

Poutō Peninsula

Rotokawau (Poutō), NRC Lake No. 364.



Rotokawau. Photo from entry point on western margin looking over at a line of pine trees on the northern margin. (Photo: Tracey Burton 19 September 2018).

| Summary | Rotokawau |
|------------------------------------|---|
| Surveyed: | 2001, 2005, 2007, 2012, 2015, 2018 and 2021 (reconnaissance). |
| Overall ranking: | Outstanding: All submerged vegetation had declined significantly since 2015, but charophyte meadows appeared to be recovering in 2021. An outstanding ranking is maintained, as the lake still supports extensive turf communities dominated by the Nationally Critical <i>Trithuria inconspicua</i> and extensive beds of freshwater mussels. |
| Threats: | Presumably eel fishing nets were the mode of introduction of egeria and pose a threat for future introductions of pest species. Water quality has declined from 2009 to 2019, with nutrient enrichment most likely relating to farming activities in the catchment. This deterioration could potentially lead to the loss of submerged vegetation, including the last Poutō population of <i>Trithuria inconspicua</i> . |
| Management recommendations: | Lake ecological assessment every 5 years. Advocate for fencing and riparian retirement to reduce nutrient addition. Monitor the distribution/abundance of egeria and hand remove if in low enough amounts. Follow up with annual surveillance for egeria. |

Description

This dune lake (1702929E 5976997N) is 26.4 ha in size and 13 m deep. A water sample taken from this lake in 2015 and analysed for chloride ion concentration showed a much lower value than concentrations for Kanono, Humuhumu and Mokeno. Based on this Dr Max Gibbs (NIWA) surmised the lake is likely to be perched, rather than linked to surrounding lakes by a regional aquifer. This is

corroborated by an elevation assessment by Andrew Macdonald (NRC) showing this lake is an additional 10 m above Kanono and Humuhumu. The catchment is pastoral, with plantation pine and shrub land. Access is across private farmland, requiring 4-WD.

Wetland vegetation

Pockets of emergent species on soft shores occupied 15% of the lake margin. Dominant species included *Schoenoplectus tabernaemontani*, *Machaerina articulata*, *M. arthrophylla*, *M. juncea*, *Eleocharis acuta*, *Eleocharis sphacelata*, *Isolepis prolifera*, *Typha orientalis* and *Apodasmia similis*. The sheltered northern arm of this lake has a well-developed wetland fringe with many of these species present. *Sphagnum falcatulum* was noted as an understory in 2018. High water levels in 2018 had flooded the normally exposed turf communities. Occasional plants of the pest plant royal fern (*Osmunda regalis*) have been recorded (and removed) from the lake margin on all surveys since 2010.

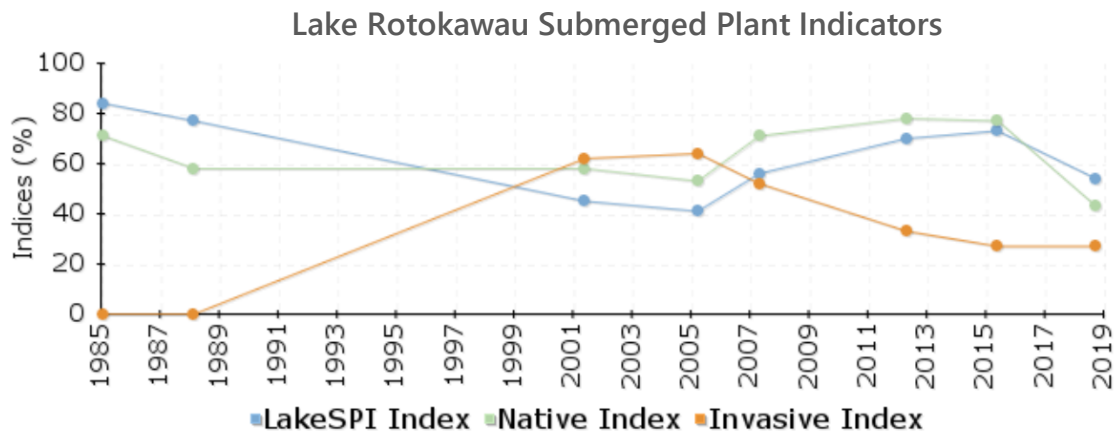
Submerged vegetation

A brief reconnaissance of submerged vegetation was undertaken by snorkel in 2021. At that time water clarity exceeded 5 m allowing the vegetation assessment. The nationally threatened *Trithuria inconspicua* was predominantly exposed but plants were also observed in water less than 10 cm deep. There was a bare zone to approximately 2 m depth, then charophyte meadows of the charophytes *Nitella pseudoflabellata* and *Chara australis* were observed. No egeria (*Egeria densa*) was seen during the survey.

In 2018, turf communities were well developed with *Lilaeopsis novae-zelandiae* and the nationally threatened *Trithuria inconspicua* co-dominants, also including the regionally significant *Myriophyllum votschii* and *M. propinquum*, *Glossostigma elatinoides* and the charophytes *Nitella pseudoflabellata* and *Chara fibrosa*, all growing to a maximum depth of 0.6 m. Below this depth, submerged vegetation was sparse with median covers of 3% (maximum cover 5%). Only two species were recorded, the native *Potamogeton ochreatus* present at all transects to a maximum depth of 5.7 m and the introduced pest species egeria (*Egeria densa*), present at two of the five transects to a maximum depth of 3 m.

In 2015, tall-growing native species, *Potamogeton cheesemanii* and *P. ochreatus* were common. The introduced pest species egeria, with lesser amounts of *Elodea canadensis*, were widespread but were having little impact on native vegetation. Charophytes were the dominant vegetation in much of the lake with *Chara fibrosa* and *Chara australis* the most abundant species and grew across the bottom of the lake to 10.4 m depth in the deepest basin.

LakeSPI



| Survey Date | Status | LakeSPI % | Native Condition % | Invasive Impact % |
|----------------|-----------|-----------|--------------------|-------------------|
| September 2018 | High | 54% | 43% | 27% |
| May 2015 | High | 73% | 77% | 27% |
| April 2012 | High | 70% | 78% | 33% |
| April 2007 | High | 56% | 71% | 52% |
| March 2005 | Moderate | 41% | 53% | 64% |
| May 2001 | Moderate | 45% | 58% | 62% |
| February 1988 | Excellent | 77% | 58% | 0% |
| January 1985 | Excellent | 84% | 71% | 0% |

LakeSPI results for Rotokawau. LakeSPI Indices expressed as a percentage of lake maximum potential.

Rotokawau is categorised as being in high ecological condition with a LakeSPI Index of 54%. LakeSPI had declined from 73% in 2015, reflecting a large decrease in the Native Condition Index, from 77% in 2015 to 43% in 2018. With no further increase in the Invasive Impact Index, LakeSPI scores had declined as a result of water quality issues and not further invasive impact.

Prior to the 2018 survey, the LakeSPI index had continued to improve from 2005 to 2015 as a result of a reduction in the invasive impact scores. In 2015, egeria and *U. gibba* did not exceed a 10% cover at any of the baseline sites, but improved water clarity (greater than 5 m during the 2012 and 2015 surveys) contributed to the expansion of native charophyte meadows down to >10 m.

Water birds

Limited marginal vegetation provides restricted cover for resident water birds. Birds observed in 2018 included bittern (*Botaurus poiciloptilus*), dabchick (*Poliocephalus rufopectus*), shoveller (*Anas rhynchos*), mallard (*A. platyrhynchos*), grey duck (*A. superciliosa*) and/or their hybrids, paradise shelduck (*Tadorna variegata*), black swan (*Cygnus atratus*) and little black shag (*Phalacrocorax sulcirostris*). In 2012, a pair of Cape Barren geese (*Cereopsis novaehollandiae*) were seen at Rotokawau.

Fish

Good habitat for fish. Common bully (*Gobiomorphus cotidianus*) and īnanga (*Galaxias maculatus*) have been observed in this lake, with NIWA FBIS records of these species and also shortfin eel (*Anguilla australis*).

The 2017 threatened species assessment recommends the disestablishment of the taxon dwarf īnanga (*Galaxias gracilis*), now being recognised as land-locked stocks of īnanga (*Galaxias maculatus*).

Aquatic invertebrates

Freshwater mussels (*Echyridella menziesii*) were abundant in the 2018 survey. Leeches (*Richardsonianus mauianus*), and *Potamopyrgus antipodarum* snails were noted in some surveys but not in 2018.



Freshwater mussels in Lake Rotokawau. (Photo: Tracey Burton, 19 September 2018).

Endangered species

Rotokawau supports possibly the last population of the Nationally Critical *Trithuria inconspicua* on the Poutō Peninsula and one of the largest global populations. The At Risk Declining freshwater mussels (*Echyridella menziesii*) and īnanga (*Galaxias maculatus*) were both commonly found in Rotokawau. Threatened birds seen in 2015 included the Nationally Critical grey duck and Australasian bittern and At Risk Recovering dabchick, At Risk Naturally Uncommon little black shag and Coloniser Australasian little grebe.

Lake Ecological Value

An ecological value rating of 13 “Outstanding” was assigned to Rotokawau, with a decrease in native LakeSPI scores and declining water quality and corresponding loss of deep water vegetation compared to the higher ecological value scores from 2012 and 2015.

Threats

Although the hornwort risk has been eliminated from the adjacent Lake Swan (Rotootuauru), the mechanism for invasive species introduction via eel fishing nets, remains. Two other lakes

supporting hornwort have been located on the Poutō in 2019 and 2020, both are targeted for eradication.

Submerged vegetation underwent a significant decline in 2018 and water quality has generally declined since 2008 (but is still mesotrophic with a 10-year median of 3.40 in 2019), with nutrient enrichment most likely relating to farming activities in the catchment. A paddock adjacent to the lake was devegetated at the time of the 2018 survey and fertiliser application may have contributed additional nutrients to Rotokawau (L. Forester, NRC, pers. comm.).



Paddock adjacent to Rotokawau (to the north (right)). Run off from the bare earth is likely to run into the lake. (Photo: Paul Champion 19 September 2018).

Livestock access to parts of this lake could also affect water quality through direct nutrient addition, and damage to emergent and wetland vegetation that currently buffer the northern part of the lake from land-based nutrient sources.

Management recommendations

Difficult access to the lake across farmland (and requiring permission) reduces the risk of weed incursions so annual weed surveillance monitoring has been suspended.

Understanding the drivers for the water quality decline is critical to sustaining the outstanding ecology of this lake. Fencing and riparian retirement are advocated for this lake to reduce nutrient addition from erosion of the catchment and direct livestock access.

Egeria distribution and abundance is apparently declining in Rotokawau. A survey of the lake littoral zone is recommended to identify any remaining colonies of this species and, if abundance is very low, hand removal of all egeria shoots is advocated.

Lake ecological assessment should be carried out every 5 years (ecological assessment recommended for autumn 2022), with annual surveillance for egeria should eradication be deemed a feasible management goal.