Motu

Freshwater contaminant limit assessment of the regions

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A Technical Paper

Motu Economic and Public Policy Research

May 2017

Document information

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Disclaimer

This technical paper is issued alongside Motu Working Paper 17-10: "Modelling the potential impact of New Zealand's freshwater reforms on land-based Greenhouse Gas emissions". All errors, omissions, and opinions expressed are the responsibility of the authors.

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 ISSN 1176-2667 (Print), ISSN 1177-9047 (Online).

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1 Introduction

This report provides freshwater contaminant limit assessments for the regions for phosphorus, nitrogen, *E. coli*, and sediment. The assessments will be used for a national modelling exercise using New Zealand Forestry and Agricultural Regional Model (NZFARM) to help estimate impact of the implementation of the National Policy Statement for Freshwater Management (NPS-FM) 2014 on New Zealand's greenhouse gas emissions.

Information about freshwater management areas (including, where available freshwater management units (FMUs)), priority catchments, relevant mandatory requirements, other practices, and non-regulatory policies that reduce contaminant loads, and limit setting in the regions are covered in the report. This information is used to estimate high and low scenarios for the expected change in levels of phosphorus (P), nitrogen (N), *E. coli*, and sediment in the freshwater of each region between 2015 and a future date such as 2030.

The report also includes information on baseline loads created by NIWA from the CLUES model.

This report fulfils Milestone 5, Limit Assessment, of the study entitled: Climate Change Co-benefits of the Freshwater Reforms. This report was revised in June 2016 but did not include any new information on FMU delineation or limits that may have been finalised between March and June 2016. This is primarily due to the modelling analysis in the final report being based on the available information in March 2016.

2 Methodology

Motu Public Policy and Research (Motu), Landcare Research and AgResearch worked together to gather this information from Regional Councils. AgResearch approached the six councils they were already liaising with for its deliverables under a complementary project. Motu and Landcare Research collected the data for the remaining councils. Information was collected through in-person meetings, email and phone calls. The information we attempted to collect from each council included:

1. A map of regional catchments and/or agreed or proposed freshwater management areas. While all Regional and Unitary Councils will eventually have NPS-FM FMUs delineated for their regions, not all councils have completed that process. Therefore, the map delineates a mix of management zones, FMUs, priority catchments and other types of catchment delineations as noted by the individual councils.
2. Any relevant water policy documentation/plans.

3. Any concerns about contamination from nitrogen, phosphorous, sediment and *E. coli* in the region.
4. A list of priority catchments/FMUs where these contaminants are being actively managed
5. Specific reduction targets or limits that have been proposed or agreed for each water management zone. In this report, we will use the limits and target terminology used in each region. Where this is unclear or where we have manipulated the data for use in our modelling, we will use the term 'limits' to refer to where existing water quality is better or worse than the desired state. We acknowledge that many regions use the term 'target' as the limit they want to reach where water quality is worse than the desired state.
6. In the event that water quality limits or targets are not yet established, a range for the potential limits/targets for each water management zone (e.g. 5–10% decrease in nitrogen, no change in phosphorous, 20% increase in *E. coli*, etc.) was specified. This range for the potential limits is based on a percentage change in the estimated current load (or baseline). This percentage change is either a reduction in contaminant loads or no change in load. The current load is estimated based on 2012 land use. This is the most current, national land-use map available. This map had previously been generated for other national level economic analyses (Daigneault et al. in review).
7. The timeframe to achieve any limit for each water management zone.
8. Mandatory practices that landowners must undertake in any region (e.g. stock exclusion1) as part of any regional plan or proposed regional plan.
9. Additional practices landowners are currently undertaking to reduce the different contaminant loads in each water management zone (e.g. farm plans for erosion control).

More details on the questions asked to each regional council are provided in the Appendix.

3 Northland

3.1 Freshwater Management Units

The FMUs for Northland are being finalised in March 2016. For the purposes of managing river water quality, Northland Regional Council (NRC) have divided rivers into lowland rivers and hill country rivers based on catchment slope, which appears to be the best explanatory variable for most but not all water quality parameters. With regard to managing river water quantity, NRC has divided the region's rivers into four classes based on river size, climate, and proximity to

1 Note: stock exclusion is being proposed as a national requirement under the 2016 Next steps for fresh water consultation document (http://www.mfe.govt.nz/fresh-water/reform-programme/freshwater-reforms-2016P

coast: coastal streams, small rivers, large rivers, and warm extremely wet rivers. For lakes, NRC has divided natural lakes into four classes: shallow (<10 m) perched, deep (>10 m) perched, shallow window, deep window. NRC has also divided aquifers into four classes: shallow coastal, deep coastal, other mapped, and unmapped. In addition, NRC has specified that there will be catchment (i.e. water body) specific FMU's across all water body types. They define catchment-specific FMU's as catchments where good information is available on current state and resource use capacity with respect to local values. The council has stated that lake and aquifer FMUs will correspond with natural catchment boundaries, but the river FMUs are based on other variables.

3.2 The situation with N, P, sediment, E. coli contamination in Northland and priority catchments

The main contaminants of concern in Northland's rivers are sediment and faecal microbes (e.g. *E. coli*). Nutrients are more of an issue in NRC's dune lakes.

NRC has identified six priority catchments (Whāngārei Harbour, Mangere, Waitangi, Poutō Peninsula, Doubtless Bay, and Ngunguru). All are considered relatively small catchments and were selected for various reasons, however NRC has indicated that the Whāngārei Harbour and Poutō Peninsula are the only areas with significant water quality or quantity related issues. Catchment groups in Mangere, Waitangi, Doubtless Bay, Whāngārei, and Poutō are currently working on catchment plans (with voluntary and regulatory elements) with a goal to have these draft catchment plans ready by mid-2016. The Ngunguru catchment group started in November 2015 and is focused on developing an erosion and sediment management plan that is due for completion by November 2018.

3.3 Freshwater quality limits

NRC intends to set concentration limits for the compulsory attributes in the NPS-FM. They have no intention in the near future to set contaminant load or property scale loss limits, given the costs and practicalities (and the lack of intervention logic) to do so.

The council anticipates that the key policies targeting improvements in river and lake water quality are compulsory stock exclusion, slightly tighter controls on farm dairy effluent discharges and land disturbance activities, and outreach and support for good management practices (GMPs). Stock exclusion requirements are likely to be similar to the recent recommendations of the Land and Water Forum. NRC does not anticipate that their existing or new water quality controls will cause any substantial land use change. The latest Regional Water and Soil and Coastal plans provide details on current controls that have already been implemented in the region.

4 Auckland

4.1 Freshwater Water Management Units

Auckland Council has defined nine water management areas. These include: Manukau Harbour (includes Mangere, Drury, Pukekohe area), Wairoa (includes Hunua Ranges), West Coast, Waitemata, Greater Tamaki, Hibiscus coast, Maharangi, Northeast coast, and the South Kaipara Harbour. FMUs within each water management area have not yet been defined.

4.2 Nitrogen, phosphorous, sediment, and E. coli contamination

Nitrogen is believed to be an issue in the Manukau Harbour, and it is likely that a substantial reduction will be required to meet the NPS-FM attribute bottom lines. Sediment is the most pressing issue in the Kaipara Harbour, as is *E. coli* (which is likely to be dealt with through addressing the sediment loss). Phosphorous is generally not believed to be a current issue in the region.

4.3 Mandatory requirements

Auckland Council has not specified any mandatory requirements for landowners in the region beyond what is already included in the Regional Plan. They are exploring economically feasible options to reduce nitrogen in the Manukau Harbour, which could be partially achieved through best management practices.

Other practices and non-regulatory policies of note that reduce contaminant loads

The council did not specify any other policies of note that could help reduce contaminant loads.

4.4 Freshwater quality limits

Potential limits for each water management area in the Auckland Region were developed in consultation AC staff involved with NPS-FM implementation (Table 1). This limit range is expressed as a percentage change from current loads. Note that these limits are only for changes in agricultural and forestry sector contaminants as urban pollutants were not discussed. The limits are also not the definitive limits for the region and are subject to change based on additional science, council investigations and outcomes of limit setting processes.

Table 1: Potential limit ranges for Auckland Council (% change from baseline), by water management area

Water Mmgt Area	**Nitrogen**	**Phosphorous**	**Sediment**	***E. coli***	**Comments/notes**
Manukau Harbour	model best practice, 20, 30, 40, 50 % decrease	No change	No change	No change	Some mangrove clearance in the Puhiri & Mangere areas; *E.coli* is naturally high; lots of houses going in (likely to reduce sediment and N); N is the big problem (likely need large reduction to meet National Objectives Framework) but not sure how far they can actually reduce or is economically feasible to reduce (fertiliser is the issue); best thing to do is to model best practice
Wairoa	No change	No change	0%, 10% increase	No change	Forestry operations are big in area; one issue is going to be that the new Forestry National Environmental Standard is weaker than Auckland Council rules so could be an increase in sediment as a result
West Coast	No change	No change	No change	No change	Mostly forestry
Waitemata	No change	No change	No change	No change	Urban
Greater Tamaki	No change	No change	No change	No change	Urban
Hibiscus coast	No change	No change	No change	No change	Mostly urban with a little forestry inland
Maharangi	No change	No change	No change	No change	Significant investment in this catchment already on improving ag practices but don't know if they have really made a difference
Northeast coast	No change	No change	No change	No change	Mostly lifestyle blocks with some sheep and beef, maybe some wetlands going in
South Kaipara Harbour	No change	10-20% decrease	No change	No change	Sediment is the big issue, mostly related to sheep and beef. *E. coli* is natural (some sheep and beef *E.coli* but likely this will be dealt with when address sediment loss)

5 Waikato

The Waikato Regional Council has only established limits and a policy to achieve these limits for the Lake Taupo catchment. It is still undergoing the process of defining limits for the other catchments in the region. The Healthy Rivers Wai Ora process will be defining limits for the Waikato/Waipa catchments in May 2016. There are eight FMUs for these catchments (Healthy Rivers 2016). As a result, this section only discusses the limits for the Lake Taupo catchment.
Freshwater Water Management Units

Lake Taupo is New Zealand's largest lake and has very high water quality. The lake and its catchment are within the rohe of Ngati Tuwharetoa, who own much of the land in the catchment, including the bed of the lake. Variation 5 to the Waikato Regional Plan is focused on protecting the existing high water clarity in Lake Taupo. It became operative in July 2011.

5.1 Nitrogen, phosphorous, sediment and E. coli contamination

The contaminant discharge of concern in Lake Taupo is nitrogen. Sources of nitrogen that can be reduced through management are relatively limited, and primarily include human wastewater and pastoral farming. Pastoral farming represents around 40 percent of the total load of nitrogen to the lake, and 93 percent of the manageable load.

5.2 Mandatory requirements

Around Lake Taupo, farmers are required to prepare a Nitrogen Management Plan that describes how the farm will be managed over the farming year within the nitrogen limit for the property or properties, including livestock levels, nutrient applications, and feed regimes.
Freshwater quality limits in the Waikato

In 2011, Waikato Regional Plan Variation 5 – Lake Taupo Catchment became operative, and was inserted as Chapter 3.10 of the Waikato Regional Plan.2 In the Taupo cap-and-trade scheme, the cap restricts nitrogen use through the resource consenting process. A resource consent, applied for by a farmer, sets the property-level nitrogen limit expressed both as a nitrogen discharge allowance (NDA – kg/ha/yr) and total annual discharge allowance (TAND – kg/yr). The nitrogen limit is a right to discharge diffuse nitrogen emissions, and is held by farmers to enable them to continue farming activities. Nitrogen can be traded permanently or through a temporary lease agreement. Trading involves formal (via the resource consent processes) adjustments to the resource consents held by the purchaser and the seller. All

2 Information about the Lake Taupo nitrogen cap and trade scheme has been adapted from: Waikato Regional Council, *Case Study I: Lake Taupo catchment property-level nitrogen discharge limits*, 2014

resource consents have a common expiry date of 2036, and are subject to changes that may occur as a result of reviews of the nitrogen removal target and its method of achievement.

A 20% reduction of nitrogen from municipal sewage schemes and pastoral land is signalled in objectives and policies of the Waikato Regional Plan. This will be achieved through Taupo District Council's ongoing upgrades to sewage treatment, and public funded buy-back of nitrogen through a specially formed charitable trust (Lake Taupo Protection Trust) respectively. As of early 2014:

- All farms in the catchment have been benchmarked, nitrogen limits have been set, and farms are now under a resource consenting system.
- The 20% reduction target has been met by the Lake Taupo Protection Trust (the Trust) – on budget and within the time limit specified.
- The policy is on-track to achieve the environmental target of 2001 levels of water quality and clarity by 2080.
- The market appears to be operating efficiently (Barnes & Young 2013; Duhon et al. 2015; Kerr et al. 2015). Private trades still occurred during the time the Trust was dominant in the market, and are expected to continue to do so.
- The monitoring regime has been established, using desk top audits of farmer-supplied financial information, as a first filter of compliance, and a risk-based approach to the frequency of audits and need for on farm monitoring inspections.

6 Bay of Plenty

6.1 Freshwater Water Management Units

The Bay of Plenty (BOP) Regional Council has specified nine water management zones for the region. These include: Kaituna, Maketu and Pongakawa; Ohiwa Harbour and Waiotahi; Rotorua Lakes; Tarawera; Tauranga Harbour; East Coast; Waioeka and Otara; Whakatane and Waimana; and Rangitaiki.

6.2 Nitrogen, phosphorous, sediment and E. coli contamination

Waterbodies in the BOP are mostly affected by nitrogen and phosphorous. The Rotorua Lakes area is particularly affected by nutrient discharges from diffuse sources, although there are also some issues with sediment.

6.3 Mandatory requirements

Rules of the Rotorua Te Arawa Lakes Programme are based on the Lake Rotorua groundwater catchment. The goal is to reduce the nitrogen load to Lake Rotorua by 320 tonnes to achieve an annual nitrogen load to the lake of 435 tonnes by 2032 (from current load of 755 t N/y), with 70 percent of this load reduction to be reached by 2022.

The strategy to achieve this reduction target is to remove 50 t N/y through "engineering solutions" (to remove geothermal sources of N) and 30 t N/ha through gorse removal. A further 96 t N/y from dairy and 44 t N/y from drystock will be removed through Nitrogen Discharge Allowances (NDAs), and the remaining 100 t N/y through an incentives scheme to further incentivise nitrogen reduction actions.

Part of an individual farm property or a farming enterprise's nitrogen management plan shall identify the risks of sediment and phosphorous loss and best practices to reduce those losses shall be implemented.

Conditions set on forestry enterprises are that there is no grazing on the land, no transfer of NDAs, and the period between harvesting and replanting is less than 2 years.

6.4 Freshwater quality limits

The BOPRC has only set limits for the Rotorua lakes (Table 2). The nitrogen limit is to be met through reductions from the land-based sectors (such as dairy and drystock), engineering solutions, and gorse removal. Approximately 53 percent of the total nitrogen reduction target is expected to come directly from changes to dairy and drystock farming (a 27% reduction from their baseline N loads). Phosphorus limits are not specifically set, but are typically based on a lake's target trophic level index.

The council is currently rolling out the Water Project, which will be setting the limits for the remaining water management zones.

Table 2: Agreed limit or potential limit range in Bay of Plenty Region (% change from baseline), by water management zone

Water Management Zone	Nitrogen	Phosphorous	Sediment	*E. coli*	Notes/Comments
Kaituna, Maketu and Pongakawa	n/a	n/a	n/a	n/a	n/a
Ohiwa Harbour and Waiotahi	n/a	n/a	n/a	n/a	n/a
Rotorua Lakes	42% decrease	co-benefit of N decrease	No change	No change	27% N decrease from drystock and dairy
Tarawera	n/a	n/a	n/a	n/a	n/a
Tauranga Harbour	n/a	n/a	n/a	n/a	n/a
East Coast	n/a	n/a	n/a	n/a	n/a
Waioeka and Otara	n/a	n/a	n/a	n/a	n/a
Whakatane and Waimana	n/a	n/a	n/a	n/a	n/a
Rangitaiki	n/a	n/a	n/a	n/a	n/a

n/a indicates there are no limits in place for these water management zones

7 Gisborne

7.1 Freshwater Water Management Units

The proposed Gisborne Regional Freshwater Plan, published in October 2015, has only established FMUs in the Waipaoa Catchment Plan.[3] There are three FMUs proposed for this catchment: Waipaoa Hill Country; Gisborne Urban; and Poverty Bay Flats. The largest FMU, Waipaoa Hill Country, is largely rural and is rolling to steep hill country composed mainly of soft sedimentary materials. Land use is predominantly pastoral grassland with scattered blocks of exotic forestry in the upper catchment areas. Farming is a major land use activity. Hill Country water bodies are also significant for their ecosystem health and natural character. Water quality across this management unit is generally good although some localised water quality issues exist and relate to specific water bodies.

Gisborne is located near the convergence of three different rivers. With the majority of the region's population living and working in the urban environment, the centrality of the city's waterways and people's exposure to them make water quality a critical issue. The two prominent freshwater bodies in the Gisborne Urban unit are the Taruheru River and the

3 http://consult-gdc.objective.com/portal/plans/pfwp15?pointId=s1442642545186#section-s1442642545186

Waikanae Stream. These waterways are identified as having important in-stream and indirect amenity values including swimming, boating, and fishing. The establishment of an Urban FMU provides a spatial context for dealing with urban challenges, such as the high proportion of hard surfacing and the stormwater network.

The Poverty Bay Flats cover over 20 000 hectares of land around the lower Waipaoa River valley.4 The area receives an annual rainfall of between 650 mm and 1640 mm and often experiences drought conditions. The management unit is used intensively for arable farming, market gardening, horticulture and viticulture. Groundwater is important to irrigation on the Poverty Bay Flats as the Waipaoa River is often subject to low flows during summer months as well as high sediment loading following storm events.

7.2 Nitrogen, phosphorous, sediment, and E. coli contamination

The overall purpose of the Proposed Gisborne Freshwater Plan is to guide the sustainable management of the region's rivers, streams, lakes, wetlands, and groundwater. *E. coli* and sediment have been prioritised in the region.5 Improving water quality in this region is strongly tied to reducing erosion and reducing opportunities for faecal contamination of waterways. River water quality is generally good in that it does not indicate high levels of nutrients, and biological indicators are generally good.

Reducing erosion rates and the effects erosion has on waterways has long been a key issue for Gisborne.6 Soft sedimentary rocks dominate the region. Council's soil conservation activities seek to mitigate or prevent soil erosion caused by historical bush clearance for pastoral farming as well as more recent tree removal and earthworks.

7.3 Mandatory requirements

The Sustainable Hill Country Project established the requirement for tree planting or maintaining tree cover on the most erosion-prone land. Works are to be completed and effective tree cover established by 2021. By mid-2012, 61% of properties and 90% of the most erosion-prone land had Works Plans completed or being progressed. The Combined Regional Land and District Plan requires that the most erosion-prone be treated with effective tree planting or reserve fencing.

There are existing rules for riparian areas that control earthworks, vegetation clearance and structures. There is no regulation of stock access to waterways, and current rules allow

4 Adapted from the proposed Gisborne Regional Freshwater Management Plan
5 The summary of the situation in the region regarding contaminants has been adapted from the proposed Gisborne Regional Freshwater Management Plan
6 Adapted from: AgResearch, *Climate mitigation co-benefits arising from the Freshwater Reforms: Summary of policy and agricultural landscape: Report prepared for MPI (Milestone Report 1),* 2015

stock entry to waterways. In comparison with other regions, the intensity of most farming operations would not warrant a blanket stock exclusion rule in this region.

There is also a requirement for intensive land users to have farm environmental plans.7 The main activities that are expected to result from the farm plans in each FMU are listed in the table below.

Table 3: Key activities as a result of farm plans in Gisborne District

FMU	Main activities in farm environmental plans that affect nitrogen, phosphorous, *E. coli*, and sediment
Waipaoa Hill Country	Install stock crossings and stock exclusion for intensively stocked locations
	Move or bund and treat runoff from woolsheds
	Willow and native riparian planting
	Slope erosion planting of poplars
	Move silage pits/offal pits to better locations
	Install water reticulation systems for stock water
Gisborne Urban	n/a
Poverty Bay Flats	Install stock crossings and stock exclusion for intensively stocked locations
	Willow and native riparian planting
	Constructed wetlands
	Various horticultural practices (earthworks, harvesting methods, fertiliser use) changes in accordance with Code of Practice for Vegetable Growing
	Growing green crops over winter rather than leaving fallow, etc., practices for maize

7.4 Freshwater quality limits in Gisborne

The Gisborne District Council has proposed freshwater concentration limits for the Waipaoa Catchment and is setting these limits through the development of catchment management plans. The plans are set out in the proposed Gisborne Regional Freshwater Plan. The council wishes to balance the limit-setting process with the NPS-FM requirement to maintain or improve the overall quality of water within the region. Therefore the council's approach to maintaining water quality through the National Objectives Framework is to maintain the current state of the attribute being measured. Improving water quality is proposed where an attribute is below a national bottom line or where the current state does not provide for the priority values. The freshwater targets that have been defined describe the specific changes the councilis aiming to achieve and relate to the freshwater objectives that have been defined for the catchment. These

7 Information provided by Lois Easton by email in February 2016

targets aim to maintain or improve nitrate, ammonia, dissolved oxygen, temperature, pH, sediment, dissolved reactive phosphorus (DRP), and *E. coli* in rivers. They are not yet linked to farming activities. Specific Freshwater Targets have been proposed for the three Waipaoa catchment FMUs. Most of the targets are aimed at increasing dissolved oxygen levels, decreasing water temperature, and reducing *E. coli* levels and sediment loads. There are also targets to reduce N and DRP concentrations in the Poverty Bay Flats FMU.

The proposed Gisborne Regional Freshwater Plan outlines the current state in a number of sites in each FMU. The council intends to maintain the water quality of those that do not need targets because they already meet acceptable water quality levels. When asked about the change in expected between 2015 and 2030 for *E. coli*, the council provided information in Table 4.

Table 4: *E. coli* limits for Gisborne District

FMU	Proposed Gisborne Regional Freshwater plan – Freshwater targets (Gisborne District Council, 2015).	Other comments about land use, mandatory or other activities to improve *E. coli*	Estimated change in *E. coli* between 2015 and 2030 (example numbers only)
Wharekopae River (in Waipaoa Hill Country FMU)	Reduce median *E.coli* levels to 260 cfus/100 ml or below and 95th percentiles to 1000 cfus/100 ml or below by 2030	Farm Environment Plans, fencing subsidies	3% decrease on median, 70% decrease on 95th percentiles
Waipaoa Hill Country excluding Wharekopae River	n/a	Farm Environment Plans for intensive land uses	Maintain
Waikanae Stream at Stanley Road (in Gisborne Urban FMU)	Reduce median *E.coli* levels to 540 cfus/100 ml or below for Waikanae Stream at Stanley Road	Stormwater quality project – urban sources	34% decrease
Gisborne Urban excluding Waikanae Stream at Stanley Road	Reduce 95th percentiles for *E. coli* levels to 1000 cfus/100 ml or below by 2030 for all water bodies	Stormwater quality project – urban sources	95% decrease

When asked about the change in expected between 2015 and 2030 for sediment, the council provided the sedimentation information outlined in Table 5.

Table 5: Sediment limits for Gisborne District

FMU	Proposed Gisborne Regional Freshwater plan – Freshwater targets (Gisborne District Council 2015)	Other comments about land use, mandatory or other activities to improve Sediment	Estimated change in sediment between 2015 and 2030 (example numbers only)
Waipaoa Hill Country (sheep and beef and forestry land uses)	target <10 g/m^3 sediment for those rivers without major gullies in headwaters	No comments made	a 41% reduction by 2030 in some rivers, and for those rivers with major erosion features we are targeting <50 g/m^3 – will represent a 66% reduction in sediment if we achieved that by 2030 (unlikely)

When asked about the change expected between 2015 and 2030 for phosphorous, the council provided the phosphorus information in Table 6.8

Table 6: Phosphorus limits for Gisborne District

FMU	Proposed Gisborne Regional Freshwater plan – Freshwater targets (Gisborne District Council 2015)	Other comments about land use, mandatory or other activities to improve P	Estimated change in P between 2015 and 2030 (example numbers only)
Poverty Bay Flats	Reduce dissolved reactive phosphorus levels to 0.03 g/m^3 or below by 2035 for Taruheru River at Tuckers Road	Farm Environment Plans required for all intensive horticultural uses by 2021. Council action on own land in flood control scheme (riparian management, wetland development)	62% decrease

The Poverty Bay FMU is the only FMU where the council is focussing on decreasing phosphorous as parts of the FMU currently lie in D band.

When asked if it was able to estimate reductions or to state no change for other catchments and for other contaminants not mentioned above, the council noted that[9] in many locations communities will expect the council to improve water quality in relation to faecal pathogens and sediment, similar to the Waipaoa Catchment situation. Swimmable streams will be the focus of community expectations. Therefore, to meet these expectations targets of a 5–

8 Email from Lois Easton (Gisborne Regional Council) to Tracy Nelson (AgResearch), 2015
9 Email from Lois Easton (Gisborne Regional Council) to Tracy Nelson (AgResearch), 2015

10% improvement in median bacteria levels could be set. For nitrate and phosphorus the council is likely to seek to maintain the current states in all locations *except* the Motu River catchment. In the Motu catchment, the community is likely to expect improvements in the order of 30% decrease in phosphorous by 2035 and perhaps 10% reduction in nitrogen.

8 Taranaki

8.1 Freshwater Water Management Units

The Taranaki does not have finalised Freshwater Management Units. However, in April 2015, the council released a draft Freshwater and Land Management Plan for Taranaki10 that proposed four FMU – A, B C, and D. Each FMU has similar physical and hydrological characteristics as well as land use and community values.11 Each FMU is briefly described below.12

8.1.1 FMU A – outstanding freshwater bodies

This FMU includes the Hangatahua (Stony) River, the Maketawa catchment immediately upstream of but excluding the Ngatoro Stream catchment and Lake Rotokare Scenic Reserve. These freshwater bodies mostly protected, have valuable, or increasingly valuable, habitat for indigenous flora and fauna and many have high cultural significance.

8.1.2 FMU B – waterways on Mount Taranaki and the ring plain

The main land use in this FMU is dairying. It also includes New Plymouth and other urban areas. High consumption and waste discharge are common in these smaller waterways.

8.1.3 FMU C – waterways on the northern and southern coastal terraces

There is intensive farming and irrigation in this FMU. In the southern coastal terraces there are mostly short, spring-fed streams that discharge as waterfalls into the ocean. In the northers coastal terraces there are longer rivers that are subject to large tidal ranges and naturally high sediment loads.

8.1.4 FMU D – waterways in the eastern hill country

A large area of this FMU is in natural land cover, there is also some drystock farming and plantation forestry. The rivers tend to carry a high sediment load as a result of the steep, easily erodible geology.

10 http://www.trc.govt.nz/freshwater-and-land-management/
11 http://www.trc.govt.nz/assets/taranaki/environment/water/DraftPlan2015/DraftPlan-April2015W.pdf
12 Information adopted from
http://www.trc.govt.nz/assets/taranaki/environment/water/DraftPlan2015/1FMU.pdf

8.2 Nitrogen, phosphorous, sediment, and E. coli contamination[13]

While nitrogen, phosphorous, sediment, and *E. coli* all have an impact on water quality in Taranaki, phosphorous is the contaminant of most concern, particularly where there is intensive farming in the ring plain and the coastal terraces.

State of the Environment monitoring confirms improvement in the management of the region's waterways over the past 40 years. Over the past 18 years the ecological health has improved at a number of sites, and at least 14 sites significant improvements have occurred since 2007.

8.3 Mandatory requirements

The draft Freshwater and Land Management Plan for Taranaki proposes to require riparian fencing and planting on intensively farmed properties (over 20 hectares) on the ring plain and coastal terraces by 2020. Those who have not done so by mid-2020 will need a resource consent requiring stock exclusion from waterways and completion of riparian planting. Policies and rules are also proposed to require animal effluent to be discharged to land as a general rule.

8.4 Other practices and non-regulatory policies of note that reduce contaminant loads

The council has two key non-regulatory programmes. First is the Taranaki Riparian Management Programme in the ring plain and coastal terraces. It is the largest environmental enhancement planting scheme on privately owned land in New Zealand. It has resulted in 99.5 percent of dairy farms with riparian plans and 14 000 kilometres of streambank is covered by fencing and planting plans, and of these, 80% of streambanks are fenced, and 65% of streambanks recommended for vegetation are protected by both established and more recent plantings. Second, in the hill country, the council is working with farmers to promote sustainable land management practices, with a focus on soil conservation and sedimentation on erosion prone land. In addition, there is an industry-led initiative to promote nutrient budgeting.

8.5 Freshwater quality limits in Taranaki

Water quality limits have not been formally set in Taranaki. The Regional Fresh Water Plan for Taranaki is currently under review. The draft Freshwater and Land Management Plan proposes to manage freshwater contamination through a combination of the new discharge policies and

13 Email from Chris Spurdle (Taranaki Regional Council) to Leah Murphy (Motu), 2015

rules plus the plan sets out boundaries for the region's waterways using the National Objectives Framework.14

The water quality limits listed in Table 7 are council estimates based on their anticipated water quality trends by 2025. These limits take into account substantial but not complete implementation of riparian management recommendations and diversion of ponds from streams to land over the next 10 years. The predictions are also based on State of the Environment monitoring trends. Findings are extrapolated from the Best Practice Dairy Catchment Study on the Waiokura15 and applied to other ring plain streams.

Table 7: Estimated limit ranges for Taranaki Region (% change from baseline)

FMU	Nitrogen	Phosphorous	Sediment	*E. coli*	Comments/notes
Outstanding freshwater body	No change	No change	No change	No change	Pristine catchments. Management response aims to maintain/protect outstanding natural character and already excellent to very good water quality
Ring plain	10–30% decrease	20–40% decrease	10–30% decrease	20–40% decrease	Intensively farmed catchments. Management response aims to maintain and enhance already good water quality through rules diverting farm effluent to land and riparian management
Coastal terraces	10–30% decrease	20–40% decrease	10–30% decrease	20–40% decrease	Intensively farmed catchments. Comments as above.
Eastern hill country	No change	5–10% decrease	5–10% decrease	No change	Extensively farmed catchments on erosion prone land. Relatively good water quality but with sedimentation issues. Largely non regulatory responses to avoid erosion and maintain good water quality.

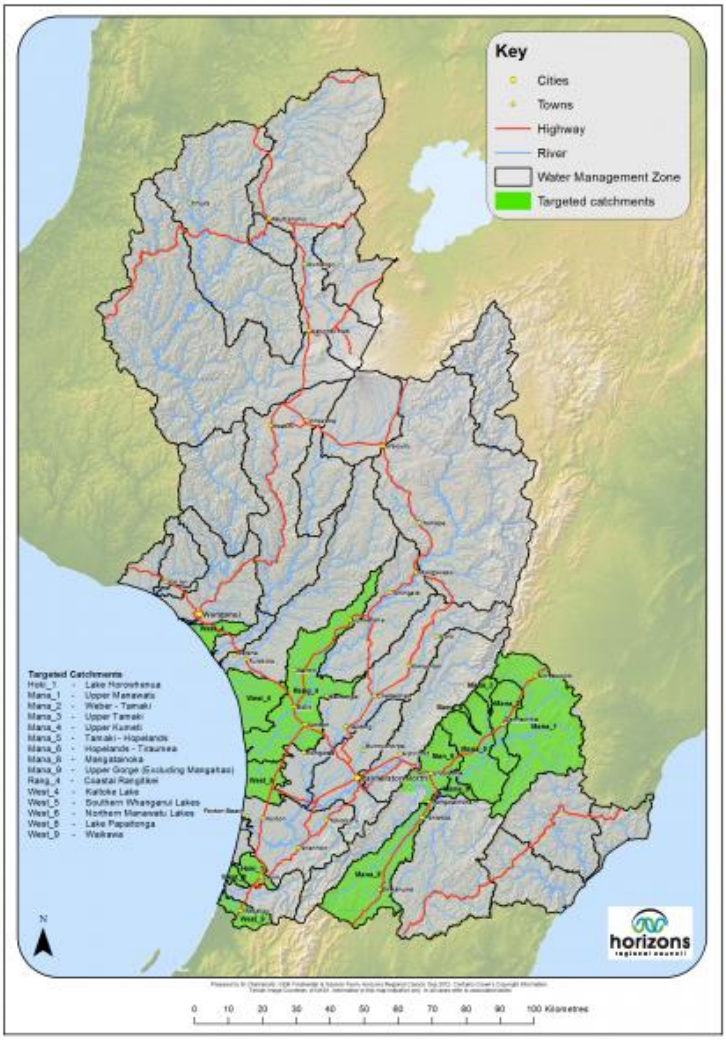
14 http://www.trc.govt.nz/assets/taranaki/environment/water/DraftPlan2015/2NOF.pdf
15 http://maxa.maf.govt.nz/sff/about-projects/search/06-029/best-practice-dairy-catchment-study.pdf

9 Manawatu–Wanganui (Horizons)

9.1 Freshwater Water Management Units

The One Plan outlines many water management zones within the Manawatu-Wanganui region (Figure 1). The council has also listed several water management sub-zones, or priority catchments, that are most affected by nutrient enrichment and/or bacterial contamination. Agricultural run-off in these sub-zones is managed using a mixture of persuasion, advice and rules.16 These water management zones predate the NPS-FM and the council will have to go through the process of identifying FMUs for the region to meet the requirements of the NPS-FM.

Figure 1: Manawatu-Wanganui water management zones and targeted catchments.



16 http://www.horizons.govt.nz/assets/publications/about-us-publications/one-plan/Chapter-1-Setting-the-Scene.pdf#pagemode=thumbs

9.2 Nitrogen, phosphorous, sediment, and E. coli contamination

Key issues for water quality in the region include: nutrient levels, algae growth and sediment. Around 75% of this region is classified as hill country and 40% of this land has potential for moderate to severe erosion. There is a need to mitigate this risk to preserve this productive land.

The growing concern around the intensification of land use (e.g. dairy) in the region and the effect of increased nutrient and bacterial runoff on water quality was tackled in Horizons' regional policy document, the One Plan. For example, in the Upper Manawatu, one of the priority catchments (Mangatainoka), the amount of nitrogen in the river is 2.5 times the ecological limit, with 50% coming from dairy occupying less than 25% of the catchment. Cyanobacteria (often referred to as blue-green-algae) have also been identified as an emerging issue affecting rivers and lakes in the region.

9.3 Mandatory requirements

The One Plan is an integrated plan which guides the management of natural resources in the Horizons Region. It weaves together the previous six separate plans and Regional Policy Statement into one document. The One Plan provides an environmental roadmap directing how the Council manages the Region's resources.

The One Plan focuses on intensive farming in priority catchments and aims to manage the effects those activities have on water quality, including as a major source of nutrients that can cause increased levels of periphyton. New regulations require intensive farmers to apply for consent around nutrient management.

The rules apply to various coastal catchments between Otaki and Wanganui and most of the dairying area of the Tararua, excluding farms in the upper Mangahao and the Tiraumea catchments, the lower section of the Rangitikei River, and Waikawa and Manakau Rivers (see Figure 1).

9.4 Other practices and non-regulatory policies of note that reduce contaminant loads

The Sustainable Land Use Initiative (SLUI), a non-regulatory approach, that is backed up by regulations covering vegetation clearing and tracking, takes a 'mountains to the sea' approach to prevent accelerated erosion in hill country. The initiative is underpinned by the development of voluntary management plans. These voluntary plans provide paddock-scale best land management advice while optimising economic return to the landowner. The first voluntary management plan was piloted on a farm in the Pohangina Valley in 2005 and the programme is currently being rolled out in priority areas.

SLUI is the key instrument being used in the region to reduce sediment and associated phosphorus losses to waterways.

9.5 Freshwater quality limits

The Horizons Regional Council has set maximum cumulative nitrogen leaching losses for priority catchments (Table 8)17 in the One Plan. These losses vary by land use capability (LUC) class and are imposed on the intensive land uses of dairy, horticulture, cropping, and intensive sheep and beef. The maximum nitrogen leaching losses are intended to become gradually more stringent over a 20-year timeframe.

There are no mandatory requirements around phosphorous, sediment or *E. coli*. Phosphorous and sediment are being managed through SLUI programme.

Table 8: Horizons One Plan maximum cumulative nitrogen leaching losses (kgN/ha/yr) by Land Use Capability (LUC) class

Year	LUC1	LUC2	LUC3	LUC4	LUC5	LUC6	LUC7	LUC8
1	30	27	24	18	16	15	8	2
5	27	25	21	16	13	10	6	2
10	26	22	19	14	13	10	6	2
20	25	21	18	13	12	10	6	2

10 Hawke's Bay

10.1 Freshwater Water Management Units

The Hawke's Bay Region has seven major river catchments. In terms of water management these catchments are further divided into 15 possible management areas (note the FMUs are still not defined). The management areas include: Wairoa, Mohaka (upper, middle, and lower), Waikere, Waihua, Esk, Tutira, Ngaruroro, Tutaekuri, Karamu, Ahuriri, Tukituki, Porangahau, and the Southern Coast.

10.2 Nitrogen, phosphorous, sediment and E. coli contamination

Hawke's Bay Regional Council (HBRC) has indicated that there are issues with all four contaminants and that the severity of the effects varies across the region. Most areas that have an issue with nitrogen are also likely to need to manage phosphorous. Sediment is a bigger issue in the hillier areas of the catchment.

17 http://www.horizons.govt.nz/assets/publications/about-us-publications/one-plan/Chapter-14-Discharges.pdf

10.3 Mandatory requirements

The Tukituki River Catchment Plan Change 6 (hereafter Change 6) is a catchment-specific change to the Hawke's Bay Regional Resource Management Plan that became operative in October 2015.18 It adds new chapters specifically for the Tukituki River Catchment, and at the same time, a number of existing chapters will no longer apply to the Tukituki River Catchment. Among its proposals, Change 6 seeks to address specific water allocation and water quality issues in the catchment.

Five key programmes are being developed to support the implementation of Change 6:19

1. Stock Exclusion
2. Nutrient Budgeting, phosphorus management planning and farm environmental management plans
3. Monitoring, evaluation, reporting and improvement (MERI) Plan
4. Sub-catchment over-allocation mitigation
5. The adoption of Industry Good Practice

These programmes are based on the short-term need to provide transitional support to landholders adapting to the new policies and rules contained within Change 6 and the medium-term programmes to target a coordinated and collaborative approach to driving the adoption of Industry Good Practice throughout the Tukituki Catchment. An additional programme will focus on targeting priority sub-catchments where existing nutrient losses are beyond the proposed targets within Change 6.

10.4 Freshwater quality limits

HBRC is in the process of setting limits for most management areas in the region. Potential limit ranges were developed with policy staff at the councils (Table 9). These limit ranges are expressed as a percentage change from current loads.

The priority catchments in the Tukituki catchment have set limits and targets20 and these are listed in the Tukituki River Catchment Plan Change 6. In the priority catchments, maximum nitrogen leaching rates are set to vary by land use capability (LUC) class (Table 10),21 which is similar to the approach taken by the Horizons Regional Council in the Manawatu-Wanganui

18 http://www.hbrc.govt.nz/About-your-Council/Plans-Strategies/RRMP/Pages/tukituki-plan-change-6.aspx
19 http://www.hbrc.govt.nz/HBRC-Documents/HBRC%20Document%20Library/Heath%20N%202013%20-%20Draft%20Tukituki%20Catchment%20Implementation%20Plan.pdf
20 Limits refer to where existing water quality is better than the desired numerical value and targets refer to where the existing water quality is worse than the desired numerical value
21 http://www.hbrc.govt.nz/HBRC-Documents/HBRC%20Document%20Library/Regional%20Plan%20Change%206%20-%20Tukituki%20River%20Catchment%20(Operative%201%20October%202015)%20excl%20planning%20maps.pdf

region. The limits are not the definitive limits for the region with most subject to change based on additional science, council investigations and outcomes of limit setting processes.

Table 9: Potential limit ranges for catchments in Hawkes Bay (% change from baseline)

Catchment	Nitrogen	Phosphorous	Sediment	*E. coli*
Wairoa	No change	No change	5–10% decrease	No change
Mohaka – upper	10–30% decrease	No change	No change	No change
Mohaka – middle	No change	No change	No change	No change
Mohaka – lower	No change	No change	5–10% decrease	No change
Waikere	0–5% decrease	0–5% decrease	No change	No change
Waihua	0–5% decrease	0–5% decrease	No change	No change
Esk	No change	No change	No change	No change
Tutira	5–15% decrease	5–15% decrease	5–15% decrease	5–15% decrease
Ngaruroro	No change	No change	No change	No change
Tutaekuri	0–10% decrease	No change	No change	No change
Karamu	No change	0–5% decrease	0–5% decrease	No change
Ahuriri	No change	No change	No change	0–5% decrease
Tukituki	See plan (Table 10)	See plan (Table 10)	See plan (Table 10)	See plan (Table 10)
Porangahau	No change	No change	5–10% decrease	0–5% decrease
Southern Coast	No change	No change	No change	0–5% decrease

Table 10: Tukituki catchment nitrogen leaching rate by Land Use Capability (LUC) class (to be calculated on a whole of farm property or whole of farming enterprise basis)

Land Use Class	**LUC1**	**LUC2**	**LUC3**	**LUC4**	**LUC5**	**LUC6**	**LUC7**	**LUC8**
Rate (kgN/ha /yr)	30.1	27.1	24.8	20.7	20	17	11.6	3

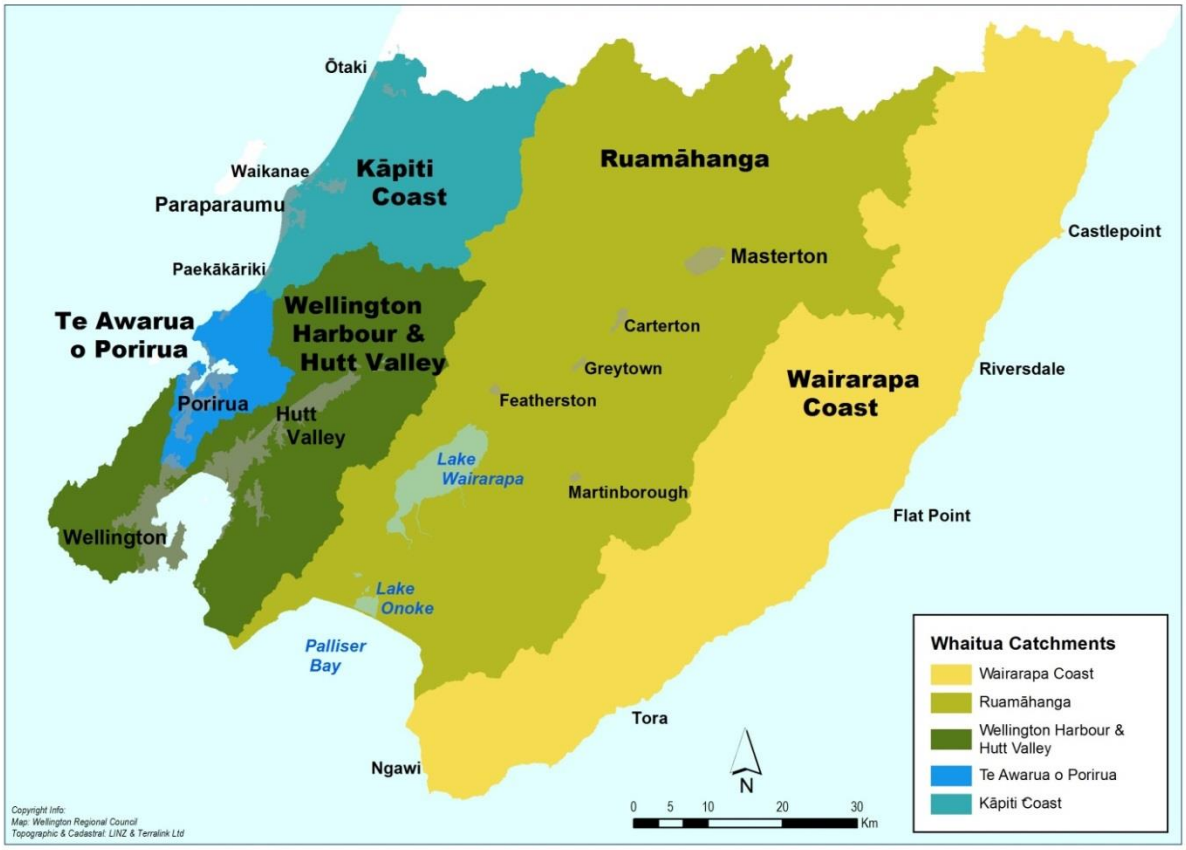
11 Greater Wellington

11.1 Freshwater Water Management Units

The Greater Wellington Regional Council (GWRC) has divided up the region into 5 catchments, referred to a Whaituas.22 These include: Ruamahanga, Wairarapa Coast, Kapiti Coast, Te Awarua o Porirua, and the Wellington Harbour and Hutt Valley (Figure 2). The council has identified that these five areas place different demands on land and water resources and is enlisting the support of local people to help understand local needs and make recommendations on how they will be managed through Whaitua Committees. The first committee established in December 2013 was the Ruamāhanga Whaitua Committee, followed by the establishment of the Te Awarua o Porirua Whaitua Committee in December 2014. Both committees are still in the process of determining the water quality limits required to meet their community values.

22 http://www.gw.govt.nz/whaitua-committees/

Figure 2: Greater Wellington Whaitua catchments.



11.2 Nitrogen, phosphorous, sediment, and E. coli contamination

Sediment is perhaps the largest issue in most of the region. Nitrogen and phosphorous are of some concern, although nutrient-related water quality is generally good in most water bodies. *E. coli* appears to be only a concern in the Kapiti Coast. Heavy metals such as zinc and copper contamination from industry are an issue in areas close to Wellington City.

11.3 Mandatory requirements

GWRC has not specified any mandatory requirements for landowners in the region beyond what is already included in the Regional Plan. They have recently drafted a Proposed Natural Resources Plan that is currently undergoing public consultation. One of the proposed activities is stock exclusion from permanent streams, which should have a noticeable impact on water quality.23

23 http://www.gw.govt.nz/assets/Plans--Publications/Regional-Plan-Review/Proposed-Plan/Chapter-5-Rules.pdf

11.4 Freshwater quality limits

GWRC is still in the process of setting limits for each whaitua in the region. Table 11 lists a draft of possible limits for each whaitua based on discussions with a member of the Science team. The limits are not the definitive limits for the region and are subject to change based on additional science, council investigations, and outcomes of limit setting processes.

Table 11: Potential limit ranges in the Greater Wellington Region (% change from baseline), by catchment

Whaitua Catchments	**Nitrogen**	**Phosphorous**	**Sediment**	***E. coli***	**Heavy metals**	**Comments/notes**
Ruamahanga	5–10% decrease	hopefully dealt with through sediment goals	15–25% decrease	No change	n/a	Most sediment coming from forestry and sheep and beef on highly erodible land; forestry rules. Should be able to deal with *E.coli* by keeping stock out of streams, moving wastewater treatment plant discharge to land (rather than water; currently 3 out of 6 wastewater treatment plants discharge to water). For water allocation, want to get rid of the water races
Wairarapa Coast	No change	No change	25–35% decrease	No change	n/a	Any ag is low intensity, most area is in forestry, typically erosion is into the sea; use of fertiliser rules - don't use fertiliser unless you can grow something; *E. coli* is a public perception problem but not really expected to be an issue
Kapiti Coast	No change	No change	No change	5–15% decrease	n/a	Land use mainly gardens; iwi very active in this catchment limit setting process; *E. coli* mostly from sheep and beef and pigs through overland flows; will address by managing the wetland streams complex; current loads are not high though but likely public perception indicates they will want some sort of improvement.
Te Awarua o Porirua	No change	No change	30–40% decrease	No change	20–30% decrease (Zn & Cu)	Land use mostly low intensity sheep and beef; farmland not used so much; *E.coli* issue is not ag related, mostly stormwater issue from dogs, etc. (should be able to deal with through stormwater infrastructure & restoring habitat in streams
Wellington Harbour & Hutt Valley	10–15% decrease	low P levels; N:P ratio causes an issue	No change	No change	20–30% decrease (Zn & Cu)	N management will be a challenge as most discharge comes from market gardens, golf courses, etc.

12 Marlborough

12.1 Freshwater Water Management Units

FMUs have not been formally set in Marlborough. However, they use the following catchments for State of the Environment Reporting:24 Marlborough Sounds, Rai/Pelorus, Upper and Mid Wairau, Lower Wairau, Opawa and South Marlborough. We use these catchments as the basis for estimating limits in the region.

12.2 Nitrogen, phosphorous, sediment and E. coli contamination [25]

Catchments are prioritised based on the annual State of the Environment monitoring report which categorizes waterways into water quality classes (A–D). The aim is to improve (where possible) water quality of currently marginal classed waterways to a fair class. The process begins with a catchment-wide investigation of water quality in order to identify problem areas and the sources of contamination. The next step for the council is to work with land-owners on improving the water quality through targeted management.

Phosphorous and sediment issues are dealt with on an individual catchment basis with management initiatives being based on catchment investigations. For example, the catchment study for Doctors Creek showed that drainage-works and bank management (including stock access) are the main contributors to increased levels of sediment and phosphorous. The council will work with the land-owners on addressing these problems, initially on a voluntarily basis. It is difficult to assess the possible reduction that can be achieved without mandatory requirements.

Another catchment where sediment is a recognized problem is the Tuamarina River (with follow-on effects on the Wairau Diversion). Investigations are currently being conducted, but it is still unclear, what the main sources are and if and to what extend they can be managed. Therefore the council aims for an improvement in regard to sediment load, but are currently unable to quantify what can be achieved with the current regulatory tools.

12.3 Mandatory requirements[26]

Marlborough regional rules are currently under review and were due to be notified for submission by the end of 2015, but this has still not occurred. There are some fencing requirements, but these may change as a result of the submission process. There are no other

24 Phone discussion with Peter Hamil, December 2015
25 Excerpts from email exchanges between Steffi Henkel (NCC) and Leah Murphy (Motu), December 2015
26 Phone call with Steffi Henkel, December 2015

relevant mandatory requirements in Marlborough, broadly the council works on an issue by issue basis with individual landowners.

12.4 Freshwater quality limits in Marlborough

There are no freshwater quality limits in place at present. Limit setting for the individual FMUs will be done through a community consultation process.

13 Nelson

13.1 Freshwater Water Management Units

Nelson has publically notified its Progressive Implementation Programme for freshwater.[27] Regional policy statement provisions will be publically consulted on during 2016 and the freshwater provisions will be publically consulted on during 2017.

Nelson City has 5 Proposed FMUs:

- Stoke Streams,
- Mahitahi/Maitai,
- Wakapuaka,
- Whangamoa, and
- Roding.

In the case of the North Nelson FMUs (Whangamoa and Wakapuaka) the FMUs are catchment based. The Mahitahi/Maitai FMU is the largest in Nelson and comprises the catchments of the Mahitahi/Maitai, York Stream, Oldham Creek Todd Valley and Hillwood Streams. The Stoke Streams FMU comprises the catchment areas of five streams, although part of the Saxton Stream is within the Tasman District Council area. The final FMU is the Roding. This FMU comprises only the upper portion of the catchment, which is a tributary of the Waimea River. The lower catchment is also within the Tasman District.

13.2 Nitrogen, phosphorous, sediment, and E. coli contamination for Nelson City[28] and priority catchments[29]

Water quality and ecosystem health are generally good in the upper reaches of most catchments in Nelson and in areas with little resource pressure like the Whangamoa River in North Nelson. However, the impacts of urban, pastoral and production forestry land uses are apparent across

27 http://nelson.govt.nz/environment/water-3/freshwater-2/freshwater-management/freshwater-implementation-programme/
28 Email from Chris Spurdle (Taranaki Regional Council) to Leah Murphy (Motu), 2015
29 Information provided by Kate McArthur (on behalf of NCC) in emails to Leah Murphy (Motu), December 2015

different waterways and declines in water quality and ecosystem health at lower catchment sites are common. Specific water quality issues include:

13.2.1 Stoke Streams FMU

The Saxton Stream has some of the worst water quality of all sites in Nelson. Elevated nitrogen, phosphorus, faecal contaminants, and sediment are indicative of pastoral land use with unmanaged or unmitigated contaminant losses.

13.2.2 Roding FMU

Little water quality monitoring has been undertaken in the Roding. Biomonitoring of the water take consent shows significant increasing trends in ecosystem health downstream of the water take since 2002.

13.2.3 Mahitahi/Maitai FMU

The Groom and Sharland tributaries contribute significantly to water quality decline in the lower Mahitahi/Maitai and potentially contribute to cyanobacterial blooms there. Sources of fine sediment and nitrogen from forestry and pastoral land uses require careful management in the Mahitahi/Maitai. York, Hillwood, and Todd Streams have poor water quality. This is a result of the impacts of urban land use and landfills in the York, and pastoral land use in the Todd and Hillwood Streams.

13.2.4 Wakapuaka FMU

Water quality issues including elevated faecal contaminants, soluble nitrogen and sediment that increases between the upstream and downstream sites on the Lud indicates contaminant losses characteristic of unmanaged pastoral land use.

13.2.5 Whangamoa FMU

Water quality and ecological health is very good in the Whangamoa FMU most likely the result of a high proportion of native forest in the catchment. Maintenance of water quality will be an important consideration, particularly if there is any risk of land use change or intensification, and when exotic forest harvesting begins in the tributaries. Little is known about the ecosystem health or water quality of the Māori Pa Stream.

Priority catchments have not been determined yet, but as Nelson is a small region a priority catchment approach is unlikely to be needed. However, there is strong community interest around the Mahitahi/Maitai catchment as it is a focal point of Nelson City and non-regulatory restoration and science has already begun in that catchment through Project Mahitahi/Maitai.30 The poorest water quality is found in the Saxton, York, and to a lesser extent

30 http://nelson.govt.nz/environment/water-3/projectmaitai/

the Todd, Hillwood, and Ludd. Additionally, the Stoke Streams provide the highest biodiversity potential with respect to migratory native fish, given their proximity to the Waimea Inlet and the coastal environment. Water quality in the Whangamoa catchment is very good and requires maintenance rather than improvement based on current monitoring data.

There are insights available about trends in the region due to an independent review of Nelson's freshwater quality classification and river health monitoring information.31 The review provides a stock take of Nelsons freshwater quality and the significant freshwater trends from 10 years of monitoring. Overall, there has been a slight improvement in water quality at monitoring sites. The recommendations in the report include investigations to identify pollution sources in the York and Poorman Valley streams and Maitai catchment, which will be part of the environmental monitoring work programme over the next year.

13.3 Mandatory requirements[32]

There are no mandatory requirements other than the consent process for new activities. However there is a lot of non-regularity activity in Nelson. Of particular note is the council's offer to cover 50% of the costs of fencing or planting around waterways. There has been good uptake of this programme but no statistics are available.

It is likely that impervious surfaces and production forestry have significant land-use influences on water quality in Nelson, with some minor exceptions. Methods around these issues have yet to be developed through the community and iwi engagement process.

Other practices and non-regulatory policies of note that reduce contaminant loads33

There are a range of non-regulatory activities in Nelson City that are expected to have an impact on nitrogen, phosphorous, sediment and *E. coli*.

13.3.1 Working with land owners

Nelson City Council provides free advice for land owners and financial assistance (50 percent) toward fencing livestock out from waterways and native plants for riparian planting and biodiversity enhancement. Several residents have taken up the offer of Council assistance to fence and plant along the Lud and Wakapuaka River, and Stoke stream.

31 Download the Updated Freshwater Classification for Nelson, 2013 Report (2.4MB PDF)
32 Information about mandatory requirements and the fending/planting regime obtained from Sharon Flood of NCC in December 2015. Information about impervious surfaces and projection forestry obtained from Kate McArthur on behalf of NCC, by email in December 2015
33 The information in this section is adapted from the NCC webpage on freshwater management: http://nelson.govt.nz/environment/water-3/freshwater-2/freshwater-management

13.3.2 Project Maitai/Mahitahi[34]

Project Maitai/Mahitahi was launched in July 2014. NCC is working in partnership with iwi, the community, and key agencies in the region, on a 5-year project to improve the water quality of the Maitai/Mahitahi River. The project's goal is to create a river in which it is safe to swim and from which to take *kai*. The integrated projects are addressing a range of issues affecting water quality.

There have been a number of projects over the past year. Six community group projects in and around the Maitai have been set up with support (grants) from the Council. These included planting, monitoring, research and beautification projects. Major riverside planting events have resulted in a total of 6500 plants being put into the ground.

The Maitai and its tributaries run through densely populated areas so there have been several initiatives to reduce urban impacts on water quality, with more planned next year. These have involved locating and fixing three large wastewater leaks, cleaning up of rubbish in Saltwater Creek, and placing of signs and bollards near the Almond Tree Flats ford to prevent inappropriate use of the ford. Other activities have been carried out to help improve in-stream biodiversity.

A variety of other work has also been carried out including fencing stock out of waterways, meetings with forestry representatives, research into gravel movement throughout the catchment and a study of river flows. Operations at the Maitai Dam were changed to improve the quality of water discharged from the reservoir into the Maitai south branch, and options for aeration of the reservoir to improve water quality have been investigated, with further work planned in this area.

13.3.3 Other relevant ongoing work by NCC[35]

The council is enhancing riparian margins and instream habitat for wildlife in urban streams, as part of the flood recovery remediation work.

13.3.4 Freshwater quality limits in Nelson City[36]

Limits have not been formally set for the proposed FMUs in Nelson City. A process to determine the values for each FMU has been completed through community engagement groups and alongside the iwi freshwater working group for Te Tau Ihu o Whakatū. Work to define the attributes relevant to these values has begun and will also involve further stakeholder engagement through 2016. The process of developing freshwater objectives and limits to support the values through each of the attributes will then be undertaken. These objectives and

34 This section has been adapted from the NCC webpage about Project Maitai/Mahitahi: http://nelson.govt.nz/environment/water-3/projectmaitai/
35 http://nelson.govt.nz/environment/water-3/freshwater-2/river-and-stream-health/
36 Information provided by email by Kate McArthur on behalf of NCC, December 2015

limits will then be tested against the current state of the values. Where resources are over-allocated targets will need to be set to achieve the objectives and limit over time. Rationalisation of the costs and benefits of various management approaches (methods) to achieve outcome for water quality and aquatic biodiversity will be undertaken in conjunction with the iwi and community FMU groups, within the bounds of the bottom lines set through the purpose of the Act and the NPS-FM (2014), including life-supporting capacity, requirements to maintain or improve water quality through the NPS-FM and s30 of the Act and the compulsory ecosystem health value and bottom lines within the National Objectives Framework of the NPS-FM (2014).

The estimated change in N, P, Sediment and *E. coli* in the district are noted in the table below. No date has been provided for these estimated targets.

Table 12: Potential limit ranges in Nelson City (% change from baseline), by FMU

FMU	**Nitrogen**	**Phosphorous**	**Sediment+**	***E. coli***
Stoke Streams#	50% decrease for Saxton Stream, other three streams require 5% decrease or no change	25–50% decrease for two streams, 5% decrease or no change for others	25–50% decrease for two streams, 5% decrease or no change for others	50% decrease for 3 or the 4 monitored streams, no change needed for the fourth
Mahitahi/ Maitai	50% decrease for York Stream, other three streams require 5% decrease or no change	Brook, Hillwood and Todd catchments: 60–40% decrease. 5% decrease or no change required in all other streams	>50% decrease needed	50% decrease for York Creek, 25% decrease in Todd, Hillwood and lower Mahitahi/Maitai
Whanga moa	No change	No change	10–20% decrease in the Collins and Dencker tributaries, no change needed elsewhere	No change
Wakapuaka	5% decrease in the Lud, no change needed elsewhere	20% decrease in the Lud, 5% decrease or no change needed elsewhere	20–40% decrease needed in the Lud, 5% decrease to no change needed elsewhere	40% decrease in the Lud. 5% decrease or no change everywhere else
Roding*	No change	No change	No change	No change

+ Historic NCC data on sediment is limited to baseflow conditions – reliable inferences cannot be drawn from this dataset

One stream out of the five in the FMU is not currently monitored

* There is no current reliable water quality information available for the Roding upper catchment FMU. Lack of requirement for change is based on MCI and Ecosystem health monitoring at the water supply weir for consent monitoring purposes. Given the land use in the FMU, it is unlikely reductions will be needed at this stage

Although many freshwater objectives and limits will already be met (see Table 12 where no change is stated), others will require targets and management actions over time – this will depend on the nature of the cause and how easily impacts are managed. As yet, no time frames have been explored.

14 Tasman District

14.1 Freshwater Water Management Units

There are six water management areas defined in the Tasman District: Oerere/West Coast, Takaka, Upper Buller, Motueka (consists of Upper Motueka, Middle Motueka, Motuek/Riwaka Plains, Abel Tasman), Moutere, and the Waimea.

14.2 Nitrogen, phosphorous, sediment, and E. coli contamination

There are few issues with contaminants in the district. The Waimea has issues with legacy nitrogen in groundwater from a piggery and intensive market gardens, but this is not expected to be a major concern as long as the land use does not change much in the future. *E. coli* used to be an issue in the Oerere/West Coast water management area, but this has since been resolved. There are no known concerns about P and sediment.

14.3 Mandatory requirements

Tasman District Council (TDC) has not specified any mandatory requirements for landowners in the region beyond what is already included in the Regional Plan.

Other practices and non-regulatory policies of note that reduce contaminant loads

The council did not specify any other policies of note that could help reduce contaminant loads.

14.4 Freshwater quality limits

A draft list of possible limits for each water management areas in the Tasman District was based on discussions with planning staff (Table 13). There are not expected to be any water management areas that require reductions in contaminants from current discharge levels. The limits, however, are not the definitive limits for the region and are subject to change based on additional science, council investigations and outcomes of limit setting processes.

Table 13: Potential limit ranges for Tasman District (% change from baseline), by water management area

Water management area	Nitrogen	Phosphorous	Sediment	*E. coli*	Comments/notes
Oerere/West Coast	No change	No change	No change	No change	*E. coli* was an issue but it is mostly resolved now
Takaka	No change	No change	No change	No change	Maybe more irrigation going into catchment to feed cows in summer (some soils may need more water); significant springs in catchment--Te Waikoropupu; going to implement farm plans
Upper Buller	No change	No change	No change	No change	Water Conservation Order in place; ecosystem health is key; expect a little more dairying; will need better land use practice than currently have; more stock access & fencing
Motueka	No change	No change	No change	No change	Water Conservation Order in place in the Upper Motueka; some risk of dairy but not a large risk
Moutere	No change	No change	No change	No change	Very dry and hilly; not suitable for dairy; lots of forestry; follow good practice and should be okay
Waimea	No change	No change	No change	No change	Legacy N (in groundwater) from piggery and intensive market gardens; if dam, then more horticulture (if livestock decreases and goes to apples it should be okay but if land goes into market gardens then water quality problems could arise; will use farm plans and track market garden conversion; there are 3 dairy farms, all small titles and won't be able to amalgamate titles to convert to dairy; mostly a groundwater system (not much surface water)

15 Canterbury

15.1 Freshwater Management Zones

There are 13 freshwater management zones in Canterbury:37 Kaikoura, Conwway, Hurunui-Waiau, Waipawa, Ashley and Waimakariri, Christchurch-West Melton, Selwyn-Waihora,

37 http://ecan.govt.nz/publications/Reports/targets-report-cwms-2015.pdf

Waiwera-Lake Forsyth, Ashburton to Rakaia, Hinds Plain, Orari-Opihi-Pareora, Waitaki, and South Coastal Canterbury. Each of these zones consists of multiple FMUs.

15.2 Nitrogen, phosphorous, sediment, and E. coli contamination

Nitrogen is the contaminant of most concern in the region. There are also some concerns about phosphorous, faecal indicator organisms (FIOs), and occasionally metals.

15.3 Mandatory requirements

There are a range of mandatory requirements in place that relate to the management of freshwater contaminants in Canterbury, some highlighted requirements are:38

- Farm Environment Plans (FEPs) and nutrient budgets are required. The plan sets limits on the amounts of nutrients such as nitrogen that can be leached into the environment especially in zones where current water quality objectives are not being met — the 'red' Nutrient Allocation Zones.
- Depending on the farm risk profile, the FEP will need to be audited regularly to monitor improvement in on-farm management practice.

15.4 Other practices and non-regulatory policies of note that reduce contaminant loads

There are a range of activities underway that relate to the management of contaminants in Canterbury:39

- The council is actively encouraging all farmers to collect their nitrogen loss data and to use Overseer™ to prepare nutrient budgets.
- Since 2009, ten catchment-based zone committees have been established as joint committees of the district or city councils and Environment Canterbury with membership from local rūnanga and appointed community members. More than 950 recommendations have been made by the Zone Committees; they include setting catchment load limits and improving nutrient management. Annually updated zone-based work programmes are in place for each Zone Committee, with clear projects and milestones tailored to meet the Zone Committees' 5-year outcomes. Currently, there are more than 90 projects underway in partnership with industry and community groups, involving more than 3400 stakeholders.

38 Adapted from: http://ecan.govt.nz/publications/Reports/targets-report-cwms-2015.pdf
39 Adapted from: http://ecan.govt.nz/publications/Reports/targets-report-cwms-2015.pdf

- The types of work programmes by catchment zone committees include: scheme support, farm environmental plans, planting, education, partnerships, catchment groups, field days, and awareness raising.
- Matrix of Good Management project aims to identify expected nitrogen and phosphorous losses under Good Management Practice across the range of farming systems, soils, and climates within the Canterbury region. This will be achieved through collaborative research and stakeholder engagement involving the primary industries, researchers, and Environment Canterbury.

15.5 Freshwater Quality Limits

Environment Canterbury has developed and started on a schedule of notified RMA Plans to set water quality limits.[40] The Land and Water Regional Plan (LWRP), effective from January 2014, sets the framework to implement community aspirations for water through the Canterbury Water Management Strategy. The plan includes region-wide limits that apply across most of Canterbury. These limits apply now and are based on the Nutrient Allocation Zones (NAZ) around Canterbury.[41] The more serious the water quality issues in a NAZ the stronger the rules. By 2017 the LWRP will be updated to reference the Matrix of Good Management that specifies numbers for nitrate and phosphorus losses and sets out good management practices across a range of land types, climates, and land uses.

Catchment load limits are in the process of being set for each of 13 water management zones through Regional Catchment Plans and sub-catchment.[42] The council's target is that a programme will have been implemented by 2020 to review existing consents where such reviews are necessary in order to achieve catchment load limits.

Many of the water management zones have been assessed and categorised as either Red (water quality not met) or as Orange (water quality at risk). Progress on limit setting is variable, with the four zones most advanced in the process (submission of plan and/or decisions reached): Hurunui/ Waiau River; Hinds Plain; Selwyn-Waihora; and South Coastal Canterbury.43 Details on the three zones where limits have been set are listed in Table 14.

40 Adapted from: http://ecan.govt.nz/publications/Reports/targets-report-cwms-2015.pdf
41 Please note it is not clear how these 'limits' relate to those being set for each catchment and described below
42 Adapted from AgResearch, *Climate mitigation co-benefits arising from the Freshwater Reforms: Summary of policy and agricultural landscape: Report prepared for MPI (Milestone Report 1),* 2015
43 Comments about these zones have been adapted from AgResearch, *Climate mitigation co-benefits arising from the Freshwater Reforms: Summary of policy and agricultural landscape: Report prepared for MPI (Milestone Report 1),* 2015 and email information provided by Environment Canterbury staff to AgResearch

Table 14: Limits for water management zones in Canterbury (% change from baseline)

Water management zone	**Nitrogen**	**Phosphorous**	**Sediment**	***E. Coli***	**Comments/notes**
Hurunui/ Waiau River	20% permissible increase in N loads at the river level.	No change	n/a	n/a	Phosphorus is the main contaminant of concern in this zone. Phosphorus limits are set at the 2005–10 catchment average (i.e. set for the receiving environment) and are therefore at or around current values. There is some headroom for intensification, in terms of limits on N. No farm limits have been set.
Selwyn-Waihora	See comments section for limits – equates to about 30% reduction	Reduce the receiving environment phosphorus load by 50%	n/a	n/a	Similar to Hurunui/ Waiau, this zone is considered to be P-limited. Approximately half of the reduction is expected to be achieved by targeting the receiving waters (e.g., alum dosing). Although the remaining half will need to be achieved by reducing the catchment load, no specific P discharge allowances have been set because it is technically too difficult to set farm specific limits. From 2017, if nitrogen loss >15 kg N/ha/year (OVERSEER® estimates), farmers will need to achieve good management practice N loss rates for their existing (2009–13) land use. For nitrogen loss <15 kg N/ha/year, land use change is allowed, provided farmers operate at good management practice and loss rates do not exceed 15 kg N/ha/year. From 2022: all farms with losses of more than 15 kg N/ha/year will need to further reduce nitrogen losses (ranging from 30% for dairy to 7% for arable; see Table 7 on page 18 of the AgResearch 2015 report for details for each sector).
Hinds/ Hekeao Plains	Estimate 15–20% by 2035 across the catchment44				The main issue in this zone relates to dairy and dairy support. The council has agreed to reductions of 15% by 2025, 25% by 2030 and 36% by 2035 or down to 20 kgN/ha (whichever is greater) for land uses leaching >20 kgN/ha in 2015. There are flexibility allowances for lower emitters to increase to 15 and 20 kgN/ha, so the overall catchment scale reductions are lower than the percentage reductions for higher emitters. (See Table 8 on page 19 of the AgResearch 2015 report for details for each sector). In recent council decisions about the Hinds, there are some values for other contaminants that could be considered limits45. These could be further investigated but are not provided here.

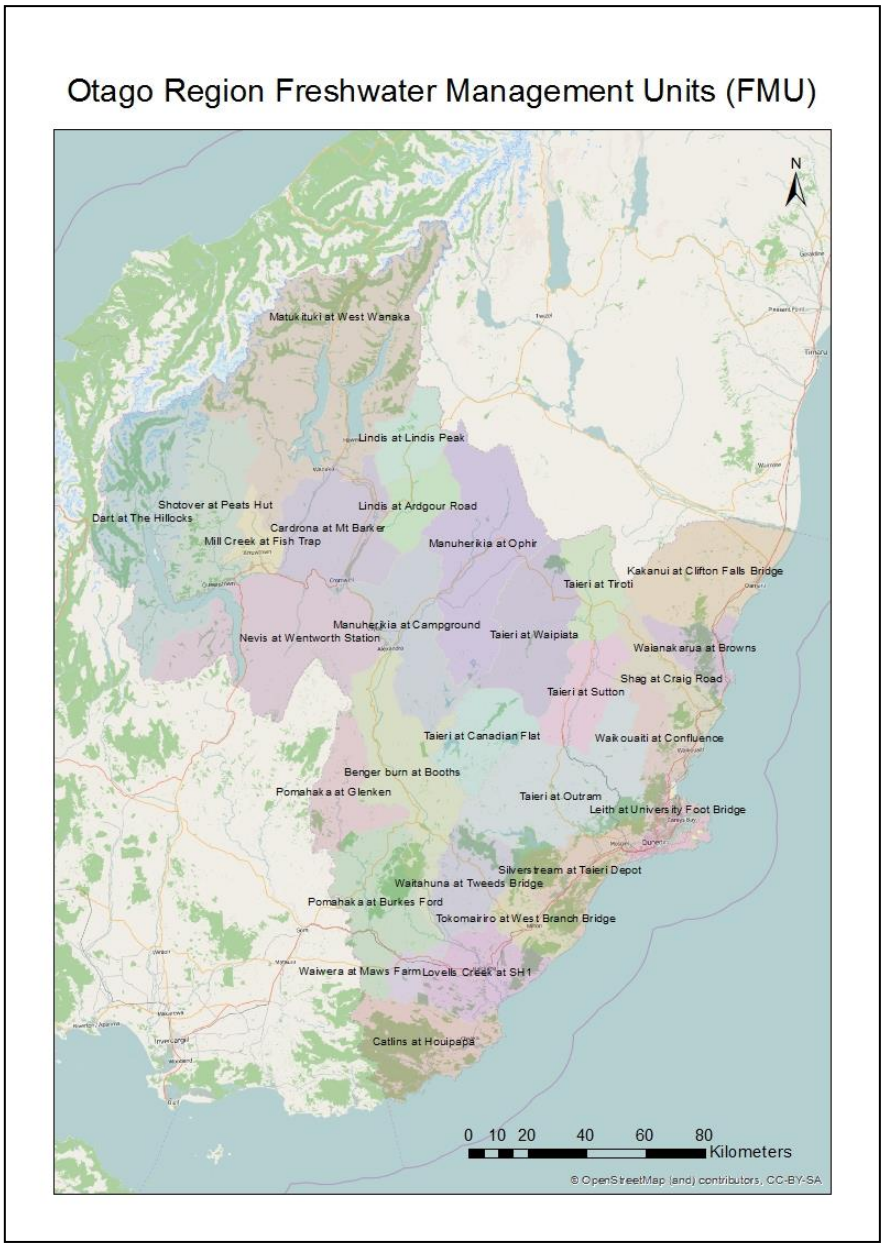
44 Information provided by Lisa Scott (ECAN) in an email to Melissa Robson (AgResearch), February 2016
45 Information provided by Robert Bower (on behalf of ECAN) by email to Melissa Robson (AgResearch), February 2016

16 Otago

16.1 Freshwater Water Management Units

Otago has the following main water catchment areas:46 Kawarau, Upper Clutha, Lower Clutha, North Otago, Taieri, and Dunedin. Within these catchment areas, there are 29 defined FMUs (Figure 3).

Figure 3: Otago FMUs.



46 http://water.orc.govt.nz/WaterInfo/Default.aspx

16.2 Nitrogen, phosphorous, sediment, and E. coli contamination

Otago Regional council has set targets and limits for its freshwater bodies and have supplied the percentage change from the current levels to 2025. More is discussed below.

16.3 Mandatory requirements[47]

The Otago Water Plan includes a suite of water quality rules to ensure good quality water in Otago's waterways. These rules control contaminants and sediment from non-point sources, mainly rural farming.

Otago Regional Councils Plan Change 6A is an effects-based, permitted activity approach to managing contaminants which may affect the water quality of waterways. Where an activity has a minimal effect on a waterway, resource consents are not needed as long as certain conditions are met. However, gross discharges and objectionable activities that degrade water quality are prohibited.

The rules provide for permitted activities, prohibited activities and a set of limits, targets and thresholds.

16.3.1 Permitted Activities

Permitted activities include contaminant discharges including surface runoff, groundwater seepage, or discharges from drains and races if:

- they comply with conditions controlling the effects of sediment runoff
- after 2020 they comply with the Otago Water Plan Schedule 16 thresholds set for nitrogen, phosphorus, and *E. coli*
- they comply with rules on nitrogen loss to groundwater as calculated using OVERSEER (Version 6).

There are specific conditions that must be met for each type of discharge set out in the rules:

- Discharges of water or contaminants
- Sediment discharge to waterways
- Discharges from water races
- Discharges from small dams
- Discharges to and from drains
- Construction work that disturbs the bed of a waterway
- Building a single span bridge
- Building a crossing
- Driving stock through waterways.

47 Information adapted from ORC website on the Water Quality Rules Plan Change 6A: http://www.orc.govt.nz/Publications-and-Reports/Regional-Policies-and-Plans/Regional-Plan-Water/Water-Quality-Rules-Plan-Change-6A/

16.3.2 Prohibited Activities

Landowners in Otago are not permitted to discharge:

- any contaminant to water that produces a nasty odour, or an obvious oil or grease film, scum, or foam
- any contaminant from an effluent pond or any other animal waste collection or storage system, silage pit, or composting
- sediment from disturbed land to water in any lake, river, or Regionally Significant Wetland, or to any drain or water race that flows to them or to coastal waters if nothing has been done to control sediment runoff.

16.3.3 Limits, Targets and Thresholds

Schedule 15 of the Otago Water Plan48 describes and sets out the characteristics, contaminant concentration limits, and targets for good quality surface water in Otago rivers and lakes, as required by the National Policy Statement for Freshwater Management. These are discussed in the section below.

Schedule 16 thresholds49 set the maximum concentration of contaminants that can come off any property, or from drains and irrigation races, and pass into waterways, without a consent. The thresholds come into effect from April 2020 and only apply when the representative flow site is at or below median flow. The sediment rules apply now.

16.4 Other practices and non-regulatory policies of note that reduce contaminant loads

Landholders are responsible for choosing methods of managing contaminant discharge to waterways that ensure that their property complies with the rules. Otago Regional Council provides some information about what landowners can do.

For example, it has provided the following guidance about what activities will help landowners to comply with the rules in areas where water quality is deteriorating:

- Improved effluent management
- Stock exclusion from streams and wetlands
- Nutrient management planning
- Wintering cows in herd shelters with restricted autumn grazing
- Uncultivated grass riparian strips

48 http://www.orc.govt.nz/Documents/Publications/Regional/Water/Plan%20Change%206A/2015/Schedule%2015.pdf

49 http://www.orc.govt.nz/Documents/Publications/Regional/Water/Plan%20Change%206A/2015/Schedule%2016.pdf

- Stock tracks and lanes located away from streams
- Limiting fertiliser use or using nitrification inhibitors
- Quickly removing dead animals from waterways.

The council commissioned AgResearch to study water quality in the Pomahaka catchment in South Otago and the effects of farming on it. The report[50] identifies the cost-effective means available to farmers to reduce stream contamination (see page 34, section 3.5.2: The cost and effectiveness of mitigation strategies for decreasing contaminant losses from dairy and sheep farms).

The council provides a phone line for information on farm discharge management practices that will help meet discharge limits.

16.5 Freshwater quality limits

The contaminant concentration limits and targets for nitrogen, phosphorus, *E. coli*, and turbidity (sediment) in Otago are listed in Schedule 15 of the Otago Water Plan (Table 15). These must be met by 31 March 2025, if they have not already been met. Schedule 1651 sets the maximum concentration of contaminants resulting from discharges that can come off any property, or from drains and irrigation races, and pass into waterways, without a consent. Schedule 16 sets thresholds for *E. coli*, phosphorus, and nitrogen. The thresholds come into effect from April 2020.

50 http://www.orc.govt.nz/Documents/Publications/Regional/RWQS/AgResearch%20-%20WQ%20of%20the%20Pomahaka%20River%20-%20scope%20for%20improvement.pdf

51 http://www.orc.govt.nz/Documents/Publications/Regional/Water/Plan%20Change%206A/2015/Schedule%2016.pdf

Table 15: Estimated limits based on Schedule 15 for the Otago Region (% from baseline) between 2015 and 2025

Receiving water	Nitrogen	Phosphorus	Sediment	*E. coli*
Catlins at Houipapa	1% decrease	No change	No change	26% decrease
Leith at University Foot Bridge	1% decrease	No change	No change	63% decrease
Lovells Creek at SH1	No change	No change	No change	No change
Pomahaka at Burkes Ford	37% decrease	No change	No change	24% decrease
Tokomairiro at West Branch Bridge	No change	No change	No change	19% decrease
Waitahuna at Tweeds Bridge	No change	No change	No change	41% decrease
Waiwera at Maws Farm	50% decrease	24% decrease	No change	65% decrease
Benger burn at Booths	No change	No change	No change	No change
Cardrona at Mt Barker	No change	76% decrease	No change	18% decrease
Kakanui at Clifton Falls Bridge	No change	No change	No change	No change
Lindis at Ardgour Road	59% decrease	No change	No change	No change
Lindis at Lindis Peak	No change	No change	No change	No change
Manuherikia at Campground	80% decrease	65% decrease	60% decrease	20% decrease
Manuherikia at Ophir	No change	40% decrease	No change	No change
Mill Creek at Fish Trap	82% decrease	No change	No change	42% decrease
Pomahaka at Glenken	No change	No change	No change	54% decrease
Shag at Craig Road	32% decrease	No change	No change	No change
Silverstream at Taieri Depot	80% decrease	No change	No change	No change
Taieri at Sutton	No change	29% decrease	No change	41% decrease
Taieri at Waipiata	No change	78% decrease	No change	46% decrease
Waianakarua at Browns	70% decrease	No change	No change	No change
Waikouaiti at Confluence	No change	No change	No change	No change
Taieri at Outram	No change	38% decrease	7% decrease	66% decrease
Shotover at Peats Hut	No change	No change	26% decrease	No change
Taieri at Tiroti	No change	71% decrease	28% decrease	86% decrease
Dart at The Hillocks	No change	No change	94% decrease	No change
Matukituki at West Wanaka	No change	No change	No change	26% decrease
Nevis at Wentworth Station	No change	No change	No change	No change
Taieri at Canadian Flat	No change	No change	No change	No change

17 West Coast

17.1 Freshwater Water Management Units

Two management areas have been set for the West Coast, one contains catchments for Lake Brunner and the other is entitled 'West Coast Excluding Brunner'. Most of the West Coast Excluding Brunner management area is in the Department of Conservation (DOC) estate, in the order of 86% of the region.

17.2 Nitrogen, phosphorous, sediment, and E. coli contamination[52]

In general, water quality in the region is either excellent or at acceptable levels. Three catchments have had quality issues. Phosphorus is the most problematic contaminant in the region. In Lake Brunner, Orawaiti, and Harris Creek the issue has been identified through monitoring and a set of management activities put in place. In each case water quality has returned to acceptable levels, most notably and recently in Lake Brunner. The statement below was made by the West Coast Regional Council in 2015:53

As of January 2015 lake water monitoring data shows the rolling 5 year mean of the Tropic Level Index (TLI) for the lake dropped below the target level of 2.8. This means that all the hard work by landowners and others in the catchment in recent years has paid off. The TLI target has been met five years earlier than was anticipated in the Regional Council's Land and Water Plan.

Lake Brunner will require ongoing management through the rules that have already been established (dedicated policy chapter in the regional plan). Other catchments where there have been issues include Orawaiti and Harris Creek.

The catchments in the DOC estate are not considered to be a problem.

17.3 Mandatory requirements

The Land and Water plan became operative in 2014.[54] Its goal is to reduce the loss of phosphorus to water in the Lake Brunner catchment. It notes that phosphorus is the limiting nutrient in Lake Brunner and that discharges of phosphorus can result from discharges of dairy effluent, the use of phosphorus-based fertiliser, and stock access to waterways.

The plan sets out to:

- require discharges of dairy effluent in the Lake Brunner catchment to be to land, rather than directly to water
- prevent stock access to waterways

52 Phone call with Lillie Sadler, November 2015
53 http://www.wcrc.govt.nz/Documents/Newsletters/2015%20September%20Newsletter.pdf
54 http://www.wcrc.govt.nz/our-services/resource-management-planning/Pages/Land-and-Water-Plan.aspx

- reduce the loss of phosphorus to Lake Brunner associated with the development of land, by managing phosphate fertiliser use in the catchment so that no net increases in annual loss occurs per property, and
- encourage methods of wintering of stock that will reduce the risk of phosphorus loss in the Lake Brunner catchment, including the management of effluent that results from wintering methods.

One of the many methods listed in the plan is to encourage the implementation of Nutrient Management Plans and Farm Plans to address best practice on individual farms to reduce effects on Lake Brunner.

The plan contains specific rules relating to:

- grazing and livestock access to riparian margins (permitted with requirements)
- any humping and hollowing, flipping, v-blading, or contouring in the Lake Brunner catchment (discretionary activity)
- stock crossings through waterways in the Lake Brunner catchment (discretionary activity)
- discharge of fertiliser, into or onto land (permitted with conditions)
- phosphorous fertiliser shall not be discharged in the Lake Brunner catchment to land that is developed under Rule 15 unless it has a water solubility of less than 10 percent
- discharge of phosphorus fertiliser into or onto land in the Lake Brunner Catchment associated with land development requires a consent (controlled activity)
- discharge of agricultural effluent into or onto land, in the Lake Brunner catchment, requires a consent (controlled activity).

17.4 Other practices and non-regulatory policies of note that reduce contaminant loads

Non-regulatory activities include riparian planting, fencing and farm plans with funding from the Ministry for the Environment. The West Coast Regional Council News55 reports that:

- In 2003/4 Council received funding through the Ministry for the Environment to undertake farm planning work in the catchment. The farm plan work was coordinated by Landcare Trust and was a voluntary process, where each participating landowner worked through a list of water quality issues identified on their property. These were prioritised and compiled into a three year plan for the farm, fitting within the farm budget. The voluntary farm plan work received a high uptake from the farming community and resulted in many improved practices. It identified high priority actions, which were completed by farmers at their own cost. In 2013 Council and Westland Milk Products funded further farm planning

55 http://www.wcrc.govt.nz/Documents/Newsletters/2015%20September%20Newsletter.pdf

work in the catchment to assist landowners in meeting the new rules. This was again a voluntary process with a high level of uptake.

- In 2013 Council was successful in an application to the Ministry for the Environment Fresh Start to Freshwater Fund. This resulted in $200,000 being allocated towards riparian planting and fencing work within the catchment. $20,000 of the funding was allocated towards the newly formed Lake Brunner Catchment Care Group who used the funding to plant and fence four community sites. $180,000 was allocated towards works landowners identified in their farm plan, which related to improving water quality. This project is set for completion in October 2015.

17.5 Freshwater quality limits

The Land and Water Plan Objective for Lake Brunner/ Kotuku-Whakaoho Catchment is:56 "To improve the water quality of Lake Brunner by managing the adverse effects of activities in the catchment to reach an average trophic level index of 2.8 by 2020, and then maintain or enhance the trophic level index." This trophic level index was achieved in 2015 which is 5 years earlier than required.

This means that no change in contaminant levels is needed between 2015 and 2020 (or later) for both management areas. In Lake Brunner, however, there will be ongoing management activities to ensure the water quality remains as good as it is today. In most other areas the land use and associated waterways are pristine.

18 Southland

18.1 Freshwater Water Management Units

Southland is drained by four major river catchments: Waiau, Mataura, Oreti, and Aparima Rivers. Combined, these cover 54% of the region. Southland has aggregated the remaining land into a fifth area called Fiordland and Stewart Island.

18.2 Nitrogen, phosphorous, sediment, and E. coli contamination

Pressures on water quality in Southland are mainly due to agricultural intensification, and industrial and urban waste water discharges (Environment Southland 2015). While water quality is generally excellent in natural state areas such as Fiordland, many lowland rivers and streams show elevated levels of nutrients. Water quality issues across the region vary but include sediment, nitrogen, phosphorous and bacteria contamination. Water quality is good in conservation areas (Fiordland and Stewart Island) and in 'low intensity' (hill and high country) areas. In contrast, the Mataura and Oreti Rivers are polluted, which is often associated with the

56 West Coast Regional Council Rates

increasing pressure that growth in farming and urban communities has placed on the region's waterways.

18.3 Mandatory requirements and other practices and policies of note that reduce contaminant loads

A two-pronged approach to managing water quality is currently being pursued. The first involves the development of a set of 'Interim Measures' intended to 'hold the line' in terms of stopping any further decline in water quality, against the backdrop of continuing changes in land-use patterns and intensity. These on-farm measures are proposed as the minimum standard for operations in Southland and are being put forward to ensure that stakeholders are in the best possible position when catchment limits will have to be set.

The measures currently being considered include:

- Managing critical source areas of runoff
- Hill country development and cultivation of steep land
- Stock access to waterways
- Nutrient management
- Riparian management, and
- Managing intensive winter grazing operations.

The second approach to guide the setting of limits is to categorize the region into different physiographic zones. The science team at Environment Southland has identified how these zones vary according to factors such as water origin, soil type, geology, and topography. Each zone is different in the way contaminants build up and move through the soil and aquifers, and into streams and rivers. This approach has provided a framework from which the council has been able to develop proposed policies and rules based on the particular issues for each zone. For example, in a zone where groundwater nitrate is the main issue, there may be more requirements for managing nitrate than in zones where nitrate is not the main issue (AgResearch 2015).

18.4 Freshwater quality limits

In terms of limit setting, Environment Southland is establishing a new Water and Land Plan under a new project called: Water and Land 2020 and Beyond. The timetable for development of catchment plans varies, but all 5 are expected to be started by 2018 (AgResearch 2015). As a result, there are no defined limits for Southland at the time of this report.

19 Summary

As discussed in this report, specified targets to reduce diffuse source contaminants to waterways vary widely both across and within regions of New Zealand. A summary of the regional level targets (with range based on the spread across water management areas in the region) is listed in Table 16. Note that for most of these regions, the limits/targets are still in draft form and/or still under discussion with stakeholders working through collaborative processes and hence could change in the future. For the regions where limits are currently undefined and there are no potential limits specified, we will use NIWA's CLUES model to estimate the current baseline loads (based on 2012 land use). We then use these baseline loads as the limit for that water management area.

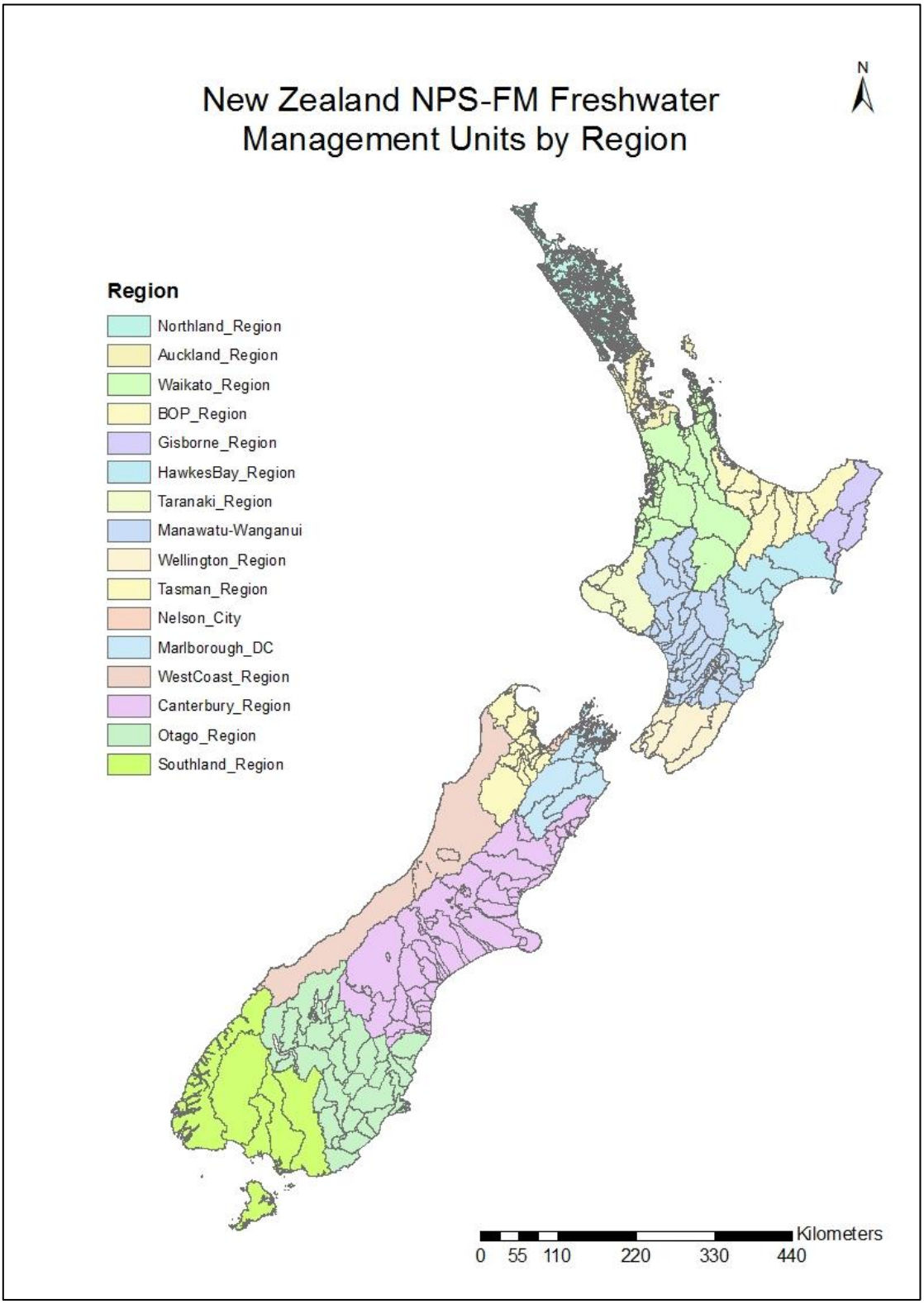
The national-level map of the different types of water management areas is shown in Figure 4. These areas are primarily based on a GIS shapefiles files provided by the Regional Councils. Where GIS files were not available, the management area boundaries were drawn in ArcGIS based on maps published online and/or descriptions provided by the council.

Table 16: Summary for the range of potential or actual regional level limits (% change from baseline)

Region	FMUs	Contaminant Limits (% change from 2012 baseline)			
		Nitrogen	**Phosphorous**	**Sediment**	***E. coli***
Northland	n/a	undefined	Undefined	undefined	undefined
		0–50%	0–20%	0–10%	
Auckland	9	decrease	decrease	increase	No change
Waikato	8	undefined*	Undefined	undefined	undefined
Bay of Plenty	9	undefined^	Undefined	undefined	undefined
		0–12%	0–50%	0–65%	0–94%
Gisborne	3	decrease	decrease	decrease	decrease
		0–30%	0–10%	0–10%	0–10%
Hawkes Bay	15	decrease	decrease	decrease	decrease
		0–10%	0–30%	0–30%	0–30%
Taranaki	4	decrease	decrease	decrease	decrease
Horizons	43	undefined	Undefined	undefined	undefined
Greater		0–15%		0-40%	0–10%
Wellington	5	decrease	No change	decrease	decrease
		0–50%	0–50%	0-50%	0–50%
Nelson	5	decrease	decrease	decrease	decrease
Tasman	6	No change	No change	No change	No change
Marlborough	n/a	undefined	undefined	undefined	undefined
		0–30%	0–50%	No change	No change
Canterbury	10	decrease	decrease		
		0–80%	0–78%	0–94%	0–66%
Otago	29	decrease	decrease	decrease	decrease
West Coast	2	No change	No change	No change	No change
Southland	5	undefined	undefined	undefined	undefined

* with exception of Lake Taupo catchment
^ with exception of Lake Rotorua catchment

Figure 4: Freshwater management areas used for the purposes of this analysis



Note: FMU is used to refer to the range of different management areas across the country.

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Appendix: Approach to determining the limits for the catchments in each region

Objective: to obtain information on possible contaminant reduction levels for all freshwater management units (FMUs) of New Zealand (note not all regions have identified FMU as yet so other types of management units have been used in some regions).

1. Get a map of regions catchments and any relevant water policy documentation/plans.
2. Contact a senior planner or other appropriate personnel
3. Find out: limits by catchment for nitrogen, phosphorous, sediment, and *E. coli* by asking the following questions:
    a. Have the FMUs for the region been finalised?
        i. If so, what are they and is there a GIS layer available for them?
        ii. If so, how well do they correspond to catchment boundaries?
    b. For each FMU, are their concerns about nitrogen, phosphorous, sediment, E. coli?
        i. If so, have reductions levels (or limits) been proposed or agreed and what are they?
        ii. If status quo, what does this mean – no change, business as usual (so some change probably for the worst but it can handle it??), no new regulation? To confirm approach to be used for all.
        iii. If no reduction levels (or limits) have been proposed or agreed, what does the council think the possible range of reductions (limits) might be, e.g. 5–10% reduction, 30–40% reduction, keep at current levels? Is there a possible plausible scenario (try to make consistent between regions)?
    c. Which are the priority catchments? Do some catchments affect others? Are some catchments not considered a problem?
    d. In the region are there any mandatory requirements on landowners that may affect nitrogen, phosphorous, sediment, and E. coli levels and what are they, e.g. streambank fencing is required on all streams with slope < x percent?

What kinds of practices are landowners undertaking to reduce the different contaminant loads in the region/FMU?