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Cc: [Judy Blakemore](#); [mwebb](#); ["Andrew Mockford"](#); [Julia Crossman](#); [Greg Ryder](#); [Richard Measures](#); [Tim Kerr](#); [Tim Ensor](#)
Subject: Plan Change 7: Adaptive Management Working Group (PC7-385) - Evidence in Chief
Date: Friday, 17 July 2020 5:11:43 pm
Attachments: [Evidence in Chief of Judy Blakemore \(AMWG\) 17.7.20.pdf](#)
[Evidence in Chief of Mark Webb \(AMWG\) 17.7.20.pdf](#)
[Evidence in Chief of Andrew Mockford \(AMWG\) 17.7.20.pdf](#)
[Evidence in Chief of Julia Crossman \(AMWG\) 17.7.20.pdf](#)
[Evidence in Chief of Dr Gregory Ryder \(AMWG & OWL\) 17.7.20.pdf](#)
[Evidence in Chief of Richard Measures \(AMWG\) 17.7.20.pdf](#)
[Evidence in Chief of Tim Kerr \(AMWG\) 17.7.20.pdf](#)
[Evidence in Chief of Tim Ensor \(AMWG\) 17.7.20.pdf](#)

Dear Tavisha

We act for the Adaptive Management Working Group (**AMWG**), submitter no. PC7-385.

We **attach** for filing, in relation to the above matter, statements of evidence in chief of the following witnesses on behalf of the AMWG:

1. Judy Blakemore (AMWG representative – Timaru District Council)
2. Mark Webb (AMWG representative – Fish and Game)
3. Andrew Mockford (AMWG representative - Opuha Water Limited)
4. Julia Crossman (AMWG representative - Opuha Water Limited)
5. Greg Ryder (ecology/freshwater quality) – please note that this statement of evidence also addresses matters pertaining to Opuha Water Limited's (OWL's) submission on PC7 and has been filed with the evidence of other OWL witnesses today).
6. Richard Measures (artificial freshes)
7. Tim Kerr (modelling)
8. Tim Ensor (planning)

Kind regards,

Georgina Hamilton
Partner



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**BEFORE INDEPENDANT HEARING COMMISSIONERS
APPOINTED BY THE CANTERBURY REGIONAL COUNCIL**

UNDER: the Resource Management Act 1991

IN THE MATTER OF: Proposed Plan Change 7 to the
Canterbury Land and Water Regional
Plan – Section 14: Orari-Temuka-Opihi-
Pareora

**STATEMENT OF EVIDENCE IN CHIEF OF TIMOTHY ALASTAIR DEANS ENSOR
ON BEHALF OF
THE ADAPTIVE MANAGEMENT WORKING GROUP (SUBMITTER NO. PC7-385)**

Dated: 17 July 2020

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1. INTRODUCTION

1.1 My full name is Timothy Alastair Deans Ensor. I am currently a Principal Planner with Tonkin & Taylor Limited having previously been employed by AECOM New Zealand Limited and its predecessor, URS New Zealand Limited. I have been a consultant planner for approximately 13 years. Prior to consulting I was employed by Environment Canterbury for approximately two and a half years as a consents planner.

Qualifications and experience

1.2 I hold a Bachelor of Science and a Bachelor of Arts with honours majoring in Geography, obtained from the University of Canterbury in 2002. In 2012 I graduated with a Post Graduate Diploma in Planning from Massey University. I am an associate member of the New Zealand Planning Institute.

1.3 I have worked throughout the South Island assisting private and public sector clients with obtaining statutory approvals, undertaking environmental impact assessment and policy analysis for projects, and providing expert planning evidence at plan and consent hearings. These clients include the Department of Conservation, the NZ Transport Agency, Environment Canterbury, the Canterbury Aggregate Producers Group, Fulton Hogan Limited and ANZCO Foods Limited.

Background

1.4 I am familiar with the provisions of PC7 to which these proceedings relate. I assisted the Adaptive Management Working Group (AMWG) through the pre-notification consultation period and assisted with the preparation of submissions.

1.5 In preparing my evidence, I have reviewed the relevant parts of the section 32 Report and the section 42A Report. In preparing my evidence, I have also reviewed:

(a) Evidence of Dr Greg Ryder on behalf of the AMWG

(b) Evidence of Dr Greg Ryder on behalf of the FAWP

(c) Evidence of Dr Tim Kerr on behalf of the AMWG

- (d) Evidence of Ms Judy Blakemore on behalf of the AMWG
- (e) Evidence of Mr Mark Webb on behalf of the AMWG
- (f) Evidence of Ms Julia Crossman on behalf of Opuha Water Limited (OWL)
- (g) Evidence of Mr Andrew Mockford on behalf of OWL
- (h) The Opihi River Regional Plan (ORRP)

Code of Conduct

- 1.6 I confirm that I have read the Code of Conduct for expert witnesses contained in the Environment Court's Practice Note as updated in 2014. My evidence has been prepared in compliance with that Code. In particular, unless I state otherwise, this evidence is within my area of expertise and I have not omitted to consider material facts known to me that might alter or detract from the opinions I express.

2. SCOPE OF EVIDENCE

- 2.1 My evidence focuses on the flow and allocation regime for the Opuha and Opihi Rivers. Specifically, I discuss Te Mana o te Wai in the context of the Opihi FMU and the three alternative management regimes proposed as part of this plan change process.
- 2.2 In terms of the latter I evaluate the three options within the planning policy context, discuss the role of discretionary decision-making and the resource consent process in implementing the regime, discuss the costs and benefits of setting minimum flows beyond the life of the OTOP sub-regional chapter, and discuss mechanisms for providing artificial freshes.
- 2.3 My evidence is structured as follows:
- (a) Statutory context
 - (b) Te Mana o te Wai
 - (c) Flow regime Opihi River mainstem
 - (d) Activity status of Rule 14.5.29

- (e) Artificial freshes
- (f) Policy 14.4.36
- (g) Conclusion

3. EXECUTIVE SUMMARY

- 3.1 The AMWG submission focused on the flow and allocation regime for the Opuha and Opihi River mainstems. The submission sought a variation of the alternative management regime proposed through PC7.
- 3.2 The s42A officer has rejected much of the relief sought by the AMWG in favour of a simpler more formulaic flow regime accompanied by more outcomes-based policies.
- 3.3 The officer's recommendation centred on the relief sought by two relatively general submissions and sought to better achieve Te Mana o te Wai. The challenge for the implementation of Te Mana o te Wai in the Opihi FMU is that the current environment is an outcome of many years of modification and management under the former planning regime.
- 3.4 The s42A officer's regime and the PC7 regime has an increased risk of draining Lake Opuha than the AMWG regime. This has the potential to reduce flows below the regime minimum flows and the ecological minimum of $3 \text{ m}^3\text{s}^{-1}$. The levels of restriction on out of stream users are similar across all regimes with the s42A officer's recommended regime providing the highest reliability at the expense of ecological values.
- 3.5 The PC7 and s42A officers regime introduced a flow limit at 2030. Dr Ryder has assessed these as having very limited ecological benefit and as discussed by Mr Kerr, also has the potential to drain Lake Opuha during times of drought. This 2030 flow step introduces additional economic and social costs without corresponding environmental benefits.
- 3.6 On this basis the AMWG regime is the most efficient and effective at achieving the relevant objectives (in terms of S32(1)(b) of the RMA).

- 3.7 The outcomes-based policy framework recommended by the s42A officer removes the policy describing the mechanics of the alternative flow regime. With a complex flow and allocation regime a necessary part of water management in the Opihi FMU, my view is it is necessary to retain a level of detail.
- 3.8 PC7 contained detailed policy requirements for artificial freshes to be released. The s42A officer has recommended a more outcomes-focused approach which is supported. However, witnesses for the AMWG have concerns about whether the outcomes specified are realistic or achievable due to operational constraints, or the ability of freshes to achieve outcomes such as river mouth opening. The outcomes focused approach is supported with suggested modifications to the outcomes sought. An artificial freshes protocol has also been proposed in line with protocols used in other parts of New Zealand to help guide the size, frequency and duration of freshes in order to achieve these amended outcomes. These amendments increase the efficiency of the artificial fresh policy by efficiently using the available stored water.
- 3.9 The changes to PC7 that I discuss in my evidence are set out in **Attachment B**.

4. STATUTORY CONTEXT

- 4.1 This section highlights the statutory context for my evidence. The objectives and policies referred to are contained in **Attachment A** to this evidence.

National policy

- 4.2 PC7 must give effect to any relevant National Policy Standard. The National Policy Standard for Freshwater Management 2014 (NPSFW) contains national level objectives and policies and “*provides a National Objectives Framework to assist regional councils and communities to more consistently and transparently plan for freshwater objectives*”.¹ Consequently the NPSFW contains national level objectives for water quantity and quality, and policies addressing the same to assist in achieving these objectives through limit setting and other processes.

¹ NPSFW, page 4
GH-148305-1-4235-V1

- 4.3 Key to setting flow and allocation regimes in the Opihi FMU are Objective AA1 and Policy AA1. Objective AA1 is: *“To consider and recognise Te Mana o te Wai in the management of fresh water.”* Te Mana o te Wai was the subject of some discussion in the s42A report and will be addressed separately in my evidence below.
- 4.4 Objectives A1, A2, A3 and A4 provide national level direction in relation to water quality. These policies are relevant to this evidence in so far as they relate to achieving water quality outcomes through the development and implementation of flow and allocation regimes (as opposed to land use and discharge related limit setting). Objectives A1, A2, A3 and A4 carry several key themes that will be picked up in this evidence: safeguarding the life-supporting capacity of ecosystems and ecosystem processes of fresh water; and enabling communities to provide for their economic well-being in sustainably managing freshwater quality within limits.
- 4.5 Objective B1, B2, B3, B4 and B5 of the NPSFW and associated policies provide direction for PC7 in relation to water quantity. These objectives also carry the key themes identified above and provide additional specific directives of particular relevance to this evidence, to avoid any further overallocation and phase out existing overallocation.
- 4.6 Of particular relevance to the Opihi FMU given the presence of the Opuha Dam, is Objective B5 which is: *“To enable communities to provide for their economic well-being, including productive economic opportunities, in sustainably managing fresh water quantity, within limits.”* The presence of the dam means that the starting point for certain decisions is not the same as for an FMU without this existing infrastructure.

Canterbury objectives

- 4.7 The NPSFW must be given effect to by the LWRP and therefore PC7. The requirement within the NPSFW to safeguard the life-supporting capacity of ecosystems and ecosystem processes of fresh water is reflected strongly in the LWRP through Objective 3.8 and 3.16. These objectives are also complimented by Objective 3.17 requiring significant indigenous biodiversity values to be protected and Objective 3.19 requiring the protection of the natural character of fresh water bodies.

- 4.8 Objectives 3.7 and 3.12 of the LWRP requires an explicit recognition of the competing interests for fresh water and that regard needs to be had to community outcomes when managing fresh water. The Canterbury Water Management Strategy and the Zone Implementation Programme (ZIP) process is a key element for achieving these objectives.
- 4.9 Objective B5 of the NPSFW is given effect to through Objective 3.11 and 3.12 of the LWRP. As discussed above in relation to Objective B5, the presence of Opuha Dam has a large influence on the approach taken to achieving Objectives 3.11 and 3.12.

Plan change 7

- 4.10 PC7 contains no new objectives, and the objectives in the LWRP are unaltered by PC7. Therefore, for the purposes of S32(1)(b) of the RMA, the objectives of the LWRP are the relevant objectives.
- 4.11 PC7 proposes Policy 14.4.35. This is particularly directive and almost plays the role of an objective in the context of flow and allocation regimes for the Opihi FMU. Policy 14.4.35 is discussed in more detail later but provides a lens through which to view the Objectives of the LWRP in the context of PC7.

5. TE MANA O TE WAI

- 5.1 Objective AA1 and Policy AA1 of the NPSFW directs regional councils making or changing plans to “consider and recognise” Te Mana o te Wai noting that:
- a) *te Mana o te Wai recognises the connection between water and the broader environment – Te Hauora o te Taiao (the health of the environment), Te Hauora o te Wai (the health of the waterbody) and Te Hauora o te Tangata (the health of the people); and*
- b) *values identified through engagement and discussion with the community, including tangata whenua, must inform the setting of freshwater objectives and limits.*
- 5.2 The preamble and introductory text of the NPSFW provides some context for Objective AA1 and Policy AA1. Specifically:

- 5.3 “*Te Mana o te Wai is an integral part of the framework that forms the platform for community discussions about the desired state of fresh water relative to the current state*”;
- 5.4 “*Te Mana o te Wai is the integrated and holistic well-being of a freshwater body*”;
and
- 5.5 “*By recognising Te Mana o te Wai as an integral part of the freshwater management framework it is intended that the health and well-being of freshwater bodies is at the forefront of all discussions and decisions about fresh water, including the identification of freshwater values and objectives, setting limits and the development of policies and rules.*”
- 5.6 The s42A officer discusses Te Mana o te Wai at length, drawing on the NPSFW and an interim decision of the Environment Court² to arrive at the opinion that:
- a) the consideration and recognition of Te Mana o te Wai is a key decision-making test; and
 - b) that Te Mana o te Wai cannot be viewed through an anthropocentric lens that seeks to place high value on out-of-stream use of water.
- 5.7 The s42A officer holds concerns as to the extent that Te Mana o te Wai has been considered and reflected in the development of PC7 and raises several specific issues at paragraph 2.14 of the s42A report. Based on the submission of Royal Forest and Bird Protection Society of New Zealand³ and Te Rūnanga o Arowhenua, the s42A officer has recommended significant changes to the flow and allocation regimes proposed through PC7.
- 5.8 The s42A report identifies the Te Mana o te Wai can be subject to some local interpretation and calls on nga runanga to assist in providing this context. Acknowledging that we do not currently have the benefit of this input from Te Runanga o Arowhenua, I wish to comment on the practical implementation of Te Mana o te Wai in the Opuha FMU.
- 5.9 In practical terms, the implementation of Te Mana o te Wai needs to begin very early in the water resource management process. Realistically, Regional

² Aratiatia Livestock Ltd & Ors v Southland Regional Council [2019] NZEnvC 208

³ PC7-472.179-181

Councils need to take the initiative in focusing on freshwater body health first and foremost engaging with the community on freshwater values, setting water quantity and quality limits, and developing policies and rules for water take and use. In the context of PC7 this would need to have been driven in part through the ZIP process.

- 5.10 The challenge for Te Mana o te Wai in the Opuha FMU, which is highlighted particularly by the presence of the Opuha Dam, is that the current environment is an outcome of many years of modification and management under the former planning regime. This does not mean that Te Mana o te Wai cannot and should not influence freshwater management direction at this stage in the LWRP by raising the importance of freshwater body health amongst the competing uses of water. However, despite the s42A officers comment that Te Mana o te Wai cannot be viewed through an anthropogenic lens, it means that any water management regime necessarily needs to factor in the current environment (for example the presence of the Opuha Dam) and the timescales that may be necessary to equitably implement significant management changes in order to achieve Te Mana o te Wai. Importantly given the investment in Opuha Dam and the economic and social context that has developed around it, any significant management changes to achieve the integrated and holistic well-being of the freshwater bodies in the FMU, need to be driven by a strong evidence base and informed through extensive community involvement.
- 5.11 The s42A report identified a list of several broad level concerns as to how Te Mana o te Wai has been considered in the development of PC7 at paragraph 2.14 of Part 2 of the s42A report. I provide some high-level comment on these broad level concerns below (with reference to the items on the list).

a) Substantial allocation to out of stream users

- 5.12 The fact that water is allocated to out of stream users is not an issue in itself and is in fact anticipated. Objective 3.7 of the LWRP recognises that water will be shared and has many in-stream and out-of-stream uses, while Objective 3.11 recognises water as an enabler of economic and social wellbeing, which in the context of the Opuha FMU includes out of stream uses for irrigation and municipal supply.

- 5.13 As discussed above the existence of the Opuha Dam plays a significant role in the application of Te Mana o te Wai and the management options available. A key purpose of the Opuha Dam is to provide for river health through flow augmentation and the associated flow and allocation regime. However, the purpose of the dam is also to provide for out of stream use and there is an expectation from those who have invested in the infrastructure that water is available for this purpose.

b) Allocation blocks determined by adding existing allocations

- 5.14 Management of the Opihi FMU is strongly influenced by the presence of the Opuha Dam. The purpose of the dam is firstly to augment flows in the Opuha and Opihi mainstems to improve ecological and cultural health, and secondly, to provide a source of irrigation water to the shareholders of OWL. Because of this second purpose, there is an anticipation of water being available for out of stream allocation in line with resource consents held to take and use water, and in line with shares and water entitlements. Due to the investment in the dam being based on the allocation of a volume of water, the determination of the volume of allocation blocks necessarily involves summing existing allocations.

c) Delaying meaningful change

- 5.15 The s42A officer is concerned that 'meaningful change' is being delayed for a decade or more. It is assumed that the meaningful change is reference to the flow and allocation regime in PC7 set down for 2030. The basis for the 2030 regime and my opinion on including this within the OTOP sub-regional chapter, has been discussed in the evidence of Dr Greg Ryder and myself on behalf of the Flow and Allocation Working Party (FAWP) and further in this evidence. As is discussed in this evidence, there is no strong ecological basis for the 2030 minimum flow increases. Therefore, a question arises as to whether or not the 2030 regime represents meaningful change or is in fact necessary in order to achieve the LWRP objectives and Te Mana o te Wai.

e) Emphasis on the status quo

- 5.16 In my view the AMWG proposed amendments to the PC7 alternative management regime gives significant weight to ecological flows while recognising the constraints posed by the existing environment. A key driver for

the AMWG proposed regime is to maintain flow connectivity and minimum flows in drought years (such as occurred in 2014 – 2016) in order to provide for ecosystem health. This will occur at the cost of reliability currently enjoyed under the ORRP and so departs from the status quo. This will be discussed in more detail below.

f) not immediately implementing simple measures, e.g. partial restriction regimes

- 5.17 Both PC7 and the AMWG proposed flow and allocation regime include a partial restriction regime that is effective from 2025. While the measure may be simple as the s42A officer describes it, any regime change that has the potential to restrict the availability of water comes with associated costs. In order to account for these costs, it is reasonable to provide a transition period to enable water users to adjust and make necessary system and operational changes. Provided there is certainty of implementation of these changes, and the timeframe for implementation is not too far in the future, then the delay does not undermine Te Mana o te Wai, rather recognises the implementation challenges discussed above.

6. FLOW REGIME OPIHI RIVER MAINSTEM

Alternative Management Regimes

- 6.1 Through PC7, the AMWG submission, and the s42A officer's recommendations there are three flow regimes for consideration. PC7 provides for a multi-level flow regime with three management regime levels, as does the relief sought through the AMWG submission (the AMWG regime). The s42A officers recommended option (S42A regime) contains two management regime levels. Entry into a management level is based on three environmental factors: snowpack in the catchment, inflows to Lake Opuha from the North and South Opuha Rivers, and the level of Lake Opuha. These multi-level flow regimes will hereafter be referred to as Alternative Management Regimes to align with the terminology used in PC7.
- 6.2 The history behind the alternative management regimes is discussed in the evidence of Ms Judy Blakemore. The experience and knowledge gained by the

Opuha Environmental Flow Release Advisory Group (OEFRAG) over the last 20 years has provided valuable insight into how a flow regime of this type can have beneficial outcomes for the Opihi FMU.

- 6.3 The three alternative management regime options being considered are similar in the fact that they all provide for a shift between flow regime levels based on a set of environmental triggers⁴. The AMWG and PC7 regimes are the most similar as PC7 is based on an early variant of the AMWG regime.

Assessment of PC7 and AMWG regimes

- 6.4 The evidence of Dr Tim Kerr describes the main differences between the AMWG and PC7 flow regime in detail. Dr Kerr has compared the AMWG and PC7 regimes using a computer model that accounts for the daily variation in flows in the Opihi River at Saleyards Bridge (the minimum flow site for the Opihi River).
- 6.5 The planning context for Mr Kerr's assessment is the objectives of the NPSFW, the LWRP and PC7 Policy 14.4.35. Of particular relevance are the key policy themes discussed above in the statutory context section of my evidence. The first theme linked to Objective A1 and B1 of the NPSFW and Objective 3.8 of the LWRP, seeks to safeguard the life-supporting capacity of ecosystems and ecosystem processes. Ecological flows of $3 \text{ m}^3\text{s}^{-1}$ were set within the model to assess the effectiveness of both regimes in achieving these objectives. The basis for the ecological flow is set out in the evidence of Mr Mark Webb where he notes that the habitat available for fish and invertebrates drops rapidly when the flow at Saleyards Bridge is below $3 \text{ m}^3\text{s}^{-1}$.
- 6.6 The theme of enabling the economic and social wellbeing that can be gained from utilising freshwater within limits is driven by Objective B5 of the NPSFW and Objective 3.11 of the LWRP. In addition, Objective 3.7 of the LWRP is that water is managed prudently as a shared resource with many in-stream and out-of-stream values. It is therefore important that alongside the ecological values, the frequency and duration of restrictions placed on out of stream uses are assessed. This is necessarily a balancing act as water available to sustain out of stream values may not be available for sustaining in-stream values.

⁴ The triggers relate to snowpack in the catchment, inflows to Lake Opuha and the level of Lake Opuha.

- 6.7 As discussed earlier in my evidence PC7 Policy 14.4.35 plays a significant role in shaping the assessment of the various attributes of the AMWG and PC7 regimes. The s42A officer has recommended amending Policy 14.4.35 to include 'ecological health' alongside connectivity and flow variability as things to be maintained in the Opuha and Opihi Mainstems. This amendment is supported as it provides a clearer link to the objectives the policy aims to achieve, including Objective B1 of the NPSFW and Objective 3.8 of the LWRP.
- 6.8 As PC7 does not introduce any new objectives, Policy 14.4.35 plays a key role in setting out how PC7 will achieve objectives of the NPSFW and the LWRP. Dr Kerr's modelling exercise has therefore factored in Policy 14.4.35 when assessing the performance of each regime.
- 6.9 Dr Kerr discusses the modelled effectiveness of each regime as being determined based on six values aligned with the planning context discussed above:
- (a) How often was river connectivity at risk?
 - (b) How often were ecological minimum flows at risk (less than $3 \text{ m}^3\text{s}^{-1}$)?
 - (c) How frequent did full restrictions occur?
 - (d) The equity of water reductions i.e. how did the amount of water gained by the river from allocation restrictions compare to the amount of water lost by the river through reduced minimum flows?
 - (e) How much time was spent in a restrictive regime?
 - (f) What percentage of abstraction water was available from the main stem of the Opihi?
- 6.10 Dr Kerr modelled three scenarios to compare the AMWG and PC7 options. A summary of the results of Dr Kerr's modelling is contained in Table 2 of his evidence. This shows that:

- (a) Under the AMWG regime (with and without stakeholder discretion),⁵ ecological flows of 3 m³s⁻¹ would have been maintained more often than under PC7.
- (b) The AMWG regime (with and without stakeholder discretion) has the least amount of time with flows at Saleyards Bridge below the regime's minimum flows.
- (c) The AMWG and PC7 regime had enough flow in the Opihi River at Saleyards Bridge to maintain connectivity (above 2 m³s⁻¹) for all the years simulated.
- (d) The availability of water for abstractors was similar under the AMWG and PC7 regimes.

Planning assessment

- 6.11 The s42A officer has noted that "*there is a fine balance between minimum flows in the river, the amount of water made available for abstraction, climate variability, the level of the lake and the frequency and size of summer freshes. Analysis by Environment Canterbury indicates that the amendments proposed may result in higher lake levels, requiring outflows to be reduced earlier than under the PC7 framework. It also increases the frequency with which Level 1 and Level 2 flows are triggered.*"⁶
- 6.12 I agree with the s42A officer that there is a fine balance to be achieved and suggest that this balance point needs to be carefully determined by the key objectives of the NPSFW, the LWRP viewed through the lens of Policy 14.4.35 of PC7.
- 6.13 Minimum flows are one of the key tools used to manage effects on ecosystems and ecosystem processes. Therefore, the ability of a regime to achieve these flows is paramount. The evidence of Dr Ryder suggests the 'current' and 2025⁷ monthly minimum flows (Full Availability flows) proposed through the AMWG submission are adequate to provide suitable habitat for the range of species present at with habitat gains and losses dependant on the species and time of

⁵ The role of discretion in decision making will be discussed later in this evidence.

⁶ S42A report, paragraph 9.52, page 313.

⁷ The PC7 2030 limits will be addressed later.

year. On this basis, these minimum flows contribute to achieving Objective B1 of the NPSFW and Objective 3.8 of the LWRP by providing flows to safeguard the life-supporting capacity of ecosystems and ecosystem processes, and indigenous species including their associated ecosystems.

- 6.14 The evidence of Dr Kerr shows that the AMWG regime provides the best opportunity to meet the regime minimum flows and maintain flows above the critical $3 \text{ m}^3\text{s}^{-1}$ ecological flow. This is where the balancing act occurs.
- 6.15 The s42A officer identifies that the AMWG regime may result in higher lake levels requiring lake outflows to be reduced earlier than under PC7. Based on the evidence of Dr Ryder and Mr Webb, my opinion is that reducing outflows earlier is not an issue in itself, as ecosystems and ecosystem processes are still being safeguarded at these flows. The higher lake level, which is the reason for these reduced flows, instead provides opportunity. As discussed by Dr Kerr, rather than just storing water for greater reliability of supply for irrigators, the increased lake storage under the AMWG regime provides a safety net for the river. As shown in Dr Kerr's Table 2, the irrigator reliability is similar between the PC7 and the AMWG regime, but the key difference between the two regimes is the number of days PC7 dips below the regime minimum flows.
- 6.16 This information needs to be placed in the context of S32(1)(b) of the RMA. Based on Dr Kerr's assessment, both the PC7 and AMWG regime had similar water availability for irrigators making the economic and social costs associated with lost production and opportunity relatively similar.
- 6.17 Both the PC7 and AMWG regimes maintain adequate flows (above $2 \text{ m}^3\text{s}^{-1}$ as discussed in Mr Webb's evidence) in the Opihi River in order to maintain connectivity. On this basis the environmental benefits associated with maintaining connectivity are similar.
- 6.18 The PC7 regime causes flows in the Opihi River to dip below the proposed minimum flows more often than the AMWG regime. In addition, the PC7 regime has a greater number of days where flows in the Opihi River are below $3 \text{ m}^3\text{s}^{-1}$. The PC7 regime is therefore likely to result in greater environmental costs through reducing available habitat.

- 6.19 With economic and social costs associated with water availability for out of stream uses similar, and both regimes maintaining flow connectivity, my view is the ability of the regime to maintain flows above the minimum is a key differentiator when making a determination as to the efficiency and effectiveness of the flow regime.
- 6.20 The s42A officer has stated that the AMWG regime “*introduces considerable additional complexity*” and has raised concern “*about the ability to undertake compliance monitoring as required by Section 35(2)(d) of the RMA*”. The s42A officer then goes on to conclude that “*with these difficulties, it is difficult to say if the submitters’ proposal is more or less efficient or effective*”.⁸
- 6.21 As acknowledged by the s42A officer, the PC7 flow and allocation regime is complex. The presence of the Opuha Dam within the catchment, and the opportunities this provides means that any management regime will necessarily be complex in order to take advantage of these opportunities. It is my opinion that complexity alone is not reason enough to discount the AMWG regime in this instance given the narrow range of stakeholders involved in the day to day implementation of the flow and allocation regime.
- 6.22 The evidence of Ms Julia Crossman, OWL’s Environmental Manager, discusses this complexity and is of the view that it is overstated. Given the role that OWL plays in the implementation of the current and any future flow and allocation regime, it is significant that Ms Crossman is comfortable with the level of complexity given much of the cost associated with this complexity will be borne by OWL. The members of OEFrag have expressed a desire to remain involved in flow release decision making⁹ indicating that they are at least somewhat comfortable with the level of complexity. It is my view that the AMWG regime is not all that much more complex than PC7. On this basis, it is assumed that in proposing the PC7 regime ECan are also somewhat comfortable with the complexity.
- 6.23 On the basis that the key parties involved in implementing the flow and allocation regime understand the complexities and accept to a certain level that this is part and parcel of freshwater management in the Opihi FMU, my view is

⁸ S42A report, paragraph 9.53, page 313

⁹ As occurred under the ORRP

that the potential administrative costs associated with the complexity of the AMWG regime (in contrast to the PC7 regime) do not significantly alter the efficiency of the regime.

- 6.24 Ms Crossman also addresses compliance monitoring in her evidence and provides a summary of the current reporting and compliance monitoring approaches, and how this might change under the AMWG's proposed changes to PC7. As she explains, OWL already monitors the range of environmental factors that the PC7 and AMWG alternative management regime triggers rely on and either provides this data to ECan or makes it publicly available. OWL's current discharge permit¹⁰ authorising the augmentation of the Opuha and Opihi River flows, requires OWL to provide written advice to ECan of any flow transition, artificial fresh or flood buffering proposal and it is expected that this requirement will continue. On this basis I struggle to see how the proposed AMWG regime will result in any significant additional administrative costs than occurs currently, or that would be introduced through PC7.
- 6.25 On the basis of Ms Crossman's evidence, my opinion is that the complexity and potential compliance issues associated with the AMWG regime do not pose a significant administrative cost hurdle to implementation, and therefore does not result in any notable efficiency problems in terms of S23(1)(b)(ii) of the RMA.
- 6.26 In summary, my view is that the economic, social and administrative costs of both the AMWG and PC7 regimes are similar and do not provide a significant differentiator. The minimum flows proposed through the AMWG regime are appropriate for safeguarding the life-supporting capacity of ecosystems and ecosystem processes, and indigenous species including their associated ecosystems, and that these minimum flows have been assessed so as to be met more often under the AMWG regime than the PC7 regime. This places the environmental costs of the PC7 regime higher than the AMWG regime. Consequently, my opinion is that the AMWG regime is more efficient and effective, and therefore the most appropriate way to achieve the relevant objectives in accordance with S32(1)(b) of the RMA.

¹⁰ CRC155950
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The role of discretion in regime implementation

- 6.27 The AMWG regime provides the opportunity to utilise the knowledge of the multi-stakeholder OEFrag to fine tune the adaptive management of flow releases from Opuha Dam. The evidence of Ms Judy Blakemore for the AMWG describes the history of OEFrag, its membership, its roles under the ORRP, and its role in water shortage directions under s329 of the RMA. Ms Blakemore's evidence also describes the value collaborate stakeholder-led decision making can have for water resource management in the Opihi FMU.
- 6.28 The role OERAG is proposed to play under the AMWG regime is to assist in making decisions as to whether to shift from one management level to another when the relevant environmental triggers have been reached. Under the AMWG regime (and PC7), once the relevant environmental triggers are reached, OWL (as the holder of a resource consent to discharge from Opuha Dam) has the discretion to enter the relevant management level or not. It is proposed that OEFrag would draw on the knowledge described in Ms Blakemore's evidence to inform this decision.
- 6.29 The modelling undertaken by Dr Kerr to compare the AMWG and PC7 regimes included two scenarios for the AMWG regime. The first scenario assumed that once the relevant environmental triggers were reached, the relevant alternative management regime level automatically applied (i.e. there was no discretion as to whether or not the alternative management regime level was entered). The second scenario involved a decision whether to enter or not (discretionary scenario). The discretionary scenario was based on a scenario testing exercise undertaken by OEFrag members. The results of the discretionary scenario are reported in Dr Kerr's evidence and indicate that applying discretion improves the effectiveness of the AMWG regime to augment Opihi River flows by increasing the regime's ability to maintain flows above the ecological minimum of $3 \text{ m}^3\text{s}^{-1}$ or the regime's minimum flow.
- 6.30 Having a level of on-going discretion within a plan flow and allocation regime is relatively unique. Adaptive processes are relatively common in the resource consent setting where flexibility of methodology or process is required in order to meet fixed outcomes¹¹. The key components of adaptive resource consent

¹¹ For example the Te Waihora lake opening protocol.
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conditions are: a set of specific outcomes that are to be achieved, and a clear process for developing, checking and implementing the method used to achieve these outcomes.

- 6.31 In the context of the alternative management regime for the Opihi FMU, Table 14(v) (either as proposed by the AMWG or through PC7) provides the specific outcomes to be achieved (minimum flows).
- 6.32 Under Policy 14.4.37, both the AMWG regime and PC7 have discretionary entry into either the Level 1 or 2 regime following the relevant triggers being reached.¹² There are several ways in which this discretion can be exercised, with the key differences relating to the level of involvement of parties other than the dam discharge resource consent holder in the decision-making process. Importantly, despite the discretion Policy 14.4.37 provides, the 'Full Allocation' flow level in Table 14(v) provides a backstop for the regime. If no decision can be made as to whether it is appropriate to enter an alternative management level, the Full Allocation minimum flows apply. On this basis I have considered the following decision-making options:
- (a) Discretion exercised by the dam consent holder only.
 - (b) Discretion exercised by the dam consent holder with consensus decision required from OEFrag¹³.
 - (c) Discretion exercised by the dam consent holder with consensus decision required from OEFrag, and certification from ECan.

Dam consent holder only

- 6.33 This option provides the simplest solution for implementation. Once the relevant environmental triggers in Table 14(x) have been reached, the consent holder decides to whether or not to enter an alternative regime level and informs ECan that it is doing so. In this option the decision-making process does not benefit

¹² Under the AMWG regime, exit from either Level 1 or 2 is based on lake level only. Under the PC7 regime exit from either Level 1 or 2 is based on whether or not the requisite environmental triggers in Table 14(x) have still been reached.

¹³ I recognise that OEFrag is a function of the ORRP and that any requirements to retain the group will disappear with the ORRP as there is no directive to retain it under PC7. Therefore, in the context of PC7, references to OEFrag could also be references to a similar multi-stakeholder group undertaking a role similar to that described in Ms Blakemore's evidence.

5.8 The PC7 percentiles were determined using a power law curve (Clark 2019b), which resulted in some identical thresholds for different percentiles (e.g. May and December Inflows, and July and December snow storage). This should not occur. This means the level 1 threshold is pointless. The power law curve used for the May inflow data is shown in Figure 1 (per Clark 2019b). This indicates that the fit of the curve is not very good, and the thresholds determined from the fit do not reflect the underlying data.

Figure 1. The curve used to fit to the observed May inflow data which resulted

in the decision-making process is advantageous. Given the challenges that arose through having a prescribed role for OEFRAG under the ORRP, my opinion is that developing the terms of reference for the role of OEFRAG through a resource consent process is likely to be more efficient in that it provides for a greater level of flexibility. The AMWG submission has sought that a new condition is added to Rule 14.5.29 requiring that an operational management plan is prepared and submitted as part of the resource consent process. This management plan would provide the vehicle for details around decision-making processes, the role of OEFRAG (or similar), and details regarding ECan involvement.

- 6.41 Management plans of this type are not unusual in the resource consent process and are often used when desired outcomes are known but methodology is not, or there are several ways of achieving the stated outcomes. A comparative example is the protocol associated with the resource consents held by Te Rūnanga o Ngāi Tahu and Environment Canterbury to open and/or close Te Waihora/Lake Ellesmere to the sea.¹⁸ The protocol outlines the procedure that is used by the consent holder when deciding when to exercise the resource consents to artificially open or close Te Waihora/Lake Ellesmere to the sea. The document sets out the objectives for opening and closing, the stakeholders involved in decision-making and their function and processes around decision making.
- 6.42 A further example is the consent held by Meridian Energy Limited to use water for power generation.¹⁹This provides for an 'alternative flow proposal' setting out how the release of water from the Waitaki Dam may occur. Prior to implementation, the alternative flow proposal must be certified by the Canterbury Regional Council as containing specific details including flow releases developed in consultation with stakeholders.
- 6.43 It is anticipated that the operational management plan as proposed by the AMWG would operate in a similar way to the examples described.
- 6.44 My opinion is that the management plan approach provides a suitable balance between the adaptability of the regime, and the level of certainty expected in a

¹⁸ RC135361, RMA92023020, CRC140366, CRC140367, CRC140368, CRC140371 and CRC142019

¹⁹ CRC180721

regional plan. By including stakeholders in the decision-making process, you gain the benefit of greater knowledge and where agreement cannot be reached, the Full Allocation minimum flows provide a solid backstop. In my view this approach provides an appropriate level of comfort that ecology and ecological processes will be safeguarded, and therefore the relevant objectives will be achieved.

PC7 2030 minimum flows

- 6.45 PC7 includes Table 14(W) that sets out a flow and allocation regime that applies from 2030. In my evidence on behalf of the FAWP, I have commented on setting limits at or beyond the life of the OTOP sub-regional chapter in the context of the tributaries of the Opihi River. In summary, my opinion outlined there is that setting limits in this way interferes with the policy cycle and means that these limits will not have the benefit of monitoring undertaken over the implementation period of the OTOP sub-regional chapter. While setting limits in this way can clearly signal the direction a plan may take, this can also be achieved by through clear objectives and policies while not foreclosing opportunity that may otherwise be restricted through setting longer term limits.
- 6.46 Dr Ryder has assessed the effectiveness of the PC7 2030 regime and has concluded that it provides minor habitat benefits over the summer months for invertebrates, and minor losses in habitat for native fish (except torrentfish), juvenile brown trout and juvenile salmon, and an 8% gain in adult brown trout habitat. He also notes there are significant losses in salmonid spawning habitat under the 2030 flows.
- 6.47 Dr Kerr has assessed the 2030 regime effectiveness as part of the modelling exercise discussed above. This assessment demonstrated that the PC7 2030 regime resulted in similar outcomes to the PC7 2025 regime when compared to the AMWG regime. The assessment showed that under the 2030 flows Opuha Lake was drained in the 2014 - 2015 drought years, there were a greater number of days where minimum flows were not met (although the number increases under the 2030 scenario)²⁰, and water availability was similar.

²⁰ (a) Under the PC7 2030 rules, the modelled flows of the Opihi at Saleyards Bridge did not meet the required minimum flows for 91 days during the 2014 - 2016 simulation and for 8 of those days did not meet the 3 m³s⁻¹ ecological flows.

5.9 In developing the AMWG regime, I used the Generalised Extreme Value (GEV) distribution to find a fit to the observations. This family of curves is more commonly used in this kind of application. An equivalent graph of the fit of the May inflows to the Generalised Extreme Value function is shown in Figure 2.

Lake level thresholds

(and formula-based) two-tiered minimum flow regime, and allocation limits that capture all “A” and “B” permits.”²²

- 6.53 The s42A officer’s option effectively removes the ‘current’ minimum flows as proposed through the notified PC7, with the PC7 2025 flows applying immediately and the PC7 2030 flows applying at 2025. The s42A officer’s regime also removes the PC7 Level 2 minimum flows.
- 6.54 Dr Kerr has reviewed the ECan modelling for the s42A officer’s regime and has assessed the differences between this option, the PC7 regime and the AMWG regime in relation to the regime effectiveness measures discussed above. Dr Kerr concludes that the S42A officer’s regime:
- (a) Fails to prevent the lake from draining under the 2015 drought conditions
 - (b) Fails to maintain ecological flows of 3 m³s⁻¹ (in February 2015)
 - (c) Fails to maintain the regime’s minimum flows (February and March 2015, and April 2016)
- 6.55 The s32 evaluation report for PC7 discusses the use of water shortage directions under the ORRP and states: *“Given the number of water shortage directions and pre-emptive circumstances in which they have been issued, it is clear that the environmental flow and allocation regime and minimum lake levels in the ORRP are not appropriate to meet the needs of the community.”²³*
- 6.56 As discussed in Mr Webb’s evidence, a regime that does not reduce the risk of draining Lake Opuha and has a greater risk of dropping below the ecological flows of 3 m³s⁻¹ is likely to still have some reliance on water shortage directions (which may take the place of the alternative management level the s42A officer has recommended removing). Therefore, under ECan’s own evaluation, this regime would not be appropriate to meet the needs of the community.
- 6.57 As discussed in the evidence of Mr Kerr, the s42A officer’s regime is more restrictive (in terms of restriction on abstractors) than the PC7 regime but less so than the AMWG regime. The s42A officer’s regime had less days with flows

²² S42A report, paragraph 9.54, page 313

²³ Section 32 Report, page 252

under the ecological flow rate of $3 \text{ m}^3\text{s}^{-1}$ and the regime's minimum flows compared to the PC7 regime, but more than the AMWG regime.

- 6.58 In terms of S32(1)(b)(ii) of the RMA, the s42A officer's regime results in a method that is likely to result in lower economic and social costs as compared to the AMWG regime based on the reduced number of days on restriction. However, it achieves this through an increase in environmental costs (days below minimum and ecological flows), and a greater likelihood of having to rely on water shortage directions. This increase in abstractor reliability at the expense of the river is unlikely to align with Te Mana o te Wai. With reference back to the s42A officer's comments regarding achieving a "*fine balance*", my view is the s42A officer's regime does not achieve this.

Plan or consenting approach to alternative management regime implementation

- 6.59 The Hearing Panel has asked a question of the s42A officer regarding the notified PC7 Table 14(x) that outlines the alternative management regime environmental thresholds. The question is: "*...why is it necessary to include notified Table 14(x) in the Plan as it would seem to deal with details that are best thoroughly examined in a consenting process?*".
- 6.60 The S42A officer has responded to the question by stating that "*... it is not necessary to include Table 14(x) in the Plan... but note that it arose out of substantial engagement with the Zone Committee with the local community*".
- 6.61 The environmental thresholds in Table 14(x) play a key role in the alternative management regime. In terms of understanding how effective a given regime is, the environmental thresholds are required to assess when, how often and for what duration the various restriction levels might apply (in the context of historical data). By deleting Table 14(x), you are removing the ability to test the regime as Dr Kerr and Mr Dan Clark have done so as to understand the regimes effectiveness. On this basis, my opinion is that removing Table 14(x) from PC7 on its own is problematic.
- 6.62 An alternative to removing Table 14(x) only, is to retain the opportunity for an alternative management regime to be implemented through a consenting process (through a modified Policy 14.4.37), but remove any detail regarding

- 5.12 Figure 3 below depicts the seasonally varying operating intent, together with the Level 1 and Level 2 thresholds for the two regimes. AMWG thresholds are set below but follow the operating intent. For PC7 level 1 and 2, the lake level thresholds are fixed and so do not change through the year.

Figure 3. Lake level thresholds and the operating intent.

- 5.13 From the operating intent perspective, the PC7 Level 1 threshold is very high late in the irrigation season (March to May) and very low in the middle of the season (October to January). The AMWG lake level thresholds were informed by discussions with the OWL lake managers, to reflect their experience of critical lake levels.

Threshold assessment frequency

necessarily limit the ability of the regime to take advantage of better information in the future.

- 6.65 Due to the significant effort that has been invested in developing and testing the alternative management regime framework, and the relatively small differences between the PC7 and AMWG regimes, my opinion is addressing the alternative management regime directly through the OTOP sub-regional chapter as opposed to wholly through a resource consent process is a more efficient method for achieving objectives.

Policy 14.4.37, Policy 14.4.38, and Policy 14.4.39

- 6.66 Policy 14.4.37, Policy 14.4.38 and Policy 14.4.39 provide detail of the mechanics of the alternative management regime. These effectively provide rules for operation such as how the regime will be implemented (through a resource consent process), how an alternative management level will be entered and exited, the length of time an alternative management level will apply and details regarding the transition of flows between management levels.

- 6.67 The AMWG submission sought several changes to these policies. Of significance to the performance of the AMWG regime are:

- (a) Enabling the ability to enter an alternative management regime level on any day of the month
- (b) Specifying that a Level 2 regime can only be entered into after a Level 1 regime has been in place for 14 days
- (c) A minimum period of 14 days is required in Level 1 or Level 2
- (d) Exiting an alternative management regime level will occur based on lake level thresholds only
- (e) Recognising that with a three level alternative management regime there are two flow transition periods.

- 6.68 These 'rules' have been incorporated in Dr Kerr's assessment of the AMWG regime and contribute to the results reported. As discussed above, the s42A officer has recommended deleting Policy 14.4.38 and Policy 14.4.39. Removing

the detail these policies provide or failing to accurately describe the mechanics of the alternative management regime risks reducing the regimes effectiveness.

- 6.69 On the basis of my conclusions drawn regarding the AMWG regime, my opinion is the amendments to Policy 14.4.37, Policy 14.4.38 and Policy 14.4.39 proposed through the AMWG submission are appropriate, and necessary in order to achieve the outcomes described.

7. ACTIVITY STATUS OF RULE 14.5.29

- 7.1 Rule 14.5.29 provides for the discharge of water from the Opuha Dam for the purposes of augmenting the Opuha and Opihi mainstems as a discretionary activity. The AMWG submitted that Rule 14.5.29 should be amended to have a controlled activity status based on the relatively prescriptive nature of the flow and allocation regime. The S42A officer has rejected the relief sought and states: “...it is important that Environment Canterbury retains the ability to decline consents where augmentation would not support the achievement of the objectives of the CLWRP or the adverse effects are not acceptable. This is particularly relevant where we recommend policies to be rather more outcome oriented.”²⁵
- 7.2 A consent applicant only attains access to Rule 14.5.29 if it complies with the stated conditions. These conditions include complying with the flow and allocation regime and discharging a volume of water to compensate for any abstraction by AA and BA permit holders downstream of the minimum flow measurement site. In addition, under a controlled activity status the AMWG submission proposes that any resource consent application under the amended Rule 14.5.29, would be subject to the matters of control set out in the region-wide Rule 5.125C. While Rule 5.125C provides for discharges from hydroelectricity generation dams and the Rangitata Diversion Race, the nature and scale of potential effects are similar. The matters to which ECan has reserved its control under Rule 5.125C (and therefore that would apply to the amended Rule 14.5.29), are fairly broad and provide ample opportunity for ECan to consider relevant effects.

²⁵ S42A report paragraph 9.65, page 316
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- 7.3 The merits of discretionary activity status or controlled activity status largely come down to certainty. As quoted above, the s42A officer has recommended more outcome-oriented policies for PC7. In a scenario where the s42A officer's recommendations are accepted, a controlled activity status provides certainty of process to the consent applicant that consent will be granted, and that a clear suite of matters will be considered through the process in the absence of policy detail. In my view a desire for clear direction is entirely appropriate given the level of investment in the dam infrastructure and the reliance on this by such a large section of the community; as with those activities addressed by Rule 5.125C.
- 7.4 Under a discretionary consenting status, my view is that it is preferable to have greater policy direction as to what will be considered through the resource consent application process in order to provide this certainty. While either option is acceptable, if policy detail is removed from PC7 as recommended by the s42A officer, my opinion is that a controlled activity status is most appropriate as it provides for a certain, and therefore more efficient resource consent process.

8. ARTIFICIAL FRESHES

Policy 14.4.35(e)

- 8.1 PC7 Policy 14.4.35(e) as notified is relatively specific in its direction regarding artificial freshes. It provides strong guidance regarding the release of water from Opuha Dam for augmentation, recognises the challenges associated with releasing flows to meet a minimum flow at a site several tens of kilometres downstream of the dam, guides the release of water in times when the lake levels in Lake Opuha are low, and specifies the required flushing flow releases. Based on an indication from ECan during pre-notification consultation that specificity was preferred, the submission by the AMWG sought to retain a level of specificity within the policy while introducing some amendments in order to adapt to river conditions through the year and to recognise the operational constraints of the current dam infrastructure.
- 8.2 The s42A officer has recommended a more 'outcomes-based' approach to Policy 14.4.35(e) and has recommended that the specificity within the policy regarding the required flushing flows is removed, and reference to specific flow volumes and frequencies are replaced with an outcome to be achieved by the

release of flows. The s42A officer has also recommended that details regarding variance of flows at Saleyards Bridge (Policy 14.4.35(b)) are removed.

- 8.3 As discussed in Mr Richard Measures' evidence on behalf of the AMWG, significant work has gone into investigating the design of artificial freshes and developing an understanding of the effectiveness of these. Despite this, the knowledge regarding the Opuha FMU, the benefits that can be achieved from artificial freshes of various sizes in the Opuha and Opihi River, and the response at the river mouth (among other things) is imperfect. Building specificity into Policy 14.4.35(e) provides a level of certainty to stakeholders regarding what freshes will be released but does not necessarily account for imperfect knowledge.
- 8.4 My view is that an outcomes-based approach to artificial freshes is preferable as this approach provides the ability to plan, test, observe and adapt the release of artificial freshes to achieve the LWRP objectives. Provided Policy 14.4.35(e) provides certainty that artificial freshes will occur, and contains deliberately worded outcomes that are clear and can be achieved with the tools available, an outcomes-based policy provides in my view the best chance of achieving the LWRP objectives.²⁶
- 8.5 The s42A report recommends amendments to Policy 14.4.35(e) to include outcomes as follows:
- “in the period 1 November to 31 March of the following year, flushing flows are released that are effective at periphyton removal so that it does not reach nuisance levels, ‘refreshing’ the river and opening the river mouth to enable effective fish passage.”*
- 8.6 In his evidence, Mr Measures supports an outcomes-based approach but raises concerns regarding the recommended changes to the notified wording of Policy 14.4.35(e). Specifically, Mr Measures is concerned that:
- (a) It is not realistic or achievable for an artificial fresh regime to be “*effective at periphyton removal so that it does not reach nuisance levels*”²⁷.

²⁶ Specifically, Objectives 3.8, 3.16 and 3.19

²⁷ Update2toAppendixEPart1Updated26June2020, Policy 14.4.35(e), page 143
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- (c) A buffer of $0.1 \text{ m}^3\text{s}^{-1}$ was added to the required Opuha Dam release flows to ensure natural variation in flows did not breach low flow rules.
- (d) The lake was managed to attempt to keep within the seasonally-varying operating intent as advised by OWL and discussed in Mr Mockford's evidence.
- (e) Lake area changed with Lake level.
- (f)

efficient and effective method for achieving Objectives 3.8, 3.16 and 3.19 of the LWRP.

Compensation flows

- 8.14 The artificial freshes regime under the ORRP and PC7 both allow the volume of water released as part of an artificial fresh to be recouped. This was supported by the AMWG but was rejected by the s42A officer on the basis that: “...it would appear to be exacerbating the very conditions that a fresh is intending to mitigate”³⁰.
- 8.15 Providing compensatory flows following an artificial fresh has the potential to encourage more or larger volume freshes. Mr Kerr has assessed the impact of not allowing flows released as freshes to be compensated through his examination of the PC7 regime. His conclusion for the PC7 2030 regime was that not providing compensation increased the number of days under a restrictive regime by an average of 98 days.
- 8.16 On the basis of Mr Kerr’s evidence, Ms Blakemore has expressed concern that if compensatory flows are not provided for, artificial freshes would be released less frequently in order to preserve lake storage for water short periods.
- 8.17 The AMWG submission proposed varying compensatory flows following an artificial fresh based on the alternative management level that the river is in at the time the fresh is released. The AMWG submission proposed recouping the volume of water released by reducing flows to the level below the regime level the fresh was released in. For example, if the river is at Full Availability minimum flow then a fresh can be recouped by reducing flows to Level 1 minimum flow for the period required to recoup the volume.
- 8.18 Mr Webb and Dr Ryder have commented on the ability of the various alternative management regime levels to safeguard ecology and ecological processes. In relation to the Level 2 flows (the lowest flows could be in order to recoup water), Mr Webb has concluded that the AMWG proposed minimum flow of 3,500 L/sec is appropriate during severe natural drought events. In relation to the extent and duration of nuisance algae growths, Dr Ryder has concluded that minimum flows have relatively little effect on the extent and duration of these.

³⁰ S42A report, paragraph 9.57, page 314
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(f) What percentage of abstraction water was available from the main stem of the Opihi?

7.2 The requirement that connectivity be maintained was considered the primary objective of the Alternative Management Regimes. This was assessed by finding when flows at Saleyards Bridge dropp

To safeguard the life-supporting capacity, ecosystem processes and indigenous species including their associated ecosystems of fresh water, in sustainably managing the taking, using, damming, or diverting of fresh water.

Objective B2

To avoid any further over-allocation of fresh water and phase out existing over-allocation.

Objective B3

To improve and maximise the efficient allocation and efficient use of water.

Objective B4

To protect significant values of wetlands and of outstanding freshwater bodies.

Objective B5

To enable communities to provide for their economic well-being, including productive economic opportunities, in sustainably managing freshwater quantity, within limits.

Policy B1

By every regional council making or changing regional plans to the extent needed to ensure the plans establish freshwater objectives in accordance with Policies CA1-CA4 and set environmental flows and/or levels for all freshwater management units in its region (except ponds and naturally ephemeral water bodies) to give effect to the objectives in this national policy statement, having regard to at least the following:

- a) the reasonably foreseeable impacts of climate change;
- b) the connection between water bodies; and
- c) the connections between freshwater bodies and coastal water.

Policy B2

By every regional council making or changing regional plans to the extent needed to provide for the efficient allocation of fresh water to activities, within the limits set to give effect to Policy B1.

Policy B3

By every regional council making or changing regional plans to the extent needed to ensure the plans state criteria by which applications for approval of transfers of water

take permits are to be decided, including to improve and maximise the efficient allocation of water.

Policy B5

By every regional council ensuring that no decision will likely result in future over-allocation – including managing fresh water so that the aggregate of all amounts of fresh water in a freshwater management unit that are authorised to be taken, used, dammed or diverted does not over-allocate the water in the freshwater management unit.

Policy B6

By every regional council setting a defined timeframe and methods in regional plans by which over-allocation must be phased out, including by reviewing water permits and consents to help ensure the total amount of water allocated in the freshwater management unit is reduced to the level set to give effect to Policy B1.

Canterbury Land and Water Regional Plan

Objective 3.2

Water management applies the ethic of ki uta ki tai – from the mountains to the sea – and land and water are managed as integrated natural resources recognising the connectivity between surface water and groundwater, and between fresh water, land and the coast.

Objective 3.7

Fresh water is managed prudently as a shared resource with many in-stream and out-of-stream values.

Objective 3.8

The quality and quantity of water in fresh water bodies and their catchments is managed to safeguard the life-supporting capacity of ecosystems and ecosystem processes, including ensuring sufficient flow and quality of water to support the habitat and feeding, breeding, migratory and other behavioural requirements of indigenous species, nesting birds and, where appropriate, trout and salmon.

Objective 3.11

Water is recognised as an enabler of the economic and social wellbeing of the region.

Objective 3.12

When setting and managing within limits, regard is had to community outcomes for water quality and quantity.

Objective 3.16

Freshwater bodies and their catchments are maintained in a healthy state, including through hydrological and geomorphic processes such as flushing and opening hāpua and river mouths, flushing algal and weed growth, and transporting sediment.

Objective 3.17

The significant indigenous biodiversity values of rivers, wetlands and hāpua are protected.

Objective 3.19

Natural character values of freshwater bodies, including braided rivers and their margins, wetlands, hāpua and coastal lagoons, are protected.

Policy 4.62

To prevent the flow falling below a minimum flow for the catchment, due to abstraction, partial restriction regimes for surface water will be implemented. Regimes will be designed to:

- (a) have a single flow monitoring point for the whole catchment that all abstractors are referenced to, with additional flow monitoring points that some or all abstractors are subject to, should the hydrology of the surface waterbody justify it;
- (b) provide for groups of water permit holders in the same sub-catchment to share water when takes are operating under partial restrictions; and
- (c) except if otherwise specified in an applicable sub-region section, implement a stepped or pro rata restriction regime that applies equally to all taking within an allocation limit and does not induce the flow to fall below the minimum flow due to abstraction.

Attachment B - Tracked changes to PC7

Definition of Level 1 Restriction

Level 1 ~~Restriction~~ Regime means the environmental flow ~~restrictions~~ regimes in Tables ~~14(v) and 14(w)~~ that may apply when two or more of the Level 1 ‘Snow Pack’, ‘Inflows’ or ‘Lake Level’ thresholds in Tables 14(x(i), (ii) and (ii)) are met.

Definition of Level 2 Restriction

Level 2 ~~Restriction~~ Regime means the environmental flow ~~restrictions~~ regimes in Table ~~14(v) and 14(w)~~ that may apply when two or more of any of the Level 2 ‘Snow Pack’, ‘Inflows’ or ‘Lake Level’ thresholds in Tables 14(x(i), (ii) and (iii)) are met.

Definition of Un-modified Flow

means the flow that would have occurred in the Opihi Mainstem at State Highway 1 in the absence of the Opuha Dam, augmentation of river flows and any abstractions, and which is calculated based on flows in the North Opuha, South Opuha, and Upper Opihi and Te Ana Wai rivers, as estimated by the Canterbury Regional Council at 12 noon.

14.4.35

Connectivity and flow variability in the augmented Opuha and Opihi mainstems is maintained by ensuring that:

- a. water released from the Opuha Dam for augmentation of the Opuha and Opihi mainstem complies with the environmental flow regime(s) for Saleyards Bridge as set out in Tables ~~14(v) and 14(w)~~; and
- b. when considering Policy 14.4.35a and provided any instantaneous variance in flow at Saleyards Bridge is not greater than 500L/s below the minimum flow, determine compliance with the environmental flow and regime based on average flows over a 24 hour period; and
- c. any water released from the Opuha Dam for the purpose of improving water availability for holders of AA, BA and/or KIL permits, complies with the environmental flow regime(s) requirements for Saleyards Bridge as set out in Table ~~14(v) and 14(w)~~ and includes sufficient water to provide for the sum of abstraction occurring under AA and BA permits downstream of Saleyards Bridge; and
- d. when the level of Lake Opuha ~~falls~~ is below RL370, water released from the Opuha Dam for augmentation of the Opuha and Opihi mainstems equals the lesser of the Level 2 environmental flows set out in Table 14(v) or the sum of the inflows in to the Lake plus community supplies restricted in accordance with a Water Supply Strategy; and

- e. i) In the period 1 November to 31 March the following year, artificial freshes that are effective at reducing the duration and severity of nuisance periphyton blooms and 'refreshing' the river shall be released from the Opuha Dam.
ii) Immediately following an artificial fresh, the minimum flow may be reduced to the Level 2 minimum flow set out in Table 14(v) and 14(w) for a period of time sufficient to compensate for the volume of water released for the fresh

14.4.36

In addition to any river specific environmental flow and allocation regime set out in Tables 14(m) to 14(y), differentiate AA, BA, KIL, AN and BN permits by:

- a. AA, BA and KIL permits being subject to an environmental flow and allocation regime on the Opihi mainstem at Saleyards Bridge which reflects water released from the Opuha Dam for the purposes of maintaining environmental flows and provision for the amount of water being abstracted under AA, BA and KIL permits; and
- b. requiring, when the level of Lake Opuha ~~falls is~~ below RL370, AA and BA permits to be treated as AN and BN permits respectively and to be subject to an environmental flow and allocation regime on the Opihi mainstem at State Highway 1 as set out in Table 14(u) and Table 14(y), determined taking into account the unmodified flow of the Opihi mainstem; and
- c. AN permits being subject to an environmental flow and allocation regime on the Opihi mainstem at State Highway 1 as set out in Table 14(u), determined taking into account the unmodified flow of the Opihi mainstem; and
- d. BN permits being subject to an environmental flow and allocation regime on the Opihi mainstem at State Highway 1 as set out in Table 14(y) determined taking into account the recorded (actual) flow.

14.4.37

Establish an alternative minimum flow management regime for the Opihi River at Saleyards Bridge, as set out in Tables 14(v) ~~and 14(w)~~, that

- a. may only be implemented through a resource consent and*
- b. ~~applies from the start of a calendar month to the start of the next calendar month and~~*
- c. ~~is~~ may be entered into when two of the specified Level 1 or Level 2 thresholds from the ~~preceding month~~ in Tables 14(x(i), (ii) and (iii)) are met, and*
- d. ~~takes into consideration the level of water in Lake Opuha, snow pack in the Lake Opuha Catchment, and inflows into Lake Opuha.~~*

14.4.38

Where a Level 1 or Level 2 alternative minimum flow management regime is entered into,

- a. ~~the applicable flows set out in Tables 14(v) and 14(w) shall be met for that month a minimum of 14 days; and~~
- b. a Level 2 Regime shall only be entered into after a Level 1 Regime has been in place for at least 14 days;
- c. ~~b. the need to continue in the alternative minimum-flow management regime is reassessed at the conclusion of the 14 day period; and commencement of the next calendar month~~
- d. Exiting of the alternative management regime shall occur when the level of Lake Opuha exceeds the applicable Level 1 or Level 2 thresholds.

14.4.39

In complying with the environmental flow and allocation regime(s) set out in Tables 14(v) ~~to 14(w)~~ and when transitioning between monthly minimum flow requirements at Saleyards Bridge, releases of water from the Opuha Dam may be progressively increased or decreased over a 48-hour period immediately after the commencement of the calendar month and the alternative management regime.

14.5.29

The discharge of water ~~to~~ water from the Opuha Dam for the purpose of augmenting the Opuha and Opihi mainstems is a discretionary-controlled activity provided the following conditions are met:

1. The discharge complies with the environmental flow and allocation regime(s) set out in Tables 14(v) ~~to 14(w)~~; and
2. Any water discharged for the purpose of improving water availability for AA, BA and KIL permit holders is released in addition to water released for the purposes of meeting the environmental flow at Saleyards Bridge, and includes sufficient water to provide for the sum of abstraction occurring under AA and BA permits and downstream of Saleyards Bridge; and
3. An operational management plan is prepared and submitted with the application for resource consent, which shall include details of the matters for consideration and a consultation process to assist the consent holder decide:
 - a. If and when the Level 1 and Level 2 Regimes in Table 14(v) shall be entered and exited;
 - b. The timing and volume of the release from the Opuha Dam for artificial freshes;
 - c. The timing of releases from the Opuha Dam for flood buffering purposes; and
 - d. The methodology for transitioning flows between months; and
4. Any existing discharge permit that authorises the discharge of water from the Opuha Dam is surrendered as part of an application for resource consent lodged under this rule.

The CRC reserves control over the following matters

1. The matters that CRC reserves control over under Rule 5.125C.

14.5.30

The discharge of water from the Opuha Dam for the purpose of augmenting the Opuha and Opihi mainstems that does not comply with one or more of the conditions of Rule 14.5.29 is a ~~prohibited~~ non-complying activity.