Whakaora Te Waihora

Joint Cultural and Ecological Restoration Plan

Approved by the Te Waihora Co-Governance Group on 9 December 2011

Overview of document structure

This is what we want to achieve in the whole catchment & why it is important to us

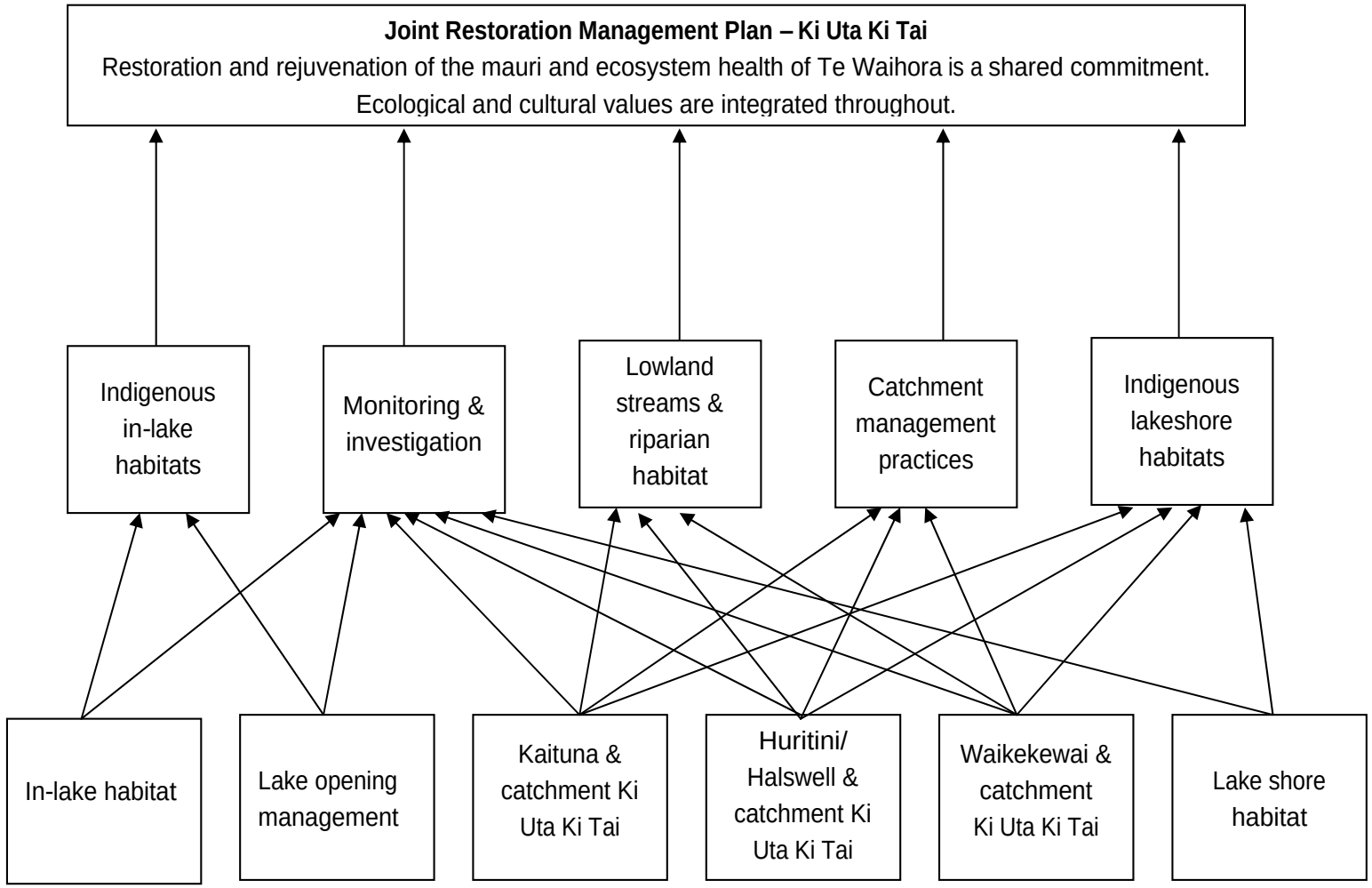
Project vision & overview [Chp 1 & 2]

This is what we would like to achieve over two generations & why it is important to do it

Two-generation outcomes & management opportunities [Chp 3]

This is how we are going to start

Five year work programmes for six focus areas [Chp 4]



Executive summary

Whakaora Te Waihora is a joint programme between Ngai Tahu and Environment Canterbury, with a shared commitment to the restoration and rejuvenation of the mauri and ecosystem health of Te Waihora (Lake Ellesmere) so that it continues to provide current and future generations with the sustenance, identity and enjoyment that it has to those in the past. This joint restoration plan was approved by the Te Waihora Co-Governance Group on 9th December 2011.

This plan is based on the following aims, set out in the Memorandum of Understanding signed between the Te Waihora Management Board representing Te Runanga o Ngai Tahu, Ministry of the Environment and Environment Canterbury:

- Accelerate the restoration of ecosystem health of an internationally significant wetland, notable for its outstanding wildlife and native vegetation values.
- Begin the process of restoring and enhancing specific cultural sites and mahinga kai.
- Protection and restoration of lake margin wetland habitats, existing indigenous vegetation and wildlife and restoration of specific lowland tributary streams and riparian habitats.
- Improved lake and catchment management practices by focusing on sustainable land use and drainage practices within the catchment.
- Establish a robust monitoring and investigations programme that ensures the lake response to management is understood and management activities are adapted accordingly.

These outcomes will be achieved in the context of Ki Uta Ki Tai, mountains to the sea integrated catchment management.

Key outcomes, values, threats and long term management options for five topic areas are outlined – protecting in-lake habitat; protecting lake shore habitats; restoration of specific lowland tributary streams and riparian habitat; improved catchment management practices; and monitoring and investigations to drive adaptive management. These topic areas integrate cultural and ecological values and considerations throughout.

A coordinated approach to action over the next five years will be achieved through integrating action in six focus areas: Kaituna Ki Uta Ki Tai; Halswell/Huritini Ki Uta Ki Tai; Waikekewai Ki Uta Ki Tai; Improving in-lake habitat; Lake opening management; and Protecting lake shore habitat. Monitoring and project management actions are listed for the whole Te Waihora catchment.

Actions are focused on achieving both visible and meaningful improvement in ecosystem health in the existing five year funding timeframe; while also providing a solid basis for understanding and implementing future management actions which will achieve the outcomes of Whakaora Te Waihora over the next two generations.

The success of Whakaora Te Waihora is dependent on the collective contributions from supporting partners including central and local government, landowners, industry, universities and education providers, non-government organisations and the wider community. The implementation of this programme will focus on working with landowners, managers and stakeholders to identify the best way to achieve the desired outcomes.

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1. Te Waihora

Te Waihora is an area of cultural, natural, historic, recreational and commercial importance to many people. It is of national importance for the protection of wildlife habitats and ecological functioning and internationally the lake is significant for many visiting migratory bird species.

Te Waihora is the largest lake, by area, in Canterbury and is a important link in the chain of coastal lagoons and esturaries along the east coast of the South Island. The lake shore margins support what is now the most extensive area of contiguous wetland habitat in the lowlands of the eastern South Island. The lake's catchment includes the foothills which feed the Selwyn River, the groundwater aquifers of the Canterbury Plains between the Waimakariri and Rakaia Rivers which surface as springs feeding the many lowland streams entering Te Waihora, and the hill-fed catchments of the northwestern edge of Banks Peninsula (map 1).

To Ngai Tahu Whanui, Te Waihora represents a major mahinga kai and an important source of mana. Te Kete Ika a Rakaihautu – The Fish Basket of Rakaihautu – is the original name for the lake. Te Kete Ika means "the fish basket" and exemplifies the once rich and bountiful resources of Te Waihora – "the flat spread-out waters". These resources, their sustainable management and use and the spiritual connection to Te Waihora are taonga (valued resources, treasures). The restoration of Te Waihora is of paramount importance to Ngai Tahu.

The ability of Te Waihora to sustain people as a mahinga kai is upheld in the whakatauki (tribal proverb) from Taumutu:

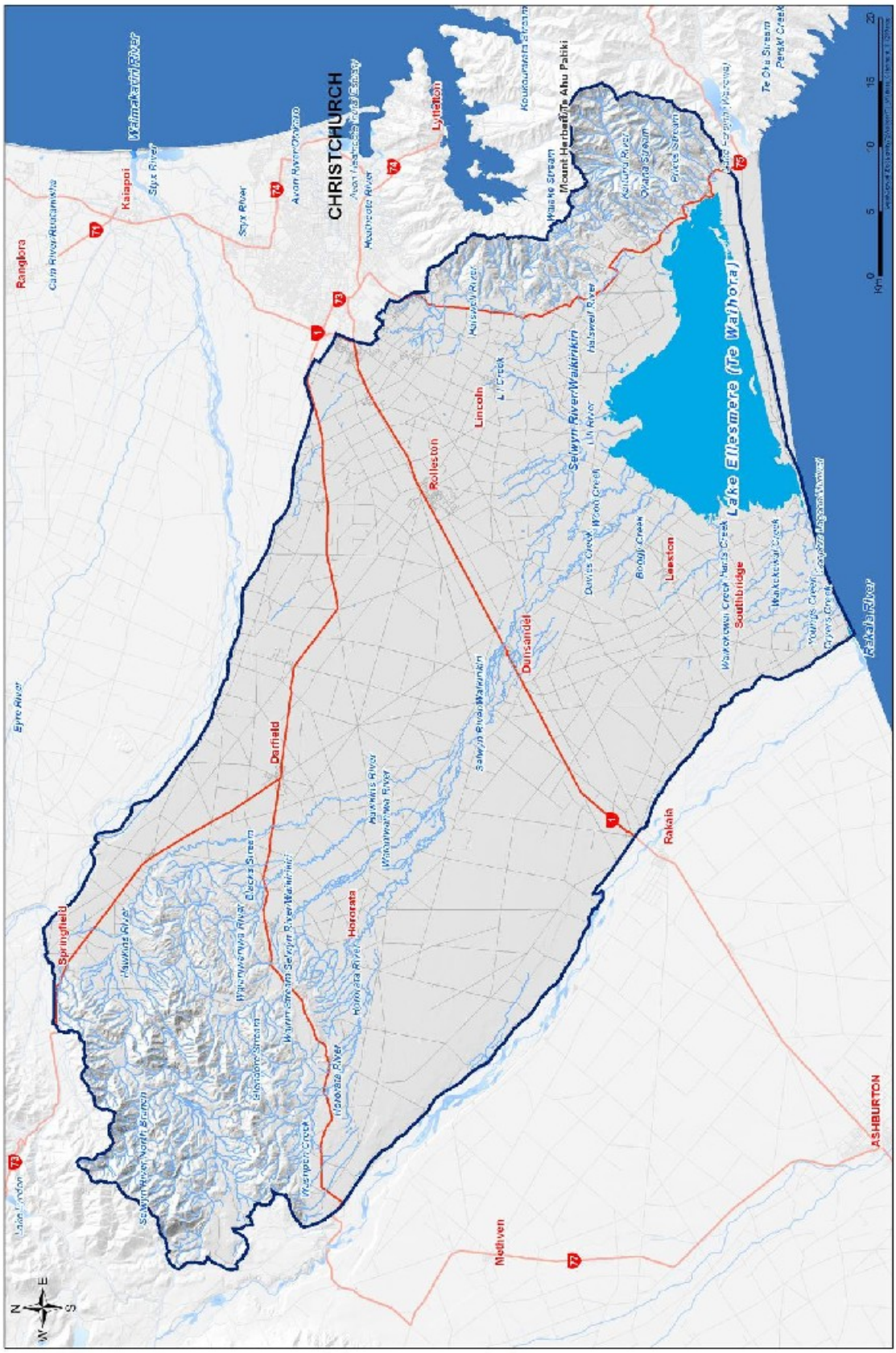
"Ko nga hau ki etahi wahi, ko nga kai ki Orariki" – No matter which way the wind blows you will always eat at the pa of Orariki, Taumutu.

Simply stated, this whakatauki proclaims that no matter the season, you could always procure food from the Te Waihora environment.

Mahinga kai

Mahinga kai includes the way resources are gathered, the places they are gathered from and the actual resources themselves. The mahinga kai resources are taonga because they enabled and sustained life in the southern environment and constituted a major food source of the area. Of all the resources gathered at Te Waihora, the plentiful fish, particularly tuna/eel and patiki/flounder, are most valued.

Mahinga kai encompasses the social and educational elements of food gathering. It includes customs practised in accordance with rangatiratanga, kaitiaki and whakapapa. Particularly with regard to kaitiaki, tangata tiaki have a role to implement and pass down customs and associated sustainable management methods, including the use of animal and plant species as tohu. In this way, mahinga kai ensures the continuation of traditional practices and the passing down of values to children and grandchildren, ensuring the survival of the practices through the generations.



Map 1: Te Waihora catchment

Mauri and wairua

All things are considered to have the qualities of wairua (spiritual dimension) and mauri (life force), to be living and have a genealogical relationship with one another. For Ngai Tahu, mauri is the life force that flows from wairua – the spirit or source of existence and all life. Mauri is the life force in the physical world as perceived and interpreted by the tangata whenua. As a life principle mauri implies health and spirit. In the environment, mauri can be used to describe the intrinsic values of all resources and the total ecosystem. It is of paramount importance to the well-being of the people.

The protection of mauri is enhanced by the use of mahinga kai and the resultant knowledge of the natural resources and their interactions with the wider environment. The preservation of the mauri of all natural resources is essential to Ngai Tahu to ensure that natural and physical resources may be used sustainably by present and future generations.

For Te Waihora, mauri can be tangibly represented in terms of elements of the physical health of the ecosystem. While there are also many intangible qualities associated with the spiritual presence of Te Waihora, tangible elements such as the presence of indigenous flora and fauna, life-supporting capacity, fitness for cultural usage, ecosystem robustness and productive capacity can be used to reflect the status of mauri.

Mauri should not be desecrated. Although Te Waihora continues to be a productive environment, its mauri has been degraded since human settlement, by introduced species, substantially reduced water inflows, increased sediment and nutrient inflows from the catchment and a decreasing availability of mahinga kai resources. Further degradation of the mauri of Te Waihora would remove its capacity to support traditional practices and values.

The Te Waihora Management Board

In today's management terms for Te Waihora, the resultant kaitiaki roles and responsibilities of all hapu with areas surrounding Te Waihora have been recognised through the establishment of the Te Waihora Management Board (TWMB). Representatives from the six Papatipu Runanga, who have customary association with the lake, form the TWMB. The Board is made up of eight members, three appointed by Te Taumutu Runanga who also appoints the Chair of the Board in recognition of their ahi ka status.

The six runanga that make up the Board are:

- Te Taumutu Runanga
- Te Ngai Tuahuriri Runanga
- Wairewa Runanga
- Te Hapu o Ngati Wheke/Rapaki Runanga
- Te Runanga o Koukourarata
- Te Runanga o Onuku.

The TWMB acts as an advisory body to Te Runanga o Ngai Tahu with regard to the implementation of the Te Waihora Joint Management Plan and the management of Te Waihora. The Board also represents Te Runanga o Ngai Tahu with Environment Canterbury as part of the newly formed Co-Governance Board for Te Waihora and its catchment.

A. Values

Te Waihora is valued by many people for many reasons. The following is a brief summary of some of these values, largely drawn from the Te Waihora Joint Management Plan. While we have considered all of these values in the development of this joint restoration plan, we feel they have been comprehensively documented elsewhere and repeating them in detail here is not necessary. We instead refer people to other documents such as the Te Waihora Joint Management Plan, DOC & Ngai Tahu; Te Taumutu Natural Resources Plan; and the 2009 report: State of the Lake and future management. Appendix 1 gives further historical background for Te Waihora.

Cultural – the management and sustainable use of the traditional food and cultural resources of Te Waihora upholds and enhances the rangatiratanga and kaitiaki role of Ngai Tahu in recognition of this tribal taonga.

Wildlife habitat and biodiversity – Te Waihora is a nationally significant area for wetland biodiversity. It is a wetland of predominantly open water, with swampland, saltmarsh and other lake margin habitats influenced by fluctuating lake levels and wind-induced water movement. The lake provides habitat for numerous species of birds – including waterfowl, wading and migratory types – and a wide variety of plant, fish and invertebrate species. The large numbers of vegetation types reflect the great diversity of habitat around the shoreline of Te Waihora.

Commercial and other activities – commercial uses occur within Te Waihora along with other public and agency activities. The lake community values these commercial activities, which are based on the natural and ecological values of Te Waihora.

Historic resources **–** historic Maori occupation around Te Waihora and ensuing Ngai Tahu and European settlement has positioned Te Waihora as an important part of Canterbury's heritage.

Landforms and landscapes – the flat, spread out nature of Te Waihora is a prominent feature of Nga Pakihi Whakatekateka o Waitaha/the Canterbury Plains. Te Waihora, as a large brackish coastal lake is a distinctive landform type in New Zealand but is also one that is rare internationally.

Recreational use and public access – Te Waihora provides a high quality recreational area for many user groups including fishers, game bird hunters, water-based recreationalists, birdwatchers and those enjoying the wide-open spaces.

2. Whakaora Te Waihora – Joint Restoration Plan

A. Vision

Whakaora Te Waihora is a joint programme between Ngai Tahu and Environment Canterbury with a shared commitment to the restoration and rejuvenation of the mauri and ecosystem health of Te Waihora (Lake Ellesmere) so that it continues to provide current and future generations with the sustenance, identity and enjoyment that it has to those in the past.

B. Aims & Ki Uta Ki Tai

This joint restoration plan is a component of the Whakaora Te Waihora programme. A Memorandum of Understanding (MOU) was signed between the Te Waihora Management Board representing Te Runanga o Ngai Tahu, Ministry of the Environment and Environment Canterbury on 25 August 2011. With regards to this joint restoration plan and the associated funding, the MOU gives the following aims:

- Accelerate the restoration of ecosystem health of an internationally significant wetland, notable for its outstanding wildlife and native vegetation values.
- Begin the process of restoring and enhancing specific cultural sites and mahinga kai.
- Protection and restoration of lake margin wetland habitats, existing indigenous vegetation and wildlife and restoration of specific lowland tributary streams and riparian habitats.
- Improved lake and catchment management practices by focusing on sustainable land use and drainage practices within the catchment.
- Establish a robust monitoring and investigations programme that ensures the lake response to management is understood and management activities are adapted accordingly.

These are long-term outcomes which will be achieved in the context of Ki Uta Ki Tai. Ki Uta Ki Tai is central to Ngai Tahu resource management philosophy – it is a way of understanding the natural environment, including how it functions, how people relate to it and how it can be looked after appropriately. It involves not only a planning and policy framework, but also the development of monitoring, reporting, geographical information system analysis, information databases, area management and succession tools for natural resource management.

It is important to recognise the significance of water to Ngai Tahu. Water is a taonga of the utmost importance, playing a central role in the culture, traditions and ongoing identity of the iwi particularly in relation to mahinga kai. Water is a source of food and physical sustenance and is of significance with regard to mana and spiritual nourishment.

Ki Uta Ki Tai considers that as water flows from the mountains to the sea, so too should resource management. The health of Te Waihora will be improved by planning and achieving meaningful and integrated restorative actions within the whole lake catchment.

Ensuring the health and well-being of water is a prerequisite for ensuring the continued health and well-being of mahinga kai resources and ultimately the people. It is those things that threaten the health of the resources of Te Waihora that are of the greatest concern to Ngai Tahu.

C. Document structure

Chapter 3: In response to the long-term outcomes chapter 3 gives a two-generation context to cultural & ecological values and management opportunities under each of five topic areas:

- Protection of existing indigenous in-lake habitats
- Protection of existing indigenous lake shore habitats
- Restoration of specific lowland tributary streams & riparian habitat
- Improved catchment management practices
- Robust monitoring and investigations drives adaptive management.

Chapter 4: The coordinated approach to the five year work programme centres on six focus areas; justification and detailed work programmes for each of these are given in chapter 4:

- Kaituna Ki Uta Ki Tai
- Halswell/Huritini Ki Uta Ki Tai
- Waikekewai Ki Uta Ki Tai
- Improving in-lake habitat
- Lake opening management
- Protecting lake shore habitat.

Monitoring and project management actions will be undertaken across the whole Te Waihora catchment.

D. Relationship to other documents

There are a number of planning instruments and documents that have been drawn on and influence the Joint Restoration Plan. These documents will require consideration throughout the development and implementation of Whakaora Te Waihora. Where specific matters of relevance to the various plans are found, recognition and consistency should be reflected where this is appropriate.

Key plans and documents include:

Te Waihora Joint Management Plan: This document focuses on the lands of the Department of Conservation and Ngai Tahu around Te Waihora. The core aspirations are reflected in Whakaora Te Waihora to ensure the Joint Management Plan is given effect to.

Te Taumutu Natural Resources Plan: This Iwi Management Plan reflects the kaitiaki responsibilities of Te Taumutu Runanga and is supported through the actions listed in the Whakaora Te Waihora Restoration Plan. Te Taumutu Runanga is also acknowledged in the introduction to Whakaora Te Waihora.

Regional and Territorial Authority Resource Management Plans: Actions in Whakaora Te Waihora will take into account the range of resource management mechanisms such as rules which form part of the Natural Resource Regional Plan, and the respective plans of the Christchurch City and Selwyn District. It is important that Whakaora Te Waihora is consistent with those plans to fulfill the statutory obligations of the partners.

Long-Term Plans under the LGA: It is anticipated that a number of actions in Whakaora Te Waihora and future restoration activities will feed into and influence the Long-Term Plans of the local authorities to ensure the respective local authorities are capable of delivering on priority issues under their jurisdiction and providing appropriate ongoing support.

Canterbury Water Management Strategy and Selwyn-Waihora Zone Implementation Programme: The acceleration of current riparian and management programme for Te Waihora and tributary streams is a goal of the CWMS and the Selwyn-Waihora ZIP reflects the importance of Te Waihora in the zone. The aspirations and actions outlined in the ZIP have been incorporated into this plan, as one means of giving effect to the ZIP.

Other plans of significance include Te Whakatau Kaupapa; Ngai Tahu Freshwater Policy; Ngai Tahu 2025; Te Waihora Water Conservation Order; National Policy Statements; Canterbury Conservation Management Strategy; North Canterbury Fish and Game Management Plan; South Island Eel Management Plan; Te Waihora Eel Management Plan.

E Ongoing stakeholder involvement

There are currently many activities being undertaken in the Te Waihora catchment, by a variety of stakeholders, agencies and community groups, which contribute to some or all of the aims of Whakaora Te Waihora (Map 2 gives an example of some of these). The importance of these activities is acknowledged, and this plan aims to continue, complement or accelerate existing activities, rather that replace them.

Collaboration and coordination with landowners, stakeholders and the wider community will be essential to the achieving the vision of Whakaora Te Waihora. The intent is that the project will be implemented with a strong focus on working with landowners and stakeholders to find the best way of achieving the outcomes sought.

The project manager will work closely and openly with key stakeholders in the development of the operational plan, acknowledging the high level of expertise and knowledge amongst those involved in this catchment.

Similar projects in other areas of New Zealand have used a variety of advisory groups as a means of involving experts and stakeholders in the ongoing development and implementation of work programmes. This model of technical advisory groups(s), which can request experts as required, and stakeholder advisory group(s) as a means of ensuring ongoing involvement of stakeholders and incorporating a broad base of expertise and knowledge into the implementation process, will be explored for Te Waihora.

Through stakeholder engagement on the draft restoration plan, many stakeholders discussed how they may contribute to the Whakaora Te Waihora project, and these commitments will be integrated into the restoration plan as they are confirmed. Landowner contributions to activities on their land will be assessed case by case, but in the majority of situations there will be an expectation of some contribution, which may include in-kind contributions.

F. Implementation & review

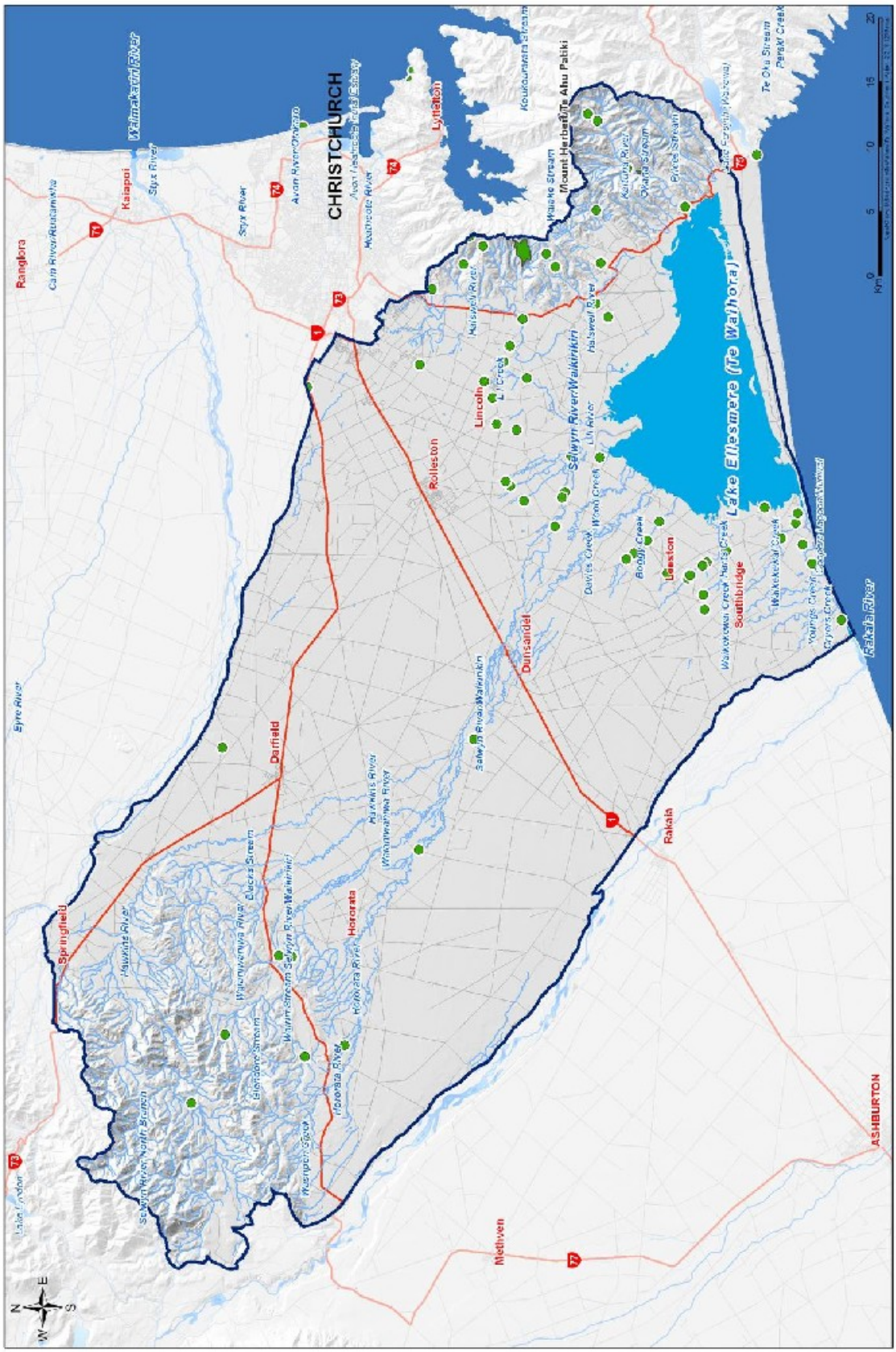
- Responsibilities of Ministry for the Environment, Ngai Tahu, Environment Canterbury and the Te Waihora Co-Governance Group with regards to implementation of this plan are described in the MOU signed in regard to this project.
- A joint project manager will be appointed to oversee the implementation of the actions in this plan. The cost of this position is included in the overall costs of this project and will be shared evenly between Environment Canterbury, Ngai Tahu and the Ministry for the Environment.

Approach to implementation of the five-year work programme

- The project will be implemented with a strong focus on working with landowners and stakeholders to find the best way of achieving the outcomes sought.
- Prior to agreement of funding all projects must provide a monitoring schedule which will enable them to be assessed against the outcomes which they are aiming to achieved. This monitoring will be regularly reviewed and will drive adaptive management of future activities.
- Maintenance of restoration actions is essential to achieving outcomes. Responsibility and planning for ongoing maintenance of any action will be clarified prior to commencement.
- Advisory group(s) will be established to liaise with the project manager.

Review

- The five-year actions include development of a monitoring programme which will assess the impact of work undertaken and determine the effectiveness of actions in meeting the desired outcomes. The results of this monitoring will be regularly reviewed and direct changes in the work programme will be made in both the short and long term.
- At the end of the five-year funding period, a full review of activities will be undertaken to provide advice on future action needed to achieve the long-term goals of the restoration of Te Waihora.



Map 2: Existing Restoration Activities in Te Waihora Catchment (2009)

3. Two-generation outcomes and management opportunities

This chapter is divided into five topics drawn from the aims of the joint restoration plan as outlined in section 2C above. Each section outlines the key principles and outcomes, followed by a discussion of the current situation and solutions in relation to each topic. The table at the end of each section summarises the key management opportunities over the short (5 yr), medium (20 yr) and long (two-generation/50 yr) timeframes.

A. Protection of indigenous lake shore habitats

i. Key principles and outcomes

- The lake shore margins of Te Waihora support what is now the most extensive area of contiguous wetland habitat in the lowlands of the eastern South Island.
- The priority outcome for this work stream is the protection of the remaining native biodiversity values in this habitat, which is also a national priority for biodiversity.
- Preservation of linkages between this habitat and others of high biodiversity value is also considered important in achieving the long-term outcomes of this project.
- This area also offers the opportunity for enhancement of biodiversity and mahinga kai values.
- A significant proportion of the lake margin land is in public ownership, which enables agencies to lead by example in their management of public land.

ii. Current situation & solutions

The lake shore wetlands around the margin of Te Waihora are habitats of regional, national and international importance. The ecological values have been well described in various publications (e.g. Taylor 1996).

The lake shore margins support an area of contiguous wetland habitat which is approximately 4,000 ha in size. Most of this saltmarsh or brackish wetland habitat supports a range of predominantly native shrub, rush and herbfield vegetation types. There are also approximately 500 ha of freshwater wetland habitats, concentrated mostly along the northern and western lake shore. However, the proportion of native wetland vegetation in these habitats is relatively low (35%) and in decline, due largely to the spread of introduced plant species, particularly willows (Hughey and Taylor, 2008). Remaining native freshwater wetland habitats areas are nevertheless an important part of the lakeshore ecosystem. They include significant examples of regionally uncommon and distinctive vegetation types, such as *baumea restiad* rushland, and are critical habitat for a number of threatened plant and bird species (e.g. orchids, swamp nettle, bittern).

Te Waihora shoreline wetlands are ecologically linked to other areas of high biodiversity value: the lake itself; native dryland and dune vegetation on Kaitorete Spit; native forest remnants in Kaituna and Prices Valley; and plains spring-fed tributary streams.

Threats to Te Waihora indigenous lake shore habitats include:

- Spread of environmental weeds (e.g. willows, reed canary grass, purple loosestrife, beggars tick, *Carex ovalis*). Freshwater wetlands are generally more threatened by the current suite of environmental weeds than brackish/saltmarsh wetlands.
- Stock grazing and trampling, and effluent discharge – contributing to loss of indigenous habitat and species, erosion of the lake shore in places, and reduced water quality.
- Construction and inappropriate management of drains, stopbanks and tracks.
- Vegetation clearance e.g. cultivation, fire, spraying.
- Off-road vehicle use on public land.
- Reduced quality and quantity of freshwater inflows.

The two most pervasive threats to lake shore habitats are the effects of stock, particularly cattle, and weeds. Removal of cattle from all lake shore wetlands, on both public and private land, should be a priority action. Continued grazing of other classes of stock in lake shore wetlands should also be reviewed, and stopped if necessary. Note that stock in waterways (including wetlands) causing conspicuous pugging, sedimentation and deposition of faeces, are prohibited under the operative water quality chapter of Environment Canterbury's Natural Resources Regional Plan (NRRP).

At present the spread of willows, especially grey willow, is considered to be the most immediate weed threat to lakeshore wetlands. A 2007 survey of lake shore vegetation and subsequent reports (Pompei and Grove 2009, Walls 2009) provide information on where best to direct and prioritise willow control operations.

Of equal importance for the protection of lake shore wetlands is to prevent spread of other currently low abundance, but highly invasive, wetland weeds. Examples already present in the lakeshore or catchment area include reed canary grass, purple loosestrife, beggars tick, *Carex ovalis* and yellow flag iris. Surveillance and preventative control of low abundance weeds is also a priority.

Summary of management options – two-generation time frame		
Management area/threat/issue	**Management option/tools**	**Timeframes**
Stock grazing, trampling, and non-point source effluent	- Enforcement of NRRP water quality rules relating to stock causing conspicuous pugging, sedimentation, faeces deposition in or alongside water bodies (including wetlands) - Land retirement (public and private) or purchase - Covenants	Short
Lake edge erosion protection	- Stock exclusion, retirement, purchase of land - Planting of lake edge, artificial islands, wave action reduction efforts	Short – medium
Spread of environmental weeds	- Ongoing control & surveillance programmes - Identification & protection of existing native vegetation	Short (control), long (surveillance)
Management of drains, stopbanks and tracks	- Implement management and future development which is sensitive to environmental values - Covered further in section 2C	Short-medium
Vegetation clearance	- Plan rules & enforcement - Land purchase/covenant	Short-medium
Off-road vehicle use on public land	- Physical barriers - Bylaws - Provision of specific use areas	Short
Reduced quality and quantity of freshwater inflows	- Covered further in sections 2C & D	Long
Pest and predator management	- Development and implementation of plan to manage pests and predators	Short (development of plan), long (ongoing control)
Creation of indigenous vegetation habitat for mahinga kai and biodiversity	- Native plant installations creating habitat and corridors	Short
Protection and enhancement of key mahinga kai sites	- Fencing, planting, retirement, interpretation – restoration and reintegration activities (example – Ahuriri & Motukarara lagoons)	Short

B. Protection & enhancement of existing indigenous in-lake habitats

i. Key principles and outcomes

This work stream will start in with the re-establishment of ruppia macrophyte (aquatic plant) beds on the lake margin of Te Waihora and the addition of artificial habitat (islands and embankments) near the lake edge. Benefits of macrophyte restoration include:

- macrophytes act as a sediment trap and nutrient sinks (increased inshore water clarity, and reduction of areas where sediment becomes re-suspended and nutrients mobilised)
- reduction in shoreline erosion
- increased dissolved oxygen in water column
- produce shading and water temperature gradients
- greater habitat diversity for mahinga kai, fish & birds.

Benefits of artificial habitat creation include:

- creating wave shelter behind which macrophyte beds have a greater chance of re-establishment
- reduction in shoreline erosion
- greater in-lake habitat diversity for mahinga kai, fish & birds.

ii. Current situation

Historically, Te Waihora had an extensive margin of macrophytes (aquatic plants). After the decline in macrophyte beds in the 1940s, their recovery during the 1950s was spectacular and luxuriant growth persisted (map 3) until the devastating effect of the Wahine Storm in 1968. Although there were scattered patches of plants seen in the early 1970s and early 1980s, the beds have never regained their former extent. Some *Ruppia* still germinates each year along the east of Greenpark but plants do not survive. In the summer of 2010-11 a sustained high lake level aided in the establishment of some ruppia beds on lake fringes.

A review of other "flipped" (regime-changed) lakes in New Zealand has shown that they are characterised by a high proportion of cyprinids (tench, goldfish, carp etc). While diets of tuna (eels) and flounders (the main customary and commercial species) have changed as a result of the lake flipping, the virtual loss of brown trout and longfin tuna from the lake may be associated with loss of macrophytes and near-shore habitat.

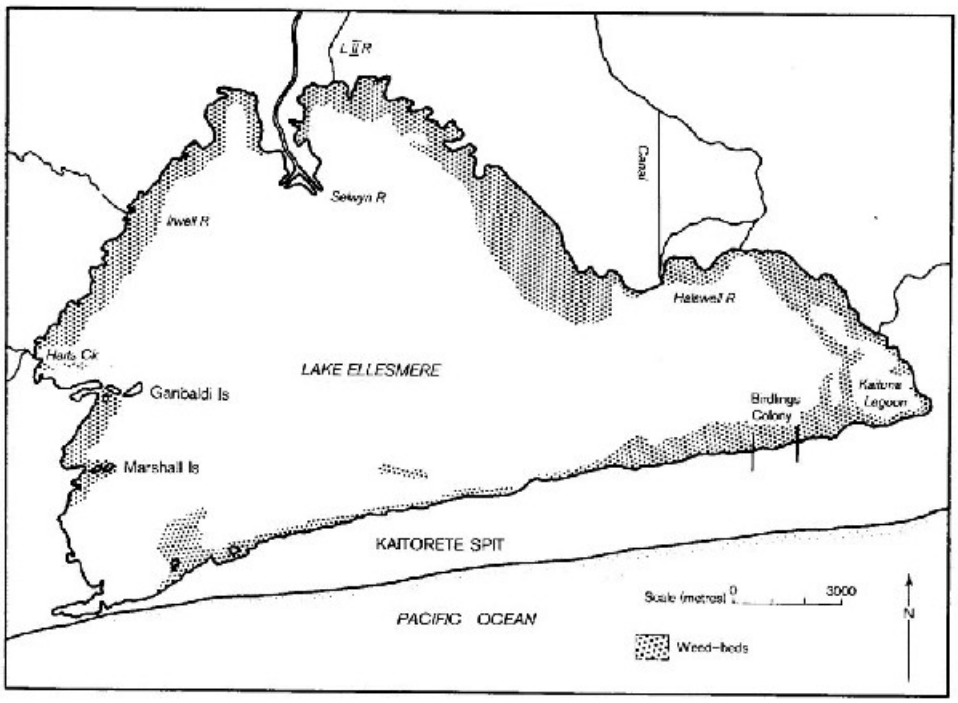
Solutions

Run trials on re-establishing macrophytes and near-shore habitat at several sites around the lake margin using a range of techniques e.g.:

- Excavating a sheltered alcove and planting macrophytes
- Build a wave shelter and plant macrophytes
- Build a wave shelter and allow regrowth from current seed bank
- Create artificial habitat banks (small islands) near shore that provide shelter for macrophytes and enhance aquatic habitat.

Wind and wave simulations modelled for Te Waihora indicate that the western shoreline is least exposed to high wave energy, especially within the vicinity of Harts Creek and the area south to Taumutu. The shoreline between the LII and Selwyn River mouths is also relatively sheltered.

Summary of management options – two-generation time frame		
Management area/threat/issue	**Management option/tools**	**Timeframes**
Re-establishment of macrophyte beds for in-lake habitat and shoreline protection	Trial establishment of macrophyte	Medium
Shoreline protection and enhanced in-lake habitat	Create artificial habitat islands in the lake	Medium
Re-establishment of macrophyte beds for in-lake habitat and shoreline protection	Re-establishment of macrophyte beds around 50% of lake margins	Long



Map 3: The distribution of aquatic macrophytes in Te Waihora, 1960 (from Hughes et al. 1974).

C. Restoration of specific lowland tributary streams & riparian habitats

i. Key principles and outcomes

This work stream involves the restoration of the lowland streams that feed into Te Waihora. With the exception of the Selwyn River/Waikirikiri and streams such as the Kaituna which drain from Banks Peninsula, the tributaries of Te Waihora are spring-fed. All tributaries of Te Waihora provide significant habitat for migratory fish species; especially longfin eels. The New Zealand longfin eel is an iconic species which is highly valued for recreational and cultural purposes. Nationally its numbers are declining. By enhancing the in-stream habitat and providing greater riparian vegetation the ecosystem of the Te Waihora catchment will be enhanced.

ii. Current situation

Te Waihora maintains very important customary and commercial fisheries, especially for tuna (eels). While information on historic proportions of the two species (shortfins *Anguilla australis* and longfins *A. dieffenbachii*) is sparse, there are strong indications that the proportion of longfins has declined over time. Present-day catches in the lake confirm the virtual absence of longfins from the lake itself. Several hundred longfin females still migrate from the lake each autumn, and a recent study has shown that the tributaries, where commercial fishing is prohibited, contain significant numbers of this species. This study has estimated that Te Waihora tributaries could produce about 540 female longfins per year, which is 2% of the estimated national total; a significant contribution. Lowland riffle areas are identified as very important habitats for juvenile eels, especially longfins. Although the lake has been relatively free of substantial blooms of blue-green algae, a large bloom during summer 2009/10 indicates that under particular conditions, such species can proliferate – under this scenario, the refugia afforded by tributaries are even more important.

Many of the Waihora tributaries are managed as part of a drainage system that includes straight-line, frequently ephemeral drains, as well as the streams themselves. The drainage network was constructed to allow land to be developed for agriculture and urban settlement and the drainage function it still performs is vital for current land use. The waterway bed gradient is generally very low and any restriction to water conveyance can have a significant negative effect on drainage. Drainage waterways are managed by local authorities, regional council and private landowners; each with different management practices. Waterways are “cleaned” to remove vegetation and silt build-up that restricts flow by hand, mechanical excavators, weed cutting boats and/or herbicide. This “cleaning” can be detrimental to in-stream biota either through direct removal of habitat (e.g. raupo) or through stirring up of the bed and any nutrient/contaminants on the bed.

There is considerable community support for network management which allows drainage while contributing to water quality and biodiversity aspirations as well (e.g. Selwyn-Waihora Zone Committee Zone Implementation Programme, and the Waihora Ellesmere Trust Sustainable Drain Management Project initiative).

Solutions

- Battering of banks for stabilisation and accommodation of suitable riparian vegetation.
- Carry out extensive planting, where appropriate and with agreement of the relevant drain managers, of fenced off tributary streams with a particular emphasis on plants that enhance native fish habitat and shade out problem weeds.
- Create pool-riffle sequences in streams where there are currently none.
- Drains are managed to ensure that the effects of mechanical cleaning are minimised.
- Exclusion of livestock (which is now required in some areas under Environment Canterbury's Natural Resources Regional Plan).
- Continued communication between and education of land owners, drain managers and general public on new developments in drain management techniques.

Summary of management options – two-generation time frame		
Management area/threat/issue	**Management option/tools**	**Timeframes**
Enhanced in-stream habitat in Waihora tributaries	Direct intervention to create riffle sequences where absent	Medium – long
Enhanced in-stream habitat in Waihora tributaries	Riparian planting and stock exclusion from all tributary waterways	Medium – long
Enhanced in-stream habitat in Waihora drainage network	Riparian planting and improvement of drain management	Medium
Enhanced in-stream habitat in Waihora tributaries	Improved drain management using education and demonstration	Long
Enhanced riparian and springhead wetlands	Identification, stock exclusion and planting of riparian wetlands	Medium

D. Improved catchment management practices

i. Key principles and outcomes

- Deliver kaitiakitanga within Ki Uta Ki Tai/Integrated Catchment Management by establishing agreed values and limits associated with water quality and quantity.
- Support long-term catchment management with its assimilative capacity throughout the next two generations of New Zealanders.
- All farms within the catchment will be achieving optimum practice which maximises nutrient and water use efficiency and minimises nutrient losses for their land class, soil type and farm system.
- All urban & industrial land use and development will be achieving optimum practice with regards to management of water, storm water, waste water and erosion and sediment control.
- Strongly innovative community looking for new and better solutions – supported by science.

ii. Current situation & solutions

Current situation

It is generally accepted that nutrient levels in the spring-fed streams and groundwater that feed Te Waihora are elevated as a result of land use activities. Environment Canterbury is now working with the Selwyn-Waihora Zone Committee and the community to establish catchment nutrient load limits for the Selwyn-Waihora water management zone. The setting of nutrient load limits is significant in that nutrient enriched groundwater from the plains rises in the spring-fed streams that feed Te Waihora, contributing to excessive algal and weed growth both in the streams and in the lake.

Sedimentation of the lake and spring-fed streams from land use activities is also an issue. The exclusion of stock from waterways, particularly cattle and deer, is particularly important. Considerable work has gone into riparian restoration in recent years in some of the spring-fed streams such as Harts and Boggy Creeks. Significant further work is required to complete the restoration in all streams feeding the lake.

Urban and industrial activities also have direct effects on water quality and quantity, particularly through the management of storm water. Ensuring that optimum practice for erosion and sediment control is met in new developments is particularly important with regards to sedimentation of the waterways and lake.

Sheep and beef cattle farming currently make up more than half of the agricultural activity[1] in the Te Waihora catchment. Dairy and arable farming is roughly a quarter of the activity while the rest is split between deer farming, nut and tree farming, flowers and vegetable horticulture.

Most of the water taken for the 60,000 ha irrigated land within the Te Waihora catchment is taken from groundwater. Currently the amount of land that is irrigated is split 50/50 east to west across State Highway 1 (SH1) 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 over-allocated for irrigation.

The Central Plains Water (CPW) project proposes the construction and operation of a large scale irrigation scheme for 60,000 ha by taking water from the Rakaia and Waimakariri Rivers through a distributed network of pipes and channels. With a reliable irrigation supply from CPW, water users to the west of SH1 could conceivably relinquish their groundwater consents, providing more water to the lower plains and to the spring-fed streams feeding Te Waihora, thereby enhancing the ecological health of these streams.

Managing to catchment nutrient load limits will mean changes for all land users within the Te Waihora catchment (dryland and irrigated). Although the nutrient load limits have not yet been set for the Te Waihora catchment, it is likely that it will be over-allocated. If this is the case some 'claw back' in nutrient status will be required. Current land users will have to adopt best practice, if they are not already doing so, and be able to demonstrate best practice. In some cases this will mean that

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

significant on-farm changes to farming operations are required. It will also mean that all new water users must adopt and demonstrate from day one that they are applying best practice.

Challenges going forward

- We don't know where we are at in relation to best practice. Evidence from studies in other areas indicates that there is likely to be a wide range of on-farm environmental performance.
- Limits will affect all existing land users, dryland and irrigated, and new water users. In the absence of some tangible incentives there is very little motivation for existing land users to change.
- There isn't a single answer. What works well for one farm enterprise may not work so well for another enterprise. Differences in climate, soil type, the nature of the operation and management style mean that a degree of flexibility is needed in the management approach.
- Voluntary approaches alone are not enough. All the evidence suggests that a combination package is required, combining education/extension, and self management backed by a strong regulatory regime.
- Improvements in water quality resulting from reduced on-farm nutrient losses may take some years to flow through from the time changes occur on farm to the time the improved results are recorded in the water body.

Solutions

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, technology and new innovations available, such that these are communicated to land managers in a way that brings about improvements to economic and environmental performance.

Integration with industry programmes will be important. Collaborative programmes between Environment Canterbury and the various primary sector groups will help ensure the best use of the limited resource of people with the right skills to provide direction and assist land managers to achieve the outcomes agreed for the catchment.

Benchmarking is a powerful tool that allows comparisons between different farming operations. For individual farm managers it provides a guide as to how their farm operation is performing in relation to nutrient and irrigation management compared with other similar farming operations. Benchmarking may also include a stock-take of current practices (e.g. distance of stream fenced). At the collective level, benchmarking provides a focus for discussion. Web tools provide the opportunity to display this information in an interactive manner. DairyNZ and Fonterra are currently investigating a nationwide nutrient benchmarking programme and in the Te Waihora catchment, the Ellesmere Irrigation Society in association with Irrigation NZ is developing an irrigation benchmarking programme. There is a need to extend this work to cover other sectors.

To achieve improved farm practices, audited self-management systems[2] (ASM) can provide the structure that will support and verify good management practice. It is possible to create a network

[2] Audited self management is:

of complementary programmes, all of which deliver continuous and verifiable improvements in water, nutrient and sediment 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, nutrient management, soil management, and riparian and biodiversity management.

Creating the right environment for innovations and creative solutions to land management issues will be important. The farming community supported by scientists have an important part to play in driving this innovation. In the absence of complete information, catchment management for diffuse pollution needs to take an adaptive management approach whereby improved information, be that on innovative mitigations, or data on environmental outcomes, can feed into decision-making processes, allowing response adjustments over time.

Underpinning the whole programme will be a number of existing and potentially new regional plan rules. A number of farming activities, including dairy effluent management, stock access to waterways and fertiliser use, are covered by regional rules. It is expected that there will be a continued strong emphasis on compliance with these rules.

The Selwyn-Waihora Zone Committee recognises nutrient and water management as a key component of the successful implementation of the Canterbury Water Management Strategy for this Zone. The solutions suggested in this section of the plan are closely aligned with the Zone Implementation Programme (ZIP), and the involvement of the Zone Committee in implementation of the associated actions is seen as one key relationship in this plan.

"An environmental management process implemented by an operator to assess, avoid and/or mitigate risks to the environment arising from their farming activities. It is a 'tool' that enables a farming operation of any size or type to control the impact of its activities, on the natural environment. ASM may be used to demonstrate to markets and regulators adherence to good management practices and/or agreed management objectives."

Summary of management options – two-generation time frame		
Management area/threat/issue	**Management option/tools**	**Timeframes**
Setting of catchment nutrient load limits	Establishment of catchment nutrient load limits using the 'Preferred Approach' as adopted by Environment Canterbury	Short term
Awareness and understanding	Relationship development, Information extension programmes, establishment of sub-catchment groups and other discussion forums	Long term
Incomplete information on the current status of best practice	Benchmarking including use of indicators such as nutrient use efficiency, irrigation efficiency and nutrient loss. Benchmarking can also extend to current state of riparian management and other on-farm activities	Short term - establish benchmarks; long term – use of benchmarks as management tool
Implementing and demonstrating best practice in agricultural landuse	Farm plans and ASM, combined with sub-catchment planning through catchment groups. Demonstration that farming activities are within agreed catchment nutrient loads	Long term
Implementing and demonstrating best practice in urban & industrial water management	Development and implementation of stormwater management plans and erosion & sediment control plans for all new subdivisions. Upgrading of stormwater and wastewater infrastructure as appropriate.	Long term
Compliance with regional rules	Continued emphasis on the achievement of full compliance	Short-long term

E. Robust monitoring and investigation drives adaptive management

i. Key principles and outcomes

Science is a key component underpinning the adaptive management approach of Whakaora Te Waihora. The science is achieved through investigations (new research) on critical factors affecting the restoration of the lake ecosystem and monitoring of the system response to changes.

The feasibility of a permanent connection between Waihora and the sea will be investigated. The lake ecosystem is highly dependent on the migration of fish species (e.g. tuna/eels; patiki/flounders) between the lake and ocean. The direction of migration is season-specific and a long-term opening that allows fish passage will increase the overall ecosystem health.

An investigation of nutrient cycling processes within the lake is required to derive a proper nutrient budget for the catchment. This information will be used to fully understand how much nutrient reduction is required to see a substantial change in nutrient status for the lake.

Monitoring of water quality and ecological health will be extended to include the majority of the drains and streams feeding into Te Waihora (at present it is only on the main streams). This will be carried out by Environment Canterbury and Selwyn District Council. The use of ecological health indicators (e.g. fish surveys) will allow a more holistic view of ecosystem restoration than relying on water quality information alone. This information will help to:

- Highlight areas that require direct intervention
- Provide an assessment of the effectiveness of interventions.

ii. Current situation

The trophic level index (TLI; see Figure 1) combines nitrogen, phosphorus and chlorophyll-a readings into a single number that describes the trophic status of a lake. The Natural Resources Regional Plan (NRRP) objective WQL1, table WQL 6 gives a TLI of 6 as a desired water quality outcome for coastal lakes, including Te Waihora. The data for Te Waihora show it has been consistently above 6.0 (hypertrophic) except for two short periods. Of particular interest is the reduction in TLI that has occurred in late 2010 and early 2011. A similar TLI reduction was observed in a nearby shallow coastal lake, which suggests a climatic influence. This was a period of higher lake level over the summer and there is no evidence of a reduction in nutrient inputs to the lake. Overall this suggests that the in-lake processing of nutrients was different from other summers but it is not clear what has driven the changes and whether it is possible to recreate the conditions through management intervention. In order to keep the lake below hypertrophic status we must gain a better understanding of what is driving these changes in in-lake nutrient processing.

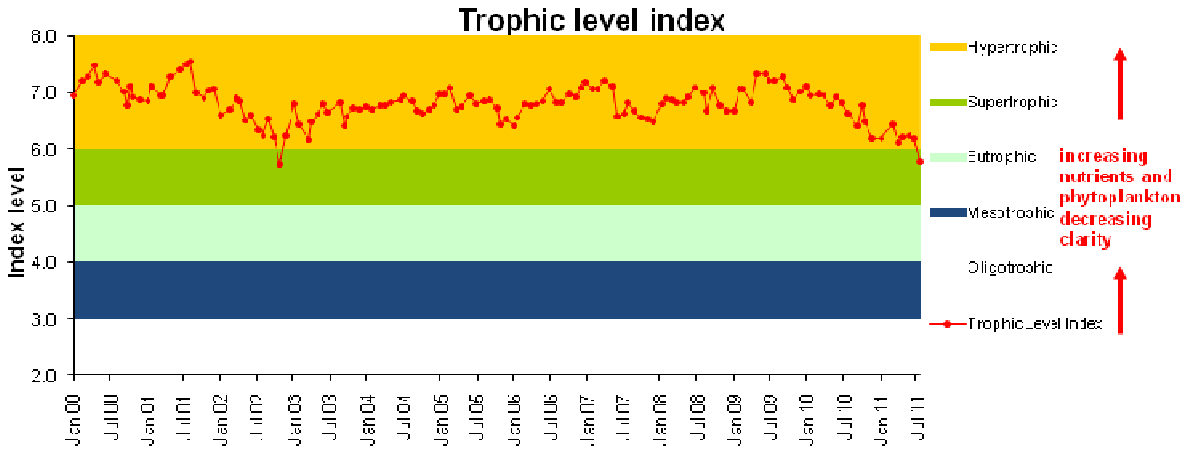


Figure 1: Trophic level index for Te Waihora from 2000 to the middle of 2011.

Questions to be answered by an investigation of in-lake nutrient processing are:

- Is a drop in TLI a temporary situation?
- What are the contributing factors to a drop in TLI?
- Are there direct management steps that could be taken to lower the TLI through in-lake nutrient processing?
- What nutrient limits could/should be set for tributary streams while keeping the lake below hypertrophic status?

The connectivity between the lake and ocean is currently through an artificial opening near Taumutu. Historically the timing of opening has been driven by the demand for flood prevention and drainage which has resulted in the lake being open during periods when fish migration is unlikely to take place and closed when the migration should take place.

Recent changes to the Water Conservation Order for the lake allow for a greater range of values to be managed via lake openings. An investigation is required as to whether a permanent opening is feasible in the highly dynamic coastal environment.

The permanent opening may not serve the purpose of flood management but if it allows greater fish passage while enabling a relatively stable lake level, this will enhance ecosystem health. A second investigation is required on whether deepening the channels within the lake and changing the position of opening will enhance drainage capacity when an opening is required for flood relief purposes.

The current Environment Canterbury monitoring of water quality has seven sites in tributaries and five within the lake (Figure 2). This provides an overall picture of water quality in the long term but does not help with assessing where direct interventions could and should take place. Selwyn District Council is currently monitoring drains in their drainage network. These data combined with an enhanced Environment Canterbury data set would allow a good assessment of interventions.

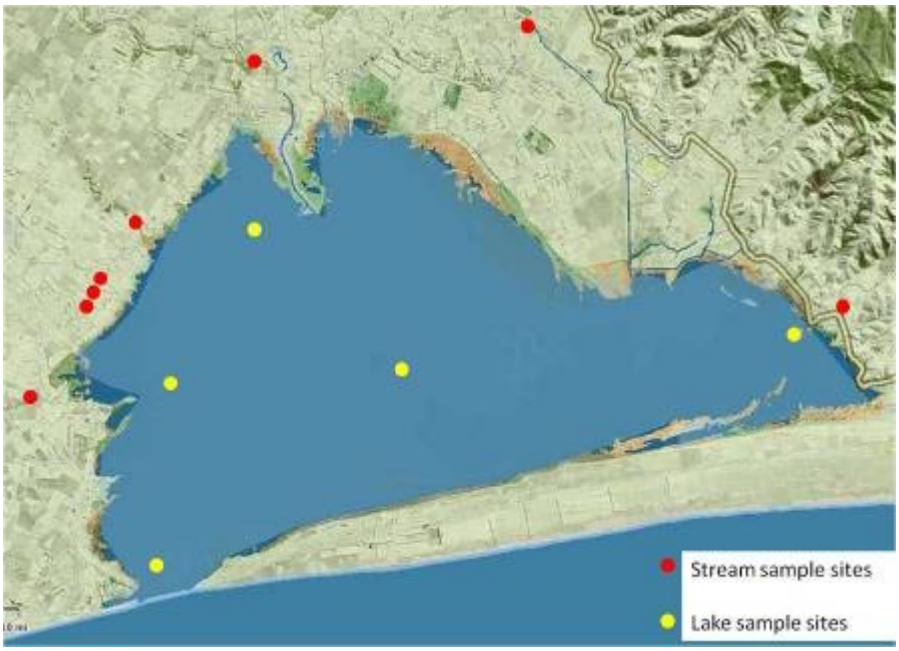


Figure 2: Water quality monitoring sites in Environment Canterbury's long-term network.

Solutions

- Extend water quality and ecosystem health monitoring in lake tributaries (including drains).
- Investigate the feasibility of an engineering solution to fish passage blockage through a permanent or semi-permanent opening structure.
- Carry out an investigation on in-lake nutrient processing with emphasis on what are the driving mechanisms for improved processing.

Summary of management options – two-generation time frame		
Management area/threat/issue	**Management option/tools**	**Timeframes**
Water quality in the lake to improve	Science investigation on mechanisms that drive in-lake nutrient processing Investigation into potential creation of in-lake channels to improve water 'flush' from lake	Short
Improvement in native fish numbers in lake and tributaries	Science/engineering investigation on permanent lake opening for fish passage Creation of improved in-lake habitat (see separate section)	Short-medium
Improvement in native fish numbers in lake and tributaries	Permanent (or semi-permanent) opening established	Long
Improvement in native fish numbers in lake and tributaries	Investigation and implementation of fish restocking/recruitment opportunities	Short-medium
Water quality and ecosystem health improvement in-lake, lake margins and tributaries	Monitoring of water quality and ecosystem health to measure effects of interventions	Long

4. Coordinated approach to five-year work programme

In order to allow the most effective targeting of the funding committed over the next five years the work programme has been focused on six areas:

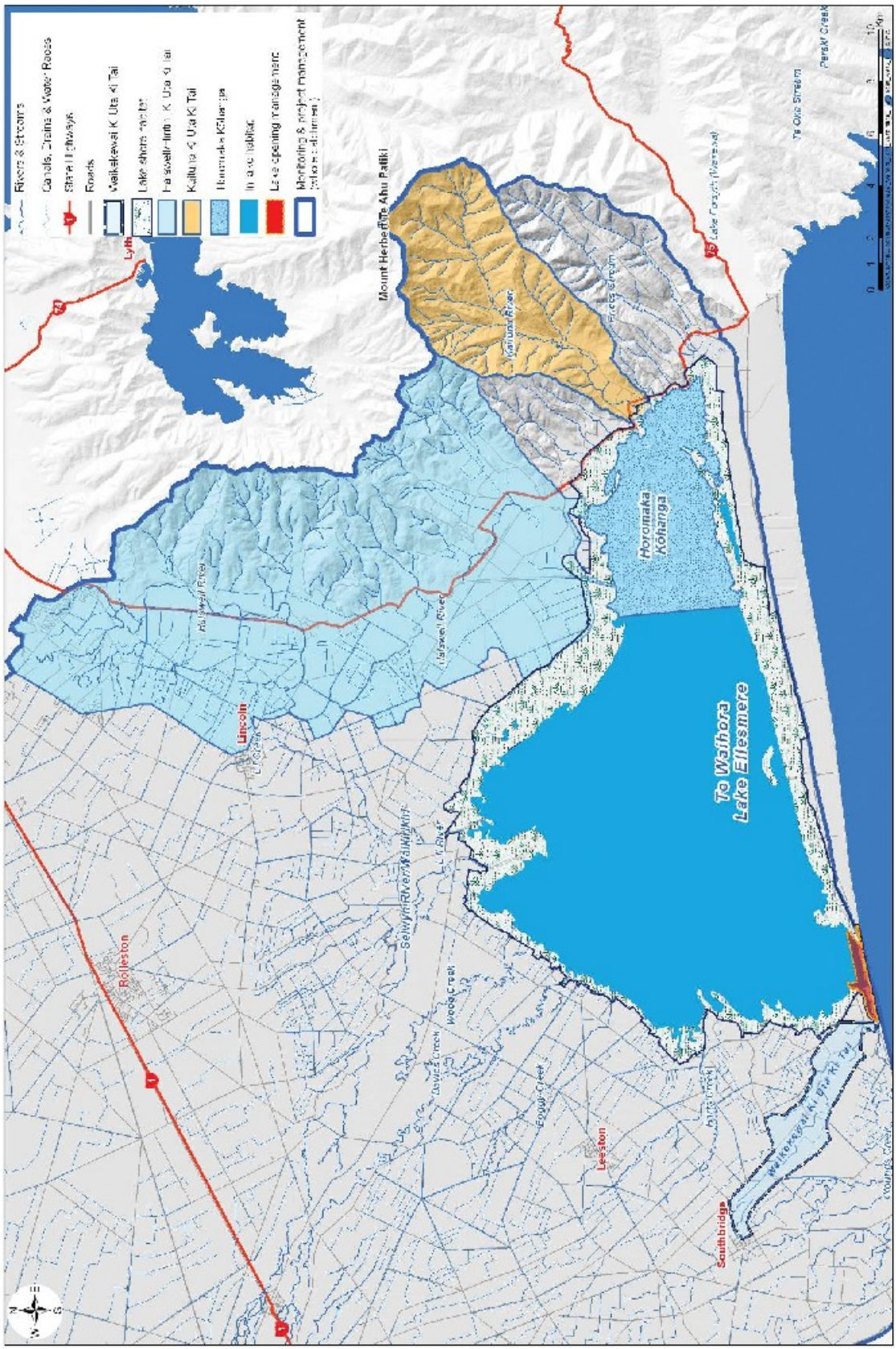
- Kaituna Ki Uta Ki Tai
- Halswell/Huritini Ki Uta Ki Tai
- Waikekewai Ki Uta Ki Tai
- Improving in-lake habitat
- Lake opening management
- Protecting lake shore habitat.

Map 4 shows each of these areas. Explanation for prioritising each of these areas is given below.

Detailed work programmes for each of these areas are given in the rest of this chapter. Actions are focused on achieving both visible and meaningful improvement in ecosystem health in the existing five-year funding timeframe; while also providing a solid basis for understanding and implementing future management actions which will achieve the outcomes of Whakaora Te Waihora over the next two generations.

All actions have allowed for a 10% contingency cost in their budget.

The actions included focus on work which will be led by Ngai Tahu and Environment Canterbury. Ongoing engagement with stakeholders will clarify where contributions can be made to make best progress towards the aims of all parties, and these will be added as they are confirmed.



Map 4: Focus areas for five-year work programme.

A. Kaituna River and Catchment Ki Uta Ki Tai

Site description and Ngai Tahu history

The Kaituna River is one of the largest waterways entering Te Waihora and is 17 km long, flowing into the north-eastern corner of the lake. It rises on the south face of Mt Herbert and its clearly defined river catchment is 5188 hectares in size. The river flows down a steep-sided river valley that contains some remnant native vegetation cover, typical of the Banks Peninsula area. The native vegetation in the upper catchment provides a significant area of high quality habitat for native flora and fauna, with much of the area is already protected through council and Department of Conservation reserves or Banks Peninsula Conservation Trust covenants.

As the name Kaituna suggests, the area was traditionally known for its large quantities of tuna (eel), which were regularly harvested by the Ngai Tahu hapu of Banks Peninsula. Other foods were also gathered from Kaituna, including a variety of native fish such as patiki/flounder and a variety of waterfowl. The Kaituna Valley was an important travel route to Te Waihora for the different Ngai Tahu hapu of Banks Peninsula, particularly for the Ngai Tahu settlements based at Koukourarata (Port Levy) and Te Hapu o Ngati Wheke/Rapaki Runanga.

There are many traditional settlements located at the Kaituna end of Te Waihora, including Kuhakawariwari which is located on a ridge overlooking Kaituna and is a significant historical feature for Banks Peninsula Ngai Tahu. Of particular historical significance is the famous Waikakahi Pa, which was established by the Ngati Mamoe chief Tutekawa and was the location of several significant events that were instrumental in the Ngai Tahu migration and eventual occupation of Te Waipounamu/South Island.

A significant feature of Te Waihora is Kaituna Lagoon, 900 ha of semi-enclosed water at the eastern corner of Te Waihora and at the mouth of the Kaituna River & Prices Valley Stream. Motumotuao has been recorded as another Maori name for this lagoon. It is only distinct from the open waters of Te Waihora at low lake levels and provides permanent shallow water even at these times. The lagoon is particularly shallow, provides an important refuge for wildlife with its sheltered waters during storms, and forms an important part of the Horomaka kohanga. It is the area of Te Waihora most often seen by the public, in clear view from the Christchurch-Akaroa State Highway 75.

Within this catchment, existing drainage schemes principally focus on land drainage. In this context the Whakaroa Te Waihora project provides the opportunity to move from a drainage-focused system to a more sustainable values approach that recognises the need to enhance the ecological and cultural values of the drainage areas and waterways in the Te Waihora catchment.

Cultural and ecological values at Kaituna

- Mahinga kai – Kaituna has long been a significant mahinga kai site for Ngai Tahu. It is intended that restoration activities at Kaituna will improve and enhance customary access to and gathering of fish, birds, plants and other resources in this area.
- Taonga species – are the culturally significant plants and animals that are treasured by Ngai Tahu. Restoration efforts at Kaituna will enhance the populations of these species.
- Historical habitation – the Kaituna end of Te Waihora includes a number of historical settlements that were instrumental in the Ngai Tahu migration and occupation of Banks Peninsula and Te Waipounamu.

- Traditional Access Route – historically the Kaituna Valley was an important travel route for Banks Peninsula Ngai Tahu. The Kaituna end of Te Waihora includes a history of joint use by the different Ngai Tahu Banks Peninsula hapu, which has crossed over into contemporary times through the kaitiaki Papatipu Runaka and the development of the Horomaka kohanga.
- Naturalness – the restoration effort will endeavour to return Kaituna closer to its original state. The reintroduction of native vegetation communities will greatly enhance its naturalness and provide some representation of its natural condition.
- Lakeshore vegetation is mostly saltmarsh habitats – native three square rushland, sea rush, marsh ribbonwood and exotic grassland. There are also several small areas of raupo in the vicinity of freshwater inflows and springs.
- High value for wading birds, with occasionally high numbers of migrant waders and pied stilt.
- Outstanding waterfowl habitat with very high numbers of waterfowl species.
- High value swamp bird habitat. Bittern, spotless and marsh crake have been recorded here.
- Over the last few years crested grebe have been nesting on the lower reaches of the Kaituna River and are now seen frequently at Kaituna Lagoon.

<u>Key supporting factors for Kaituna focus area</u>

1. Continuous occupation and importance as a mahinga kai site make Kaituna a particularly significant area for Ngai Tahu at Te Waihora.
2. Kaituna is situated at the top end of the Kaituna Lagoon and Horomaka kohanga and as such plays an essential role in their biological functions and ecological connectivity.
3. The Kaituna River and valley provide an opportunity to develop and test Ki Uta Ki Tai whole catchment management in preparation for its use in other parts of the Te Waihora catchment.
4. River restoration actions will help to reinstate habitat and enhance the nationally significant local population of the declining longfin tuna/eel.
5. State Highway 75 and the Rail Trail pass through this area and this provides a high visibility, publically accessible opportunity to promote the Whakaora Te Waihora project.

Five-Year Work Programme – Project Area: Kaituna					
Action/workstream grouping		**Outcome**	**Success indicators**	**Timeframe**	**Total contribution**
LOWLAND STREAMS AND RIPARIAN HABITAT					
A1	Weed control & surveillance for willow, canary reed grass, flag iris, *Carex ovalis*, purple loosestrife, beggars tick, others spp.	Waterway and adjoining lake margin wetlands protected	- reduced abundance and extent of willows and other weeds in waterways and lakeshore wetlands - Improved mahinga kai access and success	2 years	$10,000
A2	Plant and maintain riparian and wetland areas for 70% of Kaituna River mainstem[3] Investigate & implement predator control for protection of threatened species, if necessary	Enhanced in-stream, riparian and wetland habitat	- Improvement in in-stream & riparian habitat - Reduction in weed growth due to shading in small streams leading to a reduction in the water quality impacts of cleaning - Reduction in sediment entering waterways - Improved cultural health - Improved populations of native fauna specifically longfin tuna - Improved mahinga kai access and success	5 years	$378,300
A3	Identification, fencing and riparian planting of waipuna/springheads & other culturally important wetland/waterways	Protection and enhancement of key cultural waterways	- Improved cultural health - Improved mahinga kai access and success	3 years	$30,000

[3] Costing includes two maintenance passes for all plantings. It is expected that part of the landowners (public & private) will contribute to this action via actions such as stock exclusion and maintenance of plantings beyond initial establishment (2 years).

CATCHMENT MANAGEMENT PRACTICES					
A4	In conjunction with key stakeholders manage appropriate forum to ensure coordination of actions	Actions of all those involved in restoration projects are informed and coordinated	- Strong relationships and trust between all stakeholders in catchment	Annually in Feb, and as needed	Project Mgr salary
A5	Develop and deliver an extension programme by working with land managers and industry	Well informed community in Kaituna River catchment	- Landowner willingness to participate in programme - Active discussion groups operating catchment - High level of awareness of key issues and options for management - High level of trust developed between landowners, agency and industry partners	February 2012 to Dec 2013	$38,850
A6	Link with dairy industry nutrient benchmarking programme. Develop and implement a nutrient and water use efficiency benchmarking programme for arable, horticulture and sheep and beef farms	Current level of land use practice in relation to industry agreed benchmarks understood	- Benchmark information available for 10 farms in Kaituna catchment - Benchmarking data used as basis for on-farm discussions on management options	June 2012 to June 2013	$10,500
A7	Develop and implement appropriate farm plan programmes & associated sub-catchment discussions	Catchment based programmes in the Kaituna catchment	- 10 farm plans completed and operational - Trial audits completed on 4 farms - 10 farms forming the basis of active discussion groups within catchment - Farm plans include actions for improved mahinga kai access and success, riparian and biodiversity management	June 2012 to December 2013	$52,500

MONITORING AND INVESTIGATION					
A8	Mahinga kai bio health investigation	Known health qualities of mahinga kai	- Improved understanding of health impacts of mahinga kai - Potential sources of contamination identified	2 years	$20,000 (A minimum value of $40,000 will be allocated to this project where needed following initial investigations and will be reallocated from other expenditure)
FOCUS AREA TOTAL					**$ 540,150**

B. Huritini/Halswell River and Catchment Ki Uta Ki Tai

Site description and Ngai Tahu history

The Huritini/Halswell River rises between Prebbleton and Halswell, in close proximity to the source of the Opawaho/Heathcote. It flows through Tai Tapu, the significant Ahuriri Lagoon and Motukarara wetlands. In 1883 the artificial Halswell canal was cut to increase the drainage of the area and it led to a reduction in the (original) river flow.

There were a number of Maori settlements located close to the Huritini/Halswell River; in particular James Canon Stack records 'old pa' near Tai Tapu and on the hills above Motukarara overlooking the Ahuriri Lagoon. There are also several Maori archaeological sites, including pits, artefacts and cooking ovens, that have been publicly recorded along the length of the Huritini/Halswell River.

The Huritini/Halswell River was a significant mahinga kai/food resource for local Maori. Foods gathered from the Huritini/Halswell River mouth include cockles, patiki/flounder, tuna/eels, waterfowl and inanga/whitebait. The Ahuriri Lagoon was an important site for the harvest of parera/grey duck and raupo.

The Huritini/Halswell River was also a significant component of the network of traditional travel routes that linked the Ngai Tahu settlements of Otautahi/Christchurch and the wider region with the great food resource of Te Waihora. Restoration actions along the Huritini/Halswell will provide the opportunity to develop and strengthen the relationship between Otautahi/Christchurch and Te Waihora, by involving catchment stakeholders in activities and improving the city's connectivity with the ecological and cultural values of the river and lake.

Within this catchment extensive existing drainage schemes principally focus on land drainage. In this context the Whakaroa Te Waihora project provides the opportunity to move from a drainage-focused system to a more sustainable values-based approach that recognises the need to enhance the ecological and cultural values of the drainage areas and waterways in the Te Waihora catchment.

Cultural and ecological values at the Huritini/Halswell River

- Mahinga kai – it is intended that restoration activities in and around the Huritini/Halswell will improve and enhance customary access to and gathering of fish, bird and plant resources. Ahuriri lagoon is a high priority site in relation to the focus in this catchment.
- Taonga species – restoration efforts will enhance the populations of the culturally significant plants and animals that are treasured by Ngai Tahu.
- Historical habitation – there was ongoing occupation and use of the Huritini/Halswell River and surrounding area.
- Naturalness – the restoration effort will endeavour to return the Huritini/Halswell closer to its original state. The reintroduction of native vegetation communities will greatly enhance its naturalness and provide some representation of its natural condition.
- Lakeshore vegetation between the Halswell River and Greenpark Huts is saltmarsh herbfield (glasswort), sea rush, salt marsh ribbonwood shrubland and exotic grassland. There are stands of raupo along the lower Halswell River and nearby drains.
- The area has potential habitat value for wading birds and waterfowl.

- There are moderate-high values for swamp birds, with marsh crake recorded and bittern breeding habitat in the raupo near the Halswell River.

Key supporting factors for Huritini/Halswell focus area

1. Continuous occupation and importance as a mahinga kai site make the Huritini/Halswell River a particularly significant area for Ngai Tahu at Te Waihora.
2. The lower Huritini area, Motukarara wetland and Ahuriri lagoon provide significant wetland enhancement opportunities consistent with the aims and objectives of the Canterbury Water Management Strategy.
3. The Huritini/Halswell River and catchment provide an opportunity to develop and test Ki Uta Ki Tai whole catchment management in preparation for its use in other parts of the Te Waihora catchment.
4. The Joint Management Plan (JMP) is a statutory planning document that recognises, enables, guides and supports the restoration of this significant area, especially in conjunction with the Horomaka kohanga (as described in the JMP).
5. Restoration activities on the river provide an opportunity to involve the Selwyn District Council, Christchurch City Council and the Halswell catchment community, and rebuild the Christchurch city connection to Te Waihora.
6. Facilitates consideration of the role that urban and industrial water and waste management has in the catchment upon the long-term health of Te Waihora.
7. River restoration actions will help to reinstate habitat and enhance the nationally significant local population of the endangered longfin tuna/eel.
8. State Highway 75 and the Rail Trail pass through this area and provide a high visibility, publically accessible opportunity to promote the Whakaora Te Waihora project.

Five-Year Work Programme – Project Area: Huritini/Halswell					
Action/workstream grouping		**Outcome**	**Success indicators**	**Timeframe**	**Total contribution**
LOWLAND STREAMS AND RIPARIAN HABITAT					
B1	Weed control & surveillance for willow, canary reed grass, flag iris, *Carex ovalis*, purple loosestrife, beggars tick, others spp.	Waterway and adjoining lake margin wetlands protected	- Reduced abundance and extent of willows and other weeds in waterways and lakeshore wetlands - Improved mahinga kai access and success	2 years	$35,000
B2	Create riffle sequences in streams	Enhanced in-stream habitat in Te Waihora tributaries	- Increase in diversity of invertebrates & fish - Increase in length of riffle habitat for longfin tuna	3 years	$200,000
B3	Plant and maintain riparian and wetland areas for 70% of Halswell (Huritini) River mainstem[4] Investigate & implement predator control for protection of threatened species if necessary	Enhanced in-stream, riparian and wetland habitat in Waihora tributaries	- Improvement in in-stream & riparian habitat - Reduction in weed growth due to shading in small streams leading to a reduction in the water quality impacts of cleaning - Reduction in sediment entering waterways - Improved cultural health - Improved populations of native	5 years	$1,055,650

[4] Costing includes two maintenance passes for all plantings. It is expected that part of the landowners (public & private) will contribute to this action via actions such as stock exclusion and maintenance of plantings beyond initial establishment (2 years).

			fauna specifically longfin tuna - Improved mahinga kai access and success		
B4	Identification, fencing and riparian planting of waipuna/springheads & other culturally important wetland/waterways	Protection and enhancement of key cultural waterways	- Improved cultural health - Improved mahinga kai access and success	3 years	$80,000
B5	Re-batter drain banks; planting to provide shade; addition of sediment traps in major drains; create demonstration site to support a review of drainage management practice	Reduced weed growth and sedimentation in drains and improved biodiversity	- Reduction in impacts of drain management on water quality, cultural and ecosystem health - Improved mahinga kai access and success	3 years	$499,000
CATCHMENT MANAGEMENT PRACTICES					
B6	Education of private landowners and drain maintenance teams on managing for multiple values	Improved drain network management for multiple values	- Reduction in impacts of management on water quality, cultural and ecosystem health	5 years	$38,000
B7	In conjunction with key stakeholders manage appropriate forum to enable coordination of actions	Actions of all those involved in restoration projects are informed and coordinated	- Strong relationships and trust between all stakeholders in catchment	Annually in Feb, and as needed	Project Mgr salary
B8	Develop and deliver an extension programme by working with land managers and industry	Well-informed community in the Halswell River catchment	- Landowner willingness to participate in programme - Active discussion groups operating catchment - High level of awareness of key issues and options for management - High level of trust developed between landowners, agency and industry partners	February 2012 to Dec 2013	$116,500

B9	Link with dairy industry nutrient benchmarking programme. Develop and implement a nutrient and water use efficiency benchmarking programme for arable, horticulture and sheep and beef farms	Current level of land use practice in relation to industry agreed benchmarks understood	- Benchmark information available for 32 farms in Halswell catchment - Benchmarking data used as basis for on-farm discussions on management options.	June 2012 to June 2013	$31,500
B10	Develop and implement appropriate farm plan programmes & associated sub-catchment discussions	Catchment-based programmes in the Halswell catchment	- 32 farm plans completed and operational - Trial audits completed on 13 farms - 32 farms forming the basis of active discussion groups within catchment - Farm plans include actions for improved mahinga kai access and success, riparian and biodiversity management	June 2012 to December 2013	$157,500
B11	Initiate discussions with CCC, SDC & Environment Canterbury to coordinate and focus existing urban & industrial storm water and erosion & sediment control programmes within Halswell catchment	Coordinated programmes for urban and industrial areas	- Landowner willingness to participate in programme - High level of awareness of key issues and options for management - High level of trust developed between landowners, agency and industry partners	1 year	Project Mgr Salary

MONITORING AND INVESTIGATION					
B12	Mahinga kai bio health investigation	Known health qualities of mahinga kai and identification of possible sources of contaminants	- Improved understanding of health impacts of mahinga kai - Potential sources of contamination identified	2 years	$20,000 (A minimum value of $40,000 will be allocated to this project where needed following initial investigations and will be reallocated from other expenditure)
FOCUS AREA TOTAL					**$ 2,233,150**

C. Waikekewai Stream and Catchment Ki Uta Ki Tai

Site description and Ngai Tahu history

Waikekewai Stream and its associated tributaries are located at the south western tip of Te Waihora. Its catchment consists of a main stream rising near Southbridge, and two main tributaries, Parkin Drain and Waikekewai stream.

The Waikekewai area is of great historical significance for Ngai Tahu, particularly the local hapu of Ngai Te Ruahikihiki and Ngati Moki. The Waikekewai stream and tributaries were a valuable source of food for the people of the nearby settlements, such as Orariki, Hakitai and Te Pa o Moki. For generations the stream has been a significant important source of mahinga kai, principally for the harvest of tuna/eel, inanga/whitebait and patiki/flounder.

Tuna come up the stream while waiting for the time/opportunity to enter the ocean. As the site for tuna heke/spawning, in the past this area had large numbers of tuna. Reports describe the beach literally alive due to the size and density of the tuna population moving from the stream/lake to the sea. This natural event on this scale has not been observed for many years.

Currently the area has relatively low indigenous vegetation values and is managed as part of an agricultural drainage network upstream. Ngai Tahu has carried out restoration actions at lower Waikekewai in recent years and it is a site that is monitored as part of the Te Waihora Cultural Health Assessment process. The Waikekewai catchment has also been part of Environment Canterbury's Living Streams programme, involving landowners in community-based action to improve stream health.

As part of the Te Waihora lake bed, the lower Waikekewai is vested in Te Runanga o Ngai Tahu under the Ngai Tahu Settlement and is surrounded mostly by lake edge, private land, Public Conservation Land and Coastal Marine Area.

The lower Waikekewai region of the lake is known as Te Korua, and is situated between the stream outlet and Whakamatakiuru/Fishermans Point (to the north). This lagoon is separated from the sea by a shingle barrier and the water is very saline when the lake is open. Te Korua is a Maori fishing reserve, which is for customary and recreational fishing only, and is protected from commercial fishing by law.

Within this catchment existing drainage schemes principally focus on land drainage. In this context the Whakaroa Te Waihora project provides the opportunity to move from a drainage-focused system to a more sustainable values-based approach that recognises the need to enhance the ecological and cultural values of the drainage areas and waterways in the Te Waihora catchment.

Cultural and ecological values at Waikekewai

- Mahinga Kai – it is intended that restoration activities at Waikekewai will improve and enhance customary access to and gathering of fish, bird and plant resources.
- Taonga species – restoration efforts will enhance the populations of the culturally significant plants and animals that are treasured by Ngai Tahu.
- Historical habitation – this area has a long history of Maori occupation with a number of well-known historical settlements such as Te Pa o Moki, Orariki and Hakitai, and continues to be a significant area of ongoing habitation and occupation at Te Waihora.
- Naturalness – the restoration effort will endeavour to return Waikekewai to its original state. The reintroduction of native vegetation communities will greatly enhance its naturalness and provide some representation of its natural state.
- Native habitat in the area includes a narrow fringe of saltmarsh reedland around most of the Te Korua margin and raupo beds at the head of the lagoon around the Waikekewai Stream inflow.
- The area also provides moderate-high values for waterfowl and swamp birds with crake and bittern breeding area at the head of Te Korua.

Key supporting factors for the Waikekewai focus area

1. Continuous occupation and importance as a mahinga kai site make Waikekewai a particularly significant area for Ngai Tahu at Te Waihora.
2. The Waikekewai stream and catchment provide an opportunity to develop and test Ki Uta Ki Tai whole catchment management in preparation for its use in other parts of the Te Waihora catchment.
3. Stream restoration actions will help to reinstate habitat and enhance the nationally significant local population of the declining longfin tuna.
4. Possible future use of the traditional lake opening site at Waikekewai will add to/integrate with the restoration efforts in this area.
5. The JMP is a statutory planning document that recognises, enables, guides and supports the restoration of this significant area.
6. Restoration activities at Waikekewai will enhance and complement existing Ngai Tahu and landowner activities.
7. Restoration of the Waikekewai and the wider area will provide an opportunity to involve community and stakeholder, including Fonterra, in the development of farm management plans.
8. Restoration activities at Waikekewai will help to reconnect the culturally and ecologically significant Muriwai/Coopers Lagoon to Te Waihora.

Five Year Work Programme – Project Area: Waikekewai					
Action/workstream grouping		**Outcome**	**Success indicators**	**Timeframe**	**Total contribution**
LOWLAND STREAMS AND RIPARIAN HABITAT					
C1	Weed control & surveillance for willow, canary reed grass, flag iris, *Carex ovalis*, purple loosestrife, beggars tick, others spp.	Waterway and adjoining lake margin wetlands protected	- Reduced abundance and extent of willows and other weeds in waterways and lakeshore wetlands - Increased extent and improved condition of indigenous waterway and lakeshore habitats. - Improved mahinga kai access and success	2 years	$20,000
C2	Plant and maintain riparian and wetland areas for 70% of Waikekewai Stream mainstem[5] Investigate & implement predator control for protection of threatened species if necessary	Enhanced in-stream, riparian and wetland habitat	- Improvement in in-stream & riparian habitat - Reduction in weed growth due to shading in small streams leading to a reduction in the water quality impacts of cleaning - Reduction in sediment entering waterways - Improved cultural health - Improved populations of native fauna specifically longfin tuna - Improved mahinga kai access and success	5 years	$295,400

[5] Costing includes two maintenance passes for all plantings. It is expected that part of the landowners (public & private) will contribute to this action via actions such as stock exclusion and maintenance of plantings beyond initial establishment (2 years).

C3	Identification, fencing and riparian planting of waipuna/springheads & other culturally important wetland/waterways	Protection and enhancement of key cultural waterways	- Improved cultural health - Improved mahinga kai access and success	3 years	$30,000
C4	Re-batter drain banks; planting to provide shade; addition of sediment traps in major drains; create demonstration site to support a review of drainage management practice	Reduced weed growth and sedimentation in drains and improved biodiversity	- Reduction in impacts of drain management on water quality, cultural and ecosystem health - Improved mahinga kai access and success	3 years	$95,000
CATCHMENT MANAGEMENT					
C5	Education of private land owners and drain maintenance teams on managing for multiple values	Improved drain network management for multiple values	- Reduction in impacts of management on water quality and ecosystem health	5 years	$7,000
C6	In conjunction with key stakeholders manage appropriate forum to enable coordination of actions	Actions of all those involved in restoration projects are informed and coordinated	- Strong relationships and trust between all stakeholders	Annually in Feb, and as needed	Project Mgr salary plus
C7	Develop and deliver an extension programme by working with land managers and industry	Well informed community Waikekewai river catchment	- Landowner willingness to participate on programme - Active discussion groups operating in catchment - High level of awareness of key issues and options for management - High level of trust developed between landowners and agency and industry partners.	February 2012 to Dec 2013	$29,600

C8	Link with dairy industry nutrient benchmarking programme. Develop and implement a nutrient and water use efficiency benchmarking programme for arable, horticulture and sheep and beef farms	Current level of land use practice in relation to industry agreed benchmarks understood	- Benchmark information available for 8 farms in Waikekewai catchment - Benchmarking data used as basis for on-farm discussions on management option	June 2012 to June 2013	$8,000
C9	Develop and implement appropriate farm plan programmes & associated sub-catchment discussions	Catchment-based programmes in the Waikekewai catchment	- 8 farm plans completed and operational - Trial audits completed on 3 farms - 8 farms forming the basis of active discussion groups within catchment - Farm plans include actions for improved mahinga kai access and success, riparian and biodiversity management	June 2012 to December 2013	$40,000
MONITORING AND INVESTIGATION					
C10	Mahinga kai bio health investigation	Known health qualities of mahinga kai and identification of possible sources of contaminants	- Improved understanding of health impacts of mahinga kai - Potential sources of contamination identified	2 years	$20,000 A minimum value of $40,000 will be allocated to this project where needed following initial investigations and will be reallocated from other expenditure
FOCUS AREA TOTAL					**$545,000**

D. In-lake habitat including the Horomaka kohanga

Site description and Ngai Tahu history

Situated just west of Banks Peninsula/Te Pataka o Rakaihautu, Te Waihora is the largest lake by area in Canterbury and is an important link in the chain of coastal lagoons and estuaries along the east coast of the South Island/Te Wai Pounamu of New Zealand. Te Waihora is a tribal taonga representing a major mahinga kai and an important source of mana. It is of national importance for the protection of wildlife habitats and ecological functioning and has been described as the most important wetland habitat of its type in New Zealand.

Internationally, Te Waihora is important for many migratory wading bird species which visit the wetland, as well as for threatened indigenous species, the diversity and high proportionate population of the bird species it supports, and for the many indigenous fish species it supports.

The fishery is significant from a customary and commercial perspective. A considerable effort is needed to enhance the customary fishery through the on-going conservation, management and research of customary fisheries, freshwater fish populations and habitats.

Cultural and ecological values In-lake

- Mahinga kai – it is intended that restoration activities In-lake will improve and enhance customary access to and gathering of fish, bird and plant resources.
- Taonga species – In-lake restoration efforts will enhance the populations of the culturally significant species that are treasured by Ngai Tahu.
- Biodiversity – the habitats, species and natural processes in an area determine its natural character. The in-lake environmental restoration will enhance the natural biodiversity values of Te Waihora.

The Horomaka kohanga

The Joint Management Plan for Te Waihora (JMP) 2005 is a statutory land management plan developed by the Crown and Ngai Tahu and includes as a key protection and enhancement mechanism the ability to control commercial activities that come into contact with the lakebed. This is achieved through the development of access agreements with commercial operators as well as the management of specific areas as customary and recreational use areas or kohanga. One such area identified in the Joint Management Plan is known as the Horomaka Kohanga (map 5), where commercial fishing and other activities are controlled, with agreement, for the purposes of enriching and improving the access to and abundance of fish and other mahinga kai resources of Te Waihora while providing for recreational and customary fishing.

A kohanga refers to a breeding and/or seeding ground or nursery and it is intended to protect and enhance fish and other resources of Te Waihora.

The Horomaka kohanga is defined by the area of Ngai Tahu lake bed and adjoining DOC land (on the northern boundary) immediately to the east of a line that runs between the ancillary claims site Ahuriri (adjoining Greenpark Huts) and the western boundary of Te Waiomakua, on the southern coastal shore of the lake. At present commercial fishing is only being undertaken on the western

side of that line. Significantly Kaituna Lagoon is located within the north eastern part of the Horomaka kohanga.

Map 5: Horomaka Kohanga area at the eastern end of Te Waihora.

Cultural values at the Horomaka kohanga

- Mahinga kai – it is intended that restoration activities within and around the kohanga area will improve and enhance traditional customary access to and gathering of fish, bird, plant and other resources.
- Taonga species – restoration efforts will enhance the populations of the culturally significant plants and animals that are treasured by Ngai Tahu.
- Customary and recreational use – restoration activities at this site will increase access to and enhance opportunities for customary use and recreation such as walking, bird watching and fishing.

Key supporting factors for in-lake and Horomaka kohanga restoration

1. Restoration of in-lake habitat is an outcome that will take a significant time to achieve. We need to begin understanding and implementing improved management now to achieve improvement in in-lake habitats in the longer term.
2. The Joint Management Plan (JMP) is a statutory planning document that recognises, guides and supports the restoration of this nationally significant water body.
3. The importance of Te Waihora as a significant mahinga kai resource, in particular its fish and bird resources, make the restoration of the lake paramount to Ngai Tahu and the community.
4. Te Waihora is an area of cultural, natural, historic, recreational and commercial importance to many people. In-lake restoration efforts will enable and enhance their use of the lake.

5. The Horomaka kohanga is supported and empowered by the Joint Management Plan. The JMP is a tool for the enhancement of customary and recreational activities and supports the restoration of this significant area.
6. The kohanga is an instrument for the enhancement of customary and recreational activities.
7. The aim of the kohanga is to provide a nursery to repopulate the whole lake with fish, birds and other desired resources.

Five-Year Work Programme – Project Area: In-lake including Kohanga					
Action/workstream grouping		**Outcome**	**Success indicators**	**Timeframe**	**Total contribution**
INDIGENOUS IN-LAKE HABITAT					
D1	Trial establishment of macrophyte beds and artificial habitat creation	Improved in-lake habitat and reduced shoreline erosion	- Improved in-lake habitat - Reduced shoreline erosion - Improved mahinga kai access and success	2 years	$685,000
D2	Trial establishment of small islands in-lake	Improved in-lake habitat and reduced shoreline erosion	- Improved in-lake habitat - Reduced shoreline erosion - Improved mahinga kai access and success	2 years	$325,500
CATCHMENT MANAGEMENT					
D3	In conjunction with key stakeholders manage appropriate forum to enable coordination of actions	Actions of all those involved in restoration projects are informed and coordinated	Strong relationships and trust between all stakeholders	Annually in Feb, and as needed	Project Mgr salary

MONITORING AND INVESTIGATION					
D4	Science investigation on mechanisms that drive in-lake nutrient processing	New guidelines for management of lake with respect to reducing lake nutrient level and setting catchment nutrient limits	New management regime set for lake openings to manage for water quality in conjunction with ecosystem health and flood prevention	2 years	$265,000
D5	Investigation and implementation of fish restocking/recruitment, including review of l fisheries management	Clear plan for the management and enhancement of fish populations in the kohanga areas- Horomaka and Te Korua	- Costs and feasibility of enhancing fish numbers in kohanga areas known in year 1 - Project initiated in year 2 if feasible & cost effective	2 years	$230,000
D6	Mahinga kai bio health investigation	Known health qualities of mahinga kai and identification of possible sources of contaminants	- Improved understanding of health impacts of mahinga kai - Potential sources of contamination identified	2 years	$20,000 (A minimum value of $40,000 will be allocated to this project where needed following initial investigations and will be reallocated from other expenditure)
FOCUS AREA TOTAL					**$ 1,525,500**

E. Lake opening management

Traditionally Ngai Tahu opened Te Waihora for cultural and ecological reasons, to allow fish recruitment and to enhance mahinga kai harvest. It is anticipated that installing a permanent lake opening and closing structure will enhance the ability to manage lake levels. A permanent structure would provide for a system of opening and closing the lake at levels to ensure biological values are achieved.

Lake openings and the resultant lake level fluctuations are major influences on the wildlife habitat and cultural and biodiversity values of Te Waihora. Lake opening levels and the duration of openings, with the resultant changes in salinity and water level, influence the composition and abundance of plant communities in and around Te Waihora. Lake openings also affect fish migration into and out of the lake, animal species diversity and abundance and mahinga kai. Water levels also influence water temperature and thus habitat, as well as wave fetch and the temporary wind-induced submergence of lake margins.

It is important to instigate a science/engineering investigation to develop a clear plan about the feasibility of a permanent opening and closing structure. This investigation would be integrated into the review of flood and drainage operations management in accordance with the (amended) Water Conservation Order and new consent conditions. This investigation would also consider the effect of coastal processes on the feasibility and likely success of any structure.

<u>Key supporting factors for lake opening actions</u>

1. The (amended) Te Waihora Water Conservation Order recognises the nationally outstanding features of Te Waihora including the association that Ngai Tahu has with the lake, the customary fishery as well as habitat for wildlife, indigenous wetland vegetation and fish. It also supports the need to manage the lake levels and opening regime specifically for these values.
2. The Lake Opening Resource Consent should reflect and provide for the values identified in the amended Water Conservation Order and legitimise the activity of opening the lake for these purposes.
3. The proposed drainage review for the lake opening will reflect and support 1 and 2 above.
4. Te Waihora as a tribal resource – the lake opening should and will continue to support cultural values with regard to Te Waihora as the kaupapa for Ngai Tahu. Without mahinga kai in and around the lake to the extent that ensures customary success, these cultural associations, practices and values are threatened.

Five-Year Work Programme – Project Area: Lake Opening					
Action/workstream grouping		**Outcome**	**Success indicators**	**Timeframe**	**Total contribution**
MONITORING AND INVESTIGATION					
E1	Investigation into moving the lake opening site and deepening in-lake channels for improved lake flush and improved opening success	Improved lake opening management success	- Costs and feasibility of a changed flood opening is fully known. - Implement knowledge in year 2	2 years	$260,000
E2	Science/engineering investigation on lake level control mechanism for cultural mahinga kai and ecological values	Clear plan for establishment of lake opening for ecological and cultural values, with primary objective for fish passage	- Costs and feasibility of a fish passage opening is fully known year 1 to 3 - Initiate project year 4 or earlier if known	4 years	$490,000
FOCUS AREA TOTAL					**$750,000**

F. Protecting lake shore habitat

Site description and values

The lakeshore wetlands around the margin of Te Waihora are habitats of regional, national and international importance. The ecological values have been well described in various publications (e.g. Taylor 1996).

The lake shore margins support what is now the most extensive area of contiguous wetland habitat in the lowlands of eastern South Island, containing approximately 4,000 ha. Most of this is saltmarsh or brackish wetland habitat supporting a range of predominantly native shrub, rush and herbfield vegetation types. There are also approximately 500 ha of freshwater wetland habitats, concentrated mostly along the northern and western lake shore. However, the proportion of native wetland vegetation in these habitats is relatively low (35%) and in decline, due largely to the spread of introduced plant species, particularly willows (Hughey and Taylor, 2008). Remaining native freshwater wetland habitats areas are nevertheless an important part of the lakeshore ecosystem. They include significant examples of regionally uncommon and distinctive vegetation types, such as baumea restiad rushland, and are critical habitat for a number of threatened plant and bird species (e.g. orchids, swamp nettle, bittern).

Te Waihora shoreline wetlands are ecologically linked to other areas of high biodiversity value: the lake itself; native dryland and dune vegetation on Kaitorete Spit; native forest remnants in Kaituna and Prices Valley; and plains spring-fed tributary streams.

The development of the work programme below is based on the consideration of the values, threats and management opportunities for each of the 15 ‘management units’ from Taylor (1996); and two reports on willow distribution and management strategies, Pompei & Grove (2009) and Walls (2009).

Key supporting factors for the lake shore restoration focus area

1. Protection of remaining freshwater wetland habitat is a national and regional priority for biodiversity.
2. Offers opportunities for protection and enhancement of key mahinga kai sites.
3. Public ownership of lake shore land enables agencies to lead by example in land management.
4. Lake shore habitats and opportunities for improved management are highly visible.

Five-Year Work Programme – Project Area: Lake Shore Habitats					
Action/workstream grouping		**Outcome**	**Success indicators**	**Timeframe**	**Total contribution**
Indigenous Lake Shore Habitat					
F1	Weed control & surveillance for willow, canary reed grass, flag iris, *Carex ovalis*, purple loosestrife, beggars tick and other species outside focus catchment areas	Waterway and adjoining lake margin wetlands protected	- Reduced abundance and extent of willows and other weeds in waterways and lakeshore wetlands - Improved mahinga kai access and success	5 years	$171,000
F2	Manage lake margins to reduce the impact on wetlands & the lake by: (1) Demonstrating good practice on public land, including review of leases. (2) Working with landowners on private land, including support for fencing and voluntary protection/covenanting and ensuring compliance with relevant NRRP & DP rules. (3) Considering lake edge property purchase should the opportunity arise.[6]	Lake and river margin wetlands protected and buffer created around lake	- Improvement in-lake shore wetland condition - Increased extent of native lake shore vegetation - Improved cultural health	5 years	$1,215,000

[6] The budget given here is for fence materials and erection, costs associated with covenanting land, and possible purchase of land. The level of funding committed will likely allow for the purchase of only one property, or part of one property in the first five year period. Property purchase will be considered should the opportunity arise through properties being offered on the market, but will not be actively sought. The determination of priority of any areas being considered for purchase will include importance of habitat; alignment with five year focus areas; opportunities for short-term improvement in habitat quality; linkages with other areas of public land.

F3	Restoration actions across 11 lake shore sites	Enhanced cultural and ecological values	- Improved cultural health - Improved mahinga kai access and success - Increased recreational usage - Improvement in lake shore habitat condition	2 years	$200,000
F4	Native planting to improve lake margin wetland habitats	Enhanced wetland habitat	- Increased extent and improved condition of indigenous lakeshore habitats - Improved mahinga kai access and success	4 years	$216,000
Focus Area Total					**$1,782,000**

G. Project Management & Monitoring – Te Waihora Catchment

These actions cover the whole Te Waihora catchment and although they will be integrated with the focus areas, it is not appropriate to assign them to a specific area.

Five-Year Work Programme – Project Management & Monitoring: Te Waihora Catchment					
Action/workstream grouping		**Outcome**	**Success indicators**	**Timeframe**	**Total contribution**
Monitoring & investigations					
G1	Monitoring programme of water quality, cultural and ecosystem health established	Monitoring programme for water quality, cultural and ecosystem health that directs adaptive management interventions	Measures of water quality, cultural and ecosystem health available for assessing effectiveness of interventions	Ongoing monitoring of existing sites plus establishment of new monitoring sites in year 1.	$1,686,200
Catchment Management					
G2	Establish nutrient limits for the Te Waihora catchment	Catchment load limits set for Te Waihora	Catchment nutrient load limits set and catchment wide implementation programme agreed	October 2011 to December 2012	$590,000
Lowland Streams and Riparian Habitat					
G3	Technical support for implementing improved management of waterways outside focus catchments	Community led restoration projects are effective & engaged	- Build relationships & trust with landowners & stakeholders - improvement in riparian & in-stream habitat in funded project areas	2 years	$20,000

Project Management					
G4	Stakeholders and public regularly updated about restoration activities around the lake and opportunities to be involved	Well informed community	Number of attendees at community action days increases	2 years	Project Mgr Salary
G5	Research on lake coordinated and well carried out	Research opportunities well carried out	Number of university-based research projects on catchment increases	2 years	Project Mgr Salary
G6	Project Manager appointed	Gains from funding maximised	Project implementation, monitoring & review timeframes are meet	2 years	$340,000
TOTAL					**$2,636,200**

H. Summary of project costs

Focus area	Total cost
Kaituna River and Catchment Ki Uta Ki Tai	$540,150
Huritini/Halswell River and Catchment Ki Uta Ki Tai	$2,233,150
Waikekewai Stream and Catchment Ki Uta Ki Tai	$545,000
In-lake Habitat including the Horomaka kohanga	$1,525,500
Lake Opening	$750,000
Lake Shore Habitats	$1,782,000
Project Management & Monitoring: Te Waihora Catchment	$2,636,200
Total programme	**$10,000,000***

***Note: total programme costs include only contributions from Ministry for the Environment, Environment Canterbury and Te Runanga O Ngai Tahu. Other stakeholder contributions will be discussed and included as they are confirmed.**

Glossary

Ahi ka – title to land through occupation by a group, generally over a long period of time.

Hapu – sub-tribe.

Kaitiaki – is derived from the verb tiaki (to guard, to protect, to keep, to watch for, to wait for). The kaitiaki system is based on whakapapa lineage and is an inherited responsibility that is traditional and strongly held.

Kaitiakitanga – is the act of guardianship.

Kawa – customs of the marae and wharenui, particularly those related to formal activities such as pohiri, speeches and mihimihi.

Ki uta ki tai – a description of environmental policy and planning that takes a holistic 'from the mountains to the sea' approach and encapsulates rangatiratanga and kaitiakitanga.

Kohanga – breeding ground, seeding ground, nursery.

Mahinga kai – the customary gathering of food and natural materials and places where those resources are gathered.

Mana – integrity, status, prestige, power.

Mana whenua – territorial rights, power from the land – power associated with possession and occupation of tribal land.

Mauri – essential life force or principle; a metaphysical quality inherent in all things, both animate and inanimate.

Papatipu runanga – marae-based councils administering the affairs of the hapu (sub tribe).

Patiki – flounder fish.

Rangatiratanga – is customary tribal authority. It incorporates the right to make, alter and enforce decisions pertaining to how resources and taonga are used and managed, and by whom.

Riffle – a short, relatively shallow and coarse-bedded length of stream over which the stream flows at higher velocity and higher turbulence than it normally does in comparison to a pool. Creation of riffles in waterways can improve habitat and habitat diversity for fauna.

Runanga – council, tribal council, assembly, board.

Takiwa – district, area, territory, vicinity, region.

Tangata tiaki – a system for Ngai Tahu to manage natural resources and activities according to tikanga and under the various legislative requirements.

Tangata whenua – local people, hosts, indigenous people of the land

Taonga – Valued resources, treasures and possessions, both tangible and intangible.

Te Waihora Co-Governance Group – Comprises of all 7 Commissioners of the Canterbury Regional Council and all 8 members of the Te Waihora Management Board.

Tikanga – Custom, obligations and conditions.

Tohu – Species used as signs, or environmental indicators of planting and gathering times or methods.

Tuna – eel.

Wairua – spirit, spiritual essence.

Wakawaka – share, division, division of a harvesting area – a descent group's division of a harvesting area and may be on land, river or sea.

Whakaora – to save, rescue, resuscitate, revive, restore to health, cure, heal.

Whakapapa – Genealogy, tribal ancestry and the interrelationship between all things

Whakatauki – proverb, saying, cryptic saying, aphorism.

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Appendix 1 – Ngai Tahu Historical background for Te Waihora

Te Waihora is an area of cultural, natural, historic, recreational and commercial importance to many people. To Ngai Tahu, Te Waihora represents a major mahinga kai and an important source of mana.

The loss of this precious tribal taonga was part of the grievance outlined in the Ngai Tahu claim to the Waitangi Tribunal. The Tribunal strongly recommended the return of Te Waihora to Ngai Tahu, and commented that this needed to be accompanied by significant and committed Crown action to restore Te Waihora as a tribal food resource (Chapter 17, Waitangi Tribunal 1991).

"Ngai Tahu cultural identity is restored through the rejuvenation of the mauri and life-supporting capacity of Te Waihora" (extracted from the Te Waihora Joint Management Plan).

"The management and sustainable use of quality traditional food and other cultural resources of Te Waihora maintains and enhances the rangatiratanga and kaitiaki role of Ngai Tahu in recognition of this tribal taonga".

Te Kete Ika means the fish basket and exemplifies the once rich and bountiful resources of Te Waihora – the flat spread-out waters. The names Te Kete Ika o Rakaihautu and Te Kete Ika o Tutekawa denote the whakapapa of the area as various ancestors laid claim to Te Waihora and its resources. These resources, their ongoing sustainable management and use and the spiritual connection to Te Waihora are taonga to Ngai Tahu.

The first people to arrive in the central Canterbury area were those on the Uruao waka under the captaincy of Te Rakihouia. Te Rakihouia had been instructed by his father Rakaihautu to seek out the rich resources of the coastal area (ki tai) while he traversed the mountain regions identifying the resources of land (ki uta).

During these journeys, Te Rakihouia discovered the wetland of Te Waihora teeming with fish and birds. Upon reuniting with his father, Te Rakihouia took him to the lake where Rakaihautu proclaimed Te Waihora as Te Kete Ika a Rakaihautu – The Fish Basket of Rakaihautu. Subsequent to this, waves of other iwi and hapu inhabited the Te Waihora area.

Two prominent ancestors that held mana to the area were Tutekawa, a Ngati Mamoe Chief, and Te Ruahikihiki, the eponymous ancestor of the hapu Ngai te Ruahikihiki who inhabited the Orariki Pa at Taumutu. Te Ruahikihiki was a close relation of all the prominent chiefs of the Banks Peninsula/Horomaka and the North Canterbury region which therefore gave rights to those chiefs and their hapu having whakapapa that links them to Te Waihora.

Mahinga kai and customary use:
Te Waihora is a tribal taonga, a resource traditionally used by the whole of Ngai Tahu Whanui. The rights to these resources were shared by many different hapu, each with access to the shore of the lake closest to their takiwa, through wakawaka (family gathering sites) and the traditional practices of manaaki, kai hau kai and networks of whakapapa. Resource use was (and continues to be) regulated through the protocols of tikanga and kawa, in accordance with the lifecycles of the mahinga kai species and encouraging sustainable resource use.

As a mahinga kai, Te Waihora provided fish and shellfish, was a birding ground for many species and was the gathering place for numerous plant and other natural materials. The swamps provided raupo and harakeke and Kaitorete Spit provided access to fish, pingao and other plant species.

Mahinga kai resources include;

- trees for whare and waka (buildings and canoes)
- plants and animals used as tohu (indicator species) for fishing and planting times
- rongoa species (medicines) and kai (food)
- feathers and plant fibre for weaving
- mud and soils, tree bark
- berries for dyes
- plant seeds for oil
- fauna and flora for food.

Materials such as bone, shells, wood and stone were also used to produce taonga (valued treasures and possessions), and other everyday tools.

Te Waihora remains a Mahinga kai of great importance to Ngai Tahu. Participation in Mahinga kai activities maintains the same importance today as in the past. This encourages the provision of continued availability and use of resources and customary areas to maintain the traditional associations of Ngai Tahu with Te Waihora. Availability involves both physical access to Te Waihora and to healthy resources within it, as well as legal access to those resources and sites.

Customary use by Ngai Tahu has changed in response to issues of scarcity, sustainability and cultural developments, such as technological advances and changed catch methods. It will continue to evolve with culture and the environment. A commitment to customary use implies sustainable use and the need to manage, protect and restore species, habitats and ecosystems to enable such use to occur.