4. Karikari Peninsula, central and east

4.1 Horahora Dune lake (central and east Northland), NRC Lake No. 199A; visited in 2008

Plate: Horahora Dune Lake, Ngunguru

Summary

Overall ranking

Moderate: Isolated, with some endangered birds. Water body very shallow, dominated by the introduced swamp lily.

Threats

High risk of drying completely.

Management recommendations

No further monitoring.

Description

Horahora Dune lake (1736048E, 6051806N) was almost dry when visited, with two shallow (0.5 m deep) ponds <1ha in area. The lake is situated on the northern side of the Horahora River mouth accessed through private Maori land. The catchment was rough pasture and scrub, with a 3 ha wetland fringe around some of the lake.

Wetland vegetation

Some areas of *Eleocharis sphacelata* were present within the lake. This and other species including *Eleocharis acuta*, *Baumea articulata*, *Cyperus ustulatus*, *Persicaria* spp. and *Alternanthera sessilis* were present in the wetland.

Submerged vegetation

The lake was dominated by the introduced swamp lily (*Ottelia ovalifolia*), with *Myriophyllum propinquum*, *Potamogeton cheesemanii* and *Ludwigia palustris* in the shallows.

Water birds

The wetland provided good bird habitat. The endangered fernbird (*Bowdleria punctata vealeae*) and bittern (*Botaurus poiciloptilus*) were seen as well as the more common mallard (*Anas platyrhynchos*), coot (*Fulica atra*) and paradise duck (*Tadornia variegata*).

Fish

Shortfin eels (*Anguilla australis*) were present.

Aquatic invertebrates

Sigara arguta were common.

Changes in indicators

This was the first time this lake has been surveyed.

Threats

The water level in the lake is now very low, apparently reducing over the past 30 years (pers. comm. owner). Further falls in water level will completely drain the waterbody.

Management recommendations

No further monitoring.

4.2 Jack's lake (Central Northland), NRC Lake No. 180; surveyed in 2005

Plate: Access point showing forest remnant at the northern end of Jack's Lake.

Summary

Overall ranking

Low: This artificially dammed lake has little current ecological value.

Threats

The location on private land reduces the threat of further pest introduction, however the presence of *Egeria densa* in neighbouring Lake Owhareiti represents the most immediate weed risk.

Management recommendations

No monitoring.

Description

This dammed lake (1684321E, 6083377N), adjacent to Lake Owhareiti, was created ~ 20 years ago. It is accessed via well-formed tracks across private pastoral land and ~ 20% of the catchment is in indigenous forest. The lake is 16.6 ha in size, 6.5 m depth and while the lake level is currently maintained by a dammed outlet, it has been known to have dried out in the past (landowner pers. comm.). There is one inlet drain to the south of the lake, with no outlet. Boat access is difficult.

Wetland vegetation

The only tall emergent species recorded at the lake was *Eleocharis sphacelata* restricted to around 25% of the lakeshore, with grazing on much of the margin except for forest areas. The regionally uncommon *Gratiola sexdentata* was found in marginal turf areas. The pest plant *Glyceria maxima* was seen adjacent to the forest remnant.

Submerged vegetation

The turf plant *Glossostigma elatinoides* was common, together with low covers of *Myriophyllum propinquum*, *M. triphyllum* and *Nitella pseudoflabellata* that were also restricted to the shallow margin in depths <1 m. Beyond 1 m depth the vegetation was equally dominated by *Potamogeton ochreatus* and the exotic *P. crispus* to a maximum depth of 2.9 m. *Chara australis* and *Potamogeton cheesemanii* were occasionally encountered to 2.5 m.

LakeSPI

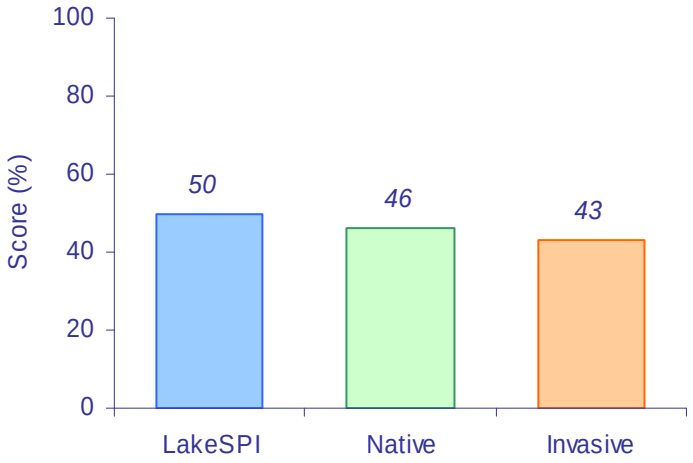

Figure: LakeSPI condition as % of potential score, native index, and invasive index (from left to right).

The moderately low LakeSPI score of 50% reflects a restricted development by native vegetation and the presence of *P. crispus*.

Water birds

The restricted emergent vegetation would provide limited water bird habitat, but the lake is fairly isolated. Black shag (*Phalacrocorax carbo*), black swan (*Cygnus atratus*) and mallard (*Anas platyrhynchus*) were noted during the visit. DoC SSBI reports regionally threatened dabchick (*Poliocephalus rufopectus*) and scaup (*Aythya novaezeelandiae*) in 1991, with only common species recorded by the more recent OSNZ survey.

Fish

Common bullies (*Gobiomorphus cotidianus*) were seen with many dead fish noted.

Aquatic invertebrates

The indigenous snails *Austropeplea tomentosa*, *Potamopyrgus antipodarum*, pea mussel (*Sphaerium novaezelandiae*) and backswimmers (*Sigara arguta*) were recorded.

Changes in indicators

Since 2001 there has been a large change in the composition and abundance of submerged vegetation. Previously, dense beds of *C. australis* extended to 3.4 m, however charophyte beds were not present in the current survey. The exotic *P. crispus* has increased in frequency since 2001.

Threats

The pest plant *P. crispus* was noted as present in 2001, but currently appears to have become more frequent, now being the co-dominant submerged species. The presence of *Egeria densa* in neighbouring Lake Owhareiti is the most immediate additional pest plant risk to this waterbody, although access to the lake is limited.

This dammed lake may be susceptible to water level reductions, as has occurred in the past, but currently the water level is rising and of concern to the landowners.

Management recommendations

No monitoring.

4.3 Roadside pond, Matai (Karikari), no NRC Lake No.; surveyed in 2005

Plate: Roadside pond at Matai, note the sprawling *Isolepis prolifer* margin (light green), contiguous mat floating mats of *Utricularia gibba* around the pond (pale brown) and floating leaves of swamp lily (*Ottelia ovalifolia*).

Summary

Overall ranking

Low: This artificially dammed pond has little current ecological value.

Threats

Utricularia gibba is abundant, the only known site on the Karikari Peninsula.

Management recommendations

No monitoring.

4.4 Lake Manuwai (Central Northland), NRC Lake No. 146

Summary from 2001 survey

Overall ranking

Low: This artificially dammed reservoir has limited ecological value.

Threats

Probably low impact of invasive species due to steep topography.

Management recommendations

No monitoring.

Description

This reservoir (1678437E 6107774N) is formed from a dam on the Waipapa River. The lake is 133 ha in size and over 10 m deep. Surrounding catchment is mostly pasture and forest. The reservoir is open to the public where boat access is easy with a concrete ramp provided.

Wetland vegetation

Emergent vegetation is sparse due to the steep topography and exposed nature of the lake. *Eleocharis sphacelata* and *Typha orientalis* were present growing to 1.8 and 1.4 m respectively.

Submerged vegetation

A turf community was also present in the shallows (to 1.5 m deep) consisting of *Glossostigma submersum*, *Myriophyllum propinquum* and the regionally significant *Gratiola sexdentata*. Below this vegetation consisted of a charophyte meadow (predominantly *Nitella* aff. *cristata*) extending from 1 to 4 m deep with scattered plants to 6.1 m. *Potamogeton ochreatus* emerged from this vegetation (up to 1.5 m tall) at low density.

LakeSPI

LakeSPI score is not generated from previous survey data.

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.

Fish

Gambusia affinis were seen.

Aquatic invertebrates

Dragonfly (*Odonata*) larvae were recorded.

Changes in indicators

Water quality of this lake has been sampled twice a year since 1991. Previous Secchi data (1.0-2.2 m) suggest low water clarity. There is no evidence of a change in water quality. Current nutrient and chl a levels are within the range previously recorded (TN <50-800 mg N m^{-3}, TP <4-574 mg P m^{-3}, chl a <3-<10 mg m^{-3}).

Threats

Egeria densa was sampled in neighbouring streams and dams but should this or other weeds establish the probable impact would be low due to steep topography.

Management recommendations

No monitoring.

4.5 Lake Omapere (Central Northland), NRC Lake No. 173; surveyed in 2005

Plate: Lake Omapere showing the mostly pastoral catchment.

Summary based on previous surveys

Overall ranking

Low: This lake is devegetated with poor water quality, but margins support an endangered mudfish.

Threats

Low due to currently degraded state.

Management recommendations

No additional monitoring.

Description

Lake Omapere (1671879E 6088198N) is the largest lake in Northland being 1197 ha in area but only 2.6 m deep (as low as 1.5 m during summer). It was formed by a volcanic flow damming the outlet. 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 Lake Omapere to the

Hokianga Harbour. Access is through private property, boats can be launched with a 4-WD.

Wetland vegetation

The western shore of Lake Omapere supported emergent vegetation consisting of dense bands (>75% cover) of *Baumea 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 gregiflorus* common near the waters edge.

Submerged vegetation

The submerged vegetation of Lake Omapere collapsed in 2001 and the lake has remained in a devegetated state dominated by cyanobacterial blooms since that time.

LakeSPI

LakeSPI score is not generated from previous survey data.

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 appear to fluctuate with submerged plant biomass. Prior to the collapse of weed beds in 1985 an estimated 8000 swans utilised Lake Omapere. This dropped to 1000 the following year, which increased to 3000 in 1995 and 8000 in 2001. This number has again dropped since the second weed collapse.

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 Lake Omapere. Two carp species deliberately 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, but never seen during the many NIWA/NRC surveys over the past decade. Large populations of nationally significant Northland mudfish (*Neochanna helios*) has been recorded from 5 sites on the wetland margins of Lake Omapere in 2000.

Aquatic invertebrates

Freshwater mussels (*Hyridella menziesi*), koura (*Paranephrops planifrons*), *Potamopyrgus antipodarum*, *Austropeplea tomentosa*, *Hygraula nitens*, dragonfly (Odonata) larvae, planarians, freshwater sponges, bryozoans and chironomids have been recorded. Freshwater mussels underwent a major decline during 2001/02 and are now rare within the lake.

Changes in indicators

The exotic invasive *Egeria densa* completely covered the lake during 1984. However, these surface-reaching stands of *E. densa* collapsed in 1985 and the lake remained de-vegetated until 1994. From that time *E. densa* re-colonised the lake until 2000 when it reached maximum biomass, with surface-reaching beds covering the lake. From 2001 onwards these beds collapsed and the lake has remained de-vegetated from 2002 until present.

The genetically distinct *Isoetes kirkii* var. *flabellata* was last collected from this lake in 1998 and may be extinct outside of cultivated plants held by NIWA.

Utricularia gibba was noted in the eastern basin of the lake during 2000, but has not been seen since.

Threats

Egeria densa could re-establish and the cycle of vegetation collapse is likely to continue if unmanaged. The introduction of grass carp will hopefully prevent this.

The lake is extremely nutrient enriched.

Management recommendations

Currently monitored by NRC, with plans to enhance condition and restore Lake Omapere.

4.6 Lake Owhareiti (Central Northland), NRC Lake No. 177; surveyed in 2006

Plate: Lake Owhareiti margin showing pasture margins and emergent beds of *Eleocharis sphacelata*.

Summary based on 2006 survey

Overall ranking

Low: This large lake was severely impacted by the pest plant *Egeria densa* and water quality is poor, but provides valuable habitat for endangered water birds.

Threats

Highly impacted by pest plants and nutrient enrichment.

Management recommendations

No monitoring.

Description

This lake (1685502E 6083555N) is 95.9 ha in area, with a maximum depth of 16 m. It was formed by a volcanic flow damming the outlet. Surrounding catchment is mostly pasture. The lake has one inflow (to the south east) but no outflows. Access is through

well-formed private roads and with gate access to adjacent farmland. Boat access requires a 4-WD.

Wetland vegetation

There was a fringe of emergent vegetation around much of the lake, 5-10 m across to 2.5 m deep. It was dominated by *Eleocharis sphacelata* with lesser amounts of *Baumea articulata*. There is cattle access to much of the lake.

Submerged vegetation

The submerged vegetation was dominated by tall beds of the exotic *Egeria densa* growing from the emergent vegetation zone to 4 m, with scattered plants to 5 m deep.

LakeSPI

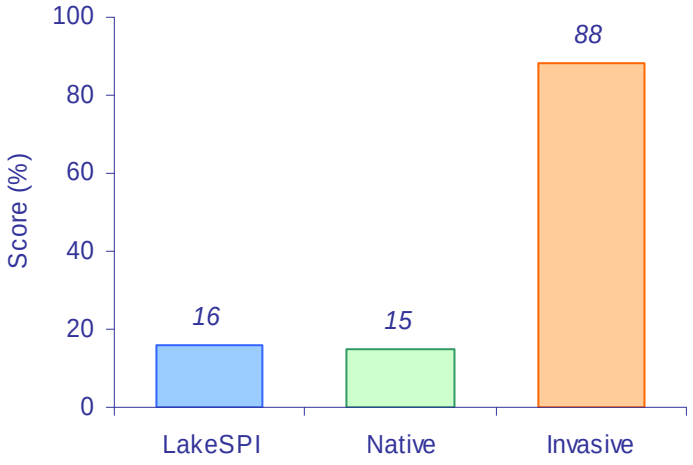

Figure: LakeSPI condition as % of potential score, native index, and invasive index (from left to right).

The low LakeSPI Index (16% of potential) was driven by the very high Invasive Impact Index (88%) with *E. densa* dominating the vegetation and displacing native values.

Water birds

The large areas of emergent and wetland vegetation provide good habitat for many aquatic birds. A recent OSNZ survey reported over 1000 birds seen including the following regionally rare species: fernbird (*Bowdleria punctata vealeae*), dabchick (*Poliocephalus rufopectus*), Australasian little grebe (*Tachybaptus novaehollandiae*)

and scaup (*Aythya novaezeelandiae*), with 6 nationally endangered bittern (*Botaurus poiciloptilus*) seen in 1990.

Fish

Common bullies (*Gobiomorphus cotidianus*) were seen in the lake.

Aquatic invertebrates

Few aquatic invertebrates were noted.

Changes in indicators

This aquatic vegetation of this lake was very similar to 1984/85 surveys.

Threats

Egeria densa had a major impact on other submerged vegetation, displacing other species from much of the depth range, but hornwort could displace the egeria and lead to vegetation decline.

There was livestock access to the lake, contributing to the poor water quality measured.

Management recommendations

No monitoring is recommended.

4.7 Lake Ora (Whangarei / Kamo), NRC Lake No. 205; surveyed in 2006

Plate: A lake with few submerged and emergent plants.

Summary

Overall ranking

Low: Very low water clarity prevents submerged vegetation establishing and there was little marginal vegetation.

Threats

Management recommendations

No monitoring. Consider marginal planting and lake restoration.

Description

This lake (2626940E 6619823.8N) is a small 2.19 ha lake in a volcanic crater. Surrounding catchment is pasture. Access is by road to within 50 m then across pasture. Boat access requires a 4-WD.

Wetland vegetation

There were a few patches of *Eleocharis sphacelata.*

Submerged vegetation

There was no submerged vegetation, just the odd amphibious *Myriophyllum propinquum* and *Potamogeton cheesemanii*. The lake was not dived as the water clarity was less than 0.1 m due to a heavy algal bloom.

LakeSPI

Not applicable.

Water birds

Not recorded.

Fish

No records.

Aquatic invertebrates

No records.

Changes in indicators

Not known.

4.8 Lake Rotokawau East (Karikari), NRC Lake No. 96; surveyed in 2005

Plate: Margin of Lake Rotokawau East showing floating mats of the pest plant alligator weed (*Alternanthera philoxeroides*) with clumps of wire rush (*Empodisma minus*) (left), pampas (*Cortederia selloana*) (mid-right) and flax (*Phormium tenax*) (right) in the marginal vegetation behind this. Note the humic-stained water.

Summary

Overall ranking

Moderate: This large shallow lake was severely impacted by the pest plant *Alternanthera philoxeroides* and water quality is poor, but provides valuable habitat for endangered water birds and fish. The adjacent wetland may contain endangered plants.

Threats

Highly impacted by pest plants and nutrient enrichment.

Management recommendations

No monitoring.

Description

This lake (1629202E 6141108N) is shallow (< 1m) with a hard iron pan base overlaid by sand. It is the smaller of the two lakes near Rangiputa, being 21.3 ha in area. The surrounding catchment is kanuka/manuka scrub, with a large wetland to the north (not investigated). The lake has no inflows or outflows. Access is through a well-formed track off Puheke Road. Too shallow for boat access.

Wetland vegetation

There was a narrow fringe of emergent vegetation around much of the lake, mostly < 5 m across. Large floating rafts of the exotic alligator weed (*Alternanthera philoxeroides*) were noted around the access point. These were interspersed with clumps of *Eleocharis acuta, Baumea juncea, Schoenoplectus tabernaemontani, Typha orientalis, E. sphacelata* and *Phormium tenax.* Immediately adjacent to this was bog/heath vegetation dominated by the regionally significant *Empodisma minus, Gleichenia dicarpa, Schoenus brevifolius* and the scrub weeds, gorse and pampas. The endangered ferns and fern ally, *Todea barbara, Cyclosorus interuptus* and *Lycopodiella serpentina* were reported from this marginal area.

Submerged vegetation

Submerged vegetation was lacking apart from small patches of *Glossostigma elatinoides* growing on sheltered parts of iron pan in water 1 cm deep. A combination of hard bottom, humic-staining and exposed shallow water would preclude vegetation development.

LakeSPI

Reconnaissance only – no LakeSPI score generated.

Water birds

The large areas of wetland adjacent to the lake provides good habitat for many aquatic birds. Black swans (*Cygnus atratus*) were seen on the field visit, with previous records of the nationally threatened Caspian tern (*Sterna caspia*) and bittern (*Botaurus poiciloptilus*) and regionally threatened marsh crake (*Porzana pusilla*), spotless crake (*Porzana tabuensis plumbea*), fernbird (*Bowdleria punctata vealeae*), Australasian little grebe (*Tachybaptus novaehollandiae*) and scaup (*Aythya novaezeelandiae*).

Fish

Common bullies (*Gobiomorphus cotidianus*), inanga (*Galaxias maculatus*), shortfin eels (*Anguilla australis*) and the pest fish *Gambusia affinis* were recorded on the

NIWA FBIS database for this lake. DoC SSBI reported the nationally threatened black mudfish (*Neochanna diversus*) from this lake in 1993.

Aquatic invertebrates

No aquatic invertebrates were noted but DoC SSBI reported the freshwater shrimp *Paratya curvirostris*.

Changes in indicators

No previous survey.

Threats

Conditions would not favour the establishment of other pest plants. Alligator weed is well established and beyond control.

The lake is highly nutrient enriched.

Management recommendations

No monitoring is recommended.

4.9 Lake Rotokawau West (Karikari), NRC Lake No. 95; surveyed in 2005

Plate: Lake Rotokawau West from the north-east. Note the beach ridge with scrub vegetation (right) and wetland area separating the two Rotokawau lakes.

Summary

Overall ranking

Moderate: The margins of this large lake were severely impacted by the pest plant *Alternanthera philoxeroides* and water quality is poor, but provides valuable habitat for endangered water birds and fish. The adjacent wetland may contain endangered plants.

Threats

Highly impacted by pest plants and nutrient enrichment.

Management recommendations

No monitoring.

Description

This lake (1628266E 6141280N) is 12 m deep with a hard iron pan base overlaid by sand. It is the larger of the two lakes near Rangiputa being 63.3 ha in area. The surrounding catchment is kanuka/manuka scrub and pasture, with pohutukawa forest on the beach ridge to the north of the lake. The lake has no inflows or outflows. Access is through a 1 km track off Puheke Road, then bush crash through forest to the lake edge. There may be easier access at the western end. No boat access at eastern end.

Wetland vegetation

There was a narrow fringe of emergent vegetation around much of the lake, mostly < 5 m across. Large floating rafts of the exotic alligator weed (*Alternanthera philoxeroides*) were noted. These were interspersed with clumps of *Eleocharis sphacelata, Baumea juncea, B. arthrophylla* and *Phormium tenax. Sphagnum* sp. formed a wetland area on the landward side of the emergent zone.

Submerged vegetation

Submerged vegetation was lacking. A combination of hard bottom, algal bloom and exposed lake would preclude vegetation development.

LakeSPI

Reconnaissance only – no LakeSPI score generated.

Water birds

The large areas of wetland adjacent to the lake provides good habitat for many aquatic birds. No birds were seen on the field visit, with previous records of the nationally threatened Caspian tern (*Sterna caspia*) and bittern (*Botaurus poiciloptilus*) and regionally threatened marsh crake (*Porzana pusilla*), spotless crake (*Porzana tabuensis plumbea*), fernbird (*Bowdleria punctata vealeae*), Australasian little grebe (*Tachybaptus novaehollandiae*) and scaup (*Aythya novaezeelandiae*).

Fish

Common bullies (*Gobiomorphus cotidianus*), inanga (*Galaxias maculatus*), shortfin eels (*Anguilla australis*) and the pest fish *Gambusia affinis* were recorded on the NIWA FBIS database for this lake. DoC SSBI reported the nationally threatened black mudfish (*Neochanna diversus*) from this lake in 1993.

Aquatic invertebrates

No aquatic invertebrates were noted but DoC SSBI reported the freshwater shrimp *Paratya curvirostris*.

Threats

Conditions would not favour the establishment of other pest plants. Alligator weed is well established and beyond control.

The lake is highly nutrient enriched.

Management recommendations

No monitoring is recommended.

4.10 Lake Rotopokaka or Coca Cola (Karikari), NRC Lake No. 104; surveyed in 2005

Plate: Lake Rotopokaka. Note *Typha orientalis* dominated emergent vegetation with manuka scrub in the background.

Summary

Overall ranking

Moderate: Water quality is poor, but lake provides valuable habitat for endangered water birds and fish. The adjacent wetland may contain endangered plants.

Threats

Highly impacted by nutrient enrichment.

Management recommendations

No monitoring.

Description

This lake (1634813E 6132432N) is 11 ha in area, c. 3.5 m depth. The surrounding catchment is manuka scrub, with pohutukawa, cabbage tree and flax along the eastern margin. The lake has no inflows or outflows. Access is off Ramp Road, with well-formed tracks to the western and northern shore. Boat access difficult.

Wetland vegetation

There were large areas of emergent vegetation around much of the lake, mostly up to 20 m across. Dominant species were *Typha orientalis, Eleocharis sphacelata, Baumea juncea, Schoenoplectus tabernaemontani, Apodasmia similis* and *Phormium tenax.*

LakeSPI

Reconnaissance only – no LakeSPI score generated.

Submerged vegetation

Submerged vegetation was lacking, apart from low covers of *Glossostigma elatinoides, Myriophyllum propinquum* and *Potamogeton cheesemanii* in areas shallower than 0.5 m. There was a dense algal bloom when this lake was visited.

Water birds

The large areas of wetland adjacent to the lake provides good habitat for many aquatic birds. No birds were seen on the field visit, with previous records of the nationally threatened bittern (*Botaurus poiciloptilus*) and regionally threatened spotless crake (*Porzana tabuensis plumbea*) and fernbird (*Bowdleria punctata vealeae*).

Fish

Common bullies (*Gobiomorphus cotidianus*), inanga (*Galaxias maculatus*), longfin eels (*Anguilla dieffenbachii*) and the nationally threatened black mudfish (*Neochanna diversus*) were recorded from this lake in 1993 (DoC SSBI).

Aquatic invertebrates

No aquatic invertebrates were noted.

Changes in indicators

No previous flora and fauna surveys.

Threats

No pest species evident, but possible risk of transfer if the area is fished for eels. Water appeared to be nutrient enriched.

Management recommendations

No monitoring is recommended.

4.11 Lake Sands Lake at Mangawhai, (central and east Northland), NRC Lake No. 309A; first surveyed in 2008

Plate: Lake Sands is a dune lake now within an area for which residential development is planned.

Summary

Overall ranking:

Moderate: A small lake with mostly native aquatic species.

Threats

Water quality could change markedly with residential development if used for residential storm water. Invasive species could be introduced by future residents.

Management recommendations

If the natural character of the lake is to be retained, careful consideration needs to be given to maintaining water quality and native biota.

Description

This dune lake (1742260E, 6004678N NZTM) is about 1 ha in area with a maximum depth of 1.6 m (in April 2008 during low water levels). The catchment was mostly pasture, but with plans for residential development. There are no inflow or outflow streams or boat launching points.

Wetland vegetation

The lake is surrounded by emergent vegetation mostly 10 m wide, extending from the shoreline to a maximum of 1.4 m depth. The dominant species were *Eleocharis sphacelata* and *Baumea articulata*.

Submerged vegetation

The whole lake was vegetated. No turfs were present because of the dense encircling reed beds. *Chara fibrosa* was the dominant submerged plant with surface-reaching *Potamogeton cheesemanii* common. The invasive *Utricularia gibba* was common sprawling through emergent and over submerged species throughout the lake.

Water birds

Fernbirds (*Bowdleria punctata vealeae*) were heard and mallard ducks (*Anas platyrhynchos*) were seen.

Fish

Not recorded.

Aquatic invertebrates

Sigara arguta and a diving beetle were common in the lake.

Changes in indicators

This was the first time this lake has been surveyed.

Threats

Plate: 1995/96 aerial photograph showing the position of the Sands Lake, Mangawhai.

There is some debate about the natural status of this lake. A 1995/96 aerial photograph (Map Toaster 2008) shows no open water and the area surrounded by a pine plantation. Since the removal of pines it may have become wetter and possibly earth works could have deepened parts of the area. There are few dune water bodies of this type between Whangarei and the Auckland Region border so it does have some significance. Residential development has the potential to threaten the current status of Sands Lake.

Management recommendations

It is currently a shallow coastal dune waterbody with strong native floristic elements offering good bird habitat. If these values are to be retained or enhanced consideration needs to be given to catchment development activities.

4.12 Smith's Dam Hikurangi (central and east Northland) NRC Lake No. 199B; visited in 2008

Plate: Smiths Dam, Hikurangi.

Summary

Overall ranking

Low: No submerged vegetation, poor water clarity.

Threats

Low risk of introduction.

Management recommendations

No further monitoring.

Description

Smith's Dam, Hikurangi (1709540E, 6066276N) was a turbid waterbody managed as an irrigation dam. Catchment was mostly pasture with some scrub/forest. Access was by private road.

Wetland vegetation

No wetland vegetation

Submerged vegetation

Very poor water clarity prevented visual assessment, and insufficient light would prevent plant growth if sustained for several months. No submerged plants were found by dragging the bottom with a grapnel.

Water birds

None seen.

Fish

None seen.

Aquatic invertebrates

None seen.

Changes in indicators

This was the first time this lake has been surveyed.

Threats

The dam was of very low ecological value and is unlikely to deteriorate further.

Management recommendations

No further monitoring.

4.13 Stanners Road Dam, Kerikeri (central and east Northland) NRC Lake No. 148A; visited in 2008

Plate: Stanners Road Dam.

Summary

Overall ranking

Low: Irrigation dam with reasonable water clarity, highly impacted by *Egeria densa*.

Threats

Egeria possibly introduced by eel fisherman or flooding. Potential for other weeds to be introduced.

Management recommendations

No monitoring recommended.

Description

Stanners Road Dam, Kerikeri (1683149E, 6107066N) is a dammed irrigation lake (16 ha) on the Kapiro Stream. The catchment is mostly pasture and arable land. Access is through private property with several properties adjacent to the dam.

Wetland vegetation

Eleocharis sphacelata was common, but much of the lake lacked emergent vegetation.

Submerged vegetation

Egeria densa about 2 m tall growing to 3.5 m water depth formed nuisance beds. *Utricularia gibba* was common to 2 m deep and charophyte meadows of *Nitella* aff. *cristata* extended to 3 m.

Water birds

None seen.

Fish

Gambusia were abundant and locals had seen an eel fisherman operating on the lake.

Aquatic invertebrates

None seen.

Changes in indicators

This was the first time this lake has been surveyed.

Threats

Further invasions such as hornwort could have a greater impact than egeria. The land owners were keen to manage egeria, with the aquatic herbicide diquat.

Management recommendations

No monitoring recommended.

4.14 Tapui Rd Quarry Lake (central and east Northland) NRC Lake No. 199C; visited in 2008

Plate: The Taupiri Rd quarry lake with minimal marginal vegetation and no inflow or outflow.

Summary

Overall ranking

Low: Poor submerged vegetation, habitat unsuitable.

Threats

Low risk of introduction.

Management recommendations

No further monitoring.

Description

Tapui Rd Quarry Lake (1709510E, 6072069N) was a flooded road metal quarry. It was therefore very steep sided. Access was via private land.

Wetland vegetation

None, the margin was steep sided with terrestrial weeds such as pampas (*Cortaderia selloana*) present.

Submerged vegetation

The lake had mostly steep rock walls with little silt. Low covers of *Nitella pseudoflabellata*, *Nitella* aff. *cristata* and *Potamogeton ochreatus* were sporadically present to a maximum depth of 2 m.

Water birds

No birds were present at the time.

Fish

Gambusia affinis was present.

Aquatic invertebrates

None seen.

Changes in indicators

This was the first time this lake has been surveyed.

Threats

The quarry lake was of limited ecological value and is unlikely to deteriorate further.

Management recommendations

No further monitoring.

4.15 Lake Waingaro (Central Northland), NRC Lake No. 167; surveyed in 2005

Plate: Lake Waingaro showing the dam edge and planted pines.

Summary from 2001 survey

Overall ranking

Low: This artificially dammed reservoir has limited ecological value.

Threats

Probably low impact of invasive species due to steep topography.

Management recommendations

No monitoring.

Description

This reservoir (1679774E, 6097659N) is formed from a dam on the Waiwhakangarongaro Stream. The lake is 22 ha in size and over 10 m deep. Surrounding catchment is mostly pasture and forest. The reservoir is closed to the public with no boat access.

Wetland vegetation

Emergent vegetation is absent due to the steep topography and exposed nature of the lake.

Submerged vegetation

An open charophyte meadow (predominantly *Nitella pseudoflabellata* and *N.* aff. *cristata*) extended from 0.5 to 6.4 m deep with scattered plants of *Potamogeton ochreatus* emerged from this vegetation (up to 1m tall) at low density extending to 6.7 m.

LakeSPI

LakeSPI score is not generated from previous survey data.

Water birds

The restricted emergent vegetation would provide limited water bird habitat, but the lake is fairly isolated. Only common species were recorded in the recent survey.

Fish

No fish were seen. The coarse fish tench (*Tinca tinca*) was recorded on the NIWA FBIS database.

Aquatic invertebrates

No invertebrates were recorded.

Threats

Lake Waingaro is very unlikely to have any weed introductions under current management conditions because there is no public access. *Egeria densa* was sampled in neighbouring streams and dams but should this or other weeds establish the probable impact would be low due to steep topography.

Management recommendations

No monitoring.

4.16 Lake Waiporohita (Karikari), NRC Lake No. 99; surveyed in 2005, surveillance 2010

Plate: Lake Waiporohita showing emergent communities on the east side of the lake accessible from the road.

Summary

Overall ranking

Outstanding: Although water quality is variable and often poor, and the pest plant *Alternanthera philoxeroides* was found, this lake contains nationally endangered plants and birds with an indigenous submerged vegetation. The first New Zealand records for three vagrant Australian plants have been made here.

Threats

Significant potential for pest plant impacts. Already nutrient enriched with frequent algal blooms.

Management recommendations

Annual pest plant surveillance monitoring. Lake native biodiversity value monitoring every 5 years.

Description

This lake (1631763E 6137937N) is 5.6 ha in area and ~ 3 m deep. The surrounding catchment is pasture (fenced off) with some areas of manuka scrub with pohutukawa. The lake has no inflows or outflows. Access is off Inland Road with a firm (iron pan overlaid by sand) lake shore.

Wetland vegetation

There were large areas of emergent vegetation around the northern end of the lake, mostly up to 20 m across, with bare iron pan in the remaining areas. Dominant species were *Typha orientalis* with an outer fringe of *Eleocharis sphacelata,* with other areas of *Schoenoplectus tabernaemontani, E. acuta* and *Apodasmia similis.* The first record of *Gratiola pedunculata*, probably a natural introduction from Australia (de Lange 1997), was made at this lake in 1996 and the species was relocated in exposed grass/herb land between tall emergent vegetation. Other species present were *Alternanthera denticulata* (also an Australian vagrant), *Paspalum distichum* and *Centella uniflora*. In 2007 *A. denticulata* had expanded its range over much of the lake margin growing on the lakeward side of some emergent vegetation. The hybrid introduced willow weed *Persicaria lapathifolia* x *P. persicaria*, previously only collected from the Waikato was recorded in 2007. The nationally endangered grass *Amphibromus fluitans* was collected in 1998 but not seen since.

Species colonising the hard iron pan area included annual weeds, *Chenopodium pumilio* and *Conyza parva*, but also indigenous species such as *Alternanthera nahui*, and *Centipeda aotearana.*

A 2 m^2 patch of alligator weed (*Alternanthera philoxeroides*) was noted in 2005 at the north end where there was an access point. In 2010 this area had increased and it was also found amongst the marginal emergent vegetation at the north-east edge of the lake.

A species of rush *Juncus polyanthemus* not previously recorded from New Zealand, was recognised growing in the marginal vegetation of Lake Waiporohita in 2009. This plant looked like a robust form of *J. usitatus* and was previously overlooked. It is likely to be another Australian vagrant.

Submerged vegetation

Turf communities were conspicuous in many areas of the lake with *Glossostigma elatinoides, Lilaeopsis novae-zelandiae, Myriophyllum propinquum,* the exotic *Ludwigia palustris* and at one site *Gratiola pedunculata* extending from the shore to ~ 1 m deep. *Potamogeton ochreatus* and *Nitella* aff. *cristata* dominated deep vegetation

extending to 2.7 m. Casual observations of submerged vegetation in 2010 suggested no significant change.

LakeSPI

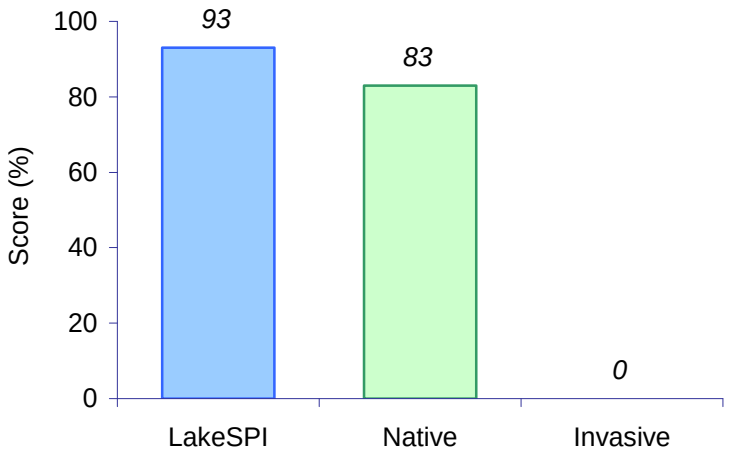

Figure: 2005 LakeSPI Index as % of potential score, Native Condition Index, and Invasive Impact Index (from left to right).

The high LakeSPI score of 93% reflects the extent of the native vegetation, with no influence of invasive exotic species.

Water birds

The large areas of wetland on the northern edge of the lake and removal of cattle browsing provides good habitat for many aquatic birds. Mallards (*Anas platyrhynchus*), black swans (*Cygnus atratus*), grey duck (*Anas superciliosa*) and the nationally threatened Caspian tern (*Sterna caspia*) were seen on the field visit. Also reported previously were the nationally threatened bittern (*Botaurus poiciloptilus*), the regionally threatened dabchick (*Poliocephalus rufopectus*) and the vagrant chestnut-breasted shelduck (*Tadorna tadornoides*) was seen on this lake in 1985.

Fish

Common bullies (*Gobiomorphus cotidianus*) and the pest fish *Gambusia affinis* were seen during the field visit.

Aquatic invertebrates

Backswimmers (*Sigara arguta*) were noted in abundance. Leeches (*Richardsonianus mauianus*) were also seen.

Changes in indicators

A vegetation survey in 1991 recorded similar species to the 2005 survey, however *Chara australis* was co-dominant with *Potamogeton ochreatus* in deeper vegetation, with no record of *Nitella* aff. *cristata*. *C. australis* was only present in areas shallower than 1 m in the current survey. The vegetation bottom limit of 3 m was similar to the 2005 survey.

Threats

The ease of access to this lake, particularly after the removal of the roadside fence on the eastern shore makes a relatively high likelihood of submerged weed transfer. These species would significantly impact the lake. Alligator weed is likely to spread and dominate marginal vegetation (possibly displacing rare plants). Alligator weed is currently restricted to the north east corner of the lake.

Water is nutrient enriched and algal blooms frequent.

Management recommendations

Annual pest plant surveillance monitoring.

Lake native biodiversity value monitoring every 5 years.

Attempt eradication of alligator weed.

4.17 Lake Waro (Hikurangi) Lake No. 410; surveyed in 2006

Plate A: Lake Waro is a recreational park and used for contact recreation, particularly swimming. It is not used for boating, but would be a prime site for further alien pest liberations.

Summary

Overall ranking

Moderate to High: Water quality is good with a complete vegetation cover, but the pest plant *Egeria densa* was found scattered throughout the lake and *Utricularia gibba* abundant to 3 m water depth.

Threats

High potential for further pest introductions.

Management recommendations

Lake native biodiversity value monitoring every 5 years.

Description

This lake (2627470E 6623010N) a little over 5 m deep. The surrounding catchment is reserve with a refuse dump, some pasture and residential. Access is by road but no power boating. It is used for contact recreation with distance swimming popular.

Wetland vegetation

There were two wetland areas at each end of the lake and a margin around the most the rest of the lake. The main species were *Typha orientatlis* and *Eleocharis sphacelata*. There was a small patch of the invasive giant reed *Arundo donax*.

Submerged vegetation

The whole lake floor was vegetated to its maximum depth of nearly 6 metres. There was a diverse native community with extensive charophyte meadows dominated by *Chara fibrosa* and *Nitella hookeri* var *cristata*. Tall growing natives, *Potamogeton cheesemanii* and *Myriophyllum propinquum* and some *Potamogeton ochreatus* were present. However there was also a blanket of the invasive *Utricularia gibba* to about 3 m water depth and scattered growths of the oxygen weed *Egeria densa* through the lake.

The plants were large-leaved and quite robust, probably reflecting the higher calcium content of the water in this limestone quarry.

Plate B: The plants were large-leaved and quite robust looking; *Potamogeton cheesemanii* left and *Myriophyllum propinquum* on the right.

LakeSPI

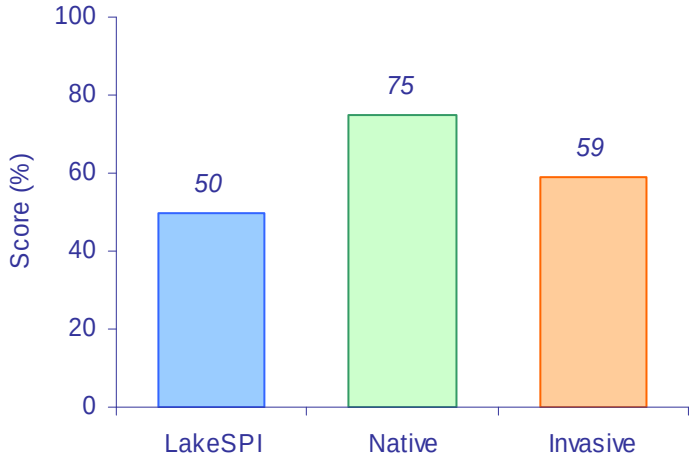

Figure: LakeSPI Index as % of potential score, Native Condition Index, and Invasive Impact Index (from left to right).

The high LakeSPI score of 50 % reflects the extent of influence by invasive exotic species *Utricularia gibba* and *Egeria densa*. A high native condition index still exists.

Water birds

Spotless crake, geese released ducks.

Fish

An eel was seen.

Aquatic invertebrates

Not seen.

Changes in indicators

No earlier survey.

Threats

The ease of access to this lake makes a relatively high likelihood of submerged weed transfer. These species would drastically impact the lake. Alligator weed is likely to spread and dominate marginal vegetation (possibly extirpating rare plants).

Water appeared to be nutrient enriched.

Management recommendations

Annual pest plant surveillance monitoring.

Lake native biodiversity value monitoring every 5 years.

Attempt eradication of alligator weed.

4.18 The Whau Dam (central and east Northland) NRC No. 206; first visit 2008

Plate: The Whau Dam (left) and looking away from the dam (right).

Summary

Overall ranking

Low: Steep sided artificial lake of low ecological value

Threats

None identified.

Management recommendations

No monitoring recommended.

Description

The Whau Dam (1716550E, 6047511N) was a steep sided dam constructed for domestic water supply. The area was accessed by public road with gated access to the car park. The catchment was native bush.

Wetland vegetation

No wetland margin

Submerged vegetation

Native species dominated with *Potamogeton ochreatus* the most abundant tall-growing species, with *Myriophyllum triphyllum* and *M. propinquum* and *P. cheesemanii* also present. A charophyte meadow of *Nitella* aff. *cristata* grew from 2 to 4.2 m deep.

Water birds

None seen.

Fish

None seen.

Aquatic invertebrates

None seen.

Changes in indicators

This was the first time this lake has been surveyed.

Threats

The dam was of very low ecological value and is unlikely to deteriorate further.

Management recommendations

No further monitoring.

Threats

As there was no boat access, the risk of invasive weed spread is limited and further more the rocky substrate and steep sides was not suited to extensive submerged weed beds.

Management recommendations

No monitoring recommended.