North of Dargaville

Waikare (Kai-Iwi Lakes), NRC Lake No. 227

Waikare. Photo taken from the ridge between this and Greer's Lake to the west (Photo: Paul Champion 2 May 2018).

Summary

Surveyed 1985, 1987, 2001, 2005, 2007, 2011, 2014 and 2018.

Overall ranking

Outstanding: A native plant dominated lake with the presence of nationally rare plants and fish. Negligible impact by pest plants.

Threats

Biosecurity: high risk of pest plant introduction but subsequent impact likely to be low due to very low nutrient status and steep sides. The introduced *Potamogeton crispus* was found in the lake for the first time in 2017.

Catchment: moderate risk of increased nutrient loading with impact on current values and consequent increased biosecurity risk.

Management recommendations

Pest plant surveillance at access points annually. Lake native biodiversity value monitoring every 5

Description

The lake (1656902E, 6038255N) is accessible for trailer boat traffic via a sealed road and concrete boat ramp. The catchment is predominantly manuka scrub (50%), felled pine plantation (45%), and a campground. This moderately large (26.5 ha) and deep (30 m) dune lake was an important venue for water skiing, but in 2016, the Kai Iwi Lakes (Taharoa Domain) Reserve Management Plan banned power boats from the lake. There is no outlet and only minor drains enter the lake.

Wetland vegetation

Emergent vegetation was sparse, only occurring around 15% of the lake shore, with *Eleocharis sphacelata, Machaerina arthrophylla, M. articulata, M. juncea, Apodasmia similis* and *Schoenus brevifolius* present in some areas. Emergent plants were usually in narrow bands < 2 m wide extending to water depths between 0.5 m and 2 m.

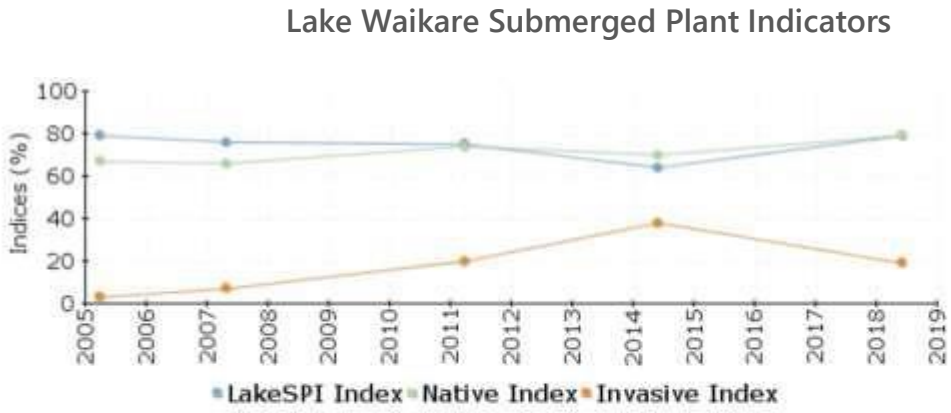
Submerged vegetation

Turf plants were not abundant due to the prevalent iron pan reefs around the lake but were locally common and associated with emergent vegetation. Species included *Trithuria inconspicua, Lilaeopsis novae-zelandiae* and *Myriophyllum votschii*. Isolated plants of the exotic rush*, Juncus bulbosus* were also recorded in shallow areas.

Surveys prior to 2018, recorded charophyte meadows that extended from < 2.5 m to 19 m depth with *Chara fibrosa* dominant in the upper profile and *C. australis* solely from 13 m to a maximum recorded depth of 19.7 m. Before 2005, *Chara fibrosa* dominated the charophytes to the bottom limit, which was 19 m in 2001. *Utricularia gibba* was recorded from between 11 and 16 m in 2014, the deepest record yet for this invasive species, where it formed high covers on charophyte meadows. One small patch of the native *Potamogeton ochreatus* was noted near the boat ramp in 2012 and the introduced *P. crispus* was recorded in the same location in 2017 as part of a dune galaxias survey (Alisha Frost, NorthTec pers. comm.). This may indicate increased nutrients in that area. The plant was removed, and the species was not seen in the 2018 survey.

The 2018 survey, found record depths for charophyte meadows in Waikare, reaching 22.6 m. *Chara australis* was the deepest growing species but *Nitella leonhardii* and *N. pseudoflabellata* were also recorded in deep vegetation (>15 m). *Potamogeton cheesemanii* was found in three transects at depths < 5 m, with the introduced *Juncus bulbosus* and the invasive *Utricularia gibba* both found in the shallows (≤2 m) at three transects. The deep water (11 to 16 m) *U. gibba* band described in previous sampling occasions was not seen in 2018.

LakeSPI



Survey Date	Status	LakeSPI %	Native Condition %	Invasive Impact %
May 2018	Excellent	79%	79%	19%
May 2014	High	64%	70%	38%
March 2011	High	75%	74%	20%
April 2007	Excellent	76%	66%	7%
March 2005	Excellent	79%	67%	3%

The 2018 LakeSPI score saw a return to the 'Excellent' status after two subsequent monitoring occasions seeing this reduce to 'High' status. This increase in status reflected the increased extent of charophyte vegetation and loss of the high cover, deep-water *U. gibba* mats, with Invasive Impact Index reduced from 38% in 2014 to 19% in 2018. Native Condition and LakeSPI indices have increased to scores seen in the early 2000's.

Water birds

The developed emergent vegetation limits the habitat available in this lake to water birds. Banning power boats may lead to an increase in emergent vegetation with improved water bird habitat in the future.

Fish

Native fish records include common bullies (*Gobiomorphus cotidianus*) and dune lakes galaxias, shortfin eel (*Anguilla australis*) and longfin eel (*Anguilla dieffenbachii*). Large pelagic schools of juvenile bullies were noted at several sites. Exotic fish present were gambusia (*Gambusia affinis*), common in shallow areas, and a stocked population of rainbow trout (*Oncorhynchus mykiss*). DOC conducted a fish survey during 2014 using a combination of Gee minnow (4) and fyke nets (2). They recorded a total of 96 gambusia, 589 common bullies, 20 dune lakes galaxias, 8 longfin and 2 shortfin eels (all large ≥540 mm long).

Aquatic invertebrates

Koura (*Paranephrops planifrons*) and pea mussels (*Sphaerium novaezelandiae*) were recorded from Waikare, although they were not abundant. The DOC fish survey in 2014 recorded 3 dragonfly nymphs and one koura.

Endangered species

The Nationally Endangered *Centrolepis strigosa* was abundant in marginal vegetation in 2014. The Nationally Critical *Trithuria inconspicua* was locally abundant in this lake with three large populations

adjacent to the concrete boat ramp on the western shore and the eastern side of the southernmost bay.

The At Risk Naturally Uncommon dune lake galaxias (restricted to the Kai iwi lakes) appears to be abundant in Waikare with large schools of this fish commonly seen during dive surveys and also sampled during the 2014 DOC fish survey. A few At-Risk Declining longfin eel were also sampled by DOC.

Lake Ecological Value

Waikare, like the neighbouring Taharoa, is a good example of a clear-water Northland lake. Submerged vegetation is dominated by dense charophyte meadows with *Chara australis* now extending to a maximum recorded depth of 22.6 m, with three other charophyte species recorded in these meadows. The lake does stratify over summer and should low dissolved oxygen levels develop in the hypolimnion this could threaten its status in the future. Its ecological value score is 15 “Outstanding”.

Threats

The ease of access and boat traffic to this lake results in a very high risk of pest plant introduction, however the ban on power boats has undoubtedly reduced the risk substantially. Water chemistry currently limits the development of large vascular plants and pest plants are unlikely to establish. However, changes in water quality parameters could increase the likelihood of pest plant establishment. Nevertheless, hornwort (*Ceratophyllum demersum*) may be able to thrive in this lake under current nutrient levels. *Potamogeton ochreatus* and *P. crispus* noted near the boat ramp may indicate localised nutrient enrichment in that area.

The biggest threat would be if increased nutrient loading from the catchment were to occur which would not only impact upon water clarity and current ecological values but also create an increased threat of pest plant establishment. Given the excellent water quality of this lake and ‘Outstanding’ ecological value rating, the possibility of water quality deterioration requires further consideration.

Management recommendations

Pest plant surveillance should be carried out at access points annually. Lake native biodiversity value should be monitoring every 5 years.

Lake water quality and catchment nutrient sources need to be closely monitored and managed.