

Te Hiku

Lake Waiporohita (Karikari), NRC Lake No. 99.



Lake Waiporohita. Image shows emergent plant communities on the east side of the lake accessible from the road.

Summary	Waiporohita
Surveyed:	2004, 2006, 2005, 2011, 2014, 2017, 2019, 2021 and 2022.
Overall ranking:	High: Indigenous submerged vegetation almost carpets this shallow lake. The first New Zealand records for four vagrant Australian plants have been made at this lake. Water quality has been poor in the past with the lake in a supertrophic state. However, despite frequent algal blooms, water quality appears to be improving and is now regarded as being eutrophic.
Threats:	Significant potential for pest plant and fish impacts. Nutrient enrichment and algal blooms can result in reduced water clarity.
Management recommendations:	Nutrient enrichment and consequent planktonic algal blooms threaten this lake. The sources of nutrients should be investigated, with possible control of the very large numbers of birds (particularly Canada geese). Annual pest plant surveillance monitoring is recommended as well as lake native biodiversity value assessment monitoring every 5 years.

Description

This lake (1631763E 6137937N) is 6.4 ha in area and 3 m deep. The surrounding catchment is pasture (fenced off) with some areas (about 30 m wide) of manuka scrub with pohutukawa. The lake has no inflows or outflows. Access is off Inland Road with a firm (iron pan overlaid by sand) lake shore.

Wetland vegetation

There were areas of emergent vegetation around the northern end of the lake, mostly up to 20 m across, with bare iron pan in the remaining areas. Dominant species were *Typha orientalis* with an outer fringe of *Eleocharis sphacelata*, with other areas of *Schoenoplectus tabernaemontani*, *E. acuta* and *Apodasmia similis*.

Species colonising the hard iron pan area included annual weeds, *Chenopodium pumilio* and *Conyza parva*, but also indigenous species such as *Alternanthera nahui* and *Centipeda aotearoana*.

The first record of *Gratiola pedunculata*, probably a natural introduction from Australia (de Lange 1997), was made at this lake in 1996 and has been commonly found again in exposed grass/herb land amongst tall emergent vegetation since then indicating successful establishment. Other species present were *Alternanthera denticulata* (also an Australian vagrant), *Paspalum distichum* and *Centella uniflora*. In 2007, *A. denticulata* had expanded its range over much of the lake margin growing on the lake side of some emergent vegetation. A species of rush, *Juncus polyanthemus*, not previously recorded from New Zealand, was recognised growing in the marginal vegetation of Lake Waiporohita in 2009. This plant looked like a robust form of *J. usitatus* and was previously overlooked. It is likely to be another Australian vagrant. The first New Zealand record of the minute annual herb *Crassula natans* var. *minus* was also made at Lake Waiporohita in 2011. Since 2014, all four vagrant species were common around the lake and can be regarded as established at this site.

A 2 m² patch of alligator weed (*Alternanthera philoxeroides*) was noted in 2005 at the north end access point. This species has increased and was found amongst much of the marginal emergent vegetation. The introduced weed, primrose willow (*Ludwigia peploides* var. *montevidensis*), was also recorded. Both species are now widespread in the margins of Lake Waiporohita.



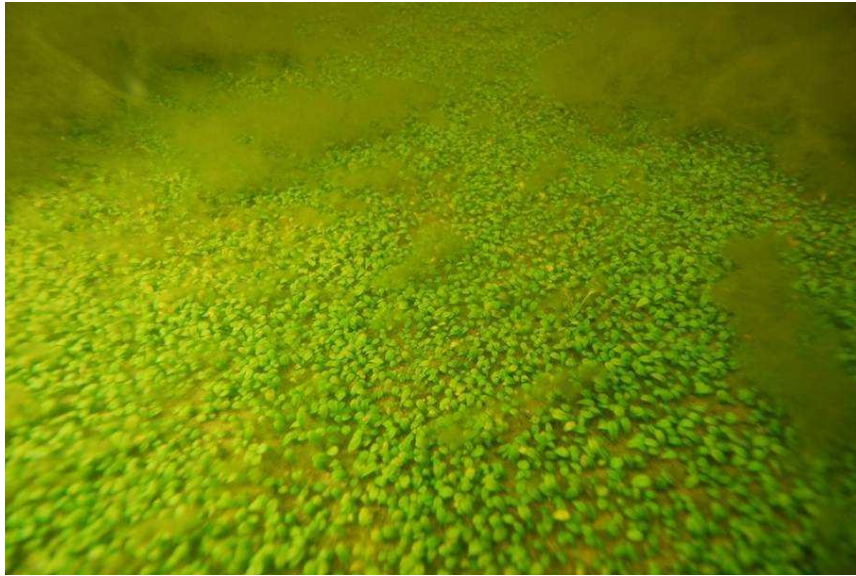
Alligator weed (left) and primrose willow (right) in marginal vegetation of Lake Waiporohita (Daniel Clements 2019).

Submerged vegetation

Turf communities were conspicuous in many areas of the lake with *Glossostigma elatinooides*, *Lilaeopsis novae-zelandiae*, *Myriophyllum propinquum*, the exotic *Ludwigia palustris* and at one site *Gratiola pedunculata* extending from the shore to ~ 1 m deep. *Potamogeton ochreatus* and *Chara australis* dominated deep vegetation extending to 2.9 m (the bottom) in 2017.

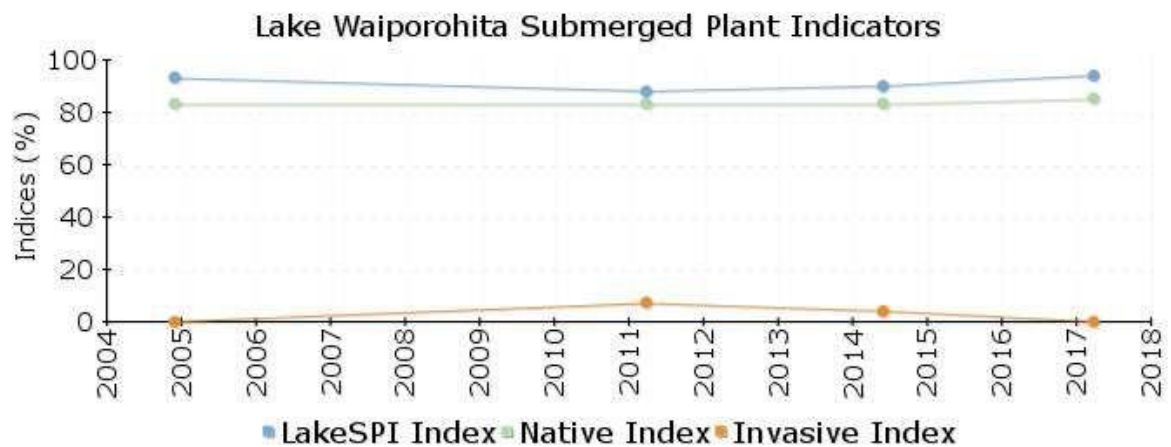
In 2004 and 2006, the charophyte bottom limit was around 1.5 m but in the 2011 and 2014 surveys the lake improved to be fully vegetated to its deepest point at 3 m. The charophyte composition has changed with *Nitella* sp. aff. *cristata* decreasing at the expense of *Chara australis*. *Nitella* sp. aff. *cristata* was last recorded in 2011 and *Chara australis* has formed tall extensive mono-specific meadows since. The water clarity was just 0.1 m when surveyed in 2017, so there remains cause for concern about algal blooms and the threat to the submerged vegetation. The vegetation grew to 2.9 m deep, so the lake was mostly vegetated.

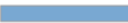
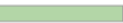
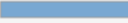
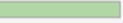





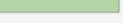
Small amounts of *Utricularia gibba* were noted in shallow areas associated with emergent vegetation in 2014, but none has been seen since then.



Submerged turfs in Lake Waiporohita. *Glossostigma elatinoides* was the most common turf species.

LakeSPI



Survey Date	Status	LakeSPI %	Native Condition %	Invasive Impact %
March 2017	Excellent	94% 	85% 	0%
May 2014	Excellent	90% 	83% 	4% 
March 2011	Excellent	88% 	83% 	7% 
November 2004	Excellent	93% 	83% 	0%

The excellent LakeSPI scores of 88 - 94% reflects the extent of the native vegetation, with limited influence of invasive exotic species.

Water birds

The large areas of wetland and removal of cattle browsing on the northern edge of the lake provides good habitat for many aquatic birds. Over 500 Canada geese (*Branta canadensis*) were counted at the lake in 2021. In 2017, over 200 black swan (*Cygnus atratus*) and Canada geese (*Branta canadensis*) were seen on the lake. Additional species were mallard (*Anas platyrhynchos*), paradise shelduck (*Tadorna variegata*) and three shag species (*Phalacrocorax* spp.). have been seen on field visits. Also reported previously, were bittern (*Botaurus poiciloptilus*), dabchick (*Poliiocephalus rufopectus*), grey duck (*Anas superciliosa*), Caspian tern (*Hydroprogne caspia*) and the vagrant chestnut-breasted shelduck (*Tadorna tadornoides*: in 1985).

Of concern were the very large numbers of swan and geese that would elevate the nutrient status of this small shallow lake.

Fish

Common bullies (*Gobiomorphus cotidianus*) and the pest fish *Gambusia affinis* have been seen during field visits.

Aquatic invertebrates

Backswimmers (*Sigara arguta*) were noted in abundance. Leeches (*Richardsonianus mauianus*) were also seen. No torewai or koura have been recorded.

Endangered species

The Nationally Vulnerable grass *Amphibromus fluitans* was collected in 1998 but has not been seen since. This was the only recent record of this species in Northland. It is a cryptic species, superficially similar to other grasses common in this lake but may have disappeared from this site.

There are four vagrant species first recorded in New Zealand from this lake; *Gratiola pedunculata*, *Alternanthera denticulata*, *Juncus polyanthemus* and *Crassula natans* var. *minus*. These are classified as Non-Resident Native - Coloniser by de Lange et al. (2013), naturally spreading here from Australia, but currently have a limited population size. Interestingly, *C. natans* var. *minus* is not native to Australia (being a South African species) but has arrived in New Zealand without human transfer.

Lake Ecological Value

Lake Waiporohita has an ecological value rating of “High” with a score of 11. The condition of the lake has improved and was fully vegetated. Water quality trends showed improvement in TLI indicating eutrophic status (10-year median of 4.96) in 2019, improving from supertrophic status prior to then. Water levels were very high in August 2022, with flooding of much of the grass verge between the lake and Inland Road. A large planktonic cyanobacterial bloom prevented any investigation of submerged ecology of Lake Waiporohita on that occasion.



Lake Waiporohita, showing the flooded grass verge and cyanobacterial bloom (Paul Champion, 9 August 2022).

Threats

The ease of access to this lake, after removal of the roadside fence on the eastern shore, makes it relatively accessible and there is a risk of weed and pest fish transfer. Submerged weed species or pest fish would significantly impact the lake.

Alligator weed and primrose willow have now spread around the lake in the marginal vegetation but do not seem to be having a major impact on other marginal species.

The lake was improving in clarity and plant health but dense cyanobacterial blooms are commonly encountered. Sources of nutrients need to be considered carefully and managed.

Management recommendations

Nutrient management, including Canadian geese control, is advocated. It would be advisable to explore the relative importance of waterfowl and catchment as nutrient sources.

Annual pest plant surveillance monitoring and is recommended with lake native biodiversity value assessment monitoring every 5 years.

References

- de Lange, P. J. (1997) *Gratiola pedunculata* (Scrophulariaceae): a new addition to the New Zealand flora, *New Zealand Journal of Botany*, 35:3, 317-322.