

**Chisholm
Associates**

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3rd November 2013-11-03

Dear Phil

Re: Lake Horowhenua Visit 1st November

Thanks very much for showing me around parts of Lake Horowhenua, and explaining some of the issues affecting this lake. I found it a very interesting visit to a beautiful area. For the record, I am an independent consultant ecologist specialising in freshwater ecology, resource management and biosecurity. I have a Masters degree in Zoology and I am a Certified Environmental Practitioner with the Environment Institute of Australia and New Zealand.

I've read the reports by Kate Arthur (dated November 2012), and Max Gibbs (dated January 2012), but I have not researched the Council, legal or political issues sufficiently to be able to comment on them much.

As discussed, in my opinion the lake faces two critical risks to its natural state, amenity values and fishery values; and hence its utility as a customary, commercial and recreational resource.

Risk 1: Threat of invasive aquatic plants

There are three species of invasive aquatic weed which could find their way into Lake Horowhenua:

- *Lagarosiphon major* (known as "Lagarosiphon")
- *Ceratophyllum demersum* (known as "Hornwort")
- *Egeria densa* (known as "Egeria")

I am unsure where the nearest infected waterways are which contain any or all of these three species, but I am aware that Hornwort has been recently recorded in nearby Horowhenua waterways. As a general "rule of thumb", if an infected waterway is within 120 kilometers, then the potential for any of these three invasive species to spread to an uninfected lake is high. This is because, over this distance, most weed fragments attached to boat trailers or outboard propellers will dehydrate and die before they reach the new lake.

All three of the above species are highly invasive, with only a small fragment being needed to infect an area which will then spread rapidly throughout the entire lake, and downstream waterways. Once infected, it is extremely difficult and prohibitively expensive to eradicate these aquatic weed species from the lake, even if the infection is localised to a small area.



Certified Environmental Practitioner

The ramifications of having any (or all) of these three aquatic weed species in the lake are very serious. These weeds can double their biomass every three months, forming continuous surface-reaching growths and “rafts” of matted weed on the surface of the lake, making boating on the lake virtually impossible. Periodic decomposition of these weed mats can cause catastrophic de-oxygenation of the lake, causing fish deaths and overall reduced fisheries in the lake. In short, if any (or all) of these three aquatic weeds infected Lake Horowhenua, then any recreational or utility value of the lake would essentially be destroyed.

I disagree with Max Gibb’s report that a weed harvester could be used in the lake, not the least because of the expense, but also because weed harvesters are known to be a major agent of aquatic weed spread. These three aquatic weed species can double their biomass every three months, so weed harvesting would be a short-term exercise in weed suppression only. In addition, the main aquatic plant present (*Potamogeton crispus*) is highly sensitive to nitrate levels, so improvements to lake water quality will be likely to naturally reduce the presence of this aquatic plant, making weed harvesting unnecessary.

I believe that the mere presence of the sign near the boat club, warning boaties and other recreational users of the lake about the dangers of lakeweed spread, is insufficient to manage the present threat of aquatic weed invasion. I understand that the lake is not used by motor boats. This is probably the main reason why these three lakeweeds are not yet present, because these weeds can easily hitch a ride on motor boat trailers and outboard propellers. However, the threat from non-motorised boats and their trailers remains. I would recommend a complete ban on allowing trailer-mounted boats of any type from entering the lake, unless they were confined to Lake Horowhenua itself. While this may seem draconian, boaties should be reminded that if these aquatic weeds enter the lake, then there will probably be no boating at all in the future because the weed mats will make boating physically impossible.

I would also recommend a similar ban (i.e. not allowed to be used outside the area) on fyke nets, eel pots or hinaki used by eel fishermen; and mechanical diggers or other heavy machinery used between waterways. A similar reminder of the serious consequences of lakeweed on the eel fishery could also be made.

Risk 2. Water Quality

Healthy growths of the lakeweed *Potamogeton crispus* in the lake indicate that it has (at least) high levels of nitrates. The reports by Max Gibbs and Kate Arthur both refer to declining water quality as a significant threat to the lake’s aquatic values. The lake is currently hypertrophic (i.e. highly polluted), which significantly increases the risk of the plant communities in the lake changing from macrophyte-dominated to algal-dominated. This would destroy the aquatic plants in the lake, severely reduce water clarity, and change the colour of the lake to a grey-green. This phenomenon is commonly known as lake “flipping”. An example of a lake that has “flipped” is Te Waihora/Lake Ellesmere just south of Christchurch.

Once “flipped” it is very difficult and expensive to get a lake to change back and regain its weed beds, water clarity and colour. For example, Te Waihora/Lake



Ellesmere “flipped” in 1968 and remains in its degraded state to this day. \$10.5 million is being spent by Christchurch iwi, Councils and central government to try and rectify this, but it unlikely to succeed for many years. In short, the best (and cheapest) remedy is to prevent the lake from “flipping” before it actually happens.

Max Gibbs reports a Trophic Lake Index (TLI) of 6.7 for Lake Horowhenua, and he also reports on incidents of algal blooms dominating the lake on occasions. A TLI of 6.7 indicates a very high level of pollution, and it somewhat surprises me that the lake hasn’t “flipped” yet. It would appear to me that “flipping” could occur at any time if the water quality is not markedly improved as soon as possible. This, however, is a lengthy and very expensive process (\$10.5 million for Te Waihora/Lake Ellesmere), and requires 100% cooperation between local landowners, iwi, District/Regional Councils and central government.

The reports by Max Gibbs and Kate Arthur provide a range of operations which could be employed to restore good water quality to the lake. I agree with all of them, with the exception of lakeweed harvesting. I believe that these two reports provide a good list of recommendations for lake cleanup. I would, however, need to look more closely at the water quality data of surface versus groundwaters, and some of the earlier reports on the lake, before recommending a priority order for these cleanup operations.

Summary

In summary, I believe that Lake Horowhenua is currently at serious risk of losing most of its fishery, recreational and amenity values from two major threats, and I recommend that immediate action is taken to reduce these two threats as soon as possible. It is disheartening to see that nearly two years have passed since Max Gibb’s report was produced. This report comprehensively outlined the problems and providing costed solutions, yet no apparent action has been taken to implement its recommendations. If anybody is of the belief that the lake can withstand business as usual, they are very mistaken.

Yours faithfully

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