

## Poutō Peninsula

Parawanui (Poutō), NRC Lake No. 297.



**Parawanui.** Photo from Southern end of lake showing the fenced pasture margins and re- establishing marginal vegetation. (Photo: Tracey Burton 18 September 2018).

Summary	Parawanui
<b>Surveyed:</b>	2001, 2016 and 2018.
<b>Overall ranking:</b>	<b>Moderate:</b> A degraded lake, with poor water quality, but fencing has prevented grazing from most of the lake margins permitting the re-establishment of an emergent vegetation band around the lake. Submerged vegetation appears to be well established around the margins despite the presence of pest fish.
<b>Threats:</b>	Pest fish (rudd, koi carp, orfe) have been introduced into this lake. Nutrient enrichment and algal blooms continuing despite fencing. The lake is fished for eels providing an introduction pathway for additional pest fish and pest plants.
<b>Management recommendations:</b>	Advocate the establishment of wetlands to mitigate impacts of the nutrients transported to the lake from the inlet. Advocate the closing of this lake to eel fishing. Five yearly surveillance for pest plants and lake native biodiversity value monitoring.

### Description

Parawanui (1676581E, 6008811N) is a relatively steep sided dune lake 6.47 ha in area with a 19.1 m maximum recorded depth. The catchment is pasture with grazing excluded by the fenced lake margin. There are two inflows, the largest entering the eastern bay at the southern end of the lake draining from approximately 1 km to the east. There is no outlet. Access is through 1 km of private farmland, mostly on well-formed tracks. Small boats can be launched from parts of the shore with a 4-WD.

### Wetland vegetation

In 2001, emergent vegetation was sparse (5%) with *Schoenoplectus tabernaemontani* the dominant

species. Since that time fencing has allowed the development of an almost entire dense margin of emergent species including *S. tabernaemontani*, *Apodasmia similis*, *Eleocharis sphacelata*, *Machaerina juncea* and *Juncus pallidus*. Floating rafts of alligator weed (*Alternanthera philoxeroides*) were noted spreading out from the lake edge in 2018. This showed the heavy browsing by the biocontrol agent *Agascicles hygrophila* seen in 2016 only provided temporary control. The turf community lining the southern margin of the lake, previously reported as containing the locally rare *Fimbristylis velata*, was submerged during the 2018 survey and this plant was not recorded.



**Alligator weed on the margin of Parawanui.** Photo on left shows Alligator weed in autumn 2016 (defoliated by alligator weed flea beetle) and on right, in spring 2018 (healthy). (Photos: Paul Champion March 2016 and September 2018).

### Submerged vegetation

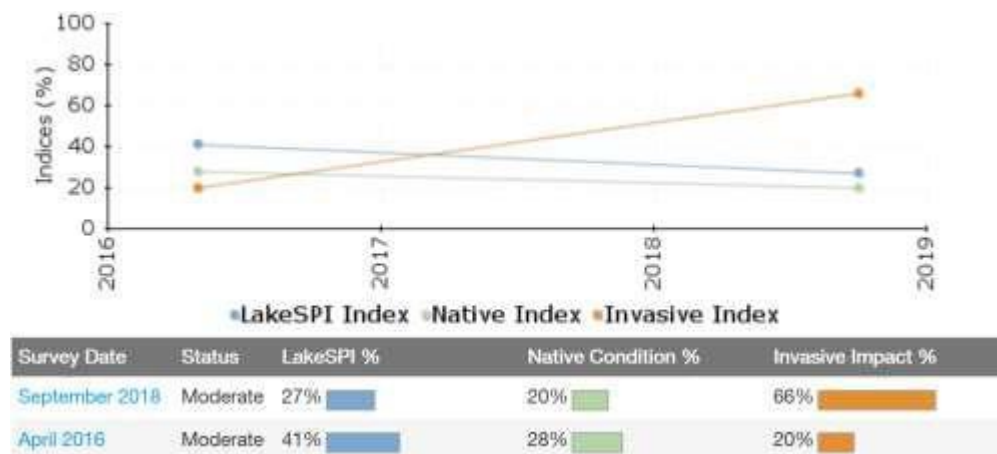
The submerged vegetation was dominated by the introduced weed *Potamogeton crispus* in 2018 forming high covers (median covers up to 50%) from 0.5 to 3.8 m. Native species were *Myriophyllum triphyllum* and *Potamogeton ochreatus*, with the latter species growing to 4.3 m, the maximum depth of submerged plants. No charophytes were recorded.

In 2016, the submerged vegetation was predominantly native with *Myriophyllum triphyllum*, *Potamogeton ochreatus* and *Chara australis* (to 3.5 m deep) the most common. The introduced *P. crispus* was also present.

The only vegetation present in 2001 was the introduced weed *P. crispus*, present at low covers from 0.2 to 2.4 m depth.

### LakeSPI

Lake Parawanui Submerged Plant Indicators



**LakeSPI results for Lake Parawanui.** LakeSPI Indices expressed as a percentage of lake maximum potential.

Lake Parawanui is categorised as being in moderate ecological condition with a LakeSPI Index of 27%.

Survey data from 2001 (not shown above) generated a LakeSPI score of zero as plant covers were below the minimum threshold for LakeSPI.

In 2016, several of the profiles had dense plant growths to 3.5 m. Parawanui was categorised as being in moderate condition with a LakeSPI Index of 41%. The decline from 41% in 2016 to 27% in 2018 is likely to be a consequence of greater abundance of the invasive *Potamogeton crispus*, predominantly with maximum biomass produced in winter and spring, before declining during summer. However, continued input of nutrient rich inflows and possible extinction of freshwater mussels may also be related to this decline.

### Water birds

In 2018, 37 black swans (*Cygnus atratus*) and smaller numbers of mallard (*Anas platyrhynchos*) and paradise shelduck (*Tadorna variegata*) were seen. Chicks of mallard and paradise shelduck were noted. Dabchick and three species of shag (*Phalacrocorax carbo*, *P. varius* and *P. sulcirostris*) were also recorded. A bittern (*Botaurus poiciloptilus*) was noted flying over the lake.

### Fish

The pest fish rudd (*Scardinius erythrophthalmus*), koi carp (*Cyprinus carpio*) and orfe (*Leuciscus idus*) were reported as liberated into Parawanui. NIWA FBIS records include shortfin eel (*Anguilla australis*), common bully (*Gobiomorphus cotidianus*) and rudd caught in this lake. A shortfin eel was noted in 2018.

### Aquatic invertebrates

Abundant freshwater mussels (*Echyridella menziesii*) were noted in surveys prior to 2018, but only empty shells were noted during the recent visit from one site (out from pump house).

### Endangered species

No threatened plant species were noted in 2018, but in previous surveys At-risk Declining freshwater mussels and the 'At risk' Naturally Uncommon sedge *Fimbristylis velata* were recorded. Threatened birds included bittern (National Critical), pied shag (At risk Declining), dabchick (At risk Recovering), black and little black shag (both At risk Naturally Uncommon).

### Lake Ecological Value

An ecological value rating of 6 "Moderate" was assigned to Parawanui with a decrease in endangered species and loss of mussels affecting this score. It appears lake water quality is declining in Parawanui. In 2016, the lake had an ecological value rating of 8 (High-Moderate), improving from the previous rating of Moderate to Low in 2001. This improvement reflected the increase in native emergent and submerged vegetation, likely a result of livestock exclusion. In 1988, seven submerged species were present, with beds of *P. ochreatus* and *Nitella* sp. aff. *cristata* extending to 5.5 and 8 m water depth respectively.

### Threats

It appears likely that coarse or pest fish have been deliberately stocked in this lake. Possibly a combination of this and nutrient run-off from the steep pasture catchment has resulted in nutrient

enrichment, algal blooms and a decline in submerged vegetation as well as the recent loss of freshwater mussels. Further pest plant or fish introductions are unlikely unless these are introduced by fishing activities, with eel fishing still permitted by the landowners.

### Management recommendations

Poor water quality remains a concern and continuation of restoration initiatives are advocated, especially the interception of nutrients from inflows, possibly by planting wetlands. The risk of new pests through contaminated fyke nets used for eel fishing is high and the recommendation to close this lake to eel fishing should be advocated to the landowner. Five-yearly monitoring is recommended.