

HE HOKIOI RERENGA TAHI

The Lake Horowhenua Accord Action Plan

2014 - 2016



He Mihi

Ko tēnei te moemoeā

O te iwi nei, arā ko Ngāi Tara te Muaūpoko o te Ika

Kia rongoā te taiao nei, te whenua me ngā wai tapū o te rohe nei

E kōrero ana tātou ki ngā Iwi katoa, kei a tātou kotahi te rongoa

Ti hea Mauria Ora!

This is the wish of our iwi Ngāi Tara te Muaūpoko o te Ika

To restore nature, our sacred lands, and waters to their former glory

We are speaking to all people, as we are all part of the solution

The breath of life!

He Whakataukī

Nōhea te toto o

Ngāi Tara te Muaūpoko o te Ika

E rere kau ana

Nō te Rangi ki te whenua

A Muaūpoko Proverb

Whence the blood of

Ngai Tara the Muaūpoko of the fish of Maui

Ran from the heaven to the earth





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Mutunga



Tasman Sea

Key

-  Streams & drainage network
-  Lake Horowhenua Catchment



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Kilometres

Tararua Ranges

Action Plan

Mahere a Mahi

In August 2013, five parties representing the Muaūpoko owners, community interests and statutory bodies agreed to work together to provide leadership; halt the degradation and put in place remedial measures on Lake Horowhenua and Hokio Stream that will ensure these taonga (treasures) hold pride of place in the Horowhenua community.

The five parties are the

- » Lake Horowhenua Trust;
- » Horowhenua Lake Domain Board;
- » Horowhenua District Council;
- » Horizons Regional Council; and,
- » Department of Conservation

One of the commitments was to consider how to respond to key issues, management goals and the 15 guiding points outlined in the Lake Horowhenua Accord document. This document presents some initial responses to some of these items that will be the focus of an Action Plan spanning from 2014-16. Key elements of the Action Plan include work related to the Ministry for the Environment's Fresh Start for Freshwater Clean-up Fund project, ongoing monitoring and science work and the facilitation of conversations and learning around key issues related to Lake Horowhenua and the Hokio Stream to develop appropriate actions for future iterations of this Action Plan.

Background

In pre-European times, Lake Horowhenua was a clean-water supply and valued fishery for the Muaūpoko iwi who lived in the coastal forest that surrounded the Lake. Clearance of coastal forest, draining of swamps, intensification of land use, urban expansion, and the disposal of treated effluent in the Lake between 1962 and 1987 has led to significant degradation of Lake Horowhenua. After the input of treated sewage stopped in 1987, water quality within the Lake started to improve. However, a decade later water quality

began to decline again and in 2010 Lake Horowhenua was ranked as the 7th worst out of 112 monitored lakes in New Zealand. Lake Horowhenua is regularly closed for recreation in summer due to the presence of toxic cyanobacteria. This is related to the large amounts of nutrients and sediment entering the Lake combined with large amounts of sediment and nutrients already present in the Lake.

This Action Plan provides detail on the key issues impacting Lake Horowhenua, as identified in the Lake Accord document, and the approaches for its restoration. Many of the restoration management actions in this Action Plan are based on scientific and monitoring work done by Horizons Regional Council to further understand the current situation of Lake Horowhenua and assess various restoration options. This includes two reports completed in 2011 and 2012 by NIWA scientist Max Gibbs which summarised the key issues affecting Lake Horowhenua water quality and identified restoration options. The reports provided the basis for many of the key issues, management goals and actions identified in the Lake Horowhenua Accord document. The Action Plan has also been informed by more recent monitoring and science work that includes new monitoring programmes, an assessment of the fish populations (April 2013) and a comprehensive weed survey (January 2014).



FURTHER INFORMATION about the Lake Horowhenua Accord and the various science reports is available from <http://www.horizons.govt.nz/managing-environment/resource-management/water/lake-horowhenua-accord/>.

Cultural Significance

The special cultural and spiritual connection Muaūpoko has with the Lake, and the negative impact the failures of the past have had on that ancient relationship, is fully acknowledged by the Lake Accord partners. The Accord Partners did not consider it appropriate to attempt to define those cultural relationships nor try to identify a vision for cultural development or reconnection as part of this Plan.

This Action Plan does, however, seek to apply real actions aimed at addressing many of the key ecological issues facing the Lake, that are to be undertaken in a culturally appropriate way and that may also support the cultural aspirations of the owners and Muaūpoko.

The Lake Horowhenua Trust has taken the lead responsibility for investigating Muaūpoko's cultural aspirations for the Lake. This will be done by the Trustees as they develop their own vision incorporating the cultural, spiritual and historical matters of importance to owners and Muaūpoko as well as customary rights and practices.

The other Lake Accord Partners are committed to supporting the Lake Trustees through this process and eventually incorporating their vision into the longer term Lake restoration goals of the Lake Accord initiative.

The lake was included in the land set apart. I intended that 3 chains should be reserved round the Horowhenua Lake, and on both sides of the Hokio Stream down to the sea. ... I included Horowhenua Lake in the land for the people for fear it should be drained. It has always been the food-supply of the people, from the time of my ancestors till now, and is highly prized...Those whose kainga are inside the reserve should shift their houses back, and plant trees on the reserve, to beautify it. ... I ask the Court to vest the lake and the reserve round it in a trust, to be chosen by the people.

- *Keepa Te Rangihiwini (Major Kemp), 1896*

The Horowhenua Block: Minutes of proceedings and evidence in the Native Appellate Court under the provisions of "The Horowhenua Block Act, 1986." [In continuation of G.-2, Sess. II., 1897.] p 146-147

The Lake Horowhenua Accord

Te Kawenata o te Roto o Horowhenua

The Lake Horowhenua Accord outlines the vision, objectives, key issues and management goals for the restoration of Lake Horowhenua and the Hokio Stream.

Vision

Lake Horowhenua; he taonga tukū iho, he taongā mo te katoa mo te katoa (A treasure handed down from our ancestors for the enjoyment of all). The whakatauki (proverb): He Kotuku Rerenga Tahi (A white Heron's flight is seen but once) best describes the overarching purpose of coming together to resolve, once and for all, the condition of Lake Horowhenua.

Objectives

The objectives of the parties are to:

- » Return Lake Horowhenua as a source of pride for all people of Horowhenua;
- » Enhance the social, recreational, cultural and environmental aspects of Lake Horowhenua in a fiscally responsible manner that will be acceptable to the community of Horowhenua;
- » Rehabilitate and protect the health of Lake Horowhenua for future generations; and,
- » Consider how to respond to the key issues, management goals and the 15 guiding action points the Accord partners have agreed upon.

Key Issues

The Lake Horowhenua Accord identifies the following eight key issues:

1. Poor water quality
2. Sources of nutrients and contamination and other causes of adverse effects to the health of the Lake;
3. Cyanobacteria blooms;
4. Excessive lake weed;
5. High turbidity and sediment inputs;
6. Declining fishery;
7. Pest fish; and
8. Confusing and overlapping responsibilities.

Management Goals

The Lake Horowhenua Accord identified the following seven key management goals:

1. To maintain or enhance the fishery in the Lake and its subsidiaries;
2. To reduce or eliminate the occurrence of nuisance cyanobacteria;
3. To limit and manage nutrient input into the Lake from all sources;
4. To improve the water quality of the Lake, for example from hypertrophic to supertrophic or eutrophic;
5. To reduce the abundance of aquatic macrophytes in the Lake;
6. To consider more efficient and effective management/decision making processes around the Lake and to empower beneficial owners and Muaūpoko to more effectively participate in the management of the Lake; and
7. To regularly communicate to beneficial owners the state of the Lake.



A Collaborative Effort

He Mahi Kotahi

The Lake Horowhenua Accord draws together five foundation partners to collaboratively pursue the objectives and goals of the Accord, while acknowledging that each partner has their own responsibilities.

The Accord sets out a clear vision for a collaborative approach. This includes outlining the acknowledgements and relationship principles for working together.

The following sections provide information on how the Accord governance structure works in practice and how support partners are working with the five organisations that are foundation signatories to the Accord. The five foundation partners are the Lake Horowhenua Trust; Horowhenua Lake Domain Board; Horowhenua District Council; Horizons Regional Council and the Department of Conservation.

Acknowledgements from the Accord

Signatories to He Hokioi Rerenga Tahi:

- » Acknowledge the special legal status of the Trust, and of all beneficial owners of Lake Horowhenua and their cultural interests in respect of the current and ongoing management of the Lake in their collective roles and responsibilities as Kaitiaki;
- » Agree that there is a need to recover, protect and enhance the legal interests and cultural values and practices of the owners and Muaupoko Iwi in respect of Lake Horowhenua and its environs;
- » Commit to the recovery of Lake Horowhenua for the recreational and leisure enjoyment of the communities of Horowhenua; and,
- » Agree to work collaboratively to develop appropriate instruments for the attainment of the goals: including best governance and management practice that may draw from recent experiences; (for example the Waikato-Tainui River Settlement 2008 and the Manawatū River Leaders' Accord).

Relationship Principles

When members are working together the following relationship principles under the Accord will be respected: Whakapapa (relationships); Kotahitanga (unity); Kaitiakitanga (custodianship); Wairuatanga (spirituality); Rangatiratanga (ownership); Manaakitanga (hospitality); and, Ūkaipōtanga (nurturing).

Support Partners

The Lake Horowhenua Accord foundation members recognise the value of working with other partners to achieve the objectives of the Accord. For example, the Ministry for the Environment, Tararua Growers Association and DairyNZ have formed a partnership with the Accord partners through the Fresh Start for Freshwater Clean-up Fund (as detailed in a later section).

Governance Structure for the Lake Accord

Following the signing of the Lake Horowhenua Accord, the five foundation members agreed on a governance model for the Accord. A Chairman and Deputy Chair have been appointed.

- » The Chairman is Matthew Sword who is also the chair of the Lake Horowhenua Trustees.
- » The Deputy Chair is Mayor Brendan Duffy.
- » Each of the foundation members have representation in the Governance Team.

Work as a part of the Accord group is progressed by collaborative agreement between all members (i.e. not by a voting system). Involvement in the Accord does not override any obligations or rights of the individual parties.

For example while works may be agreed to under the Accord, permissions still need to be sought from the Lake Horowhenua Trust, Horowhenua Lake Domain Board, District or Regional Council in relation to activities on Lake Horowhenua and its immediate environs.

Roles and Responsibilities

Ngā Tūranga me ngā Tokohanga

Fundamental to each of the foundation members' involvement is the approach of working in partnership to achieve the objectives and goals of the Accord. This may involve working together to access resources, from relevant organisations such as Central Government and also non governmental organisations.

LakeHorowhenuaTrust

Purpose & Responsibilities:

Lake Horowhenua is privately owned by the Lake Horowhenua Trust, which represent the interests of the Beneficial Owners of Horowhenua Block 11 (Lake). The purpose of the Lake Horowhenua Trust is to protect and enhance assets of the Lake Horowhenua Trust on behalf of the Beneficial Owners of the Lake under the Te Ture Whenua Māori Act (1993). The Lake Horowhenua Trust also has the responsibility to manage fishing easement and fishing rights on behalf of Muaūpoko iwi in accordance with the Reserves and Other Land Disposal Act 1956 (ROLD Act).

Governance Description:

Lake Horowhenua Trust members are elected every three years through a vote by beneficial owners.

Overall role in the Lake Accord:

The Accord is led and chaired by the Chair of the Lake Horowhenua Trust and supported by the signatories to the Accord. The Lake Horowhenua Trust also has a role to ensure communication and consultation with the beneficial owners and Muaūpoko iwi members.

HorowhenuaLakeDomainBoard

Purpose & Responsibilities:

The purpose and responsibility of the Horowhenua Lake Domain Board is to manage the recreational reserve of the Lake, this includes access to the surface waters of the Lake and Muaūpoko Park.

Governance Description:

The Lake Domain Board is a Statutory Board of eight members, appointed under the ROLD Act (1956). The Department of Conservation provides the Chair, the Horowhenua District Council appoints three members and the Muaūpoko iwi appoint four representatives.

Overall role in the Lake Accord:

The Horowhenua Lake Domain Board helps facilitate access to Lake Horowhenua and ensure any work undertaken is consistent with management roles and responsibilities of the reserve and is conducted in accordance with legislation.



Department of
Conservation
Te Papa Atawhai

Purpose & Responsibilities:

The Department of Conservation has legislative responsibilities under many Acts such as, the Conservation Act (1987), National Parks Act (1980) and Reserves Act (1977). The purpose of the Department of Conservation is to promote conservation leadership for a prosperous New Zealand by:

- » Managing natural and historic heritage on roughly one third of New Zealand's land area, as well as marine environments;
- » Doing hands-on work with species and ecosystems;
- » Leading conservation research and science; and
- » Sharing information and partnering with others including iwi, communities, non-government organisations, businesses, conservation boards, and central and local government.

Overall role in the Lake Accord:

The Department of Conservation delivers support to the objectives of the Accord by providing technical advice and the conservation of native species such as native fish.



Purpose & Responsibilities:

The purpose of Horowhenua District Council is to enable democratic local decision making to promote the social, economic, environmental and cultural well being of the Horowhenua District in the present and for the future. The District Council has responsibilities to:

- » Sustain district well-being;
- » Provide local infrastructure, including water, sewerage, stormwater and roads;
- » Ensure environmental safety and health, undertake public health inspections and investigate other environmental health matters; and
- » Control the effects of land use (including hazardous substances, natural hazards and indigenous biodiversity) and the effects of activities on the surface of lakes and rivers.

Governance Description:

The Horowhenua District Council is made up of one elected Mayor and ten elected councillors from four wards: Levin, Waiopahu, Kere Kere and Miranui. There is also one elected Community Board in Foxton.

Overall role in the Lake Accord:

The District Council provides secretarial services and administration support for the Accord as well as developing infrastructure improvements in accordance with the Accord.

Purpose & Responsibilities:

The purpose of Horizons Regional Council is to create opportunities for the Region to grow economically and socially in a way that preserves or enhances agreed environmental and cultural values.

The Regional Council has responsibilities to:

- » Sustain regional well-being;
- » Manage the effects of using freshwater, land, air and coastal waters, by developing regional policy statements and the issuing of consents; and
- » Manage rivers, mitigate soil erosion and manage flood control.

Governance Description:

Councillors are elected during local body elections, which are held every three years. Horizons Regional Council has twelve Councillors including two elected from the Horowhenua constituency. The last election was held in October 2013.

Overall role in the Lake Accord:

Horizons' role in the Accord includes provision of monitoring and science input, regulatory management of resource consents and implementation of other Regional Council functions, including administering and delivering the Lake Horowhenua Freshwater Clean-up Fund project.

Further information on the responsibilities of the various agencies is available from:

- » **Lake Horowhenua Trust**
<http://www.facebook.com/LakeHorowhenuaTrust>
- » **Horowhenua Lake Domain Board**
<http://www.horowhenua.govt.nz/Living/About-Horowhenua/Horowhenua-Lake-Domain-Board>
- » **Department of Conservation**
<http://www.doc.govt.nz/about-doc/role/vision-role-overview-and-statutory-mandate>
- » **Horowhenua District Council**
www.horowhenua.govt.nz
- » **Horizons Regional Council**
www.horizons.govt.nz/about-us/who-what-where

Key Issues/Challenges

Ngā Take Matua me ngā Wero

Eight key issues and challenges have been identified by the Lake Horowhenua Accord partners.

1 Poor water quality

Water quality of lakes monitored in New Zealand is classified by trophic level. The level is based on a combination of four key variables; nitrogen, phosphorus, chlorophyll and water clarity. Lake Horowhenua is highly degraded and classified as hypertrophic (Trophic Level Index 6.7) which means that it has high chlorophyll, phosphorus and nitrogen levels and low water clarity.

Based on the trophic level, Lake Horowhenua was ranked the 7th worst out of 112 monitored lakes in New Zealand in 2010. Nutrients from 25 years of sewage inputs accumulated in the sediment and new inputs of nutrient and sediment are key contributing causes of Lake Horowhenua's current poor water quality state. After the input of treated sewage was stopped in 1987, water quality in the Lake did improve to supertrophic (Trophic Level Index fell from 6.28 in 1989 to 5.88 in 2000). However, from 2000 to 2008 water quality declined steadily again reaching a hypertrophic state (Figure 1).

Nutrients and sediment from the surrounding catchment have been a key factor driving this continued decline in water quality. One of the goals of the Lake Horowhenua Accord is to improve water quality of the Lake as measured by the trophic level index.

In 2008 when the water quality of Lake Horowhenua was last measured, the trophic level was in the worst of the categories for this measure (hypertrophic). To achieve improvement of the Lake's water quality, it is important to reduce not only the nitrogen and phosphorous levels already present in the Lake, but also to reduce the inputs of phosphorous, nitrogen and sediment from the surrounding catchment.

It has been reported that poor water quality in Lake Horowhenua has impacted on the native fish populations. The most recent fish survey, undertaken in 2013, revealed that there are six native fish species in Lake Horowhenua: common smelt, common bully, inanga, grey mullet and short and long fin eel (tuna). This is only slightly below the number of fish species

expected for a coastal dune lake. Consequently, water quality does not seem to be having a large effect on fish populations.

A report out of the University of Waikato, noted that the weir on the Hokio Stream restricts upstream migration of some species of fish and has a major influence on the fish populations of some of the species in the Lake that require access to the Lake from the sea as a part of their lifecycle.

Ongoing monitoring will allow adaptive management and assessment of changes in water quality as it helps identify any new issues which can be acted upon before they become a problem.

Monitoring information around the health of Lake Horowhenua has been collected in a range of ways by many different groups and agencies. The primary agency for water quality data collection around and in the Lake in recent years has been Horizons Regional Council.

There was a relatively recent gap in Horizons' monitoring due to the threats that staff faced when sampling on and around the Lake. Monitoring resumed during the formation of the Lake Accord and is ongoing.

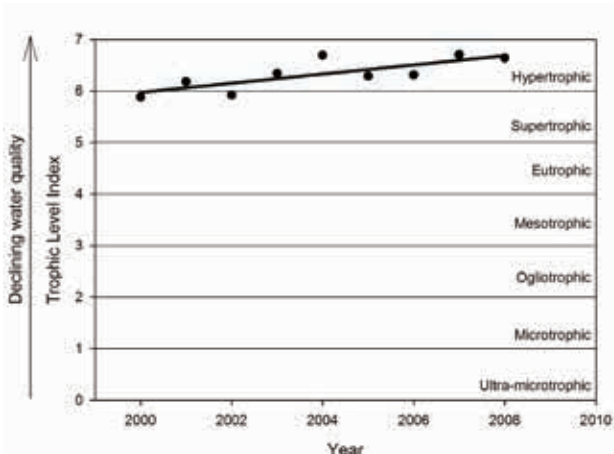


FIGURE 1: Lake Horowhenua trophic level index from 2000 – 2009.

2

Sources of nutrients and contamination and other causes of adverse effects to the health of the Lake

Nutrients are a naturally occurring part of any river and lake system. However, excessive amounts of nutrients can cause many problems, as they:

- » Can exclude sensitive fish and insects;
- » Can turn waterways inhospitable for fish and other life in the Lake when oxygen levels drop due to the oxygen use of, and breakdown of vegetation/slime; and
- » Make waterways unattractive and difficult for swimming and other recreational activities.

There are two major nutrients of concern: nitrogen and phosphorus.

Nitrogen

Nitrogen levels within the Lake Horowhenua catchment are high with the highest concentration coming from the Arawhata Stream. The Arawhata Stream has previously been ranked as having the second highest median nitrogen concentration in the country and the Patiki Stream, valued for its population of rare native fish (the giant kokopu), was also ranked poorly, as having the fourth highest nitrogen concentration in the country.

Nitrogen can also enter Lake Horowhenua through groundwater. It is estimated that groundwater can reach the Lake from almost anywhere in the catchment within one to two years. This means that excess nutrients lost from the land through leaching or runoff can reach the Lake over relatively short timeframes.

Phosphorus

The majority of the phosphorus entering Lake Horowhenua is bound to fine soil particles washed off farmland, cropland or urban roads and pathways. In 1988/89 it was established that 80 percent of the phosphorus entering Lake Horowhenua came via storm water from the Queen Street drain. However, recent data from Horizons Regional Council indicates the Queen Street drain is no longer the highest contributor of phosphorus to the Lake. High amounts of phosphorus are entering the Lake from a range of streams and drains within the Lake Horowhenua catchment. High amounts of phosphorus are also being transferred out of the Lake via the Hokio stream.

Reducing nutrient inputs

Riparian fencing and planting stabilises stream banks, intercepts nutrient and sediment runoff, shades streams reducing water temperature fluctuations and creates habitat for fish and invertebrates. A lot of riparian planting around Lake Horowhenua has already been undertaken, including over 250,000 plants being established in a fenced riparian buffer.

To complement this, plantings of in-lake vegetation and riparian buffers along streams have been recommended to further reduce the amount of nutrients entering the Lake and improve water quality.

Although the Queen Street drain is not the only contributor of phosphorus to Lake Horowhenua, it does contribute significant loads of nutrient and sediment. Treating storm water from the Queen Street drain before it enters the Lake will help to reduce phosphorus entering the Lake.

Dairy farming, horticulture and cropping are key land uses within the Horowhenua catchment. Prior to the development of the Lake Horowhenua Accord, Horizons Regional Council's One Plan established regulatory requirements for dairy, horticulture and cropping farms to manage their sediment and nutrient inputs into the Lake Horowhenua catchment.

Ongoing collaboration with landowners to complete farm plans will identify opportunities to further reduce sediment and nutrient run-off to streams and the Lake.



ABOVE: Matua Marokopa Wiremu Matakatea planting trees around Lake Horowhenua (Image from: *The Lake Horowhenua Accord*)

3

Cyanobacteria blooms

Cyanobacteria (blue-green algae) blooms are smelly and release toxins which cause skin irritation and other health issues. They can also be lethal to dogs and, in extreme conditions, could be lethal to small children. Cyanobacteria blooms regularly cause the Lake to be closed to recreational users over summer.

Cyanobacteria blooms are driven by the low levels of oxygen caused when weed beds collapse and decompose in late summer. The collapsed weed bed forms a barrier to oxygen reaching lake bed sediments, resulting in a large release of phosphorus. The excess phosphorus allows cyanobacteria to bloom. Recently, a lake buoy has been installed to get a better indication of cyanobacteria levels and monthly monitoring of cyanobacteria concentrations in the Lake is also underway.



ABOVE: Google Earth image of Lake Horowhenua, 9 March 2011, showing cyanobacteria (Image from Gibbs 2011).

4

Excessive lake weed

Lake weed has been identified as a key issue for the Lake due to its impact on sediment and its part in driving cyanobacteria blooms. Excessive lake weed also causes issues for recreational lake users by creating a physical barrier for boats and making the area unsuitable for swimming.

A lake weed survey undertaken in January 2014 found the main weed present in Lake Horowhenua is a type of oxygen weed (*Elodea canadensis*). This weed was found to cover about 50 ha of the approximately 300 ha lake. Monitoring also showed weed presence was closely associated with softer sediments where there are fewer disturbances. This likely indicates the lake weed is slowing water movement and enabling more sediment to settle out of the water and onto the lake bed. Historically, curled pondweed (*Potamogeton crispus*) has been the dominant lake weed. Another key finding of the survey was that *Egeria densa* (another type of invasive lake weed), which was found in the Lake in 2002; was not present in the 2014 survey. There is still some curled pondweed present but a change in weed dominance has taken place. More surveys at other times of the year are recommended to increase understanding of the changes in lakeweed over the various seasons.

Lake weed can be spread by fragments broken off the main weed bed. Fragments of lake weed can survive considerable periods of time out of water and can be transferred on boat trailers and recreational equipment. A change of weed species to hornwort or *Egeria densa* could cause a large change to water quality or the character of the Lake. The availability of a

boat wash facility for public use would reduce the likelihood of aquatic weeds entering the Lake on recreational equipment.

Lake weed also has its advantages as it dampens wave action, provides habitat for fish and removes nitrogen from the water. One restoration activity recommended by NIWA is to undertake lake weed harvesting. Weed harvesting will have the advantage of removing nutrients from the Lake and improving recreational use of the Lake by reducing cyanobacteria blooms.

Weed harvesting will be undertaken with care to ensure no negative impact for native fish. Importantly the lake weed will not be fully removed, rather it will be cut to minimise the disturbance of the bed sediments. If the bed sediment is disturbed it can release further nutrient into the Lake.



ABOVE: Areas of submerged vegetation (biovolume) in Lake Horowhenua. Dense areas of weed are identified in red and areas of less weed are identified in green. The blue areas indicated clear water (Source: Weed-mapping Report January 2014).



ABOVE: Rob Warrington (Lake Horowhenua Trust) retrieves a clump of oxygen weed (*Elodea Canadensis*) from the lake (Image from Aleki Taumoepeau, NIWA).



ABOVE: Several types of lake weed that have been found in Lake Horowhenua (Image reproduced from Gibbs 2011. Original source Mason & West 1973).

STOP!

Don't bring lake weed with you.



Egeria
Photo by Nathan Wells, NIWA



Hornwort
Photo by Nathan Wells, NIWA

We don't want weeds establishing in the lake. Please clean your waka, boat, trailer or sports equipment away from the lake's edge before and after using the lake.

Lake weeds spread by fragments and can destroy the ecology of lakes. Introduction of weeds is prohibited pursuant to the Horowhenua Lake Domain bylaws.

Contact Horizons Regional Council on toll free number **0508 800 800** for more information.



LakeHorowhenuaTrustees

LakeDomainBoard

Horowhenua

ABOVE: Signage established in the Lake Domain about lake weed at Lake Horowhenua

5

High turbidity and sediment inputs

Sediment is a natural component of any river or lake and can also enter waterways as the result of human activity. Excess sediment can cause a range of issues as it:

- » Discolours water making it unattractive for swimming and other water-based activities;
- » Clogs up habitat for insects and fish;
- » Reduces visibility for fish that use sight to catch food; and
- » Carries nutrient into the Lake and can cause infilling of the Lake.

A report by Max Gibbs in 2011 identified that large sediment loads entering Lake Horowhenua are causing the Lake to infill at a rate of 3.3mm per year and up to 10cm per year in the centre. The report noted the weir installed in 1956 on the Hokio Stream has played a part in reducing the Lakes natural flushing ability. Currently under the ROLD Act 1956 Horizons Regional Council must maintain the Lake level at thirty feet above mean low water spring tides.

The focus of restoration efforts in this Action Plan is to reduce the amount of sediment entering the Lake. The monitoring information collected by Horizons Regional Council provides good information about which streams are contributing the most sediment. The Arawhata Stream is clearly the most consistent contributor of sediment to Lake Horowhenua. At present, sediments and nutrients are carried by flood waters and overland drainage from farmland and parts of Levin into the Arawhata Stream and then into the Lake. Creating a sediment trap and treatment wetland before the Arawhata Stream enters Lake Horowhenua would reduce sediment and nutrients entering the Lake, improving water quality and clarify. Another way to reduce sediment inputs is to work with farmers and growers in the area to identify and implement methods to limit the amount of sediment reaching the Lake.

A further strategy to limit sediment in the Lake is to harvest lake weed. This will reduce its contribution to the amount of sediment settling on the lake bed.



ABOVE: Sediment in the Arawhata Stream following rainfall.



ABOVE: Lake Horowhenua showing the impacts of sediment input.

6

Declining fishery

In pre-European times, Lake Horowhenua was a clean water supply with an abundance of native fish that were a hugely valued fishery for the Muaūpoko iwi.

Current perceptions are that Lake Horowhenua is depleted of native fish and is no longer a valued fishery site. However, a fish survey undertaken by Horizons Regional Council and the University of Waikato, in collaboration with the Lake Horowhenua Trust and other Accord partners in 2013, found six native fish species within Lake Horowhenua.

These species were: common smelt, common bully, inanga, grey mullet and short and long fin eels. Nevertheless, black flounder and mullet were absent.

A weir installed on the Hokio stream in 1956 restricts upstream migration of species such as mullet and flounder. This weir is the most likely reason for the reduced number of some types of native fish species and it has been recommended that this be addressed by installing a fish pass. The fish pass that is proposed will not alter the lake level or the weir level.

The fish survey undertaken in 2013 also found a high abundance of tuna (eel) in Lake Horowhenua. However, tuna greater than 1 kg in size were nearly absent and average tuna weight was only 191.4g, well below the minimum commercial size limit of 220g set by the Ministry for Primary Industries.

These findings may be consistent with tuna populations which have been overfished, although there could be other reasons for these findings and more research is needed.



ABOVE: Photos of eel (tuna) from the Arawhata Stream (Top and middle) and Turitea Stream (Bottom) (Images from Horizons Regional Council).

7

Pest fish

Lake Horowhenua contains three introduced fish species; perch, koi carp and goldfish. The Gibbs report 2011 signalled that pest fish could be negatively impacting on native fish populations and water quality.

To investigate this, a fish survey was undertaken in April 2013. This survey found that current pest fish populations in Lake Horowhenua have not reached densities where they are likely to be having a significant impact on the Lake.

Therefore, addressing pest fish populations is not a current priority. No rudd, catfish, trench, gambusia or salmonids were found in the Lake during the survey. These pest fish, if introduced to the Lake, could have highly negative impacts on native fish species.

It is recommended that the populations of fish in the Lake continue to be monitored to assess if further species of fish have reached the Lake or if populations of pest fish already present are increasing toward levels where they are impacting on native fish populations and/or water quality.



Photo of a single koi carp with an unusual pink colouration (Centre) with three potential koi-goldfish hybrids caught during the fish survey (Image from Horizons Regional Council).

8

Overlapping responsibilities

There is specific legislation where overlaps occur between the roles and responsibilities of all foundation members of the Accord. For example the management of the fishery for Lake Horowhenua is impacted by the ROLD Act (1956) and many other pieces of legislation.

Fishery management in Lake Horowhenua includes the Lake Trust responsibilities to manage the legal fishing rights of

Muaūpoko, the Department of Conservation's responsibility to manage native fish populations and Horizons Regional Council's responsibility to manage water quality and to provide for native fish habitat. The overlap in responsibilities between these agencies reinforces the need for the Lake Horowhenua Accord and the collaboration of all members.







Restoration of Lake Horowhenua

Ngā Mahi hei Whakaora i te Roto o Horowhenua

Key Management Actions

A series of key actions and tasks have been established as the next steps in the restoration of Lake Horowhenua. The Actions and Tasks reflect the focus of work over the next two years which includes administering the funds allocated from the Fresh Start for Freshwater Clean-up Fund and facilitating conversations and learning around some of the key issues to develop appropriate actions for future iterations of this Action Plan.

The Plan to restore Lake Horowhenua will take time and the progress of the Action Plan will be reviewed after two years with a full review undertaken after five years. Restoration of Lake Horowhenua will be ongoing and continued monitoring and reporting will be necessary to measure the actions against the set objectives. The actions in this Plan are arranged in sections based on the Management Actions identified in the Lake Accord. These are:

1. Enhance monitoring;
2. Public education - including lake report cards;
3. Farm environmental plans;
4. Boat treatment and weed containment;
5. Storm-water diversion [treatment] - spill drain;
6. Remove sediment inputs;
7. Riparian enhancement - lake;
8. Riparian enhancement - streams;
9. Lake weed harvesting;
10. Fish pass at the weir;
11. Pest fish management – including enhanced predation;
12. Lake level management;
13. Build the capacity of the Lake Horowhenua Trust to more effectively contribute to the management of the Lake;
14. To develop a cultural monitoring programme based on Muaūpoko values and indicators; and
15. Build the capacity of beneficial owners and Muaūpoko to participate and engage in the management of the Lake.

Action 1 - Enhance Monitoring

TASK	DESCRIPTION	CONTRIBUTING ORGANISATIONS	COMPLETION DATE
1	Establishment of a new lake buoy sensor in the Lake.	Horizons Regional Council.	A new sensor was deployed in July 2013 and this monitoring is ongoing.
2	Establish stream monitoring of the inflows and outflows of the Lake and continue to complete monthly monitoring that includes measurement of flow and water quality.	Horizons Regional Council.	Regular stream monitoring was established in December 2013 and flow and water quality are monitored monthly.
3	Establish lake monitoring on a monthly basis measuring water quality and cyanobacterial levels.	Horizons Regional Council.	Monthly monitoring is currently being undertaken.
4	Establish a lake level recorder and flow recorder on the outlet stream, the Hokio.	Horizons Regional Council.	A lake level recorder and flow recorder have been established.

Action 2 - Public Education INCLUDING LAKE REPORT CARDS

TASK	DESCRIPTION	CONTRIBUTING ORGANISATIONS	COMPLETION DATE
5	Create Lake report cards and provide updates on Lake health.	Horizons Regional Council.	Ongoing.
6	Increasing communication between the members of the Lake Horowhenua Accord.	All signatories to the Accord.	Ongoing.
7	Establish riparian signage at key locations around the Lake.	Horizons Regional Council and the Ministry for the Environment.	Signage established at three places in the catchment by 30 June 2015.
8	Regular reporting on the progress of the Lake Accord to the public.	Lake Trustees, Horowhenua District Council.	Ongoing.



What Can You Do?

Get involved with a community planting day and have a read of the Lake report cards.

Action 3 - Farm Environmental Plans

TASK	DESCRIPTION	CONTRIBUTING ORGANISATIONS	COMPLETION DATE
9	Completion of the integrated stormwater management plan for the Arawhata Stream.	Horizons Regional Council in partnership with Tararua Growers Association and Ministry for the Environment.	30 April 2016.
10	Completion of Sustainable Milk Production Plans for dairy farms in the catchment.	Horizons Regional Council in partnership with Dairy NZ and Ministry for the Environment.	30 June 2015.



What Can You Do?

Nutrients do not only enter waterways from the farming community. Be careful not to over fertilise your garden as these nutrients will leach through the soil too. Take care where you wash your car. Detergent in car wash can contain high levels of phosphorus and this can easily transport through to the Lake via the stormwater system.

Action 4 - Boat Treatment AND WEED CONTAINMENT

TASK	DESCRIPTION	CONTRIBUTING ORGANISATIONS	COMPLETION DATE
11	Implementation of a boat wash facility in the Levin Township.	Horowhenua District Council, and Ministry for the Environment.	Completed



What Can You Do?

Ensure all recreational equipment is washed down properly before and after using it in the Lake. Equipment includes: boats, boat trailers, kayaks and other sports gear. Please don't empty your aquarium into the storm water drain as aquatic weeds, such as oxygen weed, could quickly establish within the Lake and affect the Lake's ecology.

Action 5 - Storm Water Diversion

TASK	DESCRIPTION	CONTRIBUTING ORGANISATIONS	COMPLETION DATE
12	Installing a stormwater treatment system on a major stormwater inflow (Queen Street Drain) from the Township of Levin.	Horowhenua District Council and Ministry for the Environment.	Design and consultation completed by December 2014 with the works to be completed by June 2015.



What Can You Do?

To reduce your impact on Lake Horowhenua you can: cut your lawn with a catcher and place clippings in a compost bin; sweep leaves and debris off your driveway away from stormwater drains and avoid pouring chemicals (paint, detergents and oils) into stormwater drains.

Action 6 - Remove Sediment Inputs

TASK	DESCRIPTION	CONTRIBUTING ORGANISATIONS	COMPLETION DATE
13	Complete the sediment trap project as part of the Freshwater Clean-up Fund.	Horizons Regional Council and Ministry for the Environment.	30 April 2016.

Action 7 - Riparian Enhancement - Lake

TASK	DESCRIPTION	CONTRIBUTING ORGANISATIONS	COMPLETION DATE
14	Complete lake-edge plantings using a variety of wetland vegetation.	Horizons Regional Council, Lake Horowhenua Trust and Ministry for the Environment.	30 June 2015.



What Can You Do?

Get involved in a community planting day near you.

Action 8 - Riparian Enhancements - Streams

TASK	DESCRIPTION	CONTRIBUTING ORGANISATIONS	COMPLETION DATE
15	Complete two community planting days.	Horizons Regional Council, Lake Horowhenua Trust and Ministry for the Environment.	October 2015.
16	Riparian fencing and planting of the inflowing tributaries.	Horizons Regional Council and Ministry for the Environment.	30 June 2015.
17	Fencing and planting on the Hokio (outlet) Stream.	Horizons Regional Council and Ministry for the Environment.	October 2015.



What Can You Do?

If you are a land owner along one of the streams in the Horowhenua catchment consider the enhancement of the stream by planting and fencing. Consider contacting Horizons' freshwater team for advice on tollfree number 050 800 800.

Action 9 - Lake Weed Harvesting

TASK	DESCRIPTION	CONTRIBUTING ORGANISATIONS	COMPLETION DATE
18	Undertake lake weed harvesting.	Horizons Regional Council and Ministry for the Environment.	31 December 2015.



Action 10 - Pest Fish Management

INCLUDING ENHANCED PREDATION

TASK	DESCRIPTION	CONTRIBUTING ORGANISATIONS	COMPLETION DATE
19	Monitor pest fish species populations within the Lake.	Horizons Regional Council.	Ongoing.



What Can You Do?

Giving your gold fish or other fish a “good home” in the Lake or down the stormwater drain introduces exotic fish to Lake Horowhenua which could impact on the ecology of the Lake and reduce native fish populations. Exotic fish can impact the ecology of the Lake and reduce native fish populations. Refrain from giving your gold fish or other fish a “good home” in the Lake or down a stormwater drain.

Action 11 - Fish Pass at the Weir

TASK	DESCRIPTION	CONTRIBUTING ORGANISATIONS	COMPLETION DATE
20	Install a fish pass at the weir.	Horizons Regional Council, Lake Horowhenua Trust and Ministry for the Environment.	31 March 2015.
21	Increasing native fish habitat around Lake Horowhenua.	Horizons Regional Council, Lake Horowhenua Trust and Ministry for the Environment.	30 April 2016.



What Can You Do?

Native fish may use vegetation along the Lake’s edge for spawning. Be careful when using the Lake for recreation and respect all signage.

Action 12 - Lake Level Management

TASK	DESCRIPTION	CONTRIBUTING ORGANISATIONS	COMPLETION DATE
22	Ensure the Hokio Stream is managed for flood protection.	Horizons Regional Council.	Ongoing.
23	Install a lake level monitoring device.	Horizons Regional Council.	A new sensor has been deployed in 2013.
24	Discuss options for lake level management as an Accord group.	All signatories to the Accord.	April 2016.

Action 13 - Build the Capacity

OF THE LAKE HOROWHENUA TRUST TO MORE EFFECTIVELY CONTRIBUTE TO THE MANAGEMENT OF THE LAKE

TASK	DESCRIPTION	CONTRIBUTING ORGANISATIONS	COMPLETION DATE
25	Improve administration and communication roles of the Lake Horowhenua Trust.	Lake Horowhenua Trust and Horowhenua District Council.	To be confirmed.
26	Develop a strategic plan for the Lake Horowhenua Trust.	Lake Horowhenua Trust and *Te Puni Kokiri.	To be confirmed.
27	Develop a fisheries management plan.	*Ministry for Primary Industries, Lake Horowhenua Trust.	To be confirmed.

**To be confirmed*

Action 14 - To Develop a Cultural Monitoring Programme

BASED ON MUAŪPOKO VALUES AND INDICATORS

TASK	DESCRIPTION	CONTRIBUTING ORGANISATIONS	COMPLETION DATE
28	Develop a cultural monitoring programme.	Lake Horowhenua Trust.	To be confirmed.
29	Define through Wananga and Hui the cultural values Muaūpoko hold.	Lake Horowhenua Trust.	To be confirmed.
30	Seek funding for a cultural monitoring programme.	*Te Puni Kokiri and *Horizons Regional Council.	To be confirmed.
31	Provide official Tangata Tiaki (Observers).	Lake Horowhenua Trust, Horizons Regional Council and Horowhenua District Council.	Ongoing.

**To be confirmed*

Action 15 - Build the Capacity

OF BENEFICIAL OWNERS AND MUAŪPOKO TO PARTICIPATE AND ENGAGE IN THE MANAGEMENT OF THE LAKE

TASK	DESCRIPTION	CONTRIBUTING ORGANISATIONS	COMPLETION DATE
32	Explore the skills beneficial owners of the Lake could contribute to works through Wananga and Hui.	Lake Horowhenua Trust.	To be confirmed.
33	Develop a register of beneficial owners.	Lake Horowhenua Trust.	To be confirmed.
34	Organise two whakawhanaungatanga gatherings per year.	Lake Horowhenua Trust.	To be confirmed.

Fresh Start for Freshwater Clean-up Fund

Over the period of developing the Lake Horowhenua Accord, Horizons Regional Council has developed a work programme and is administering the funds allocated from the Ministry for the Environment's Fresh Start for Freshwater Clean-up Fund. This work contributes to the actions in this Action Plan.

Minister Amy Adams announced \$540,000 funding from the Ministry for the Environment, as part of a total \$1,270,500 Clean-up Fund programme on 25 February 2014. The remainder of the funding is being contributed from local councils (Horizons Regional Council and Horowhenua District Council) and through in-kind contributions from industry (Taranaki Growers Association and Dairy NZ).

The interventions that were selected for the Lake Horowhenua Clean up project link strongly to the management actions outlined in the Lake Horowhenua Accord. Eight projects were selected in order to improve the suitability of the Lake for recreational use, reduce the inputs of sediment and nutrients into the Lake and to improve native fish populations in the Lake. The selection process for the projects in the Action Plan were informed by the criteria set out in the Freshwater Clean-up Fund.

Overall the projects are being managed through a contractual arrangement between the Ministry for the Environment and Horizons Regional Council.

The eight projects are:

1. Purchase and operation of lake weed harvesting equipment;
2. Provision of a boat wash facility in Levin Township;
3. Riparian fencing and planting;
4. Installing stormwater treatment systems;
5. Installing a sediment trap/treatment wetland on the Arawhata inflow to the Lake;
6. Creating integrated drainage and sediment control plans for up to 500ha of cropping farms;
7. Preparing sustainable milk production plans for dairy farms in the catchment; and
8. Fish pass and habitat improvement for native fish.

Summary

Mutungua

This Action Plan has identified the roles and responsibilities of the five signatories to the Lake Horowhenua Accord, eight key issues regarding restoration of Lake Horowhenua and fifteen management actions the signatories are going to undertake over the next two years. After two years a review of progress will be undertaken, with a full review of the Lake Horowhenua Accord and a refreshment of objectives to take place in August 2018.

A key part of the review process will be to reflect on the management objectives and goals of the Accord and the overall vision that Lake Horowhenua is: he taonga tuku iho; he taonga mo te katoa mo te katoa (a treasure handed down from our ancestors for the enjoyment of all).





