WAIORA NORTHLAND WATER

Poutō Catchment Management Plan

August 2017

Northland REGIONAL COUNCIL

Contents

Introduction

The purpose of this Poutō Catchment Management Plan is to identify solutions to dune lake water quality and water quantity issues/problems in the Poutō catchment.

The Poutō Catchment Management Plan has been developed by a collaborative stakeholder group supported by Northland Regional Council and made up of members representing a range of parties with an interest in freshwater in the catchment of the Poutō dune lakes.

This catchment plan sets out the issues identified by the group, their objectives for water quality and quantity in the Poutō catchment and includes a range of methods to achieve the outcomes sought.

A draft Poutō Catchment Plan was released for consultation with the wider public. A number of submissions were received on both the substance and format of the catchment plan. The Poutō Catchment Group is appreciative of the time taken by the public to make submissions. The submissions have been taken into consideration in revising the draft catchment plan.

It is a non-statutory document that records objectives, methods and actions for management of the Poutō dune lakes and their margins that have been agreed by the catchment group. The objectives, methods and actions are recommendations only unless included in statutory documents by local authorities or other agencies with regulatory powers.

More detail on the catchment group process is available online at: www.nrc.govt.nz/waiora.

Catchment overview

The Poutō catchment (Figure 1) is located approximately 50km south of Dargaville on the Poutō Peninsula, the northern head of the Kaipara Harbour. The boundary of the catchment was created by grouping together river and lake catchments of similar ecological characteristics using the Freshwater Ecosystems of New Zealand (FENZ) database.

There are about 50 dune lakes over one hectare in size on the Poutō Peninsula. The lakes have mainly formed in basins where newer mobile sand has dammed streams flowing on older, stabilised sand.

The majority of the lakes, especially those of higher ecological value, are found near the southern-most end of the peninsula. In general, the lakes have high cultural, ecological, environmental, recreational and intrinsic values but range in their current water quality and ecological condition.

Dune lakes are internationally rare but, in Northland, represent a large proportion of New Zealand's warm lowland lakes with reasonably good water quality (Champion and de Winton, 2012). They provide habitat for a range of endangered species and in general experience low levels of impacts from invasive plants and fish.

There are several small streams that flow into the dune lakes or flow directly to the

Tasman Sea or Kaipara Harbour. There is very little information for these streams. The groundwater is contained in an unconfined shallow sand aquifer and, likewise, there is very little information on groundwater resources for Poutō Peninsula.

The dominant land uses in the catchment are exotic forestry and pastoral farming, particularly dairy and beef farming. Good practice for dairy and sheep/beef and forestry on Poutō's unique soils and in dune lake catchments is, however, a knowledge gap.

Very few people live in the Poutō Lakes Catchment and there is very little pressure from subdivision, use and development. The greatest pressures on the lakes are the impacts of farming and forestry and the risk of invasive plants and animals being introduced to the lakes.

Te Uri o Hau have a very special connection with the Poutō Peninsula and wider environs. The peninsula is recognised as a major waahi tapū (sacred area) because many urupa (burial grounds) and taonga (treasures) rest beneath the whenua (land) in this region. Traditionally Te Uri o Hau also used the Poutō area extensively for gathering kai (food).

This relationship has been formally recognised in the settlement between Te Uri o Hau and the Crown and resulting statutory acknowledgements. A statutory acknowledgement is a formal acknowledgement by the Crown of the mana of tangata whenua in relation to a specified area. It recognises the particular cultural, spiritual, historical, and traditional association of an iwi or hapū with the site, which is identified as a statutory area.

Maps of the statutory areas for Poutō can be found in the document *Te Uri o Hau and Her Majesty the Queen in right of New Zealand: Deed of Settlement of the Historical Claims of Te Uri o Hau Historical Claims: Attachments*: https://www.govt.nz/dmsdocument/6259.pdf

For a more detailed description of the Poutō catchment please go to www.nrc.govt.nz/waiora.

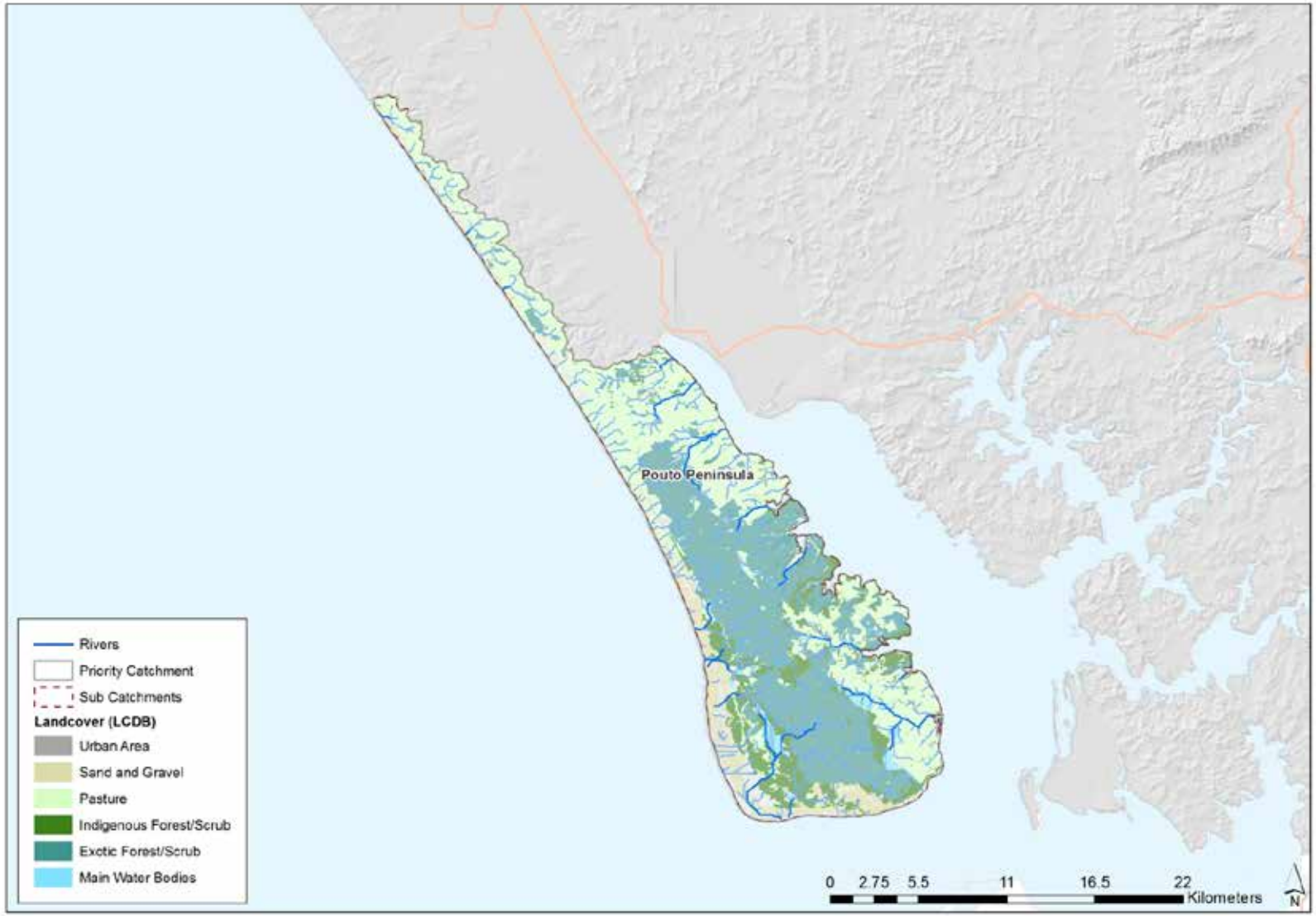


Figure 1: Poutō Catchment boundary and land cover.

Water quality

Water quality is influenced by a wide range of factors. Northland Regional Council monitors nine of the Poutō lakes every three months and measures 12 physical and chemical parameters at each site. Figure 2 shows the locations of the nine monitored lakes.

Nutrient levels are a key indicator of lake water quality with nitrogen and phosphorous being the two elements that drive algal growth in water. Algal growth in water is a particular concern in lakes as it affects ecological health (the quality of habitat for native plants and animals).

Table 1 shows the results for Total Nitrogen and Total Phosphorous for 2012 to 2014 and ranks the current state of these elements for each of the nine monitored lakes. These rankings are in accordance with those set out in Appendix 2 (National Objectives Framework) of the National Policy Statement for Freshwater Management.[1]

In addition to nitrogen and phosphorous, Chlorophyll-a concentration (Chl-a) is used as an indicator of ecological health and is a measure of the abundance of lake phytoplankton (algal biomass).

Table 2 presents the figures for Chlorophyll-a concentration in each of the monitored lakes for 2012-2014.

Phytoplankton abundance varies in response to both internal (in-lake) and external processes (nutrient supply from the catchment). These results are used for reporting current state, to monitor trends of lake ecological health and to calculate a Trophic Level Index (TLI) score for each of the monitored lakes.

The 10-year trends in trophic level are shown in Figure 3.

[1] – See http://www.mfe.govt.nz/fresh-water/national-policy-statement/about-nps

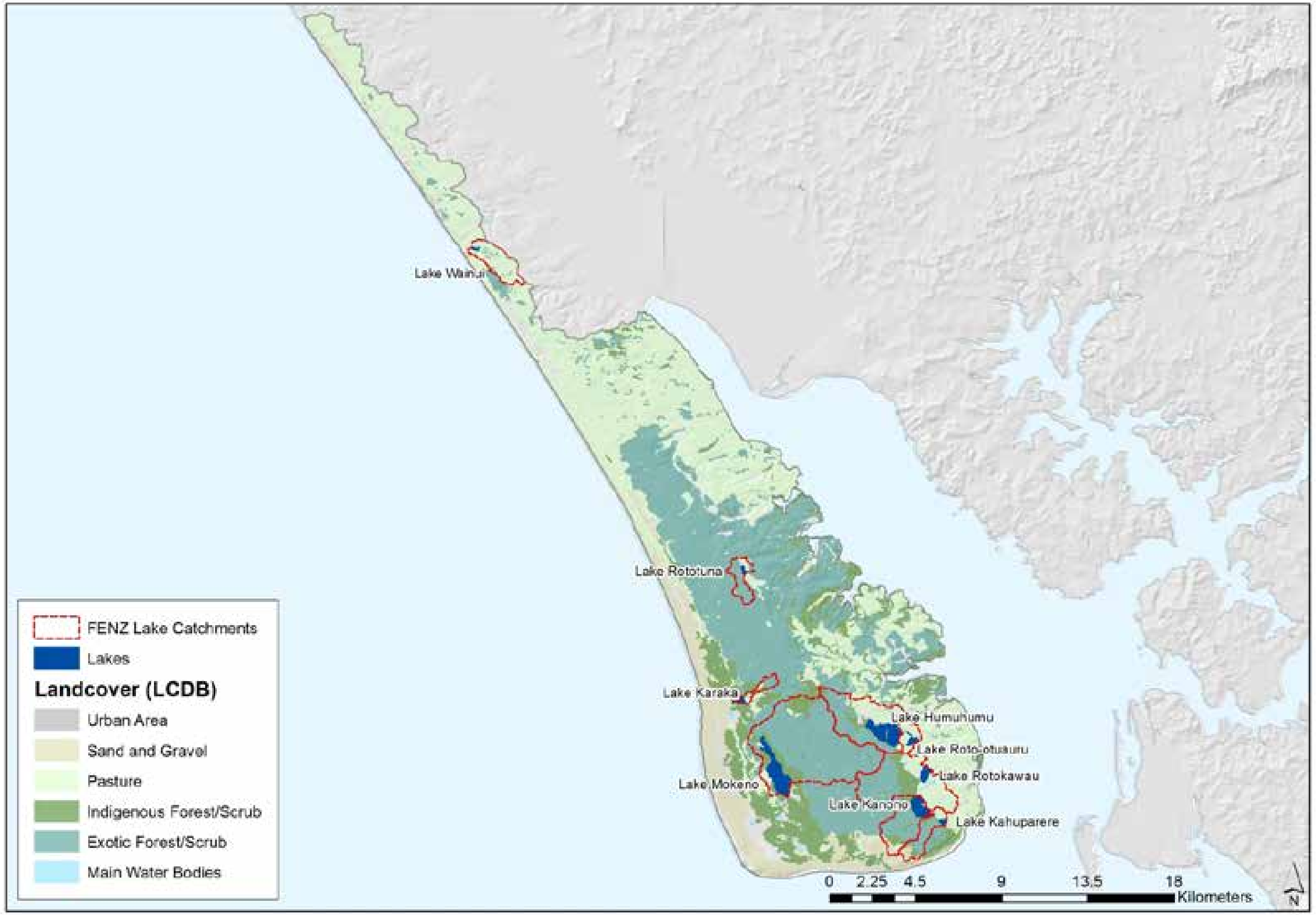


Figure 2: location of monitored lakes.

Table 1: total phosphorus and nitrogen results compared against national objectives framework (NOF) guidelines.

Lake name	2014 Total Nitrogen Annual median	2013 Total Nitrogen Annual median	2012 Total Nitrogen Annual median	2014 Total Phosphorus Annual median	2013 Total Phosphorus Annual median	2012 Total Phosphorus Annual median
Rotokawau	349.5	369	379	8.5	7.5	7.5
Wainui	327.5	424	371.5	13	15	14
Humuhumu	350.5	350	304.5	13.5	12.5	9
Kahuparere	391	358.5	331	15	12.5	11
Kanono	319	364	328.5	16.5	18.5	15
Karaka*	417	627.5	320.5	28	37.5	23.5
Rototuna*	784.5	774	953.5	31	32	40
Mokeno*	1099.5	1460	1310	46.5	39.5	72
Swan*	931.5	911.5	1250	47	57	67.5

Classed as a Polymictic lake from historical depth profile data (different numeric states for total nitrogen). Note, there is insufficient data to classify all the polymictic monitored lakes in Northland.

Key

Attribute state	Description
A	Similar to reference conditions (that is, a very natural state).
B	Slightly impacted.
C	Moderately impacted (lower/upper limit of national bottom line).
D	Degraded/unacceptable (exceeds “National bottom line” and must be managed to C or better).

Total nutrients, both phosphorus (TP) and nitrogen (TN), record the total fraction of dissolved and particulate, organic and inorganic nutrients in the water column and indicate the likelihood of algal blooms and associated risks to water quality degradation.

Table 2: Chlorophyll-a results compared against national objectives framework (NOF) guidelines.

Lake Name	2014		2013		2012	
	Chlorophyll-a		Chlorophyll-a		Chlorophyll-a	
	Annual median	Annual maximum	Annual median	Annual maximum	Annual median	Annual maximum
Rotokawau (Poutō)	1.9	9.0	2.0	3.8	1.9	3.7
Wainui	1.9	15.0	2.2	18.3	2.3	3.0
Humuhumu	8.1	11.9	7.5	10.5	2.8	6.4
Kahuparere	6.0	12.0	8.5	10.5	8.3	13.0
Kanono	8.2	3.1	6.9	2.7	7.1	4.1
Karaka	4.2	56.5	14.9	119.0	4.3	32.0
Rototuna	9.2	45.0	20.3	62.9	27.4	57.9
Mokeno	32.2	109.0	31.0	81.8	103.2	113.0
Swan	11.2	29.1	22.6	24.4	79.7	159.0

Chlorophyll-a concentration (Chl-a) is an ecological measure of the abundance of lake phytoplankton (algal biomass). Phytoplankton abundance varies in response to both internal (in-lake) and external processes (nutrient supply from the catchment). Chl-a is an attribute associated with ecosystem health

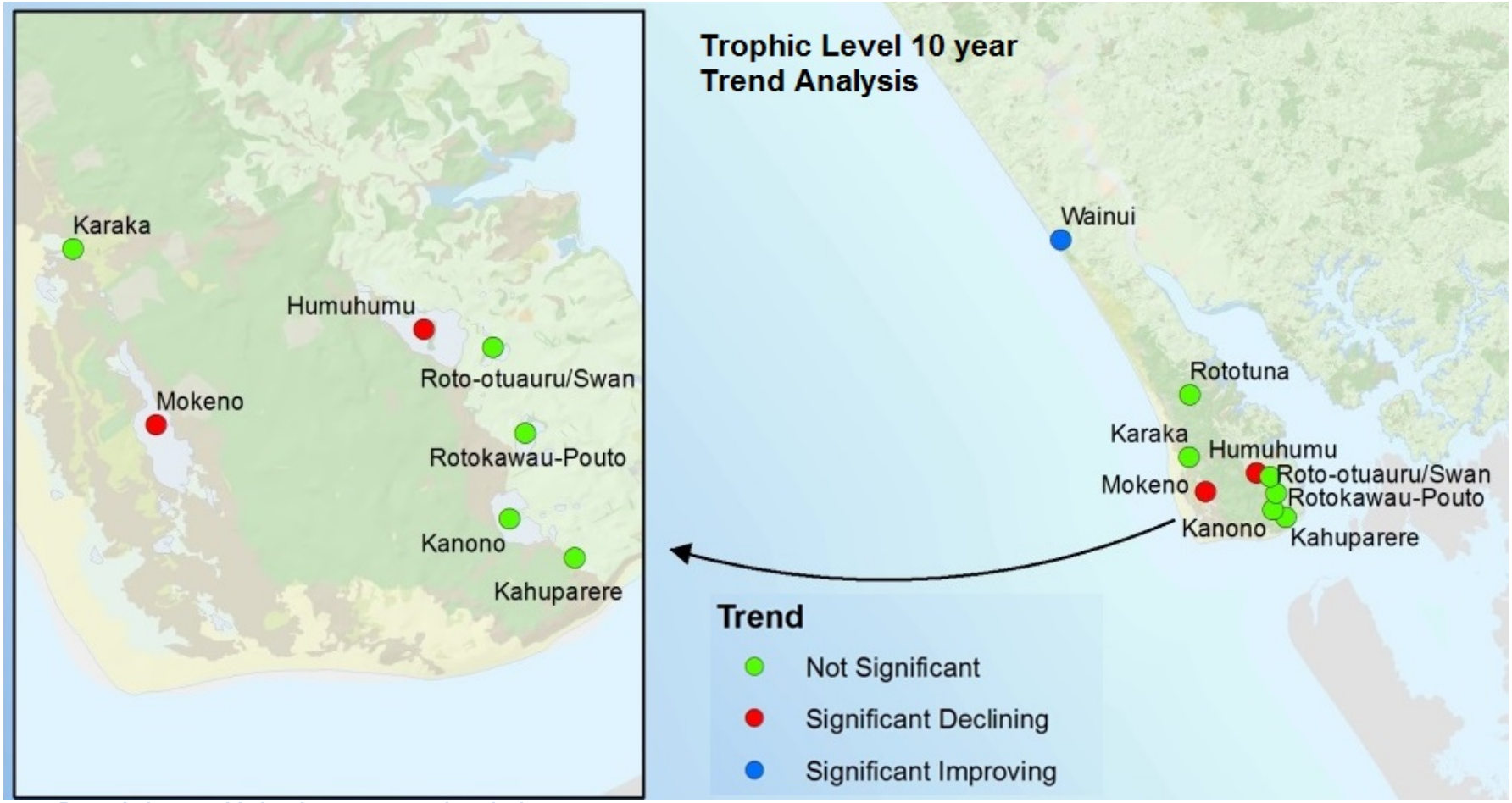


Figure 3: Poutō Lakes trophic levels 10-year trend analysis.

In addition to quarterly State of the Environment monitoring of the lakes in Table 2, Northland Regional Council carries out staggered annual ecological monitoring for approximately 90 dune lakes; on outstanding lakes (every 2 – 5 years) and on high values lakes (at least every 5 years).

For the purposes of managing freshwater quality in lakes in the Regional Plan, the Northland Regional Council has divided Northland lakes into two types towards the purpose of defining Lake Management Units.

These two lake types are “deep” (greater than or equal to 10 metres maximum depth) and “shallow” (less than 10 metres maximum depth). Shallow and deep lakes show different characteristics and react differently to environmental changes. There is also an additional layer of protection given to lakes designated as outstanding freshwater bodies in the regional plan, including Humuhumu, Kanono, Rotokawau and Mokeno, in the Poutō catchment.

Water quantity

Northland Regional Council has been monitoring lake levels on a monthly basis at seven of the Poutō dune lakes since 1995 and is currently looking to add a further three sites to this programme. Monitoring is carried out by manually reading staff gauges, however there is a programme underway to install an automated system that will give continuous monitoring. Lake level monitoring data is presented in Figure 4.

Water quantity can be a major factor influencing water quality and ecosystem health in a lake. As lake volume and depth decrease, the lake becomes more sensitive to environmental stressors and littoral margins[2] are impacted. Lake depth can be influenced by a number of factors including seasonal and annual variation in rainfall patterns, land use in the catchment and extraction of water.

[2] Littoral margins are the lake edge that support plants that filter nutrients and sediment and provide habitat for aquatic species

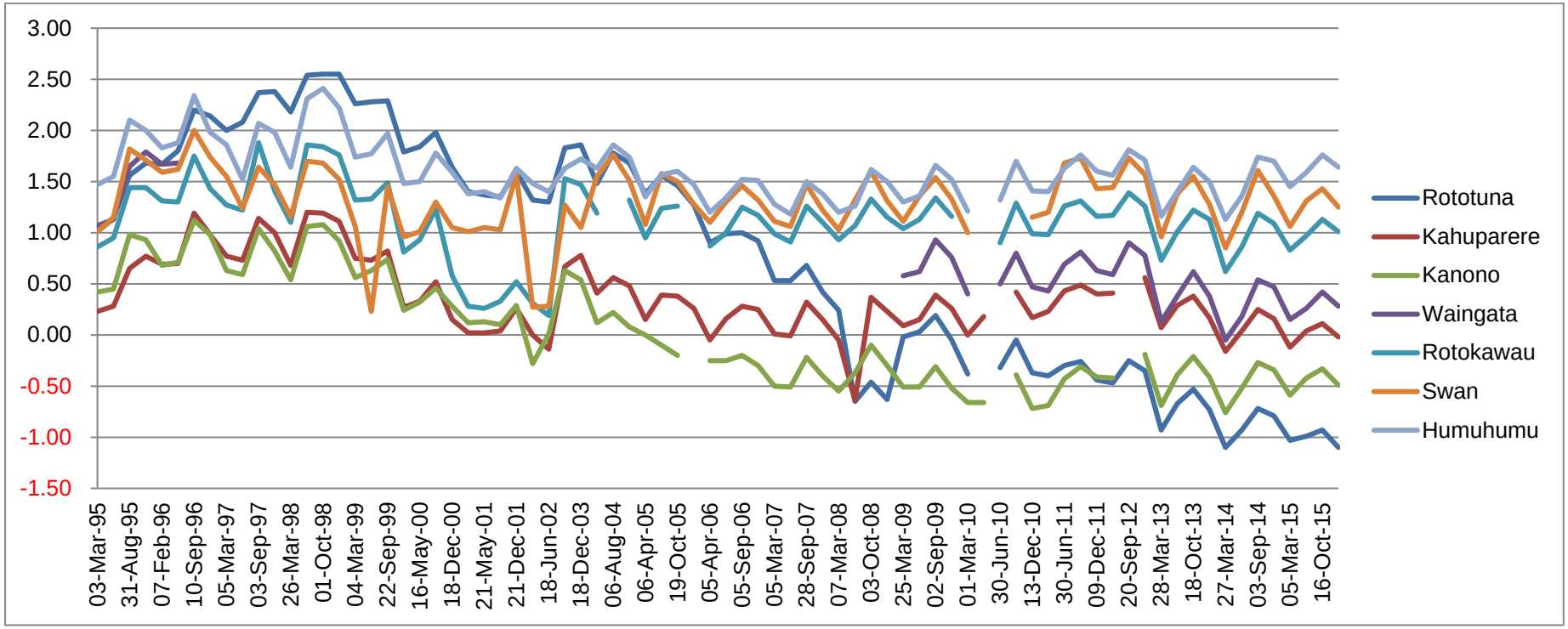


Figure 4: lake level data 1995-2015.

The results in Figure 4 show considerable inter-annual fluctuations in water levels in all of the lakes, but little change in the long-term trends of most lakes. The exceptions are lakes Rototuna and Kanono, which are the two lakes with the greatest percentage of their catchment in pine forest (80% and 55% respectively). Additionally, the level of Lake Rototuna may be impacted by the loss of water from Lower Rototuna.

Poutō lakes are under less pressure from extractive uses than other dune lakes in Northland. Current levels of extraction from the lakes and from groundwater bores within the lake catchments are low. Bores on the peninsula are primarily outside the lake catchments. There is currently only one consented take from a Poutō lake. Other existing takes include permitted activity takes for domestic and stock water and unauthorised takes for dairy shed use, though these small extractions are unlikely to be compromising lake values.

Catchment objectives (the outcomes sought)

Table 3 identifies uses and values identified by the catchment group and the issues that affect those uses and values. High level objectives have been identified and management variables (attributes) assigned. Specific objectives have then been identified to address those issues. This provides the link between what is valued, what impacts those values, what the catchment group wants to achieve and what needs to be managed to address the impacts.

Table 3 Draft catchment objectives

Uses and values	Issues that impact uses and values[3]	High level objectives	Management variable / attribute	Specific objectives
Ecosystem health · Native fish. · Rare plants. · Wetland habitats. · Native birdlife.	· Livestock access to lakes. · Nutrient enrichment from land use/discharges to land. · Exotic and pest species. · Lack of riparian vegetation. · Lake level reduction and impact on littoral zone.	**Protect the ecological values of outstanding lakes.** **Maintain the ecological values of other lakes.** Measure: change in NIWA ecological rankings; lake SPI[4]; lakes levels.	· Water levels in lakes and water extraction. · Riparian cover. · Nutrient inputs (nitrogen and phosphorous). · Pest species (distribution / populations).	· Identify and protect lakes with outstanding ecological values. · Ensure there is low risk to habitat values and lake littoral zones in outstanding lakes (Humuhumu, Rotokawau, Mokeno and Kanono, and including the un-named lake/wetland complex to the south-west of Lake Mokeno) due to water level fluctuations as a result of extraction of water and/or land use change. · Ensure no more than moderate risk to habitat values and lake littoral zones due to water level fluctuations as a result of extraction of water and/or land use change. · Protect lakes from the effects of land disturbance, stock access and

[3] Refer to Appendix 1 for more detail
[4] Lake SPI = Lake Submerged Plant Indicators

Uses and values	Issues that impact uses and values[3]	High level objectives	Management variable / attribute	Specific objectives
				discharges of effluent and fertilisers. · Enhance riparian vegetation on lakes Kanono, Rototuna, Kahuparere, Waingata, Wainui, Parawanui and Humuhumu. · Restrict the spread and minimise the impact of pest species on aquatic habitats in high and outstanding value lakes.
Recreation · Camping. · Jet boating/skiing. · Fishing. · Swimming. · Education. · Bird watching. · Waka ama. · Canoeing. · Duck shooting.	· Livestock access to lakes (E. coli). · Water clarity as a result of nutrients/ sediment. · Wildfowl.	**Maintain water quality for recreational activity.** **Maintain current levels of public access.** (Measure: cyano-bacteria; reports of illness.)	· E. coli concentrations. · Cyanobacteria. · Extent / type of public access. · Water clarity.	· Maintain current water quality for recreational use. · Maintain current level of public access to lakes and their margins. · Ensure recreational use does not impact on sensitive wetlands and lakes.
Cultural values · Cultural rituals (for example, christening). · Waahi tapū. · Sites of significance (for example, taonga/waka). · Mahinga kai.	· Livestock access to lakes (E. coli). · Exotic species (for example, pest fish and aquatic plants). · Lack of awareness/ damage to sites of significance. · Severe lake level	**Improve cultural 'health' and awareness.** Measure: incidents of damage/disturbance of cultural sites. Eel (tuna) populations / catch records.	· Lake levels. · E. coli. · Algae blooms and water clarity. · Riparian cover. · Native aquatic species.	· Improve public awareness and understanding of cultural values at sites of significance to tangata whenua within the Poutō catchment. · Enhance the sustainability of important mahinga kai species and their habitats. · Identify and protect sites of significance to Māori.

Uses and values	Issues that impact uses and values[3]	High level objectives	Management variable / attribute	Specific objectives
	fluctuations.			
Socio-economic · Firefighting. · Primary industry (irrigation, stock drinking, dairy shed). · Domestic supply. · Commercial fisheries. · Forestry. · Tourism.	· Access to freshwater (for primary industry and domestic use). · Loss of nutrients from land. · Reliability of water supplies.	**Enhance the productive capacity of land in the Poutō lakes catchment.** Measure: uptake of water quality improvement plans and good practice.	· Access to water and reliability of supply. · Nutrient / sediment loss.	· Ensure limits on water extraction from lakes provide capacity for economic growth and reasonable access to and reliability of supply of water. · Minimise the loss of nutrients through leaching/run-off from primary production.
Natural character · Aquatic habitat. · Natural ecosystem processes. · Low levels of modification by structures, noise and light. · Visual aesthetics. · Low pest plant and animal numbers.	· Nutrient enrichment (trophic state). · Modification by structures, lake bed disturbance, noise and light. · Stock access to lakes. · Presence of pest species in lakes (fish and plant).	**Improve the natural character of high and outstanding value lakes.** Measure: trophic state; Trophic Level Index; change/increase in pests.	· Riparian cover. · Nutrients (nitrogen and phosphorous). · Pest species (distribution). · New structures / bed disturbance. · Water extraction / lake levels.	· Restrict the spread and minimise the impact of pest species on aquatic habitats in high and outstanding value lakes. · Enhance riparian vegetation on lakes Kanono, Rototuna, Kahuparere, Waingata and Humuhumu.

Implementation

The following section outlines the implementation methods identified by the Poutō Catchment Group to achieve the objectives in Table 4. Table 4 includes both regulatory (rules) and non-regulatory (methods/actions) measures identified by the group. Once finalised, regulatory measures can be included in the new regional plan and apply specifically to the Poutō catchment in addition to the other region-wide rules in the regional plan. The non-regulatory measures will be achieved in an implementation plan.

Table 4 Implementation methods

Issues and current management approach	Poutō catchment plan methods
Livestock access to water bodies Stock access to lakes can damage littoral zones which provide valuable habitat for aquatic species and filter/uptake nutrients. Stock can also disturb the bed and generate sediment, all of which can increase the likelihood of aquatic blooms and reduce water clarity, which is important for native aquatic plant life. There are currently no operative regional rules that require stock to be excluded from lakes. Stock exclusion is encouraged on a voluntary basis through water quality improvement plans. Stock access is primarily an issue for pastoral users, but also pests capable of grazing and treading damage (e.g. feral cattle, goats, pigs and deer). Good progress has been made with stock exclusion to date – dairy farmers have excluded livestock from lakes as a result of application of industry good practice and supplier contracts. However, stock currently have access to parts of the following lakes: Kapoai, Parawanui, Rototuna, Karaka, Waingata, Kanono and the Spectacle Lakes.	**Regulatory** Not applicable – rely on regional plan stock exclusion rules. **Non-regulatory** · Continue to work with land owners on excluding stock from the remaining unfenced lakes. · Encourage stock exclusion for all classes of stock from all freshwater bodies (including streams/drains that discharge into lakes). · Encourage use of riparian buffers when fencing to exclude stock. · Prioritise outstanding lakes for stock exclusion.

Issues and current management approach	Poutō catchment plan methods
Riparian management Operative regional rules currently apply a riparian management zone, which varies with slope (the steeper the slope the greater the width up to 20m). Vegetation clearance and land disturbance are limited in riparian management zones.	**Regulatory** Refer to riparian set-back rule below recommended for plantation forestry adjacent to outstanding lakes. Rely on regional plan provisions for other lakes. **Non-regulatory** · Enhance natural character and ecological values of lakes Kahuparere, Humuhumu, Waingata, Kanono, Rototuna, Wainui and Parawanui by re-establishing riparian planting.
Nutrient enrichment There are currently no water quality limits applying to lakes in the operative regional Water and Soil Plan (for example, limits on the concentration of nitrogen or phosphorus). However, current regional rules provide a high level of protection from the effects of point source discharges. There are also no nutrient load/loss limits applied to land in lake surface water catchments (for example, limits on the amount of fertiliser applied per/ha/annum). To date, management of lake nutrient levels has relied on the voluntary uptake of water quality improvement plans by land owners. However, there is limited information on good practice for farming within dune lake catchments. Another notable knowledge gap is our understanding of nutrient transfer into lakes (leaching/diffuse run-off) from soils on the	**Regulatory** Not applicable – rely on regional plan provisions. **Non-regulatory** · Encourage voluntary uptake of water quality improvement plans and nutrient management plans. · Develop (with industry) good practice guidelines for land use (with a particular focus on agriculture and forestry) in dune lake catchments, with particular focus on Poutō soil characteristics.

Issues and current management approach	Poutō catchment plan methods
Poutō Peninsula. The degree to which groundwater influences lake nutrient enrichment is also largely unknown – this is only a factor in 'window' lakes that are connected to groundwater (as opposed to perched lakes which are only influenced by surface water run-off). The impact of wildfowl on nutrient enrichment of lakes and grazing of aquatic plants is also uncertain.	· Investigate groundwater nutrient concentrations and interaction with Poutō Lakes. · Identify and address surface water drains that discharge into lakes from pastoral land (fence drains and/or use sediment/nutrient traps). · Review the effectiveness of existing sediment traps – if merited identify potential additional sites for such interception measures for Poutō lakes. · Continue to monitor waterfowl numbers and assess impacts on lake condition (including impact of grazing of native plants). · Undertake monitoring in Lakes Kapoai and Parawanui to provide a snapshot / baseline of water quality.
Identification/protection of outstanding waterbodies The National Policy Statement for Freshwater Management requires the protection of 'outstanding' freshwater bodies in regional plans (based on ecological, cultural, recreational or landscape values). Catchment boundaries for the lakes identified as outstanding freshwater bodies are determined using FENZ [5] lake catchments (refer Appendix 2 for catchment boundaries and current catchment land use).	**Regulatory** Identify the lake/wetland complex at the dune field edge south-west of Lake Mokeno as an outstanding water body (Refer to map in Appendix 3). New plantation forestry: Afforestation that exceeds 5ha per property in the surface water

[5] FENZ = Freshwater Ecosystems of New Zealand

Issues and current management approach	Poutō catchment plan methods
Operative regional plan provisions currently identify a number of dune lakes (listed in Schedule E of the Regional Water and Soil Plan) for special protection from water takes, bed disturbance, structures and discharges, but these are not mapped (nor are all necessarily outstanding for the purposes of the freshwater national policy statement). The plan also includes rules restricting the introduction of pest plants (but not animals). The release, distribution and sale of pest species is also managed through regional pest management plans under the Biosecurity Act. Land use change: land use change can also impact lake levels in the form of increased demand for water (for example, through a shift from pastoral use to irrigated cropping) or by reducing the water yield to lakes from surface or groundwater (for example, shift from pasture to plantation forestry). Operative regional rules currently control the extraction of water from lakes (for example, for irrigation) but do not control land use changes, such as conversion of pasture to forestry (other than to provide riparian set-backs for land disturbance and vegetation clearance).	catchments[6] of outstanding dune lakes in the Poutō catchment (Refer to Appendix 2) is a restricted discretionary activity. Note: for the purposes of the new regional plan, the boundaries of the surface water catchments of outstanding Poutō lakes have been refined using updated imagery (Refer to Proposed Regional Plan – Maps) and therefore differ to those shown in Appendix 2. Matters of discretion: i. The total area and location to be planted; ii. Potential effects of reduced surface water yield to lakes and water levels in lakes and aquatic ecosystems; iii. The sensitivity of the ecological, cultural or recreational values of the lake to reduced water levels; iv. Potential effects of future fertiliser use, vegetation clearance and earthworks on water quality and aquatic ecosystems. **Set-backs for plantation forestry:** The planting of forestry trees within **20m** of the bed of an outstanding Poutō Lake (Refer Appendix 2 and 3) is a restricted discretionary activity:

[6] all land that drains to an outstanding Poutō lake

Issues and current management approach	Poutō catchment plan methods
	Matters of discretion: i. The location and extent of forestry activity within the setback; ii. The potential effects of future vegetation clearance and associated earthwork activities on waterbodies. **Non-regulatory** · Poutō catchment group to work with regional council in the development of lake management plans for outstanding water bodies in the Poutō catchment; · Develop good practice/guidance to limit further spread of aquatic pest species.
Lake water levels and water use Operative regional rules apply a precautionary approach to water extraction from those lakes in Schedule E of the Water and Soil Plan (non-complying activity). The lakes in Poutō are the most accessible/reliable source of water for adjacent land owners, given rivers tend to have very small flows and many can stop flowing altogether in dry summers. Groundwater is another water source but is typically more costly (bore and pumping costs) than using lake water. Lakes are, more or less, susceptible to water extraction based on depth (deep lakes are less susceptible than shallow). Lake size is also a factor with smaller lakes being more susceptible to water takes. There are currently very low rates of extraction from Poutō dune lakes (there is only one consented take from a Poutō lake and an estimated 3-4 unauthorised takes) – demand is unlikely to increase on recent land use change predictions. Most Poutō lakes currently used	**Regulatory** **Other permitted takes** The taking and use of water from a lake in the Poutō catchment (other than for reasonable stock drinking or domestic needs) is a permitted activity provided: a) There is only one take per property; b) The take is from a lake that is two hectares or more in area; c) The total daily take does not exceed: i. From an Outstanding lake: 10 cubic metres or 200 litres per hectare, up to a maximum of 20 cubic metres, and ii. From other Poutō lakes: 10 cubic metres or 200 litres per hectare up to a maximum of 50 cubic metres;

Issues and current management approach	Poutō catchment plan methods
for water supply are also large and deep (except Swan Lake which is shallow) and therefore are at low risk of modification of natural lake levels/fluctuation by extraction.	d) Water is not taken when the water level is less than a minimum water level limit, as set in the regional plan; e) The take does not adversely affect the reliability of water supply for lawfully established takes; f) A screen must cover the intake structure of surface water takes and have a minimum aperture (mesh size) of 1.5mm to protect native fish species, and the velocity across the screen must not exceed 0.3m/s; g) The take does not lower the water level in a natural wetland; h) The reticulation system is constructed and maintained to minimise leakage and wastage; and i) The water user must provide the council with: i. Their name, address, and phone number; ii. The location of the water take; and iii. The nature of the water use. j) At the written request of the council, a water meter is installed at the location specified in the request and water use records are provided to the council in a format and at the frequency specified in the request. **Non-regulatory** · Council to undertake further monitoring of Poutō lake levels.

Issues and current management approach	Poutō catchment plan methods
	· Council to continue to investigate interactions between groundwater and lakes. · Develop and encourage water use efficiency methods.
Access/availability of mahinga kai species Lakes have been a significant traditional source of food for Māori. Access to this resource can be limited by reduced supply through: · Reduced habitat quality and populations of mahinga kai species; · Commercial harvest; and · Impacted water quality (by wildfowl, effluent or other contaminants in water) preventing consumption. Commercial harvest of native species is managed by the Ministry for Primary Industries under fisheries management law.	**Regulatory** Not applicable. **Non-regulatory:** · Council to work with tangata whenua to identify important mahinga kai sources in lakes. · Identify means to enhance mahinga kai sources. · Identify available data sources for commercial catch of native species. · Develop good practice / guidance to limit further spread of aquatic pest species.
Cultural values and protection of sites of significance to tangata whenua There are no sites of significance to Māori currently identified in operative regional plans (an acknowledged gap). There have been incidences where such sites have been inadvertently disturbed/ damaged – identification in plans (or alert layers on maps if the site is sensitive) can reduce this risk. However, there is also some risk that identification can lead to greater risk of disturbance – the decision whether or not to identify such sites in district or regional plans ultimately rests with tangata whenua. Typically, district plans manage heritage / cultural sites on land while regional plans address those in fresh or coastal waters – in cases where a site spans a land-water boundary it can be included in both plans.	**Regulatory:** Not applicable. **Non-regulatory:** · Recommend Waikaretu marae works with councils to include sites of significance in the relevant district or regional plans or by use of Council-held confidential alert layers/silent files. · Support iwi / hapu to identify sites of significance in relevant district or regional plans where appropriate.

Issues and current management approach	Poutō catchment plan methods
	· Encourage tangata whenua and land landowners to work together to manage sites of significance in the event they are identified on private land. · Promote funding or other assistance for the management of sites of significance (e.g. assistance with fencing or management advice).
Recreational activity Recreational use of Poutō lakes is currently relatively low given remoteness, limited formed public access and low resident population. However, some wetlands / lake margins in the Poutō dune system are accessible by recreational vehicles (4wd / all-terrain vehicles and motorbikes). Caution is also required to ensure that if recreational use were to increase dramatically that infrastructure is provided to ensure impacts are managed (e.g. toilet and rubbish facilities).	**Regulatory** Rely on new regional plan (water quality limits and stock exclusion rules). **Non-regulatory** · Promote educational signs at vehicle entry points to the beach and at sensitive sites in the dune systems. · Develop and distribute 'Code of care' to recreational vehicle clubs. · Require proposals for increased public access to lakes to be accompanied by appropriate levels of infrastructure.

Conclusion

The recommendations of the Poutō Catchment Group can be grouped into two types – regulatory (that is, rules) and non-regulatory (that is, methods or actions). Regulatory measures only have effect once adopted into statutory documents by local authorities or other agencies with regulatory powers.

The non-regulatory measures do not impose any obligations or costs on land owners or agencies as these are voluntary. The Poutō Catchment Group considers that the combination of regulatory and non-regulatory methods outlined in this catchment plan provide a good balance of approaches and will, over time, achieve the objectives/outcomes sought for the Poutō Lakes. The non-regulatory measures proposed will be progressed through an implementation plan developed by the catchment group.

Ongoing lake monitoring by the Northland Regional Council will enable an assessment of progress towards the objectives and an indication of success (or otherwise) of the catchment plan. The Poutō Catchment Group greatly appreciates the thought and effort provided by those who provided feedback into the draft catchment plan and have incorporated this input where practicable.

Implementation priorities

Table 5 Implementation priorities: (Note: this is subject to confirmation following development of an implementation plan)

Priority	Action	Description	Method	Who
Priority 1	Stock exclusion of lake margin.	Work with land owners adjoining lakes to complete stock exclusion of areas where stock still have access to lake margins.	Work with land owners to provide Farm Water Quality Improvement Plans and Environment Fund applications.	Northland Regional Council and land owners.
Priority 3	Continue lake margin vegetation re-establishment.	Community groups, land owners and agencies continue to work together to carry out planting programme at identified sites.	Develop planting plan to identify sites, sources of plants and funding, and work schedule for pre-plant, planting and post-planting management. On-going project to plant at Kahuparere, Kanono, Humuhumu, Waingata, Rototuna, Wainui and Parawanui.	Poutō Landcare Group, Te Uri O Hau, Northland Regional Council, Kaipara District Council, DOC and land owners adjoining the lakes.
Priority 4	Review the effectiveness of existing detention dams. If merited, identify potential additional sites for	Detention dams sited on pathways of overland flow into the lakes provide a means of removing sediment and phosphate before it enters the lake. A trial would provide an opportunity to demonstrate the construction and	Identify a suitable site and work with land owner to design and construct dam. Carry out soil monitoring at site before and after construction.	Northland Regional Council, Poutō Catchment Group and land owners.

Priority	Action	Description	Method	Who
	such interception measures for Poutō lakes.	effectiveness on these soils.	Revisit and monitor site of existing detention dam.	
Priority 2	Develop and promote good management practices.	Good management practices for land management can reduce loss of nutrients and other contaminants from land into the lakes.	Council to work with industry groups, research organisations and land owners to develop and promote good management practices (including Nutrient Management Plans) appropriate to the lake catchments.	Northland Regional Council, Dairy NZ, Beef & Lamb NZ, land owners and forestry companies, research providers, fertiliser companies.
Priority 5	Removal of grass carp from lakes Waingata and Swan.	Grass carp were introduced to these two catchments in order to remove invasive weeds. These weeds are now absent and removal of the carp will allow native aquatic plants to re-establish.	Northland Regional Council to work with NIWA to develop appropriate method for removing grass carp.	Northland Regional Council, NIWA and land owners adjoining Lakes Waingata and Swan.

Appendix 1: Issues and impacts

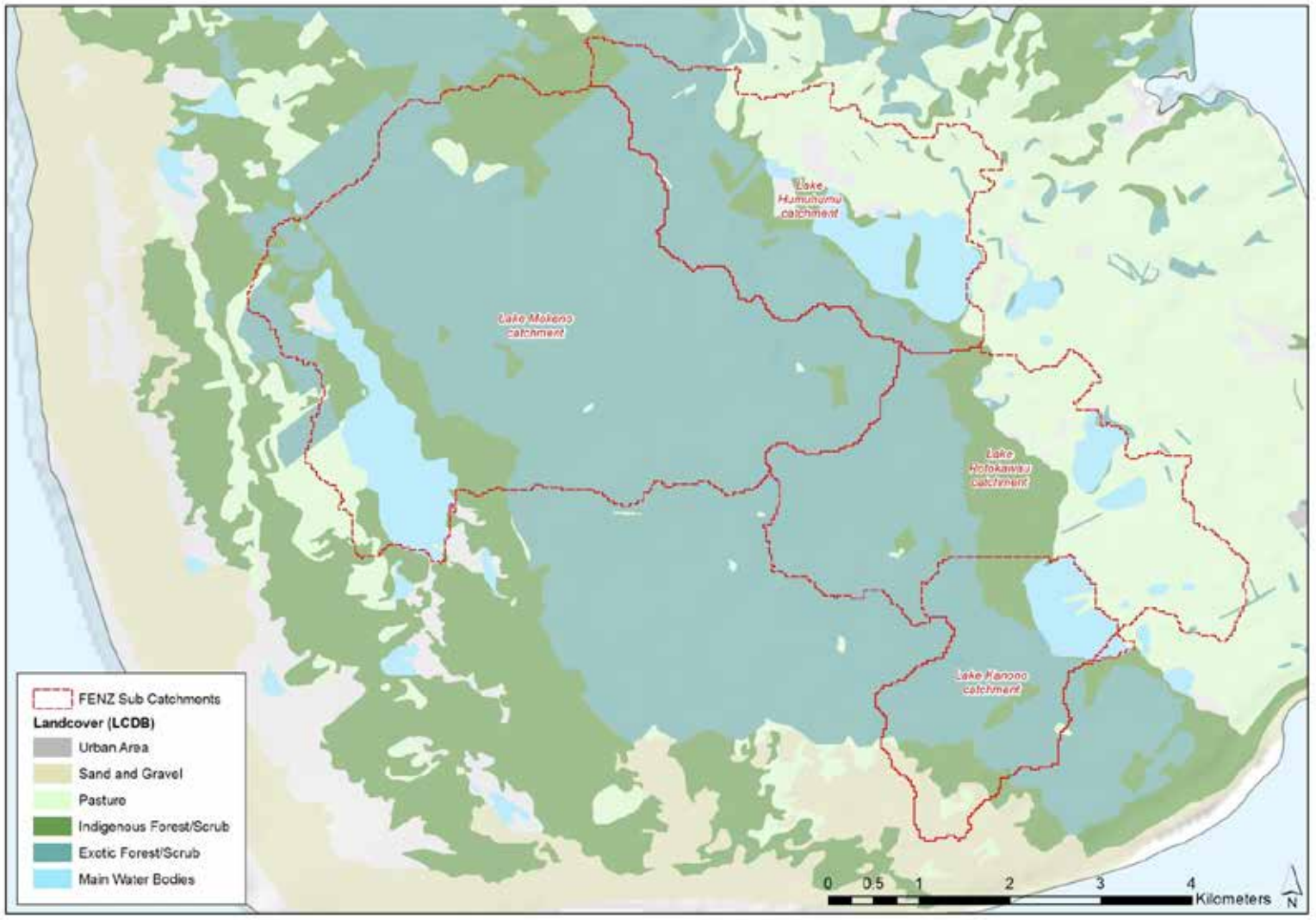
Issues identified by the catchment group	Ecosystem health Impacts	Natural form and character impacts	Cultural values	Recreational impacts	Socio-economic impacts
Livestock access to lakes.	· *Damage to littoral and riparian vegetation.* · *Damage to lake bed habitat.* · *Reduced water clarity.*	· *Reduced amenity /aesthetic values.* · *Damage to littoral and riparian vegetation.* · *Damage to lake bed habitat.* · *Reduced water clarity.*	· *Impact on mauri of water.* · *Restriction on traditional uses of water.*	*Increased health risk from contact with water (E. coli/pathogens).*	· *Stock losses.* · *Cost of fencing (approximately $8 per metre for three-wire electric fence) plus any water reticulation costs.*
Riparian disturbance due to vegetation clearance and earthworks.	· *Loss of connectivity between aquatic and terrestrial systems.* · *Increased run-off of sediment into lake.*	· *Loss of native species.* · *Increased risk of weed establishment.*			*Loss of productive use of land.*

Issues identified by the catchment group	Ecosystem health Impacts	Natural form and character impacts	Cultural values	Recreational impacts	Socio-economic impacts
Lack of riparian vegetation.	· *Loss of habitat.* · *Reduced ecosystem 'connectivity' (links between littoral and terrestrial habitats).* · *Greater exposure to effects of wind and temperature.*	*Reduced visual amenity.*		*Reduced recreational amenity.*	
Nutrient enrichment.	· *Increased frequency of algal blooms and reduced plant growth.* · *Reduced oxygen levels/habitat values for native aquatic species.*	· *Reduced amenity/aesthetic values.* · *Reduced water clarity.*	· *Impact on mauri of water.* · *Reduced availability for mahinga kai.*	*Increased frequency of algal blooms.*	
Availability of water from lakes.	*Hydrological modification and associated impacts on habitats and species.*	*Hydrological modification and impacts on natural patterns and processes.*	*Impacts on mahinga kai species and other traditional resources.*		· *Reliability of water supply for water users.* · *Capacity for productive use of land.* · *Opportunity*

Issues identified by the catchment group	Ecosystem health Impacts	Natural form and character impacts	Cultural values	Recreational impacts	Socio-economic impacts
					costs.
Lake level fluctuation due to land use change (for example, increased demand for water or reduced water yield).	*Hydrological modification and associated impacts on habitats and species.*	*Hydrological modification and impacts on natural patterns and processes.*	*Impacts on mahinga kai species and other traditional resources.*		· *Opportunity costs (land use options).* · *Capacity for primary production.*
Availability of mahinga kai species.			· *Reduced availability of mahinga kai.* · *Reduced ability for manaakitanga.*		
Limited public awareness of cultural values and sites of significance to tangata whenua.			· *Impacts on the mauri of waterbodies. Damage to sensitive sites.*		
Exotic species (for example, pest fish and plants).	· *Predation of native fish.* · *Competition for space/smothering native plants (for example, Hornwort, oxygen weed).*	*Weed species displacing riparian natives.* *(Notably Sheoak, Mexican devil impacts in riparian margins).*	· *Predation (for example, exotic fish species).* · *Smothering/reduced habitat for traditional foods (for example, Hornwort).*	*Reduced recreational amenity (due to prolific weed growth).*	

Issues identified by the catchment group	Ecosystem health Impacts	Natural form and character impacts	Cultural values	Recreational impacts	Socio-economic impacts
Lack of identification/protection of ecologically significant water bodies and heritage sites.	*Potential risk of effects on significant ecological values.*		*Potential disturbance to heritage sites (Māori or NZ European).*		

Appendix 2: Catchment boundaries and land cover for outstanding freshwater bodies.



Appendix 3: Location and extent of proposed outstanding waterbody

Glossary

Ammonia	A highly soluble nitrogen compound, chemical formula NH_3, characteristically found in manure, sewage and anaerobic conditions.
ANZECC (Australian New Zealand Environment Conservation Council) 2000 Guidelines	The ANZECC (2000) guidelines outline trigger values for water quality aspects that put stress on river and stream health. They specify a level below which there is a low risk that adverse biological effects will occur. The trigger values are not designed to be used as threshold values at which an environmental problem is inferred if they are exceeded. Rather they are designed to be used in conjunction with professional judgement to provide an assessment of the state of a water body.
Chlorophyll-a	A green pigment found in plants that is used to absorb sunlight during photosynthesis. Chlorophyll-a concentrations are an indicator of phytoplankton abundance and biomass in water.
Contact recreation	Primary contact recreation refers to swimming and bathing; secondary contact recreation refers to activities such as boating, fishing and wading.
Dissolved oxygen	A measure of the quantity of oxygen in the water column. Oxygen is required by freshwater and marine organisms, with some species being more sensitive to low oxygen levels than others.
Dissolved reactive phosphorus (DRP)	The fraction of phosphorus that consists largely of an inorganic orthophosphate (PO_4) form of phosphorus that can be directly taken up by algae. The amount of dissolved reactive phosphorus therefore indicates the amount of phosphorus that is immediately available for algal growth
Escherichia coli (E. coli)	A common form of faecal bacteria that live in the guts of mammals and birds. Although usually harmless themselves, high levels of E. coli indicate that other pathogens – invisible microbes such as bacteria, viruses, and so on that cause disease – are present.
FDE (Farm Dairy Effluent)	FDE systems are divided into consented or non-consented (permitted) types. Non-consented systems are visually inspected and graded depending on compliance with the criteria for “permitted activities” in the Regional Water and Soil Plan. All Northland dairy farms are inspected at least once per season. Follow-up inspections are also made to all farms found to have significantly non-compliant discharges.
FMU (Freshwater Management Unit)	A water body, multiple water bodies or any part of a water body determined by the council as the appropriate spatial scale.
Heavy rainfall event	50mm within six hours or greater than 100mm rain in 24 hours.
Kaitiakitanga	Guardianship, protection or preservation. Environmental management based on the traditional Māori world-view.
L/s (litres per second)	A unit of measure of river volume flow rate, that is, the number of litres of water which passes that point per second.

Mahinga kai	Food and other resources, and the areas they are sourced from.
Mahinga mātaitai	Customary seafood gathering site, shellfish bed.
Mana	Prestige, authority, control, power, influence
Manaakitanga	Hospitality, kindness.
Mana whenua	Those who have customary authority.
Mātauranga	Knowledge, body of knowledge.
Mauri	The essential life force of all things; spiritual essence.
MALF (Mean Annual Low Flow)	A 7-day MALF is commonly used for setting minimum flow and allocation limits because it is a measure of water availability during dry periods. MALF also standardises minimum flow and allocation by the size of the river.
MCI (Macroinvertebrate Community Index)	An index where macroinvertebrates are used for monitoring and reporting on stream health in New Zealand. The MCI assigns a score to each species or taxon (from one to 10), based on its tolerance or sensitivity to organic pollution, then calculates the average score of all taxa present at a site.
MPN (Most Probable Number)	Method used to enumerate the number of bacteria in a sample.
Nitrate	A highly soluble compound of nitrogen and oxygen with the chemical formula NO_3.
NOF (National Objective Framework)	Established in the National Policy Statement for Freshwater Management 2014, providing a number of grades as well as “national bottom lines” – thresholds of water quality attributes that good management should prevent our waterways from reaching in a consistent way across the country.
NTU (Nephelometric Turbidity Units)	A measure of turbidity in water being the propensity of particles to scatter a light beam.
Periphyton	Slime and algae community growing on river and stream beds. As the primary producer in stream ecosystems, it is an important indicator of ecosystem health.
Taonga tuku iho	Treasure(s) handed down.
Turbidity	Measure of water clarity, the cloudiness or haziness of water. A measure of the degree to which light is scattered in water by particles, such as sediment and algae.
Wāhi tapu	Places and things that are sacred.