

Selwyn Waihora Zone Implementation Programme



Selwyn Waihora Zone Committee

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Mā whero, mā pako; ka oti ai te mahi
The task shall be achieved through unity

EXECUTIVE SUMMARY

This Zone Implementation Programme has been produced under the Canterbury Water Management Strategy (CWMS) and is a non-statutory document. It has been prepared by the Selwyn Waihora Zone Committee through a collaborative process, and contains a collection of integrated actions and tactics to give effect to the CWMS in the Selwyn Waihora Zone. It is a living document.

The committee have established five key areas of work: Nutrient and Water Management, Water Supply, Te Waihora and Lowland Waterways, Braided Rivers / Upper Plains / High Country, and Biodiversity.

Features of this programme include:

- An extension programme for water and nutrient management
- The role of audited self management frameworks and user groups
- The desired characteristics of water storage and a collaborative process to facilitate this
- Surface Water for irrigation in the upper plains
- Staged development of new irrigation
- A mountains to the sea aquatic biodiversity corridor
- A collection of integrated actions and innovations for Te Waihora
- Identification and protection of mahinga kai sites
- Actions to integrate biodiversity into farming systems
- The rehabilitation, enhancement and protection of wetlands, particularly in the Upper Waimakariri basin, and those associated with the Hororata River and hill-fed river flows.

The priority critical issue to be addressed is setting limits for nutrients. Other critical issues are around water storage within the Zone, and the health of Te Waihora. There are no nutrient limits in this document. The Zone Committee will deliberate on nutrient limits during 2012 as a major workstream for the Committee. The setting of limits is only one strand of work to address ecosystem health and the Committee have fast tracked other actions including support for on-farm management practice and enhancement of habitat.

The Committee has identified the key characteristics for any water storage in the Zone and signposted a collaborative process to ensure any development achieves the best outcome for the community under CWMS. Staged development in conjunction with nutrient limit setting is considered the best way to facilitate sustainable development in the Zone that meets aspirations for thriving communities and healthy ecosystems. Consideration of water storage options and working with the various parties will be a major workstream for the committee in 2012.

To achieve the aspirations for Te Waihora will require the multi-faceted collection of actions identified in this programme, including: a combination of a continuous improvement and innovation in on-farm management, improved groundwater inflows into the lake and lowland streams, riparian management of the lake and lowland streams including grazing management and habitat enhancement, and innovations in lake management including innovative lake opening and fish passage, channel enhancement, sediment removal, nutrient stripping via wetlands and macrophyte bed re-establishment. No one of these actions alone will have the necessary impact to address issues with the lake.

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1 INTRODUCTION

The Canterbury Water Management Strategy (CWMS) provides a path toward improving the management and use of Canterbury’s water resources. The Strategy takes a regional approach to achieving collaborative and sustainable water management. The CWMS, initiated in 2005 by the Canterbury Mayoral Forum, is a collaborative process between the Canterbury Regional Council, the ten territorial authorities of Canterbury and Ngāi Tahu, as well as key environmental and industry stakeholders.

The CWMS addresses critical water management issues: the declining health of both surface and groundwater, habitats and ecosystems, an ongoing loss of cultural value and recreational opportunities as well as the declining availability and reliability of water for agricultural and energy use. Water management in Canterbury has become increasingly adversarial as the availability of water and the cumulative effects of water use reach environmental limits. The CWMS provides a strategic approach to water management that aims to restore community expectations

as well as the trust and confidence between the various interests in water resources.

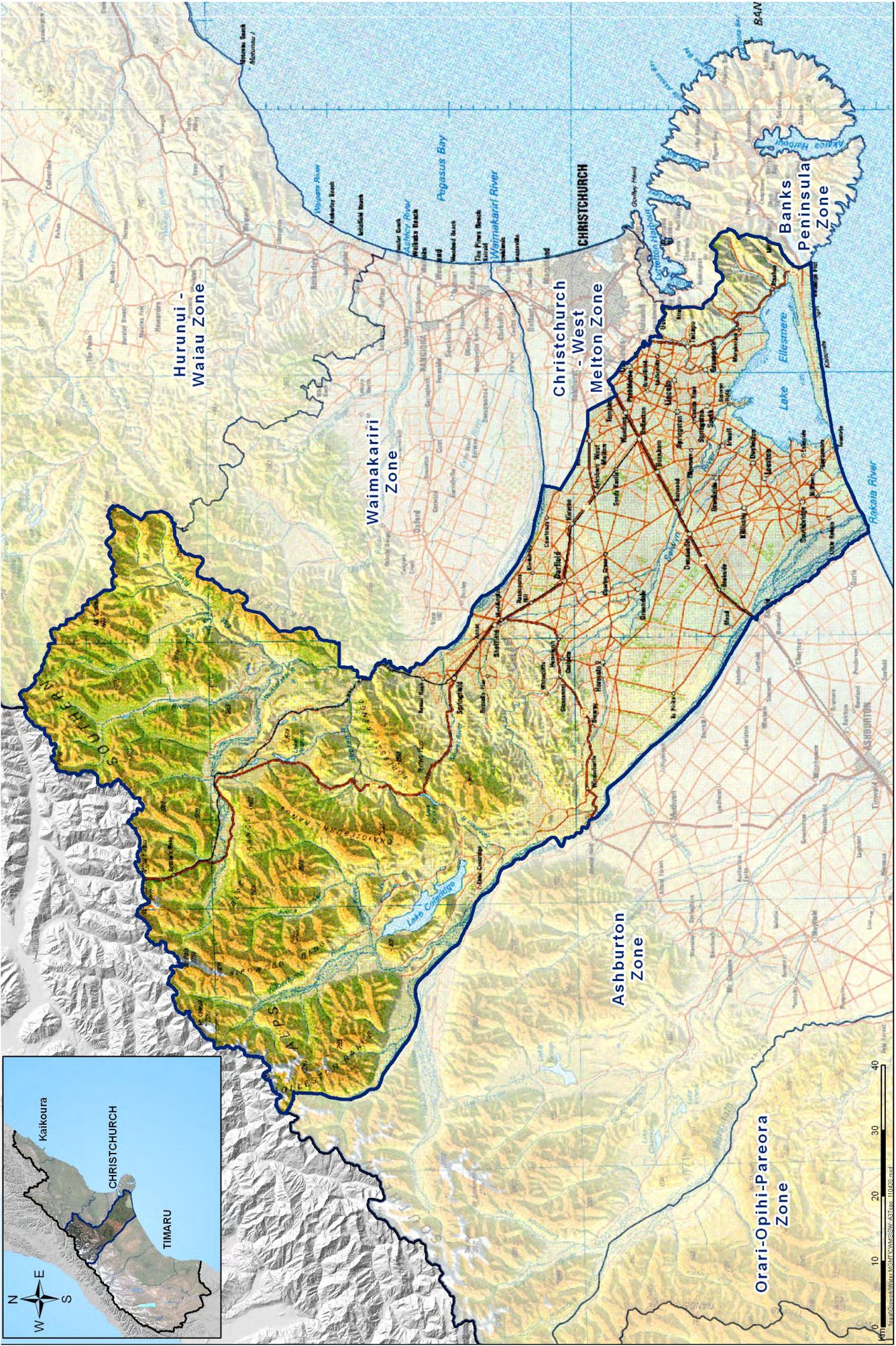
The Selwyn Waihora Zone is one of the ten management Zone Committees used as the mechanism for consultation, assessment and decision making across Canterbury. The role of the Selwyn Waihora Zone Committee is to work with the community to prepare a Zone Implementation Programme (ZIP). This outlines a series of actions for integrated water management for the Selwyn Waihora Zone. The implementation programme is seen as a rolling-ten-year programme. This is the first version and contains recommendations principally for actions in the next three years, but with a long-term horizon also in view. The ZIP is a living document and the Zone Committee will review progress against it and update it as required.

For more information on the CWMS, the overarching regional principles and targets, and membership of the Selwyn Waihora Zone Committee, see Appendix 1.

1.1 GEOGRAPHIC SCOPE

The geographic area covered by the Selwyn Waihora ZIP includes the headwaters of the Waimakariri River to the Gorge, and part of the headwaters of the Rakaia River, including the Wilberforce, Harper and Avoca Rivers and Lake Coleridge. The Zone includes the central plains, between these two rivers, the catchments of the Selwyn/ Waikirikiri, Waianiwaniwa, Hororata and Hawkins Rivers, the lowland streams and ephemeral waterways of Banks Peninsula that flow into Te Waihora/ Lake Ellesmere.

The Rakaia River forms the southern boundary of the Selwyn Waihora Zone and shares this boundary with the Ashburton Water Management Zone. This mirrors the boundary between the Ashburton and Selwyn District Councils who, with Environment Canterbury, agree that the two Zone Committees will work collaboratively with the Regional Committee for the management of the Rakaia River. The Zone Committee will also work with the Waimakariri Zone Committee and the Christchurch West Melton Zone Committee on joint issues on the shared boundaries.



**Selwyn - Waihora Zone
Canterbury Water Management Strategy**

1.2 ZONE COMMITTEE PROCESS

The Selwyn Waihora Zone Committee is a joint committee under the Local Government Act (2002) of Environment Canterbury and the Selwyn District and Christchurch City Councils. Environment Canterbury provides staff to help facilitate the committee process with Selwyn District Council providing the secretarial support.

The Zone Committee operates through a collaborative consensus approach and reflects the agreed commitment by all members to seek the outcomes outlined in this ZIP. The Implementation Programmes although not statutory, provide a very clear pathway, expectation and commitment for the programmes to be implemented and resourced as proposed.

This ZIP contains recommendations to Environment Canterbury, Selwyn District Council, and Christchurch City Council as well as to other parties. Work is already underway on some of the recommendations to Environment Canterbury outlined within the ZIP; these cut across a number of work programmes and will form part of the development of the next Long Term Plan. Discussions about the realignment of existing work will be agreed with the Environment Canterbury Commissioners.

The Zone Committee has met fifteen times since September 2010, with additional field trips to improve their understanding of the issues associated with: nutrient management, the Rakaia River and Lake Coleridge/Whakamataua, Te Waihora and lowland streams, irrigated and non irrigated farms, the Selwyn/Waikirikiriri River, and the Hororata River. The Zone Committee has also received briefings on: hydrology and water allocation in the Zone, water quality, cultural values, indigenous vegetation and biodiversity, future climate projections, drinking water, drainage management, irrigation, strategic storage options, and regional and district planning. And the Committee has engaged with numerous parties including Central Plains Water, Selwyn District Council and Environment Canterbury staff, Whitewater NZ, Fish and Game, Irrigation NZ, MAF, the Canterbury District Health Board, Malvern Hills Protection Society, and Trustpower.

The Zone Committee identified the priority outcomes under the CWMS and held a series of public meetings to share and refine these outcomes. The priority outcomes include:

- thriving communities and sustainable economies,
- high quality and secure supplies of drinking water,
- best practice management of nutrients and water,
- the integration of kaitiakitanga into water management,

- healthy lowland waterways,
- Te Waihora is a healthy ecosystem,
- hill-fed waterways that support aquatic life and recreation,
- the protection of alpine rivers and high country values, and
- enhanced indigenous biodiversity across the Zone.

Subsequent to setting the priorities the Committee established four working groups to help develop the actions and tactics to help achieve these outcomes. This involved 15 working group meetings and two stakeholder workshops with close to 100 attendees. The working groups were:

- Water Supply,
- Te Waihora and the Lowlands,
- Biodiversity, and
- Voluntary approaches to water and nutrient management

Furthermore, a science working group was established and a workshop held with 11 scientists from a range of organisations. The workshop involved the Zone Committee members putting a pre-circulated group of questions to the group of scientists and a forum discussion between the scientists and each other and the scientists and the Zone Committee. This workshop was crucial in giving the committee the confidence to stand behind their recommendations and it will lead into deliberations on setting nutrient limits.

It was agreed that the whole committee would address nutrient limit setting¹ due to the complexity and importance of this strand of work. This will be the major element of work for the Zone Committee in 2012.

The working groups engaged directly with the relevant key stakeholders and reported back to the Zone Committee the potential options and recommendations for this draft ZIP.

¹ Setting nutrient limits is a complex workstream that will be developed through 2012 in a process described on page 18.

2 SELWYN WAIHORA ZONE – WATER RESOURCES AND CONTEXT

2.1 WATER RESOURCES

The Selwyn Waihora Zone is an alpine, foothill, and lowland rural area in central Canterbury. Hydrologically the Zone is diverse; it is characterised by large alpine rivers, central plains, hill fed rivers, groundwater zones, spring-fed streams and Te Waihora, a large barrier-beach built coastal lagoon classified as a wetland of international significance and highly prized by Ngāi Tahu. The Rakaia / Selwyn and Selwyn / Waimakariri groundwater zones are within the Selwyn Waihora Zone.

Te Waihora /Lake Ellesmere

Te Waihora is a tribal taonga; it has been home to a permanent settlement for many generations. The lake was known as Te Kete a Rākaihautū (the food basket of Rākaihautū) because it provided abundant mahinga kai all year round. It is central to Ngāi Tahu values, culture, and social order. Fish, tuna (eels) in particular and a range of birdlife were widespread and abundant. The lake is one of New Zealand's most important wetlands; and is internationally significant for the abundance and diversity of wildlife. Te Waihora is an important link in the chain of coastal lagoons/ estuaries of the east coast for birds. Te Waihora supports a commercial fishery; eel, flounder and mullet are the primary species caught.

Thousands of years ago Te Waihora was the estuary of the Waimakariri and Rakaia Rivers. It is a brackish, shallow lagoon of around 20,000 hectares averaging a depth of 1.4m. It is New Zealand's fifth largest lake. It is influenced by wind and the inflows (and outflows) from around 40 key inflows: groundwater directly and surface water from spring fed streams, the Waikirikiri /Selwyn River, the drainage network, and Banks Peninsula streams. The lake is hypertrophic, high in nutrients and highly turbid mainly due to sediment re-suspension by wind that helps to limit algae growth. Te Waihora is opened periodically to the sea in accordance with the Te Waihora / Lake Ellesmere Water Conservation Order.

Waikirikiri /Selwyn River

The Selwyn River/Waikirikiri has its headwaters in the Rockwood Range and flows east for 80 kilometres across the Canterbury Plains before emptying into Te Waihora, to the south of Banks Peninsula. The Waikirikiri / Selwyn River is very seasonal and is fed from two sources; from rain in the foothills and small springs in the lower plains. It is high and flood-prone in winter and early spring, but low during summer. In the foothills, the Selwyn flows year-round. The river is an important mahinga kai trail for hapu at Te Waihora.

On the plains, the riverbed is highly permeable, and as soon as it reaches the plains, water is lost into the aquifers. There is

evidence that the reach of the river, which dries entirely, has been extending in distance and duration over recent decades. Upstream of Te Waihora shallow groundwater rises back to the surface and the Selwyn flows again making the lower reaches popular for swimming, camping and picnicking.

Waimakariri River

The Waimakariri River rises in the Southern Alps running then to the east coast across the Canterbury Plains. About 90% of the water reaching the mouth of the river originates from the alpine mountain catchment of 2,500 km². The upper Waimakariri Basin supports diverse habitats: high country lakes, wetlands, inter-montane streams and braided river beds. The basin also has significant remaining relatively intact biodiversity, water and wetland values that feed into the lower catchments. It includes nationally and regionally significant habitats including important habitat for native fish and invertebrates, and large populations of native water birds as well as native shrub land, tussock grassland and forest. The Waimakariri Basin has high cultural significance as a historical trail through to the west coast and as a significant mahinga kai gathering area. All of these values, however, are threatened by the spread of wilding pines in the basin.

Rakaia River

The Rakaia River rising from the snowfields of the Southern Alps is the largest and most outstanding natural braided river in New Zealand. The upper catchment consists of large shingle flats and fast flowing rapids and runs within multiple criss-crossing braids. Downstream of the Rakaia Gorge the river spreads out to the coast across a braided bed up to two kilometres wide. The Selwyn and Ashburton District Councils both take water from the Rakaia River for stock water and gravel is extracted for the roading and building industries. Water is also diverted into Lake Coleridge from the Wilberforce and Harper Rivers for use in the Lake Coleridge Hydro Scheme and water is allocated for irrigation below the Rakaia gorge.

It has significant cultural value for Ngāi Tahu as part of a trail to the West Coast and also for mahinga kai. The upper Rakaia area has an extensive intact and ecologically well-connected network of nationally significant wetlands, high country lakes, inter-montane streams and braided river beds. It contains some of the largest intact wetlands in the region, including habitat for native fish and populations of native water birds. The river also supports rare riverbed species such as wrybill, black-fronted tern and banded dotterel and is highly valued for bird watching, fishing, jet-boating, kayaking, and tramping. The Rakaia and Waimakariri Rivers have nationally important salmon fisheries.

Foothills, Upper Plains Streams and Wetlands, and Water-races

This area contains the springs, wetlands and streams of the Malvern Hills and Hororata Plains feeding into the Waianiwaniwa, Hororata and Selwyn / Waikirikiri Rivers. These are of varying size draining diverse geologies and landforms. Remnant wetlands exist along the valleys and at the toe of the foothills with more extensive wetlands in the upper slopes and summits of the foothills. The Waianiwaniwa Valley has large population of Canterbury mudfish. Significant native forest shrub-land and tussock grassland vegetation in the valleys and headwaters contain threatened plant species. The plains are a highly modified environment with pastoral and arable agriculture dominating the landscape.

The stock water-race network began operation over 120 years ago providing 360 km of reliable water for agricultural uses bringing significant economic gain. As well as supporting agricultural activities, over the years of operation there has been a gain in amenity and biodiversity values, including mudfish habitat and bird life, while also providing urban street and rural visual amenity.

Lowland Streams /Banks Peninsula Streams

The lowlands of the Zone consist of spring-fed streams on the lower plains, and ephemeral streams of southern Banks Peninsula. Seasonal fluctuations of groundwater are generally small due to rainfall recharge, the flows of the Rakaia and Selwyn / Waikirikiri Rivers, water abstraction and irrigation recharge. Over recent decades, however, flows in many of the lowland streams have declined, in some cases significantly. Spring-fed

streams are often characterised by the variable management practices around them. Banks Peninsula by contrast has volcanic geology, erodible loess soils, short steep catchments and moderate intensity of land use on the flat. Flows are highly variable, at times intermittent depending on rainfall and water quality is highly susceptible.

The lowland streams are highly prized by all cultures for the aesthetic, recreation, and food gathering they provide. The Halswell and Irwell Rivers, and the Waiekekewai and Harts Creeks are important habitat for native fish and invertebrates. Remnant wetlands in these highly modified lower plains land environments can still support native locally-rare plant communities. Muriwai /Coopers Lagoon to the south of Te Waihora has significant salt marsh and bird habitat and is of significant cultural value to Ngāi Tahu.

The Drainage Network

The network drains land that was converted from wetland or swamp to what is now productive farm land. This network is located on private land or on council road reserve, and takes stormwater and helps to reduce flooding on the plains. Ten classified drainage districts, manage the almost 500 km of drain, many of which are located in the Lincoln/ Leeston area. The Halswell River is included in this drainage network as well as the extensive network of private drains that connect to the publicly managed drains. These drains include some important areas of lowland habitat and provide an opportunity to improve lowland and wetland biodiversity and habitat, while still ensuring their primary function.

2.2 CONTEXT

Ngāi Tahu

Seven Ngāi Tahu Papatipu Rūnanga have Tangata Whenua interests in Selwyn Waihora Zone. Six of these are represented on the Zone Committee. Te Taumutu is the acknowledged Kaitiaki Rūnanga for Te Waihora. The four Banks Peninsula Rūnanga: Ngāti Wheke (based at Rapaki), Koukourāata (Port Levy), Ōnuku (Akaroa) and Wairewa (based at Little River) also have an interest in Te Waihora. Ngāi Tūāhuriri and Te Taumutu Rūnanga also have interests up to the main divide. Arowhenua Rūnanga, based in Temuka, share an interest in the Upper Rakaia but do not sit on this Zone Committee.

These Rūnanga all have kaitiaki responsibilities. Kaitiakitanga is the concept of stewardship, and is expressed through actions to protect natural resources including the involvement of Rūnanga in the decision making and management of those resources. Water is central to Ngāi Tahu resource management philosophy of ki uta ki tai – from the mountains to the sea. For Ngāi Tahu this requires a holistic view of the world, including the integration of legislation and management frameworks, and the cooperation of all agencies responsible for water.

For Ngāi Tahu, water is a taonga left by the ancestors to provide and sustain life. All the waterways and their associated tributaries, wetlands and springs in the Zone are considered significant resources of cultural, spiritual and historical importance. The ability to gather and share food is a cornerstone of Ngāi Tahu society, tradition and mana and is reliant on healthy ecosystems, on water that is fit for human consumption and that is able to support mahinga kai species. Significant cultural sites within the Zone include: Te Waihora/Lake Ellesmere, Muriwai/Coopers Lagoon, Waikirikiri/Selwyn River, the Kaituna River, the Rakaia and Waimakariri braided rivers and their upper catchment wetlands and lakes, and the Rakaia river mouth. More generally, all spring-fed streams, lowland streams and wetlands are of cultural significance, as are areas of mahinga kai and any remaining indigenous biodiversity. Amongst these areas are more specific wāhi tapu and wāhi taonga sites across the zone that require protection.

Climate Change

Overall, projections² indicate that the Canterbury region will experience increasing rainfall in the ranges, and less rainfall on the plains. This has particular significance for groundwater recharge and foothills-fed rivers such as the Waikirikiri /Selwyn River. Although the increase in temperatures would likely to lessen the amount of winter snow cover, warmer air holds more moisture, and during winter this could be precipitated as snow at high elevations. Warming does not rule out, therefore, increased winter snowfall, although the duration of seasonal snow could be shortened and snowlines could rise. Greater precipitation is projected to fall as rain in the alpine rivers, including more extreme events. The less predictable rainfall combined with higher summer temperatures and increased evapo-transpiration would lead to higher irrigation demand³ and potential increased pressure on ground water and the Waikirikiri /Selwyn River.

Regional and District Planning

Environment Canterbury is preparing a Land and Water Regional Plan that is to be publicly notified in July 2012. The Land and Water Regional Plan will replace Chapters 4 to 8 of the Natural Resources Regional Plan that manages water quality and quantity, the beds of lakes and rivers, wetlands and soil conservation. The plan is intended to have four sections: the first three sections will apply across the region while the fourth section will apply at a sub-regional level to the catchments or areas that are within or align with the Zone Committee area.

The sub-regional section that applies to the Selwyn Waihora Zone will include planning provisions to support the delivery of its outcomes, priorities and recommended actions around the management of water quality and flows in the Selwyn / Waikirikiri River catchment, lowland streams, groundwater and Te Waihora.

Water Conservation Orders

The Rakaia River National Water Conservation Order (1988) was established to protect the outstanding natural character of the braided river and wildlife, recreation, and fishery of the river. It establishes certain minimum standards for the management of water quality and quantity within the Rakaia River catchment. Trustpower Limited has applied to amend the order to enable water in the lake to be stored and used for both irrigation and hydro-electricity generation.

The Te Waihora National Water Conservation Order was recently amended to expand the list of the lake's outstanding features to include significance to tikanga Māori in respect of Ngāi Tahu history, habitat for indigenous wetland vegetation and fish and mahinga kai and customary fisheries (it previously only referred

to wildlife habitat). The amendments also allow for additional lake openings at any level primarily to aid eel migration.

Te Waihora Co-governance

Ngāi Tahu, specifically the Te Waihora Management Board⁴ and Environment Canterbury have entered into an interim co-governance agreement, which will be finalised by February 2012. This implements one of the CWMS Kaitiakitanga targets. Its purpose is to realise outcomes aimed at the restoration and rejuvenation of Te Waihora, which will be delivered through a framework driven by Ki Uta Ki Tai/integrated management of the catchment. The Governance Group is made up of representatives of both parties, with functions that include the provision of leadership to the organisations and community for the Whakaora Te Waihora Restoration Plan (see below), and the approval of plans, work programmes and budgets developed for the implementation of that programme. It will also have input into this ZIP, and work closely with the Zone Committee on implementation.

Whakaora Te Waihora

Whakaora Te Waihora includes a Joint Cultural and Ecological Restoration Plan for Te Waihora developed by Ngāi Tahu and Environment Canterbury, with funding support from both those parties and central government through the Ministry for the Environment. The Plan is a programme of work incorporating a detailed project plan for the first two years as the starting point working toward two generation long-term outcomes. The first two years focus on lake shore habitat, in-lake habitat, the restoration of specific lowland stream tributaries and riparian habitat, improving catchment management practices and monitoring and investigations to inform management. Fonterra are also contributing through committed funding and working with their suppliers for on-farm management.

Te Waihora Joint Management Plan

The Te Waihora Joint Management Plan - Mahere Tukutahi o Te Waihora is the first statutory joint land management plan between the Crown and Iwi. The Plan between Ngāi Tahu and the Department of Conservation contains the long-term objectives, policies and methods to manage the natural and historic resources of the lake for mahinga kai and conservation.

Zone Demographics

Approximately 38,000 people currently live in the Zone, with around 67,000 people expected to be living in the Zone by 2041⁵. Currently 95% of people live on the plains, about half living in the districts towns and villages while the remainder are on farms.

² <http://ecan.govt.nz/advice/Sustainable-Living/Pages/climate-change.aspx> - 184KB - 29/06/2010 Accessed 09/2011

³ *Climate change effects and impacts assessment: A guidance manual for local government in New Zealand* <http://www.mfe.govt.nz/issues/climate/index.html> Accessed August 2011

⁴ *Te Waihora Management Board is made up of representatives of the 6 Papatipu Rūnanga with interests in Te Waihora. The Taumutu representative chairs the Board. It is supported by a coordinator funded by Te Rūnanga o Ngāi Tahu.*

⁵ *BERL for Selwyn District Council (2010)*

Lincoln and Rolleston are the largest towns both of which are planned to grow significantly over the next 30 years: Rolleston from 7000 to over 14,800 and Lincoln from just over 3000 to 10,100. Other towns such as Darfield, Leeston, and West Melton will continue to grow but to a much lesser extent.

Economic Activity

The Zone has a significantly higher proportion of GDP devoted to agriculture at 29 % of GDP 2007⁶, government administration and defence at 18.4% than the rest of New Zealand. Other significant sectors are manufacturing at 8.5 % of GDP, ownership of owner-occupied home at 6.7% and education at 6.1%. Sheep and beef farming make up more than half of the agriculture activity⁷, dairy and arable farming is roughly a quarter of the activity while the rest is split between deer farming, nut and tree, flowers and vegetable horticulture.

Changing land use has resulted in a growing population and more employment and demand for other services such as primary schools, health-care, and community infrastructure has also grown. Tourism is also important; skiing, white water rafting, tramping, golf and fishing are all flourishing tourist activities. The education and research sectors are significant with Lincoln home to Lincoln University and a number of Crown Research Institutes and other organisations of scientific research most of which are directed to the agricultural sector.

Irrigation and Energy

Most of the water taken for the 60,000 ha of irrigated land is taken from groundwater. Currently the amount of land that is irrigated is split 50/50 east to west across of State Highway 1 with the majority of water applied via spray irrigation systems. To the west of SH1 groundwater has to be pumped from increasing depths. Both the Rakaia-Selwyn and the Selwyn-Waimakariri groundwater zones are considered to be over-allocated for irrigation.

TrustPower Limited operates the hydro electric power station at Whakamātau/ Lake Coleridge. Water is diverted from the Harper/ Wilberforce Rivers into the lake and then back into the Rakaia River through turbines for generation. TrustPower is proposing to alter the operation of the lake to supply 70 MW of new power generation at the same time as providing irrigation water for 60-80,000 hectares in the Central and Mid Canterbury. This includes the Central Plains Water command area.

⁶ Infometrics, <http://www.infometrics.co.nz/>

⁷ Source: Statistics New Zealand, New Zealand Business Frame, <http://www.stats.govt.nz/products-and-services/table-builder/table-builder-business.htm>.

The Central Plains Water Project proposes the construction and operation of a large scale irrigation scheme for 60,000 ha, with a net gain of 30,000 new irrigated hectares, by taking water from the Rakaia and Waimakariri Rivers through a distributed network of pipes and channels. The current proposal, without a reservoir would supply low reliability from run-of-river.

Community Supplies

Selwyn District Council is responsible for the 26 reticulated water schemes and the three rural water supplies that bring water to 16,900 people within the Zone. Overall, there is 852 km of reticulation: 54 source points, including wells and intakes, 28 storage facilities and 42 pump stations. The reticulated urban water schemes provide water for domestic and industrial use, with the majority achieving fire fighting code of practice capabilities. Restricted schemes provide stock and domestic water on a regulated basis without normal fire fighting capabilities.

3 IMPLEMENTATION FRAMEWORK

3.1 KEY PRINCIPLES

- A **whole of waterway approach** is taken to integrate the management of resources from the mountains to the sea – Ki Uta Ki Tai. Activities are integrated across agencies and groups working together through in an outcome-focused approach.
- **Kaitiakitanga** is woven throughout the document with recommendations to address the principal of Kaitiakitanga in each management priority area. These include actions to address water quality and quantity concerns and provisions for improved customary use and the involvement of Rūnanga in water management.
- The recommendations in this ZIP represent an **integrated approach to water management** and are not considered in isolation and the **collaborative approach** that has been used in the development of this ZIP is to be carried through to the implementation of the recommendations.
- **Public land** is used to **lead** and accelerate **good management practices** and restoration and rehabilitation works alongside initiatives on private land.

3.2 PRIORITY OUTCOMES

The Committee identified nine outcome areas for action that are specific to the Selwyn Waihora Zone derived from the targets and goals of the CWMS. Under these nine outcome areas are more defined specific outcomes from which progress can be measured. The Committee considers all outcomes are equally important; the outcomes below are not in any priority order.

The outcomes are for:

a. Thriving communities and sustainable economies

- Sustainable and productive land use
- Energy security is increased
- Customary and commercial fisheries are improved
- Secure water supply to provide a target of 95% reliability for irrigation

CWMS target areas: regional /national economic growth, irrigated land area, kaitiakitanga

b. High quality and secure supplies of drinking water

- All domestic drinking water meets national standards preferably without treatment within 10 years

CWMS target areas: drinking water, environmental limits, kaitiakitanga

c. Best practice nutrient and water management

- Land managers use optimal water and nutrient practices for their land class, soil type and farm system

- Management is based on clear and agreed science including mātauranga
- Innovative nutrient and water management is adopted rapidly

CWMS target areas: drinking water, water use efficiency, ecosystem health, environmental limits

d. Kaitiakitanga is integrated into water management in the Zone

- Rūnanga are actively involved in resource management decision making
- Wāhi tapu and mahinga kai are protected and enhanced

CWMS target areas: Kaitiakitanga, ecosystem health/ biodiversity

e. Healthy lowland streams

- Water quality, flows and habitat supports increased abundance and diversity of aquatic life
- Safe and plentiful food gathering is available
- Nutrient inflows decline over time to acceptable levels⁸

CWMS target areas: ecosystem health/ biodiversity, kaitiakitanga, environmental limits, recreation

f. Te Waihora is a healthy ecosystem

- There are healthy macrophyte beds and water clarity is improved

- Fish recruitment and food gathering on and around the lake is improved
- Governance of Te Waihora reflects Rangatiratanga and Kaitiakitanga in action
- Nutrient inflows decline over time to acceptable levels
- Recreation opportunities are improved
- High water quality and quantity in high country lakes and streams is maintained
- Populations of native and sports fish flourishing
- River mouths and hapua are healthy and functioning
- High quality recreation opportunities are maintained

CWMS target areas: ecosystem health/ biodiversity, kaitiakitanga, environmental limits, recreation

g. Hill-fed waterways support aquatic life and recreation

- Popular swimming places meet contact recreation standards
- Flows are sufficient to provide for swimming at popular swimming places
- Flows support aquatic life and fish passage

CWMS target areas: ecosystem health/ biodiversity, environmental limits, recreation

h. Alpine rivers and high country values are protected

- Threatened bird populations trends improve
- The natural braided character of alpine rivers is preserved

CWMS target areas: ecosystem health /biodiversity, kaitiakitanga, environmental limits, recreation, natural character

i. Enhanced Indigenous Biodiversity across the Zone

- No further loss of indigenous biodiversity habitat and ecosystems
- Indigenous biodiversity corridors are created across the plains including waterway corridors
- Significant high country wetlands are protected
- Wetlands associated with hill fed river flows are protected and restored
- Wetlands on the plains are restored
- The wetlands of Te Waihora are enhanced

CWMS target areas: ecosystem health /biodiversity, kaitiakitanga

3.3 KAITIAKITANGA

Kaitiakitanga is the traditional Māori philosophy of resource management and includes the concept of stewardship. The principles of kaitiakitanga are woven into all sections of this ZIP to ensure they are fully incorporated to all outcomes. This includes the adjunct extension work and any subsequent regional plans. Recommendations to address specific concerns of Tangata Whenua have been included in the relevant chapters of the ZIP.

The key principles of Kaitiakitanga are:

- Whakapapa - genealogies and generations – All elements of nature are related in space and time and therefore what happens upstream will effect what happens downstream.
- Ki uta, ki tai - from the mountains to the sea – Resource management is based on catchments given that what happens upstream effects what happens downstream.
- Mauri - life, health and vitality – Mauri is the traditional measure of physical, spiritual and/or emotional wellbeing of people and places.
- Wakawaka - hunting and gathering grounds – Traditional

rights to access and the use of key resources (including water) were collectively managed and on the premise of one’s ability to uphold any associated responsibilities.⁹

- Utu - balance, reciprocity – Failure to uphold one’s responsibilities could result in the associated rights being removed or restricted.

As Kaitiaki, particular issues of concern to the Rūnanga they would like to see addressed specific to the Zone are:

- Water quality is suitable for food gathering and returning mahinga kai resources to Te Waihora, Muriwai Lagoon and the lowland streams; nitrates in groundwater of these areas is of particular concern.

⁹ Responsibilities include such things as (a) harvesting resources sustainably (e.g. leave breeders for the next generations); and (b) preserving healthy habitats (e.g. adhering to any rāhui imposed – i.e. temporary restrictions placed on a given area or resource so that the mauri (life supporting capacity) of that area or resource can be restored in the interests of present and future uses/users.

- All waterways are able to be used and include places where families can go to swim and fish, in particular on the Waikirikiri / Selwyn River where water quantity and quality is of particular concern.
- Stock is kept out of waterways.
- Drain management clearance methods are appropriate.
- Springs and wetlands are protected from inappropriate use and degradation.
- Alpine rivers, lakes and wetlands are protected.
- Remnant indigenous vegetation is maintained and enhanced.
- Fish passage is enhanced.

Tangata Whenua, as kaitiaki, would like to ensure their specific concerns are addressed. These are primarily about ensuring healthy ecosystems for the community and future generations: and that the mauri of rivers, streams, springs, the groundwater, wetlands and lagoons are restored and protected. They recognise the need for sustainable regional economic development and believe this is fundamentally dependent on sustaining healthy waterways. Te Waihora at the bottom of the Zone is a good indicator of catchment health. Tangata Whenua want to restore this very important area for mahinga kai, so are heavily involved in working with the Councils, industry, and landowners to ensure best practice land management is in place to address nutrient, water and other issues within the Zone. Whakaora Te Waihora and the co-governance arrangement will help to direct this work.

“Tangata Whenua Rights and Interests in Water”

The Zone Committee notes that the issue of indigenous rights to fresh water lies beyond the purview of the CWMS and is not a matter that the Committee can resolve. Indeed, indigenous rights to fresh water in Canterbury can only be resolved by Ngāi Tahu and Crown representatives as it relates to agreements reached by their predecessors under the Treaty of Waitangi (1840) and the Sale and Purchase Agreement for Canterbury (1848). That said the Committee recognises the following:

- a) That the relationship between Tangata Whenua and freshwater is longstanding;
- b) That Tangata Whenua’s relationship with water is fundamental to their culture;

- c) That water per se is valued as a taonga of paramount importance; and
- d) That the obligations to protect and enhance the mauri of water are inter-generational and must apply to all those who benefit from the use of water.

The representatives on the Committee stated:

It is worth noting that, notwithstanding the unresolved nature of their rights to freshwater, Ngāi Tahu have made it very clear that economic development is vital for the region and for the nation. Ngāi Tahu representatives on the Committee have fully participated in discussions around how best to use water for regional economic benefit while protecting, maintaining or enhancing their wider social, environmental and cultural values in water. They have been very clear that sustainable economic development is fundamentally dependent on sustaining healthy waterways. Poor water, poor economy! No water, no economy!

Water quality should therefore be the paramount determinant governing all land and water use and development, ensuring that land and water users share relative responsibility to protect, maintain or enhance environmental values as a matter of first order priority so that the water can continue to uphold economic, social and cultural endeavour for generations to come.

Ultimately, Ngāi Tahu seeks outcomes from water that:

- a) Sustain the physical and metaphysical health and well-being of waterways as a matter of first principle;
- b) Ensure the continuation of customary in-stream values and uses; and
- c) Satisfy development aspirations.

4 RECOMMENDATIONS

The ZIP identifies key areas of management and under each of these are specific recommendations being actions, tactics or strategies to address the CWMS targets. The recommendations form an integrated approach to water management and **are not to be considered in isolation**. There is overlap between

chapters, and recommendations appear in the section they are most relevant to, with no prioritisation in the order of the following sections. The aspect column signifies the subject of the recommendation and the responsibility column, those agencies who are responsible for delivering on the recommendation.

1 NUTRIENT AND WATER MANAGEMENT

Nutrient and water management is a key component of the successful implementation of the CMWS for this Zone. This section considers the actions to address outcomes for water quality, drinking water, ecosystem health and the efficient use of water. They are complementary to recommendations across all priority areas for management and therefore should be considered collectively. The committee considers that on-farm management is critical to improved water and nutrient efficiency and the outcomes sought. The committee have considered a range of non-regulatory actions to bring about a continuous and demonstrable improvement in on-farm water and nutrient management. With the target: **“for each farm to be achieving optimum practice for their land class, soil type and farm system”**. Alongside this the Committee recognises the need for a strong regulatory bottom line and the setting of water quality limits consistent with the NPS on Freshwater Management 2011¹⁰. Setting of nutrient limits will be a significant piece of work for the Zone Committee in 2012. A graduated approach is recommended from education, audited self-management, research and innovation, to regulation.

Rationale

There is a very strong need for education and extension programmes to support the continuous improvement in on-farm water and nutrient management and to harness the diverse tools and technology available, and ensure that these are communicated to land managers in a way that brings about improvements to economic and environmental performance. The Zone Committee considers that a collaborative approach is needed to research, to ensure that resources are used effectively to achieve the outcomes that meet the needs of the community, and that research outcomes are communicated in such a way that they reach the community. Also the Committee supports innovations in water and nutrient management and recognises the need share the knowledge of innovative practices.

To achieve improved farm practices there is an opportunity to use existing audited self-management¹¹ (ASM) and environmental management systems (EMS), to provide the structure that will support and verify good management practice. The Zone Committee sees a network of complementary programmes, all of which deliver continuous and verifiable improvements in water and nutrient management on farms. These can be tailored to the needs of individual properties or groups and would include some or all of the following management areas: irrigation management (e.g. soil moisture monitoring and irrigator audits), nutrient management (e.g. effluent and fertiliser management systems), soil management (e.g. controlling erosion), waterway management (e.g. riparian protection), and biodiversity management (e.g. protection of existing indigenous biodiversity). Implementation would be through land manager clusters or groups such as irrigation schemes, a water user group, or an industry. Examples are in practice - the Ellesmere Irrigation Society is working with Irrigation NZ and Environment Canterbury to identify irrigation benchmarks and an audited self-management framework. Rūnanga would like to be involved in the development of any overarching framework.

The Central Plains Water project also has an environmental management system built in, and other land managers operate under industry accreditation programmes such as those operated by Synlait and the arable industry. Other land managers outside of these groups will also benefit from a facilitated approach. A coordinated approach both within Selwyn Waihora Zone and across zones will be advantageous for those issues that cut across groups and clusters (such as the wintering of dairy cows). Therefore, the Zone Committee strongly supports the establishment of a complete network of water user / land management groups across the Zone. The Zone Committee supports the continuation and updating of industry accords, such as the Fonterra Clean Stream Accord with other stakeholder input, as a positive mechanism for improving industry practice.

¹⁰ The recently released National Policy Statement for Freshwater Management requires Regional Councils to establish freshwater quality limits for all bodies of freshwater (<http://www.mfe.govt.nz/publications/rma/nps-freshwater-management-2011/docs/nps-freshwater-mgmt-2011.pdf>).

¹¹ Audited Self-Management (ASM) is an audit system designed to verify good management practice and it can transfer day to day resource management responsibilities to users under terms agreed with regulatory authorities. It can be used as a framework to move towards optimum farm productivity, profitability, and environmental performance

The National Policy Statement on Freshwater and the CWMS Environmental Limits Target, direct the Regional Council to set water quality limits and catchment load limits, respectively. The Zone Committee has the opportunity to be the principal group to deliberate on the setting of limits in the Zone, with comprehensive engagement with the community. The development of potential limits would involve detailed economic, social, environmental and cultural modelling of the impacts of a range of limits, including detailed on-farm analysis. In addition, the Rūnanga plan to be involved in Cultural Health Monitoring of waterways and to identify limits that will protect Tangata Whenua values. This process is not to be considered in isolation and the Zone Committee support the acceleration of voluntary actions described above and other measures to improve waterway health such as riparian management, and improved flows. To give certainty to the process for setting limits requires having an understanding of the key water quality sites

and trends, associated values, and a detailed understanding of nutrient dynamics in the Zone. The committee has identified the need to ‘join the dots’ with a range of monitoring that is taking place in the Zone, along with recommendations for new monitoring sites (see section 3), to give improved certainty to future management, including nutrient limits.

The committee considers that water and nutrient management principles apply across the Zone to rural and urban alike. Darfield is the largest town in New Zealand without a sewage treatment plant. Given Darfield’s size and the growth projections, improved sewage management is considered necessary to protect groundwater. Selwyn District Council has developed an innovative approach to stormwater treatment in Lincoln and the Committee support the use of wetlands in stormwater management in all new residential development in the Zone.

Aspect		Recommendation	Responsibility	Timeline	CMWS Target
1.1	Extension and Education	<p>Develop and deliver a Zone extension programme by working with farmers and industry, covering:</p> <ul style="list-style-type: none"> • Tools and information for water and nutrient management • Water and nutrient science and monitoring • Demonstration projects using leading practitioners • Profiling leading practice via media 	Environment Canterbury working with Industry	From 2012	<p><i>Water Use Efficiency</i></p> <p><i>Ecosystem Health</i></p> <p><i>Energy Efficiency</i></p>
1.2	Management Frameworks	<p>Develop a regional management framework that allows existing complementary frameworks to ‘plug in’, with farm plans covering:</p> <ul style="list-style-type: none"> • Irrigation Management • Nutrient Management • Soils Management • Waterway Management • Biodiversity Management 	<p>Regional Committee</p> <p>Environment Canterbury</p> <p>Industry</p> <p>Zone Committees</p>	by 2013	<p><i>Water Use Efficiency</i></p> <p><i>Ecosystem Health / Biodiversity</i></p> <p><i>Energy Efficiency</i></p> <p><i>Environmental Limits</i></p>

1.3	Management Frameworks	<p>Establish a Zone network of groups of water users / land managers to facilitate the implementation of:</p> <p>Extension programmes</p> <p>Audited Self-Management frameworks</p> <p>Nutrient management</p>	<p>Environment Canterbury</p> <p>Zone Committee</p> <p>Industry</p>	From 2013	<p><i>Water Use Efficiency</i></p> <p><i>Ecosystem Health</i></p> <p><i>Energy Efficiency</i></p> <p><i>Environmental Limits</i></p>
1.4	Management Frameworks	<p>Implement audited self-management programmes for new irrigation schemes and water user groups / land management groups</p>	<p>Environment Canterbury</p> <p>Industry</p>	From 2012	<p><i>Water Use Efficiency</i></p> <p><i>Ecosystem Health</i></p> <p><i>Energy Efficiency</i></p> <p><i>Environmental Limits</i></p>
1.5	Science	<p>Establish a collaborative science model to understand and clearly communicate the Zone groundwater and nutrient pathways including any variances in nutrient levels</p>	<p>Environment Canterbury</p>	2012/2013	<p><i>Environmental Limits</i></p>
1.6	Science	<p>Develop and implement a process for sharing science and regular reporting of water quality, quantity, and biodiversity/ ecosystem health monitoring with land managers and the community</p>	<p>Environment Canterbury</p>	2012/2013	<p><i>Water Use Efficiency</i></p> <p><i>Ecosystem Health</i></p> <p><i>Energy Efficiency</i></p> <p><i>Environmental Limits</i></p>
1.7	Science	<p>Ensure water and nutrient research is targeted to address on the ground problems and the results are communicated to targeted end users.</p>	<p>Dairy NZ</p> <p>Foundation for Arable Research</p> <p>Beef and Lamb</p> <p>AgResearch</p> <p>Plant and Food</p>	ongoing	<p><i>Water Use Efficiency</i></p> <p><i>Ecosystem Health</i></p> <p><i>Energy Efficiency</i></p> <p><i>Environmental Limits</i></p>
1.8	Innovation	<p>Support trial work to establish irrigation benchmarks and the development of an irrigation toolkit to support good practice</p>	<p>Irrigation NZ</p> <p>Environment Canterbury</p>	ongoing	<p><i>Water Use Efficiency</i></p>

1.9	Innovation	Host an annual Zone workshop on innovations in water and nutrient management.	Environment Canterbury Industry Ngāi Tahu Zone Committee Waihora Ellesmere Trust Selwyn District Council	From 2012	<i>Water Use Efficiency</i> <i>Ecosystem Health</i> <i>Energy Efficiency</i>
1.10	Industry Accords	Support the continuation of Industry Accords, the review of targets, and an outcomes-based approach	Primary Industries Environment Canterbury	ongoing	<i>Environmental Limits</i> <i>Drinking water</i> <i>Ecosystem health / Biodiversity</i>
1.11	Kaitiakitanga	Monitor key waterways in the catchment through the COMAR¹² process to identify nutrient limits and flows to protect cultural values	Environment Canterbury working with Runanga	From 2012	<i>Environmental Limits</i> <i>Kaitiakitanga</i> <i>Ecosystem Health</i>
1.12	Nutrient Limits	Work through the Zone Committee under the CWMS to set water quality limits in accordance with the National Policy Statement	Environment Canterbury Zone Committee	2012	<i>Environmental Limits</i> <i>Drinking water</i> <i>Ecosystem health / Biodiversity</i>
1.13	Compliance	Support the prosecution of significant non-compliance and/repetitive non-compliance, that is financially meaningful and cost effective to carry out	Environment Canterbury	From 2012	<i>Ecosystem health / Biodiversity</i>
1.14	Sewerage	Improve community sewage systems and management for unsewered townships, prioritising Darfield and Kirwee townships	Selwyn District Council	ongoing	<i>Environmental Limits</i> <i>Drinking water</i> <i>Ecosystem health / Biodiversity</i>
1.15	Stormwater Treatment	Support the innovative treatment of residential stormwater such as the creation of artificial wetlands	Selwyn District Council	ongoing	<i>Environmental Limits</i> <i>Ecosystem health / Biodiversity</i>

1.16	Monitoring	Investigate the elevated levels of nitrates found in groundwater in some sites on the upper plains Monitor groundwater quality in the upper plains	Environment Canterbury	2013	<i>Environmental Limits</i>
1.17	Monitoring	Rationalise and integrate the monitoring networks to include: CPW, Selwyn District Council, Lincoln and Canterbury University, and private consents data	Environment Canterbury	From 2012	<i>Environmental Limits</i>

2 WATER SUPPLY

The Zone Committee regards the preservation of the high quality drinking water in the Zone as sacrosanct. The nutrient management recommendations are the principal recommendations to deliver on the drinking water targets. The two groundwater zones in the Zone are considered over-allocated, the flows in some of the spring-fed streams depleted and the energy demand from pumping deep groundwater is very high. The recommendations in the water supply section seek to address these. The role of stock water races is also considered. The development of water storage is seen as essential to be able to deliver on aspirations for returning flows in lowland streams, improving the Waikirikiri / Selwyn River flows, reducing energy demand, ensuring thriving communities who are resilient to climate change, and for sustainably increasing food production and irrigated land area as enabled by the envelope of nutrient limits. By staging development and accelerating actions to address ecosystem health and on-farm management, sustainable growth can be accommodated. The Zone Committee considers that water storage is a vital component to be able to deliver on their priority outcomes in the Zone, and working with parties on water storage options will be a major strand of work for the Committee in 2012. The Zone Committee encourages innovative water storage proposals and encourages parties to work together to share ideas and solutions that can deliver on the CWMS in the Zone and across the region.

Rationale

A reliable supply of surface water that is comparable to the current volumes of groundwater used to irrigate the upper plains (approximately 30,000 ha above SH1) is essential to achieve Zone Committee desired outcomes. Replacing deep groundwater takes with a reliable surface water supply would provide improved flows to the Selwyn/Waikirikiri and lowland streams, increase pressure and reliability of groundwater in the lower plains, reduce energy demand, and support the ability to implement nutrient and water management programmes through surface water irrigation schemes. There is the potential to increase the area of new irrigated land by up to 30,000 ha. This staged development would be dependent upon the setting, allocation, and management of nutrient limits.

To ensure highly productive systems and security of investment a highly reliable surface water supply that attains 95% reliability is necessary to achieve the switch from groundwater. Currently groundwater gives close to 100% reliability. The best measure of reliability is a combination of volume and deficit days. Volume is the amount available versus the demand and deficit days are the number of days in a season when there is less water than needed. With low reliability of more than 10 consecutive deficit days, crops can fail. Low reliability can also result in overwatering, whereby water is applied just in case, rather than just in time. Reliability is expressed in percentage terms, and can be compared to constant flow of 100% which is the case with most groundwater.

The Committee sees a potential risk to achieving the desired outcomes for lowland streams and Selwyn/Waikirikiri flows, if users who are supplied with surface water are able to transfer their groundwater consent to another part of the Zone. Restrictions on the transfer would achieve the outcome without being seen as a disincentive, ensuring there is security of supply with groundwater consent as a backup. The action required to achieve the outcome is that the groundwater consent is not used.

The Central Plains Water project could provide low 50% reliability of supply from run-of-river to the currently irrigated 30,000 ha and potential new 30,000 ha. To provide approximately 95% reliable water supply to the current irrigated 30,000 ha¹³, approximately 125 Mm³ of water storage is required. For the full 60,000 ha, approximately 250 Mm³ of water is required. The current Lake Coleridge Proposal has potential to store 100 Mm³ of water while the Lees Valley reservoir proposal could supply enough water to meet 95% reliability, but has a projected construction cost of approximately \$2B, making the cost to users potentially too high.

¹³ These numbers refer to work completed by CPW to provide certainty of reliability over 30 years. Calculations using differing rates of reliability will give a different suite of numbers.

The Zone Committee considers that it is critical that any water storage development in the Zone is able to deliver on the priority outcomes under the CWMS principles and targets and that a regional view is taken collaboratively across the region bringing together potential developers and key stakeholders for the best community outcomes. This collaborative approach could be modelled on the Te Waihora WCO process.

Selwyn District Council is currently reviewing the operation of their 360 km stock water race network. This provides the opportunity for the rationalisation of some of the network, improving the efficiency in the way water is provided for stock to drink and taking account of the development of a surface water supply network. This review provides the opportunity to continue to provide water for stock while taking the opportunity to manage some stock water races for biodiversity and community values and leaving water in rivers that would have previously been taken for the water race network.

Aspect		Action	Responsibility	Timetable	CMWS Target
2.1	Drinking Water	All drinking water supplies are safe, clean and preferably untreated	Selwyn District Council	ongoing	<i>Drinking Water</i>
2.2	Drinking Water	All new water storage developed in the Zone identifies and reports on alternatives for supply of quality drinking water to communities with low quality supplies. Priority should be given to communities with poor quality supplies.	Developers Selwyn District Council	ongoing	<i>Drinking Water</i>
2.3	Water Storage	The upper central plains are supplied with surface water for irrigation to replace existing deep groundwater supply	Regional Committee	From 2012	<i>Ecosystem Health</i> <i>Energy Security</i> <i>Irrigation Reliability</i>
2.4	Water Storage	New surface water applied, is first made available to the existing irrigated land area and : <ul style="list-style-type: none"> • Is used in conjunction with audited self-management and extension programmes. • Users supplied with new surface water are not able to transfer their existing groundwater consent. 	Regional Committee Environment Canterbury	From 2012	<i>Ecosystem Health</i> <i>Energy Security</i> <i>Irrigation Reliability</i> <i>Water Use Efficiency</i>
2.5	Water Storage	Surface water applied is next made available to potential new irrigated land area and: <ul style="list-style-type: none"> • Is used in conjunction with an audited self-management framework and extension programme • if this level of intensification fits within the envelope of nutrient limits for water quality 	Regional Committee Environment Canterbury	From 2014	<i>Irrigated land area</i> <i>Regional Economies</i> <i>Environmental Limits</i> <i>Water Use Efficiency</i>

2.6	<p>Water Storage</p> <p>Informs Biodiversity Recommendations</p>	<p>Any water storage development in the Selwyn Waihora Zone has the following desired characteristics:</p> <ul style="list-style-type: none"> • It is able to enhance Te Waihora, the Waikirikiri / Selwyn, lowland streams, hapua, and braided rivers, in accordance with the CWMS principles • Native biodiversity corridors and new wetland creation are conditions of development • The natural character, ecosystems, habitats, and recreational opportunities of braided rivers are protected or enhanced • Any mixing of waters is addressed with Te Taumutu and Ngāi Tūāhuriri Rūnanga. • Infrastructure for water storage and distribution in the upper Zone is considered as a part of an integrated catchment management approach with infrastructure for Kaitiakitanga and Te Waihora • Infrastructure is considered as part of an integrated Canterbury wide concept to achieve the best CWMS outcomes • Infrastructure is future proofed, including the ability to harness the effects of climate change projections • Water is provided first to the Selwyn Waihora Zone • Surface water supply contracts are part of an Audited Self-Management framework developed to provide for optimum water and nutrient management • The reliability of supply is high enough to incentivise surface water to replace groundwater, and meet the target of 95% reliability • The cost of development is economic for developers and water users • Increased energy security is achieved 	<p>Regional Committee</p> <p>Environment Canterbury</p> <p>Selwyn District Council</p>	<p>From 2011</p>	<p><i>Ecosystem Health/ Biodiversity</i></p> <p><i>Kaitiakitanga</i></p> <p><i>Water Use Efficiency</i></p> <p><i>Energy Security</i></p> <p><i>Irrigated Land Area</i></p> <p><i>Irrigation Reliability</i></p> <p><i>Regional Economies</i></p>
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2.7	Water Storage	<p>A collaborative process is initiated to ensure that the development of any water storage in the Zone is the best for the community under the CWMS</p> <p>Support investigations into off-stem water storage in the Zone</p>	<p>Environment Canterbury</p> <p>Developers</p> <p>Zone Committee</p>	2011	<i>CWMS Principles and Targets</i>
2.8	<p>Drainage Management</p> <p>Links to 3.12</p>	Drainage systems are modified to take any extra water from the use of surface water in the upper catchment	Selwyn District Council	ongoing	<i>Irrigated land area</i>
2.9	Stockwater Race Management	Support the rationalisation of the water race system	Selwyn District Council	From 2012	<p><i>Ecosystem Health and Biodiversity</i></p> <p><i>Wateruse Efficiency</i></p>
2.10	Stockwater Race Management	Guarantee through rationalisation, the provision of reliable stockwater, as a CWMS first order priority	Selwyn District Council	From 2012	<i>Wateruse Efficiency</i>
2.11	Stockwater Race Management	<p>Identify significant biodiversity and community values in the water race network prior to rationalisation – including wetland areas</p> <p>Protect, maintain, and provide intergenerational resources based on the water race network, including a potential aquatic biodiversity corridor as a flagship environmental enhancement project</p> <p>Re-allocate any unused water race water to the next priority according to the CWMS priorities</p>	<p>Selwyn District Council</p> <p>DOC</p> <p>Environment Canterbury</p> <p>Rūnanga</p> <p>CPW</p>	From 2012	<i>Ecosystem Health and Biodiversity</i>
2.12	Stockwater Race Management	Investigate creation of wetlands at points where races discharge by wash to ground	Selwyn District Council	From 2012	<i>Ecosystem Health and Biodiversity</i>
2.13	Stockwater Race Management	Support the enforcement of Selwyn District Council policy relating to the exclusion of stock (apart from sheep) from stockwater races	Selwyn District Council	From 2012	<i>Ecosystem Health and Biodiversity</i>

3 TE WAIHORA AND LOWLANDS

This set of recommendations relates specifically to Te Waihora and the lowland waterways. It is acknowledged that achieving aspirations for the lake and lowlands will be contingent on the management of water quality and quantity catchment wide and the collective recommendations in the ZIP will contribute to Te Waihora.

A number of the lowland waterways of the Zone are highly prized for their cultural, recreational and ecological values. Waterway habitats are highly variable and modified, and in

Rationale

Te Waihora's decline has accelerated since the 1970's, particularly since the Wahine Storm and the loss of macrophyte beds, although lake opening regimes and nutrient inflows have played a role in decline. There has, however, been a reduction in direct nutrient inflows due to the end of farming practices that discharged pollutants directly into waterways. Deep groundwater discharging directly to the lake is likely to be very low in nutrients given the age (decades to centuries) and depth of its source. However, shallow groundwater that rises in the numerous springs and flows via lowland streams to the lake, is younger (years to decades old) and contains elevated levels of nitrates. These streams rise with a mix of shallow ground water, with groundwater that is either very old and deep, or has come from the alpine rivers. This deep groundwater influence dilutes the nitrate concentrations in these streams. Changes in land management practice with nitrogen are therefore likely to take some decades to bear fruit, whereas phosphorus (which travels predominantly overland) can be dealt with much more simply and quickly through farm and riparian management.

The Committee wish to see a lowland waterways programme delivered to accelerate restoration efforts in conjunction with work to address nutrient management and water quantity. The programme should develop appropriate and realistic outcomes for each lowland waterway based on its functions and characteristics, give priority to finishing waterways where work has already started, consider particular catchments of concern, and consider spawning areas (especially for inanga and the opportunities to enhance for this¹⁴).

The drainage network in the Zone is highly significant in its size and the contribution it makes to water quantity and quality, with over 500 km of publicly managed drains and many more kilometres of privately managed drains. The drainage network is vital in its role enabling agriculture in the catchment. The Committee support a solution to drainage management that allow drains to carry out their function but also contribute to aspirations for water quality and habitat. The committee supports the Sustainable Drain Management Project initiative of the Waihora Ellesmere Trust (WET). The aim of the project is to improve the management of drains through a better understanding of costs and benefits of planting native species as a management tool, including: reduced drain maintenance costs, improvements to soil, shelter, pollination, amenity, cultural and other values.

most the nutrient levels are elevated and the flows reduced. Te Waihora is a tribal tāonga to Ngāi Tahu. The lake is an area of cultural, mahinga kai, natural, historic, recreational and commercial importance. It is regarded as outstanding for its values relating to habitat for wildlife, indigenous vegetation and fish. Te Waihora's health is in decline and it ranks as one of New Zealand's three most degraded lakes according to the Trophic Level Index. It is characterised by high nutrient and sediment levels and is classified as hypertrophic.

The Committee supports the improved management and restoration of the margins/wetlands of Te Waihora. They believe improved management and restoration should be led on public land, while working with private landowners to achieve the outcomes desired. The Regional Committee has committed to a flagship biodiversity programme for Te Waihora of \$540,000 over 5 years. The Committee also supports trial work to re-establish macrophyte beds and a number of innovative initiatives that are proposed involving: lake opening – including a permanent managed opening, the harvesting of nutrients in the lake, and vacuuming channels to remove nutrient laden sediment. The committee has identified the potential for strategic wetlands to play a role in denitrifying decades old groundwater that rises at the springs of the lowland streams, and wish to see this investigated. An approach of continuous improvement and innovation integrated across the catchment is seen as the way ahead. It is hoped that the Whakaora Te Waihora Programme will include and co-ordinate the essential components of restoring the health of Te Waihora, including:

Lake margin wetland habitat restoration

Lake margin grazing management

Lowland stream riparian management

Alternative approaches to drainage management

Improved groundwater inflows

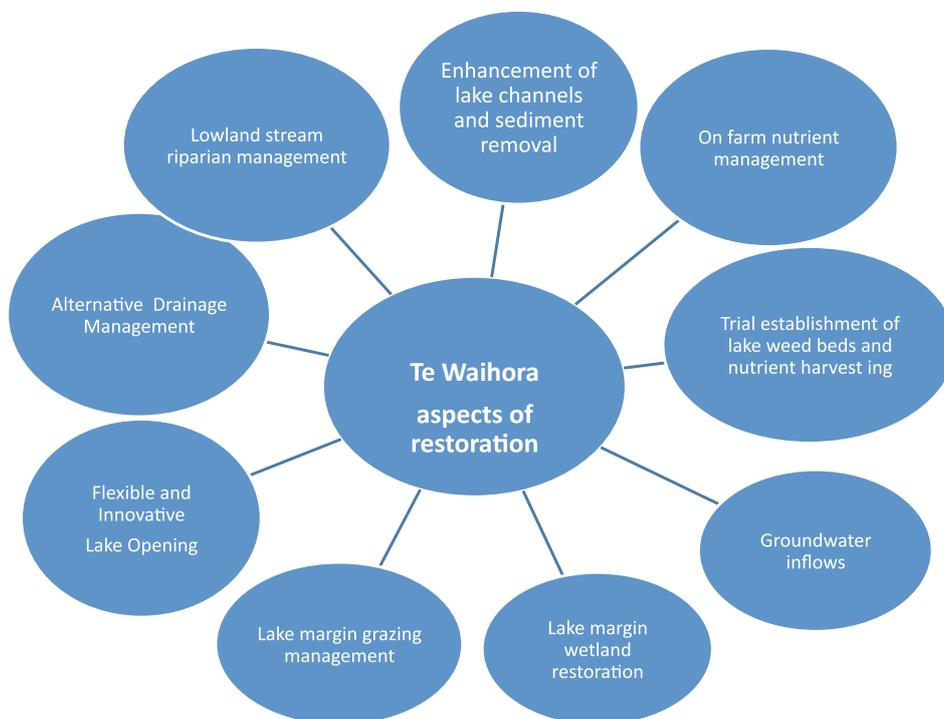
Innovative and flexible Lake opening management

Lake ruppia bed re-establishment

Lake channel enhancement and sediment removal

Improved on-farm nutrient management

¹⁴ The success of the spawning of some species in lowland streams will also link to lake openings and management.



	Aspect	Recommendation	Responsibility	Timetable	CMWS Target
3.1	Lowland Waterways	Identify lowland waterways for inclusion in a restoration programme	Environment Canterbury Te Waihora Management Board Selwyn District Council/ Christchurch City Council /DOC Community groups	2012	<i>Ecosystem Health and Biodiversity</i> <i>Kaitiakitanga</i>
3.2	Lowland Waterways	Deliver a restoration programme for prioritised waterways that includes: <ul style="list-style-type: none"> gathering baseline data and monitoring for water quality, fish passage and mahinga kai fencing and planting with landowners co-ordinating work between agencies 	Environment Canterbury Te Waihora Management Board Selwyn District Council/ Christchurch City Council Community groups	From 2012	<i>Ecosystem Health and Biodiversity</i> <i>Kaitiakitanga</i>

3.3	Lowland Waterways	Support the trial of new technologies/ initiatives to address fine sediment in streams	Environment Canterbury University of Canterbury Fish and Game Industry DOC	Ongoing	<i>Ecosystem Health and Biodiversity</i>
3.4	Lowland Waterways	Identify and protect the permanent sources of the lowland streams Initiate water quality monitoring at the spring heads Investigate the potential of the constructed strategic wetlands, at prioritised spring heads, to strip nitrates from emerging groundwater considering the need for the removal of nutrient laden material	Environment Canterbury Te Waihora Management Board NIWA Landowners Selwyn District Council/ Christchurch City Council Industry Waihora Ellesmere Trust	2015	<i>Ecosystem Health and Biodiversity</i> <i>Kaitiakitanga</i>
3.5	Lowland Waterways	Develop a video of the Harts Creek, Boggy Creek, and Tramway Reserve stories including interviews with community members as a resource for education	Environment Canterbury Industry Waihora Ellesmere Trust	2012	<i>Ecosystem Health and Biodiversity</i>
3.6	Lowland Waterways	Beginning with the Halswell River, wherever practical and where flood and erosion control is not compromised, plant native riparian species following river maintenance works and consider the removal of silt from the river bed	Environment Canterbury Industry Selwyn District Council/ Christchurch City Council Waihora Ellesmere Trust		<i>Ecosystem Health and Biodiversity</i> <i>Kaitiakitanga</i>
3.7	Lowland Waterways	Support the maintenance of the natural flow regime and character in smaller tributaries	Environment Canterbury Industry Landmanagers / Water User Groups	Ongoing	<i>Ecosystem Health and Biodiversity</i> <i>Kaitiakitanga</i>

3.8	Lowland Waterways	<p>Deliver a programme of education about managing stock and waterways including rules relating to stock management</p> <p>Enforce NRRP rules relating to stock and waterway</p>	<p>Environment Canterbury</p> <p>Industry</p> <p>Selwyn District Council/ Christchurch City Council</p> <p>Waihora Ellesmere Trust</p>	From 2012	<i>Ecosystem Health and Biodiversity</i>
3.9	Lake Margins / Wetlands	<p>Protect and restore wetlands of Te Waihora by:</p> <ul style="list-style-type: none"> • leading protection/restoration efforts on public land • prioritising actions based on their contributing to and/or achieving the desired outcomes for mahinga kai (first) and nutrient management (second) 	<p>Te Waihora Management Board</p> <p>DOC</p> <p>Selwyn District Council/ Christchurch City Council</p> <p>Environment Canterbury</p> <p>Waihora Ellesmere Trust</p> <p>Industry</p> <p>Landmanagers / Water User Groups</p>	2020	<p><i>Ecosystem Health and Biodiversity</i></p> <p><i>Kaitiakitanga</i></p>
3.10	Lake Margins / Wetlands	<p>Encourage the integration of restoration efforts around Te Waihora into a single programme</p> <p>Support the Te Waihora Immediate Steps Regional Flagship Project</p>	<p>Environment Canterbury</p> <p>Te Waihora Management Board</p> <p>DOC</p> <p>Selwyn District Council</p> <p>Industry</p> <p>Land managers / Water User Groups</p> <p>Waihora Ellesmere Trust</p>	From 2012	<p><i>Ecosystem Health and Biodiversity</i></p> <p><i>Kaitiakitanga</i></p>

3.11	Lake Margins / Wetlands	<p>Manage grazed lake margins to reduce the impact of stock on wetlands and the lake through good management practice by:</p> <ul style="list-style-type: none"> • Demonstrating good practice on public land • Working with landowners on private land • Considering lake edge purchase of land 	<p>Environment Canterbury</p> <p>Selwyn District Council</p> <p>DOC</p> <p>Christchurch City Council</p> <p>Landowners</p> <p>Industry</p>	2013	<i>Ecosystem Health and Biodiversity</i>
3.12	Drainage Management	<p>Support the ‘Sustainable Drain Management Project’</p>	<p>WET and partners</p> <p>Christchurch City Council / Selwyn District Council</p> <p>Drainage Committees</p>	2011-2013	<i>Ecosystem Health and Biodiversity</i>
3.13	Drainage Management	<p>Trial a count and return to waterways, of tuna/ eels stranded after drain cleaning</p> <p>If this is significant, develop tools to address this, using the process developed by the Waimakariri District Council as an example</p>	<p>Selwyn District Council/ Christchurch City Council</p> <p>Environment Canterbury</p> <p>Te Waihora Management Board</p>	2012	<p><i>Ecosystem Health and Biodiversity</i></p> <p><i>Kaitiakitanga</i></p>
3.14	Te Waihora	<p>Support trials on the re-establishment of lake macrophyte beds to:</p> <ul style="list-style-type: none"> • Reduce wave action, therefore reducing erosion resulting in less sediment and reduced turbidity (create clear water); • Increase juvenile fish habitat; • Increase nutrient uptake 	<p>Environment Canterbury</p> <p>NIWA</p> <p>Te Waihora Management Board</p>	Ongoing	<p><i>Ecosystem Health and Biodiversity</i></p> <p><i>Kaitiakitanga</i></p>

3.15	Te Waihora	<p>Test the feasibility of lake opening/ management regimes to enable lake level control/management that delivers improved:</p> <ul style="list-style-type: none"> • Ease for land owners to manage their properties/lake edge activities; • Temperature control for species/ algae growth; • Management of potential increased flows and lake refill; • Increased flushing and fluctuations for a healthy ecosystem; • Wetland protection • Fish access / passage for migratory fish (Sept-Nov) 	<p>Te Waihora Management Board</p> <p>Environment Canterbury</p> <p>Selwyn District Council/ Christchurch City Council</p> <p>DOC</p> <p>Landowners</p> <p>ESR</p>	ongoing	<p><i>Ecosystem Health and Biodiversity</i></p> <p><i>Kaitiakitanga</i></p>
3.16	Lake Opening	<p>Develop a new lake opening rating model that addresses the equitable attribution of costs and benefits, and is future proofed</p>	<p>Environment Canterbury</p> <p>Selwyn District Council</p>	2012	<p><i>Ecosystem Health and Biodiversity</i></p>
3.17	Te Waihora	<p>Explore the feasibility of options to enhance water flow within lake:</p> <ul style="list-style-type: none"> • including the re-establishment of channels (by dredging or vacuum methods) to help enhance suction/ removal of nutrient laden sediment in the bed of lake 	<p>Te Waihora Management Board</p> <p>Environment Canterbury</p>	2014	<p><i>Ecosystem Health and Biodiversity</i></p> <p><i>Kaitiakitanga</i></p>
3.18	Te Waihora	<p>Test the feasibility of potential lake nutrient harvesting</p>	<p>Te Waihora Management Board</p> <p>Ministry of Fisheries</p> <p>University of Canterbury</p> <p>Lincoln University</p>	2014	<p><i>Ecosystem Health and Biodiversity</i></p> <p><i>Kaitiakitanga</i></p>
3.19	Catchment Approaches Ki Uta Ki Tai	<p>Host an annual field trip for groups working in natural resource management to increase across zone connectivity and co-ordination</p>	<p>Environment Canterbury</p> <p>Te Waihora Management Board</p> <p>Zone Committee</p>	From 2012	<p><i>All CWMS targets</i></p>
3.20	Te Waihora Monitoring	<p>Install a continuous monitoring site in Te Waihora to measure salinity, temperature, dissolved oxygen, and turbidity to provide data to analyse the effect of management changes.</p>	<p>Environment Canterbury</p>	2013	<p><i>Ecosystem Health and Biodiversity</i></p> <p><i>Kaitiakitanga</i></p>
3.21	Drainage Funding	<p>Review the drainage funding model to take into account wider aspirations for drainage management</p>	<p>Selwyn District Council</p>	2012	<p><i>Ecosystem Health and Biodiversity</i></p>

4 BRAIDED RIVERS, HIGH COUNTRY, UPPER PLAINS

This set of recommendations relates to the Rakaia River and Upper Rakaia, the Coleridge lakes, the foothills, the Waimakariri River, the Upper Waimakariri, and the plains above SH1, including the hill fed rivers of the Zone. The braided rivers are highly prized and are regionally, nationally, and internationally significant. They also form the boundaries between zones,

and need particular attention. The hill and high country is the primary source of water for the Zone water and the upper plains are characterised by the hill fed waterways. Biodiversity recommendations particular to this area are found in this section, while general biodiversity recommendations are in Section 5 – Biodiversity.

Rationale

With the Rakaia and Waimakariri Rivers forming the Zone boundaries it is proposed that a workshop be held in 2012 with the adjoining Zone Committees and the Regional Committee to identify issues and actions common across the braided rivers, and identify work streams of actions particular to the specific rivers. The values of the Upper Waimakariri are under threat from wilding pine trees (and other exotic weeds) and the high water quality in the lakes is susceptible to land use impacts. Actions that co-ordinate work across agencies with an outcome focused approach are supported. The Committee supports the protection of the Rakaia River's outstanding habitat through a range of actions, including habitat protection, survey work, and management of the river mouth for multiple values and needs. The Trustpower development proposal using Lake Coleridge/Whakamatau provides the opportunity to accelerate protection

of high country wetland and braided river biodiversity. The Zone's hill fed streams are susceptible to variable rainfall in their foothill source which could become exacerbated under climate change projections. Wetlands play a significant role in the buffering of river flows, acting as water storage. Therefore the protection / enhancement of wetlands associated with hill-fed rivers are prioritised. High value biodiversity values exist on the Hororata River which are currently protected by landowners. There is the opportunity to build on this success by connecting remnant biodiversity values, including wetland vegetation. The Waikirikiri/Selwyn River is managed for flood control, however if native species could be used in a river protection role then biodiversity outcomes could be achieved and the river relieved of the high water demand of willows.

	Aspect	Recommendation	Responsibility	Timetable	CMWS Target
4.1	High Country - Coleridge Lakes	<p>Consider the following projects for environmental enhancement,</p> <ul style="list-style-type: none"> Protect from stock access and undertake weed control in all wetlands and small lakes in and associated with Lake Coleridge/Whakamatau catchment (eg Selfe, Georgina) Provide additional support to Lake Coleridge/Whakamatau Eel Trust to ensure successful development and long term implementation of management plan Complete habitat enhancement work on deltas of Lake Coleridge/Whakamatau Undertake willow control and native re-vegetation around lake margins Provide ongoing annual funding for protection of braided river birds and their habitat, fish passage, predator and weed control in the Rakaia catchment, administered through DOC for a programme similar to Project River Recovery in the Waitaki catchment 	Trust Power	From 2012	<p><i>Natural Character of Braided Rivers</i></p> <p><i>Ecosystem Health and Biodiversity</i></p> <p><i>Kaitiakitanga</i></p>

4.2	High Country – Spawning Areas	<p>Protect spawning areas and habitat of native and sports fish particularly those associated with mahinga kai and threatened species through:</p> <ul style="list-style-type: none"> • Collating existing data on the distribution of native and sport fish habitat and spawning in the high country • Conducting surveys where data are missing • Identifying areas of ecological and cultural significance and management requirements for protection • Implement actions for protection including the exclusion of trout from streams with significant populations of native fish 	<p>NIWA</p> <p>University of Canterbury</p> <p>Trustpower</p> <p>Environment Canterbury</p> <p>DOC</p> <p>Fish and Game</p>	2012-2013	<p><i>Ecosystem Health and Biodiversity</i></p> <p><i>Kaitiakitanga</i></p>
4.3	High Country – Upper Waimakariri	Develop a voluntary code of practice with Upper Waimakariri land managers to cover: stock access to waterways, protection of spawning sites, wetlands and braided river springs, land development and lake water quality	<p>Environment Canterbury</p> <p>Land Managers</p> <p>DOC</p> <p>University of Canterbury</p>		
4.4	High Country – Upper Waimakariri	<p>Support existing work by community groups and Environment Canterbury to reduce the extent of spread of wilding trees in upper Waimakariri</p> <p>Support the exemption of wilding pine trees from the provisions of the Emissions Trading Scheme where community groups are working to control the trees</p>	<p>Environment Canterbury,</p> <p>WELRA¹³</p>	Ongoing	<p><i>Ecosystem Health and Biodiversity</i></p> <p><i>Kaitiakitanga</i></p>
4.5	<p>High Country – Upper Waimakariri</p> <p>Also see Biodiversity Recommendations</p>	Support the co-ordination of work across agencies and landowners to maintain the habitat of the Upper Waimakariri River	<p>Landowners</p> <p>DOC,</p> <p>LINZ,</p> <p>Selwyn District Council</p> <p>Environment Canterbury</p> <p>University of Canterbury</p>	From 2012	<p><i>Natural Character of Braided Rivers</i></p> <p><i>Ecosystem Health and Biodiversity</i></p> <p><i>Kaitiakitanga</i></p>

4.6	Braided Rivers	<p>Identify issues common across the region's braided rivers and work streams to meet the CWMS targets</p> <p>Selwyn Waihora, Ashburton and Regional Committees identify and address outstanding issues on the Rakaia River to meeting the CWMS targets</p> <p>Regional Committee, Selwyn Waihora, Christchurch West Melton and Waimakariri committees identify and address outstanding issues on the Waimakariri River to meeting the CWMS targets</p>	<p>Regional Committee</p> <p>Zone Committees</p>	2012	<p><i>Natural Character of Braided Rivers</i></p> <p><i>Ecosystem Health and Biodiversity</i></p>
4.7	Braided Rivers – River Birds	Carry out river engineering works in a way that is sensitive to braided river birds and identify opportunities to enhance habitat through works	<p>Environment Canterbury</p> <p>DOC</p>	From 2012	<p><i>Ecosystem Health and Biodiversity</i></p> <p><i>Kaitiakitanga</i></p>
4.8	Braided Rivers – River Birds	Support existing DoC work including braided river bird surveys	DOC	ongoing	<p><i>Ecosystem Health and Biodiversity</i></p> <p><i>Kaitiakitanga</i></p>
4.9	Braided Rivers – Sport Fish	Support existing work of Fish and Game on habitat and fisheries enhancement	<p>Fish and Game</p> <p>Environment Canterbury</p>	Ongoing	<i>Recreation and Amenity</i>
4.10	Rakaia River Mouth	Investigate the impact of river flow on river mouth / hapua health	<p>Environment Canterbury</p> <p>Rūnanga</p> <p>University of Canterbury</p> <p>NIWA</p>		<p><i>Natural Character of Braided Rivers</i></p> <p><i>Ecosystem Health and Biodiversity</i></p> <p><i>Kaitiakitanga</i></p>
4.11	Rakaia River Mouth	Protocols and consents are developed to open and/ or manage the Rakaia River mouth for multiple values and needs to protect wāhi tapu, wāhi taonga and community values	<p>Environment Canterbury</p> <p>Selwyn District Council</p> <p>Rūnanga</p>	2012	<p><i>Natural Character of Braided Rivers</i></p> <p><i>Recreation and Amenity</i></p> <p><i>Kaitiakitanga</i></p>
4.12	Rakaia River	Support the Regional Committee 'Braided River' flagship biodiversity project	Regional Committee and partners	2011-2015	<i>Ecosystem Health and Biodiversity</i>
4.13	Hill fed Rivers – Headwaters and Wetlands	Protect significant wetlands associated with the sources of the hill-fed rivers in the Zone	<p>Environment Canterbury</p> <p>Selwyn District Council</p> <p>Landowners</p>	2014	<p><i>Ecosystem Health and Biodiversity</i></p> <p><i>Kaitiakitanga</i></p>

4.14	Hill fed Rivers – Hororata River Also see Biodiversity Recommendations	Work with landowners to identify opportunities to build on existing projects to protect and connect biodiversity and fish passage along the Hororata River	Environment Canterbury and partners Landowners	From 2012	<i>Ecosystem Health and Biodiversity</i> <i>Kaitiakitanga</i>
4.15	River Protection – Native Species Also see Biodiversity Recommendations	Investigate the effectiveness and use of native plant species for river protection	Environment Canterbury Landcare Research	2012-2013	<i>Ecosystem Health and Biodiversity</i> <i>Kaitiakitanga</i>
4.16	River Protection – Willow Management Also see Water Supply Recommendations	Prioritise willow removal where willows impact on water quantity and provide no river protection or biodiversity function	Environment Canterbury	2012-2013	<i>Ecosystem Health and Biodiversity</i> <i>Kaitiakitanga</i>

5 BIODIVERSITY

The alpine catchments, braided rivers and coastal lagoons of the Selwyn Waihora Zone contain species that are highly distinctive; many of which are threatened. The Selwyn Waihora Zone contains over 60% of remaining individuals of the Canterbury mudfish species and the most intact array of habitat sites including upland valleys, upper plains, wetland populations and lower plains populations. The central plains

are highly modified and in particular the loss of wetlands has been significant. The primary areas of historic wetlands have been: the high country, foothills, Selwyn/Hororata River corridor, lowland/coastal and Te Waihora margins. Biodiversity recommendations appear integrated into all previous chapters of this document, while biodiversity recommendations that cut across all sections follow.

Rationale

The mapping of wetlands location, condition and value for water quality and quantity is seen as an important first step in wetland protection. Leading the way with wetlands on public land is seen as the most important first step in wetland enhancement and restoration. There is the potential to develop new wetlands to strip nutrients where groundwater rises to surface water or where surface waters meet or move to ground, however this is not seen as a substitute for improved on-farm management.

Mahinga kai refers to traditional resources gathered for food and fibre and the actual harvesting of these resources. The first step in improving mahinga kai is a monitoring programme and the identification of key sites for restoration. There is the opportunity to integrate species used for weaving and food into restoration planting in appropriate areas.

There is the opportunity to improve biodiversity on the plains by working with industry and landowners to integrate biodiversity into farming systems through demonstration sites, local

trusted 'experts', articles in agricultural papers, existing field days/discussion groups. Furthermore biodiversity needs to be integrated into water infrastructure and into an ASM framework. The Committee would like to see remaining significant high quality examples of indigenous biodiversity on the plains protected.

The Committee has identified two priority areas for funding through the Immediate Steps programme in years 2-5. These are the Hororata River and The Upper Waimakariri Basin. This is a five year programme, of \$100,000 per annum to protect and restore freshwater biodiversity. The Committee will work with stakeholders and landowners to identify possible projects which will contribute to the outcomes which have been identified in this ZIP for Immediate Steps funding. This may include the identification of existing projects, as well as a public call for new projects. Only projects that contribute to the outcomes identified, are not contrary to the goals and targets of the CWMS, have landowner support, and are viable will be considered for funding.

	Aspect	Recommendation	Responsibility	Timetable	CMWS Target
5.1	Mahinga Kai	<p>Improve ecological health of sites important for mahinga kai species through:</p> <ul style="list-style-type: none"> Identify waterways / sites for restoration and rehabilitation of each of longfin eel, lamprey / kanakana and koura populations. Considering these sites for Year 2-5 Immediate Steps funding Implementing a monitoring programme to show the health of mahinga kai species 	Environment Canterbury working with Runanga	2012-2013	<i>Kaitiakitanga</i>

5.2	Mahinga Kai	<p>Increase abundance and availability of weaving and food species though:</p> <ul style="list-style-type: none"> • Mapping the location of plantings of weaving species • Mapping appropriate areas and habitat for each species • Providing easily accessible information about food and weaving species and their habitats • Encouraging integration of these species in restoration plantings in all appropriate areas 	Landcare Research Environment Canterbury	2012-2014	<i>Kaitiakitanga</i>
5.3	Biodiversity Corridors See Water Supply Recommendations	<p>Create a mountains to the sea, Ki Uta Ki Tai, biodiversity corridor through:</p> <ul style="list-style-type: none"> • Supporting the work of community led initiatives • Identifying options for an aquatic corridor based on a stockwater race or the Waikirikiri/Selwyn River and tributaries 	Environment Canterbury Selwyn District Council CPW Community Groups Ngai Tahu	2015	<i>Ecosystem Health and Biodiversity</i> <i>Kaitiakitanga</i>
5.4	Plains Biodiversity	<p>Collate existing information on biodiversity values on the plains</p> <p>Work towards protecting any significant examples of remaining indigenous biodiversity on plains</p>	DOC Selwyn District Council	2013	<i>Ecosystem Health and Biodiversity</i> <i>Kaitiakitanga</i>
5.5	Integration of Biodiversity into Farming Systems	<p>Develop best practice examples of integrating biodiversity into farming systems and promote these</p> <p>Develop demonstration sites for biodiversity around</p> <p>(a) on farm storage ponds; (b) shelter under centre pivots/laterals (c) shelter belts</p>	Industry Environment Canterbury Lincoln University	From 2012	<i>Ecosystem Health and Biodiversity</i>
5.6	Wetland Identification and Protection	<p>Identify remaining wetlands in the Zone</p> <p>Work towards protecting remaining wetlands</p> <p>Enforce NRRP rules relating to stock access to wetlands</p>	Environment Canterbury Selwyn District Council	2012-2015	<i>Ecosystem Health and Biodiversity</i> <i>Kaitiakitanga</i>
5.7	Wetland Enhancement	<p>Identify 3-6 significant sites in each area of historic wetlands and work with landowners to enhance and rehabilitate these wetlands</p>	Environment Canterbury Selwyn District Council Zone Committee Landowners	2014	<i>Ecosystem Health and Biodiversity</i> <i>Kaitiakitanga</i>

5.8	Wetland Management – Public Land	Manage wetlands on public land according to best practice	Environment Canterbury Selwyn District Council Christchurch City Council LINZ DOC	From 2012	<i>Ecosystem Health and Biodiversity</i> <i>Kaitiakitanga</i>
5.9	Wetland Restoration	Restore Ahuriri Lagoon as an opportunity for restoration and demonstration of best practice	Environment Canterbury	2014	<i>Ecosystem Health and Biodiversity</i> <i>Kaitiakitanga</i>
5.10	Wetlands and Water Quality	Investigate feasibility of constructed wetlands to provide a role in nutrient stripping and identify appropriate locations	Environment Canterbury	2013	<i>Ecosystem Health and Biodiversity</i>
5.11	Infrastructure Development Also see Water Supply Recommendations	Integrate biodiversity into irrigation schemes: <ul style="list-style-type: none"> • Significant biodiversity values are identified and protected during infrastructure design and development • Provision is made for biodiversity offsets • Schemes administer environmental enhancement funds, funded by annual levies from scheme members • Farm plans include biodiversity protection 	Environment Canterbury Developers	From 2012	<i>Ecosystem Health and Biodiversity</i>
5.12	Biodiversity Protection - Immediate Steps Biodiversity Project	Target Immediate Steps Funding from 2011/12 to 2014/15 to support projects in: <ul style="list-style-type: none"> • Hororata River catchment focusing on protecting and connecting springs and wetlands with remnant native biodiversity values • Upper Waimakariri catchment focusing on protecting significant spawning sites for mahinga kai species, lakes and wetlands with remnant native biodiversity values 	Environment Canterbury	From 2012	<i>Ecosystem Health and Biodiversity</i> <i>Kaitiakitanga</i>
5.13	Biodiversity Protection - Immediate Steps Biodiversity Project	Support the Te Waihora Immediate Steps Regional Flagship Project Ensure various restoration and rehabilitation efforts around Te Waihora are coordinated	Environment Canterbury Zone Committee WET Selwyn District Council/ Christchurch City Council	From 2012	<i>Ecosystem Health and Biodiversity</i> <i>Kaitiakitanga</i>
5.14	Dryland Biodiversity	Provide advice to the committee on the protection of remnant dryland biodiversity on the plains, in particular Bankside Reserve	DOC	2012	<i>Ecosystem Health and Biodiversity</i>

APPENDIX 1 - THE CANTERBURY WATER MANAGEMENT STRATEGY

The Canterbury Water Management Strategy (CWMS) provides a way forward towards the improved management and use of Canterbury's water resources. The CWMS Framework Document (Mayoral Forum 2009) sets out the key challenges, vision, principles and targets for the integrated management of Canterbury's water.

The expressed outcome of the strategy is:

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

1.1 TARGETS AND PRINCIPLES THAT MUST BE MET

Principles

The principles that underpin the CWMS will help to ensure that our water resource is managed sustainably:

Primary principles - sustainable management, regional approach and Tangata Whenua

Supporting principles - natural character, indigenous biodiversity, access, quality drinking water, recreational opportunities, and community and commercial use.

Within the regional approach is a set of priorities for planning of natural water use. These are:

First order priorities - environment, customary use, community supplies and stock water

Second order priorities - irrigation, renewable electricity generation, recreation and amenity

Targets

The strategy focuses on delivering a set of quantified outcome targets by specific dates. The outcome targets will be in the following areas:

Ecosystem health and biodiversity

Natural character, processes and ecological health of braided rivers

Kaitiakitanga

Drinking water

Recreational and amenity opportunities

Water use efficiency

Irrigated land area

Energy security and efficiency

Indicators of regional and national economies

Environmental limits

1.2 ZONE COMMITTEE AND COUNCIL'S ROLE IN IMPLEMENTATION

The Selwyn Waihora Zone Committee is a joint committee of local and regional councils operating under the Local Government Act. Their role is to co-ordinate the development and periodic review of Zone Implementation Programmes that give effect to the CWMS. Each Committee:

Seeks to develop solutions in its own zone

Facilitates community involvement and debate

Keeps relevant Councils (local and regional) and other Committees informed during the process

Must work collaboratively with neighbouring Zone Committees and the Regional Committee

The Regional Committee is a committee of the regional council, and has a focus on infrastructure associated with managing large scale storage and transfer of water across Canterbury, and with related issues such as energy generation and region-level biodiversity issues.

1.3 THE SELWYN WAIHORA ZONE COMMITTEE

The Committee is a joint committee of the Selwyn District Council, Christchurch City Council, and Environment Canterbury. The fourteen committee members are:

Peter Jackson	Chair and Community Member – Lake Coleridge
Terrianna Smith	Deputy Chair and Te Taumutu Rūnanga
Pat McEvedy	Selwyn District Council
Stewart Miller	Christchurch City Council
Donald Couch	Environment Canterbury
Clare Williams	Te Ngāi Tūāhuriri Rūnanga
Charles Crofts	Te Rūnanga o Koukourātata
Te Whe Phillips	Te Hapu o Ngāti Wheke
Robin Wybrow	Te Rūnanga o Wairewa
George Tikao	Te Rūnanga o Ōnuku
John Sunckell	Community Member - Brookside
Doug Catherwood	Community Member - Hororata
David Painter	Community Member - Greenpark
Eugenie Sage	Community Member - Lyttelton
Sue Cumberworth	Community Member – Tai Tapu

See <http://ecan.govt.nz/get-involved/canterburywater/committees/selwyn-waihora/Pages/membership.aspx#membership> for the committee member biographies.

1.4 IMMEDIATE STEPS BIODIVERSITY FUNDING CRITERIA

Projects will be assessed against ecological, cultural and zone-specific criteria. These assessments will be used by the Zone Committee to prioritise projects for funding.

Essential Project Criteria:

1. Contributes to the outcomes identified for Immediate Steps Funding in the Selwyn-Waihora Zone
2. Reflects Canterbury Water Management Strategy
 - Reflects principles and will help achieve Targets & Goals for indigenous biodiversity
 - Protects and restores habitats and ecosystems identified for biodiversity action
3. Has landowner support
4. Project viability
 - Project is feasible and cost-effective
 - Project will realistically achieve outcomes/gains it is aiming to.
 - Project is sustainable (e.g. any ongoing or future management requirements are identified and affordable)
 - No other potential costs (e.g. consent costs) that may make the project less viable and/or affordable

APPENDIX 2

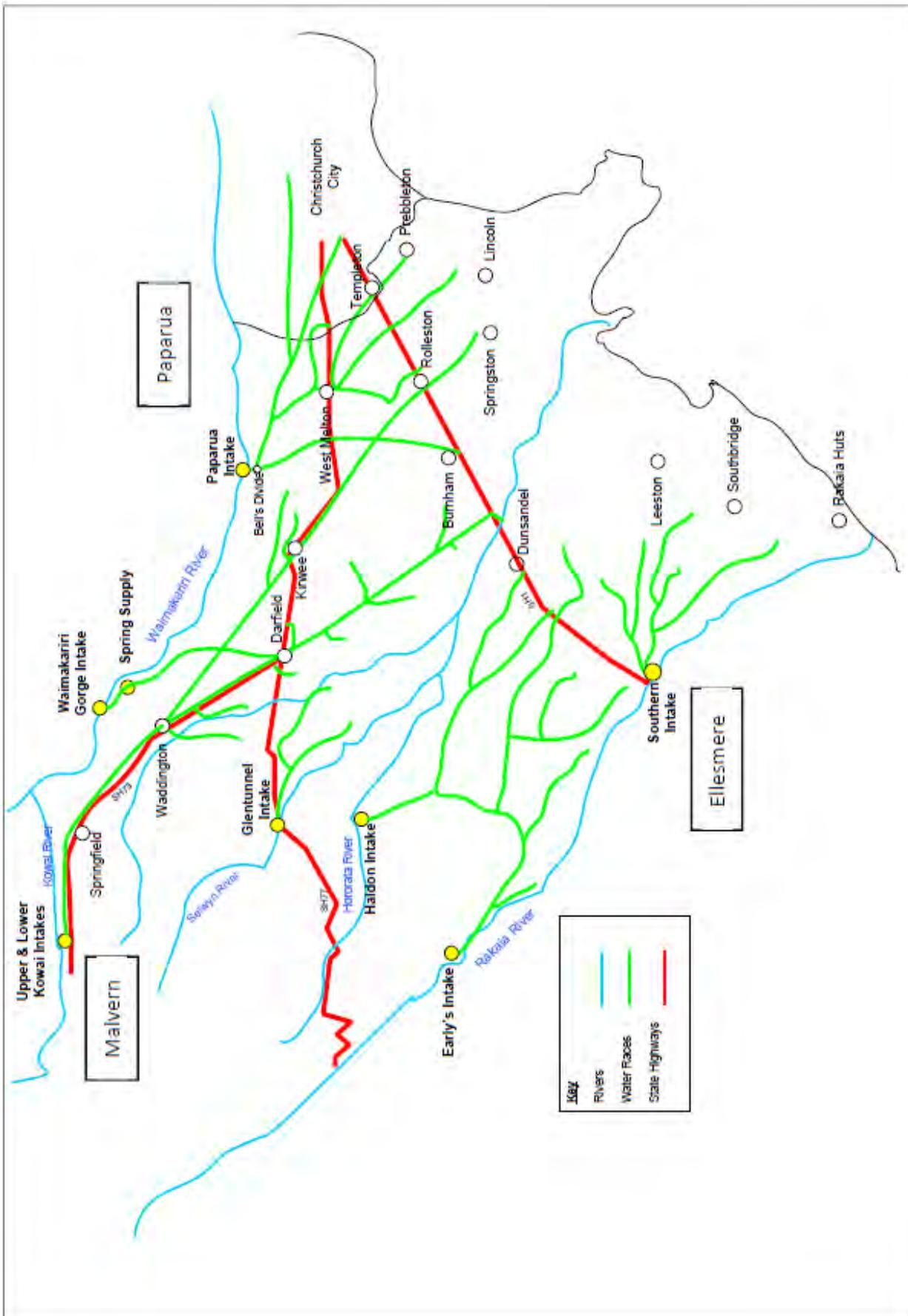
Summary of factors contributing to the nitrate-nitrogen concentration of freshwaters in the Selwyn-Waihora Zone

By Dr Vince Bidwell, for the Selwyn-Waihora Zone Committee, July 2011

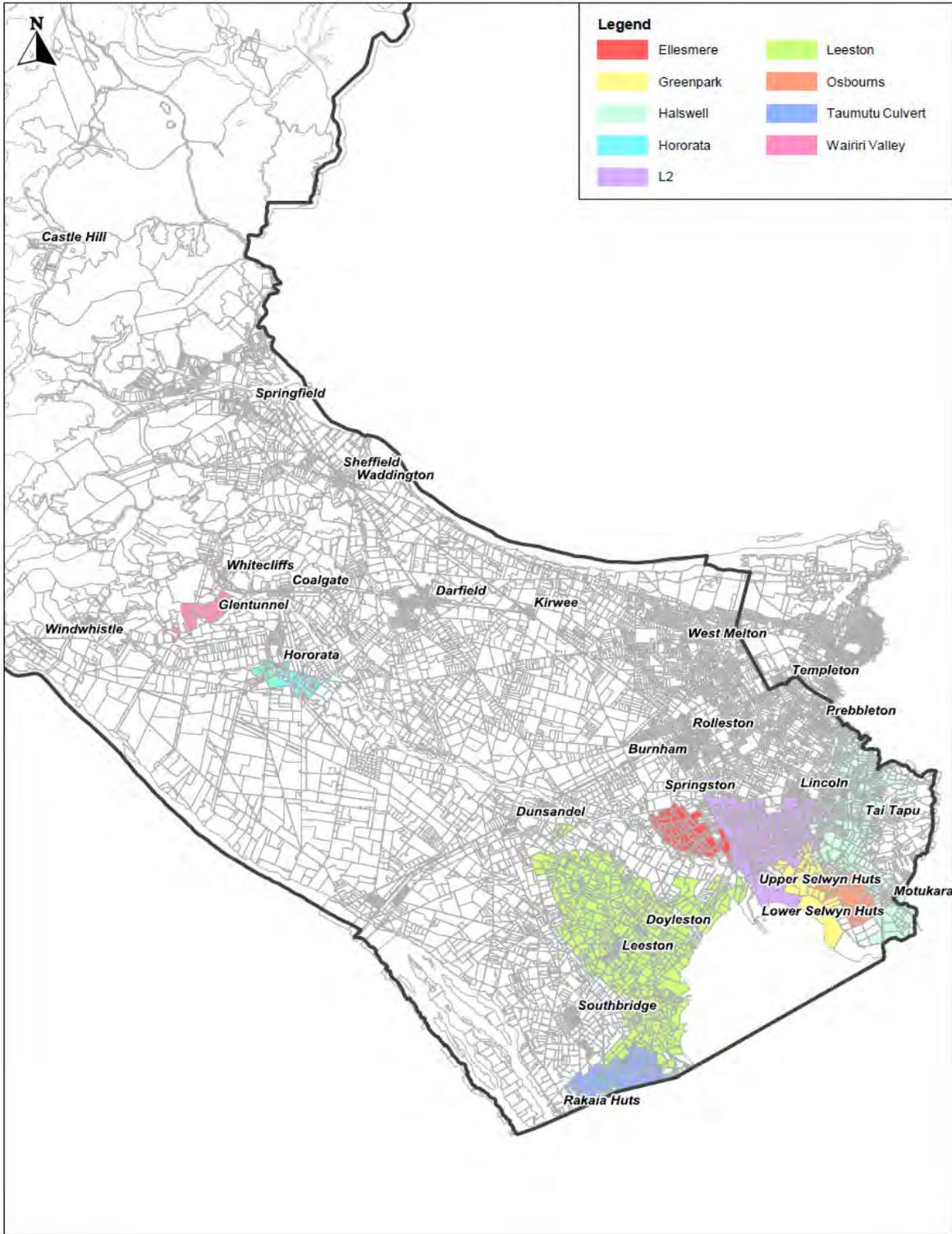
- Nitrate-nitrogen, usually referred to as “nitrate”, is one of the two dominant nutrients that determine the ecological state of freshwater bodies. Nitrate is predominantly transported into freshwaters by discharge from contributing groundwater. The other important nutrient is phosphorus, which is transported to freshwaters mainly by overland flow, as well as by sediment from stream network erosion and wind. The following notes are concerned only with nitrate, its sources, and transport pathways.
- The dominant source of nitrate in the Selwyn-Waihora Zone is agricultural land use. Nitrate occurs within soil water as one of the mineral forms of nitrogen that is readily available to plants. As a result of rainfall and irrigation, soil-water surpluses containing nitrate drain vertically downwards into the underlying groundwater. This soil-water drainage is the “land surface” component of groundwater recharge. The other component of groundwater recharge is leakage from rivers, called “river recharge”. River recharge in Canterbury usually has very low nitrate concentration.
- The springs, lowland streams, and Te Waihora, receive most of their water as discharge from the groundwater that lies beneath Central Canterbury, between the Waimakariri and Rakaia rivers. The source of this groundwater is land surface recharge, as well as river recharge from the Waimakariri, Rakaia, and foothill rivers such as the Selwyn (the lower part of the Selwyn is a lowland river fed by groundwater discharge).
- The nitrate quality of the groundwater discharge to the various lowland surface waters is determined by a blend of the nitrate qualities of the land surface and river recharge contributions to groundwater. The blend for a particular surface water body depends to some extent on its location and flow (groundwater discharge). This is because the nitrate concentration in the groundwater varies with depth and location, depending on the magnitude and location of the recharge sources.
- In Central Canterbury, the high-nitrate recharge from the land surface forms the upper layers of the groundwater body, with the low-nitrate river recharge forming the lower layers. Groundwater from adjacent layers blends together as the groundwater flow paths converge at discharge zones for surface water bodies. Thus the nitrate quality at each discharge zone is determined by the particular mix of this blending process.
- The nitrate concentration of land surface recharge from intensive agriculture is in the range of 7 to 15 (units of mg/L), whereas river recharge is less than 1 unit. The blending of these recharge sources in Central Canterbury results in nitrate concentrations in lowland streams that are in the range of about 1 to 7 units.
- Long-term changes to these current levels of nitrate in lowland waters would be expected as a consequence of any long-term changes in land use or river recharge processes.

APPENDIX 3

Selwyn District Water Race Network

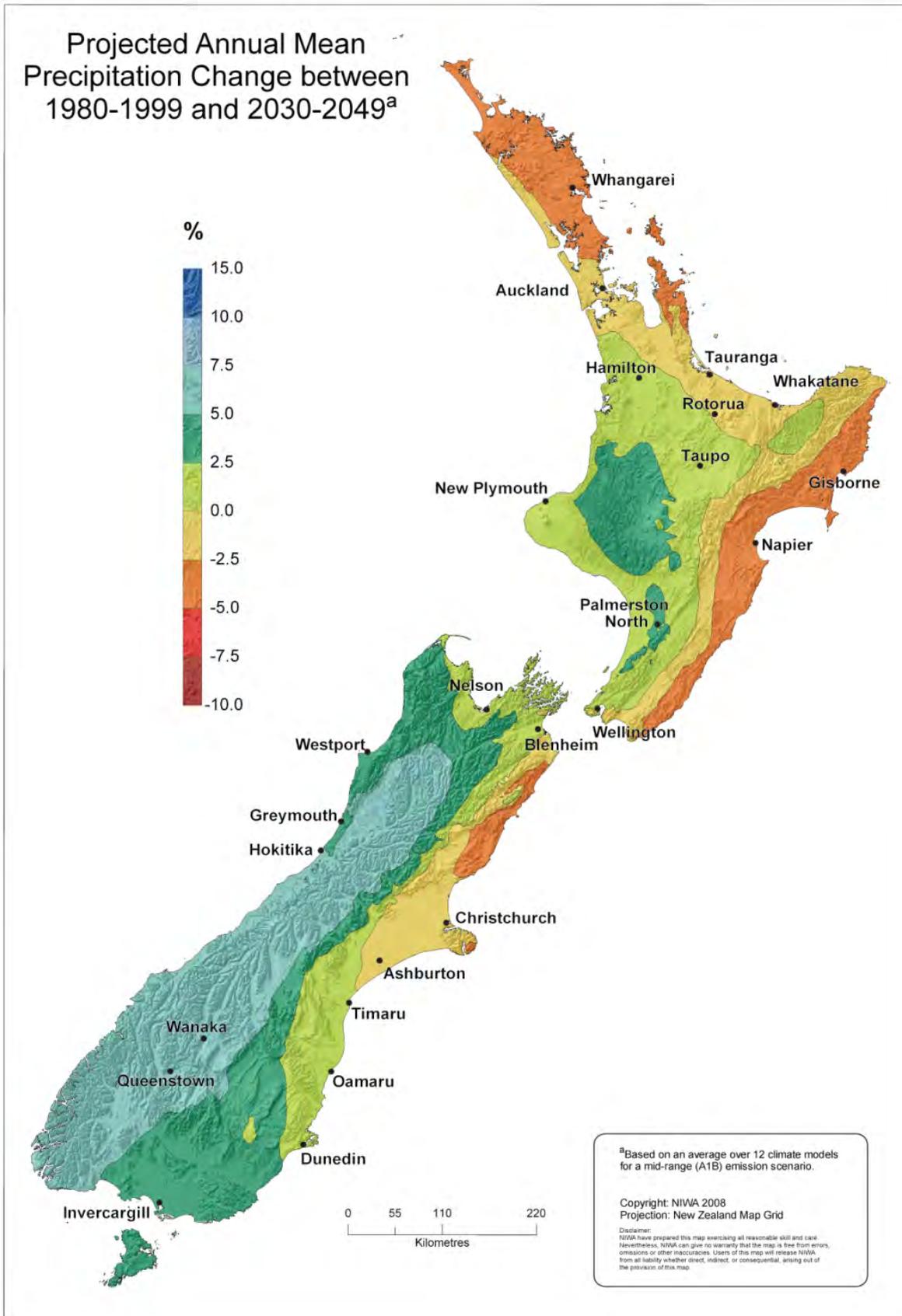


Selwyn District Drainage Network

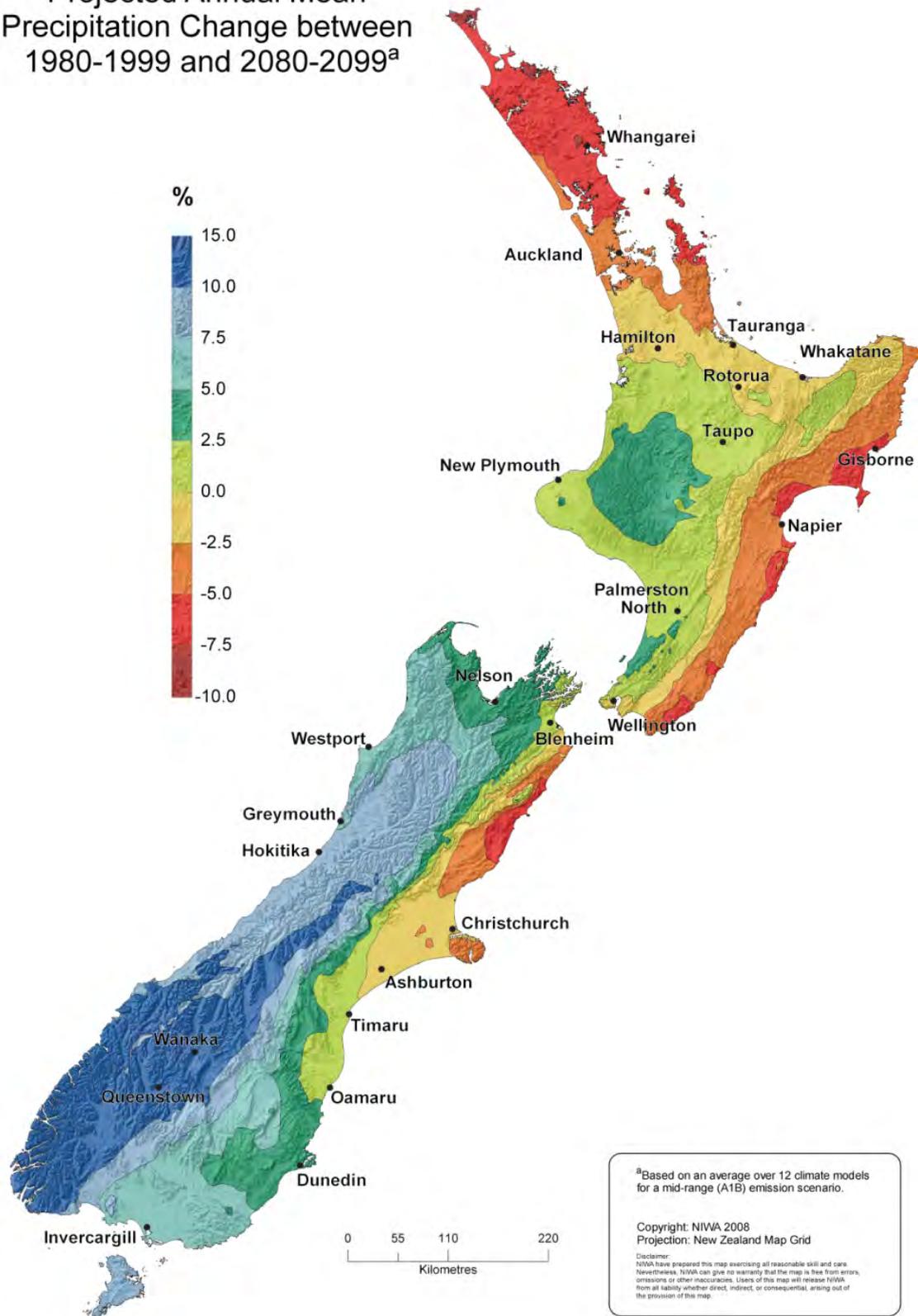


Key Data: Constructed 1850 onwards

No. schemes	10 rated
Total Area	20,700 hectares
Total Annual Cost	\$217,400



Projected Annual Mean
Precipitation Change between
1980-1999 and 2080-2099^a



^aBased on an average over 12 climate models for a mid-range (A1B) emission scenario.

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APPENDIX 4 PRESENTATIONS / REPORTS TO THE ZONE COMMITTEE

Presentation Title	Date	Presenter /Organisation
Selwyn Waihora - Observations on water resources	Sept 2010	Ken Taylor, Environment Canterbury
Canterbury Water - Demand, Efficiency Reliability	Nov 2010	John Bright, Aqualinc
Water Quality Issues – Background	Nov 2010	David Kelly, Environment Canterbury
Irrigation 101	Nov 2010	Andrew Curtis
Preliminary Strategic Assessment Briefing for CWMS Regional Committee	Dec 2010	Dr Brett Painter Environment Canterbury
Nutrient Management and the Land Use and Water Quality Project	Dec 2010	Ian Brown Environment Canterbury
Te Waihora/ Ellesmere Catchment Regional Water Plan	April 2011	Lynda Weastell Murchison. Environment Canterbury
CWMS and Regional Planning in the Selwyn Waihora Zone	April 2011	Commissioner Peter Skelton Environment Canterbury
Mana Whenua	April 2011	Te Rūnanga o Ngāi Tahu
Lincoln Stormwater Consent Application	April 2011	Selwyn District Council
2011 Water Race Strategic Review	April 2011	Selwyn District Council
White Water NZ	May 2011	Graeme Wilson White Water Canoe Club
Potential Lake Coleridge Development - CWMS Alignment	Jun 2011	Chris O’Hara, Peter Lilley Ian Lees TrustPower
Selwyn District Land Drainage Scheme	June 2011	Hugh Blake-Manson Selwyn District Council
Drinking Water and Public Health	June 2011	Peter Burt Ministry of Health
Irrigation and Groundwater	June 2011	John Bright
Nitrate concentration of freshwaters	June 2011	Vince Bidwell
Central Plains Water	July 2011	Central Plains Water Ltd
Integrated groundwater, surface water, and groundwater system	Aug 2011	Dr Brett Painter Environment Canterbury
Report Title	Date	Author /Organisation
Strategic Assessment – Lake Coleridge Initiative	Mar 2011	TrustPower
Coleridge Development Proposal – Environmental Enhancement Opportunities	Mar 2011	TrustPower
Te Rūnanga o Ngāi Tahu Freshwater Policy	1999	TRONT
Strategic Assessment of Kaitiaki Targets – Lake Coleridge	Feb 2011	Tipa and Associates
Te Waihora Catchment – Ecological Values and Flow requirements	May 2011	Golders Associates
Modelling of stream discharge and groundwater levels in the Te Waihora / Lake Ellesmere catchment.		Howard Williams, Elemental Geoconsulting
The Surface Water Resource of Lake Ellesmere/ Te Waihora Catchment	Jul 2011	Dan Clark. Environment Canterbury
Field Trips		
Te Waihora and lowland streams	Oct 2011	
Nutrient Management under various farming systems	Jan 2012	
Dairy Farm, Upper Selwyn/Waikirikiri, Hororata River,	April 2012	
Biodiversity protection sites	Aug 2012	

APPENDIX 5

Glossary of Māori terms

<i>Kaitiaki</i>	Guardians, custodians
<i>kaitiakitanga</i>	The exercise of guardianship by the Tangata Whenua of an area in accordance with tikanga Māori in relation to natural and physical resources; and includes the ethic of stewardship
<i>ki uta ki tai</i>	From the mountains to the sea
<i>mahinga kai</i>	Food and places for obtaining natural foods and resources. The work (mahi), methods and cultural activities involved in obtaining foods and resources.
<i>mauri</i>	Life supporting capacity; spiritual essence; life, health and vitality; Mauri is the traditional measure of physical, spiritual and/or emotional wellbeing of people and places.
<i>mātauranga Māori</i>	Māori traditional knowledge and systems. Mātauranga takes many forms, including language (te reo), traditional environmental knowledge (tāonga tuku iho, mātauranga o te taiao), traditional knowledge of cultural practice, such as healing and medicines (rongoā), fishing (kai moana) and cultivation (mahinga kai).
<i>Ngāi Tahu</i>	Iwi with Tangata Whenua status in Canterbury and the South Island, excluding the northern part of the island.
<i>Papatipu Rūnanga</i>	The modern day administrative councils and representatives of Ngāi Tahu hapū and whanau. Each Rūnanga has its own area (rohe /takiwā) determined by natural boundaries such as mountain ranges and rivers.
<i>Rangatiratanga</i>	Chieftainship.
<i>Tangata Whenua</i>	Those with traditional status, rights and responsibilities in an area, based on their traditional takiwā.
<i>Taonga</i>	Treasured possessions, both tangible and intangible.
<i>Taonga raranga</i>	Plants which produce material highly prized for use in weaving.
<i>Tikanga</i>	Rights, customs, accepted protocol, rule, Māori traditions, lore or law, the correct Māori way.
<i>Wāhi taonga</i>	Places and resources of historical and traditional significance often linked to significant mahinga kai values.
<i>Wāhi tapu</i>	A place sacred to Māori in a traditional, spiritual, religious, ritual or mythological sense (section 2, Historic Places Act 1993).

General Glossary

<i>Adaptive management</i>	A structured process of decision making using system monitoring in order to respond to change or uncertainty.
<i>Allocation</i>	The volume of water that may be taken from a fresh water resource by resource consent holders.
<i>Audited self management</i>	ASM is a process where collective groups manage their resource use and activities to verify their adherence to good practice to achieve set outcomes
<i>Ecosystem</i>	Plants, animals, their physical environment and the dynamic processes that link them.
<i>Groundwater</i>	Water located underground in rock crevices and pores /layers of geological material, groundwater supplies wells and springs.
<i>Intensity of land use</i>	The concentration of the use of the land through activity or productivity.
<i>Limit</i>	To define the capacity for use of a resource, e.g. maximum water take, minimum discharge quality or receiving water quality standards.
<i>Natural character</i>	The natural flow regimes, dynamic processes and biodiversity of rivers are still in place, and the interdependence of waterways, land and coastal systems are intact.
<i>Riparian planting</i>	Planting usually of indigenous plants on the banks of rivers or streams to reduce erosion, stock access and pollution run off into a waterway.
<i>Target</i>	A biological (eg species abundance), physical or chemical (eg temperature or concentration) indicator representing objectives for environmental protection.
<i>Values</i>	Values of water bodies include uses by people (drinking water, mahinga kai, recreation, irrigation hydro-generation) and intrinsic values (ecological, cultural, aesthetic, natural character).
<i>Wetlands</i>	Wetlands are areas that are intermittently or permanently wet, shallow water and land water margins that support plants and animals that are adapted to the wet conditions.

Everything is connected

*Promoting quality of life through
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