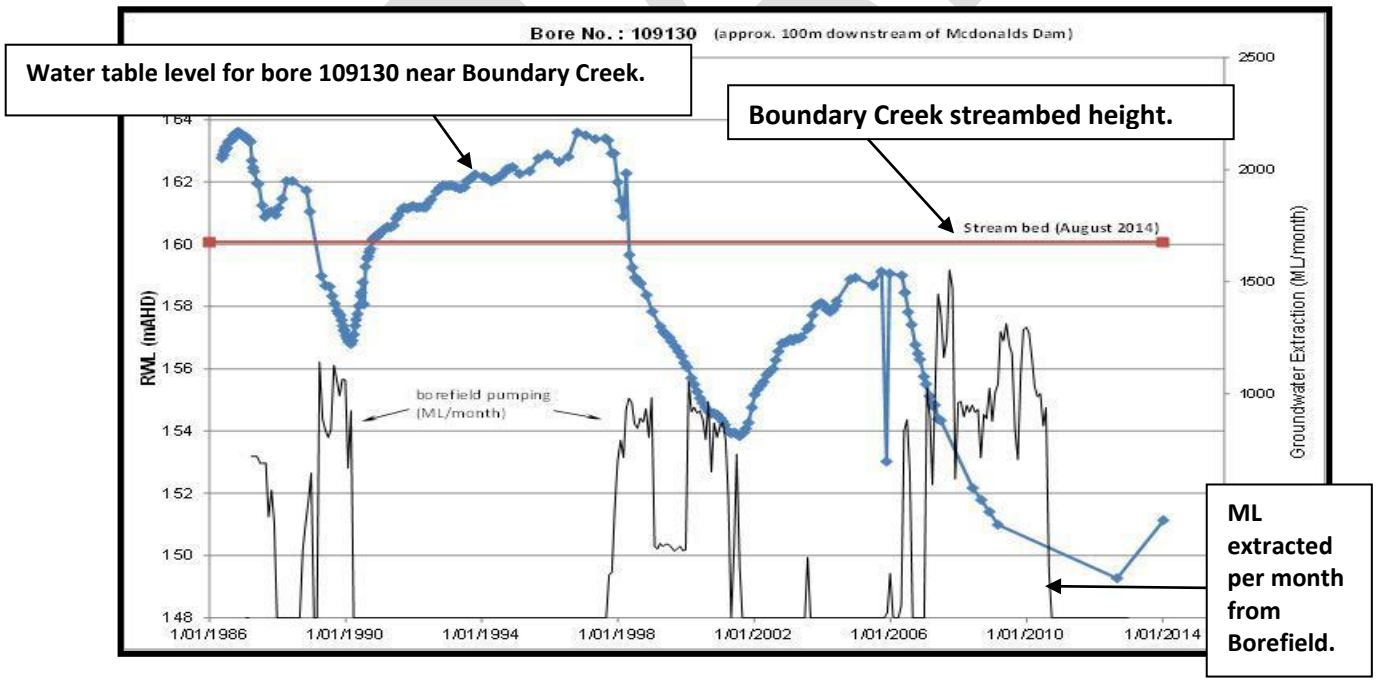


Despite extraction having ceased in 2010 the Artificial Supplementary Flows are still being released because Boundary Creek continues to dry up each summer.



(It was while preparing this book that the days of no flow down Boundary Creek where discovered to be quite "rubbery." See Appendix I page 47.)

Early 2010. The Big Swamp re-ignited burning the entire swamp and much of the surrounding area.



Late 2010. The drought broke and in August 2010 groundwater extraction ceased and pumping did not start again until a relatively small pump between April and September 2016 (3267 ML).

2013. LAWROC Landcare Group commissioned Barry Tunbridge to carry out an assessment of the environmental condition of Boundary Creek in relation

to fish habitat.[8] Tunbridge found that "***The major changes in land use, vegetation cover and channel structure affecting the creek had been completed by 1986.***" He also found that "***Fortunately there was data on the condition of fish habitat in the creek in different years and there was a methodology available to assess the general environmental condition of the creek.***" This data collected between 1986 and 2002 is readily available.

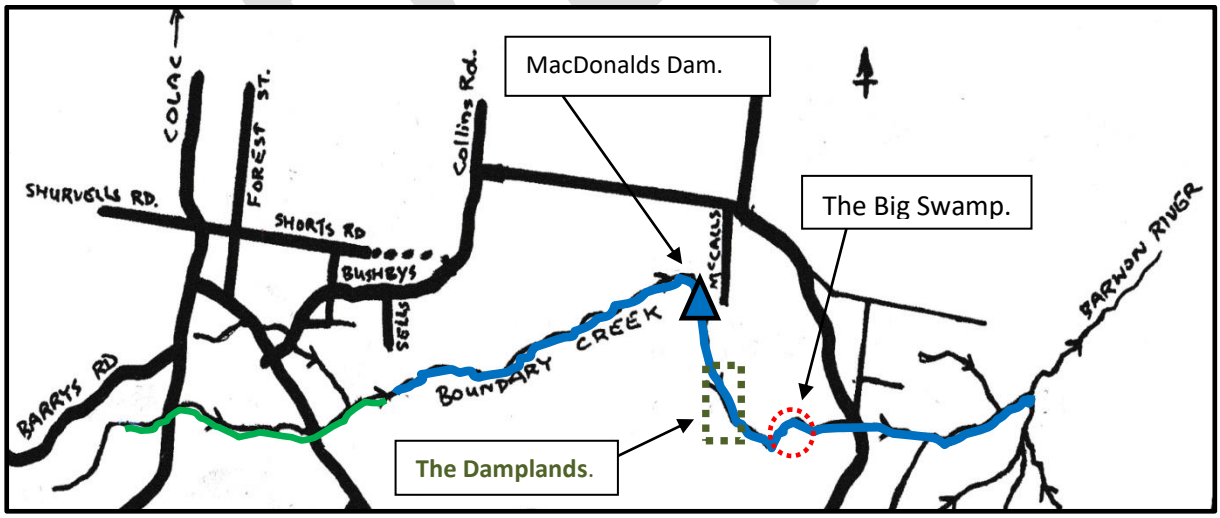
2012-2013. Barwon Water made the decision to introduce a new groundwater data collection and monitoring program that was designed to commence gathering reference material post 2012.[12][13]

December 2013. At a Barwon Water Groundwater Community Reference Group meeting it was made known to SKM representatives that Barry Tunbridge was a valuable source of information regarding fish surveys conducted along Boundary Creek. No follow up occurred.

2013. At this same meeting an overhead display stated that any fish surveying was not required "***Not required because we know enough (11 Native spp).***" This same overhead stated "***Determining current presence is too difficult and labour intensive.***" (see Appendix C, page 40)

As a matter of interest a quote for electroshock surveying of Boundary Creek was obtained and it was found to be $3000 a day, maximum.

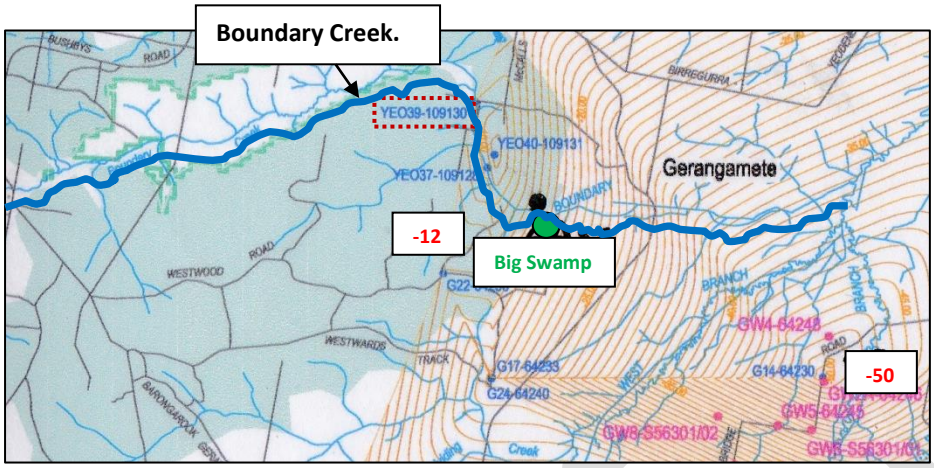
Boundary Creek pre Groundwater extraction.



The section of Boundary Creek marked in **green** would have no flows during summer unless there were summer rains. Springs, soaks and creek pools would survive through a normal summer but with little to no water movement. Up until groundwater extraction at the Barwon Downs Borefield caused Boundary Creek to stop flowing for its full length, the **blue** section below the Damplands never stopped flowing as far back as 1912. Shalley

family history relates the reliance the family placed on the permanent year round flows even throughout numerous droughts.

April to September 2016. 3267 ML was extracted from the Barwon Downs Borefield.



This map shows the July 2016 Residual Water Table Drawdown contours for the Dilwyn Aquifer, shown in red. The drawdown of the water table under Boundary Creek is known to be quite considerable. Out to 12 metres in the Big Swamp area.

***SOURCE*: 2015-2016 Barwon Water report to Southern Rural Water.**

Summary of this background information.

- Historically the lower reaches of Boundary Creek had a continuous flow between 1912 and the start of large scale groundwater extraction in the early 1980s.
- Jacobs has the dry days in Boundary Creek pre 1999 wrong.
- Four native fish had been found over a 16 year period involving five surveys between 1986 and 2002.
- No further fish studies to be conducted due to labour and cost restraints.
- Peat swamps along Boundary Creek never known to be dry caught fire after extensive groundwater extraction had lowered the watertable in these areas (fires in 1997, 1998 and 2006).
- These fires ignited following periods of wet winters.
- Artificial Supplementary Flows, started in 2004, and released from the Otway to Colac Pipeline fail to reach the lower sections of Boundary Creek, soaking into a depleted aquifer below, especially during dry periods.
- The days of no flow down Boundary Creek have progressively increased and follow a similar graphic pattern to increased extraction rates (see page 8).
- The Big Swamp had completely dried out by 2010 and then re-ignited in this year.
- Boundary Creek continues to dry up each summer despite pumping having ceased in 2010. The residual drawdown is still having an impact.

- Stock and Domestic rights are not protected.
- Artificial Supplementary Flows continue to be released during these periods and continue to disappear in the Big Swamp vicinity.

2017.

The Jacobs' Aquatic Investigation Report of 2017.

The 2017 Jacobs' report includes comment on community issues; supplementary flows; vegetation groundwater dependent ecosystems; drought & climate change; land use changes, and surface & water interconnectedness as background to the report. None of these things are dealt with in any detail. However, there is much to take issue with many of these comments and are challenged in brief in Appendix A (see page 34). Other Otway Water Books deal with these challenges in more detail. Otway Water Book 39 concentrates on the aquatic component of the Jacobs' report.

The report states that this Aquatic Ecology Investigation is a preliminary study with an objective "***...to estimate the aquatic flora and fauna species and communities currently supported by Boundary Creek and at a broad scale (i.e. qualitatively), discuss the elements of the creek's flow regime that these values require.***" The word "*estimate*" unfortunately highlights what is seen as a weakness of this study, as will become clear.

Page 16 reinforces this objective stating "***The objective of this study is to estimate the aquatic flora and fauna species and communities (the "ecological values") currently supported by Boundary Creek.***"

It is made quite clear that aquatic ecosystems and aquatic values includes species and communities. "***In order to understand potential impacts of groundwater extraction on the hydrology and ecology of the creek an understanding of the aquatic ecological values (species and communities) that the creek currently support is needed.***"

An aim of this preliminary study is "***...to understand at a high level the ecological condition of Boundary Creek and the ecological values the creek currently supports.***"

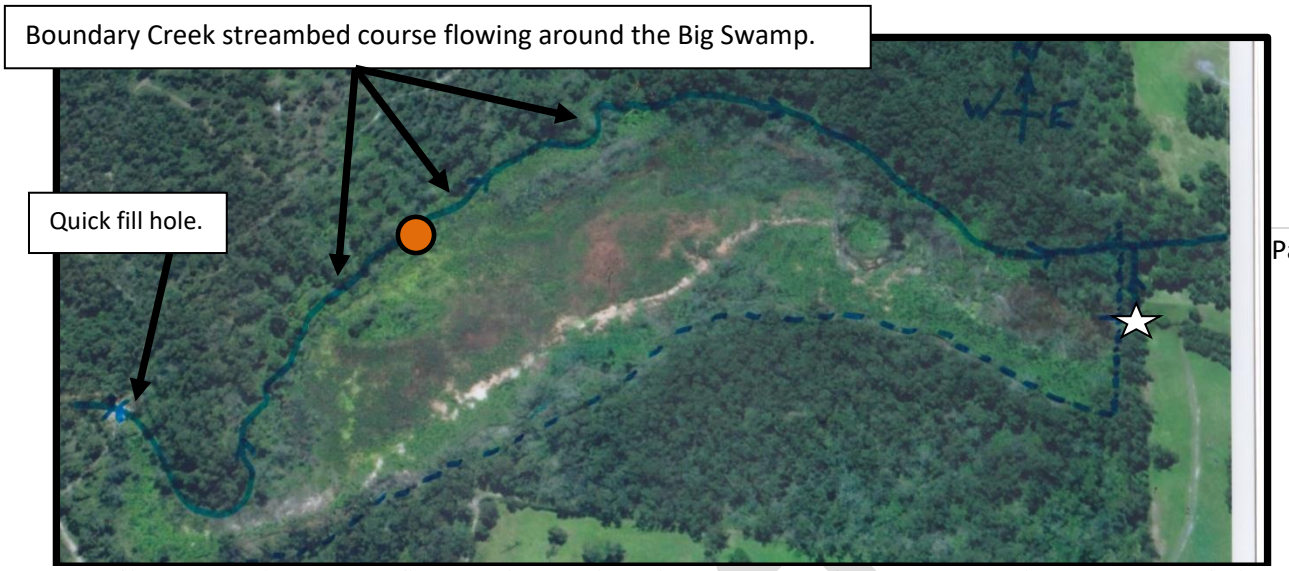
At this point to help understand some of the reasons this study seems to fall short of its aims and objectives, the definition of ecology requires clarification. Wikipedia's explanation says "***Ecology is the scientific analysis and study of interactions among organisms and their environment. It is an interdisciplinary field that includes biology, geography, and Earth science.***"

From the statements quoted above and from the ones below, this Wikipedia definition seems to fit with the objectives and aims of this Jacobs study.

However, only surveying macroinvertebrates and no other biota seems to be falling short of the studies' aims and objectives.
"***The purpose of this study is to assess the aquatic ecosystems of Boundary Creek...***"
"***...the focus of which is an identification of the aquatic ecosystems supported by the creek.***"

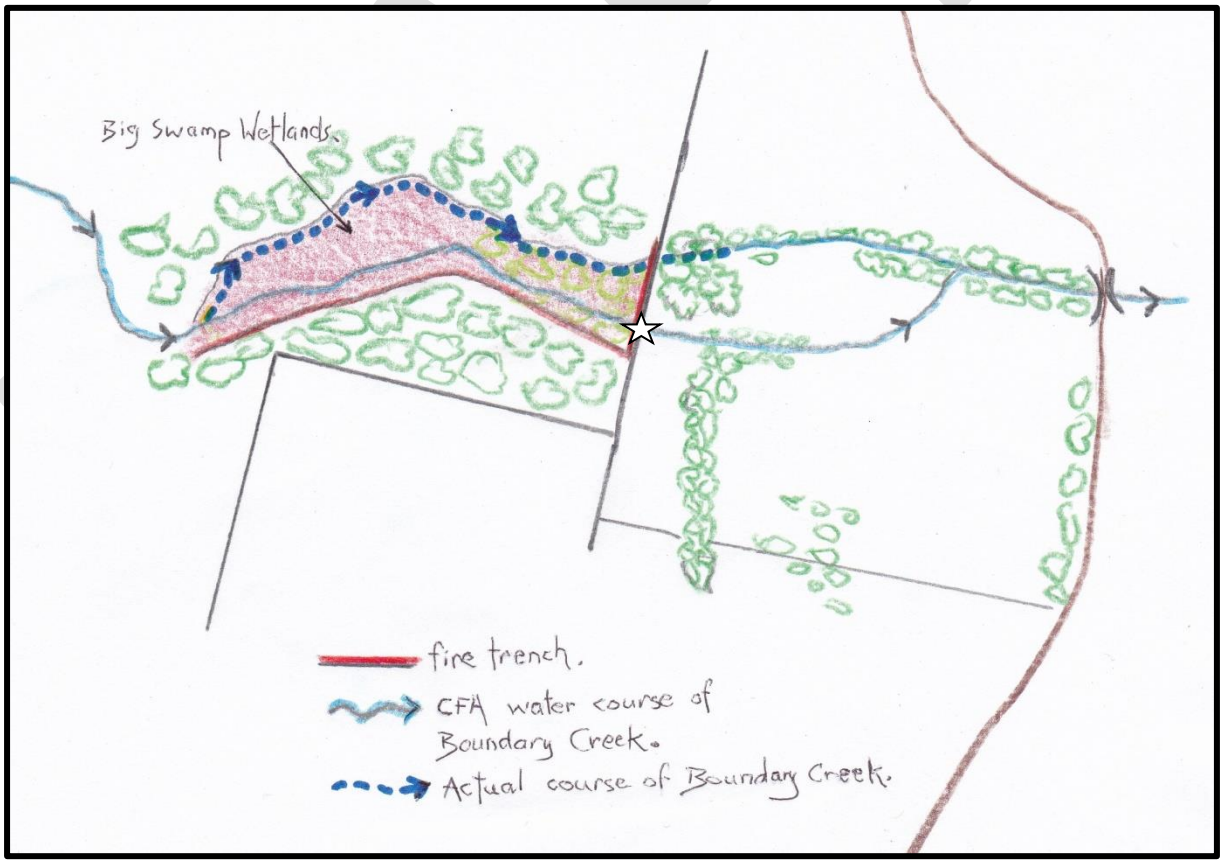
Predicting, inferring and drawing conclusions as to which species and communities may be present in Boundary Creek, based on a study of macroinvertebrates, and a desk top study of species found elsewhere, seems extremely difficult to justify.

Also, and unfortunately, leaving the section of Boundary Creek, that runs around the Big Swamp, out of the study is another short fall of the study. The only explanation given for this is the complexity of the acid sulfate soil disturbance and impacts found in the Big Swamp. However, it is difficult to understand this reasoning as Boundary Creek runs along the northern edge of the Big Swamp and maintains a relatively healthy ecosystem for at least half its length beside the swamp. Perhaps the reason that Jacobs has chosen to ignore this section is found in Jacobs maintaining that Boundary Creek actually enters the Big Swamp and then dissipates out across the swamp with no recognition that the streambed of Boundary Creek skirts around the margins of the swamp.
"***This site***(A transect found in the 2015 survey that cuts across the top end of the swamp) ***is located within the Big Swamp into which Boundary Creek flows and dissipates before reverting to a channel west of the Colac-Forrest Road.***"[(11)]
The 2017 Aquatic report states... "***Through the "damplands" and the Big Swamp, the flow path is dispersed through a number of smaller channels...***"
"***There is no obvious main flow path of the creek through the swamp area, which would likely have been historically.***" There is no flowpath of Boundary Creek through the Big Swamp but there most definitely is a flowpath around the northern edge of the Big Swamp..



NOTE of interest: The Big Swamp was first recognised as being seriously impacted as far back as 2008 and it has taken 9 years for it to be stated that a comprehensive study will be conducted sometime in the future.

The photographs on the next page, have been downloaded from videos that were taken (8 July 2011) while standing on a large tree that had fallen over Boundary Creek at the spot indicated with this symbol. ● (see above).



Map adapted from 23 April 2010 fire map of DSE & CFA.

Since 2008 my observations have only seen the water flow out of the Big Swamp at the ☆once Boundary Creek overflows in high rainfall.

This photograph is looking west along Boundary Creek with the creek waters flowing well below the height of the bank. Co-incidentally this is the spot where the Artificial Supplementary Flows disappear in the drier summer months.

This photograph has been taken from the same location, standing on a tree that has fallen across the creek. The view is looking in a southerly direction across the Big Swamp. From this location the swampy wetland is dry right across to its southern boundary.

This is the log that has fallen over Boundary Creek. The photograph is looking south into the Big Swamp. Boundary Creek is flowing approximately one metre below this log.

Taking into consideration the last 40 year background of Boundary Creek, the Big Swamp and the stated aim and objectives of this aquatic study, it appears to be most unusual that the only organisms studied were macro-invertebrates. Vegetation, fish, frogs, platypus, Otway Bush Yabbies and all other organisms were not studied.

"***This study did also not involve direct survey of fish, frogs, Platypus and vegetation. This is because as the creek is relatively small, it is likely to support only low numbers of aquatic animals and therefore field surveys may not record many expected taxa. As a failure to record a certain species during a field survey does not mean we can confidently infer that it is not present, even intensive field surveys may yield uncertain results. The presence of the ecological values in Boundary Creek has therefore been inferred using the indirect techniques described above (i.e. historic records, other literature and assessments of the habitat present at the creek).***"

The most reliable data is observable data, and not conducting other biota surveys than macroinvertebrates for "fear" of not finding things, ignores the fact that scientifically based outcomes can also come from negative results. From a scientific point of view "inferred" outcomes should be put to the test and proven one way or another. For such a small creek, estimation and "indirect techniques" do not seem to be justifiable. "***The objective of this study is to estimate the aquatic flora and fauna species and communities (the "ecological values") currently supported by Boundary Creek.***"

Once again, as found throughout the 2012-2013 new Technical Works Monitoring Program[12][13] and the ensuing Jacobs reports, there appears to be a strong emphasis on making a "fresh start" collecting baseline data from 2014. Too much emphasis is being put on future potential impacts with an almost complete disregard to the past. This 2017 report reflects this numerous times throughout the report with the use of words such as...

- potential (environmental/ecological) impact – 14 times
- potential – 8 times
- assumptions – 3 times
- probability – 28 times
- likely – 81 times
- possible – 8 times
- predict(ed) - 5 times
- infer(red) – 3 times

This emphasis on the present as a reference point on which to predict the future likely outcomes ignores what has taken place pre 2014. The notion of looking at potential impacts taken from 2014 tends to discount past impacts and treats them as being of little consequence when considering the present and future state of the aquatic ecosystems.

An example of this is most apparent as set out in the Technical Works Monitoring Program. "***The technical Works Monitoring Program was designed to improve the capacity to differentiate between groundwater extraction and climate effects on the groundwater system, predict water table and stream flow changes, and increase understanding of potential ecological impacts. Key improvement areas include:***

- ***assessing whether vegetation in areas dependent on groundwater will be at risk from water table decline, which could change future extraction practices.***" (This Aquatic Ecology study and the vegetation study form part of the Technical Works Monitoring Program.[12][13])

However, the data establishing impact on vegetation in areas dependent on groundwater has already been gathered pre 2014, but ignored. The pre 2014 impact has been extraordinary. The devastation of the Big Swamp being one such example. If this data is not officially "pulled together" and written up, the problem is placed into the time frame of pre 2014 where the attitude is, let's make a new start and set a reference date at 2014, or there a-bouts. This 2017 Boundary Creek Aquatic Ecological Investigation makes it abundantly clear that an official comprehensive study of the Big Swamp has not been done and is yet to be commenced despite the problem being known for 2 decades. "***The purpose of this study*** (2017) ***is to assess the aquatic ecosystems of Boundary Creek and therefore it is beyond the scope to complete a comprehensive investigation of Big Swamp. Big Swamp will be the focus of a future, stand-alone study***."

Another example where pre 2014 impacts have been dismissed and disregard given to the 3 decades of groundwater dependent ecosystem studies already conducted.

Fish Studies.

The reasons given for not conducting a fish survey of Boundary Creek is an interesting subject.

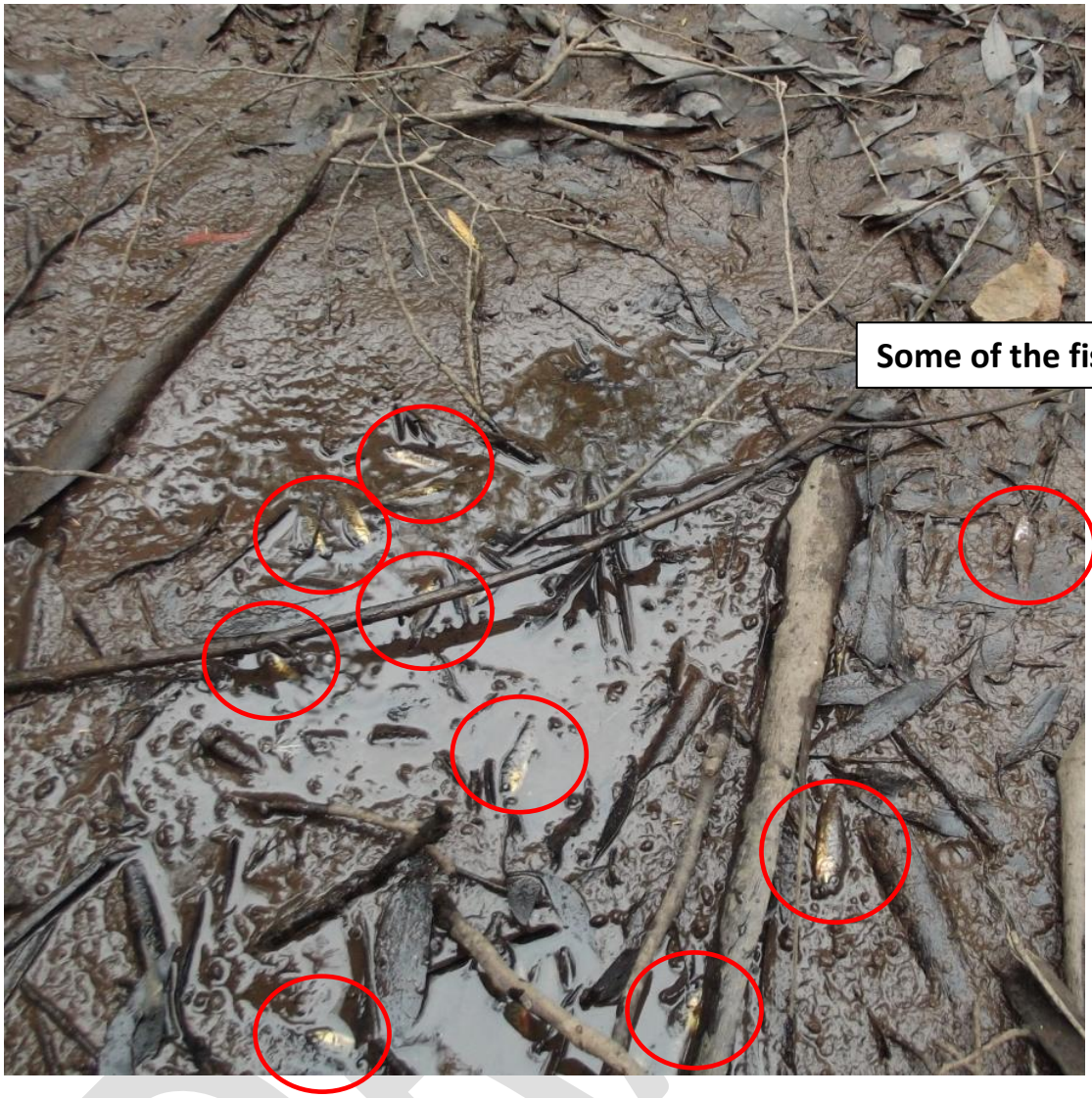
In December 2013 Jacobs stated that enough was already known, including the identification of 11 native species, and, that carrying out a survey was too difficult and labour intensive (see Appendix C, page 40). Of the 11 native species of fish identified in the Otway Ranges, only 4 have ever been found in Boundary Creek. Giving an initial impression that 11 species could be found in

Boundary Creek because of the bountiful macroinvertebrates present, is grossly misleading. The pre 2014 devastation of the creek environment has to be considered.

By 2017 the difficulty and labour intensive reasons for not carrying out a fish survey were forgotten. The 2017 reasons being..."***This is because as the creek is relatively small, it is likely to support only low numbers of aquatic animals and therefore field surveys may not record many expected taxa. As a failure to record a certain species during a field survey does not mean we can confidently infer that it is not present, even intensive field surveys may yield uncertain results.***" (See Appendix G pages **44-45** for further justification and clarification.)

To also state only one fish survey has ever been conducted along Boundary Creek needs to be addressed (see page **7**). "***Only one fish survey has been conducted specifically in Boundary creek and this was undertaken by Tunbridge in 1988.***" This statement is far from accurate. Four more studies commissioned and funded by Barwon Water were conducted over a 11 year period between 1992 and 2002. (Tunbridge conducted his fish survey in 1986.)

During the 1997 or 1998 Big Swamp fires a large hole was dug adjacent to Boundary Creek[19] in an effort to have a quick fill spot for fire fighting purposes (see page **14** for location). During a dry period in early 2016 Boundary Creek was dry at this point, that is above the Big Swamp, and the quick fill fire-fighting hole was also all but dry. In amongst the mud and struggling to survive at the bottom of this hole were several native pygmy perch. Over twenty perch were rescued from this mud hole.



Some of the fish rescued.

At the very least, pygmy perch were still present in the waters above the Big Swamp in late 2015. It would be fair to assume that the Damplands in Reach 2 and below McDonalds Dam was able to support these fish. Jacobs stated "***Southern Pygmy Perch and Dwarf Galaxias may find some suitable habitat in this reach, however, this is only a low***

probability." Any assumptions, inferences and guess work could easily be eliminated by conducting an on ground, in water fish survey.

Platypus.

"*Platypus have not been recorded in Boundary Creek, although anecdotal records suggest that they may have been present historically.*"
After reading this statement, calming down somewhat and taking stock, I came to the conclusion that the contents of this statement is one of the reasons local landholders hold Barwon Water's appointed consultants in such low esteem. Because the 2017 Boundary Creek Aquatic Ecology Investigation has been commissioned, paid for and the findings endorsement by Barwon Water, by default Barwon Water is likewise considered.
And, for the report to state:

- platypus *have not* been recorded
- anecdotal records *suggest*, and
- platypus *may have been present* historically,

would not sit well with those people who have lived on Boundary Creek and have observed platypus "playing" and "frolicking" in the waters of the creek. To disregard these sightings and experiences so off handedly instils no goodwill with the "locals."
This also makes a mockery of these two statements:
"*To address community interest adequately and inform...*"
"*The program is underpinned by scientific rigor using multiple lines of evidence-based techniques...*"
Not seeking and or acknowledging local experience and observation suggests this "local" information is not reliable, unscientific or credible enough to come under the banner of scientific rigor. Then salt is added to the wound as highlighted in the following statement.
"*A range of sources were consulted for background reviews including past surveys, anecdotal reports from local residents and predicted species distribution.*" An inconsistency with what is said to be done and what actually is done.

(See Appendix G, pages **44-45**, for an apology, no offence intended to local knowledge.)
(See Appendix H, page **46**, for the results of a test of eDNA for platypus completed in April 2017. This test was conducted after the Barwon Water March 2017 Aquatic Ecology report had been released.)

The 2017 Aquatic Ecology Report concluded:

Reach 1.

Platypus are rated as having a low probability of occurring in Reach 1.

Reach 2.

It is highly unlikely that Reach 2 would provide suitable habitat for Platypus.

Reach3.

The highly acidic water and lack of flow in summer also makes reach 3 unsuitable.

I knew that Nellie Shalley had repeatedly reported to Barwon Water representatives and consultants going back at least as far as 2002 during the lead up to the 2004 groundwater extraction licence renewal process, that a platypus colony used to exist in Reach 3 before large scale groundwater extraction took place. I had also recalled either Greg Potter or Daryl Sell telling me some years ago that platypus had been observed in reach 1. I decided to follow this up, ringing both Greg Potter and Daryl Sell. Both men said they had not been asked about platypus as part of the new monitoring program and to my surprise they both confirmed they had observed platypus in Reach 1 of the Boundary Creek Catchment.

Daryl owns property along Boundary Creek in the vicinity of point 2 on the map found on page 5. Greg owns a property between points 2 and 3. Nellie owns a property between points 6 and 7

Their statements are recorded in the next few pages.

State of Victoria – Evidence Act 1958

[JP/DOJ.1/2000]

STATUTORY DECLARATION

I, Petronella Cornelia Shalley
[full name]

of "Sunny Side" Yeodene Lot 45 Parish of Yeo. 125 Shalleys Road, Yeodene, Victoria 3249
[address]

Farmer
[occupation], do solemnly and sincerely declare that:-

I have lived at the above address for 44 years. This property abounds both sides of Boundary Creek and on the north west boundary of the West Branch of the Barwon River. My late husband's family have owned this property since 1912. Frank, my husband, and I wrote to Mr. Whiteside of the Geelong Water Trust on the 29th of January 1990 and informed him that Boundary Creek continued to flow through the 1914 drought and the 1967-1968 drought even when the West Barwon River became dry and dusty. The West Barwon forms our south eastern boundary. Boundary Creek was the salvation of our property through these droughts. Our family has relied on this permanent water for three generations.

We had relied on the continuos flow in Boundary Creek all the time that I have been on this property up until the year after Barwon Water pumped water from the ground at Gerangamete during the 1982-1983 drought. On the 19th of February 1991 we wrote to Mr K Maxwell of the Rural Water Commission in Camperdown because we were gaining no satisfaction from the Geelong and District Water Board. We stated that since water was being pumped from the Gerangamete wells in 1988 Boundary Creek ceased to flow in the summer of 1989-1990 and was bone dry by the 10th of January 1990.

This has happened numerous times since. After many discussions and hours spent Barwon Water agreed to release supplementary water using discharge from the Colac pipeline. A trial was conducted in 1999 but repairs had to be done to the Colac pipeline late in 1999. A meeting with Barwon Water and Sinclair Knight Merz with results that showed groundwater pumping affects Boundary Creek. Water was again released from the Colac pipeline in May 2002 but was very slow to reach our home farm.

In February 2003 water was trucked in because Barwon Water could not release the water from the Colac pipeline because I was told it was affecting the Colac supply. This scenario of trucking water in went on until 2006. Barwon Water has been now releasing 2 ML a day as per the requirement of their Licence Number 893889. However, the water doesn't reach the lower parts of Boundary Creek until it rains so the released water is of no value to our farm, to the creek and its environment, nor can we rely on Boundary Creek as a water supply.

Before Boundary Creek ran dry during 1984 there were colonies of platypus along our stretch of the creek. There were many blackfish, trout, red fin and brown trout. None of these animals have been able to live in a dry creek bed and disappeared soon after Boundary Creek dried up.

After rains and when the creek begins to flow again I am unable to use the water for stock from the creek until 4-5 inches of rain has flushed away the unpalatable water.

I acknowledge that this declaration is true and correct, and I make it with the understanding and belief that a person who makes a false declaration is liable to the penalties of perjury.

Declared at Forrest

in the State of Victoria, this 19TH day of September 2009

P O Shalley
Signature of person making this declaration
[to be signed in front of an authorised witness]

Before me,

Signature of authorised witness

DR. R. SARKIS
Grant & Henry Street,
Forrest Vic. 3236
Ph. 052-366 355
Prov. No. 0108014 H

State of Victoria – Evidence Act 1958

[JP/DOJ.1/2000]

STATUTORY DECLARATION

I, Gregory James Potter
[full name],

of 280 Oakley's Road Yea 3249
[address],

FARMER
[occupation], do solemnly and sincerely declare that:-

I have owned property at the above address for 24 years. It has a frontage to Boundary Creek of about 4000 metres. The property produces sheep and cattle and requires regular inspection and upkeep. As a consequence I have a lengthy period of observation and experience involving my section of Boundary Creek. On one occasion around 1995-96 I spotted a platypus in the creek. It was totally unexpected as I thought the stream would have been too small. At the time I was surprised to see a platypus because I had associated platypus with large rivers like the Gellibrand.

I acknowledge that this declaration is true and correct, and I make it with the understanding and belief that a person who makes a false declaration is liable to the penalties of perjury.

Declared at COHAC

in the State of Victoria, this 14th day of

September 2017

Greg Potter
Signature of person making this declaration
[to be signed in front of an authorised witness]

Before me, Janine C Boyd
Signature of authorised witness

JANINE CLAIRE BOYD
Clerk to an Australian Legal Practitioner
within the meaning of the
Legal Profession Uniform Law (Victoria)
119 Murray Street, Colac Victoria 3250

The authorised witness must print or stamp his or her name, address, and title under section 107A of the Evidence Act 1958 (Vic.)
(eg. Justice of the Peace, Pharmacist, Police Officer, Court Registrar, Bank Manager, Medical Practitioner, Teacher)

Daryl's Stat Dec and photo of a platypus killed in Bc 2 come.

At least one more stat dec to get.

Jacobs' Macro-invertebrate Studies.

During discussion time at Barwon Downs Groundwater Community Reference meetings I had on several occasions stated that it was my belief that as long as the Artificial Supplementary Flows were continued to be released, the aquatic ecological health of the upper reaches of Boundary Creek would be maintained. Because of the mobility of macroinvertebrates they would have every chance of re-colonising the sections supplied with these supplementary flows. This being especially true of Reach 1. And, as long as the amount of Artificial Supplementary water flowing into McDonalds dam was released out of the dam, then Reach 2 would also have a continuous flow of water maintaining a viable aquatic habitat for macroinvertebrates. Because the Artificial Supplementary Flows were then disappearing half way down the length of the Big Swamp, Reach 3 would be found to be extremely degraded. If this lack of flow had not degraded this reach, then the pollutants flushing out of the Big Swamp in high rainfall events most certainly would have.

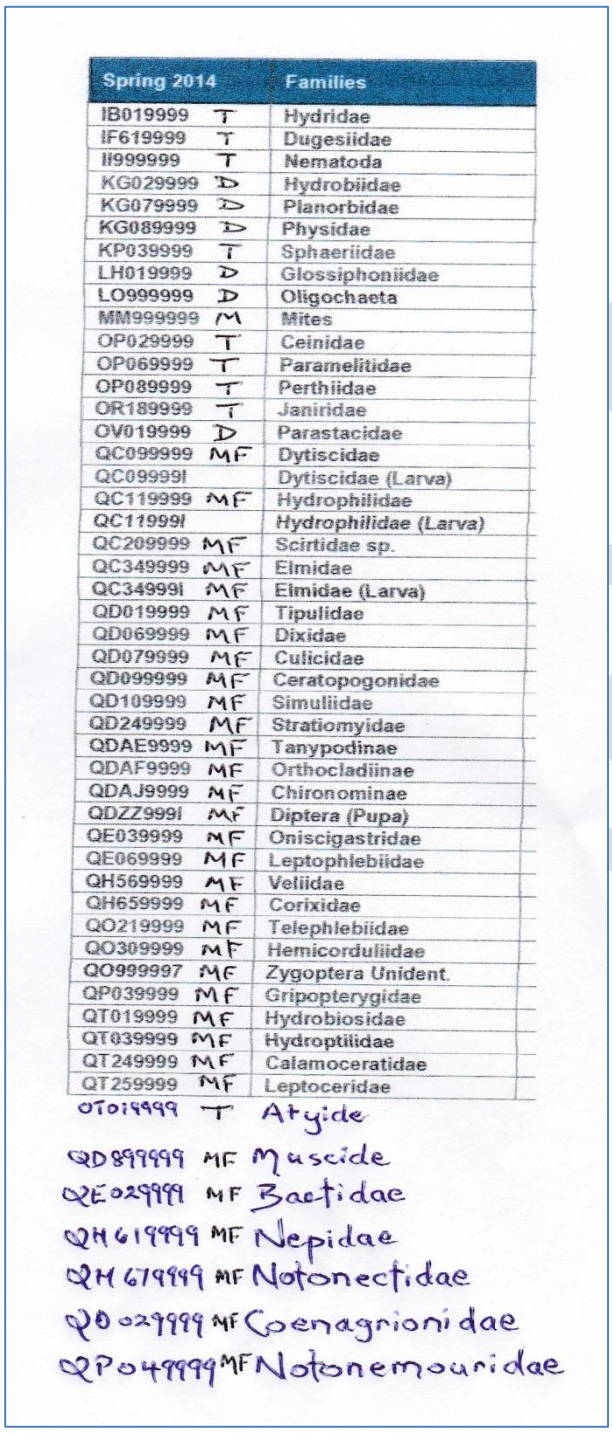
As predicted Reach 1 had
"*...excellent macroinvertebrate community...*"
Reach 2
"*There is a diversity of physical habitat (vegetation, woody substrate) in this reach and the surface water that does flow likely supports the diverse array of macroinvertebrates.*
And Reach 3,
"*The community of Reach 3 is significantly impaired...*"

Nothing unexpected with these results. The Artificial Supplementary Flows maintain, in dry periods, a very good environment for macroinvertebrates. The upper reaches benefit from these flows before the flows completely disappear into the depleted aquifer adjacent to the Big Swamp.

"*The supplementary flow makes up a significant portion of the flow in the summer months in Reach 1 and 2.*" It is as fair to say and probably more to the point, the supplementary flow makes up the only flow in Boundary Creek during summer months (outside rainfall events). Considering that the flows then disappear before reaching Reach 3. It would also be fair to say that this is further support of the notion that

supplementary flows are now the only flow in summer months. As Jacobs states Boundary Creek has "*...changed from being a gaining creek (groundwater provides baseflow) to being a losing creek(water flows from the creek to the groundwater).*"(17)

Not knowing a great deal about macroinvertebrates it was felt that some knowledge of the macroinvertebrate families found in the Jacobs' survey may be of assistance. Bearing this in mind it was found that some macroinvertebrates live in water for part of their life cycle; can fly as another part of their cycle and given the right conditions can be prolific breeders.(14)(15)(16) Of the 48 macroinvertebrates including crustacean families collected in this study, a preliminary grouping of these families indicated that:



Spring 2014		Families
IB019999	T	Hydridae
IF619999	T	Dugesiidae
II999999	T	Nematoda
KG029999	D	Hydrobiidae
KG079999	D	Planorbidae
KG089999	D	Physidae
KP039999	T	Sphaeriidae
LH019999	D	Glossiphoniidae
LO999999	D	Oligochaeta
MM999999	M	Mites
OP029999	T	Ceinidae
OP069999	T	Paramelitidae
OP089999	T	Perthiidae
OR189999	T	Janiridae
OV019999	D	Parastacidae
QC099999	MF	Dytiscidae
QC09999I		Dytiscidae (Larva)
QC119999	MF	Hydrophilidae
QC11999I		Hydrophilidae (Larva)
QC209999	MF	Scirtidae sp.
QC349999	MF	Elmidae
QC34999I	MF	Elmidae (Larva)
QD019999	MF	Tipulidae
QD069999	MF	Dixidae
QD079999	MF	Culicidae
QD099999	MF	Ceratopogonidae
QD109999	MF	Simuliidae
QD249999	MF	Stratiomyidae
QDAE9999	MF	Tanypodinae
QDAF9999	MF	Orthocladiinae
QDAJ9999	MF	Chironominae
QDZZ999I	MF	Diptera (Pupa)
QE039999	MF	Oniscigastridae
QE069999	MF	Leptophlebiidae
QH569999	MF	Veliidae
QH659999	MF	Corixidae
QO219999	MF	Telephlebiidae
QO309999	MF	Hemicorduliidae
QO999997	MF	Zygoptera Unident.
QP039999	MF	Gripopterygidae
QT019999	MF	Hydrobiosidae
QT039999	MF	Hydroptilidae
QT249999	MF	Calamoceratidae
QT259999	MF	Leptoceridae
OTOI9999	T	Atyide
QD899999	MF	Muscide
QE029999	MF	Baetidae
QH619999	MF	Nepidae
QH679999	MF	Notonectidae
QO029999	MF	Coenagrionidae
QP049999	MF	Notonemouridae

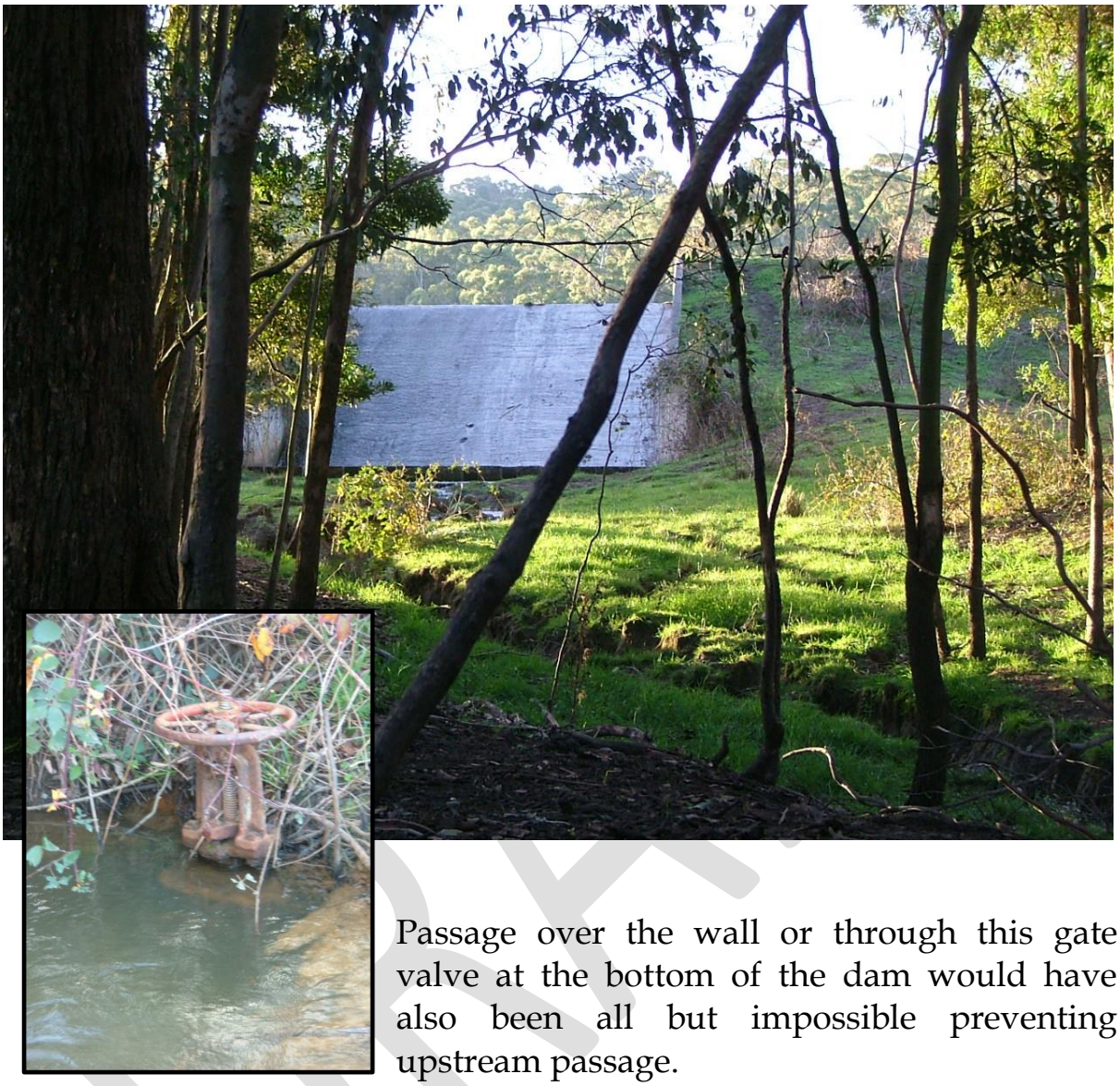
- nine families completed their life cycle completely in water(T).
- Six required moist and damp conditions(D).
- One being reasonable mobile(M).
- Thirty two being very mobile with part of their life cycle as flight(MF).

Given that many of these macroinvertebrates are very mobile enables them to re-colonise a degraded area when the conditions in this area return to favourable ones. From 2004 Artificial Flows would have returned Reaches 1 and 2 to favourable conditions.

In contrast fish and platypus will have found it much more difficult to re-habit a degraded Boundary Creek once it was returned to a much healthier condition after the releases of Artificial Supplementary Flows.

With Reach 3 being "***significantly impaired***" as a food source for top of the food chain fish and platypus; heavy metal laden and acidic waters and or the lack of any water for large periods of the year; the chances for fish and platypus to survive is minimal. More recently, the 2016 fish kill for kilometres down the Barwon River below the confluence of Boundary Creek, would also have seriously depleted nursery stock with any chance of heading up Boundary Creek.

Before the release of Artificial Supplementary Flows started, Reach 2 began to dry out as groundwater extraction drawdown influence spread. By the time these Artificial Supplementary Flows were introduced Boundary Creek had experienced a total of 468 days of no flow. Compounding the influence from groundwater extraction was the haphazard management of releases of the Artificial Supplementary Flows through McDonalds Dam. The 2006 peat fire just below McDonalds Dam in this reach is testament to this drying out. If any fish were able to survive in Reach 2 during this period, McDonalds Dam presented a formidable barrier to any migration upstream.



Passage over the wall or through this gate valve at the bottom of the dam would have also been all but impossible preventing upstream passage.

McDonalds dam itself would have been the only reliable water source refuge post groundwater extraction and pre Artificial Supplementary Flow releases. Farm dams would have provided refuge for mobile macroinvertebrates

Before groundwater extraction, the upper part of Reach 1 was prone to have no flowing water. Spring fed holes and dams would have been the only habitat refuges during these no flow summer periods.

Burrowing Yabby

Other than through casual observation there was no investigation into the yabby within the region of Boundary Creek.

When I asked John Day whether he had made any observations over his long history of land ownership along Reach Three of Boundary Creek, he had this to say.

> On Thursday, October 12, 2017, 11:05, John Day <johnday8@bigpond.com.au> wrote:
>
> Hi Malcom, I was just thinking the other day about these yabbies, There are some currently building away in the paddock on the flats, but there is hardly any these days, i can remember the paddocks being covered with them and they did give me the shits because crickets used the holes to evade detection and treatments. They were right along the edge of the creek everywhere, I used to think thats why it dried out so quickly, using their underground tunnels. Now they are further up on slightly higher ground, well way from the creek. As for the platypus, I havnt even bothered to look, i havnt seen any life in the creek since it first dried up all those years ago, before that you would spot fish, crays, eels, etc all the time. There is a few ducks swimming on the creek at the moment, but thats probably not what your after, cheers John

It would be an interesting investigation to study the yabby status along Boundary Creek, including the impact on the yabby at Boomerang Swamp on a tributary of Boundary Creek (see Otway Water Books 18, 20 and 40 that deal with the acidification of peat and the yabby at Boomerang Swamp).

CONCLUSION.

The 2017 Jacobs Boundary Creek Aquatic Ecology Investigation resulted from the introduction of a new Technical Works Monitoring Program instigated by Barwon Water in 2012,[12] revised in 2013[13] and designed to be implemented from this date, creating a data baseline that could be used as a reference point in later investigations.

Whether "***This study used the best information available at the time to estimate the current ecological values in Boundary Creek (excluding Big Swamp) and provide a high level qualitative assessment of their flow needs.***" depends whether one accepts that predictions, estimations and inferences of possible species and communities present in Boundary Creek being sourced from other catchments in the Otway Ranges is, in this case, acceptable. I doubt it, an acceptable investigation would have included on ground surveys and investigation of fish, frogs, Platypus and flora. These surveys should have been conducted as a matter of course considering:

1. the unique circumstances surrounding the background history of Boundary Creek,
2. the small size and length of the creek, and
3. the amount of local knowledge available, but not tapped into.

To accurately make inferences, estimations and predictions regarding which species and communities form part of the aquatic ecology of Boundary Creek in 2017, one has to take into consideration the previous conditions, impacts and other influences that have taken place pre 2014.

Every indication and data available before 2014, points to a conclusion that it would have been extremely difficult for any fish species and platypus to have survived outside of the McDonalds Dam immediate area. Once groundwater extraction started at the Barwon Downs Borefield in 1982, flows in Boundary Creek progressively declined. All reaches outside McDonalds Dam started going dry over the summer period by the middle 1990s, and even after the addition of Artificial Supplementary Flows in 2004, the lower reach of Boundary Creek continued to have periods of no flow. Pumping was postponed in 2010 but the periods of no flow continued and the number of days of summer no flow also continued to increase. Those species and communities relying on an aquatic environment struggled to exist. To make matters

even more difficult the dam wall barrier and the pollutants flowing out of the Big Swamp have made passage up and down the creek, impossible. The aquatic species and communities reliant on creek flows have been devastated.

With the release of Artificial Supplementary Flows in the upper reaches of a tributary of Boundary Creek, some semblance of order returned. Disruption of flows only happened when maintenance work demanded the Artificial Supplementary Flows be turned off. Another unfortunately event being the haphazard method of allowing these flows pass and be released out of McDonalds Dam. A reliable flow down Reach 2 could never be assured. By Reach 3 all of the Artificial Supplementary Flows allowed to pass would completely disappeared into the depleted Lower Tertiary Aquifers under the Big Swamp.

After the Artificial Supplementary Flows had returned Boundary Creek to some form of an observable healthy aquatic environment, the first aquatic biota to recover because of their mobility and ability to survive in nearby dams and other local water courses, were the macroinvertebrates. However, the fact that these animals were able to achieve this does not necessarily mean that the larger species could as easily, if at all, recolonise Boundary Creek.

"***Following the background review, we undertook rapid field inspections to assess the available aquatic habitat at a number of sites in the creek. The field inspections allowed specialist ecologists to "ground-truth" the information gathered as part of the background review and to determine if suitable habitat in the creek to support the species and communities predicted to occur.***"

Just because the specialist ecologists were able to "ground-truth" that aquatic conditions indicated a viable environment for the predicted species and communities, it is a quantum leap to use indirect techniques, infer and predict that these larger species and communities exist. If larger animals exist in other streams spread throughout the Otway Ranges, one cannot assume they will be present in Boundary Creek, given its past and present circumstances. It is most probable that the majority of the predicted species and communities referred to in this aquatic investigation do not exist in the Boundary Creek Catchment.

Addendum

On the 2nd of November 2017 a draft copy of this Book 39 was emailed to Barwon Water. The covering letter can be seen on page 44. A reply to this email arrived soon after and can be seen in Appendix G on pages 45 and 46. However, it is nearly 12 months that this page has been kept blank waiting for the promised Addendum to the Jacobs report to arrive.

(This page was written on 19 October 2018).

APPENDIX A.

1. "*These data show that surface water flow has ceased for long periods nearly every summer and autumn since 1999, however, before that time (1985-1998) Boundary Creek rarely stopped flowing (the only time being in autumn 1990).*"(1) Boundary Creek stopped flowing in 1984 for 7 days; 8 days in 1985 and 17 in 1990(see graph page 9).
2. "*The water in Reach 3 of Boundary Creek is highly acidic.*" "*Reach 3 dries in most summers, has highly acidic water when it is flowing...*"(1) There are periods when this reach below the Big Swamp has a pH reading between 5 and 6 after high flow events during rainfall periods.
3. "*Groundwater has also been extracted from Barwon Downs to augment Geelong's water supply during drought. The Barwon Downs borefield has been used to augment Geelong's water supply over three time periods: 1987 to 1990; 1997 to 2001 and 2006 to 2010. The most recent pumping activity commenced in April 2016. Small scale pumping has also taken place outside these periods.*" There was an extraction during the 1982-1983 drought when up to 50% of Geelong's drinking water came from the Barwon Downs Borefield.
4. Given that 6 extraction bores have the capability to provide up to 12 ML flow per day no explanation is given why the daily borefield production capacity is 55 ML.
5. "*The borefield is a critical back up source for Barwon Water because it is buffered from climate variability due to the depth and large storage capacity of the aquifer*..." This has been a critical supply of water for Geelong in the past but this is no longer the case. By not stating that Barwon Water has over 30 GL of water in reserve in the Yarra Thompson system, and more to come this year, the impression is given that the groundwater is still a critical resource. This is no longer the case.
6. But, there is a persistent emphasis of the so called reliance Geelong has on groundwater. One of the reasons for conducting the present costly monitoring program is this so called "reliance."
   "*Driving the need for this monitoring program is the reliance on the borefield to provide water security for Barwon Water customers...*"

7. When the lower Tertiary Aquifers are full as they were before groundwater extraction at the Barwon Downs Borefield these aquifers buffered the surface discharging waters from climate variability. Soaks, springs, creeks and rivers flowed all year round and would continue to do so in the foreseeable future if it was not for extensive groundwater extraction at the Barwon Downs Borefield (see the quote in point 5 above).
8. Depending on the source depends on the amount of groundwater that has been extracted over the years 1983-2016. The total quoted in the 2017 report states 114,610 ML, well short of other sources.
9. Through a Freedom Of Information request to Barwon Water in 2006 asking for groundwater extraction figures for the Barwon Downs Borefield, this was included in the answer. "***Please note there are no records prior to 1988.***"(10)
10. The Barwon Downs Borefield "...***licence makes provision for ... the protection of riparian vegetation, protection of stock and domestic use and the protection of flows in the Barwon River tributaries.***" The licence may state that these provisions be made but unfortunately in reality none of them have been achieved.
11. "***The township of Colac will soon be connected to the Geelong system through the construction of a pipeline between Colac and Geelong.***" The pipeline sadly only goes to Barwon Downs then water is transferred towards Geelong in an antiquated leaky open earthen channel to the evaporative bowl of the Wurdee Boluc Reservoir.
12. Also, only a slight variation to the direction this latest monitoring program is heading, but critical, is the emphasis on data and modelling geared towards "supporting" a licence renewal. The emphasis should be on "informing" the decision makers preparing the licence renewal application. "***Provide additional monitoring data and subsequent analysis required to support the licence renewal process.***"
13. Including the Lloyd et al. 2005 environmental flows for Boundary Creek site in the present aquatic investigation and not visiting the site seems extraordinary. Especially when the Lloyd report recommended 2 fortnightly periods of no flow as desirable. Without a cease of flow for these periods Lloyd's work suggested that without 4 weeks of no flow the Platypus and other water dependent biota would suffer. "***If these reaches do not cease to***

flow, sustained flows may promote the growth of perennial emergent species such as Typha and Phragmites, which will replace other vegetation assemblages and may degrade habitat for Platypus, larger fish species, such as River Blackfish, and macroinvertebrates."

14. Lack of local consultation remains a problem. The section on Channelization highlights a distinct lack of understanding how the bottom reach of Boundary Creek had operated post channelization and pre groundwater extraction.
15. One of the key areas of the Technical Works Monitoring Program is "...*assessing flow requirements in Boundary Creek to determine if the current complimentary flow is effective.*" The answer to this is quite simple. The complimentary Artificial Supplementary Flows do not and never have achieved flows as set down under the 2004 licence extraction conditions.
16. The statement "*Trenches up to 3 m deep were dug in 2006 by the Country Fire Authority (CFA) at the margins of the swamp....*" is wrong. The trenches were not dug until the fire of 2010. The 2006 peat fire some 800 metres upstream did not have any trenches dug.
17. "*A fire was reported in the swamp on October 10 1997 (Colac Otway Fire Management Plan 2015), which suggests that it dried at some stage prior to this time. Subsequent fires presented at the surface at various times between 1997 and 2010, with the peat swamp burning underground throughout that period (Colac Otway Fire Management Plan 2015).*"
    For this part of the swampy wetland to have dried out after several years of above average rainfall can only be attributed to the very large groundwater extraction test pump between 1986 and 1991. The wetland was alight in 1997, 1998 and then in 2010 and at no observable period between these dates.
    It is pure conjecture that the swamp was burning underground for 12 years. A more feasible reason for the 2010 fire is spontaneous combustion. There are other theories as well.
18. "*The supplementary flow makes up a significant portion of the flow in Reach 1 (and possibly Reach 2) in the summer months.*" It is just as justifiable to say that when there is no rainfall in the drier months of the year the only flow in Boundary Creek is from the Artificial Supplementary Flows.

19. Jacobs states that additional studies and investigations are required and include "***Undertaking a stand-alone assessment of the soil chemistry and groundwater-surface water interactions of Big Swamp and the impact of Big Swamp on the hydrology if Reach 3.***" It is now 2017 nine years after the Big Swamp predicament was first raised in 2008. A stand-alone assessment is long over due and should have been recommended and conducted as part of the 2012 Barwon Water New Monitoring Program.

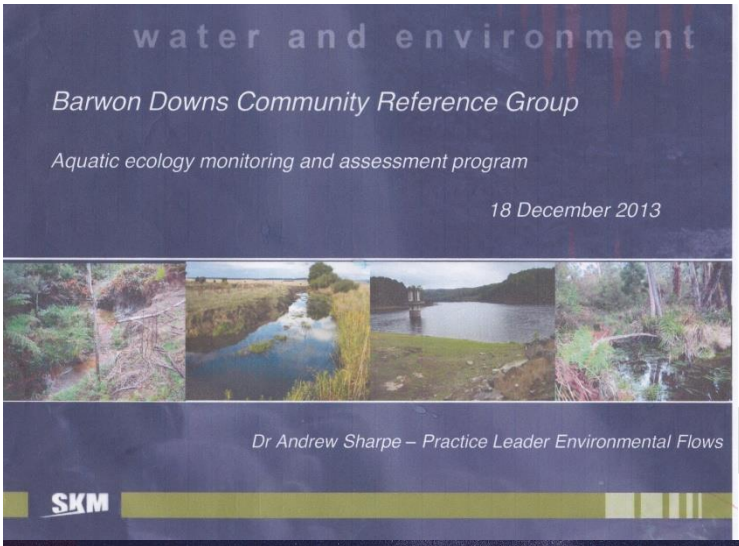
APPENDIX B.

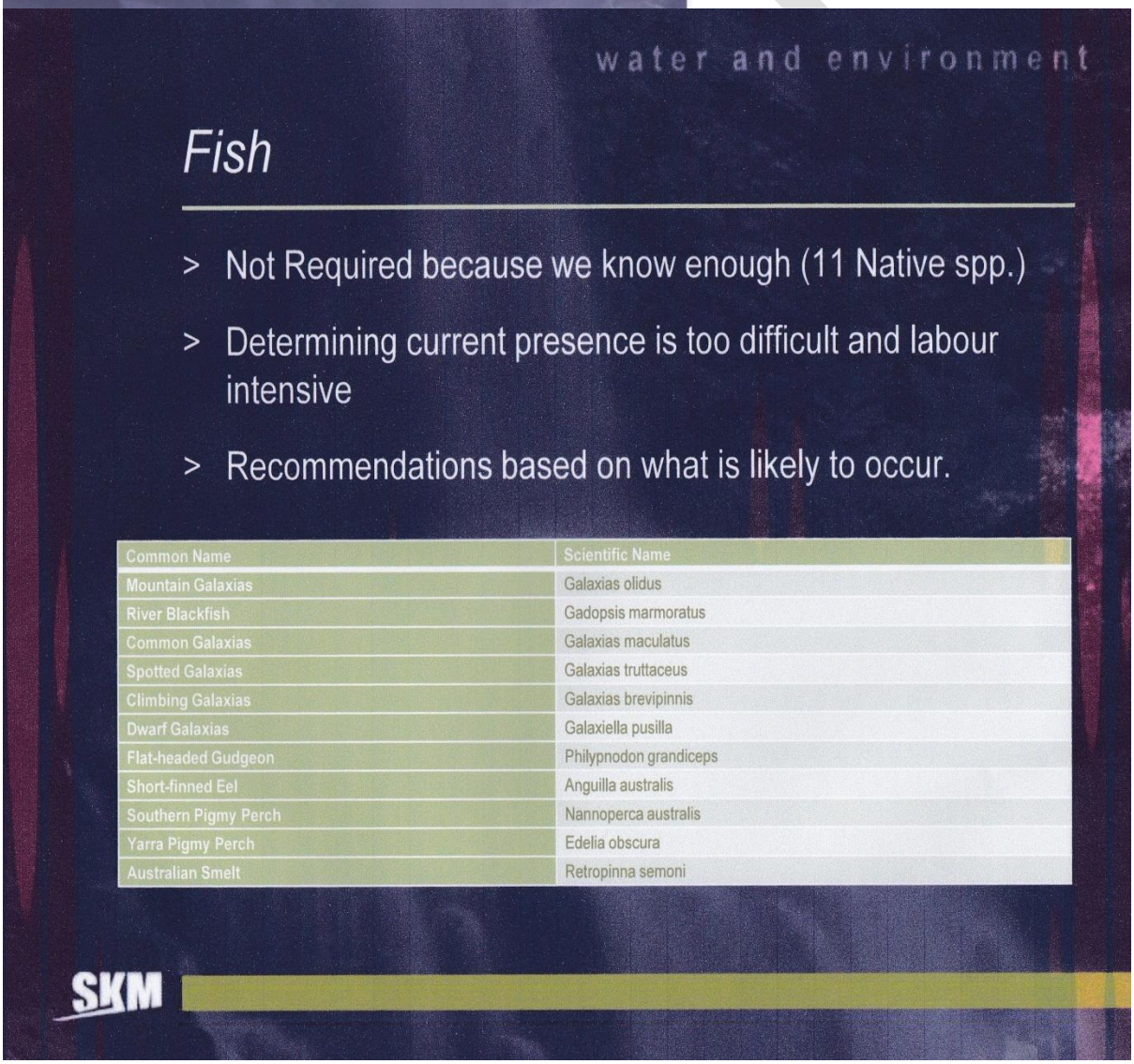
A.8 Macroinvertebrate taxa list

Spring 2014	Families	Site 1		Site 2	Site 3		Site 4
		Kick	Sweep	Sweep	Kick	Sweep	Sweep
IB019999	Hydridae					3	
IF619999	Dugesiidae			1	4		
II999999	Nematoda				1		
KG029999	Hydrobiidae			5			
KG079999	Planorbidae			5			
KG089999	Physidae				17	14	
KP039999	Sphaeriidae				9	6	
LH019999	Glossiphoniidae					12	
LO999999	Oligochaeta	1	2		12	3	1
MM999999	Mites	3	14	6	12	5	
OP029999	Ceinidae				12	12	
OP069999	Paramelitidae	3	1		10		
OP089999	Perthiidae			1			
OR189999	Janiridae						5
OV019999	Parastacidae		1	1	1	5	
QC099999	Dytiscidae			1	3	2	2
QC09999l	Dytiscidae (Larva)			1	2		9
QC119999	Hydrophilidae		4		1	1	
QC11999l	*Hydrophilidae (Larva)*					1	
QC209999	Scirtidae sp.	1	2				10
QC349999	Elmidae	7			1		
QC34999l	Elmidae (Larva)	4			1		
QD019999	Tipulidae				1		
QD069999	Dixidae		4	17			
QD079999	Culicidae			1			8
QD099999	Ceratopogonidae	2	1				
QD109999	Simuliidae	23	8		26	27	
QD249999	Stratiomyidae		1				
QDAE9999	Tanypodinae		3	2		12	2
QDAF9999	Orthocladiinae	4	37		7	1	
QDAJ9999	Chironominae	5	60	5	1	13	43
QDZZ999l	*Diptera (Pupa)*						5
QE039999	Oniscigastridae			2			
QE069999	Leptophlebiidae	30	24	61		2	
QH569999	Veliidae	2	1	72	1	14	7
QH659999	Corixidae			1	10	20	1
QO219999	Telephlebiidae	8	6				
QO309999	Hemicorduliidae				1	1	
QO999997	Zygoptera Unident.		2				
QP039999	Gripopterygidae	4	6	8			
QT019999	Hydrobiosidae	6	2		33	1	
QT039999	Hydroptilidae		15	3			
QT249999	Calamoceratidae	1	1				
QT259999	Leptoceridae		3	7	1	7	

Autumn 2015	Families	Site 1	Site 2	Site 3		Site 4
		Sweep	Sweep	Kick	Sweep	Sweep
IB019999	Hydridae			2	7	
IF619999	Dugesiidae			4	20	
KG029999	Hydrobiidae	2	9		1	
KG079999	Planorbidae	3	1			
KG089999	Physidae				11	
KP039999	Sphaeriidae			35		
LH019999	Glossiphoniidae				2	
LO999999	Oligochaeta			7	10	
MM999999	*Mites*	22	13	5	2	
OP029999	Ceinidae				1	
OP069999	Paramelitidae				2	
OT019999	Atyidae				1	
QC209999	Scirtidae sp.	13				
QC349999	Elmidae		2			
QD019999	Tipulidae	1				
QD069999	Dixidae	16	2		2	
QD079999	Culicidae		2			34
QD07999I	Culicidae (Pupa)					10
QD109999	Simuliidae	1		23	38	
QD899999	Muscidae					1
QDAE9999	Tanypodinae	2	2	1	1	
QDAF9999	Orthocladiinae	11	3		1	
QDAJ9999	Chironominae	14	1	10	8	
QE029999	Baetidae	5				
QE069999	Leptophlebiidae	20	48		2	
QH569999	Veliidae	1	15	1	5	1
QH619999	Nepidae				1	
QH659999	Corixidae		1		13	
QH679999	Notonectidae		5			
QO029999	Coenagrionidae				1	
QO219999	Telephlebiidae	4	2			
QP049999	Notonemouridae	1	1			
QT019999	Hydrobiosidae	6				
QT039999	Hydroptilidae	37	1			
QT259999	Leptoceridae	60	61		11	

APPENDIX C.





Common Name	Scientific Name
Mountain Galaxias	Galaxias olidus
River Blackfish	Gadopsis marmoratus
Common Galaxias	Galaxias maculatus
Spotted Galaxias	Galaxias truttaceus
Climbing Galaxias	Galaxias brevipinnis
Dwarf Galaxias	Galaxiella pusilla
Flat-headed Gudgeon	Philypnodon grandiceps
Short-finned Eel	Anguilla australis
Southern Pigmy Perch	Nannoperca australis
Yarra Pigmy Perch	Edelia obscura
Australian Smelt	Retropinna semoni

APPENDIX D.

Table 3. Summary of fish species captured from sites 1-6 in Boundary Creek on four sampling occasions from May 1992 to December 2001.

Site	Species captured	Sampling date			
		May 1992	Oct 1992	June 1993	Oct /Dec 2001
1	Anguilla australis		2		1
	Galaxias olidus	14	19	51	2
	Nannoperca australis	6	1	46	16
	Engaeus sp.	6	~70	5	30
2	Galaxias olidus	49	21	98	12
	Nannoperca australis	10			
	Engaeus sp.	4	~35	9	25
3	Galaxias olidus	48	10	90	36
	Nannoperca australis				20
	Engaeus sp.	1			8
	Paratya australiensis	~50			
4	Anguilla australis	1	5	1	8
	Galaxias olidus	1		91	12
	Perca fluviatilis	1	9	4	49
	Paratya australiensis	~50			
5	Anguilla australis	1	1		
	Galaxias olidus	3	1	42	1
	Perca fluviatilis				1
	Engaeus sp.		17		29
6	Anguilla australis	1	2		
	Galaxias olidus		1	58	
	Engaeus sp.	3	14		1

APPENDIX E.

State of Victoria – Evidence Act 1958

[JP/DOJ.1/2000]

STATUTORY DECLARATION

I, John Graeme Day
[full name],

of 1645 Colac Forrest Rd Yeodene
[address],

Dairy Farmer.
[occupation], do solemnly and sincerely declare that:-

Re: Boundary Creek, Yeodene, Victoria, post code 3249, Australia.

In 1979 my parents and I purchased the property on Boundary Creek, Yeodene. We came from a high rainfall area and looked for a new home with permanent water. The biggest asset to us with this farm was the permanent water flowing down Boundary Creek. The property came with good fishing (blackfish, eels and fresh water crayfish). On many nights, cars would park on the side of the road to fish these waters just as our family did. We made use of the swimming holes to cool off in the heat of the day during summer. With irrigation equipment we were able to irrigate from the creek in mid summer.

In the years 1982-1983 it was very dry and our investment in a permanent water supply became apparent. The Boundary Creek flow was still very strong whilst the area was in the grips of drought. Late in summer it still had sufficient flow to irrigate. However, we did not take advantage of this.

It was soon after the 1982-83 drought however that for some reason Boundary Creek rapidly died. I witnessed the death of many eels in small muddied pools at this time. Boundary Creek has gone as a permanent creek, it now exists as a lifeless open stormwater drain. Boundary Creek is now often dry for months at a time during periods of no rain.

I acknowledge that this declaration is true and correct, and I make it with the understanding and belief that a person who makes a false declaration is liable to the penalties of perjury.

Declared at Colac

in the State of Victoria, this 16th day of November 20 11

Signature of person making this declaration
[to be signed in front of an authorised witness]

Before me,

Signature of authorised witness

TRACEY WILLIAMS
PHARMACIST

The authorised witness must print or stamp his or her name, address and title under section 107A of the Evidence Act 1958 (Vic)
(eg. Justice of the Peace, Pharmacist, Police Officer, Court Registrar, Bank Manager, Medical Practitioner, Dentist)

Colac Healthwise Pharmacy
Charlie Tomeo, B.Pharm.
ABN 62 551 908 022 Approval Number 23419N

APPENDIX F.

State of Victoria – Evidence Act 1958

[JP/DOJ.1/2000]

STATUTORY DECLARATION

I, Petronella Cornelia Shalley
[full name]

of "Sunny Side" Yeodene Lot 45 Parish of Yeo. 125 Shalleys Road, Yeodene, Victoria 3249
[address]

Farmer
[occupation], do solemnly and sincerely declare that:-

I have lived at the above address for 44 years. This property abounds both sides of Boundary Creek and on the north west boundary of the West Branch of the Barwon River. My late husband's family have owned this property since 1912. Frank, my husband, and I wrote to Mr. Whiteside of the Geelong Water Trust on the 29th of January 1990 and informed him that Boundary Creek continued to flow through the 1914 drought and the 1967-1968 drought even when the West Barwon River became dry and dusty. The West Barwon forms our south eastern boundary. Boundary Creek was the salvation of our property through these droughts. Our family has relied on this permanent water for three generations.

We had relied on the continuos flow in Boundary Creek all the time that I have been on this property up until the year after Barwon Water pumped water from the ground at Gerangamete during the 1982-1983 drought. On the 19th of February 1991 we wrote to Mr K Maxwell of the Rural Water Commission in Camperdown because we were gaining no satisfaction from the Geelong and District Water Board. We stated that since water was being pumped from the Gerangamete wells in 1988 Boundary Creek ceased to flow in the summer of 1989-1990 and was bone dry by the 10th of January 1990.

This has happened numerous times since. After many discussions and hours spent Barwon Water agreed to release supplementary water using discharge from the Colac pipeline. A trial was conducted in 1999 but repairs had to be done to the Colac pipeline late in 1999. A meeting with Barwon Water and Sinclair Knight Merz with results that showed groundwater pumping affects Boundary Creek. Water was again released from the Colac pipeline in May 2002 but was very slow to reach our home farm.

In February 2003 water was trucked in because Barwon Water could not release the water from the Colac pipeline because I was told it was affecting the Colac supply. This scenario of trucking water in went on until 2006. Barwon Water has been now releasing 2 ML a day as per the requirement of their Licence Number 893889. However, the water doesn't reach the lower parts of Boundary Creek until it rains so the released water is of no value to our farm, to the creek and its environment, nor can we rely on Boundary Creek as a water supply.

Before Boundary Creek ran dry during 1984 there were colonies of platypus along our stretch of the creek. There were many blackfish, trout, red fin and brown trout. None of these animals have been able to live in a dry creek bed and disappeared soon after Boundary Creek dried up.

After rains and when the creek begins to flow again I am unable to use the water for stock from the creek until 4-5 inches of rain has flushed away the unpalatable water.

I acknowledge that this declaration is true and correct, and I make it with the understanding and belief that a person who makes a false declaration is liable to the penalties of perjury.

Declared at Forrest

in the State of Victoria, this 19TH day of

September 2009

P O Shalley
Signature of person making this declaration
[to be signed in front of an authorised witness]

Before me,

Signature of authorised witness

DR. R. SARKIS
Grant & Henry Street,
Forrest Vic. 3236
Ph. 052-366 355
Prov. No. 0108014 H

APPENDIX G.

Nov 2, 2017 @ 12:42. from email otwaywater@yahoo.com.au

Hello Jo,
A worthwhile meeting last night reported by all at our follow up meeting.

Below is another task adding to your workload, but this probably needs to go to Jacobs for their response, as they are the experts being paid to do a satisfactory job. You may also wish to pass this on to the CRG members.

The Group thought that to continue to promote BW's move towards change, the crit on SKM/Jacobs Aquatic report of Boundary Creek should be provided to BW for its consideration. This report is still in DRAFT form with several things still to be completed. If Jacobs do respond to this, LAWROC would appreciate any feedback.

LAWROC would also like to see the revised report of the 2015 Vegetation study where the co-ordinates have been corrected and the description of Transect 1 also corrected. The revised description of the Transect needs to include an accurate description of the Boundary Creek flows around the Big Swamp.

Kind regards,
Malcolm.

Malcolm Gardiner
1805 Colac Lavers Hill Road
Kawarren
Vic 3249
ph (03) 52 358 325
www.otwaywater.com.au

OTWAY WATER BOOK 39.pdf

A reply to the above email in December 2017 arrived containing the following comments regarding the draft copy Otway Water Book 29.

Aquatic ecology report

Survey method

The intent of the aquatic ecology study was to gain a high level understanding of the species and communities supported by Boundary Creek. The approach taken was to balance the information already gathered from the area (i.e. targeted fish surveys, observational reports, database records) and to augment that information with a macroinvertebrate survey and site inspections. Targeted fish surveys were not undertaken.

One of the major issues with targeted field surveys is that absence cannot be definitively proven. And therefore, for example if we had relied heavily on an electrofishing survey conducted over a short period to inform our assessment of the species that could be supported by the creek, we would be rightly criticised.

In that context, it was our intent to consider more broadly the species that could be supported by the creek if there was flow of suitable quality and quantity, and in this way, inform the next phase of this study (i.e. the determination of low flow recommendations). Our approach resulted in a likely conservative estimate of the species supported by the creek. We believe this approach is appropriate because regardless of the results of a targeted survey, we would still have had to consider the species previously recorded as part of targeted surveys and observed from the creek and those that may occur as they are known from the area and have suitable habitat in Boundary Creek.

It should be noted that as a result of feedback from the CRG that additional Platypus investigations, including eDNA surveys, were completed. The results of this assessment, undertaken by independent scientist Josh Griffiths from Cesar consulting, is attached.

-

Additional fish studies and information

We were not previously aware of the fish surveys undertaken by the Arthur Rylah Institute referred to in the draft report (Otway Water Book 39). These results of these surveys will make an important addition to our understanding of the aquatic species and communities supported by Boundary Creek. We are currently attempting to source these reports and once we have obtained them, we will review and include all pertinent information in an addendum to the aquatic ecology report which will be completed in the first quarter of next year.

This addendum will also provide an opportunity to include additional relevant information raised in Otway Water Book 39 and to update our assessment. For example, the confirmation that a hole dug to support fire-fighting efforts provide suitable habitat for Southern Pygmy Perch (Nannoperca australis), as evidenced by the photos from 2016 on page 18 of the Otway Water Book, will allow us to refine our understanding of the biotic assemblage of the creek. In the report as it stands, Southern Pygmy Perch are assessed as being of low probability of being supported by Reach 2, but this will be amended.

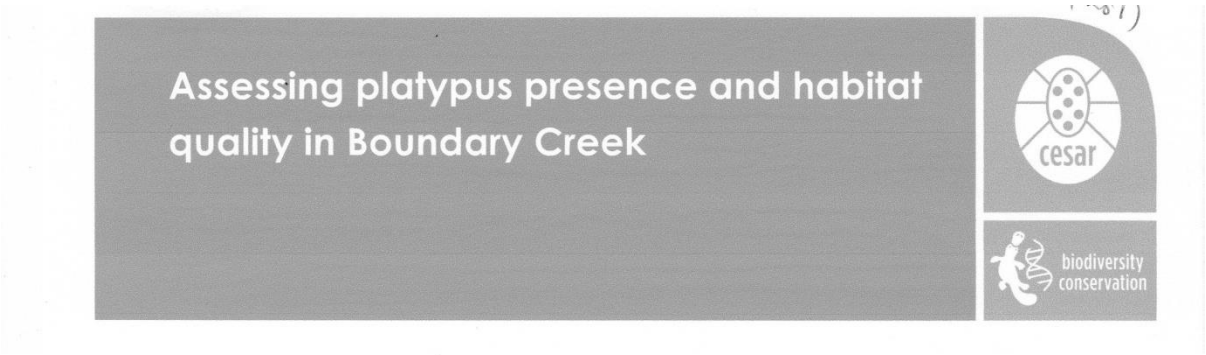
-

Apology for the offence caused by the blunt use of language in the report

We acknowledge and apologise that an interpretation of our report was that we did not value the input of locally based stakeholders regarding their observations of the creek. This was not our intent. Following the public request for information in 2014, we were approached by Stewart Alford, John Day and Nellie Shalley who provided information regarding their knowledge of the creek and its biota. We attempted in our report to delineate the different information sources (i.e. targeted surveys, government database records, observations) but acknowledge that the language chosen to do so did not accurately portray the value of these contributions or their importance in assisting us to develop an understanding of the creek. We will be mindful of this in the future and appreciate the feedback.

APPENDIX H.

Barwon Water's Boundary Creek Aquatic Ecology Investigation of 2017 was made available to the public in March 2017. In April 2017 Josh Griffiths of CESAR conducted an eDNA assessment for platypus along Boundary Creek and a section of the adjacent Barwon River. The test results were negative, no platypus.



Habitat assessment of Boundary Creek

Site	Waterway	Location	Easting	Northing	Test result
BC1	tributary of Boundary Ck	BC release pipe	727545	5745385	Negative
BC2	Boundary Ck	Reach 1 upstream MacDonald's dam	733558	5745986	Negative
BC3	Boundary Ck	McDonald's dam	734150	5745515	Negative
BC4	Boundary Ck	Reach 2 channel upstream damplands	734291	5744629	Negative
BC5	Boundary Ck	Reach 2 upstream Big Swamp	734655	5743987	Negative
BR1	Barwon Rv	Colac-Lorne Rd	741846	5747383	Negative
BR2	Barwon Rv East	Dewings bridge Rd	739877	5742355	Negative

Table 1: Site details and results of eDNA testing for platypuses in Boundary Creek and the adjacent Barwon River in April 2017.

APPENDIX I.

I compiled days of no flow down Boundary Creek using a combination of Barwon Water reports and figures calculated from the Victorian Government website, data.water.vic.goc.au. Until reading the Jacobs' Boundary creek Aquatic report (2017), I would have argued strenuously that my figures were very accurate. However, on re-examination I came up with the following table and discovered that many of the totals did not match, except for 2012 and 2013. Some of the periods for the Victorian data water website I did not spend the exhaustive time recalculating and not all years were re-examined.

YEAR	Vic Water Data	Jacobs Data	My effort
1990	16	38	15
1999	45	61	32
2000		170	133
2001	107	122	112
2007		183	169
2012		158	158
2013		159	159
2015	128	183	107

Days of no flow recorded at the stream flow gauging station at the Colac to Forrest Road bridge, Number 233228A.

I am more than willing to accept mistakes made in my calculations knowing that gathering the data is arduous, time consuming and subject to errors, even when due diligence is taken. However, the different data sets presented above indicate a reasonable correlation showing an increase in no flow days over the groundwater extraction period. It is interesting to note that even after pumping ceased between 2010 and 2015 the impact from the pumping could not be mitigated by intervening wet winters.

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