From:	Georgina Hamilton
To:	Mailroom Mailbox
Cc:	Mark Webb; Angela Christensen; Judy Blakemore; Andrew Mockford; Julia Crossman
Subject:	Plan Change 7 to the LWRP Submission - Adaptive Management Working Group
Date:	Friday, 13 September 2019 12:50:22 PM
Attachments:	GH-148305-1-2966-1 Adaptive Management Working Group Submission on Plan Change 7 13919.pdf

Dear Sir/Madam

Please find **attached** a submission by the Adaptive Management Working Group on Proposed Plan Change 7 to the Canterbury Land and Water Regional Plan.

Kind regards,

Georgina Hamilton
Partner

GRESSON DORMAN & CO
EST 1868

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SUBMISSION ON PROPOSED PLAN CHANGE 7 TO THE CANTERBURY LAND AND WATER REGIONAL PLAN

Clause 6 First Schedule, Resource Management Act 1991

TO: Proposed Plan Change 7 to the Canterbury Land and Water Regional Plan

Environment Canterbury
PO Box 345
Christchurch 8140

By email: mailroom@ecan.nz

Name of submitter:

1 Adaptive Management Working Group (**AMWG**)

Address: c/- Gresson Dorman & Co
P O Box 244
TIMARU 7940

Contact: Georgina Hamilton

Phone: (03) 687 8065

Email: georgina@gressons.co.nz

Trade competition statement:

2 The AMWG could not gain an advantage in trade competition through this submission.

Proposal this submission relates to is:

3 This submission is on proposed Plan Change 7 to the Canterbury Land and Water Regional Plan (**PC7**), specifically the Orari-Temuka-Opihi-Pareora (**OTOP**) sub-region component of PC7, comprising "Part B" (**Proposal**).

The specific provisions of PC7 that this submission relates to:

4 This submission is confined to matters within the scope of the AMWG's pre-PC7 and ongoing workstreams in relation to the environmental flow, allocation and partial restriction regimes for the mainstem of the Opuha and Opihi rivers.

5 This submission therefore relates primarily to the following provisions of PC7:

5.1 14.1A Definitions:

(a) "Alternative Management Regime"

(b) "Level 1 Restriction"

(c) "Level 2 Restriction"

(d) "Opihi River Un-modified Flow"

5.2 14.4 Policies: Policies 14.4.34 – 14.4.39 (inclusive);

5.3 14.5 Rules: Rules 14.5.29 and 14.5.30;

5.4 14.6 Allocation and Water Quality Limits:

(a) Table 14(v): Minimum Flow Restrictions in the Opihi Freshwater Management Unit for AA and BA Permits (2025);

(b) Table 14(w): Minimum Flow Restrictions in the Opihi Freshwater Management Unit for AA and BA Permits (2030); and

(c) Table 14(x): Alternative Management Regime Triggers.

Wish to be Heard:

6 The AMWG wishes to be heard in support of this submission.

7 The AMWG would be prepared to consider presenting a joint case with others making similar submissions at the hearing.

Request for pre-hearing meetings and expert witness caucusing:

8 The AMWG is cognisant of the breadth and complexity of technical issues raised in its submission. It therefore sees considerable value in, and requests that an opportunity be provided for:

8.1 A meeting (or meetings) between the AMWG and ECan technical and/or planning staff for the purpose of clarifying or facilitating the resolution of matters raised in its submission in accordance with clause 8AA of Schedule 1 of the Resource Management Act 1991 (**RMA**); and

8.2 The narrowing of technical issues in contention through informal or formal expert witness caucusing and associated preparation of joint expert witness statements, ideally scheduled prior to the completion of the section 42A RMA report and subsequent lodgement of submitters' evidence on PC7.

Submission

Submission Structure

9 The AMWG's submission is structured as follows:

9.1 Introduction, including background to the AMWG, its involvement in the collaborative planning process for PC7, and its approach to submissions on PC7;

9.2 Summary of the AMWG's position on PC7; and

9.3 The AMWG's specific submissions on PC7, including reasons and detailed relief sought.

Introduction

Background to the AMWG

10 The AMWG was initiated during the collaborative planning phase of PC7. At that time, there was an acceptance by Environment Canterbury (**ECan**) and the members of the Opuha Environmental Flow Release Advisory Group (**OEFRAG**) (an advisory group

established under the Opihi River Regional Plan (**ORRP**) to provide advice to ECan and Opuha Water Limited (**OWL**) on flow management) that the prior reliance on water shortage directions under section 329 RMA to manage the surface water resources of the Lake Opuha catchment during water short periods was not ideal. The development of a new environmental flow regime, which could respond better to changing climatic conditions and water availability in the Lake Opuha catchment and in doing so address the serious shortcomings of the ORRP environmental flow regime for the mainstem Opihi river, was considered preferable.

11 The AMWG was established in late 2016. The AMWG's current membership comprises representatives of the Central South Island Fish and Game Council, Timaru District Council and OWL. The Department of Conservation has been a member of the AMWG since its establishment, however it will be making its own submission on PC7.

12 Technical and planning support is provided to the AMWG by consultants from Aqualinc (water scientist), NIWA (hydrodynamics scientist), Ryder Consulting Ltd (freshwater ecologist/environmental scientist), Graeme Horrell Consulting Ltd (hydrologist), Tonkin and Taylor (planning).

Summary of the AMWG's involvement in the PC7 collaborative planning process

13 The AMWG's primary focus was to develop an adaptive river management regime for the mainstem of the Opihi river for consideration of the OTOP Zone Committee as part of the development of the OTOP Zone Implementation Programme Addendum (**ZIPA**), and subsequent inclusion in the future PC7. The AMWG recognised the value of bringing together the collective learnings and research from the last 20 years of the Opuha Dam's operation, particularly during the severe low flow period from November 2014 until January 2016, and the opportunity that the future PC7 presented to make positive changes to the environmental flow regime for the benefit of both instream values and out-of-stream users.

14 Over what would become an almost 2-year process, with the endorsement of the OTOP Zone Committee, the AMWG met together regularly to develop the key elements of an adaptive management regime for the mainstem Opihi river and various technical workstreams were completed in parallel. The development of an adaptive management regime was not a simple task, due to the complex nature of the Lake Opuha catchment and the technical challenges in estimating water availability in the catchment and the climatic conditions that drive it.

15 The AMWG met with ECan planning and technical staff on numerous occasions in the early stages of the development of the regime, and iterations of the regime were presented to the OTOP Zone Committee. The first iteration of the AMWG's "proposal" was submitted to the OTOP Zone Committee in September 2017. Following considerable further technical work (including the development of a snow pack estimation model, data analysis and development of possible catchment snow pack, Lake inflow and Lake storage thresholds, which subsequently formed the basis of PC7's "alternative management regime" framework) and assessment, the AMWG submitted an updated "proposal" to the OTOP Zone Committee in October 2018.

16 Regrettably, the OTOP Zone Committee's timeframes for finalising the ZIPA precluded the opportunity for the AMWG and ECan staff to collaboratively refine the proposal prior to the ZIPA being finalised. As a consequence, the final ZIPA that was released in December 2018 included the following high-level, principles based, recommendation for the mainstem Opihi river environmental flow regime:

5.3.1 Recommendation: Augmentation of the Opuha and Opihi Rivers

I. The OTOP sub-region plan change includes an Adaptive Management Regime for the augmentation of the Opuha and Opihi rivers that provides for:

a. Environmental Flows;
b. Mahinga Kai Values;
c. Flow Variability;
d. Flushing Flows and Freshes;
e. All flow gains achieved by minimum flow increases on the Upper Opihi and Te Ana Wai Rivers remaining in the mainstem of the Opihi River, and not being available for abstraction, and should be reflected in the minimum flows measured at Saleyards Bridge.
f. Community Drinking Water Supplies;
g. Irrigation Abstractions;
h. The Opuha Environmental Flow Release Advisory Group (OEFRAG);
i. A flow regime that can be adapted to reflect the available water in the catchment and that recognises the priority of flows set out in clauses (a) – (h) above.

The AMWG's approach to submissions on PC7

17 The AMWG acknowledges that its October 2018 updated "proposal" has since been assessed by ECan technical staff and feedback provided in the section 32 Report for PC7 and supporting technical reports. It is understood that various elements of that "proposal" are not supported by ECan, and as a consequence, PC7 adopts an "alternative management regime" that is based on the framework proposed in OEFRAG's much earlier August 2008 "*Application for changes to Opihi River Regional Plan – Consultation Draft*".

18 The AMWG is surprised that the section 32 report for PC7 and supporting technical assessments are bereft of any clear explanation of the underlying technical/environmental justifications for the "alternative management regime", given the significance of the regime for the Opuha/Opihi river system and the future management of the water resources of the Lake Opuha catchment.

19 The extent of ECan's technical analysis of PC7's "alternative management regime" and the AMWG's October 2018 "proposal" appears limited to an analysis of the frequency with which Level 1 and Level 2 water shortage regimes might occur under each. However, being based on historical lake levels influenced by historical management decisions, that analysis is largely meaningless from the perspective of assessing the effects anticipated from the future implementation of the regimes. Importantly, no attempt appears to have been made by ECan to analyse the comparative impacts of the two regimes on Lake storage, which in the AMWG's view is a critical consideration for PC7.

20 Furthermore, with PC7 being notified in advance of essential habitat survey data for the mainstem Opihi river becoming available[1], the extent to which the proposed environmental flows achieve ecological outcomes has not been assessed. Nor does there appear to have been any attempt by ECan to quantify flow requirements for the

[1] This information was provided to the AMWG on 29 August 2019.

Opihi river mouth, and how the "alternative management regime" fares against such requirements. Overall, it is unclear to the AMWG what factors (if any) have influenced the development of the environmental flow regimes and thresholds forming PC7's "alternative management regime".

21 The AMWG has completed further detailed technical assessments following the notification of PC7 and receipt of the NIWA habitat survey data, with a view to being in a position to provide constructive, informed submissions on PC7 and proffering amendments it considers are necessary to ensure that PC7 implements intended policy outcomes and otherwise achieves the relevant statutory planning tests.

22 The experience of operating the Opuha Dam since its commissioning in 1998, and in particular over the 2014-16 severe low flow situation, has demonstrated that the adaptive management of the surface water resources of the Lake Opuha catchment would provide better environmental, economic, cultural and recreational/amenity outcomes for the waterways of the Opihi catchment than the current prescriptive regime in the ORRP. For the AMWG, it is essential that any adaptive management framework that is incorporated into PC7 is able to respond to various climatic and river health situations, and makes the best use of the storage capability of Lake Opuha for the purpose of:

22.1 Retaining connectivity in the Opihi River and reliability of supply for the river, affiliated community water supply and affiliated irrigators; and

22.2 Improving river health in the downstream catchment.

<u>Summary of the AMWG's position on PC7</u>

23 The AMWG strongly supports the intention to codify an adaptive flow management regime for the water resources of the Lake Opuha catchment in PC7, in accordance with Recommendation 5.3.1 of the ZIPA.

24 However, the AMWG believes that the flow management regime developed by ECan and included in PC7 is fundamentally flawed as it:

24.1 Fails to provide for critical elements of the existing planning and operational framework for the Opuha Dam and water abstractions from the mainstem and tributaries of the Opihi River; and

24.2 Adopts an unnecessarily simplistic approach towards the development of key components of the regime and the supporting policy framework.

25 As a consequence of the above, PC7:

25.1 Contains numerous errors and serious omissions.

25.2 Does not recognise:

(a) the regional and national significance of the Opuha Dam and the water schemes it supplies;

(b) the environmental benefits of the Opuha Dam;

(c) the complexities of the hydrology in the Lake Opuha and wider Opihi catchment;

(d) the operational constraints of the Opuha Dam and on-farm irrigation infrastructure;

(e) the knowledge and experience that members of the AMWG have gained about water management in water short periods since 2008 through their involvement in the OEFRAG; and

(f) the pivotal role that OEFRAG presently plays in water management in the Opihi catchment (and is expected to play in the future).

25.3 Is bereft of the necessary level of detail and flexibility to enable the implementation of an alternative flow management regime that can:

(a) effectively respond to changes in hydrological and non-hydrological conditions in the Lake Opuha catchment; and

(b) achieve "connectivity and variability" as directed by proposed Policy 14.4.35.

26 Unless these issues are addressed, the AMWG considers that there will be no other option but to continue to rely on the statutory process for water shortage directions under 329 RMA as the primary means of effectively managing the water resources of the Lake Opuha catchment in water short periods. This would not be an acceptable outcome, and accordingly, the AMWG considers PC7 is at risk of:

26.1 Seriously compromising the efficient use of OWL's assets and those of water users affiliated to the Opuha Scheme, and the resources which those assets are dependent on;

26.2 Not achieving ZIPA Recommendation 5.3.1;

26.3 Not representing the most appropriate plan provisions in terms of section 32 RMA;

26.4 Not giving effect to the higher-order planning instruments such as the National Policy Statement for Freshwater Management 2014 (updated 2017);

26.5 Being inherently inconsistent with the objectives and policies of the Canterbury Land and Water Regional Plan; and

26.6 Otherwise being contrary to the RMA, particularly Part 2 and sections 67 and 68.

27 The AMWG's specific concerns in respect of PC7's environmental flow, allocation and partial restriction regime for the Opuha and Opihi mainstems are set out in detail in **Annexures A** and **B** to this submission, together with a summary of the changes to PC7 it considers are necessary to address those concerns.

Summary of decisions sought by the AMWG:

28 The AMWG seeks the following decisions from Environment Canterbury:

28.1 that the decisions sought in **Annexures A** and **B** to this submission be accepted; and/or

28.2 alternative amendments to the provisions of PC7 to address the substance of the concerns raised in this submission; and

28.3 all consequential amendments required to address the concerns raised in this submission and ensure a coherent planning document.

The Adaptive Management Working Group

By its Solicitors and authorised Agents

Gresson Dorman & Co: Georgina Hamilton

Date: 13 September 2019

ANNEXURE A – REASONS FOR SUBMISSION AND DECISIONS SOUGHT BY THE ADAPTIVE MANAGEMENT WORKING GROUP

(1) The specific provisions of Proposed Plan Change 7 (PC7) that the Adaptive Management Working Group (AMWG's) submission relates to are:		**(2) The AMWG's submission is that:**		**(3) The AMWG seeks the following decisions from Environment Canterbury (Note: amendments sought to the text of PC7 are shown in tracked changes, with additions shown in underline and deletions shown in ~~strikethrough~~).**
Section & Page Number	**Sub-section/ Point**	**Oppose/ support (in part or full)**	**Reasons**	
14.1A Definitions				
Page 126	"Alternative Management Regime"	Support	The AMWG considers that the definition, as notified, accurately records the underlying principles on which the alternative management regime for the Opihi River mainstem should be based on.	Retain the notified definition of "Alternative Management Regime".
Page 127	"Level 1 Restriction"	Oppose in part	The AMWG considers that the "Level 1 Restriction" under Table 14(v) is not in so much an environmental flow "restriction" but an environmental flow "regime". It therefore considers that it would be preferable for the term "regime" to be used in the definition instead of the term "restriction". The AMWG supports the proposed approach under PC7 that there is discretion to apply a Level 1 Regime when two or more of the Table 14(x) thresholds are met. The AMWG notes that consequential amendments are required to reflect the AMWG's submission on Tables 14(w) and (x) below.	Amend the definition of "Level 1 Restriction" as follows: *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.*
Page 127	"Level 2 Restriction"	Oppose in part	The AMWG considers that the "Level 2 Restriction" under Table 14(v) is not in so much an environmental flow "restriction" but an environmental flow "regime". It therefore considers that it would be preferable for the term "regime" to be used in the definition instead of the term "restriction".	Amend the definition of "Level 2 Restriction" as follows: *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.*

(1) The specific provisions of Proposed Plan Change 7 (PC7) that the Adaptive Management Working Group (AMWG's) submission relates to are:		(2) The AMWG's submission is that:		(3) The AMWG seeks the following decisions from Environment Canterbury (Note: amendments sought to the text of PC7 are shown in tracked changes, with additions shown in <u>underline</u> and deletions shown in ~~strikethrough~~).
Section & Page Number	**Sub-section/ Point**	**Oppose/ support (in part or full)**	**Reasons**	
			The AMWG supports the proposed approach under PC7 that there is discretion to apply a Level 2 Regime when two or more of the Table 14(x) thresholds are met. The AMWG notes that consequential amendments are required to reflect the AMWG's submission on Tables 14(w) and (x) below.	
Page 127	"Opihi River Un-modified Flow"	Oppose in part	The term "unmodified flow" in relation to the Opihi River has its origins in the Opihi River Regional Plan (**ORRP**), which defines this term as:[2] *"…means the amount of water that would have been flowing instream if there were no dam storage, augmenting of river flows or abstractions occurring. This is calculated or estimated by Environment Canterbury in accordance with the provisions of Rule 1 of Chapter 5 of this Plan."* The AMWG understands it is ECan's intention to continue to utilise the term "unmodified flow" in PC7 in the same context as the ORRP, and as presently calculated by ECan. It is therefore necessary, in the AMWG's view, for PC7's definition of "Opihi River Un-modified Flow" to be amended to fully reflect the ORRP definition, specifically that the "unmodified flow" is the flow that would occur at State Highway 1 without the Opuha Dam, augmentation of river flows and any abstractions. It is also necessary to amend	Amend the definition of "Opihi River Un-modified Flow" as follows: *means the flow that would have occurred in the Opihi Mainstem at State Highway 1 in the absence of the Opuha Dam<u>, augmentation of river flows and any abstractions,</u> and which is calculated based on flows in the North Opuha, South Opuha~~,~~ <u>and</u> Upper Opihi ~~and Te Ana Wai~~ rivers, as estimated by the Canterbury Regional Council <u>at 12 noon</u>.*

[2] ORRP, Appendix 1 Definition of Terms, page 70.

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			the definition to reflect that the un-modified flow is presently calculated by ECan using measured flows in the North Opuha, South Opuha and Upper Opihi (at Rockwood), not the Te Ana Wai river. To align with Policy 14.4.35(b), the AMWG considers it is also appropriate that the definition include the timing of flow estimation, which it understands is currently undertaken by ECan daily at 12 noon.	
	New definitions for the terms "small artificial fresh" and "large artificial fresh"		As discussed below in the AMWG's submission on Policy 14.4.35 in relation to flow variability and artificial freshes, the AMWG seeks new definitions be included in PC7 for the terms "small artificial fresh" and "large artificial fresh", which are terms referred to in the AMWG's revised clause (e) of Policy 14.4.35.	Include the following new definitions in Section 14A.1: (a) ***Small artificial fresh*** *means the voluntary release of 300,000 m³ measured over a 24 hour period at the Opuha Dam Downstream Weir as volume released above the pre-fresh 24-hour average flow at the Weir.* (b) ***Large artificial fresh*** *means the voluntary release of 600,000 m³ measured over a 24 hour period at the Opuha Dam Downstream Weir as volume released above the pre-flush 24-hour average flow at the Weir.*

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Section & Page Number	**Sub-section/ Point**	**Oppose/ support (in part or full)**	**Reasons**	
14.4 Policies				
Freshwater Management Unit Specific Policies				
Opihi Freshwater Management Unit: Surface Water Flows (pages 140 - 142)	14.4.34	Oppose in part	As the focus of Policy 14.4.34 is on the un-augmented tributary rivers within the Opihi FMU (not the Opihi mainstem), the AWMG considers it is unnecessary for Tables (u),(w), (v) and (x) to be referred to in the Policy (which apply to the mainstem of the Opihi river not the un-augmented tributary rivers of the Opihi FMU).	Amend Policy 14.4.34 as follows: *14.4.34 Surface water flows in un-augmented rivers within the Opihi Freshwater Management Unit are improved by ensuring all AA, BA, KIL, AN and BN abstractions comply with the applicable environmental flow and allocation regimes set out in Tables 14(m) <u>to 14(t) and Table</u> 14(y) by the specified dates.*
	14.4.35	Oppose in part	The AMWG supports the intention of Policy 14.4.35, that is, to maintain connectivity and flow variability in the augmented Opuha and Opihi rivers. These principles accord with the ethos of the AMWG and underpin the Opuha Environmental Flow Release Advisory Group's (**OEFRAG's**) approach to managing the surface water resources of the Lake Opuha catchment over the years, including in particular, during the severe water short years of 2014, 2015 and 2016. Subject to the AMWG's submissions below on the environmental flow and allocation regimes set out in Tables 14(v) and 14(w), the AMWG supports clauses (a), (b) and (c) of Policy 14.4.35 on the basis that:	(a) Include the following new definitions in Section 14.1A OTOP Definitions: • ***<u>Small artificial fresh</u>*** *<u>means the voluntary release of 300,000 m³ measured over a 24 hour period at the Opuha Dam Downstream Weir as volume released above the pre-fresh 24-hour average flow at the Weir.</u>* • ***<u>Large artificial fresh</u>*** *<u>means the voluntary release of 600,000 m³ measured over a 24 hour period at the Opuha Dam Downstream Weir as volume released above the pre-fresh 24-hour average flow at the Weir.</u>*

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Section & Page Number	**Sub-section/ Point**	**Oppose/ support (in part or full)**	**Reasons**	
			• PC7's approach to measuring flows in the Opihi river mainstem at Saleyards Bridge (**SYB**) on the basis of a daily 24-hour average with instantaneous variance of not greater than 500L/s below the minimum flow is acceptable for the current operator of the Opuha Dam (Opuha Water Limited (**OWL**)) from an operational perspective; and • These clauses otherwise accurately reflect the current operational and consenting framework for the Opuha Dam. In terms of clause (b), however, the AMWG considers the term "instantaneous" should be included before the word "variance" for clarity. In terms of clause (d), the AMWG considers that amendments are required to reflect that as a result of the proposed inclusion in PC7 of an alternative management regime, when the level of Lake Opuha is below RL370, water releases from the Opuha Dam will equal the lesser of Level 2 minimum flows or the sum of the inflows into the Lake, plus community supplies restricted in accordance with a Water Supply Strategy. In terms of clause (e), the AMWG supports the inclusion of flow variability as a means of efficiently using the environment flows released from the Opuha Dam to manage	(b) Amend Policy 14.4.35 as follows: *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 Table~~s~~ 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. artificial freshes are provided for through the release of flow from the Opuha Dam, and in the period 1 November to 31 March of every year, three ~~releases of water for~~ small*

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			nuisance periphyton and achieve improved environmental outcomes. However, the AMWG is concerned that the artificial fresh requirements provided in clause (e) are too prescriptive and not flexible enough to adapt to river conditions. In addition:
			
			• It is unclear how the required number of freshes would be calculated over seasons when Level 2 Regime flows apply for part of the November to March period;
			• There is no specification of where the flow/volume of an artificial fresh is measured;
			• It is not clear how the volume of an artificial fresh is defined/measured, which is important for calculation of the duration at which it is allowed to reduce the minimum flow to the Level 2 Regime flows to recoup the flush volume and may pose compliance/operational issues;
			• With the current Opuha Dam infrastructure:
			  ○ It is not physically possible to release a flow of 60m³/s continuously for two hours;
			  ○ It would be possible to release a peak flow of up to approximately 80m³/s and sustain an average flow of approximately 50m³/s for two hours, but it is not possible to maintain an instantaneous flow of 60m³/s for two hours (i.e. the flow would always drop below this before the end of the 2 hour period due
				artificial freshes ~~of at least 30 cumecs~~, or alternatively one large and one small artificial fresh, with each artificial fresh being at least one week apart~~two~~ ~~releases of water where one release is at least 60 cumecs and the other release is at least 30 cumecs~~, are provided ~~for a duration of not less than two hours~~, except that:
				(i) during any period when the Level 2 flow regime (as set out in Table~~s~~ 14(v) ~~and 14(w)~~) applies, the number of artificial freshes shall be reduced as follows:
				
				Duration of Level 2 Regime between 1 November and 31 March / **Minimum Requirements for artificial freshes**
				Up to 1.5 months of Level 2 Regime apply / Either 2 small freshes or 1 large fresh
				More than 1.5 months and up to 3.5 months of Level 2 Regime / 1 small fresh
				More than 3.5 months of Level 2 Regime / No freshes required
				
				and

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			to the dynamics of the volume limitation of the regulation pond below the Dam and the limited rate of discharge achievable from the power station, except in the rare situation that the main dam is more than 100% full and able to spill); • It is unclear how flood buffering or spill events are defined and whether they would be counted as artificial freshes, thus allowing environmental flows to be reduced to Level 2 Regime flows; and • Whilst the November to March period is the key period for artificial freshes (to avoid disturbing bird nesting or fish spawning) nuisance periphyton in the Opuha River has been observed at any time of year, including winter. The AMWG considers that these various concerns can be addressed by a revised clause (e), which: • Defines varying fresh requirements depending on the proportion of the period 1 November to 31 March which Level 2 Regime flows apply; • Allows for measurement of artificial fresh flow/volume at the downstream weir, immediately downstream of the Opuha Dam; • Defines artificial freshes based on a specified volume to be released in addition to baseline pre-fresh flows (defined as mean flow over 24 hours	*(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 or if a Level 2 regime is in place for part of the compensation period, then the period will be extended for sufficient time after the regime has commenced to allow for full compensation of the fresh volume.* (c) Should the AMWG's submissions (including relief) in respect of the flow regimes in Table 14(v) and 14(w) be accepted, the following further amendment to the AMWG's clause (e)(ii) of Policy 14.4.35 is sought: *(ii) immediately following an artificial fresh, the minimum flow may be reduced to:* • *the Level 1 minimum flow set out in Table 14(v), when the fresh occurs during the Full Availability Regime; or* • *the Level 2 minimum flow set out in Table 14(v) ~~and 14(w)~~, when the fresh occurs during the Level 1 Regime* *for a period of time sufficient to compensate for the volume of water released for the fresh or if a Level 2 regime is in place for part of the compensation period, then the period will be extended for sufficient*

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			prior to the fresh), rather than in terms of peak flow and duration; • Provides a minimum of 1 week gap between freshes; and • Retains the requirement of a minimum number of freshes over summer, but allow additional freshes at any time of the year. In addition to the above, the AMWG supports the provision made in clause (e) for compensatory flows following artificial freshes. In the AMWG's view, compensatory flows based on Level 2 environmental flows would be appropriate if the proposed environmental flows under the Level 1 and Level 2 Regimes as notified are retained. However, if the AMWG's relief in relation to those environmental flows is accepted (which provides a greater gap between the environmental flows under the Level 1 and Level 2 Regimes), the AMWG considers that clause (e) should be amended to allow for two types of compensatory flows, as follows: • Where the artificial fresh occurs during the Full Availability Regime prescribed by Table 14(v), then the compensatory flows should reflect the Level 1 Regime environmental flows; and • Where the artificial fresh occurs during the Level 1 Regime prescribed by Table 14(v), then the compensatory flows should reflect the Level 2 Regime environmental flows.	*<u>time after the regime has commenced to allow for full compensation of the fresh volume</u>.*

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			The AMWG notes that consequential amendments are required to clauses (a) and (c) to reflect the AMWG's request for the deletion of Table 14(w), set out below in its submission on Table 14(w).	
	14.4.36	Oppose in part	The AMWG considers that clauses (a) to (d) of Policy 14.4.36 accord with the approach historically taken in relation to AA, BA, KIL Permits, AN and BN Permits under the ORRP, and should continue to apply under PC7. It notes, however, that it would be appropriate to make it clear: • In clause (b) that when the level of Lake Opuha is (not "falls") below RL370 (and there is no release of flow for augmentation of the Opihi river mainstem), AA and BN Permits are treated as if they were AN and BN Permits respectively; and • In clause (d) that the Opihi river mainstem environmental flow regime for BN Permits is based on actual flows at State Highway 1. The AMWG notes that consequential amendments are required to Policy 14.4.36 to reflect the AMWG's request for the inclusion of an environmental flow and allocation regime for the Opuha river mainstem, set out below in its submission on Table 14(v).	Amend Policy 14.4.36 as follows: *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*

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				1 as set out in Table 14(y) determined taking into account the recorded (actual) flow.
	14.4.37 and 14.4.38	Oppose in part	As explained in more detail below in relation to its submission on Rule 14.5.29, the AMWG supports the approach adopted by PC7 by enabling the implementation of an alternative management regime (**AMR**) for the Opihi River mainstem, which takes into account the available water within the Lake Opuha catchment, through a discharge consent held by the operator of the Opuha Dam. The AMWG questions the use of the term "alternative minimum flow regime" under Policies 14.4.37 and 14.4.38 when the term used elsewhere in PC7 is "alternative management regime". In the AMWG's view, there needs to be consistency across PC7 and the latter term would be preferable. However, if that term is to be utilised in Policies 14.4.37 and 14.4.38, the AMWG questions whether clause (d) of Policy 14.4.37 is necessary, given that it appears to largely replicate the definition of "adaptive management regime" in Section 14A.1 of PC7, which is: *means a flow management regime developed to achieve environmental flows in the Opihi River and which takes into account the depth of snow pack, inflows upstream of the Opuha Dam and the level of water in Lake Opuha.* The AMWG is concerned about the implications of clause (b) of Policy 14.4.37 and Policy 14.4.38 for the efficient and effective management of the surface water resources in the Lake Opuha catchment. In the AMWG's view, the	Amend Policies 14.4.37 and 14.4.38 as follows: *14.4.37 Establish an alternative ~~minimum flow~~ management regime for the Opihi River at Saleyards Bridge, as set out in Table~~s~~ 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~~b. may be entered into when two of the specified Level 1 or Level 2 thresholds ~~from the preceding month~~ in Table~~s~~ 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 Table~~s~~ 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~~* *c. Exiting of the alternative management regime shall occur when the level of Lake Opuha exceeds the applicable Level 1 or Level 2 thresholds.*

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			requirements of clause (b) that an AMR (i.e. Level 1 or Level 2 flow regime) could only be entered at the start of a calendar month and must remain in place for the whole month (which is also reflected in Policy 14.4.38) fail to recognise that climatic conditions and water demand can change significantly over a month. These requirements would lead to delayed intervention, which in turn is more likely to lead to a fully drained Lake and associated loss of minimum flow control. For example, if the Level 1 regime thresholds are crossed a day after the first day of the month, Policy 14.4.37(b) would result in a month's delay in moving into a Level 2 regime. On average, it is anticipated that a 2 week delay in action would occur under PC7. In the context of an irrigation season or the monthly-varying environmental flows proposed by PC7, a month's delay is considerable. In addition, the AMWG notes that there also appears to be no valid reason to delay exiting a regime until the start of the next calendar month if conditions indicate that abstractions and minimum flows are likely to be able to be met for the upcoming months. This delay could be up to a month, would provide no appreciable benefit, causing unnecessary stress to the Opuha and Opihi river systems and abstractors. The AMWG members' experience with historical water shortage directions has shown that the threshold test for entering into a water shortage regime is not appropriate for coming out of a regime. For example, if a small fresh occurred in the tributaries of Lake Opuha when the Lake	

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			level was at a minimum, the threshold test would not be met, but it would be poor management to return to the "full availability" regime. While Policy 14.4.38 contemplates "reassessment" of the need to continue in a regime at the end of the calendar month, the Policy and Policy 14.4.39 are silent as to the intended "exit" strategy for AMR. In the AMWG's view, it would be appropriate for guidance to be provided. To address these concerns, the AMWG considers that Policies 14.4.37 and 38 should be amended to provide as follows: • The ability to enter into an AMR on any day if the requisite thresholds are met; • If an AMR is entered, the AMR must apply for a minimum of 14 days; and • The ability to enter into a Level 2 Regime only if a Level 1 Regime has been in place for at least 14 days; • The AMR "exit" thresholds are the equivalent of the Level 1 and Level 2 Lake level entry thresholds. Overall, the AWMG considers that these key changes to Policies 14.4.37 and 14.4.38 are necessary to ensure the storage in Lake Opuha is able to be managed in such a way so as to achieve the PC7 policy directives of connectivity and flow variability.	

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			As noted earlier in this submission on the definitions in Section 14.1A, the AMWG supports the approach proposed by PC7 in providing a discretion to apply a Level 1 or Level 2 Regime when two or more of the Table 14(x) thresholds are met. The AMWG notes that consequential amendments are required to Policies 14.4.37 and 14.4.38 to reflect the AMWG's request for the deletion of Table 14(w), set out below in its submission on Table 14(w).	
	14.4.39	Oppose in part	Based on ecological advice, the AMWG supports the proposed flow transition period of 48 hours between monthly flows in Policy 14.4.39. However, the AMWG is concerned that the wording of Policy 14.4.39, as notified, does not fully reflect that there are two flow transition periods, namely the transition between monthly minimum flows and also between flow management regimes (i.e. between the Full Availability Regime and AMR). In the AMWG's view, Policy 14.4.39 should clearly cover both. The AMWG notes that consequential amendments are required to Policy 14.4.39 to reflect the AMWG's request for the deletion of Table 14(w), set out below in its submission on Table 14(w). A consequential change is also required to reflect that the AMWG's relief in relation to Policies 14.4.37	Amend Policy 14.4.39 as follows: *14.4.39 In complying with the environmental flow and allocation regime(s) set out in Table~~s~~ 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 <u>and the alternative management regime</u>.*

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			and 14.4.38, namely to enable entry into the AMR more frequently than only at the commencement of the month.	
14.5 Rules				
Opihi Freshwater Management Unit				
Augmentation of the main stem of the Opuha and Opihi Rivers (page 155)	14.5.29 and 14.5.30	Oppose in part	The AMWG acknowledges the crucial advisory role OEFRAG has historically had in the management of flow releases from the Opuha Dam, both in terms of its express role under the ORRP in advising on the transitioning of flow between months, management of artificial freshes and flood buffering releases from the Opuha Dam, as well as its less formalised role in making recommendations to ECan for pre-cautionary flow management measures in times of anticipated water shortage (i.e. by way of water shortage directions (**WSD**) under section 329 RMA). While comments made in the Section 32 Report for PC7 suggest ECan's decisions on WSD have, in recent times, received a mixed response from community in the OTOP sub-region, it is the AMWG belief that on the whole the OEFRAG model has been hugely successful in ensuring the effective management of stored water in Lake Opuha during water short periods for the benefit of the Opuha and Opihi river systems and abstractors. This is not least due to the breadth of knowledge, experience and technical expertise held by its members (which include representatives of Te	Amend Rules 14.5.29 and 14.5.30 as follows: ***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 Table~~s~~ 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;*

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			Rūnanga o Arowhenua, Timaru and Mackenzie District Councils, Central South Island Fish & Game Council, Department of Conservation, Federated Farmers and OWL). The AMWG therefore strongly believes that OEFRAG should continue to have an advisory role under PC7 on flow releases from the Opuha Dam (monthly flow transitioning, artificial freshes and flood buffering) and the implementation of AMR. The AMWG accepts there are challenges in attempting to codify a community-led advisory body within a modern regional planning framework. It also acknowledges that nothing in PC7, including Rule 14.5.29 or 14.5.30 as notified, would preclude OWL from consulting with OEFRAG members before making decisions around Opuha Dam flow releases or implementation of AMR under any future consent it might obtain pursuant to those rules. However, the AMWG considers that further certainty around this intention could be provided in Rule 14.5.29 by way of an additional requirement for an operational management plan to be prepared and submitted with any application for resource consent made pursuant to that Rule. The AMWG notes that the requirement for management plans as a condition of augmentation consents is not novel in the context of the CLWRP (see Rule 15A.5.31) and there are various other examples where management plans have been used in similar contexts (e.g. in relation to flow releases from the Manapouri Lake Control Structure in the	*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.***

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			Lower Waiau River in Southland (RC206156) and the Te Waihora/Lake Ellesmere opening consent (CRC140366)). In terms of activity status, the AMWG considers that: • To align with region-wide Rule 5.125C, Rule 14.5.29 should classify the discharge of water for augmentation of the Opuha and Opihi mainstems subject to the listed conditions as a <u>controlled</u> activity. The AMWG suggests that the matters of control should reflect those under Rule 5.125C. In the AMWG's view, a controlled activity status would also recognise the relatively prescriptive nature of the Opihi river flow management regime contemplated by PC7. • To protect against improvements in methodology over time which may affect the thresholds set in Table 14(x) (as sought to be amended by the AMWG, as discussed in the AMWG's submission below on Table 14(x)), resulting in the thresholds becoming outdated and/or not fit for purpose, Rule 14.5.30 should classify discharges of water that do not comply with one or more of the conditions of Rule 14.5.29 as a non-complying activity. The AMWG considers that the title of Rules 14.5.29 and 14.5.30 should be consistent. The AWMG's preference is the title of Rule 14.5.30, which is: *The discharge or water*	

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			from the Opuha Dam for the purpose of augmenting the Opuha and Opihi mainstems …… The AMWG considers that PC7 should not foreclose the opportunity for the AMR to be implemented through a resource consenting process pursuant to Rule 14.5.29 prior to 2025 (as recorded in Table 14(v), as notified), should that be considered desirable. It is the AMWG's view that the conditions of Rule 14.5.29 are worded in such as way so as to enable that outcome, and to that extent, the AMWG supports Rule 14.5.29. The AMWG notes that consequential amendments are required to Rule 14.5.29 to reflect the AMWG's request for the deletion of Table 14(w), set out below in its submission on Table 14(w).	
14.6 Allocation and Water Quality Limits				
14.6.2 Environmental Flow and Allocation Regimes (pages 170 – 171)	Table 14(v): Minimum Flow Restrictions in the Opihi Freshwater Management Unit for AA and BA	Oppose in part	<u>Current Regime</u> The current regime for the Opihi mainstem river prescribed by the ORRP is presently missing from the Tables in Section 14.6.2. This is a fundamental omission and the AMWG considers a further table should be included in PC7 to record the current regime, which it assumes is intended to continue to apply until 2025 (in a similar way to the Opihi tributary regimes prescribed in Section 14.6.2).	(a) Include a new table in PC7, Table 14(v(i)), that records the current Opihi mainstem environmental flow and partial restriction regime (as set out in **Annexure B**); and (b) Delete Table 14(v); and (c) Replace Table 14(v) with two new tables, Tables 14(v(ii)) and 14(v(iii)) (as set out in **Annexure B** to this

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	Permits (2025)		<u>Adaptive Management Regime</u> The AMWG strongly supports the codification of an adaptive management regime for the mainstems of the Opuha and Opihi rivers in PC7 through the proposed AMR planning framework, which proposes a tiered approach to environmental flows that would apply according on Lake Opuha levels, catchment snow pack and inflows to Lake Opuha, based on the concepts developed by the AMWG prior to the notification of PC7. However, the AMWG is genuinely concerned that that PC7's AMR has been simply drawn from the August 2008 "Application for changes to Opihi River Regional Plan – Consultation Draft", which was prepared by Environmental Consultancy Services Ltd for OEFRAG. (**Draft OEFRAG Regime**). Certainly, it appears from the Section 32 Report for PC7 and supporting technical documents prepared by ECan staff, that the AMR has not been informed by any hydrological, ecological or other technical assessments (except for an assessment of the expected frequency of the "Level 1 Restrictions" and "Level 2 Restrictions" under PC7. This is particularly concerning as the Draft OEFRAG Regime was trialled by OEFRAG in the dry years since 2008 and was ineffective in achieving the level of water savings required to achieve connectivity and flow variability in the mainstem of the Opihi River. Specifically, the experience in the 2014/15 water short period highlighted the following	submission), applying to AA and BA Permits in the Opihi Freshwater Management Unit, which prescribe: (i) environmental flow and allocation regime (new Table 14(v(ii))); and (ii) partial restriction regime (new Table 14(v(iii)); and

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			serious shortcomings of the Draft OEFRAG Regime (and consequently PC7's AMR): • The lake level threshold for moving into a Level 1 Regime or Level 2 Regime equates to 50% full, which is too low to make any meaningful impact on Lake storage (i.e. it is too little to late). • The reductions in minimum flows through the Level 1 and Level 2 Regimes would not be enough to make meaningful water savings, for subsequent use for the benefit of the downstream environment and abstractors. • The ability to make water savings under a Level 1 Regime between April and August is severely constrained. In this regard it is noted that in 2015, WSD were in place for much of the winter in order to reduce the minimum flows prescribed by the ORRP and improve the likelihood of a full Lake at the start of the 2015/16 season, to meet the needs of the downstream environment and abstractors. The AMWG therefore doubts that PC7's AMR would enable the level of flexibility required for proactive management of available storage in the Lake Opuha catchment, and accordingly, compromise the outcomes envisaged by Recommendation 5.3.1 of the OTOP ZIPA. It is the AMWG's fear that, given these shortcomings, there is a real risk that there will be an ongoing need to rely on section 329	

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			RMA for WSD in water short periods. This is not the preferred outcome from the AMWG's perspective, and would compromise the directives of Policy 14.4.35 (i.e. maintaining connectivity and flow variability). The AMWG has had the opportunity to review the technical reports and analyses conducted by ECan staff and consultants of the AMWG's earlier proposal, which were submitted to the OTOP Zone Committee in stages during 2017/18. In light of the feedback provided in those documents and the AMWG's concerns about the effectiveness of the Draft OEFRAG Regime within the context of the PC7 policy framework in particular, the AMWG has conducted further technical analysis and obtained further ecological advice to identify a set of revisions to PC7 that it believes will achieve the outcomes of the Proposal. Summarily the changes sought by the AMWG include: (a) Amendments to the "full availability" flows proposed in Table 14(v), which • Provide more water for the river environment during the summer months (by moving water from the shoulder periods to Jan/Feb); and • Ensure sufficient flows for salmon migration (Mar/Apr) and whitebait migration (particularly Oct) (i.e. flows will be maintained at SYB during these critical	

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			periods at greater than 6 cumecs, which prior research has indicated is the flow required to maintain the mouth of the Opihi river open). (b) Amendments to the "Level 1 Restriction" flows proposed in Table 14(v), which also provide more water for the river environment during the summer than PC7 and otherwise respond to changing climatic conditions in the catchment; and (c) Amendments to the "Level 2 Restriction" flows proposed in Table 14(v), to align with PC7's proposed 2022 Opihi mainstem environmental flow requirements for AN permits of 2.6 cumecs at Stage Highway 1 (Table 14(u) and historical IFIM habitat modelling). As a result of the further analysis conducted by the AMWG and advice received from its consultants, revisions are also proposed to Tables 14(w) and 14(x), which are addressed later in this submission. <u>Partial Restrictions</u> It is understood that the approach adopted by PC7 to partial restrictions for AA and BA Permits in the Opihi FMU (being a 50% restriction under "Level 1 Restriction" moving to 75% under a "Level 2 Restriction") is for reasons of simplicity. However, the AMWG is concerned that PC7's proposed	

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			partial restriction regime lacks the level of flexibility necessary to respond to changes in climatic conditions and water demands between months. Accordingly, AMWG is concerned that ECan's drive for simplicity would significantly undermine the concept of adaptability that is central to achieving ZIPA Recommendation 5.3.1. The approach taken to partial restrictions represents a significant change from the present planning and consenting framework under the ORRP. The AWMG accepts that the ORRP regime's 50% restriction when Lake Opuha reached RL375m was too late to make any measurable benefit (i.e. in terms of water savings). However, the approach under PC7 of linking a "Level 1 Restriction" to a 50% restriction will have significant consequences for the irrigators who have funded and own the Opuha Dam. In short, the regime is considered too harsh and does not align with ECan's approach to partial restrictions in other catchments in the Opihi FMU (i.e. "pro-rata"). Recognising the underlying principles of the AMR intended by PC7 and associated policy drivers, the AMWG considers it necessary and appropriate that the partial restriction regime for AA and BA Permits in the Opihi FMU reflect; • the criticalities between river demand and irrigation for different times of the year;	

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			• in the case of AA and BA Permits in the North Opuha, South Opuha, Upper Opihi and Te Ana Wai Rivers, lower reliability as a result of tributary-specific environmental flow regimes. The AMWG is also concerned about the implications of the proposed partial restrictions being daily 24 hour volumetric restrictions, which fail to recognise the operational constraints of the irrigation infrastructure of consent holders. In the AMWG's view, this approach would lead to gross inefficiencies in terms of water released from the Dam if, for example, a shareholder only irrigated 12 out of the 24 hours. For these reasons, the AMWG considers it necessary for the restriction regime to be based on a fortnightly volumetric restriction, as was originally proposed by AMWG in its pre-PC7 notification proposal to the OTOP Zone Committee. The AWMG acknowledges that ECan staff have previously expressed reservations about the AMWG's earlier proposal from a monitoring and compliance perspective. However, on the basis of advice from OWL, the AMWG believes the regime could work from a compliance perspective as it understands OWL receives water orders daily from its shareholders and also has a live telemetry feed into the OWL office of the majority of consent takes within the Opuha Scheme, which it monitors. The AMWG understands that OWL is confident a monitoring and reporting system can be set up internally (within OWL), that would provide ECan with the information it needs to ensure fortnightly restrictions are	

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			adhered to. Accordingly, on that basis, the AMWG considers that PC7 should allow for fortnightly volumetric restrictions. <u>Opuha River mainstem</u> The AMWG supports the inclusion in Table 14(v) of an environmental flow and allocation regime for the mainstem of the Opuha river. However, the AMWG considers that amendments are required to reflect the present minimum flow regime under OWL's consents, which is 1,500 plus the sum of abstractions by shareholders from the Opuha River, with additional provision for adaptability under a "Level 2 Restriction".	
	Table 14(w): Minimum Flow Restrictions in the Opihi Freshwater Management Unit for AA and BA Permits (2030)	Oppose	The AMWG opposes the minimum flows under "Level 1 Restriction" and "Level 2 Restriction" in Table 14(w) for the reasons addressed above in relation to Table 14(v). The AMWG is also fundamentally opposed to the provision in Table 14(w) of increases in the "full availability" environmental flows beyond those proposed in Table 14(v), which would take effect from 2030. The AMWG understands that these increases in "full availability" environmental flows in Table 14(w) are intended to implement ZIPA Recommendation 5.3.1(I)(e) that *[a]ll flow gains achieved by minimum flow increases on the Upper Opihi and Te Ana Wai Rivers remaining in the mainstem of the Opihi River, and not being available for abstraction and should be reflected in the minimum flows measured at*	(a) Delete Table 14(w) in its entirely; or (b) In the alternative: (i) Delete Table 14(w); and (ii) Include a new Policy in PC7, as follows: <u>*Policy 14.4.X*</u> <u>*Flow gains achieved by the time staged increases in environmental flows on the Upper Opihi and Te Ana Wai Rivers shall remain in the mainstem of the Opihi River and not be available for abstraction by ensuring that:*</u>

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			Saleyards Bridge. However, the AMWG notes that this aspect of ZIPA Recommendation 5.3.1 was included in the ZIPA at the eleventh hour, has no underlying scientific rationale and does not appear to have been informed by any detailed technical (i.e. hydrological, ecological or otherwise) analysis. Preliminary analysis of the recent habitat modelling of the lower Opihi River undertaken by NIWA on behalf of ECan indicates that Table 14(w) monthly minimum flows generally provide minor gains in physical habitat for benthic invertebrates and more significant gains for adult brown trout habitat in six months of the year, relative to Table 14(v) monthly flows. However, most native fish species assessed are subjected to habitat losses that range from minor to more significant in many months, as is the case for juvenile brown trout and salmonid spawning. From the AMWG's perspective, the proposed "full availability" environmental flows present the following significant issues: • the approach fails to recognise that the relationship between flows in the tributaries (Upper Opihi and Te Ana Wai rivers) and SYB is much more complex than the 1:1 ratio assumed in Table 14(w).	*a. when the flows in the Upper Opihi and Te Ana Wai are between the current and future environmental flows set out in Tables 14(p) and 14(r), water released from the Opuha Dam for augmentation of the Opuha and Opihi mainstems complies with the environmental flow regime requirements in Table 14(v) and includes sufficient water to provide for the sum of abstraction occurring under AA and BA Permits downstream of Saleyards Bridge and the flow gains in the Opihi river mainstem from the Upper Opihi and Te Ana Wai rivers as calculated by Environment Canterbury; and* *b. when the flows in the Upper Opihi and Te Ana Wai are below the current environmental flows set out in Tables 14(p) and 14(r), water released from the Opuha Dam for augmentation of the Opuha and Opihi mainstems complies with the environmental flow regime requirements in Table 14(v) and includes sufficient water to provide for the sum of abstraction occurring under AA and BA Permits downstream of Saleyards Bridge.*

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			• the approach would result in approximately 5.2 million cubic metres (on average per year) of additional water released from Opuha Dam to meet this increased minimum flow, as the AMWG's analysis indicates additional water from the Upper Opihi and Te Ana Wai would only be flowing 1% of the time The release of 5.2 million cubic metres would reduce the availability of stored water volume in Lake Opuha for environmental and irrigation releases by approximately 8% per year on average, which may increase the frequency of water shortages into the future. • the approach raises issues of equity as PC7 does not include a commensurate increase in the environmental flows for AN Permits in Table 14(y). From a practical perspective, the AMWG also considers that the deletion of Table 14(w) has the advantage of simplifying PC7 and the scope of consent conditions that will be required as a result of ECan's intended consent review after PC7 becomes operative (as contemplated by proposed Policy 14.4.12). For the above reasons, it is the AMWG's preference that Table 14(w) be deleted. If, despite the AMWG's submission, to implement ZIPA Recommendation 5.3.1(I)(e) and otherwise address the AMWG's concerns with Table 14(w), the AMWG considers that Table 14(w) be deleted and PC7	

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			be amended to include a directive (e.g. via a policy in PC7) that requires: • when the flows in the Upper Opihi and Te Ana Wai are between the current (2019) and proposed environmental flows under PC7, the calculated additional water (gains) in the Opihi river mainstem cannot be abstracted and releases from the Opuha Dam must equal the sum of augmentation needs to meet the environmental flows in Table 14(v) and downstream abstractions, plus the calculated flow gains; and • when the flows in the Upper Opihi and Te Ana Wai are below the current (2019) environmental flows, releases from the Opuha Dam must equal the sum of the augmentation needs to meet the environmental flows in Table 14(v) and downstream abstractions only. The AMWG notes that the above alternative is predicated on ECan determining the true relationship between flows in the Upper Opihi/Te Ana Wai rivers and SYB, and developing a model to estimate the extent and timing of any flow gains from those tributaries realised at SYB. The AMWG recognises that the deletion of Table 14(w) is likely to be a simpler solution to this complex issue than the alternative proffered by the AMWG.	

	Table 14(x): Alternative Management Regime Triggers	Oppose in part	As outlined earlier in this submission, the AMWG strongly supports the proposed AMR framework introduced by PC7. However, for the reasons outlined above in its submission on Table 14(w), the AMWG is genuinely concerned that the AMR as proposed in PC7 would not achieve the objectives of the Proposal. This appears in part to be due to the thresholds proposed in Table 14(x) and how they might be implemented in the future. It is the AMWG's assessment that the ability to enter a Level 1 Regime only when the Lake Level has dropped to 50% full is a fundamental flaw of the PC7 AMR, as are the narrow bands proposed for the snow pack and Lake inflow thresholds for the Level 1 and Level 2 Regimes. which the AMWG also notes have been produced using a methodology with technical errors. Overall, it is the AMWG's view that the AMR is simply too conservative to enable the proactive management of flows for the benefit of both the Opihi river system and abstractors. In order for the AMR to meet the relevant statutory tests and fully implement ZIPA Recommendation 5.3.1, the AMWG considers that PC7 needs to provide for a set of thresholds that achieve the following outcomes: • Maintains connectivity of the Opihi River mainstem 100% of the time, by managing the risk of Lake Opuha running dry (i.e. precluding augmentation) and therefore the amount of time the minimum flows at SYB are below 2 cumecs (being the flow below which, based on the AMWG's experience, connectivity is lost); • Optimises Lake storage to minimise the amount of time the minimum flows at SYB are at or below 3 cumecs and abstractors (irrigators) are on full restriction; • Ensures equity between the volume given up by abstractors (irrigators) and the river; and	(a) Delete Table 14(x); and (b) Replace Table 14(x) with the revised set of thresholds for Lake inflows (Table 14(x(i)), snow storage (Table 14(x)(ii)) and Lake level (Table 14(x)(iii)) as set out in **Annexure B** to this submission, or an alternative set of revised thresholds that ensure the implementation of the AMR achieves the following outcomes: • Maintains connectivity of the Opihi River mainstem 100% of the time, by managing the risk of Lake Opuha running dry (i.e. precluding augmentation) and therefore the amount of time the minimum flows at SYB are below 2 cumecs (being the flow below which, based on the experience of OWL and the members of the AMWG, connectivity is lost); • Optimises Lake storage to minimise the amount of time the minimum flows at SYB are at or below 3 cumecs and abstractors (irrigators) are on full restriction; • Equity between the volume given up by abstractors (irrigators) and the river; and • Irrigators achieve 95% reliability (in accordance with Canterbury Water Management Strategy outcomes). .

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			• Ensures irrigators achieve 95% reliability (in accordance with Canterbury Water Management Strategy outcomes). The AMWG has reviewed and analysed PC7's AMR against these key principles and believes that the following refinements are required to the thresholds set out in Table 14(x): • Variable daily Lake level thresholds that have been based on percentage reductions below the lower band of the operating intent for the Opuha Dam, with Level 1 Regime thresholds at 15% below the lower band and Level 2 Regime thresholds a further 10% below the Level 1 Regime threshold; and • Daily Lake level and snow pack thresholds for the Level 1 and Level 2 Regimes that have been derived from the 25th percentiles (1 in 4 year) and 10th percentiles (1 in 10 year) of daily inflow and snow pack estimates from 1998 to 2017 respectively.	

ANNEXURE B: REPLACEMENT TABLES 14(v(i), (ii) and (iii)) AND 14(x(i), (ii) and (iii)) REFERRED TO IN the AMWG'S SUBMISSIONS ON TABLES 14(v) AND 14(x) OF PLAN CHANGE 7 IN ANNEXURE A

(i) Table 14(v(i)): Opihi Freshwater Management Unit Environmental Flow Regime – AA and BA Permits current

River	Location of recorder site, or site where flow is measured	NZTM Map Reference	Lake Opuha	Minimum flow for AA and BA Permits (L/s)												Partial Restrictions
Opihi mainstem	Saleyards Bridge	5098685N 1451845E	Above RL 375m	Jan	Feb	Mar	Apr	May	June	July	Aug	Sept	Oct	Nov	Dec	N/A
				3,500	3,500	7,500	8,000	4,500	4,000	4,000	4,500	6,000	8,500	7,000	6,000	
			At or below RL 375m, but above RL 370m	3,350	3,350	5,350	5,600	3,850	3,600	3,600	3,850	4,600	5,850	5,100	4,600	50%

(ii) Table 14(v)(ii) Opihi Freshwater Management Unit Environmental Flow Regime – AA and BA Permits from 1 January 2025

River	Location of recorder site, or site where flow is measured	NZTM Map Reference	Management Regime	Minimum flow for AA and BA Permits (L/s) From 1 January 2025												Partial Restrictions
Opihi Mainstem	Opuha Dam Downstream Weir	5124591N 1431579E	Full Availability and Level 1 Regime	1,500 plus the sum of the AA and BA allocation block for the Opuha River												N/A
			Level 2 Regime	1,000 plus the sum of the AA and BA allocation block for the Opuha River												N/A
			Lake Opuha level < RL 370m	Discharge from Opuha Dam equals the lesser of the flows prescribed by the Level 2 Regime at Saleyards Bridge or the sum of the inflows to Lake Opuha from the North and South Rivers, and flows required for community supplies restricted in accordance with a Water Supply Strategy												100%
	Saleyards Bridge	5098685N 1451845E	Full Availability	Jan	Feb	Mar	Apr	May	June	July	Aug	Sept	Oct	Nov	Dec	N/A
				4,500	4,500	7,000	7,000	4,500	4,000	4,000	4,500	6,000	8,000	7,000	6,000	
			Alternative Management Regime													
			Level 1 Regime	Jan	Feb	Mar	Apr	May	June	July	Aug	Sept	Oct	Nov	Dec	Refer Table 14(v(iii))
				4,000	4,000	6,000	6,000	4,000	3,500	3,500	4,000	5,000	6,000	6,000	5,000	
			Level 2 Regime	3,500												Refer Table 14(v)(iii))

(iii) Table 14(v(iii)): Partial Restrictions for AA and BA Permits in the Opihi Freshwater Management Unit from 1 January 2025

Lake Level	Flow regime	Fortnightly volumetric restrictions (%)											
		Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sept	Oct	Nov	Dec
N/A	Level 1*	25	25	25	25	50	75	75	75	50	50	25	25
	Level 2#	50	50	50	50	75	100	100	100	75	75	75	75
<373m (<5% operational volume available)		100	100	100	100	100	100	100	100	100	100	100	100

* Restrictions under a Level 1 Regime shall not apply to water permits to take and use water from the North Opuha, South Opuha, Upper Opihi or Te Ana Wai Rivers.

Under a Level 2 Regime, Level 2 partial restrictions shall apply to water permits to take and use water from North Opuha, South Opuha, Upper Opihi or Te Ana Wai Rivers except when the Lake Opuha Level graph on ECan's website indicates the Lake level is rising, in which case partial restrictions for the Level 1 Regime shall apply to these permits.

(iv) Table 14(x(i)): Alternative Management Regime Thresholds: Inflows (m^3/s)

	Jan		Feb		Mar		Apr		May		Jun		Jul		Aug		Sep		Oct		Nov		Dec	
Day	L1	L2	L1	L2	L1	L2	L1	L2	L1	L2	L1	L2	L1	L2	L1	L2	L1	L2	L1	L2	L1	L2	L1	L2
1	5.3	3.8	3.9	2.9	3.2	2.5	3.1	2.4	3.2	2.3	3.5	2.7	3.7	2.8	4.0	3.2	4.1	3.2	4.4	3.4	7.1	5.0	7.8	5.3
2	5.3	3.8	3.9	2.8	3.2	2.5	3.1	2.4	3.2	2.3	3.5	2.7	3.7	2.8	4.0	3.2	4.1	3.2	4.5	3.4	7.2	5.1	7.7	5.2
3	5.2	3.7	3.8	2.8	3.2	2.5	3.1	2.4	3.2	2.3	3.5	2.7	3.7	2.8	4.0	3.2	4.1	3.2	4.5	3.5	7.2	5.1	7.7	5.2
4	5.2	3.7	3.8	2.8	3.2	2.5	3.1	2.3	3.2	2.3	3.5	2.7	3.7	2.8	4.0	3.2	4.1	3.2	4.6	3.5	7.3	5.1	7.6	5.2
5	5.1	3.7	3.8	2.8	3.2	2.5	3.1	2.3	3.2	2.4	3.5	2.7	3.7	2.8	4.0	3.2	4.1	3.2	4.7	3.6	7.4	5.2	7.6	5.2
6	5.0	3.6	3.7	2.8	3.2	2.5	3.1	2.3	3.3	2.4	3.5	2.7	3.8	2.9	4.0	3.2	4.1	3.2	4.7	3.6	7.4	5.2	7.5	5.1
7	5.0	3.6	3.7	2.8	3.1	2.5	3.2	2.3	3.3	2.4	3.5	2.7	3.8	2.9	4.0	3.2	4.1	3.2	4.8	3.7	7.5	5.2	7.5	5.1
8	4.9	3.5	3.7	2.7	3.1	2.5	3.2	2.3	3.3	2.4	3.5	2.7	3.8	2.9	4.0	3.3	4.1	3.2	4.9	3.7	7.5	5.3	7.4	5.1
9	4.9	3.5	3.6	2.7	3.1	2.5	3.2	2.3	3.3	2.4	3.5	2.7	3.8	2.9	4.0	3.3	4.1	3.2	4.9	3.7	7.6	5.3	7.4	5.0
10	4.8	3.5	3.6	2.7	3.1	2.5	3.2	2.3	3.3	2.4	3.5	2.7	3.8	2.9	4.0	3.3	4.2	3.2	5.0	3.8	7.6	5.3	7.3	5.0
11	4.8	3.4	3.6	2.7	3.1	2.4	3.2	2.3	3.3	2.4	3.5	2.7	3.8	3.0	4.0	3.3	4.2	3.2	5.1	3.8	7.7	5.3	7.2	5.0
12	4.7	3.4	3.6	2.7	3.1	2.4	3.2	2.3	3.3	2.4	3.5	2.7	3.9	3.0	4.1	3.3	4.2	3.2	5.1	3.9	7.7	5.3	7.2	4.9
13	4.7	3.4	3.5	2.7	3.1	2.4	3.2	2.3	3.3	2.5	3.5	2.7	3.9	3.0	4.1	3.3	4.1	3.2	5.2	3.9	7.8	5.4	7.1	4.9
14	4.6	3.3	3.5	2.6	3.1	2.4	3.2	2.3	3.3	2.5	3.5	2.7	3.9	3.0	4.1	3.3	4.1	3.2	5.3	4.0	7.8	5.4	7.0	4.8
15	4.6	3.3	3.5	2.6	3.1	2.4	3.2	2.3	3.4	2.5	3.5	2.7	3.9	3.0	4.1	3.3	4.1	3.2	5.4	4.0	7.8	5.4	6.9	4.8
16	4.6	3.3	3.5	2.6	3.1	2.4	3.2	2.3	3.4	2.5	3.5	2.7	3.9	3.0	4.1	3.3	4.1	3.2	5.5	4.1	7.9	5.4	6.9	4.7
17	4.5	3.3	3.4	2.6	3.1	2.4	3.2	2.3	3.4	2.5	3.5	2.7	3.9	3.0	4.1	3.3	4.1	3.2	5.6	4.1	7.9	5.4	6.8	4.7
18	4.5	3.2	3.4	2.6	3.1	2.4	3.2	2.3	3.4	2.5	3.5	2.7	3.9	3.1	4.1	3.3	4.1	3.2	5.7	4.2	7.9	5.4	6.7	4.6
19	4.4	3.2	3.4	2.6	3.1	2.4	3.2	2.3	3.4	2.5	3.5	2.7	3.9	3.1	4.1	3.3	4.1	3.2	5.8	4.3	7.9	5.4	6.6	4.6
20	4.4	3.2	3.4	2.6	3.1	2.4	3.2	2.3	3.4	2.5	3.5	2.7	3.9	3.1	4.1	3.3	4.1	3.2	5.9	4.3	7.9	5.4	6.5	4.5
21	4.3	3.1	3.3	2.6	3.1	2.4	3.2	2.3	3.4	2.6	3.5	2.7	3.9	3.1	4.1	3.3	4.2	3.2	6.0	4.4	7.9	5.4	6.4	4.4
22	4.3	3.1	3.3	2.6	3.1	2.4	3.2	2.3	3.4	2.6	3.5	2.7	4.0	3.1	4.1	3.2	4.2	3.2	6.1	4.5	7.9	5.4	6.3	4.4
23	4.3	3.1	3.3	2.5	3.1	2.4	3.2	2.3	3.4	2.6	3.6	2.7	4.0	3.1	4.1	3.2	4.2	3.2	6.2	4.5	7.9	5.4	6.2	4.3
24	4.2	3.1	3.3	2.5	3.1	2.4	3.2	2.3	3.4	2.6	3.6	2.7	4.0	3.2	4.1	3.2	4.2	3.3	6.3	4.5	7.9	5.4	6.1	4.2
25	4.2	3.0	3.3	2.5	3.1	2.4	3.2	2.3	3.4	2.6	3.6	2.7	4.0	3.2	4.1	3.2	4.2	3.3	6.3	4.6	7.9	5.4	5.9	4.2
26	4.1	3.0	3.2	2.5	3.1	2.4	3.2	2.3	3.4	2.6	3.6	2.7	4.0	3.2	4.1	3.2	4.3	3.3	6.4	4.6	7.9	5.4	5.8	4.1
27	4.1	3.0	3.2	2.5	3.1	2.4	3.2	2.3	3.4	2.6	3.6	2.7	4.0	3.2	4.1	3.2	4.3	3.3	6.5	4.7	7.9	5.3	5.7	4.0
28	4.1	3.0	3.2	2.5	3.1	2.4	3.2	2.3	3.4	2.6	3.6	2.8	4.0	3.2	4.1	3.2	4.3	3.3	6.6	4.8	7.8	5.3	5.6	4.0
29	4.0	2.9	3.2	2.5	3.1	2.4	3.2	2.3	3.5	2.6	3.7	2.8	4.0	3.2	4.1	3.2	4.3	3.4	6.7	4.8	7.8	5.3	5.4	3.9
30	4.0	2.9			3.1	2.4	3.2	2.3	3.5	2.6	3.7	2.8	4.0	3.2	4.1	3.2	4.4	3.4	6.8	4.9	7.8	5.3	5.3	3.8
31	3.9	2.9			3.1	2.4			3.5	2.6			4.0	3.2	4.1	3.2			7.0	4.9			5.2	3.7

(v) Table 14(x(ii)): Alternative Management Regime Thresholds: Snow storage (Mm^3 of water equivalent)

	Jan		Feb		Mar		Apr		May		Jun		Jul		Aug		Sep		Oct		Nov		Dec	
Day	L1	L2	L1	L2	L1	L2	L1	L2	L1	L2	L1	L2	L1	L2	L1	L2	L1	L2	L1	L2	L1	L2	L1	L2
1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	20.0	14.7	27.0	19.5	24.4	17.9	17.8	13.7	9.8	6.7
2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	20.3	15.0	27.0	19.5	24.3	17.8	17.6	13.5	0.0	0.0
3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	20.6	15.2	27.1	19.5	24.1	17.8	17.4	13.3	0.0	0.0
4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	20.9	15.4	27.1	19.5	23.9	17.7	17.1	13.1	0.0	0.0
5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	21.2	15.6	27.2	19.5	23.7	17.6	16.9	12.9	0.0	0.0
6	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	21.4	15.8	27.2	19.5	23.5	17.5	16.6	12.7	0.0	0.0
7	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	21.7	16.0	27.2	19.5	23.3	17.4	16.4	12.4	0.0	0.0
8	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	22.0	16.2	27.2	19.5	23.1	17.4	16.1	12.2	0.0	0.0
9	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	22.3	16.4	27.2	19.5	22.8	17.3	15.9	12.0	0.0	0.0
10	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	22.6	16.6	27.2	19.4	22.6	17.2	15.6	11.7	0.0	0.0
11	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	22.9	16.8	27.1	19.4	22.4	17.1	15.3	11.4	0.0	0.0
12	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	23.2	17.0	27.1	19.4	22.2	16.9	15.1	11.2	0.0	0.0
13	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	23.5	17.3	27.0	19.3	22.0	16.8	14.8	10.9	0.0	0.0
14	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	23.8	17.5	26.9	19.2	21.8	16.7	14.5	10.7	0.0	0.0
15	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	24.1	17.6	26.8	19.1	21.6	16.6	14.3	10.4	0.0	0.0
16	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	24.3	17.8	26.7	19.1	21.4	16.4	14.0	10.2	0.0	0.0
17	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	24.5	18.0	26.6	19.0	21.2	16.3	13.7	10.0	0.0	0.0
18	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	24.7	18.1	26.5	18.9	20.9	16.2	13.5	9.7	0.0	0.0
19	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	24.9	18.2	26.4	18.8	20.7	16.1	13.2	9.5	0.0	0.0
20	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	25.1	18.4	26.3	18.8	20.5	15.9	12.9	9.3	0.0	0.0
21	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	25.3	18.5	26.2	18.7	20.3	15.8	12.7	9.0	0.0	0.0
22	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	25.6	18.6	26.1	18.7	20.1	15.6	12.4	8.8	0.0	0.0
23	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	25.8	18.8	25.9	18.6	19.8	15.5	12.1	8.6	0.0	0.0
24	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	26.0	18.9	25.7	18.5	19.6	15.3	11.8	8.3	0.0	0.0
25	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	26.1	19.0	25.6	18.4	19.4	15.1	11.5	8.1	0.0	0.0
26	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	26.3	19.1	25.4	18.4	19.2	15.0	11.3	7.8	0.0	0.0
27	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	26.5	19.2	25.2	18.3	19.0	14.8	11.0	7.6	0.0	0.0
28	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	26.6	19.3	25.0	18.2	18.7	14.6	10.7	7.4	0.0	0.0
29	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	26.7	19.4	24.8	18.1	18.5	14.4	10.4	7.2	0.0	0.0
30	0.0	0.0			0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	26.8	19.4	24.6	18.0	18.3	14.2	10.1	6.9	0.0	0.0
31	0.0	0.0			0.0	0.0			0.0	0.0			0.0	0.0	26.9	19.5			18.1	14.0			0.0	0.0

(vi) Table 14(x(iii)): Alternative Management Regime Thresholds: Lake level (Mm^3 of water equivalent)

	Jan		Feb		Mar		Apr		May		Jun		Jul		Aug		Sep		Oct		Nov		Dec	
Day	L1	L2	L1	L2	L1	L2	L1	L2	L1	L2	L1	L2	L1	L2	L1	L2	L1	L2	L1	L2	L1	L2	L1	L2
1	388.3	387.0	387.0	385.5	385.0	383.3	383.3	381.4	384.2	382.4	385.5	383.9	387.0	385.5	387.9	386.5	388.5	387.2	389.2	387.9	389.8	388.5	389.2	387.9
2	388.3	386.9	386.9	385.4	385.0	383.3	383.4	381.4	384.2	382.5	385.5	383.9	387.0	385.5	387.9	386.6	388.6	387.3	389.2	387.9	389.7	388.5	389.1	387.9
3	388.2	386.9	386.8	385.3	384.9	383.2	383.4	381.5	384.3	382.5	385.6	384.0	387.0	385.6	387.9	386.6	388.6	387.3	389.2	387.9	389.7	388.5	389.1	387.8
4	388.2	386.8	386.8	385.3	384.9	383.2	383.4	381.5	384.3	382.6	385.6	384.0	387.0	385.6	388.0	386.6	388.6	387.3	389.2	388.0	389.7	388.5	389.1	387.8
5	388.1	386.8	386.7	385.2	384.8	383.1	383.5	381.5	384.4	382.6	385.7	384.1	387.1	385.6	388.0	386.6	388.6	387.3	389.2	388.0	389.7	388.5	389.1	387.8
6	388.1	386.7	386.6	385.1	384.8	383.0	383.5	381.6	384.4	382.6	385.7	384.1	387.1	385.7	388.0	386.6	388.7	387.3	389.3	388.0	389.7	388.4	389.0	387.8
7	388.0	386.7	386.6	385.1	384.7	383.0	383.5	381.6	384.5	382.7	385.8	384.2	387.1	385.7	388.0	386.7	388.7	387.4	389.3	388.0	389.6	388.4	389.0	387.7
8	388.0	386.6	386.5	385.0	384.7	382.9	383.5	381.6	384.5	382.7	385.8	384.3	387.2	385.7	388.1	386.7	388.7	387.4	389.3	388.1	389.6	388.4	389.0	387.7
9	388.0	386.6	386.4	384.9	384.6	382.9	383.6	381.7	384.5	382.8	385.9	384.3	387.2	385.8	388.1	386.7	388.7	387.4	389.3	388.1	389.6	388.4	388.9	387.7
10	387.9	386.5	386.4	384.8	384.6	382.8	383.6	381.7	384.6	382.8	385.9	384.4	387.2	385.8	388.1	386.7	388.7	387.4	389.3	388.1	389.6	388.4	388.9	387.6
11	387.9	386.5	386.3	384.8	384.5	382.7	383.6	381.7	384.6	382.9	386.0	384.4	387.3	385.8	388.1	386.8	388.8	387.5	389.4	388.1	389.6	388.3	388.9	387.6
12	387.8	386.5	386.2	384.7	384.4	382.7	383.7	381.8	384.7	382.9	386.0	384.5	387.3	385.9	388.1	386.8	388.8	387.5	389.4	388.1	389.5	388.3	388.9	387.6
13	387.8	386.4	386.2	384.6	384.4	382.6	383.7	381.8	384.7	383.0	386.1	384.5	387.3	385.9	388.2	386.8	388.8	387.5	389.4	388.2	389.5	388.3	388.8	387.5
14	387.7	386.4	386.1	384.5	384.3	382.6	383.7	381.8	384.8	383.0	386.1	384.6	387.4	385.9	388.2	386.8	388.8	387.5	389.4	388.2	389.5	388.3	388.8	387.5
15	387.7	386.3	386.0	384.5	384.3	382.5	383.7	381.9	384.8	383.1	386.2	384.6	387.4	386.0	388.2	386.9	388.8	387.5	389.4	388.2	389.5	388.3	388.8	387.5
16	387.7	386.3	385.9	384.4	384.2	382.4	383.8	381.9	384.8	383.1	386.2	384.7	387.4	386.0	388.2	386.9	388.9	387.6	389.4	388.2	389.5	388.2	388.7	387.5
17	387.6	386.2	385.9	384.3	384.2	382.4	383.8	381.9	384.9	383.2	386.3	384.8	387.5	386.0	388.2	386.9	388.9	387.6	389.5	388.2	389.4	388.2	388.7	387.4
18	387.6	386.2	385.8	384.2	384.1	382.3	383.8	382.0	384.9	383.2	386.3	384.8	387.5	386.1	388.3	386.9	388.9	387.6	389.5	388.3	389.4	388.2	388.7	387.4
19	387.5	386.1	385.7	384.1	384.1	382.2	383.9	382.0	385.0	383.3	386.4	384.9	387.5	386.1	388.3	386.9	388.9	387.6	389.5	388.3	389.4	388.2	388.7	387.4
20	387.5	386.1	385.7	384.1	384.0	382.2	383.9	382.0	385.0	383.3	386.4	384.9	387.5	386.1	388.3	387.0	388.9	387.7	389.5	388.3	389.4	388.1	388.6	387.3
21	387.4	386.0	385.6	384.0	384.0	382.1	383.9	382.1	385.0	383.4	386.5	385.0	387.6	386.2	388.3	387.0	389.0	387.7	389.5	388.3	389.4	388.1	388.6	387.3
22	387.4	386.0	385.5	383.9	383.9	382.1	383.9	382.1	385.1	383.4	386.5	385.0	387.6	386.2	388.3	387.0	389.0	387.7	389.6	388.3	389.3	388.1	388.6	387.3
23	387.4	385.9	385.5	383.8	383.8	382.0	384.0	382.1	385.1	383.5	386.6	385.1	387.6	386.2	388.4	387.0	389.0	387.7	389.6	388.4	389.3	388.1	388.6	387.2
24	387.3	385.9	385.4	383.7	383.8	381.9	384.0	382.2	385.2	383.5	386.6	385.1	387.7	386.3	388.4	387.1	389.0	387.8	389.6	388.4	389.3	388.1	388.5	387.2
25	387.3	385.8	385.3	383.7	383.7	381.9	384.0	382.2	385.2	383.5	386.7	385.2	387.7	386.3	388.4	387.1	389.0	387.8	389.6	388.4	389.3	388.0	388.5	387.2
26	387.2	385.8	385.2	383.6	383.7	381.8	384.1	382.2	385.2	383.6	386.7	385.2	387.7	386.3	388.4	387.1	389.1	387.8	389.6	388.4	389.3	388.0	388.5	387.1
27	387.2	385.7	385.2	383.5	383.6	381.7	384.1	382.3	385.3	383.6	386.8	385.3	387.8	386.4	388.4	387.1	389.1	387.8	389.7	388.4	389.2	388.0	388.4	387.1
28	387.1	385.7	385.1	383.4	383.6	381.7	384.1	382.3	385.3	383.7	386.8	385.3	387.8	386.4	388.5	387.1	389.1	387.8	389.7	388.5	389.2	388.0	388.4	387.1
29	387.1	385.6	385.0	383.3	383.5	381.6	384.1	382.3	385.4	383.7	386.9	385.4	387.8	386.4	388.5	387.2	389.1	387.9	389.7	388.5	389.2	387.9	388.4	387.0
30	387.0	385.6			383.4	381.5	384.2	382.4	385.4	383.8	386.9	385.4	387.8	386.5	388.5	387.2	389.1	387.9	389.7	388.5	389.2	387.9	388.4	387.0
31	387.0	385.5			383.4	381.5			385.4	383.8			387.9	386.5	388.5	387.2			389.7	388.5			388.3	387.0