ECOSYSTEM HEALTH

The National Policy Statement for Freshwater Management 2014 (Freshwater NPS) sets out the objectives and policies for freshwater management under the Resource Management Act 1991. The National Objectives Framework of the Freshwater NPS contains a list of attributes that must be managed. These attributes are graded into four different categories of which Band D falls below the national bottom line. Unless certain criteria are met an Authority must develop plans to move systems out of Band D.

The monitoring data to date shows the attribute state that Lake Horowhenua falls into Band D for several measures:

PRESENT BAND	TP	TN	TAN	Chl a	CYANOBACTERIA
	Annual median (mg/m3)	Annual median (mg/m3)	Annual maximum (mg/m3)	Annual maximum (mg/m3)	80th percentile (mm3/L)
A	< 10	< 300	< 0.05	< 10	< 0.5
B	> 10 AND < 20	> 300 and < 500	> 0.05 and < 0.4	> 10 and < 25	N/A
C	> 20 and < 50	500 and < 800	**0.4 and < 2.20**	> 25 and < 60	> 0.5 and < 10
D	**> 50 (250)**	**> 800 (1910)**	**> 2.20**	**> 60**	**> 10**

< less than | > greater than

As part of the integrated approach that is being undertaken for the restoration of Lake Horowhenua predications have been made by Dr Max Gibbs (NIWA) that a range of parameters will move from Band D (or below national bottom lines) to:

PREDICTED FUTURE BAND	TOTAL PHOSPHOROUS	TOTAL NITROGEN	AMMONIA	Chlorophyll a	CYANOBACTERIA
	Annual median (mg/m3)	Annual median (mg/m3)	Annual maximum (mg/m3)	Annual maximum (mg/m3)	80th percentile (mm3/L)
A	< 10	< 300	**< 0.05**	< 10	< 0.5
B	**> 10 AND < 20**	> 300 and < 500	**> 0.05 and < 0.4**	**> 10 and < 25**	N/A
C	**> 20 and < 50**	500 and < 800	0.4 and < 2.20	**> 25 and < 60**	> 0.5 and < 10
D	> 50 (250)	**> 800**	> 2.20	> 60	> 10

< less than | > greater than

These predictions show that the restoration work, including the sediment trap and weed harvesting activities, will provide immediate and positive effects on water quality through the reduction of cyanobacterial blooms.

WHAT IS THE TLI?

Lake Horowhenua has very poor water quality and is classified as supertrophic on the trophic level index (TLI). The TLI measures four parameters: water clarity, chlorophyll content, total phosphorus and total nitrogen, and is used to give an overall picture of the health of New Zealand lakes. Each lake is assigned a number typically between 1 and 7, the lower the number, the better the water quality in the lake.

TLI HISTORY FOR LAKE HOROWHENUA DATA TABLE							
Year	2006	2007	2008	2009	2014	2015	2016
TLI Score	6.5	6.1	6.7	7.1	6.1	6.3	6.7

*2010-2013 Lake not monitored.

HUMAN HEALTH

Currently swimming is actively discouraged at Lake Horowhenua. Other recreational activities, such as boating, rowing and sailing, are discouraged during the summer months when toxic algal blooms may be present. A key goal of the lake weed harvesting activity, planned for 2018-19, is to reduce the frequency of toxic cyanobacteria blooms. Over the 2016-17 summer period (November to April) Lake Horowhenua's water quality was sampled 22 times for *E. coli.*

CATEGORY	RANGE	% SAMPLES IN EACH CATEGORY
Avoid swimming	>550 *E.coli* MPN/100ml	55%
Could be a health risk	260-550 *E.coli* MPN/100ml	14%
Should be safe to swim	<260 *E.coli* MPN/100ml	32%

* All samples were taken from the Lake edge rather than the centre of the Lake, and represent the risk to human health from contact with the Lake at the Domain.

< less than | > greater than

E.coli monitoring in the middle of the lake shows that between July 2013 and June 2017 it was always safe to swim from an *E. coli* infection risk perspective. This is likely due to the UV radiation killing the *E. coli* that will be entering the lake from various sources.

Compiled by Horizons Regional Council, November 2017. Document 2017/710

He Hokioi Rerenga Tahi
Te Kawenata o te Roto o Horowhenua

LAKE HOROWHENUA

CATCHMENT REPORT CARD

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!

LakeHorowhenuaTrust · horizons regional council · Horowhenua District Council · Department of Conservation Te Papa Atawhai · HorowhenuaLakeDomainBoard

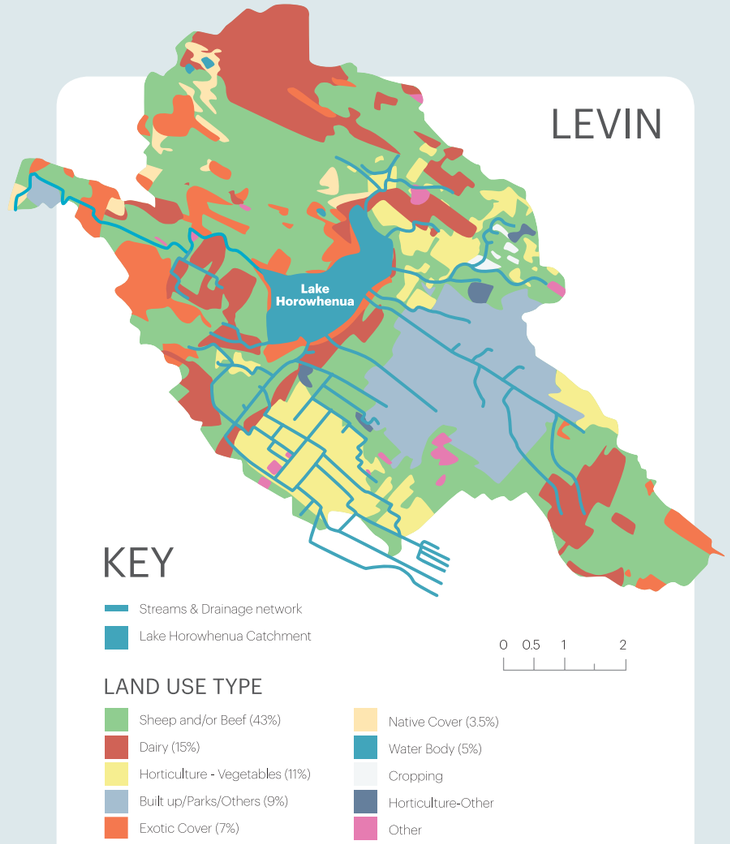
LAKE HOROWHENUA CATCHMENT

BACKGROUND

In pre- European times, Lake Horowhenua was a cleanwater 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 lead 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.



LAKE HOROWHENUA RESTORATION

Since the signing of the Lake Horowhenua Accord in 2013, 15 key actions outlined in the 2014-2016 action plan, have significantly progressed.

15 KEY ACTIONS FOR LAKE RESTORATION WERE IDENTIFIED in the action plan

12 SPECIES of native fish call Lake Horowhenua **HOME**

3 SPECIES of **INTRODUCED** fish are present in Lake Horowhenua

Currently **SWIMMING** is not advised at the Lake

LAKE HOROWHENUA Accord was signed in **2013**

ACCORD PARTNERS have secured **$2.36 million** **FROM CENTRAL GOVERNMENT FUNDING.**

ACCORD PARTNERS have contributed **$1.7 million** towards the restoration of the Lake

19km of STREAM-LAKE **FENCING** has been achieved since **2007**

7765 NATIVE TREES have been planted along streams and the Lake since **2010**

TLI is Supertrophic **Very poor** water quality

2 in-stream **FISH BARRIERS** have been remedied

In the 1990s over **250,000** native plants were established around the edge of Lake Horowhenua

SEVEN COMMUNITY **PLANTING** days have been held over the last three years

LAKE HOROWHENUA ACCORD

In 2013, five parties representing Muaūpoko owners, community interests and statutory bodies agreed to work together to provide leadership, halt degredation 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 that form the Lake Horowhenua Accord are: Lake Horowhenua Trust, Lake Horowhenua Domain Board, Horowhenua District Council, Horizons Regional Council, and the Department of Conservation.

FUNDING

Lake restoration initiatives have been greatly enhanced with funding and inkind resource from all Lake Horowhenua Accord parties. The $1.28 million Fresh Start for Freshwater Clean-up Fund project received $730,500 from Horizons Regional Council, Horowhenua District Council and industry, as well as $540,000 from the Ministry for the Environment.

The Clean-up Fund project included the installation of a fish pass over the weir to enable fish to travel between the sea and the lake, the construction of a sediment trap which is predicted to reduce sediment phosphorus loads from streams into the lake by more than 25%, and lake weed harvesting to reduce cyanobacteria blooms. Less blooms will increase the lake's frequency of suitability for swimming over summer and the weed harvesting will also enhance the fishery by reducing the toxicity effects of the lake weed in spring.

Sub-projects through the Clean-Up Fund project included the completion of environmental management plans for all 10 dairy farms in the catchment, sediment and erosion control plans for growers covering 80 per cent of the horticultural land in the catchment, and the building of a boat wash facility to reduce the risk of further lake weed species being introduced to and contaminating the Lake.

MfE have also contributed a further $980,000 as part of the Te Mana o Te Wai fund (Te Kakapa Manawa o Muaūpoko) towards a $1.2 million project that will involve a scientific assessment of the lakebed sedimentation and native fish populations, community planting days, an education programme, development of a plant nursery, completion of storm water treatment upgrades and the repairing of fish barriers.

Most recently a $1.6 million Freshwater Improvement Fund project has been awarded to the Accord Partners. This project, lead by the Lake Horowhenua Trust, has co-funding from Horizons, Horowhenua District Council and the Lake Trust, as well as $842,750 from MfE. The work programme will include assessment and flushing of the stormwater system, establishment of a silt interceptor, shallow groundwater monitoring and implementation of two cultural monitoring programme activities.

Monitoring in 2015 and 2016 found five species of macrophytes within the lake of which two species are exotic. There are currently 12 species of native fish and three introduced species of fish which have been sighted in the Lake Horowhenua catchment. Koura and freshwater mussels are also present.