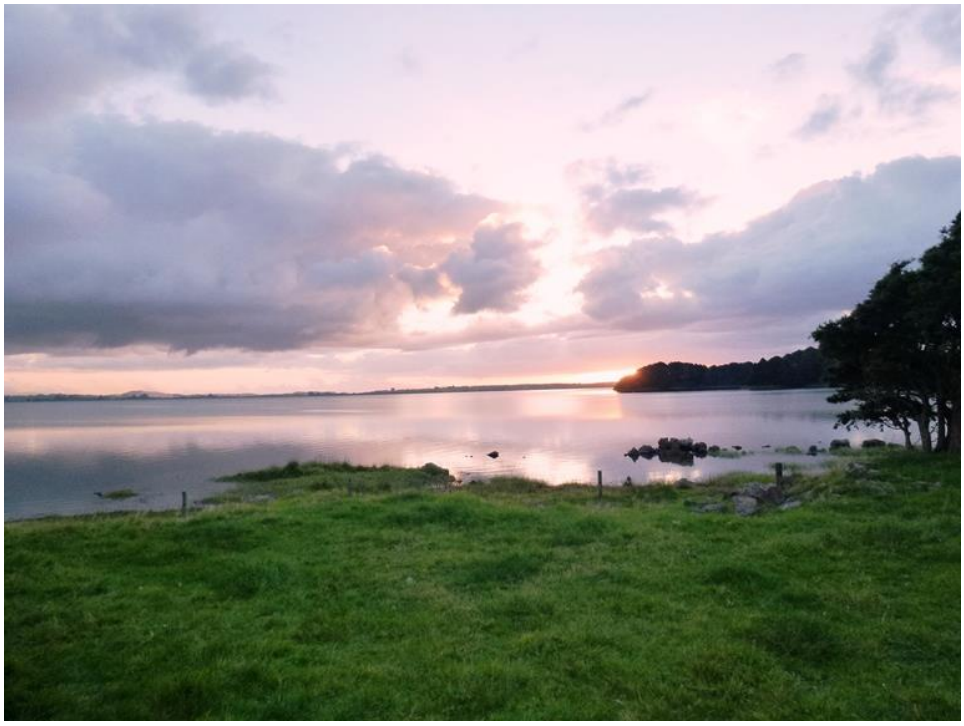
Central and East Northland

Ōmāpere, (Central Northland) - NRC Lake No. 173



Ōmāpere in a predominantly pastoral catchment.

Summary	Ōmāpere
Surveyed:	2005, 2012, lakeside visit with Lake Ōmāpere Trustees (March 2019).
Overall ranking:	**High-Moderate**: The largest lake in Northland, but only 2.6 m deep (as low as 1.5 m during summer). This lake has been de-vegetated since 2001, but submerged plants have re-established in 2019. High lake nutrient concentrations an issue (hypertrophic - Verburg 2012), but extensive marginal vegetation supports three critically endangered species.
Threats:	Nutrient inputs from land use in the catchment has led to an enriched (hypertrophic) water quality together with the invasive plant egeria has caused the lake to flip between algal and submerged vegetation domination. Egeria is re-establishing in the lake. Grass carp were stocked to control egeria (1999), but there are now insufficient numbers to achieve control. Water level could be increased for irrigation purposes.
Management recommendations:	Reestablishment of egeria has complicated the plans to restore Ōmāpere. Undertake a delimitation/LakeSPI survey. Initiatives such as attempting to restore the critically endangered *Isoëtes* sp. aff. *kirkii* to its last known locality, is dependent on effective egeria management. Monitoring of other critically endangered species is required. Continue fencing and marginal restoration planting. Investigate ways of reducing the nutrient sediment load. Review the likely consequences of increase lake level.

Description

Ōmāpere (1671879E 6088198N) is the largest lake in Northland being 1,197 ha in area but is only 2.6 m deep (as low as 1.5 m during summer). It was formed by a volcanic flow damming the outlet, with evidence of the lake becoming a forested wetland, then re-flooded following a fire around 1300. The surrounding catchment is mostly pasture. There are a few inflow streams, mostly in the southern part of the lake, with the outflow, the Utukura River flowing from the south-western margin of Ōmāpere to the Hokianga Harbour. Access is through private property, boats can be launched with a 4-WD.

Wetland vegetation

The western shore of Ōmāpere supported emergent vegetation consisting of dense bands (>75% cover) of *Machaerina articulata*, *Schoenoplectus tabernaemontani* and *Typha orientalis* to a water depth of 1.2 to 1.3 m. The remainder of the shoreline was pasture with the rush *Juncus edgariae* common near the water's edge and a range of turf species such as *Lilaeopsis novae-zelandiae, Myriophyllum propinquum, Gratiola sexdentata, Glossostigma elatinoides* and *G. cleistanthum* in the wettest areas. Two nationally threatened marginal plants were discovered during the 2012 field trip. These were the annual composite *Centipeda minima* subsp. *minima* and the fern *Ophioglossum petiolatum*. Alligator weed (*Alternanthera philoxeroides*) was well established and formed large floating mats on the eastern shoreline of the lake.

Submerged vegetation

The submerged vegetation of Ōmāpere collapsed in 2001 and the lake has remained in a de-vegetated state dominated by cyanobacterial blooms since that time. Submerged vegetation had established in the lake as noted by the discovery of stranded plants on 29 March 2019. A subsequent survey in October 2019 recorded egeria (*Egeria densa*), elodea (*Elodea canadensis* - first record in Ōmāpere), *Potamogeton ochreatus* and *Chara australis* as well established in central parts of the lake.

On 16 April 2012, a profile from the south side of the lake to the north side, about 3.3 km long from NZMG 2582533E, 6648324N to 2583273E, 6651676N was spot dived. Very small amounts of *Glossostigma cleistanthum* were found at 0.4 m deep at the south end and one tiny plant *Chara australis* at 1.4 m deep was found. High covers of *G. cleistanthum* and *G. elatinoides* were found amongst basalt boulders during a snorkel search around the eastern shore in 2012.

LakeSPI

In 2012, this lake generated a default LakeSPI Index of 0% (Non-vegetated) on account of submerged plants being recorded at <10% cover. This status is the result of management stocking of grass carp (see below).

Water birds

The restricted emergent vegetation would provide limited water bird habitat, but the lake is fairly isolated. Only common species were recorded by the recent OSNZ survey. Previous surveys reported the presence of the nationally rare bittern (*Botaurus poiciloptilus*) and regionally significant fernbird (*Bowdleria punctata vealeae*) from this lake.

Black swan (*Cygnus atratus*) numbers fluctuate with submerged plant biomass. Prior to the collapse of weed beds in 1985 an estimated 8000 swans utilised Ōmāpere. This dropped to 1000 the following year, which increased to 3000 in 1995 and 9000 in 2002. This number has again dropped

since the second weed collapse, with annual counts varying between 50 and 400 over the last decade (Northland Fish and Game unpublished data).

Fish

Eels (*Anguilla dieffenbachii* and *A. australis*), common bully (*Gobiomorphus cotidianus*), smelt (*Retropinna retropinna*), goldfish (*Carassius auratus*) and brown bullhead catfish (*Amieurus nebulosus*) have been caught from Ōmāpere. Two carp species introduced for algal and weed control; silver carp (*Hypophthalmichthys molitrix*) and grass carp (*Ctenopharyngodon idella*) are both present in the lake. *Gambusia affinis* have been recorded from this lake. Large populations of nationally significant Northland mudfish (*Neochanna helios*) have been recorded from the wetland margins of Ōmāpere (Department of Conservation 2003).

Aquatic invertebrates

Freshwater mussels, known locally as torewai (*Echyridella menziesi*), koura (*Paranephrops planifrons*), *Potamopyrgus antipodarum*, *Austropeplea tomentosa*, *Hygraula nitens*, dragonfly (Odonata) larvae, planarians, freshwater sponges, bryozoans and chironomids have been recorded. Torewai underwent a major decline during 2001/02 and were rare within the lake in 2005. In 2012, torewai had recovered and were abundant right across the lake confirming the lake is not currently experiencing anoxic (minimal oxygen) episodes.

Endangered species

The genetically distinct *Isoëtes* sp. aff. *kirkii* was last collected from Lake Ōmāpere in 1998 and is classified as Nationally Critical: Extinct in the Wild (de Lange et al. 2018), with the last remaining plants cultivated by NIWA.

An additional Nationally Critical plant, the fern *Ophioglossum petiolatum,* was found on the margins of Ōmāpere during the 2012 field trip. Another rare species, the annual composite *Centipeda minima* subsp. *minima* was also found in 2012.

Australasian bittern (*Botaurus poiciloptilus*) is classified as Nationally Critical. Fernbird (*Bowdleria punctata vealeae*) is classified as At Risk Declining.

Northland mudfish (*Neochanna helios*) is classified as national threatened (Nationally Vulnerable), Longfin eel (*Anguilla dieffenbachii*) is classified as At Risk Declining.

Torewai (*Echyridella menziesi*) is classified as At Risk Declining, with the snail *Austropeplea tomentosa* classed as Data Deficient.

Lake Ecological Value

Ōmāpere ecological value rating is assessed as “8 – high to moderate”, a large but shallow water body, with a moderately buffered habitat, low biodiversity, invasive species present but containing several critically endangered species that significantly increase the ecological value of this lake.

Threats

The exotic invasive egeria (*Egeria densa*) completely covered the lake during 1984. However, these surface-reaching stands of egeria collapsed in 1985 and the lake became dominated by algal blooms and remained de-vegetated until 1994. From that time egeria re-established weed beds in the lake until 2000 when it again reached maximum biomass, with surface-reaching weed beds covering the lake. From 2001 onwards, these beds collapsed, and the lake suffered toxic algal blooms again. To

prevent this cycle continuing, grass carp (a herbivorous fish used to control submerged weeds) were released to the lake to prevent re-establishment of the egeria. In 2019, egeria showed signs of re-establishing in the lake, anecdotally seen as a consequence of re-introduction from farm water troughs, with insufficient browsing pressure by grass carp.

The lake is hyper-eutrophic (very high nutrient levels). While catchment loadings are high due to farming, nutrients arising from lake sediments during anoxic (low oxygen) episodes have had a much greater influence on the nutrient budget of Ōmāpere and elevates nutrients in the lake in the order of 380% greater than catchment inputs.

Additional threats include the marginal emergent weed alligator weed, which is now abundant around the lake and the pest fish brown bullhead catfish (*Amieurus nebulosus*) and *Gambusia affinis.*

Management recommendations

Reestablishment of egeria has complicated the plans to restore Ōmāpere. Undertake a delimitation/LakeSPI survey. Explore potential control methods to prevent another flip to a devegetated state. If left unmanaged, egeria is likely to dominate Ōmāpere, with the cycle of excessive weed beds, anoxia, nutrient release, vegetation collapse and toxic algal blooms likely to continue if unmanaged. The introduction of grass carp had prevented this until recently, but additional efforts are required to ensure the lake catchment is free of this weed and that new introductions do not occur.

Initiatives such as attempting to restore the critically endangered *Isoëtes* sp. aff. *kirkii* to its last known locality, is dependent on effective egeria management.

Monitoring of populations of other critically endangered species and conservation actions to protect them is required.

Continue fencing and marginal restoration planting. Investigate ways of reducing the nutrient sediment load.

Review the likely consequences of increased lake level on lake ecology.