North of Dargaville

Taharoa (Kai-Iwi Lakes), NRC Lake No. 229.

Southern shoreline of Taharoa. The photo shows oioi (*Apodasmia similis*) on the shoreline and pampas (*Cortaderia selloana*) in the area previously under pine plantation forest (Photo: Aleki Taumoepeau 2 May 2018).

Summary

Surveyed 1984, 1987, 2001, 2005, 2007, 2011, 2014 and 2018.

Overall ranking

Outstanding: The best example of a clear-water lake in Northland, with the deepest recorded (27.5 m) submerged vegetation in the North Island.

Threats

Biosecurity: high risk of pest plant introduction but subsequent impact is likely to be low due to very low nutrient status and steep sides.

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

Management recommendations

Surveillance for pest plant introductions at access points annually and lake native biodiversity value monitoring at 5 year intervals.

Description

This dune lake (1658567E, 6037260N) is the second largest (197 ha) and deepest lake (37 m) in Northland. It is a situated in a catchment comprised of ~1.8 M year old consolidated, nutrient-poor, sand dunes with shrub land, pastoral land and planted forest. The immediate surrounds include a domain with two camping grounds and the lake is popular for boating swimming and water skiing. There are two minor inflows at the south-west end of the lake, with no outflow. Access is via public roads with three boat launching areas.

Wetland vegetation

Much of shore was wave exposed with hard iron pan and compacted sand that is unsuitable for emergent vegetation. Low covers (25%) of oioi (*Apodasmia similis*) and *Schoenus brevifolius* were present in places. Additional emergent species recorded included *Machaerina arthrophylla, M. articulata, M. juncea, Eleocharis acuta, E. sphacelata, Ficinia nodosa, Isachne globosa, Isolepis prolifera* and *Juncus pallidus*.

The major woody weeds on the lake surrounds were delimited during 2014 with Sydney golden wattle (*Acacia longifolia*), coastal banksia (*Banksia integrifolia*) and two wilding pines (*Pinus pinaster* and *P. radiata*) the dominant species found.

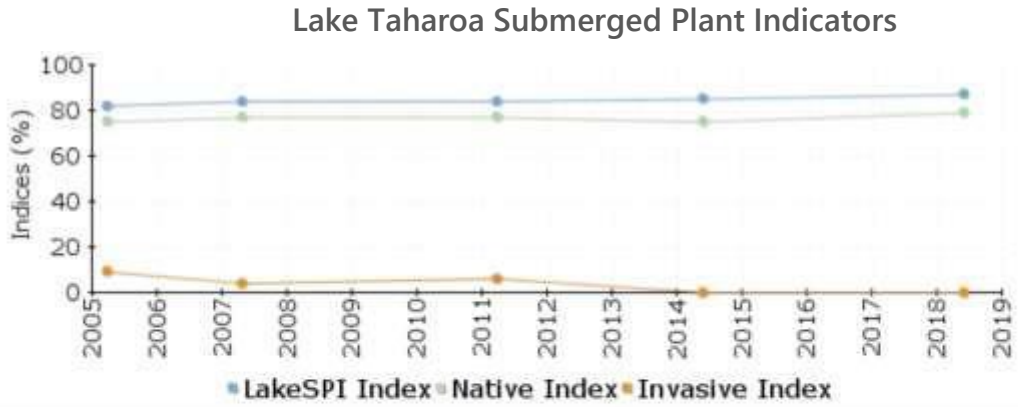
Submerged vegetation

Sparse turf plants grew on the shallow (0-1 m) sandy substrates of the wave-cut shelves and included *Trithuria inconspicua, Triglochin striata* and *Myriophyllum votschii*. The exotic rush, *Juncus bulbosus*, was also recorded in these areas along with isolated plants of the bladderwort *Utricularia gibba*. Steep slopes immediately beyond these shelves were largely devoid of plants from 1 to 6 m. In 2018, charophyte meadows, dominated by *Chara fibrosa* and *Nitella leonhardii* (the deepest growing species) and lesser amounts of *N. pseudoflabellata* extended from 5.9 m to 27.5 m water depth. No *U. gibba* was recorded on the five transects.

The bottom depth limits of charophyte meadows have fluctuated from 18 to 27.5 m over the 8 surveys since 1984, but no trend in these fluctuations was apparent.

Low diversity of submerged vegetation reflects the low nutrient status of Taharoa, with no tall vascular species, or charophytes more typical of more enriched water bodies e.g., *Chara australis* and *Nitella* sp. aff. *cristata.*

LakeSPI



Survey Date	Status	LakeSPI %	Native Condition %	Invasive Impact %
May 2018	Excellent	87%	79%	0%
May 2014	Excellent	85%	75%	0%
March 2011	Excellent	84%	77%	6%
April 2007	Excellent	84%	77%	4%
March 2005	Excellent	82%	75%	9%

An 'Excellent' LakeSPI score of 87% reflects the depth extent of vegetation, the predominance of the native charophyte community and lack of impact by invasive exotic plants. LakeSPI condition remains very stable.

Water birds

The limited development of marginal and emergent vegetation and popular use of this lake by the public reduce its suitability for water birds. Despite this, large numbers of waterfowl are reported to utilise the Kai-Iwi lakes, although the numbers were noted to be declining. The regionally rare dabchick (*Poliocephalus rufopectus*) was reported. Few birds were seen during the current survey.

Fish

Native fish sighted during surveys include common bullies (*Gobiomorphus cotidianus*), while the exotic pest gambusia (*Gambusia affinis*) were also observed. Previous surveys have recorded shortfin eels (*Anguilla australis*) and rainbow trout (*Oncorhynchus mykiss*) stocked by Northland Fish and Game. Dune lakes galaxias were last recorded in the 1999 survey.

Aquatic invertebrates

Koura (*Paranephrops planifrons*) and freshwater crab (*Amarinus* (was *Halicarcinus*) *lacustris*) were observed during the 2018 survey.

Endangered species

The Nationally Endangered *Centrolepis strigosa,* an annual, was found in the marginal turf in 2010 and has been found in the same location subsequently, usually as dead plants. Over 100 plants of this species were found on iron pan outcrops and beach areas in November 2013. No sign of this species was found in most of these areas during our 2018 survey, suggesting our annual surveys do not correspond with the actively growing stages of its life-cycle. The National Critical *Trithuria*

inconspicua was uncommon in this lake, with few plants seen during our shoreline survey in 2014. It was locally common at one site amongst *Machaerina arthrophylla* in the "Sin-bin" area. The At-Risk Relict sundew *Drosera pygmaea* was noted amongst mosses on iron pan outcrops.

The At-Risk Naturally Uncommon dune lakes galaxias (restricted to the Kai iwi lakes) has not been seen during our vegetation surveys since 1999 and a survey of Taharoa fish is advocated.

There appears to be a secure population of the freshwater crab (*Amarinus lacustris* - At Risk Naturally Uncommon).

Lake Ecological Value

Taharoa remains the best example of a clear-water lake in Northland with the deepest recorded (currently 27.5 m) submerged vegetation in the North Island. This is dominated by the charophyte, *Chara fibrosa*. The deepest extent of high cover *C. fibrosa* and *N. leonhardii* meadows has varied between 18 and 27.5 m between vegetation surveys and is currently the deepest recorded at 27.5 m. This measure will be a sensitive baseline for future assessments of long-term water clarity. Water quality trends show this lake is stable with an oligotrophic status. 2019 and 2020 water quality data equate to TLI of microtrophic (< 2). Its ecological value rating remains "Outstanding" with a score of 15.

Threats

The only pest plants present were *J. bulbosus* and *U. gibba*, which were sparse and of insignificant impact on the lake's ecology. While good boat access to the lake results in a high risk for introduction of pest plants, the potential impacts are currently very low. Firstly, the exposed wave cut platforms around the lake reduce the likelihood of establishment and secondly, unusual water chemistry limits the development of large vascular plants, likely due to dissolved carbon limitation. However, changes in water chemistry could make the lake more vulnerable to pest plant invasion. Such a change would be initially indicated by development of tall-growing native vascular plants such as *Myriophyllum* spp. and *Potamogeton* spp.

Large numbers of the pest fish gambusia could threaten the population of the endangered dune lake galaxias.

Nutrient loading from the catchment is a major threat with potential sources from nitrogen-fixing woody vegetation, pine harvesting and livestock farming. Resulting changes in water chemistry would not only decrease water quality but could also facilitate native vascular and pest plant establishment.

Management recommendations

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

A survey of Taharoa fish is advocated.

Continue investigations into ground water and identification of possible nutrient sources from the catchment with consideration of appropriate mitigation measures.