

RDRML  
joint hearing  
02/05/2018

### Introduction

My name is Keith Gunn and I am the chairman of Save the Rivers.

I have spent most of my life living in various parts of Canterbury and have retired from being the Head of Chemistry at Ashburton College. It was through my teaching position that I became involved with Save the Rivers.

About 15 years ago, I had some of my junior students measure the E.coli levels in the Ashburton River at the SH 1 bridge after "don't swim" signs were put up. That task motivated some students to monitor at several sites along the river and at regular intervals over a number of months to try and find where the E.coli was entering the river. Quite interesting data was collected. I purchased a colorimeter for college which enabled my senior chemistry students to very accurately test well water, from around the Ashburton region, for nitrate and phosphate levels plus other dissolved salts. Some of those investigations made it into the newspapers when the students won Science Fairs and other awards. Marian Baker was the secretary of Save the Rivers about that time and, having read the articles, contacted me to ask if I would test water for them. I went to their meeting and have never left!

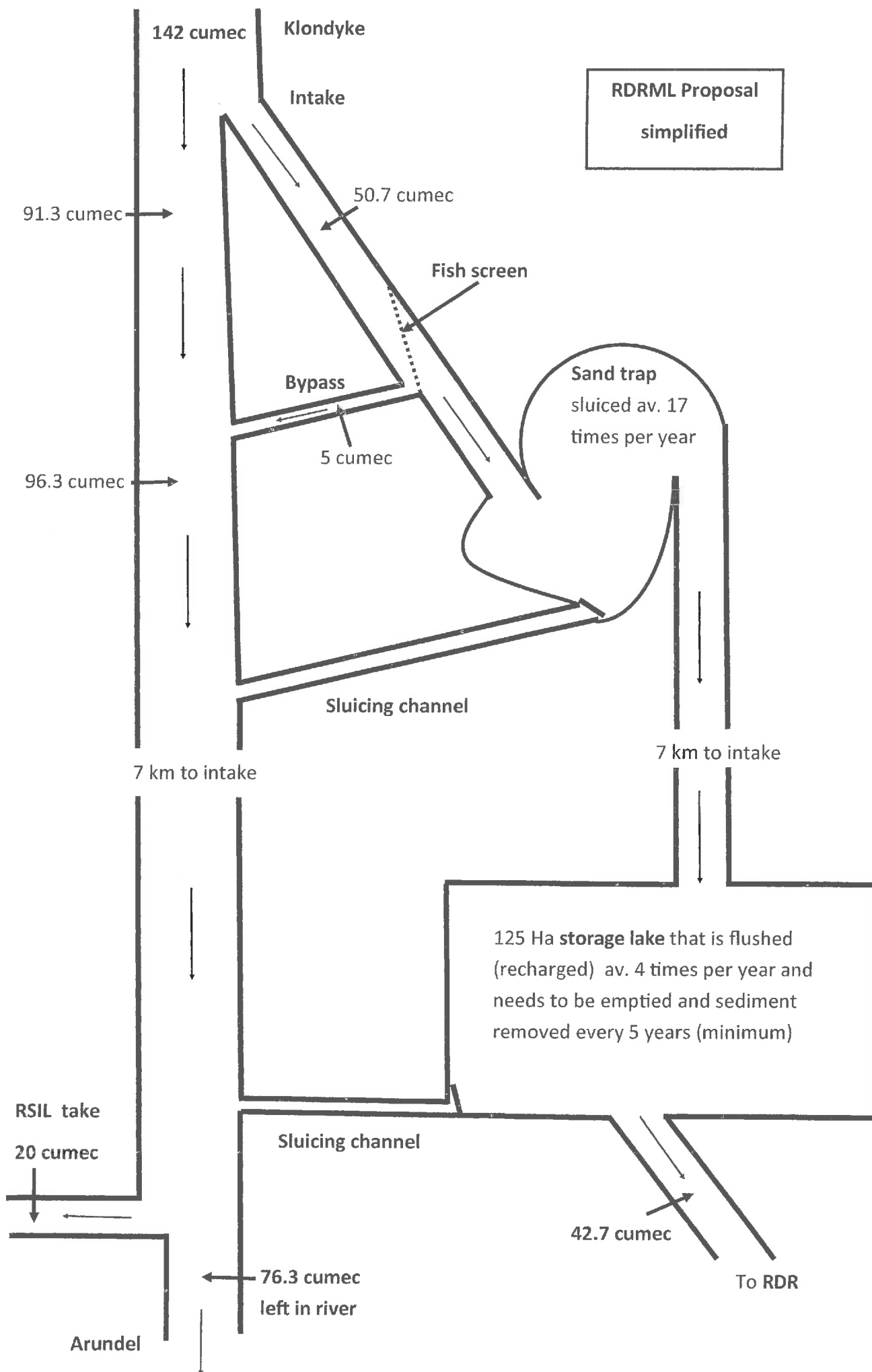
I was pleased to be among such sincere people who were very knowledgeable and humble but also determined to stop the degradation of our local waterways. Save the Rivers may seemed to have failed in their founding mission if you look at how our rivers have deteriorated since the group formed in the early 1980s but they have had an impact. The knowledge gained, by some of our members living their lives on and around the rivers, was recognised by the judges at the Water Conservation Orders for the Rakaia and Rangitata Rivers where they were deemed "expert anglers". Matthew Hall, one of our members, has been recognised by ECan. They made a prestigious Environment Canterbury Contribution Award to Matthew to recognise his outstanding knowledge about braided rivers.

I am certainly no expert angler but I am determined to stop our waterways being further degraded.

The aspects Save the Rivers submitted to ECan regarding RDRML's consent applications were:

The threat to qualities of the Rangitata River, fish screening, sediment flushing, intent of the WCO on the Rangitata River, precedence for further abstraction, impact of flows in the Ashburton River, dam safety and changes to future irrigation viability.

The above concerns will be addressed in the documents that follow:



## The Need for More Water?

### Recommendation

**Priority needs to be given to protect the environment and Save the Rivers asks that the application by RDRML to take another 10 cumec of water from the Rangitata River be declined.**

### Proposal Size

RDRML, and their consultants, refer to their proposed storage reservoir as a “pond”. Even literature from ECan uses the word “pond” to describe where RDRML propose to store 53 million m<sup>3</sup> of water taken from the Rangitata River. A “**pond**”, according to the Oxford Dictionary, is “a **small** body of still water”. A “lake” is a large area of water surrounded by land”.

The RDRML storage proposal would have a surface area of 125 Ha. Lake Camp has a surface area of 44 Ha and Lake Hood has a surface area of 80 Ha. The RDRML proposal is massive and describing it as a pond diminishes the enormity of it. It is a “lake” or “reservoir” but definitely **not a pond!**

### Some History

Many Cantabrians, and others, believe that when the government replaced democratically elected ECan councillors with commissioners, (in March 2010), they did so to hasten the consenting of more irrigation. That government set extreme future production targets and saw increased irrigation as a way of reaching those arbitrarily set goals.

Canterbury has a land area of just 17% of the national land area but already has nearly 70% of the country’s irrigated land area.

The Rangitata River has had water taken from it, to use for irrigation, under many consents for many years. The first being in 1947 when RDRML started taking water from the river and continuing to the present day with major abstractors including, Ashburton District Council, Mesopotamia Station, Rangitata Water Ltd (RWL or RSIL) and Cumberland Dairy. RDRML takes, by far, the largest volume of water.

### RDRML’s Allocation

Viewing bar graphs (included) of the existing RDRML consent, (CRC01123 also included), clearly shows that **RDRML have a very generous allocation**. For example in the period 1<sup>st</sup> September – 31<sup>st</sup> May, when the Rangitata River flow at Klondyke drops to a meagre 40.1 cumec RDRML take 18.9 cumec of it. That same 40.1 cumec in the period 1<sup>st</sup> June – 31<sup>st</sup> August loses 21.5 cumec to RDRML – **more than half of the river!** RDRML already have a very generous allocation from this stressed river.

If a new irrigation company today applied, to the consenting authority, to take about half of a river flow between median and low flow and some additional water when the river was in higher flow their chances of being successful would probably be slight in these times when sustainability and the environment are increasingly high priorities. **History has positioned RDRML in a very fortunate position with the consents it already has.**

At present RDR shareholders enjoy at least 88% reliability of supply from the existing RDR system. Many farmers have invested in on-farm storage giving them even greater reliability. The RDRML proposal to take even more river water can only be seen as a revenue gathering exercise. More

irrigated area, more intensive farming and more electricity generation. The Rangitata River has already given enough – many would say more than enough. The decision to grant the taking of another 10 cumecs, or not, can be simplified down to the whether the priority of this hearing panel is **economic or environment**.

### **Sustainability**

According to the Ministry of Business, Innovation and Employment New Zealand we currently earn about \$37 billion a year from primary-sector exports. Those same products get sold in international markets for an estimated \$250 billion – more than six times what the producers receive. The way forward must be for producers to capture more of that value.

At a recent annual meeting Fonterra Chief Executive, Theo Spierings, announced handsome profits for the company. They resulted not from selling an increased volume of milk, but from adding value to the raw product in the form of infant formula etc. He called them “higher returning products”. Better profits were generated by moving from volume to value. There needs to be a cultural change, away from striving to be “low cost” producers to being “high value” producers. The drive for ever increasing production volumes is clearly unsustainable.

It is ironic that the agricultural sector, which relies heavily on the “clean green image” of New Zealand to sell their product to export markets, has been encouraged, by government and others, to increase production volumes which has lead to polluted and depleted waterways. Brand “New Zealand” relies on our reputation as being a clean and environmentally conscious country.

For New Zealanders, it is an all too common blight on our lifestyle to have rivers littered with signs warning that it is unsafe to swim there. The impact of some historic agricultural practices on our rivers is well documented and it will take many, many years to only partially restore them.

The number of milking cows in Canterbury is approximately 950,000. In 2012 the Ministry for the Environment, (MfE), estimated that 137,000 tonnes of nitrogen was leaching from agricultural land into lakes and streams every year – 80 percent of it from cow urine. It has continued to increase by 1.2 percent annually since then. Recent national surveys of public opinion show that water issues are a major and rapidly increasing concern for New Zealanders. They are resisting further degradation of our rivers, lakes and waterways.

Given that water is a finite resource it should be used as efficiently as possible. When approximately 700L of water is needed to produce just one litre of milk the question needs to be asked if passing our rivers through the digestive systems of five million odd cows is the best use of our water. Locally most irrigation water goes to dairy.

About half of all New Zealand’s greenhouse gases come from farm animals, primarily methane from cattle. Greenhouse gases are changing our climate, making it hotter and drier on the East Coast. It is problematic to follow the logic that goes:

**Our climate is getting hotter and drier → increase irrigation → more farm animals → more greenhouse gases → our climate is getting hotter and drier → (the cycle continues!)**

## Rangitata Water Limited (RWL)

RDRML and Rangitata Water Limited, (RWL), have “mirror” consents - that were not publically notified. This means that when one company is not needing consented water the other can take that water. Depending on the season, often individual farmers – especially those that are not dairy-based – will not use their maximum amount of consented water and that water remains in the environment. The mirror consents between irrigation companies causes the river to be “flat lined” and the minimum flows permitted becomes the common flow except for high rainfall events which cause the flow to peak but which then fall quickly back to the new normal dictated by the minimum flow restriction.

In regard to the application of CRC070927 by Rangitata South Irrigation Limited, (RSIL – now identified as Rangitata Water Limited). The Section 42A Officer’s Report. (Date of Hearing: 21 - 24 October 2008) written by Senior Consents Investigating Officer, Ms Rosemary Miles, reported: para 350. *“I also note that, in practice, the taking of surplus water allocated to other consent holders when their consents are not being exercised, is almost impossible to manage, monitor and enforce. I am also unsure as to how the proposal would fit in with the water conservation order. I would not recommend a consent to be granted that proposed taking water under these circumstances”.*

There has been little discussion about the accuracy of the RDR take. Apparently, (according to the above s42A report), the RSIL take has an accuracy of 10%. If that same accuracy were to be applied to the RDR total take, (including proposed take of 10 cumec), of 45.7 cumec there would be 4.57 cumec, plus or minus. For those who are not familiar with flow rates, that margin of error of 4.57 cumec is about the same as the mean flow in the Ashburton River at SH1 for the period December 2015 to May 2016. (RDRML also has consents to abstract up to 7.1 cumec from the Ashburton River).

If RDRML were consented to build a storage lake, RWL would likely get no water from RDRML under their mirror consent arrangement. Would that precipitate RWL applying for a consent to take more water to make up for the loss of RDRML water?

## The Question of Cost

The cyclical nature of primary products, (Fonterra milk pay-outs: 2013-14: \$8.40 then, 2015-16: \$3.90), is likely to have curbed the enthusiasm for expensive irrigation water. The water used for irrigation is currently free but the infrastructure to supply the water is increasingly expensive. In the future, large abstractors may need to pay a royalty for the water they take.

A 2016 survey from Irrigation NZ reported that when recent irrigation developments are compared, 9 schemes which include both existing scheme upgrades and new schemes, the average cost is \$1,181/ha/year or \$0.21/m<sup>3</sup>, and the range of costs is \$980 – \$1,471/ha/year or \$0.17 – \$0.26m<sup>3</sup>. This gives an indicative price range for irrigation scheme affordability.

The RDRML CEO did not include any indication of the cost of water to shareholders for their proposal in his evidence. If it was expensive water shareholders would need to farm intensively to justify their use of the water. Intensive farming has led to pressure being placed on the environment. History has also shown that when there is a downturn in profitability the environment also takes a hit.

While banks and financial institutes that loaned money are likely to do well from the lending, shareholders are always vulnerable to the cyclical nature of commodity prices, which influence their farm profitability. Some money lenders are becoming environmentally aware. Blake Holgate, a sustainability analyst at Robobank, says that lenders are starting to ask loan applicants hard questions about their environmental performance, not just the economics of their business.

## **Flat Lining the River**

The RDRML proposal to take more water from the Rangitata River means the river will effectively be flat lined at 76.3 cumec below Arundel when the Klondyke recorder is on 110 cumec and for the next 32 cumec until it reaches 142 cumec. It follows that water flow of 76.3 cumec at Arundel could have very different turbidity. It could have the turbidity of 110 cumec at Klondyke or the much higher turbidity of 142 cumec at Klondyke. Turbidity is a key factor that influences how the river can be used.

Below Arundel, the river will effectively be flat lined at 76.3 cumec when the Klondyke recorder is on 110 cumec right through until there is 142 cumec at Klondyke, if the RDRML proposal to take more water was granted.

When a river user checks out river flow data from the media, or the ECan website, and reads the Klondyke flow then they may find the river they visit has had up to 55.7 cumec taken from it. Were RDRML to be granted consent for their proposal then the visitor could find 65.7 cumec has been lost from the river. It is simply too much!

It is at higher flows when salmon do their migration to the spawning grounds. Our salmon fishery is now in a critical position and to allow any more water to be taken from this river is totally unacceptable.

The Rangitata River and Rakaia River are internationally recognised for their braided nature. The RWCO prevents damming the Rangitata River for many reasons, including preventing it changing into a single stream river. Braided rivers need changing flows. When natural freshes are captured the flow velocity does not reach that required to move larger cobbles along the river. The braided character of the Rangitata River will change if higher flows are allowed to be captured. People who are familiar with the region about the mouth of the Rangitata River have reported noticing changes, including a reduction in the size of the aggregate on the beach and a build-up of fine sediment in the lagoon. Those gradual changes may be due to the reduction in flow above 110 cumec resulting from RWL capturing 20 cumec since 2010.

## **What We Don't Know**

Many anglers believe that freshes are very important for migratory fish such as whitebait, (Galaxias), longfin and shortfin tuna, salmon and sea run trout. They think that there may be some signature marker in the river water from which they spawned. When pushed out to sea during a fresh, or flood, that signature marker may play a part in the fish navigating their way back to "their" river. Anglers look forward to freshes because they anticipate improved fishing about the river mouth as a fresh recedes.

Research is being done on how the metabolism, (especially the kidneys and gills), of fish transitions when they move from fresh river water to salt water at sea. Juvenile fish spend time in the estuarine area where there is a mixing of fresh and salt water. It may be that when a flood, or fresh, sends a block of fresh water out to sea the mingling of both fresh and salt water is the best environment for the juveniles to transition in. Nobody completely understands the full significance of floods and freshes and allowing them to be reduced in size and duration by consenting further abstraction would be irresponsible.

## No Need for More

Ryder Consulting has stated flows at Klondyke above 132.6 cumecs occur approximately **16%** of the year.

Save the Rivers has used flow data since 2014, supplied from ECan, to generate flow graphs, (that are included).

Those graphs show the percentage of the year when flows were above 132.6 cumec. The flows were above 132.6 cumec for the following percentages of the years: **14.2%** in 2014, **10.9%** in 2015, **14.2%** in 2016 and **8.02%** in 2017, (for the 10 month period that data was available for).

Possibly Ryder Consulting used historic flow data, that was not available to us, and if that was the case then the business model for the proposed project needs to be questioned because all recent annual flows are well below the stated historic frequency of 16% .

To fill a 53 million m<sup>3</sup> storage lake at the rate of 10 cumec would require an equivalent of 62 days continuous abstraction, or 17% of a calendar year. It follows that if only the additional 10 cumec that RDRML are asking for were used to fill the proposed lake it would take more than a year to fill it. For some years it would be considerably more than 12 months to fill the proposed lake.

Ryder Consulting state the proposed lake is predicted to have an average water residence time of 91 days and an average flushing rate of 4 times per year. ("Flushing rate" being the number of times water in the lake is replaced in a year). The modelling for different river flows and irrigation demands give flushing rates from 3 times per year up to 7 times per year.

For that many flushes the storage lake would require water other than the extra 10 cumec that RDRML are wanting consented. If RDRML are planning to use already consented water to fill their proposed storage lake **they are able to do that without being consented any extra water**. Evidence of Mr Clarke Brunton, (for ALIL), table 3, clearly shows that reliability depends on the size of the storage lake and the 10 cumec being applied for is not needed. Their storage proposal is not dependant on them being consented yet more water from the stressed Rangitata River. The application to be consented another 10 cumec is purely an economic one. Taking another 10 cumec from the Rangitata River will not improve the environment.

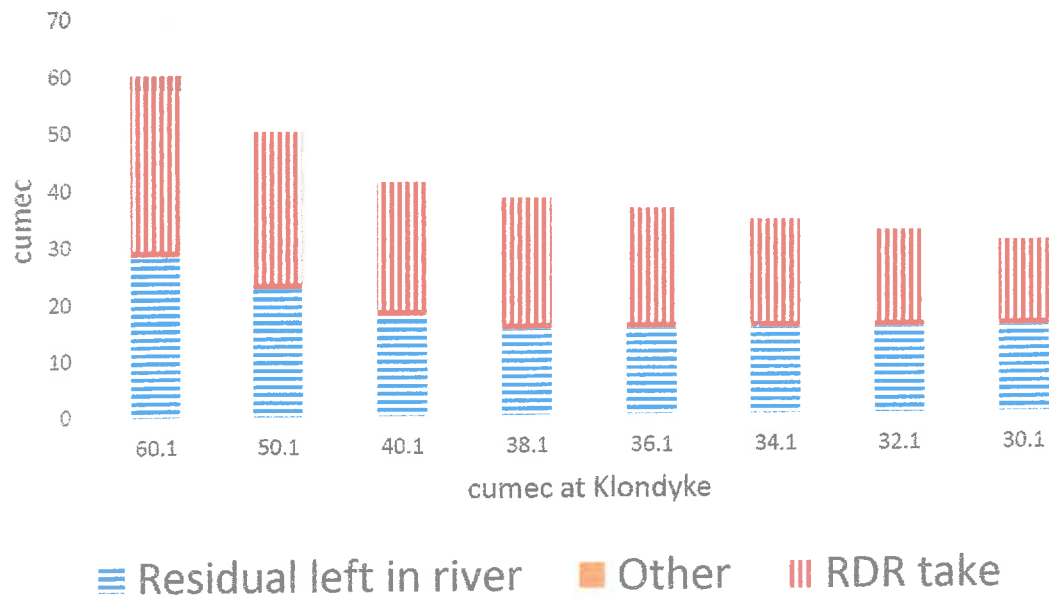
## The Question and Answer

Is it OK to take more water from the Rangitata River? Sorting through the pre-hearing submissions showed two clearly different opinions. Those with an economic interest in the water thought it was good to take more. Those with an interest in the river environment were opposed to more water being taken. The decision that the Hearing Panel needs to make seems complex, given the huge quantity of expert opinion to be assimilated, but it is really quite straight forward. The decision is about whether the river should be used for more economic gain, by some, or should the river environment be protected from further abstraction. It is **economic versus environment**. The Rangitata Water Conservation Order, Canterbury Land and Water Regional Plan, National Policy Statement for Freshwater Management and Canterbury Water Management Strategy each give the same guide as to what decision should be made.

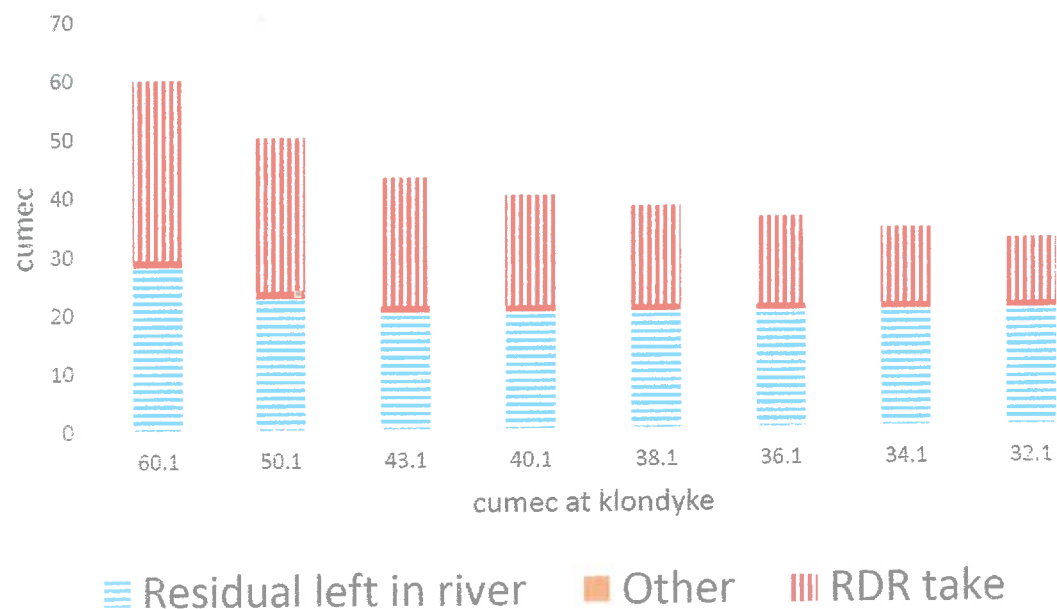
## Recommendation

**Priority needs to be given to protect the environment and Save the Rivers asks that the application by RDRML to take another 10 cumec of water from the Rangitata River be declined.**

### RDR consent CRC011237 June 1 - August 31



### RDR consent CRC011237 September 1 - May 31





# Details for CRC01123

**RMA**  
**Authorisation** CRC011237  
**Number**

**Client** Rangitata Diversion Race  
**Name** Management Limited

**Consent Location** Rangitata Diversion Race,  
ASHBURTON DISTRICT

**State** Issued - Active

**To** To dam the Rangitata River by means of a rock weir to an average height elevation of 365.5 metres above mean sea level, and to divert and take water continuously at a maximum rate of 30.7 cubic metres per second from the Rangitata River into the Rangitata Diversion Race via the Klondyke intake structure, at or about map reference NZMS 260 J36:678-144, to use water for irrigation and stockwater purposes, and to generate electricity at Montalto and Highbank Power Stations.

**Commencement** 31 Jan 2007

**Expiry Date** 31 Jan 2042

The maximum rate at which water may be taken and diverted shall be 30.7 cubic metres per second (m<sup>3</sup>/s), such that the combined take with that from the South Ashburton River (CRC011245) does not exceed 35.4 cubic metres per second. Water shall be taken in accordance with the Water Abstraction Restriction Levels and minimum flow provisions outlined in the following tables:

Permitted Rate of Water Abstraction for the period 1<sup>st</sup> September to 31<sup>st</sup> May:

Flow (m <sup>3</sup> /s) at Klondyke RDR	Other Irrigation	Other Stockwater	Residual Flow in River
64.0 – 60.1	30.7 0.3	1.0	32.0 – 28.1
60.0 – 50.1	26.2 0.3	1.0	32.5 – 22.6
50.0 – 43.1	21.8 0.2	1.0	27.0 – 20.1
43.0 – 40.1	18.9 0.1	1.0	23.0 – 20.1
40.0 – 38.1	16.9 0.1	1.0	22.0 – 20.1
38.0 – 36.1	14.9 0.1	1.0	22.0 – 20.1
36.0 – 34.1	12.9 0.1	1.0	22.0 – 20.1
34.0 – 32.1	10.9 0.1	1.0	22.0 – 20.1

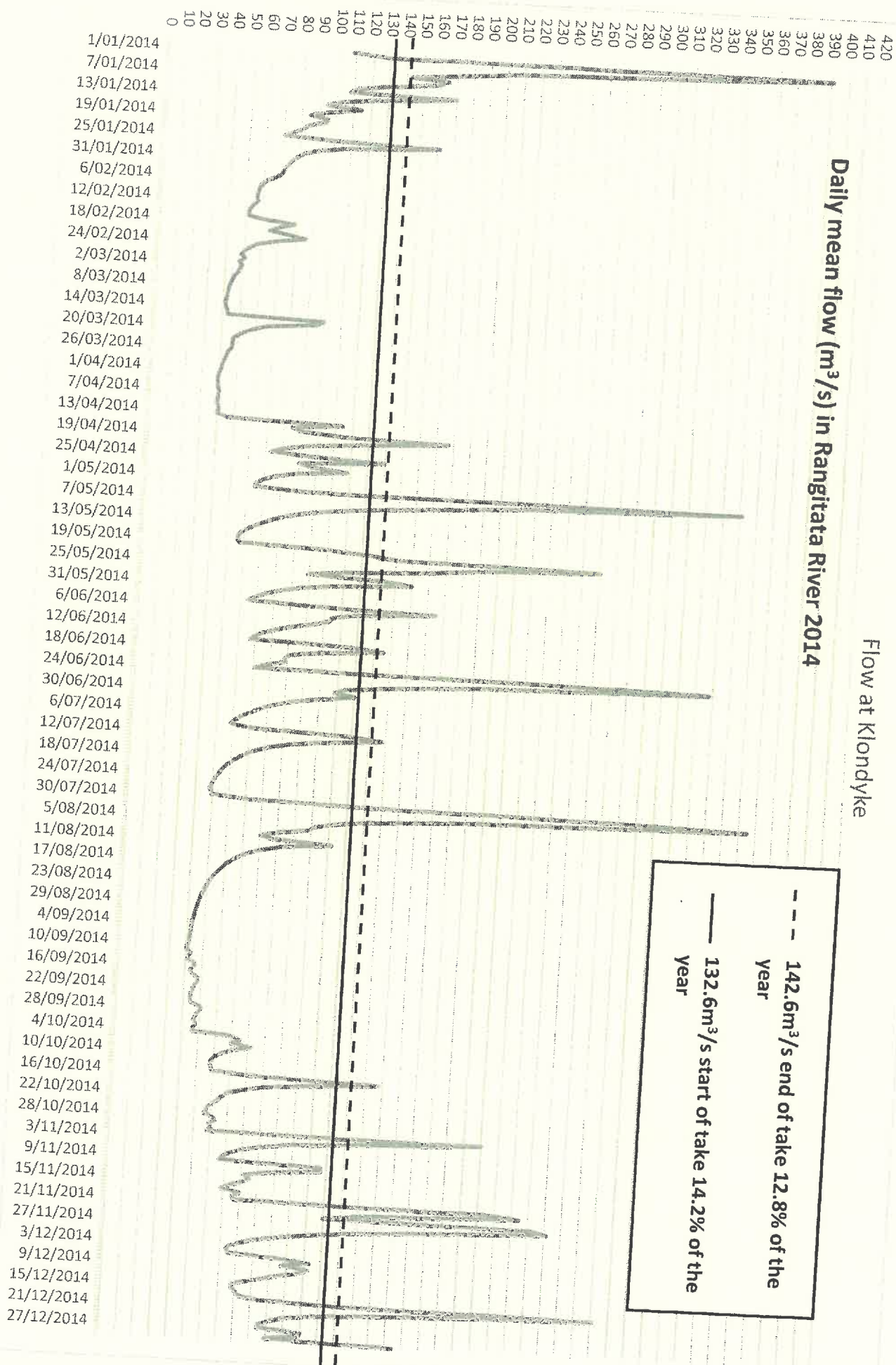
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Permitted Rate of Water Abstraction for the period 1<sup>st</sup> June to 31<sup>st</sup> August:

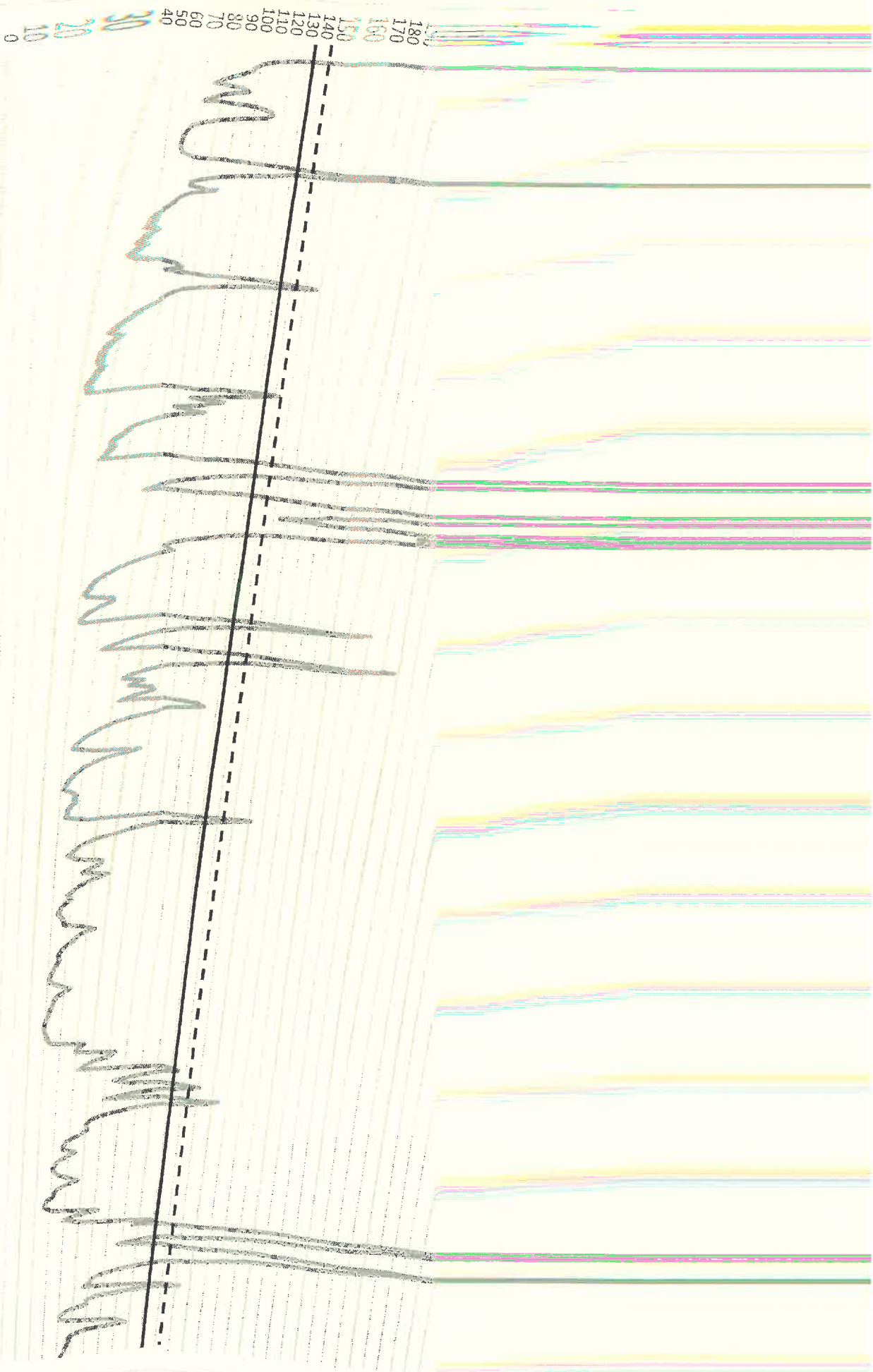
Flow (m <sup>3</sup> /s) at Klondyke RDR	Other Irrigation	Other Stockwater	Residual Flow in River
Above 64	30.7 Nil	1.0	GT 32.3
64 – 60.1	30.7 Nil	1.0	32.3 – 28.4
60 – 50.1	26.5 Nil	1.0	32.5 – 22.6
50 – 40.1	22.5 Nil	1.0	27.5 – 17.6
40 – 38.1	22.0 Nil	1.0	17.0 – 15.1
38 – 36.1	20.0 Nil	1.0	17.0 – 15.1
36 – 34.1	18.0 Nil	1.0	17.0 – 15.1
34 – 32.1	16.0 Nil	1.0	17.0 – 15.1
32 – 30.1	14.0 Nil	1.0	17.0 – 15.1

# Flow at Klondyke

## Daily mean flow (m<sup>3</sup>/s) in Rangitata River 2014

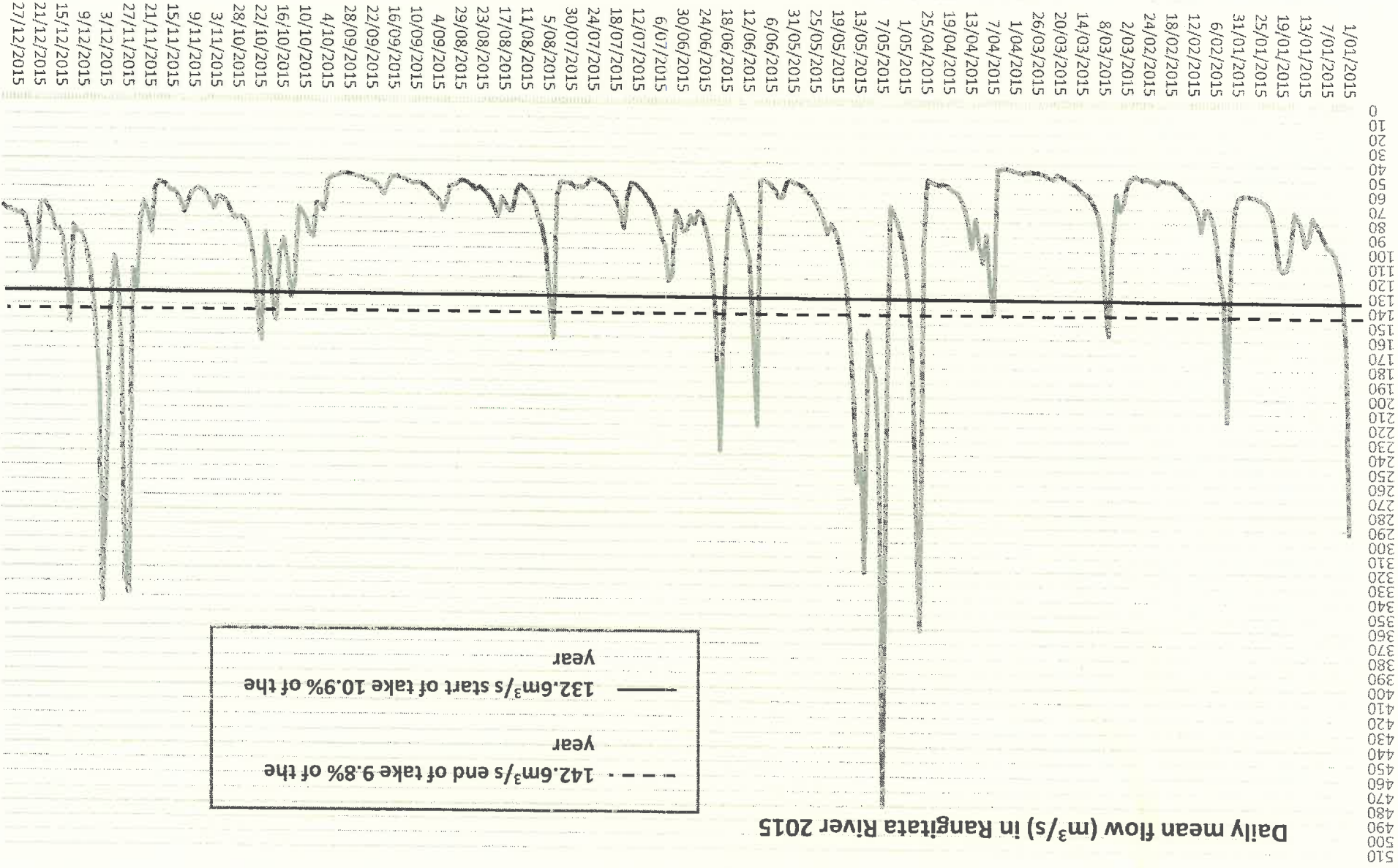


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# Flow at Klondyke

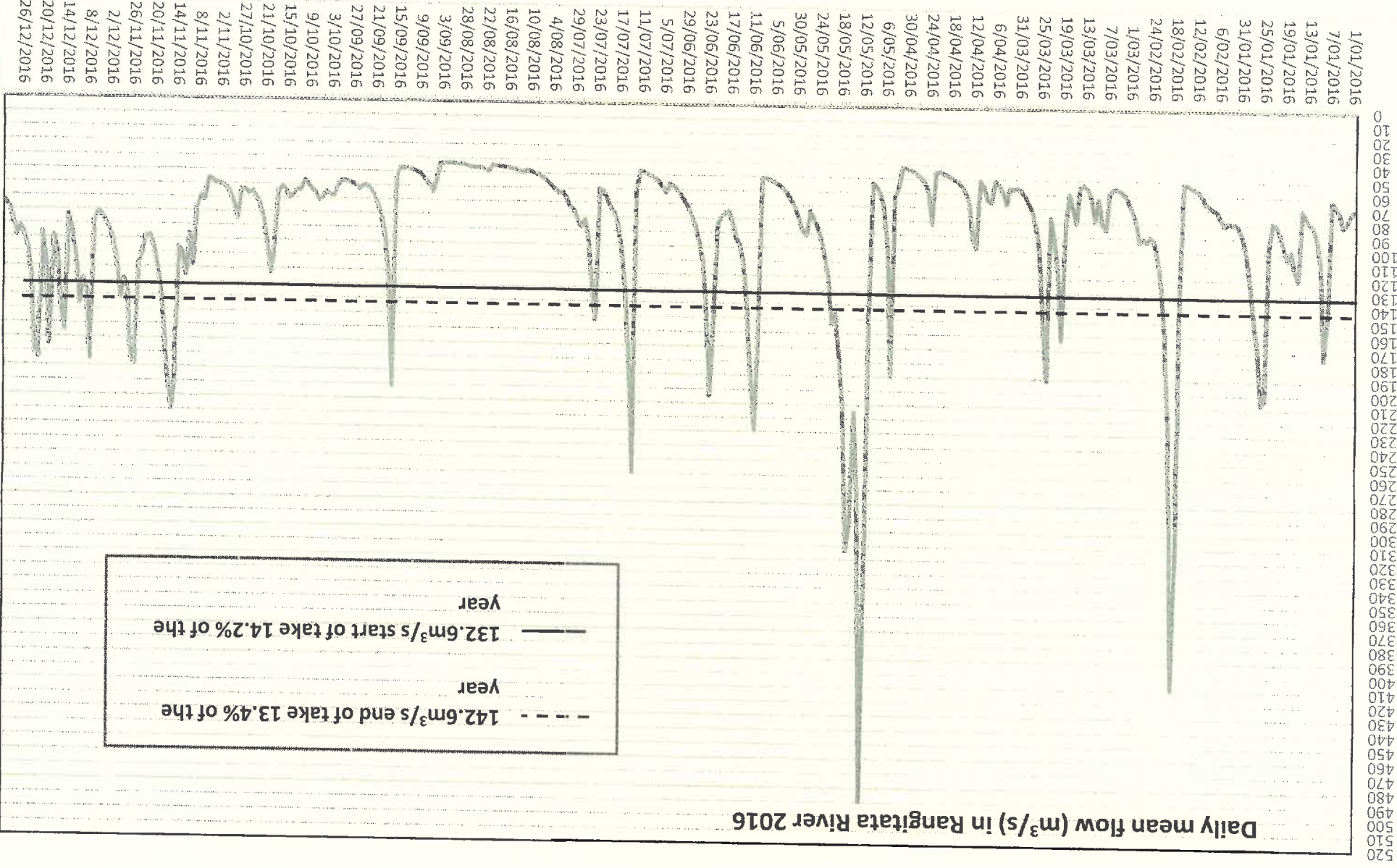
Daily mean flow (m<sup>3</sup>/s) in Rangitata River 2015





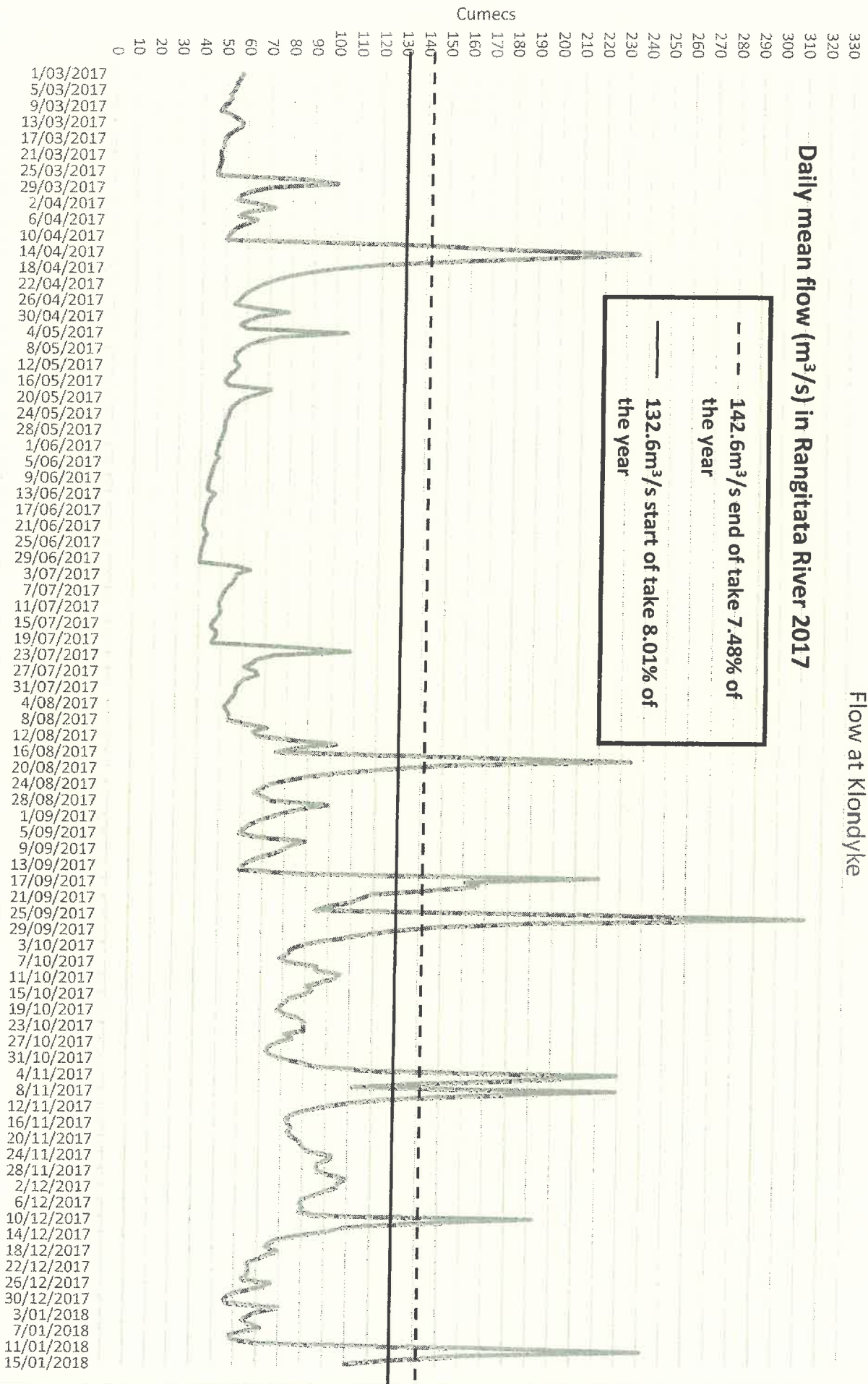
# Flow at Klondyke

Daily mean flow (m<sup>3</sup>/s) in Rangitata River 2016



# Flow at Klondyke

## Daily mean flow (m<sup>3</sup>/s) in Rangitata River 2017



## Fish Screen and Lapse Period

### Recommendation

**A lapse time of 2 years needs to be applied to the granting of a new fish screen consent.**

### Fish Screen and Bypass

The Rangitata River desperately needs a fish screen that works effectively!!

There is a compounding effect to the taking, by RDR, of up to an estimated 200,000 juvenile fish annually from the Rangitata River year after year after year. The effect of that annual loss of 200,000 juvenile fish from the river is difficult to quantify but, over many years, has likely had a devastating impact on the salmon fishery which was recognised in the Rangitata Water Conservation Order as being "outstanding" at the national level.

It is pleasing to see that RDRML now seems to be making a genuine effort to screen fish from their diversion races.

Most references indicate that the proposed fish bypass will carry 5 cumec but to quote from the RANGITATA DIVERSION RACE FISH SCREEN CONCEPT REPORT: *"The current intake to the RDR takes a total of 35.7m<sup>3</sup>/s. This is inclusive of 30.7m<sup>3</sup>/s for the RDR to supply to the various irrigation companies, 0.7m<sup>3</sup>/s to 3.0m<sup>3</sup>/s for the fish bypass, 0.5m<sup>3</sup>/s for MAR, and 1.5m<sup>3</sup>/s for an individual farmer."* (35.7m<sup>3</sup>/s assuming 3.0m<sup>3</sup>/s for bypass)

*"It is proposed that the canal modification will allow an additional 10m<sup>3</sup>/s at times of high river flow. It is also proposed to increase the flow for the fish bypass to provide a suitable stimulus for the fish to follow and to maintain sufficient velocity to avoid deposition of sediment. The bypass flow will include the existing 700l/s bypass flow take with the addition of up to a further 4.3m<sup>3</sup>/s, to a maximum bypass take of 5m<sup>3</sup>/s."*

*"We note that the RDRML had, until quite recently, a resource consent to enable it to take and discharge 3m<sup>3</sup>/s for fish bypass purposes. An application has been lodged to restore this flow (it would replace the 700l/s flow) that presently exists. We understand that it should be approved by the Canterbury Regional Council (CRC) shortly. This results in a total of 50.7m<sup>3</sup>/s at the intake, and 42.7m<sup>3</sup>/s in the canal downstream of the proposed fish screen."*

If these figures are correct there will be 8m<sup>3</sup>/s, (50.7 – 42.7 = 8.0), in the fish bypass. Other references, (eg Table 1.4.1 of Proposed Rangitata Diversion Race Fish Screen and supplementary Matters Resource Consent Application by Ryder), repeatedly quote there being a maximum of 5 m<sup>3</sup>/s in the fish bypass. Whether intentional or not, it is difficult for lay people to avoid confusion when figures are presented in this manner.

Assuming the correct flow in the bypass to be 5.0 m<sup>3</sup>/s, then that 50.7 m<sup>3</sup>/s of water carrying debris and juvenile fish at the intake will be concentrated into just 5.0 m<sup>3</sup>/s in the bypass. There is the potential for fish to be injured in that environment. The length of the fish bypass is important in that the longer it is the more chance there is for juvenile fish to be injured as they pass along it. The shorter the fish bypass is, the better it is for fish welfare. Again there is confusion about the length of the fish bypass. From ECan42A report recommended conditions *"CRC170652: a land use consent for earthworks to construct the 53M m<sup>3</sup> storage dam; to upgrade part of the RDR Canal; and to*

*construct a 460 metre long fish bypass channel."* In the Annexure Two – Design Report document 9.2 Fish Bypass : *"The proposed fish bypass is approximately 200m in length"*.

There is possible predation, especially from birds, of juvenile fish in the bypass where they would be ten times more concentrated than in the intake and the natural river.

There needs to be advanced planning about the methodology to be used to determine the efficiency of the new fish screen and bypass. Riley Consultants have identified *"the difficulty in getting reliable data from live fish trials"*. It is likely that there will need to be some infrastructure in the bypass and above, below and behind the screen to allow an accurate assessment of fish numbers before and after the screen. Before a consent is granted, details about the method that would be used to establish the efficiency of the fish screen needs to be made known and peer reviewed.

### **Lapse time**

In response to questions, asked by Save the Rivers, to Local Government Official Information and Meetings Act 1987 (LGOIMA) I quote " ..... in November 2015, we issued RDRML with a grading of 'significant non-compliance' due to the fish screen failing to meet the consent requirements. However, since then significant progress has been made, including an agreement to replace the fish screen with a new design **within two years**, which has led one of our Resource Management Officers to recently issue a grading of 'compliance'."

*"The 'compliant' grade was issued after a visit by a Resource Management Officer in November 2016 and, given the progress in working towards a replacement fish screen, he considered the fish screen to now be compliant with RDRML's consent conditions."*

It seems odd that even though all parties are in agreement that the BAFF is ineffective, and has been for many years, with an estimated loss of at least 200,000 juvenile fish each year the BAFF which was formally graded *"significantly non-compliant"* in 2015 was graded compliant a year later because RDRML had plans to replace it!!

If a lapse period of 5 years was granted at least another million juvenile fish would be taken from the river and from a fishery that is under huge stress.

The officer that graded the BAFF as compliant, after it was earlier non-compliant, noted *"I have graded this consent condition compliant. It must be noted that RDRML have a consent application in process to construct a storage pond, which is currently in 'hearing' process. Part of this consent application includes a brand new fish screen by pass. If the new consent application does not pass, RDRML still intend to upgrade the BAFF in the 2 year timeframe."*

### **Recommendation**

**A lapse time of 2 years needs to be applied to the granting of a new fish screen consent.**



## Managing Sediment

### Recommendation

**Save the Rivers asks that it be written into the consent conditions that accumulated sediment in the sediment retention pond be mechanically removed rather than sluiced into the river.**

### Deposition

As suspended material is transported down a river it gets deposited at different sites depending on the mass of the particles and velocity of the river and eddies, where current slows and moves in different directions to that of the main stream. Even when the main braids are in high flow there are small branches and back washes that have low, or no, flow velocity, allowing fine sediment to leave the water and deposit there. Where the fine sediment deposits the “quicksand” that forms becomes a hazard to river users.

The Rangitata River is a braided river, (recognised in the RWCO as having special significance because there are so few remaining), and the nature of deposition is quite different to that of a single stream river where the flow velocity is much more consistent. In some braids the flow velocity will be low and deposition happens more than in braids where the flow is higher. It is the nature of how braided rivers get to be built up at some sites and scoured out in others. Only people who spend a lot of time on the Rangitata River can gain a full appreciation of all its characteristics.

Sediment with larger than 2 mm diameter will not go through the proposed fish screen and will be carried down the fish bypass. The flow velocity of the fish bypass will need to be high to ensure the sediment does not deposit there. In the immediate area where the bypass joins the river, and downstream of that junction, deposition will occur. Over time, the accumulation of bedload material below the junction will cause changes to the physical characteristics and environment of the river.

Deposition would also occur, for the same reasons and with the same result, if accumulated sediment from the sand trap was permitted to be flushed into the river.

Because the proposed fish screen is at an acute angle, (less than 10°), to the flow in the intake reach and the sweep velocity is planned to be high compared to the velocity of the water passing through the screen particles much smaller than 2mm, (the gap between the proposed fish screen fins), are likely to be transported down the fish bypass rather than to the sand trap. The composition of sediment in the sand trap may well be more silt/clay/mud than sand. The “sand trap” might more accurately be described as the “mud and silt trap”. Periodically flushing that material into the river may change the physical characteristics and environment of the river.

### Turbidity

Turbidity has a big impact on the potential recreational use of the river. As the flow from a fresh decreases the turbidity also decreases. If the application by RDRML to take another 10 cumec was granted there would be a total of 65.7 cumec taken from the river between Klondyke and Arundel, [50.7 (– 5 cumec for fish bypass) to RDRML and 20 cumec to RWL].

When the natural flow in the river at Klondyke is 142 cumec the flow at Arundel, (below the intake to RWL), is just 76.3 cumec, (142 – 65.7 = 76.3). The residual flow of 76.3 cumec has the turbidity of a flow twice that (142 cumec). The river gets flat lined at 76.3 cumec once the Klondyke recorder hits

110 cumec, (when RWL take their 20 cumec), and RDRML have taken their consented allocation plus the extra 10 cumec they are applying for when there is 142 cumec at Klondyke.

The turbidity, measured at Klondyke, at 110 cumec is quite different to when Klondyke is at 142 cumec but the flow at Arundel throughout that range in turbidity remains constant at 76.3 cumec. If the RDRML proposal to take more water was to be granted the turbidity of the water remaining in the river will be higher for the same flow at Arundel and below.

### **Flushing and Sluicing Sediment into the River**

At present the number of annual discharges from the retention pond, (sand trap), of accumulated sediment varies between 9 and 25 with an average of 17 times a year. If RDRML were consented to take at higher flows than at present, (up to 142 cumec rather than up to 66 cumec), the higher flow would be carrying a heavier sediment load. Sediment would accumulate in the sand trap considerably more quickly and need clearing more frequently.

It is difficult to reconcile the number of times the sand trap is flushed each year with the flow data for the years 2014 – 2017. The consent to flush accumulated sediment from the sand trap into the Rangitata River requires a flow, at Klondyke, in excess of 140 cumec. The flow exceeded 140 cumec 17 times in 2014, 12 times in 2015, 18 times in 2016 and 8 times, (for the 10 month period that data was available from ECan), in 2017/18.

If RDRML was granted consent to take another 10 cumec from the Rangitata River their operational staff would have a quandary about whether to use it for flushing the sand trap or capture it to help fill their proposed lake.

In his evidence, 8.8.10, the RDRML CEO stated *“For completeness, the originally proposed sluicing of sediment from the Pond to the Rangitata River is no longer sought. As such, this activity no longer has the potential to affect RWL.”* It was a telling statement in that he showed concern for RWL, from the proposed dumping of a massive 22kg of sediment per m<sup>3</sup>, as was in the initial application, but not for the river environment.

Obviously the additional 10 cumec RDRML are seeking would be helpful, to them, for filling their proposed lake - but **not essential**. It would certainly not be helpful to the river environment to be flushing accumulated sediment into the river and it is essential that the river environment is not further degraded.

Save the Rivers is concerned about the impact of releasing accumulated fine sediment from the sand trap into the environment of the river bed down-stream of the junction with the river and the sluicing channel. Fish tend to avoid lying in parts of the river where there is fine sediment and the deposits of fine sediment, called “quicksand”, can be a serious danger to people trying to negotiate through it.

A build-up of fine sediment is likely to deteriorate habitats that currently exist. There is a strong likelihood that at least some fish that reside or transit through the river system will be adversely affected.

### **Recommendation**

**Save the Rivers asks that it be written into the consent conditions that accumulated sediment in the sediment retention pond be mechanically removed rather than sluiced into the river.**

## Consent Period

### Recommendation

**Save the Rivers asks that there be no more than a 15 year consent period be considered for CRC170654 and CRC182631**

Save the Rivers **strongly opposes** the granting of consents for CRC170654 and CRC182631 to take and use an additional 10 cumecs of water from the Rangitata River during flows above 142.6 cumec.

In their application for these consents RDRML have asked for consent periods of 35 years for each of these consents.

Save the Rivers have evidence, in other documents, explaining their opposition to the taking and using of another 10 cumecs from the Rangitata River. Our opposition to the long consent period being applied for, (35 years), is as follows:

## Case Studies

### Cawthorn Institute

Recent research from Southland's Cawthorn Institute<sup>1</sup>, (June 2016), indicates that Regional Councils should be raising minimum flows. Project leader and Cawthron freshwater fisheries scientist Dr John Hayes says *"Science has now provided evidence for what many anglers have suspected for years: taking water from rivers is risky for some fish, and we may have been short-changing them and their food sources in the past. The new knowledge, based on 15 years' research led by Cawthron Institute, has global implications for irrigation and hydro-electric development, and recreational fishing. In New Zealand, regional councils may need to revise minimum flows upward and water allocation limits downward."* Neil Deans, technical policy advisor to the Minister for the Environment, says up-to-date technical information is vital for policy development, and such research can help inform water resource management. He says the quality of Dr Hayes' and his collaborators' research is internationally recognised, and he would recommend it be evaluated for the national limit-setting process.

Because ECan has issued consents for 35 years, RDRML will not need to address this until 2042!

### Ashburton River

Section 13 of the Land and Water Regional Plan, (LWRP), requires the Ashburton River to have a minimum flow of 6 cumecs by 2023 and 10 cumecs by 2033. Unless consents are reviewed – potentially an expensive exercise for the Regional Council with litigation likely – those required minimum flows will not be realised until more than a decade later because the consents are for 35 year periods. ECan has historically set the longest consent period of all the Regional Councils and this must change, including for the consents RDRML are applying for.

## Issues Related to Long Consent Periods

Issuing 35 year consent periods is absolutely inappropriate. When we reflect back on how our natural resources were treated three decades ago and how we manage them now the difference is startling. Then, our soils were subject to all manner of pollutants and practices and our waterways were allowed to be over abstracted and rivers often treated as drains rather than life systems. Fast forward to today when nutrient budgets are set and water application is computer controlled. The pace of change is increasing exponentially. To lock in conditions for 35 years is to deny a whole generation of New Zealanders any input about what they might reasonably expect regarding management of their natural resources. It is simply not possible to imagine all future changes for the next 35 years.

## Technology Changes – An Example

Production of synthetic protein really began just five years ago, 2013, when strips of beef muscle were cultured. High tech organisations are presently working to make artificial and realistic meats, fish products, milk and other proteins.

While extremely expensive now, the price of these “animal-less” foods is expected to drop to far below the cost of production by conventional farming. Auckland food futurist Dr Rosie Bosworth, believes price parity between lab-grown and conventional meat will be reached in just 5 years!

It takes 23 calories of feed to grow one calorie of prime beef and just 3 calories from a nutrient solution to grow one calorie of lab-meat. Dr Bosworth says *“factories growing cellular-ag meat would slash land use, **water use** and climate emissions **by 90 to 95 percent**”*.

Substitute milk can be produced from nearly any plant protein.

The technology to produce animal-less foods is being driven by the imperatives of climate change, population growth and sustainability. Germany is leading other EU countries in actively producing future development strategies around changes due to alternative production of protein. Other countries, including China, are doing similar planning.

Changes to conventional agriculture in New Zealand is expected to come much more quickly than most of us anticipate. The production of synthetic protein is expected to have such an impact on the world it has been described as the **“third industrial revolution”**.

Setting 35 year consent periods may suit money lenders but would not allow primary producers to be nimble enough to accommodate the changing demands on our resources that alternative protein technology will bring. Who knows what other changes our communities will experience inside 35 years?

## Future Demand

Some of the possible/likely future changes that would be impediments to the viability of ever more irrigation include:

- Historically low interest rates are sure to rise causing the cost to service borrowing for expensive irrigation water to increase.
- A future administration could do what other countries do and impose a charge per cubic meter of water abstracted.

- Imposition of an “environment tax” (also called “Ecotax”). This tax is levied on activities considered harmful to the environment or for the loss of amenity values to the general population.
- Climate change.
- Science is advancing, at pace, to sustainable production and away from animal protein and into plant protein. Changes towards future crop-based farming will lead to reduced demand for water.
- To actually become a clean/green country rather than merely using that image for international marketing of primary products and tourism.
- People demanding that our rivers have water in them and of a quality that they can be used for contact recreation.

### **Public Opinion**

In 2017 research company Colmar Brunton, found that water issues were a major concern for New Zealanders and the fastest riser of concern aspects. A UMR survey also in 2017, commissioned by MPI, reported that the level of concern about water issues had increased by 24% among urban respondents and by 27% among rural respondents compared to 2008.

Leading up to the 2017 general election some large water users achieved headlines, in their opposition to paying a proposed royalty for the water they took, by declaring that there was a rural-urban divide. The UMR survey confirmed that there was no such divide at present. There is, however, the potential for a tension to build if the general public are deprived of any input into management of their natural resources, such as water, by the imposition of long consent periods. Denying them the chance to be part of the conversation by continuing to grant long consent periods would be outrageous!

### **Recommendation**

**Save the Rivers asks that there be no more than a 15 year consent period be considered for CRC170654 and CRC182631.**

<sup>1</sup> Cawthron Institute research 17 June 2016 <http://www.cawthron.org.nz/coastal-freshwater/news/2016/trout-and-native-fish-need-more-water-we-think-research-finds/>

## Rangitata Water Conservation Order

**For RDRML to take more water from the Rangitata River does not meet the intended expectations of the Rangitata Water Conservation Order.**

### History

In 1996 irrigation companies were queuing up to lodge more consent applications. Fish and Game and Save the Rivers Mid-Canterbury, along with other stakeholders, were witnessing the demise of the river by a thousand cuts, the so called “salami effect”. Groups, and individuals, with a keen focus on the health of the river and the associated ecology and world renowned fishery, set about applying for a Water Conservation Order, (WCO), for the river to ensure it was subject to protection in the future. There were over 1,100 submissions and after a long and difficult battle the Environment Court, in 2006, found in favour of those groups, and individuals, and a Water Conservation Order was granted for the Rangitata River, (RWCO).

### Canterbury Water Management Strategy (CWMS)

Ashburton’s Mayor Bede O’Malley was chairman of the Steering Group of Canterbury Water Management Strategy (CWMS). CWMS was a group led by Environment Canterbury, Ngai Tahu and Canterbury’s District and City Councils. After years of community discussions, in 2009, they formulated a shared vision for the future of Canterbury’s water. The priorities set by the CWMS are as quoted:

*“First and foremost our water resource **must be sustainable**. This means water quality and water levels and flows must be maintained for future generations. Both surface and groundwater must be given equal importance.*

*Second, the Mayoral Forum has quite deliberately set priorities.*

*So the **first order priorities are environment, customary use, community supplies and stock water**. The second order priorities are irrigation, renewable electricity generation, recreation and amenity. This prioritisation has been strongly influenced by the stakeholder consultation undertaken to date. The intention is that the strategy must address these principles.”*

The environment has **“first order” priority**. The Rangitata River has had so much water taken from it and it is unacceptable for it to be further degraded.

Maybe the New Zealand public voted for a new administration in the 2017 General Election partly in response to their experience of driving over river bridges under which there was little, or no, water or seeing the degradation of their waterways caused by intensive agriculture or the embarrassment of reading a recently published OECD report that highlighted how our water resources had been managed or, more correctly, mismanaged. The previous administration were focussed on increasing New Zealand’s wealth by increasing the volume of production.

### OECD Performance Review (NZ) 2017

“OECD Environmental Performance Reviews NEW ZEALAND 2017” contained many damning observations and comments including the following quotes:

*“The Land and Water Forum, established in 2009, brings together a range of industry groups, environmental and recreational non-governmental organisations, Maori communities, scientists and other organisations with a stake in freshwater and land management. The forum’s recommendations*

*have been instrumental in the development of the National Policy Statement for Freshwater Management. It held four years of discussions and engagement with stakeholders and made recommendations for three key reform areas: planning as a community; developing a National Objectives Framework; and managing within quantity and quality limits. **Despite consensus within the Forum on ways to improve freshwater management, the central government only took up some of its recommendations.***

*“New Zealand has an international reputation as a “green” country, both as a tourist destination and as a producer of natural and safe food. New Zealand should protect this reputation. It should build on its well-developed research and innovation system to export higher-value products, and **it should decouple growth from natural resource use.**”*

## **RWCO and RMA**

In accordance with Section 199 of the RMA, the purpose of a water conservation order is to “recognise and sustain –

(a) Outstanding amenity or intrinsic values which are afforded by water in their natural state

(b) Where waters are no longer in their natural state, the amenity or intrinsic values of those waters which in themselves warrant protection because they are considered outstanding”.

The water conservation order for the Rangitata River identifies three different parts of the Rangitata River and its tributaries, which are afforded different levels of protection. These are:

**Schedule 1 Waters** – which are waters that are to be retained in a natural state.

**Schedule 2 Waters** – which are waters that are to be protected for their outstanding characteristics and features.

**Schedule 3 Waters** – which are waters that are to be protected because of their contribution to the outstanding features of the Rangitata River and its tributaries.

For the Schedule 2 waters, the conservation order advises that, for the area likely to be affected by these applications described as being between Klondyke and the coast, the outstanding characteristics and features that the river has and needs to be particularly protected for, are:

- aquatic bird habitat
- aquatic macroinvertebrates
- salmon fishing
- salmon passage
- scientific – in relation to the braided character of the river
- significance for Ngai Tahu
- spiritual and cultural values
- water-based recreation

The river supports several species of introduced fish, including Chinook salmon, brown trout, rainbow trout and brook char. The salmon fishery in the Rangitata River is considered to be outstanding. There are at least 16 species of native fish known to inhabit the Rangitata River.

The Rangitata River is used for the many recreational activities including:

- Trout and salmon angling
- Fishing for other species, including whitebait, flounder and tuna
- Canoeing and kayaking
- Rafting

- Jet boating
- Tramping
- Hunting
- Swimming

Abstracting another 10 cumec from the river will not have the effect of protecting the significant or outstanding characteristics, features and values identified in the WCO for the Rangitata River.

### Rangitata River – a Braided River

Globally, braided rivers are rare. We are fortunate to have two internationally recognised excellent examples of braided rivers nearby: the Rakaia River and the Rangitata River. Similar extensive braided river systems only occur in Alaska, Canada and the Himalayas, and many of these rivers are different types from the New Zealand ones. In New Zealand, (predominantly on the east side of the South Island), they are characterised by high spring to early summer flows, frequent flooding and rapid substrate deposition. During periods of flow stability a floodplain may shift away from braiding to single stream. The flow regime of a river has a strong direct influence on its physical structure (Glova & Duncan 1985; Resh et al. 1988; Jowett & Duncan 1990; Mosley 2004). Both ECan<sup>1</sup> and DOC<sup>2</sup> have identified loss of flood flow as a threat to the braided nature of our rivers and the associated risks to ecosystems that inhabit those rivers. Braided rivers are classified as endangered ecosystems, (Holdaway et al. 2012), but that is a field of concern for experts other than Save the Rivers.

Environment Canterbury Council resolved, in 2017, to make Plan Change 4 of the Land & Water Regional Plan operative. Among other things, this plan change strengthens the rules regarding removal of vegetation from braided river beds. Weeds and other vegetation growing on the river stabilises the medium their roots are in and decreases the mobility of the material in the river bed. Highly mobile sediment is needed for a braided river. Reducing the peaks from freshes and floods and having those events lasting for shorter periods of time decreases the opportunity for rivers to clear themselves of the unwanted plant material. (Included is a flow graph showing Natural flow and Residual flow 2015 as an example).

Reducing the size and duration of freshes and floods, by abstraction at the higher flows, has an impact on vegetation growing on the river area not being wash away as before. It would also prevent didymo mats and other algae that grew in the river from being flushed out to sea.

### Damming the River

ECan identifies the damming of rivers and the “*diversion of water from rivers and wetlands to canals for electricity generation and the abstraction of water for irrigation*” as threats to our braided rivers. The RWCO, (2006), prevents the damming of the Rangitata River. In consent application **CRC170657** RDRML are applying for “a **dam** of up to 53 Mm<sup>3</sup> of water in a proposed storage **dam** at Klondyke”. Rather than the river being dammed the river water will be used to fill a dam away from the riverbed. The effect on the river below the intake site will be similar to putting a dam on the river there in that the sizes of freshes is diminished either way.

If the tops are allowed to be taken from floods and freshes, by abstraction, the high energy water is lost in a similar way to a dam in the headwaters. When the energy of the high flow water is lost and the residual water peaks for a shorted time, one of the essential requirements for a braided river is removed. Flow data clearly shows that the combined effect of both RWL, (consented 20 cumecs) and the proposed RDRML, (10 cumecs), is to reduce the size of any flood or fresh and also shorten the duration of higher flow. The impact of this on the braided nature of the Rangitata River will be gradual but significant. Some people who spend a lot of time at the river mouth and lower parts of



the river have noticed changes that may be due to the 20 cumecs taken by RWL between 110 cumecs and 130 cumecs since 2010.

The RWCO is not worth the paper it is written on if water is allowed to be repeatedly abstracted from it above 110 cumec, at Klondyke. Allowing further abstractions to continue would have a similar effect as damming the river and that is written into the RWCO as a prohibited activity. At some time the consenting authority must say no to further abstraction and we believe that time is now!

### **Mirror Consents**

RDRML and RWL, (also identified as RSIL), have non-notified, mirror consents. RDRML and RWL hold consents that permits water that is consented to one company to be taken by the other. That accommodation would likely happen when one of the companies is not needing the water, due to low demand for irrigation water or when maintenance is being carried out. If RDRML is consented to build a storage lake then the chances of RWL getting "spare" water from RDRML would be greatly reduced. It may precipitate the management of RWL to apply for more water to ensure the viability of their system. The "salami effect" and death of the river by a thousand cuts that the Rangitata Water Conservation Order sought to put a halt to should not be allowed to continue. The notion that there will be "only minor" deterioration to the river environment by taking just a little bit more water should not be accepted. It is the cumulative impact of all the abstractions rather than the incremental impact of taking another 10 cumec that is important. If the logic of how small the impact of an additional abstraction was accepted it could effectively assign the maximum flow in the river to be 110 cumec. That was **not the intent of the Rangitata Water Conservation Order**.

### **Cap on Abstraction**

**The RWCO Special Tribunal report recommended including a cap on abstraction above 110 cumec.** The "cap" would have prevented any abstraction above a flow of 110 cumec at Klondyke.

The removal of a cap on abstraction above 110 cumec, in the final gazetted document, by some unnamed editor, from the recommendations of the Special Tribunal in the writing of the RWCO has been a sore point among those interested in protecting the Rangitata River. **It was the intent of the recommendation of the Special Tribunal that the Rangitata River would be protected from further abstraction and prevent further degradation.**

**For RDRML to take more water from the Rangitata River does not meet the intended expectations of the Rangitata Water Conservation Order.**

ECan<sup>1</sup> <http://www.doc.govt.nz/documents/about-doc/concessions-and-permits/conservation-revealed/braided-rivers-canterbury-lowres.pdf> and <https://www.ecan.govt.nz/get-involved/news-and-events/2017/environment-canterbury-announces-braided-river-protection-ramps-up/>

DOC<sup>2</sup> <http://www.doc.govt.nz/Documents/conservation/land-and-freshfreshwater/Freshwater/PRR/braided-river-field-guide>.

## Natural flow and Residual flow 2015

