

**Proposed Plan
Change 2 (Maerewhenua River)**

**Waitaki Catchment Water Allocation
Regional Plan**

***Proposed Plan Change and
Section 32 Report***

November 2013

This is the approved Plan Change 2 and Section 32 Report to the Waitaki Catchment Water Allocation Regional Plan.

The Common Seal of the Canterbury Regional Council was fixed in the presence of:



**Bill Bayfield
Chief Executive
Canterbury Regional Council**



**Dame Margaret Bazley, ONZ DNZM, Hon DLit
Chair
Canterbury Regional Council**

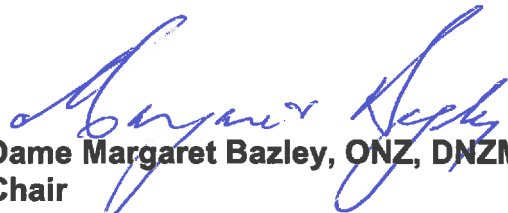
14 November 2013

I hereby certify this is a true and correct copy of Plan Change 2 and Section 32 Report to the Waitaki Catchment Water Allocation Regional Plan prepared by the Canterbury Regional Council.

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14 November 2013

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Part 1: Summary Report

Introduction

This report describes and explains proposed amendments (Plan Change 2, or ‘the proposal¹’) to the Waitaki Catchment Water Allocation Regional Plan (the Plan). The Plan Change is in Attachment 1 to this report. It provides an explanation of the problems with the Plan as currently drafted, options for resolving those problems, and the proposed amendments. This report also summarises the evaluation of the proposed amendments that has been undertaken by the Canterbury Regional Council (Council) as required by section 32 of the Resource Management Act 1991 (the RMA). In undertaking this assessment Council has commissioned advice from Greg Ryder, Ecologist, and Simon Harris, Economist. The Ryder report is in Attachment 4, whereas the economic evaluation has been incorporated into this report.

Plan Change 2 deals with amendments to the environmental flow regime for the Maerewhenua River and its tributaries. It proposes to amend the allocation limit and point at which the minimum flow is measured (refer Attachment 1) and clarifies that the environmental flow regime encompasses both the mainstem of the river and its tributaries. It does not amend any other rules, policies, or the objectives of the Plan. The proposal affects the Maerewhenua catchment only.

The Maerewhenua River has an allocation limit of 0.4 cumecs which is exceeded. Most water take consents were granted prior to the Plan being made operative and are of long duration. Some have no minimum flows, and those that do require cessation of takes when flows reach 0.4 cumecs at Kelly’s Gully. The Plan sets a minimum flow of 0.4 cumecs, measured at the State Highway 83 bridge (SH83).

Plan Change 2 reflects a solution that has been developed by a local Water User Group and endorsed by the Lower Waitaki – South Coastal Canterbury Zone Committee. The solution:

- addresses the overallocation of the water resource
- improves reliability for consent-holders
- addresses the uncertainty in water measurement created by the natural loss of surface water to ground between Kellys Gully and the confluence with the Lower Waitaki River.
- Incentivises the efficient use of water.

To give effect to the solution, some consent-holders will cease taking water from the Maerewhenua River and instead, will obtain water from the Lower Waitaki River through the Maerewhenua District Water Irrigation Company. Abstraction of this water from the Lower Waitaki River has already been provided for.

¹ S32(6) of the RMA defines a “proposal” as meaning a change for which an evaluation report must be prepared under this Act.

Requirements of the Act

In achieving the purpose of the Act, section 32 requires the Council to evaluate the provisions proposed under the Plan Change before it is notified for public submission. The evaluation must:

- (1) (b) *examine whether the provisions in the proposal are the most appropriate way to achieve the objectives by –*
 - i. *identifying other reasonably practicable options for achieving the objectives; and*
 - ii. *assessing the efficiency and effectiveness of the provisions in achieving the objectives; and*
 - iii. *summarising the reasons for deciding on the provisions; and*
- (c) *contain a level of detail that corresponds to the scale and significance of the environmental, economic, social and cultural effects that are anticipated from the implementation of the proposal.*
- (2) *An assessment under subsection (1)(b)(ii) must –*
 - a) *Identify and assess the benefits and costs of the environmental, economic, social, and cultural effects that are anticipated from the implementation of the provisions, including the opportunities for –*
 - i. *Economic growth that are anticipated to be provided or reduced; and*
 - ii. *Employment that are anticipated to be provided or reduced; and*
 - b) *If practicable, quantify the benefits and costs referred to in paragraph (a); and*
 - c) *Assess the risk of acting or not acting if there is uncertain or insufficient information about the subject matter of the provisions.*

The section goes on to clarify what is being examined. Clause (3) stipulates that if the objectives are to remain, the examination must relate to those objectives, to the extent that they will remain. There are no new additional objectives proposed, nor any amendment to existing objectives. The objectives of the Plan are reproduced in Attachment 3.

A policy or rule is considered to be appropriate if it is consistent with and assists in achieving the objective(s). As part of assessing whether a provision is appropriate, an analysis of effectiveness and efficiency is also undertaken. The effectiveness of a provision involves assessing how well it will give effect to the objectives. The efficiency of a provision is assessed by evaluating the costs and benefits. A provision is considered to be efficient if the costs that arise from it are outweighed by the benefits it brings.

Where the Council considers that there is uncertain or insufficient information an evaluation must be undertaken of the risks of acting (what might happen if the plan is amended) versus the risks of not acting (what might happen if the plan is not amended).

In assessing appropriateness in achieving objectives, Council must consider other reasonably practicable options. Four options are identified and examined elsewhere in the report.

Scope of the Plan Change

The Plan Change proposes three changes to Rule 2 (refer Table 3, line xx):

- moving the point at which the minimum flow must be achieved from State Highway 83 upstream to Kelly's Gully (the minimum flow remains unchanged);
- reducing the allocation limit from 0.4 cumecs to 0.2 cumecs
- including tributaries of the Maerewhenua River into the environmental flow regime.

Water abstraction consents began expiring from 2010 and many are operating under s124 of the Act which provides for exercise of a consent until a new application is resolved (ie either granted or declined). Moving consent-holders to the regime set out in the Plan is creating conflict and uncertainty. Conflict has arisen over the estimated natural losses to ground, and what flows at Kelly's Gully should be to achieve a minimum flow of 0.4 cumecs at the SH83 bridge. Consent applications that seek minimum flows less than the Plan are non-complying activities (refer Rule 16) and there is no certainty that the flows established by the Plan will be implemented.

Local water users have worked collaboratively to develop an alternative approach. The proposed solution is for consent holders to relinquish their consents to take 0.4 cumecs of water from the Maerewhenua River and instead obtain water via the Maerewhenua District Irrigation Company. Abstraction of the water from the Lower Waitaki River is already provided for. By joining a water scheme the consent holders can benefit from greater reliability and efficiency of use, meaning that additional land can be irrigated with the same amount of water.

It also reduces the consented demand on the Maerewhenua River to 0.2 cumecs. The allocation limit will be reduced from 0.4 cumecs to 0.2 cumecs to avoid accidental reallocation. The flow-sharing regime will remain unchanged. The outcome will be that the river is fully, but not over, allocated.

Prior to the Plan being made operative, enough water had been allocated that with a minimum flow measured at Kelly's Gully, it was possible for the river to be induced to run dry. The Plan addressed this by requiring the minimum flow to be achieved at SH83 bridge at the bottom of the catchment. As this site is unsuitable for a flow gauge, measurement has continued at Kelly's Gully, and many of the consents (which were granted prior to the plan being made operative in 2006) specify a minimum flow of 0.4 cumecs at Kelly's Gully.

Measuring flows in the river for the purposes of managing water takes is challenging as there is considerable natural losses to ground between Kelly's Gully and the bottom of the catchment. There are abstractions in this reach as well. Gauging has shown losses ranging

from 0.065 cumecs to 0.25 cumecs. This variability complicates the management regime, and to address this, it is proposed to amend the plan to require a minimum flow of 0.4 cumecs at Kelly's Gully. This means that the minimum flow at the bottom of the catchment will be less than 0.4 cumecs. The ecological assessment is based on the highest loss of the range.

Council undertook an Efficiency & Effectiveness review of the Plan in 2012. It concluded that the Plan needed to be explicit about including tributaries in the environmental flow regimes, to clarify that abstractions from tributaries should be included in the allocation limit. This is achieved by the proposal to amend Table 3 line xx, to read Maerewhenua River **and tributaries** [shaded words are proposed amendment].

Consultation

Schedule 1 to the Act sets out the process for preparing or amending regional plans. Clauses 3, 3B and 3C address consultation for regional plans. Clause 3 identifies the parties that Council must consult with, although there is discretion to consult with anyone else. There are specific requirements set out for consulting with iwi authorities in clause 3B. The recognised iwi authority in Canterbury is Te Runanga o Ngai Tahu. Council must consider ways to foster capacity, establish and maintain processes to provide opportunities for consultation, consult with the iwi authority, enable the iwi authority to identify issues of concern, and indicate how those issues have or are to be addressed. Clause 3 provides for recognition of previous consultation within 36 months of the plan notification provided that parties consulted were aware that information obtained was also to apply to matters under the RMA.

To assist it in meeting these requirements, Environment Canterbury has adopted the Canterbury Water Management Strategy (CWMS) and established a regional water committee and catchment based committees (Zone Committees²) to assist it in its statutory functions. It has also recognised the importance of the Strategy and the role of local people in managing freshwater in the Canterbury Regional Policy Statement 2013 (the RPS).

The RPS promotes a framework for freshwater management that involves greater participation and action by local people and communities, and sets out three approaches for doing that: stewardship of water resources at a local level; enabling Ngai Tahu to exercise kaitiakitanga; and provision for consent-holders to take greater responsibility (refer Policy 7.3.13). The RPS directs Council to seek and have regard to recommendations from the Zone Committees (refer for example Method 9 to Policy 7.3.4; Method 5 to Policy 7.3.8).

Plan Change 2 originally formed part of a larger plan change that responded to recommendations from the Lower Waitaki – South Coastal Zone Committee. The larger plan change was consulted on under the First Schedule to the Act. Consultees generally supported inclusion of the tributaries into Table 3 line xx, although there was concern about

² Zone Committees comprise local people appointed to the committee and they operate under a Terms of Reference that requires them to act collaboratively to address freshwater management issues in the catchment (refer www.ecan.govt.nz for more information).

amending the minimum flow site for the Maerewhenua River because of the impact on flows at the bottom of the catchment.

Three meetings were held with Te Runanga o Ngai Tahu (TRoNT) staff, and two subsequent hui were held in September/October 2013. These were held with Te Runanga o Waihoa, Te Runanga o Moeraki (together), and separately with Te Runanga o Arowhenua. TRoNT staff also attended the hui. Runanga and TRoNT were also invited to a meeting of the Working Group of the Lower Waitaki – South Coastal Zone Committee held in November 2013.

Statutory Framework

Resource Management Act 1991

Preparation or Change of Regional Plan

Under section 65 of the RMA, a regional council is encouraged to consider preparing a plan if there is likely to be significant conflict between the use, development or protection of a resource. It must prepare a plan or a change in accordance with the functions of Council under section 30, Part 2 and duties under section 32 of the RMA. The change must have regard to any management plans prepared under other Acts, consistency with adjacent regional council documents, iwi management plans, and must give effect to a National Policy Statement and any regional policy statement. It must not be inconsistent with any other regional plan for the region.

In making rules, Council must have regard to the actual or potential effect on the environment of activities, in particular any adverse effect (s68(3)). Where the rule relates to minimum flows or rates of use of water, the plan may state whether the rule shall affect the exercise of existing resource consents for activities that contravene the rule; and that the holders of consents may comply in stages or over specified periods (s68(7)).

Part 2

The RMA sets out the functions and duties of regional councils which, in relation to water quality and quantity, includes establishing, implementing and reviewing objectives, policies, and methods to achieve integrated management of the natural and physical resources of the region (section 30(1)(a)). Section 30(1)(b) and (c) give regional councils the function to control the use of land to maintain the quality and quantity of water in water bodies. Under section 30(e) the functions of a regional council also include the control of the taking, using, damming, and diverting of water, and the control of the quantity, level or flow in any water body.

In carrying out these functions, Council must also ensure that it acts in accordance with Part 2 of the RMA – section 5 (Purpose), section 6 (Matters of national importance), section 7 (Other matters) and section 8 (Principles of the Treaty of Waitangi).

The purpose of the RMA is set out in Part 2, section 5 which states:

- (1) The purpose of this Act is to promote the sustainable management of natural and physical resources.*
- (2) In this Act, sustainable management means managing the use, development, and protection of natural and physical resources in a way, or at a rate, which enables people and communities to provide for their social, economic, and cultural wellbeing and for their health and safety while-*
 - (a) Sustaining the potential of natural and physical resources (excluding minerals) to meet the reasonably foreseeable needs of future generations; and*
 - (b) Safeguarding the life-supporting capacity of air, water, soil, and ecosystems; and*
 - (c) Avoiding, remedying, or mitigating any adverse effects of activities on the environment.*

The ‘ECan Act’ 2010

The Environment Canterbury (Temporary Commissioners and Improved Water Management) Act 2010 (the ‘ECan Act’) came into force on the 14th of April 2010.

Part 3 of the ECan Act gives the Canterbury Regional Council new powers, functions and duties in relation to resource management issues. Subpart 4 of the ECan Act introduces new powers and duties for the Regional Council in processing “proposed regional policy statements and plans”. Section 61 defines the term “proposed regional policy statement or plan” and it includes any proposed regional plan or change to or variation of a plan which is notified after 14 April 2010.

The ECan Act makes two significant changes to the way policy statements and plans which fall within the definition of section 61 are processed:

- Section 63 of the ECan Act requires the Council, in considering any proposed regional policy statement or plan, to have particular regard to the vision and principles of the CWMS, in addition to the matters relevant under the RMA, in making its decisions.
- Section 66 of the ECan Act limits appeals on plans which are covered by sections 61 and 63, to appeals to the High Court on a question of law.

The vision and principles of the Canterbury Water Management Strategy are found in Schedule 1 to the ECan Act (reproduced in Attachment 2).

The proposed Plan Change enables the local community to maintain the benefits of water abstraction and reduce the total volume of water taken from the river, with its consequent benefits. Water is managed sustainably and in-stream values are enhanced through reducing the allocation limit.

The National Policy Statement for Freshwater Management 2011

The National Policy Statement for Freshwater Management (NPSFM) was made operative in 2011. It contains objectives and policies relating to Water Quality, Water Quantity, Integrated Management and Tangata Whenua Roles and Interests. It also has a policy framework outlining how the NPSFM should be implemented.

Objective A2 of the NPSFM seeks to protect the quality of outstanding freshwater bodies and the significant values of wetlands, and improve the quality of fresh water in water bodies that have been degraded by human activities to the point of being over-allocated. Objective B4 also seeks to protect the significant values of wetlands. Plan Change 2 addresses the over-allocation of the Maerewhenua catchment through reducing the volume of water abstracted.

Objective B1 of the NPSFM seeks to safeguard the life-supporting capacity, ecosystem processes and indigenous species of fresh water when activities relating to fresh water are being managed. Policy B1 requires the Council to ensure that its plans establish freshwater objectives and set environmental flows for water bodies to give effect to the objectives of the NPSFM. Plan Change 2 provides for more water to remain in the river with consequent benefits for in-stream values. Measuring minimum flow at Kellys Gully will have implications for flow at the bottom of the catchment and the ecological effects of this have been considered in the Ryder report (refer Attachment 4).

Objective B2 of the NPSFM seeks to avoid any further over-allocation of fresh water and phase out existing over-allocation. The proposal addresses over-allocation in the Maerewhenua River.

Objective D1 of the NPSFM seeks to provide for the involvement of iwi and hapu, and ensure that tangata whenua values and interests are identified and reflected in the management and decision making relating to fresh water. Iwi were involved in decision-making at two stages – through the Zone Committee which has representatives of Te Runanga o Moeraki, Te Runanga o Waihoa, and Te Runanga o Arowhenua, and as First Schedule consultees through Te Runanga o Ngai Tahu. These processes have identified support for the proposal, amid concern about the impact of moving the measurement location upstream.

Canterbury Regional Policy Statement 2013

The Canterbury Regional Policy Statement 2013 (the RPS) contains provisions which specifically relate to the management of fresh water, and those which are of relevance to the Plan Change are outlined below.

Objective 7.2.1 of the RPS seeks to ensure fresh water resources are managed to enable people and communities to provide for their economic and social well-being, for in-stream recreational and amenity values, and any economic and social activities associated with those values, provided: the life-supporting capacity/mauri is safe-guarded; natural character values are preserved; and any actual or reasonably foreseeable requirements for community and stockwater supplies and customary uses are provided for.

Objective 7.2.4 of the RPS seeks to ensure fresh water is managed in an integrated way within and across catchments and between agencies and people with interests in water management in the community. The role and importance of the Zone Committee in achieving this objective of stakeholders working together is recognised in the RPS (refer for example Method 9 to Policy 7.3.4, and Method 3 to Policy 7.3.9). The plan change responds to a proposal developed by a local water users group and endorsed by the Zone Committee.

Policy 7.3.4(1) of the RPS seeks to manage the abstraction of surface water by establishing environmental flow regimes and water allocation regimes which primarily protect a range of values and the existing or reasonably foreseeable drinking water or stock water supplies while also providing for any actual or reasonably foreseeable demand for abstraction. The plan change meets the needs of abstractors while ensuring more water remains in the river to provide for social, cultural, and environmental values.

Policy 7.3.4(2) of the RPS requires that where the quantum of water allocated for abstraction from a water body is at or exceeds the maximum amount provided for in an environmental flow and water allocation regime, Council must prevent any additional allocation of water for abstraction and identify the actions to address any adverse effects of over-allocation. The voluntary cessation of takes from the Maerewhenua River addresses over-allocation.

Natural Resources Regional Plan

Chapter 5 of the NRRP deals specifically with water quantity, and provides an overarching planning framework for the taking, diverting and/or using of water within the region. However it is not relevant because there is a location specific regional plan, being the Waitaki Catchment Water Allocation Regional Plan.

Proposed Canterbury Land and Water Regional Plan

In August 2012, Council notified the Proposed Canterbury Land and Water Regional Plan (PLWRP). The PLWRP limits itself to not apply to the catchment. Consequently the Land and Water Regional Plan is not relevant to this plan change.

Canterbury Water Management Strategy

The Canterbury Water Management Strategy (CWMS) is the result of a collaborative discussion that has developed over the past decade to address water resource issues in Canterbury. The vision of the CWMS is:

To gain the greatest cultural, economic, environmental, recreational and social benefits from our water resources within a sustainable framework both now and for future generations.

The CWMS is not a policy statement or plan prepared under the RMA, and as such it cannot override the provisions of the RMA or other planning instruments prepared under the RMA. However, many of the fundamental concepts of the CWMS have been incorporated into the

objectives and policies of the RPS, while the ECan Act 2010 requires Council to have particular regard to the vision and principles of the CWMS in making planning decisions.

Iwi Management Plans

Iwi Management Plans (IMPs) are important tools to assist with the identification of Ngāi Tahu cultural values, and Council must take into account any relevant planning document recognised by an iwi authority under Section 66(2A)(a) of the RMA when preparing a Plan Change.

Those IMPs within the Waitaki catchment that have been lodged with Council are:

- Te Rūnanga o Ngāi Tahu - Freshwater Policy (undated)
- Kai Tahu ki Otago Natural Resource Management Plan (1995), revised in 2005
- Te Whakatau Kaupapa - Resource Management Strategy for Canterbury (1992)
- Iwi Management Plan of Kati Huirapa- Arowhenua – Rakaia to Waitaki (1992)

The Ngāi Tahu Freshwater Policy supports a catchment based and holistic 'mountain to sea' approach to resource management (Section 4.1.2). Priority areas include to restore, maintain and protect the mauri of freshwater resources (Objective 6.2) and to maintain vital, healthy mahinga kai populations (Objective 6.3). Addressing overallocation will increase the amount of water in the river which will benefit mauri and mahinga kai.

Te Whakatau Kaupapa, the Resource Management Strategy for Canterbury, was first published by Ngāi Tahu in November 1990. General policies within the strategy relating to water include the encouragement of more efficient use of water (Policy 7, Page 4-20) and the maintenance of existing wetlands (Policy 10, Page 4-20). The WCWARP has policies on efficient use and Policy 28 (unchanged) will ensure that applications to abstract water will consider efficiency requirements of the Plan.

The IMP of Kati Huirapa- Arowhenua, published in July 1992, covers the area from the Rakaia to the Waitaki River and contains policies relating to land, water and air. Policies of the IMP to restore the life supporting capacity of waterbodies also encourage restoration of existing wetlands and the construction of new wetlands. Furthermore, the IMP seeks to maintain the natural rises and falls of flows in rivers. Reducing allocation limit will provide more water in the river for environmental, and cultural values.

Kai Tahu ki Otago's Natural Resource Management Plan 2005 (NRMP) has a chapter on the Waitaki catchment. It identifies that a key issue is threats to cultural values associated with water abstraction (Section 6.2.2). Policies to resolve this issue include the efficient use of water, and the requirement for acceptable minimum flows for the water body (Section 6.2.3). the ecological report assesses the impact of changing the measurement point for minimum flow (refer Attachment 4).

Effects of the Amendments to the Rules

Section 68(3) of the RMA states that:

- (3) *In making a rule, the regional council shall have regard to the actual or potential effect on the environment of activities, including, in particular, any adverse effect.*

The Act defines the term environment:

Environment includes-

- a) ecosystems and their constituent parts, including people and communities; and*
- b) all natural and physical resources; and*
- c) amenity values; and*
- d) the social, economic, aesthetic, and cultural conditions which affect the matters stated in paragraphs (a) to (c) or which are affected by those matters*

The actual or potential effects on the environment of this Plan Change are:

1. the effects on river flows of removing over-allocation in the Maerewhenua River and reducing the total volume of water that can be taken,
2. the effects of reducing flows at State Highway 83 bridge as a result of changing the point at which the minimum flow is measured.

The context of undertaking this assessment is to consider whether the proposed amendments are more appropriate to give effect to the objectives of the Plan. In making this evaluation Council has commissioned advice from Ryder Consulting in relation to the ecological effects of the Plan Change, and from Harris Consulting regarding economic costs and benefits.

Setting environmental flow and level regimes (incorporating minimum flows and levels, allocation limits, flushing flows, and flow-sharing arrangements) are one of the principal methods by which Objectives 1 and 2 are to be achieved. Objective 1 requires the Council to sustain the qualities of the environment of the Waitaki River, and sets out a series of steps that must be undertaken to achieve this. These steps include recognising the importance of maintaining the integrity of the mauri of the river, safeguarding life-supporting capacity and the physical integrity, form, functioning and resilience of the river, and providing for domestic, stockwater and fire-fighting needs. Objective 2 seeks to enable various uses of water (including for agricultural and horticultural activities), subject to the requirements of Objective 1.

Policies 4 and 44 provide guidance on the values that should be considered. Policy 4 of the Plan states that when setting an environmental flow and level regime, the following matters should be considered:

- a. mauri and healthy ecosystems of indigenous species, including mahinga kai species;*

- b. *wāhi tapu sites or areas, and wāhi taonga;*
- c. *natural character, landscape, and visual amenity;*
- d. *vegetation within and adjacent to the water body;*
- e. *habitats including those of invertebrates, birds and fish;*
- f. *fish passage, as appropriate, including controlling spread of non-indigenous species into new areas;*
- g. *undesirable periphyton and sediment accumulation;*
- h. *effects on water quality;*
- i. *maintenance of groundwater flows;*
- j. *naturally occurring dry river or stream beds;*
- k. *the potential for establishment of invading exotic vegetation;*
- l. *bedload and sediment transport processes;*
- m. *shoreline or bank erosion;*
- n. *functioning of the river mouth;*
- o. *recreation opportunities;*
- p. *existing flow and level regimes, physical resources and activities;*
- q. *the amount and reliability of water that can be taken, used, dammed or diverted; and*
- r. *accessibility to water bodies and their margins.*

Policy 44 provides guidance when establishing environmental flow regimes (including minimum flows) in the Lower Waitaki tributaries. Regimes must:

- (i) *recognise the natural and recreational values of the tributaries, in particular, the value of the Awakino and Maerewhenua Rivers for trout-spawning, and the Waikakahi Stream for healthy ecosystems of indigenous species, including mahinga kai species;*
- and*
- (ii) *enable appropriate access to water for the activities identified in Objective 2, to the extent consistent with Objective 1.*

Ryder Consulting have undertaken an assessment of the ecological impacts of the proposal (refer Attachment 4), assuming the largest natural losses in the lower catchment. They conclude that a flow of 0.4 cumecs at Kellys Gully appears to provide connectedness of surface flow and provides suitable habitat for small native fish. Adult salmonids will not have sufficient habitat but increasing the minimum flow is unlikely to address this due to the physical character of the bed. The flow regime should provide adequate fish passage for native fish. Flow variability should be maintained. Spawning should remain unaffected, and effects on water quality from the proposal are unlikely.

Objective 3 recognises that water allocation has beneficial and adverse effects for the environment, and a range of effects at both national and local levels. The proposed amendments address over-allocation in the river. It maintains reliability and security of supply for abstractors and provides for an orderly process of consent renewal.

Part 2: Section 32 Evaluation and Report

Introduction

This part summarises Council's evaluation of the amendments in the context of achieving the objectives of the Plan. The summary of the evaluation presented is in narrative form. Based on this evaluation, Council's overall judgement, having regard to efficiency and effectiveness, as to whether the proposed provisions are the most appropriate for achieving the objectives, is also recorded. Consideration is given to the circumstances where there is uncertain or insufficient information. In addition, references to key research and documents that have assisted the decision-making process are identified.

No amendments to the objectives of the Plan are proposed. In order to assess whether the proposed amendments are the most appropriate for achieving the objectives, the objectives are reproduced in Attachment 3.

In evaluating the proposed amendments to policies and rules, Council has categorised the benefits and costs as follows:

Environmental

Environmental benefits and costs fall upon ecosystems and natural and physical resources. Generally, the impacts of these changes generally fall in the locality, or lower down in the catchment of, where the water is taken and used, although opportunities for enhancement can occur elsewhere in the catchment or area.

Economic

Economic benefits and costs are based around economic wellbeing and efficiency considerations. These have different implications at a national and local level.

Social

Social benefits and costs are those that fall on people and the community. Often these impacts relate to changes in environmental and economic conditions and fall in the locality where the water is taken from and used. Recreational use is included under the social benefits and costs.

Cultural

Cultural benefits and costs are those that relate to the customs, values and beliefs of people and communities, particularly Ngāi Tahu. These considerations can be specific or holistic in nature. They are generally affected by changes in environmental, economic, or social conditions. The impacts affect people and communities that have a relationship with the Lower Waitaki River and the Maerewhenua River and fall wherever those people and communities are located.

Evaluation Baseline

When evaluating benefits and costs, the Council's reference point is the current environment. Within the catchment, the natural environment is significantly altered through the current abstractions and human activities, including introduction of animals and vegetation.

Other Options for Achieving Objectives

The other options for addressing over-allocation in the Maerewhenua catchment are:

- a) Amend the plan to increase the allocation limit to reflect existing consents. This approach is consistent with the setting of other allocation limits in the Plan, but has no regard for effects on the environment. Consequently it has not been considered further.
- b) Undertake a review of consents to reduce the over-allocation. The outcomes of reviewing these consents is difficult to predict, however it is unlikely that an additional 0.2 cumecs would be voluntarily returned to the river, as is the case with the proposal.
- c) Retain plan provisions unchanged, and rely on the gradual replacement of consents to reduce over-allocation. Some of the consents have expiry dates several years forward so this option has been discarded because it will not address the overallocation in a timely fashion.
- d) To 'add back' any losses through abstraction below Kelly's Gully so that a minimum flow of 0.4 cumecs is achieved at the bottom of the catchment. Natural losses to ground downstream of Kelly's Gully mean that adding back abstractions alone would not achieve this. The variance in total natural loss complicates the picture, meaning that it is difficult to determine exactly what the flow at Kelly's Gully should be to achieve a minimum flow of 0.4 cumecs at SH83 bridge.

Effectiveness of the Proposal

The Council's evaluation of the effectiveness of the amended policies and rules in relation to resolving the over-allocation in the Maerewhenua catchment is summarised in the table below. Objectives 1 –3 are relevant to the evaluation.

Objectives	Rule	Effectiveness
1, 2, 3	<p>The s32 evaluation for the Plan drafted by the Waitaki Board supported the use of environmental flow regimes to 'increase certainty to existing and potential users as to the circumstances under which they can take, use, dam or divert water (Annex 1 to the Plan, parag. 110)'. These regimes are an effective tool to achieve objectives 1 and 2.</p> <p>The agreement between consent-holders to cease taking water from the Maerewhenua River reduces the over-</p>	Effective

	<p>allocation, but goes further to reduce the total volume of water extracted from the river. Because it arises through consent-holder agreement it is an effective approach to addressing over-allocation and meeting the needs of communities (Objective 2).</p> <p>The proposal recognises there are economic costs (and environmental benefits) in reducing the volume of water taken from the river. These costs will be offset through provision of water from an alternative source.</p> <p>Reverting to minimum flow at Kelly's Gully removes the uncertainty causes by natural losses. This is more effective than reliance on a regime that is not robust because of the uncertainty about flow losses in the lower catchment.</p>	
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Efficiency of the Proposal

Provisions are efficient if there is a net benefit, ie if benefits outweigh costs. In making this evaluation Council has considered benefits and costs across environmental, social, cultural and economic factors, and has considered where those benefits or costs may fall. The evaluation is qualitative, reflecting the anticipated scale and significance of effects, and practical difficulties in accurately quantifying benefits and costs. Benefits and costs are tabled below.

Benefits	Costs
<p>Environmental</p> <p>The reduction in allocation means that sections of the river downstream of Kellys Gully will not run dry due to abstraction, as is possible under the current situation.</p> <p>A reduced allocation will, on occasion, reduce severity of future low flows.</p>	<p>Environmental</p> <p>Fish passage and fish habitat in the lower reach of the river will potentially be significantly limited when low flows coincide with the irrigation season, however increasing the minimum flow is unlikely to significantly improve habitat availability in the lower reaches due to physical characteristics of river bed.</p>
<p>Economic</p> <p>Taking water from the Maerewhenua District Irrigation Scheme rather than individually encourages more efficient spray irrigation and allows for a greater area to be irrigated.</p> <p>Less competition among abstractors directly from the Maerewhenua should mean consent-holders left in the Maerewhenua</p>	<p>Economic</p> <p>Capital costs of new irrigation connections to Lower Waitaki River, borne by the affected consent-holders.</p> <p>Administrative costs to Council and stakeholders in plan drafting and decision processes.</p>

Benefits	Costs
<p>will experience better reliability.</p> <p>Irrigators moving to the Lower Waitaki are likely to experience greater reliability because the Waitaki is a controlled environment whereas the Maerewhenua is climate driven.</p> <p>Avoid transaction costs of consent renewals from the Maerewhenua (ie application fees) for those irrigators who move to the Waitaki.</p>	
<p>Social</p> <p>Continued abstraction of water by existing water users within the catchment continue to support the local community.</p> <p>Angling opportunities in single channel reach may be enhanced through lower abstraction rates.</p> <p>Requiring minimum flow to be measured at Kellys Gully avoids potential conflict arising over variable data on losses in the reach downstream of Kellys Gully and above SH83 bridge.</p> <p>Removes uncertainty of consent renewals in an overallocated catchment.</p>	<p>Social</p> <p>Temporary physical disruption to the community to install required infrastructure.</p>
<p>Cultural</p> <p>Resolving over-allocation allows for the enhancement of the mauri, and of mahinga kai³.</p>	<p>Cultural</p> <p>None identified</p>

In summary, the proposal enables continued levels of production and employment in the catchment to continue. Moving to a Scheme allows further land to be irrigated, although this is not directly a result of the proposal. Were consents required to come up to a higher minimum flow at Kelly's Gully, or reduce their allocation, so as to address over-allocation, there would be consequent costs to current economic yield from the catchment. These costs have not been quantified as the outcomes of consent processes (and therefore the amount of water retained for irrigation) are not certain. There are no lasting social costs and several social benefits of the proposed approach. Similarly with cultural costs and benefits

³ It is an objective of the Te Runanga o Ngai Tahu Freshwater Policy to restore, maintain and protect the mauri of freshwater resources; and to maintain vital, healthy mahinga kai populations.

where no cultural costs have been identified. Ngai Tahu have expressed concerns about the loss of flows in the lower part of the catchment and the effects of this have been evaluated in the Ryder report (refer Attachment 4).

Overall the benefits of the proposal are anticipated to outweigh the costs and therefore the proposal is efficient.

Uncertain or insufficient information

There is a general lack of information on the aquatic ecology of the Maerewhenua River. The exact effect of moving the minimum flow measurement point to Kelly's Gully is also unknown, as gauging has shown a range of possible flow losses. A conservative approach has been taken to the ecological assessment, using the highest estimated losses, and it has concluded that if the proposal proceeds, the adverse effects on fish passage for adult trout and adult eel are unknown. Minimum flow is not the critical element however. Ryder addresses this further in his report. The risk of not acting is that over-allocation in the Maerewhenua River will not be resolved.

Summary

Having regard to this information, and taking into account the benefits and costs, it is the Council's view that the proposed provisions are more appropriate for meeting the objectives of the Plan.

Further Analysis and Information

Ryder Consulting Ltd (2013). *Waitaki Catchment Water Allocation Plan – Proposed Plan Change PC2 – Maerewhenua Catchment: Ecological Considerations*.

Progress towards achieving objectives in the Waitaki Catchment Water Allocation Regional Plan Report R11/ISBN 978-1

Waitaki Catchment Water Allocation Regional Plan Annex 1 Decisions and principal reasons for adopting the Plan provisions. Prepared by the Waitaki Catchment Water Allocation Board, September 2005

Conclusion

This report examines the extent to which the provisions in the proposal are the most appropriate way to achieve the objectives. It has done this to a level of detail that reflects the scale and significance of the effects anticipated. In doing so it has identified four other

options and concluded the proposed approach is the most appropriate. Efficiency and effectiveness of the proposed amendments have been considered, with the conclusion that the provisions are effective in achieving relevant objectives, and benefits outweigh costs. Impacts on economic growth and employment have been identified and considered. There is some uncertainty and so the risks of acting or not acting have been considered. The evaluation concludes that the risks of not acting are greater than those of acting. Council is therefore satisfied that the proposed amendments are the most appropriate for achieving the objectives of the Plan.

Attachment 1 Plan Change 2

The proposed amendments to the Waitaki Catchment Water Allocation Regional Plan are set out below with deletions shown as being struck-through, and additions shown as shaded. Underlined words indicate that they are defined in the Plan.

Amend Rule 2, Table 3xx as follows:

xx. Maerewhenua River and tributaries	a. A <u>minimum flow</u> of 0.4m ³ /s at State Highway 83 Kelly's Gully. b. An <u>allocation limit</u> of 0.4m³/s 0.2m ³ /s
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Attachment 2 Vision and Principles CWMS

Vision and principles of Canterbury Water Management Strategy—Strategic Framework, November 2009

Part 1 Vision and principles

Vision

To enable present and future generations to gain the greatest social, economic, recreational and cultural benefits from our water resources within an environmentally sustainable framework.

Fundamental principles

Primary principles

1 Sustainable management

Water is a public resource which must be managed in accordance with sustainability principles and be consistent with the Resource Management and Local Government Acts.

2 Regional approach

- The planning of natural water use is guided by the following:
 - first order priority considerations: the environment, customary uses, community supplies and stock water
 - second order priority considerations: irrigation, renewable electricity generation, recreation, tourism and amenity
- A consistent regulatory approach to water is applied throughout the Canterbury region, recognising these principles
- Both surface and groundwater are given equal importance
- Further development of scientific knowledge of the region's water resources and the impacts of climate change are given priority
- The actual or potential cumulative effects the taking and using water can have on waterways are recognised and managed within defined standards
- A cautious approach is taken when information is uncertain, unreliable, or inadequate
- The need for efficient use of water in existing and new infrastructure is recognised
- There is strong emphasis on the integration of water and land management including protection of indigenous biodiversity and enhancement of water quality
- Current and potential effects of land use intensification is an integral part of decision-making on water takes. This may mean amending regional and district plans.

3 Kaitiakitanga

- The exercise of kaitiakitanga by Ngai Tahu applies to all water and lakes, rivers, hapua, waterways and wetlands, and shall be carried out in accordance with tikanga Maori.

Supporting principles

4 Natural character

The natural character (mauri⁴) of Canterbury's rivers, streams, lakes, groundwater and wetlands is preserved and enhanced:

- natural flow regimes of rivers are maintained and, where they have been adversely affected by takes, enhanced where possible
- the dynamic processes of Canterbury's braided rivers define their character and are protected
- environmental flow regimes are established for every waterway where abstraction occurs
- that restoration of natural character and biodiversity, is a priority for degraded waterways, particularly lowland streams and lowland catchments
- the interdependence of waterways and coastal ecosystems is recognised.

5 Indigenous biodiversity

- Indigenous flora and fauna and their habitats in rivers, streams, lakes, groundwater and wetlands are protected and valued.
- The aims of the Canterbury Biodiversity Strategy are recognised and supported.

6 Access

- Public access to and along rivers, lakes, waterways and wetlands is maintained and, where appropriate, enhanced. Access may need to be limited in situations including where environmental risk, public safety, security of assets, cultural values, biodiversity and farm management require.

7 Quality drinking water

- All those living in Canterbury have access to high quality drinking water:
- The region's high quality aquifer-sourced drinking water is protected.
- Where Canterbury's drinking water is currently untreated and safe for drinking, it is maintained at that high standard.

8 Recreational and amenity opportunities

- Rivers, lakes, groundwater and wetlands provide opportunities for enjoyment, recreation and tourism:
- High quality water ensures contact recreation such as swimming, fishing, boating and other water sports are able to be enjoyed throughout Canterbury.
- Adequate environmental flows should ensure that recreational users and tourists can enjoy Canterbury rivers.
- Eco-tourism opportunities are recognised and encouraged.

9 Community and commercial use

Water resources are used sustainably to enhance quality of life:

- where water is abstracted, it is used effectively and efficiently:
- land use, industry, and business practices to not adversely impact on natural water quality:
- discharges to waterways are minimised and do not compromise quality:
- land use practices are monitored and best practice approaches are required:
- agricultural stock is excluded from all waterways in catchments where irrigated farming is practised and all lowland streams:
- where acclimatised wildlife in lowland streams cause contamination, they are appropriately managed:
- degraded waahi taonga are enhanced to restore tangata whenua cultural wellbeing.

Attachment 3 Objectives of the WCWARP

Objective 1⁵

To sustain the qualities of the environment of the Waitaki River and associated beds, banks, margins, tributaries, islands, lakes, wetlands and aquifers by:

- a. recognising the importance of maintaining the integrity of the mauri in meeting the specific spiritual and cultural needs of the tāngata whenua, and by recognising the interconnected nature of the river
- b. safeguarding the life supporting capacity of the river and its ecosystems
- c. managing the water bodies in a way that maintains natural landscape and amenity characteristics and qualities that people appreciate and enjoy
- d. safeguarding the integrity, form, functioning and resilience of the braided river system
- e. providing for individuals. reasonable domestic water needs
- f. providing for individuals. reasonable needs for their animals. drinking-water
- g. providing for fire-fighting water needs.

Objective 2⁵

To the extent consistent with Objective 1, to enable people and communities to provide for their social, economic and cultural wellbeing and their health and safety, by providing for water for:

- a. town and community water supplies
- b. hydro-electricity generation
- c. agricultural and horticultural activities
- d. industrial and commercial activities
- e. tourism and recreation facilities
- f. any other activities.

Objective 3

In allocating water, to recognise beneficial and adverse effects on the environment and both the national and local costs and benefits (environmental, social, cultural and economic).

Objective 4

To promote the achievement of a high level of technical efficiency in the use of allocated water.

Objective 5

To provide for a practical and fair sharing of allocated water during times of low water availability.

⁵The order in which the items within the objectives are stated does not imply an order of importance or priority. In any circumstance in which a decision is made, the relative importance of competing or conflicting factors may need to be considered for that decision.

Attachment 4 Ecological Report

Prepared for Environment Canterbury
By Ryder Consulting Ltd

**Waitaki Catchment Water
Allocation Plan - proposed plan
change PC2 – Maerewhenua
Catchment**

Ecological Considerations

Prepared for Environment Canterbury
By Ryder Consulting Ltd

Waitaki Catchment Water Allocation Plan - proposed plan change - PC2 – Maerewhenua Catchment

Ecological Considerations

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Document version: 04/10/2013

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1. INTRODUCTION

1.1 Background

Environment Canterbury is proposing amendments to the Waitaki Catchment Water Allocation Regional Plan (referred to as the **WAP** or the **Plan**). The existing Plan recommends that consents should be reviewed by 2011, with the exception of the Maerewhenua River (a tributary of the lower Waitaki River), for which the Plan recommended a review in 2013.

The Maerewhenua River is over-allocated. Prior to the introduction of the WAP, abstraction totalling 0.685 m³/s was permitted from the lower Maerewhenua River provided that the flow at Kelly's Gully (located approximately 12 km upstream of the confluence with the Waitaki River, and upstream of most abstractions), was at least 0.4 m³/s. Abstraction could therefore induce the river to run dry throughout the middle reaches whilst complying with the minimum flow conditions. Under the WAP, the minimum flow of 0.4 m³/s was shifted downstream to State Highway 83 (SH83).

Plan change PC2 proposes changes to the WAP rules for the Maerewhenua River. The minimum flow monitoring site is proposed to be changed from SH83 back to Kelly's Gully¹ and therefore reverts to the minimum flow monitoring situation prior to the introduction of the WAP. There is no proposed change to the existing minimum flow of 0.4 m³/s, although there are potential ramifications to flows in the lower river by changing the monitoring site due to losses of water to ground between Kelly's Gully and SH83².

It is also proposed that the allocation limit for this river be reduced from 0.4 m³/s to 0.2 m³/s. This change effectively reduces the actual allocation by about 485 L/s (because currently 685 L/s are allocated so reducing the allocation to 200 L/s is a 485 L/s reduction relative to the current situation). The short-fall in allocation is to be sourced directly from the Waitaki River. The flow-sharing threshold is to remain unchanged.

¹ At Kelly's Gully the river has a MALF of 0.56 m³/s and a mean flow of 2.83 m³/s.

² As described under section 2.1, flow investigations have shown varying losses to ground in the reach downstream of Kelly's Gully, with one gauging showing a loss of up to approximately 0.25 m³/s. For the purposes of this report, the loss has been taken as 0.25 m³/s, so as to illustrate the largest effect.

The proposed Plan change has the following wording amendments for the minimum flow and flow allocation for the Maerewhenua River catchment (highlighted as red underlined text where text has been added and in black struck out text where text has been deleted; underlined black text are words and phrases that have formal definitions in the WAP):

xx. Maerewhenua River <u>and tributaries</u>	<p>a. A <u>minimum flow</u> of 0.4 <u>0.4</u> m³/s at State Highway 83 <u>Kelly's Gully</u></p> <p>b. An <u>allocation limit</u> of 0.4 m³/s <u>0.2 m³/s</u></p> <p>c. <u>Flow-sharing</u> between the thresholds of 0.8 and 2.0 m³/s</p> <p>d. Any water taken, diverted, dammed or used pursuant to the <u>flow-sharing</u> regime is in addition to the <u>allocation limit</u></p> <p>e. Any water taken when the river is above 2 m³/s is in addition to the <u>allocation limit</u> and <u>flow-sharing</u> regime</p>
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The test of the RMA is whether these provisions are the most appropriate way to achieve the objectives of the WAP, rather than the existing provisions. Environmental effects must also be considered (s68(3) RMA).

1.2 Report objectives

Environment Canterbury engaged Ryder Consulting to assess the ecological effects of relocating the minimum flow monitoring site for the Maerewhenua River and changing the location of the flow monitoring site. The following aspects were considered in the assessment:

- flow variability;
- river connectedness; and
- aquatic communities and their habitats.

Policy 4 of the current WAP relates to matters to be considered when setting environmental flow and level regimes:

- a. mauri and healthy ecosystems of indigenous species, including mahinga kai species;
- b. wāhi tapu sites or areas, and wāhi taonga;
- c. natural character, landscape, and visual amenity;
- d. vegetation within and adjacent to the water body;
- e. habitats including those of invertebrates, birds and fish;
- f. fish passage, as appropriate, including controlling spread of non-indigenous species into new areas;

- g. undesirable periphyton and sediment accumulation;
- h. effects on water quality;
- i. maintenance of groundwater flows;
- j. naturally occurring dry river or stream beds;
- k. the potential for establishment of invading exotic vegetation;
- l. bedload and sediment transport processes;
- m. shoreline or bank erosion;
- n. functioning of the river mouth;
- o. recreation opportunities;
- p. existing flow and level regimes, physical resources and activities;
- q. the amount and reliability of water that can be taken, used, dammed or diverted; and
- r. accessibility to water bodies and their margins.

Policy 44 of the current WAP relates to setting environmental flow regimes in the tributaries of the Lower Waitaki River that:

- (i) recognise the natural and recreational values of the tributaries, in particular, the value of the Awakino and Maerewhenua Rivers for trout spawning, and the Waikakahi Stream for healthy ecosystems of indigenous species, including mahinga kai species;

and

- (ii) enable appropriate access to water for the activities identified in Objective 2, to the extent consistent with Objective 1.

1.3 Information sources

The approach used in this report was primarily one of reviewing existing information on the ecology and water quality of the Maerewhenua River and how they are influenced by flow frequency and low flows. No new surveys were undertaken. The bulk of the existing information reviewed is in the form of assessment of environmental effects documents (AEEs), and related evidence of expert witnesses presented at consent hearings for water abstractions primarily for irrigation (joint hearing of consent applications to take water from the lower Waitaki River mainly for existing irrigators).

2. PROPOSED CHANGES TO THE FLOW SETTING

2.1 Lower river hydrology

2.1.1 Flow losses

Flow analyses indicate that, even in the absence of irrigation abstractions, water is lost to gravels below Kelly's Gully and SH83, with this loss occurring primarily

in the reach extending from the SH83 bridge to 800m upstream (Hall, evidence in chief Lower Waitaki irrigation resource consent hearings, para 8. Also see Pierce 2012). Results of flow gaugings undertaken by Environment Canterbury suggest that to achieve 0.4 m³/s at SH83, a flow of 0.65 m³/s is required at Kelly's Gully (S42A Officer's Report for applications CRC070820 and CRC070826 by M S Gillingham, Report 7, Lower Waitaki irrigation consent hearings) indicating that up to 0.25 m³/s is not resurfacing in the lower catchment.

Subsequent to the Lower Waitaki irrigation resource consent hearings, in the season of 2011/2012, Boraman Consultants made further flow measurements on two occasions to determine if and where any losses to groundwater were occurring (Pierce 2012). An attempt was made to ensure that all irrigation extraction from the river had been stopped for at least 20 hours prior to gauging. Water losses of 0.144 m³/s and 0.172 m³/s were recorded in the reach from Kelly's Gully to 800m upstream of the SH83 bridge (on 29 December 2011 and 24 January 2012, respectively). Prior flow measurements in this reach had shown little or no flow loss (March and April 2007). In the reach between the SH83 bridge and 800m upstream of the bridge, further losses of 0.232 m³/s and 0.065 m³/s were recorded on 29 December 2011 and 24 January 2012, respectively. Losses were also observed in this reach in 2007. Overall, based on 2007 and 2011/2012 figures, the total loss to groundwater in the reach from Kelly's Gully downstream to the SH83 bridge was determined to be approximately 0.213 m³/s (0.063 m³/s plus 0.150 m³/s, Pierce 2012). This is similar to the earlier loss estimate of 0.25 m³/s made by Environment Canterbury.

2.1.2 Flood frequency

Floods and freshes provide important cues for fish behaviour. In particular they can act as stimulus for migration as well as providing conditions suitable for fish passage. For example, adult eels typically migrate downstream during autumn freshes (Jellyman 2006, Figure 1), adult trout and salmon often move upstream on flood recessions to take advantage of easier passage.

High flows can also be beneficial by removing significant periphyton accrual and accumulated fine sediment. The frequency of flow events that exceed three times the median flow per year (FRE3, expressed as number per year, or number per

season for a seasonal analysis) is often used as an index of the amount of disturbance experienced by instream organisms (e.g., benthic algae or periphyton, macroinvertebrates, plants and fish). For example, the New Zealand periphyton guidelines use a FRE3 hydraulic calculation for determining periphyton accrual periods. FRE3 statistics for the Maerewhenua River were examined for the period 1970 to 2011 using mean daily flow data (Kelly’s Gully recorder) supplied by Environment Canterbury.

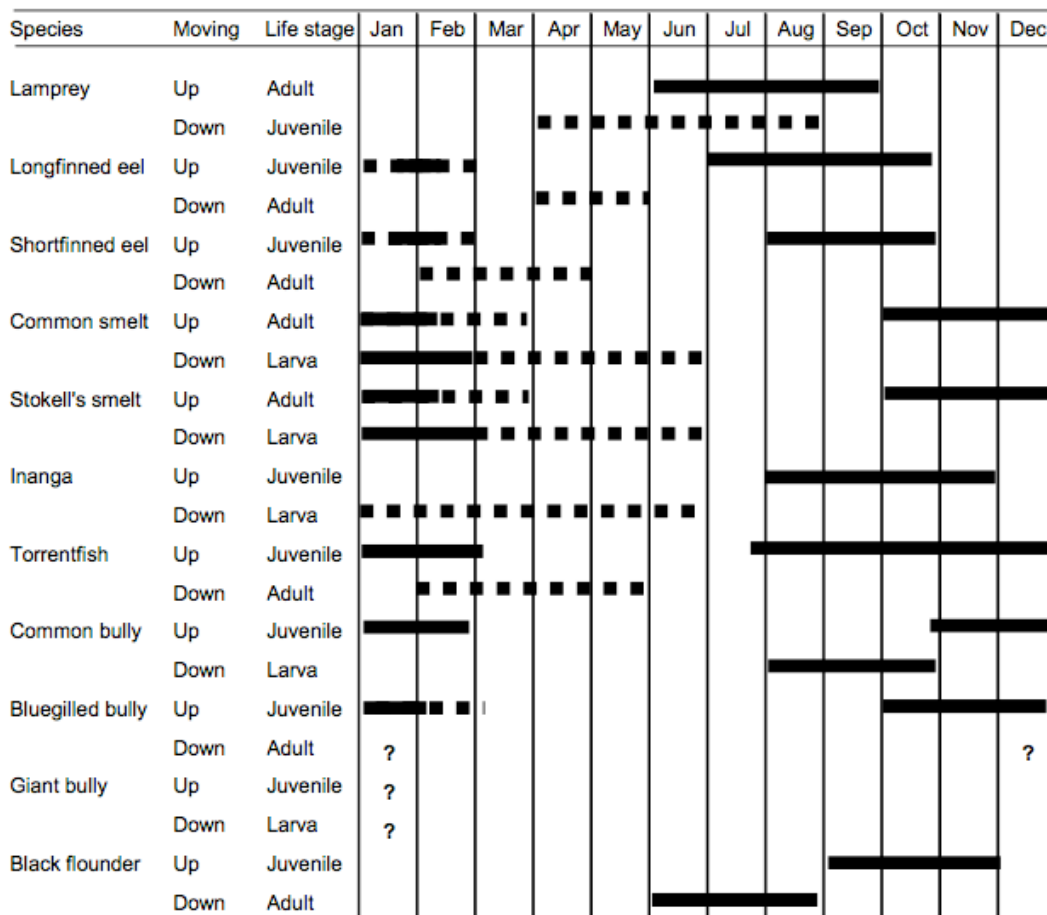


Figure 1 Summary of migration periods of migratory freshwater fish species occurring in the lower Waitaki River. Solid lines represent probable main periods of migration; dashed lines represent probable periods of less intense migration; ? period uncertain (redrawn from Jellyman 2006).

The Maerewhenua River is not a flashy river and an analysis of the Kelly’s Gully flow record (Figure 2) indicates it has a FRE3 statistic of 7.6 (average of 7.6 flow events each year where the flow exceeds three times the median flow³). A

³ A filter period of five days was used as the minimum interval between counting of significant floods.

significant reduction in FRE3 events due to abstraction could adversely affect stream ecology (see section 3). However, under the proposed changes to the WAP, there is only a minor reduction in the average annual FRE3 for the Maerewhenua River from 7.6 to 7.0.

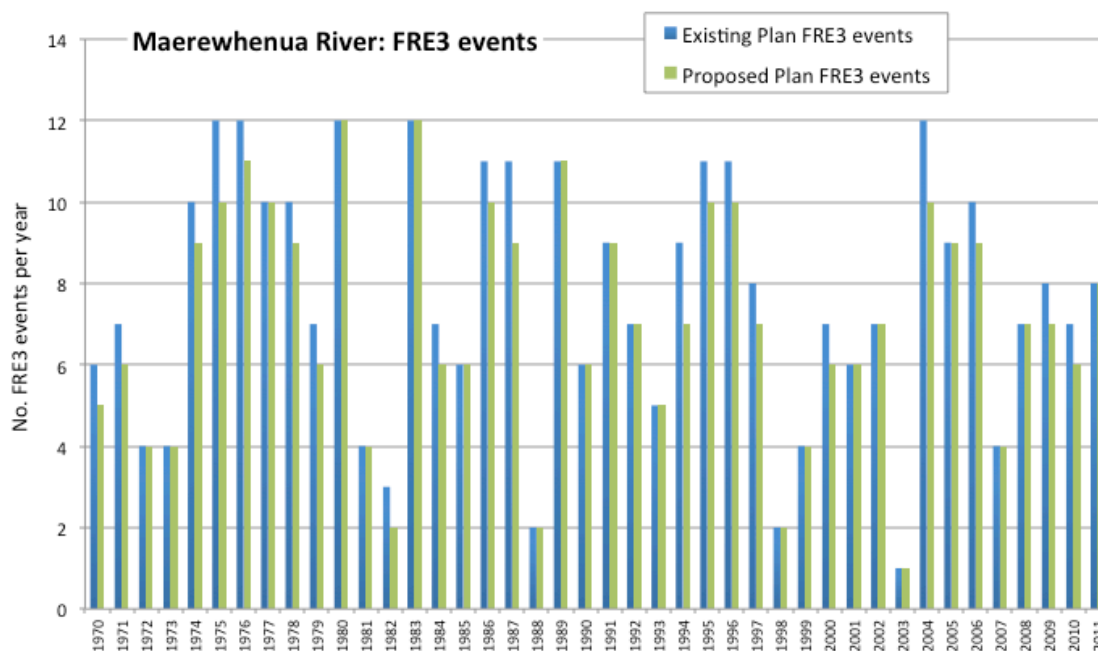


Figure 2 FRE3 statistics for the Maerewhenua River flow record since 1970 (Kelly’s Gully site) using a 5 day filter period as the minimum interval between counting of significant floods (hydrology data supplied by Christina Robb, Environment Canterbury).

3. AQUATIC ECOSYSTEM

Somewhat surprisingly, there is a general lack of information on the aquatic ecological characteristics of the Maerewhenua River catchment. Biggs (in evidence to the Waitaki Catchment Water Allocation Board) described some periphyton surveys from 1988/89. He found periphyton was dominated by thin films of diatoms and green algae. Biomass in the lower river was moderately high in autumn after a long period without floods, then declined moving into winter when a large flood occurred.

No recent fish or aquatic resource surveys have been undertaken to our knowledge. The national freshwater fisheries database records the last fish survey being undertaken in 2006.

The Maerewhenua River provides spawning habitat for brown and rainbow trout, and the recruitment of juveniles from the river is considered important for the Waitaki River rainbow trout fishery. Recreational fishing occurs in the single channel reach of the Maerewhenua River approximately 12 km upstream of the Waitaki River confluence (Webb, evidence in chief Lower Waitaki irrigation resource consent hearings 2008).

Downstream of the single channel reach (i.e., in the lower 12 km reach), the river meanders through a wide flood plain. The stream channel in this lower reach is typically shallow with little cover for adult trout and high summer water temperatures likely inhibit juvenile trout migration. Fish salvage in this reach is required on average about one year in five (Graeme Hughes, pers. comm., cited by Webb, evidence in chief Lower Waitaki irrigation resource consent hearings 2008).

The Maerewhenua River also provides habitat for native fish, however, its confluence with the Waitaki River is located too far inland to be accessible for many of the migratory species (Jellyman *et al.* 2003). Common bully, upland bully, koaro, longfin eel and Canterbury galaxias have been recorded in the Maerewhenua River catchment, with upland bully and Canterbury galaxias (both non-migratory species) numerically dominant (Jellyman *et al.* 2003). Surveys undertaken in the lower Maerewhenua River in 1978-1982 found common bully and upland bully (numbers of each individual species are not distinguished) present at high densities (approximately 187 fish per 100 m²) and Canterbury galaxias at moderate densities (approximately 45 fish per 100 m²) (Jellyman *et al.* 2003). Longfin eels were also present at low densities (approximately 3 fish per 100 m²). Additional surveys in 2001 associated with Project Aqua recorded upland bully, longfin eel and Canterbury galaxias (Jellyman *et al.* 2003). Total native fish densities of 72.1 fish per 100 m² were reported in the river by Jowett and Richardson (1996), and in 2001 densities of 43.6 fish per 100 m² were recorded (Jellyman *et al.* 2003).

3.1 Ecological implications of the proposed change

An instream habitat assessment was undertaken in the Maerewhenua River in

2005 to determine a minimum flow that would provide for the requirements of the native fish community (Jowett 2005). The survey site was at the location of the water level recorder (i.e., at Kelly's Gully), and therefore upstream of most abstractions and within a relatively well confined reach. The flow that provided optimum habitat for a range of native species and brown trout spawning was predicted, and also the flow below which habitat for each species begins to decline sharply (the breakpoint) (Table 1). From his assessment, Jowett (2005) concluded that a minimum flow of 0.2 m³/s (at Kelly's Gully) would provide for the requirements of the native fish community in the river. However, in making this conclusion he noted that the river may be less well-confined in the reaches downstream that are affected by irrigation and this would tend to increase flow requirements. The wide nature of the bed in the lower reaches downstream of Kelly's Gully, dominated by quartz gravels and sands thought to have been transported there from historic upstream gold working sites, are less suitable for benthic invertebrate production and fish habitat is limited (evidence of Graeme Hughes, Lower Waitaki irrigation resource consent hearings 2008).

Table 1 Maerewhenua River flows (m³/s) that provide maximum habitat (optimum) for each species and life stage and flows at which habitat begins to decline sharply with flow (breakpoint) (adapted from Jowett 2005). The percentage of the optimum habitat retained at the existing minimum flow of 0.4 m³/s has also been calculated from Jowett 2005 Figure 5.

Species/lifestage	Optimum (m ³ /s)	Breakpoint (m ³ /s)	Percentage of optimum habitat retained at 0.4 m ³ /s
Common river galaxias	1.0	0.25	89
Upland bully	0.5	0.15	100
Common bully	1.3	0.65	87
Longfin eel (<300 mm)	1.5	0.20	80
Brown trout spawning	0.9	0.60	55

At the existing minimum flow of 0.4 m³/s, 80-100% of optimum habitat is retained for native fish species and 55% of optimum brown trout spawning habitat is retained. The instream habitat assessment therefore indicates that a minimum flow of 0.4 m³/s provides adequate habitat for the requirements of native fish and less so for trout spawning habitat, although spawning takes place largely in months of the year outside of the irrigation season and as such should not be affected by abstraction for irrigation. This assessment does not, however, provide any guidance on adult trout habitat availability, or on habitat suitability

for adult trout passage. The location of the assessment in a confined reach of the river at Kelly's Gully also does not necessarily provide useful information about habitat available in the less confined reaches downstream to State Highway 83.

Because of the loss of water from the river to groundwater, Fish and Game supported the existing provisions of the WAP to change the minimum flow monitoring site to State Highway 83, and maintain the minimum flow of 400 l/s. The current Plan change proposal effectively reverses the WAP decision. Although the allocation limit has been reduced (from 0.4 to 0.2 m³/s), fish passage and fish habitat in the lower reach of the river will potentially be significantly limited when low flows coincide with the irrigation season.

Fish passage requirements vary with species, life stage and season (see Figure 1 and Table 2). The native fish community of the Maerewhenua River is dominated by the non-migratory species Canterbury galaxias and upland bully, which do not undertake extensive migrations.

Table 2 Probable main migration periods of migratory trout and native fish species found in the Maerewhenua River (some movement can also be expected in adjoining months). Canterbury galaxias and upland bully are non-migratory. Cells shaded with light blue represent the average irrigation season.

Species	Summer			Autumn			Winter			Spring		
	D	J	F	M	A	M	J	J	A	S	O	N
Brown trout (adult upstream)*						✓	✓					
Brown trout (juvenile downstream)*											✓	✓
Rainbow trout (adult upstream)*									✓	✓		
Rainbow trout (juvenile downstream)*	✓										✓	✓
Common bully (juvenile upstream) ⁺	✓	✓	✓								✓	✓
Longfin eel (adult downstream) ⁺					✓	✓						
Longfin eel (juvenile upstream) ⁺								✓	✓	✓	✓	

* Graynoth *et al.* (2003). ⁺ Jellyman *et al.* (2003).

Downstream migrations of juvenile trout, and upstream migrations of juvenile common bully and longfin eel should not be affected by the changes to the flow rules as observations of the lower river at 0.4 m³/s (at Kelly's Gully) indicate surface connectivity is maintained. Also, the significant reduction in the allocation volume relative to the existing consented situation means that sections of the river downstream of Kelly's Gully will not run dry due to abstraction, as is

currently possible.

If the minimum flow for the river is set at Kelly's Gully, and is kept at the current level of 0.40 m³/s, flows in the lower reach could be reduced to around 0.15 m³/s through losses to ground. Whether this reduced flow is sufficient to provide upstream passage for adult trout and downstream passage for adult eel is uncertain, however passage for these life stages occur mostly outside of the peak of the irrigation season and typically in and around flood events. Consequently the minimum flow is not critical for these movements provided the frequency of floods and freshes are not reduced. A reduced total allocation of 0.2 m³/s has only a minor effect on such flow events.

Instream habitat for adult trout in the lower reaches of the Maerewhenua River is likely to be limited, regardless of the minimum flow, as habitat appears limited for reasons other than those related to flow. Passage for native fish should be achievable under this flow as well as providing some habitat for native fish in the lower reach of the river (based on Jowett's (2005) assessment at Kelly's Gully, a flow of 0.15 m³/s would provide 65 to 85 percent of optimum native fish habitat). A reduction in the allocation limit will provide for an increase in flow variability, which may provide some benefit, although of uncertain magnitude, to aquatic biota. Further, under the revised flow regime with reduced allocation, there will be occasions when future low flows are of less severity than the current allocation regime would allow.

Didymo is present in the lower Maerewhenua River. If found in high abundance it can have a detrimental effects on the macroinvertebrate community with potential flow-on effects of fish and river-bird communities. There is no information to suggest that the proposed changes to the flow regime will alter the presence of Didymo in the Maerewhenua River.

4. SUMMARY

Policy 4 of the WAP requires a number of matters to be considered when setting environmental flow and level regimes (see section 1.2). A flow of 0.4 m³/s at Kelly's Gully appears to provide connectedness of surface flow in the lower river between Kelly's Gully and the Waitaki River, and provides suitable habitat for

small native fish but not adult salmonids. Increasing the minimum flow is unlikely to significantly improve habitat availability for adult salmonids in the lower reaches due to the physical character of river bed. A higher minimum flow would at best widen the wetted area of the bed, but do little to provide greater depth of water. The proposed flow regime appears to provide adequate fish passage for native fish.

Flow variability appears to be maintained by the proposed changes to the WAP. In particular, there is only a minor reduction in the number of flood events of a size capable of scouring periphyton and fine sediments from the bed of the river. The occurrence of the non-indigenous and invasive Didymo algae is unlikely to be affected by the proposed changes.

Policy 44 relates to the setting of environmental flow regimes in the tributaries of the Lower Waitaki River including the Maerewhenua River. The Policy requires that the setting of an environmental flow regime for the Maerewhenua River recognises natural and recreational values, in particular the value for trout spawning, and enable appropriate access to water for the activities identified in Objective 2 to the extent consistent with Objective 1.

Setting a minimum flow of 0.4 m³/s at Kelly's Gully, in conjunction with a significant reduction in the total allocation for out of stream users, should not result in additional detrimental effects on trout spawning. Spawning takes place largely in months of the year outside of the irrigation season (brown trout spawn around May through to July, while rainbow trout spawn from late July to mid October) and as such should not be affected by abstraction for irrigation.

Effects on water quality due to proposed flow changes are also unlikely, although these are likely to be influenced by adjacent land use and associated land management practices.

Proposed changes to the Maerewhenua River flow regime will not aid the spread of non-indigenous species into new areas of the Maerewhenua catchment.

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