Northland REGIONAL COUNCIL
Te Kaunihera ā rohe o Te Taitokerau

He Mahere Pāmu mō Te Tiaki Wai

Freshwater Farm Plan

Te horopaki, ngā wero, me ngā uara o te riu hopuwai: Te wehenga whakahaere waimāori o Northern Wairoa

Catchment context, challenges and values: Northern Wairoa freshwater management unit

Te Ihirangi
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How to use this document

This document provides information about the Northern Wairoa freshwater management unit (FMU). It enables you to understand the issues and challenges in the FMU and ensure they are recognised in your freshwater farm plan. It does not provide a template for creating your freshwater farm plan, but it provides guidance on the key things you need to think about as you prepare your plan.

The document has four main sections:

1. **Overview** – This section provides an overview of the Northern Wairoa FMU and a summary of the key challenges to freshwater quality in the FMU.

2. **Context and values** – This section gives you contextual information about topics such as the topography, land use, soils, waterbodies, biodiversity, climate, and Māori iwi and hapū in the FMU. It also identifies community, tāngata whenua, biodiversity or other values that you need to consider when preparing your farm plan.

3. **Challenges –** This section focuses on the challenges to freshwater in the FMU. Challenges are presented as subsections, each focusing on a specific challenge.

4. **Central government and regional council rules** – This section is a brief overview of relevant central and regional government rules and regulations.

Each section is important. Please check them all before preparing your farm plan. You can read the document from start to finish, or dip into the subsections as you need them.

This document can be read on a screen or as a printed copy. Links to further information are provided where relevant as you work through the document. If you read the document on a screen, click the links to find the additional information. If you read the document in print, look out for the arrow icon alerting you to online resources (see 'Abbreviations and interpretation' below). Type the URL beside the arrow icon into your browser to find an online resource library with all the further information links gathered in one place.

This document works alongside the Te Taitokerau CCCV viewer.

Abbreviations and interpretation

FDE	Farm dairy effluent
FMU	Freshwater management unit
ha	hectare
KMR	Kaipara Moana Remediation
Land Unit	an area of contiguous or non-contiguous land with similar biophysical features. (definition from RMA Freshwater Farm Plan Regulations 2023)
MCI	Macroinvertebrate community index
TLI	Trophic level index
	Online further information resource

He Tirohanga Whānui

Overview

The Northern Wairoa freshwater management unit (FMU) covers 365,000ha (Fig 1). It stretches from Kaipara, Whangārei, and Far North to the Kaipara Moana (harbour). The catchments and rivers in the Northern Wairoa FMU drain to the Kaipara Moana, so the state of freshwater affects the harbour and its ecosystems.

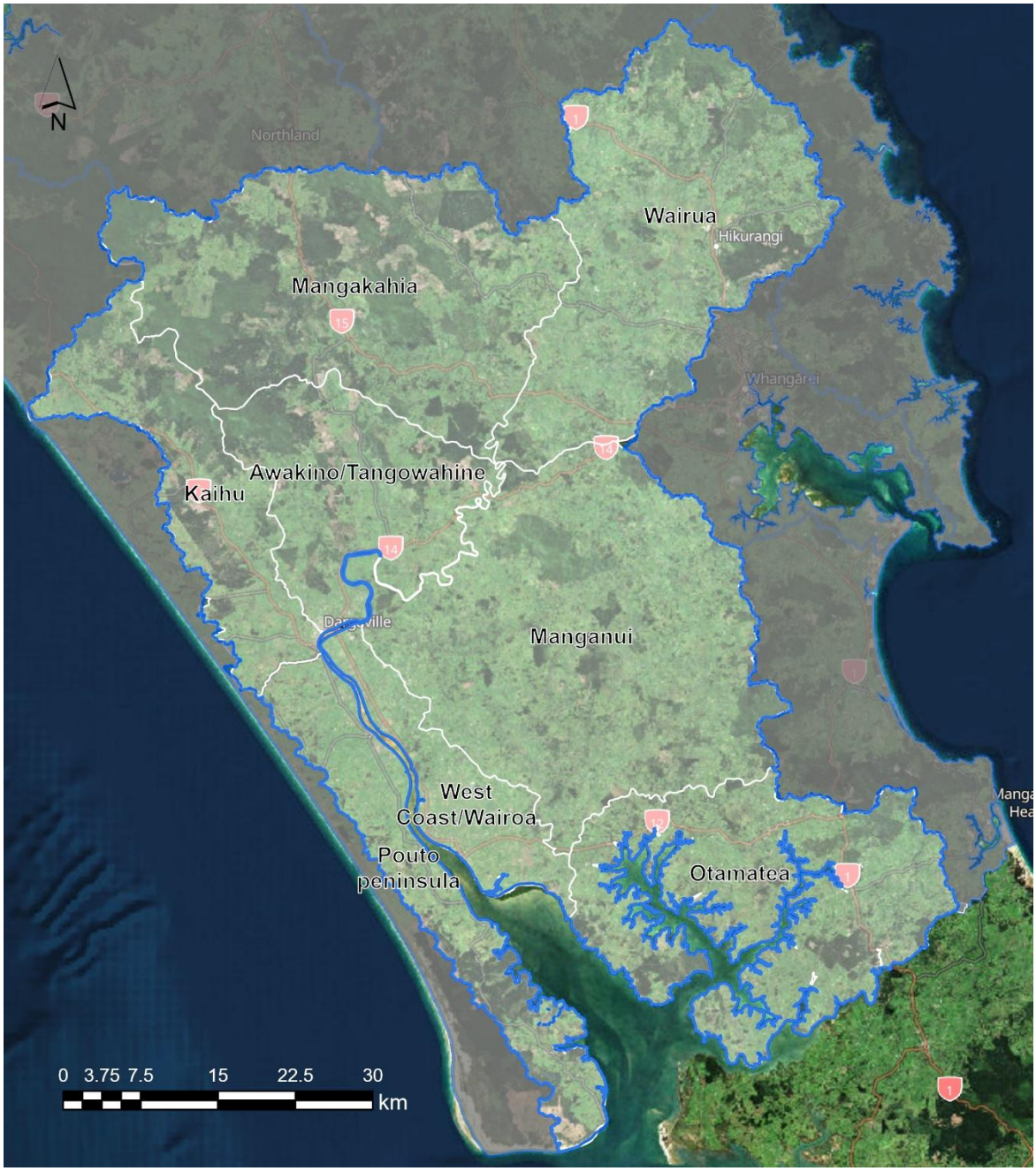
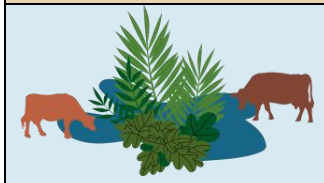


Figure 1: The Northern Wairoa freshwater management unit has eight sub-catchments

Table 1: Summary of causes, impacts, and considerations relating to freshwater quality challenges in Northern Wairoa FMU

Challenges	Causes	Impact	Things to think about	Helpful map layers
 **Sediment in waterbodies and the Kaipara Moana (harbour)** *700,000 tonnes of sediment flows into the Kaipara Moana (harbour) each year – seven times the natural rate.*	• Disturbance or exposure of erodible soils • Run-off or erosion from steep slopes • Cultivation close to waterbodies without filtering vegetation • Rainfall • Pugging/heavy stock • Stock access to waterbodies and immediate margins • Earthworks/farm races without sediment control • Poor drain management	Sediment in waterbodies means less soil on farm. Healthy soils have better production. Sediment in waterbodies affects freshwater plants and animals by smothering the riverbed, reducing water clarity and plant growth. It can affect fish by reducing their ability to feed and clogging their gills. It makes water less appealing for recreation and unsuitable for mahinga kai. It can also mean water is not suitable for human uses, such as drinking, or that treatment costs for town supplies are higher. It affects coastal areas by smothering shellfish beds and reduces habitat quality for fish.	• What soils are on your farm? • What are your steeper areas of pasture and are they eroding? • What is your stock class, grazing intensity and rotation, especially in steep areas close to waterbodies? • What areas do not have riparian planting or filtering buffers? • What areas are high or low risk to cultivate? • How are you managing sediment from earthworks or races? • What areas are likely to result in sediment loss during heavy rain? • When do you undertake drain maintenance and to what extent? Where do you put the drain clearing spoil? • Are your drains fenced? • Can you reduce the sediment loads coming from your drains?	• Fundamental Soils • Terrain: Slope Map • Landcare SedNet • Waterbodies
 **Faecal contamination (*E. coli*) and other pathogens in waterbodies**	• Stock in or near waterbodies • Poor management of critical source areas (e.g. stockyards, races/tracks and stock crossings)	Faecal contamination can mean water is unsuitable for drinking or domestic uses and that rivers are unsafe to swim in. It can also make mahinga kai unsafe to consume and degrade	• Do you have areas where stock can enter waterbodies or immediate margins? • What are the critical source areas and where do they discharge to? • What uses of water downstream of your farm that are sensitive to pathogens?	• Rivers • Registered Drinking Water Supply Sites • Swimming Sites • Fundamental Soils • Flood Risk

All river monitoring sites in the FMU typically grade as poor or very poor state in terms of E. coli.	• Animal effluent disposal near waterbodies, drains or in overland flow paths • Frequently used unformed stock crossings • Soil compaction leading to overland flow	the mauri of the water so it is unfit for cultural uses. There is a higher risk that people can get sick from water-based recreation.	• Do you have areas where effluent collects and washes into waterbodies? • Is your farm effluent system appropriately sized and designed? • Where and when are you irrigating effluent? Is it near waterbodies or overland flow paths and what is the soil saturation? • Is there effluent entering water from your stock crossings? • Are your drains fenced? • Where are your flood risk areas that may increase animal effluent run-off into water?	
 **Elevated nutrients in waterbodies** *10 out of 14 monitored river sites in the FMU have elevated dissolved reactive phosphorus.*	• Application of fertiliser, especially close to waterbodies • Urine from animals entering water or filtering through soils • Effluent spreading • Soil compaction increasing nutrient run-off • Lack of filtering by vegetated riparian buffers	Elevated nutrients increase the likelihood of algal blooms in waterbodies (especially in hot, dry periods). Algal blooms can be toxic, and reduce the suitability of the water for swimming, and for collecting mahinga kai. Algal blooms can also block light, which reduces habitat quality and reduces nighttime dissolved oxygen levels to the point where aquatic animals can suffer or die. High nitrogen in drinking water negatively affects human health. Some native fish species are particularly sensitive to nitrogen.	• Where and when are you spreading fertiliser and effluent – is the separation from waterbodies adequate? • Do you have stock in or near waterbodies? • How are you managing critical source areas for nutrient run-off (such as overland flow paths or stock crossings)? • How do your soils affect nutrient run off or uptake?	• Fundamental Soils • Waterbodies

 **Riparian vegetation loss** *Many river margins no longer have riparian vegetation, which reduces the quality of habitats of aquatic native species, many of which are adapted to cooler shaded water and rely on vegetated margins for part of their lifecycle.*	• Stock accessing riparian areas • Vegetation clearance	Loss of riparian vegetation can mean higher water temperatures, which can increase the risk of algal blooms and mean less suitable habitats for native species, which are often adapted to cooler, shaded water. Loss of ability of riparian vegetation to filter sediment, animal wastes and nutrients running off the land. Detrimental to native species, which often rely on vegetation next to waterbodies for breeding and feeding. Less vegetation increases stream bank erosion, which increases sedimentation and can undermine fencing.	• Do you have areas where stock access riparian areas? • How far back are your fences from waterbodies? • Are your waterbody margins planted or maintained in long grass? • Are there areas next to waterbodies where you could plant or enhance vegetation for filtering and shading? • Do you have streambanks that are actively eroding? Could these be stabilised by planting?	• Waterbodies • Rivers
 **Wetland loss** *It is estimated that a fifth of the region was covered in*	• Drainage • Grazing • Earthworks	Loss of ecological functions such as sediment trapping and filtration of nutrients. Loss of habitat for native species. Increased flooding risk of areas downstream.	• Do you have wetland areas? • Do you have areas that would work well as wetland restoration locations to trap runoff from critical source areas? • Are existing wetlands fenced?	• Wetlands

wetlands but now only about 5% of our original wetlands remain (roughly half the national average).		Loss of drought resilience, as wetlands act like sponges that release water in dry periods.		
 **Changing climate**	• Increasing annual temperatures • More extreme weather events	Drought leading to increased risk of erosion on hill slopes. Reduced water levels in waterbodies impacting on native species living in them. Flooding leading to nutrients and *E. coli* being transported into waterbodies. Sedimentation in waterbodies from soil eroded by flooding, collapsed banks as water levels rise.	• When and where are you disposing of farm dairy effluent? • Are there areas next to waterbodies where you could plant or enhance vegetation for filtering and shading? • Do you have steep slopes or banks around waterbodies where you could plant to reduce sediment?	Flood Risk

Te Horopaki me Ngā Uara
Context and values

Land and land use

The topography of your land and how you use it influences your farm's potential impact on freshwater quality. You need to keep these things in mind as you identify risks and consider actions to take in your freshwater farm plan. For example, steep terrain is more prone to erosion, particularly if it is in pasture. This can lead to poor water quality due to the resulting sediment, *E. coli* and nutrient runoff. In orchard areas, such as Maungatapere, nitrogen from fertilisers affects waterbodies.

Topography

The Northern Wairoa freshwater management unit (FMU) generally has flat to rolling topography.

Just over one third of the FMU has a slope less than three degrees. These areas are mainly alluvial floodplains and (historic) wetlands areas. They include the Hikurangi Swamp and Ruawai Plains.

Around 45% of the FMU is undulating to rolling with a slope up to 15 degrees.

Eight percent of the FMU is strongly rolling with a slope up to 20 degrees. The remainder is steep. These steep areas include forests such as the Tangihua, Tutamoe, and Maungaru Ranges. Slope is a key driver of erosion risk, as are soil type, geology and vegetation type. This should be a focus of your risk assessment for your freshwater farm plan. The Te Taitokerau CCCV viewer includes maps of land considered prone to erosion.

www.nrc.govt.nz/CCCVResources

The Te Taitokerau CCCV viewer can indicate the slope of the land on your farm. If you want a more detailed breakdown of the slope or aspect on your farm, Landcare Research – Maanaki Whenua have a useful tool to assess these.

Landcare Research – Maanaki Whenua slope tool

www.nrc.govt.nz/CCCVResources

Land use

Much of the flat and rolling areas of the FMU are productive farmlands.

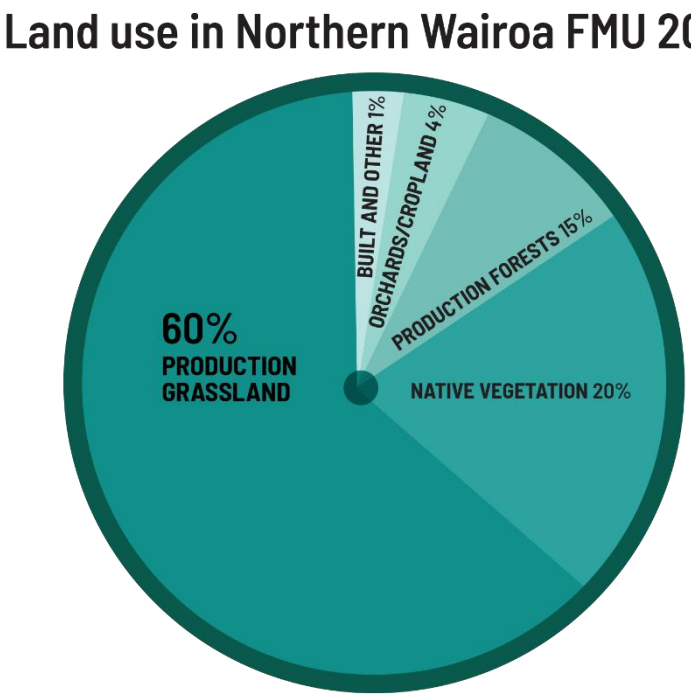


Figure 2: Land use in Northern Wairoa FMU (2018)

Pastoral farming is the main land use of many of the sub-catchments. However, significant proportions of the FMU remain in native vegetation, such as the Tangihua Ranges.

The smaller northwestern sub-catchments of Kaihu and Mangakahia have larger areas of intact native forest. These generally have better water quality. In contrast, the main waterbody, the Northern Wairoa River, and its tributaries run through low-lying valleys and flood plains that have largely been converted to high-production pasture or croplands.

Soils

The Northern Wairoa FMU has a wide range of soil types. The most common soil types in the catchment, starting with the most prevalent, are listed in this section. The different soil types have different vulnerabilities under different land uses and weather events. They need different management to maintain their health and production abilities.

When you produce your freshwater farm plan, think about the type of soil you have on your farm and what you need to do to address the risks associated with it. Bear in mind that individual farms may have different soils across them. The Te Taitokerau CCCV viewer identifies soil types.

www.nrc.govt.nz/CCCVResources

Soil types

Young sandstone

Young sandstone soils form from shattered sandstone and mudstone rocks, often on steep slopes. These soils are typically winter-wet, with high clay content and poor drainage, making them prone to pugging and difficult to cultivate. They are highly erosion-prone, especially to tunnel gullying, slumping, and landslides during heavy rain. Soil fertility varies widely depending on what kind of rock the soil originated from.

Management includes maintaining good pasture cover, avoiding cultivation on steep or wet areas, and using direct drilling for pasture renewal. Retiring marginal land and planting erosion-prone areas can help stabilise slopes and improve long-term productivity.

Recent alluvial soils

Recent alluvial soils are found on floodplains and formed from river-deposited sediments. Coarser materials like sands settle near streams, while finer silts and clays accumulate in lower areas. These soils are generally fertile with high water-holding capacity and deep rooting potential, making them suitable for crops and pasture. However, they often have fluctuating water tables, leading to waterlogging and slow spring warming.

Management challenges include soil compaction, erosion, and the need for careful drainage and cultivation timing. While flooding can enrich the soil, it may also deposit unproductive silt, causing anoxic conditions.

Young semi-volcanic soils

Young semi-volcanic soils, formed from weathered volcanic rock, ash, and sedimentary material, are found in upper catchments. They range from fertile loams on gentle slopes to erosion-prone clays on steep terrain. Topsoils are friable and granular but dry quickly, while subsoils are sticky and poorly drained, especially in compacted or steep land areas. Erosion risks include sheet erosion on exposed slopes and deep slips.

Management includes maintaining dense pasture, avoiding overgrazing, and using subsurface drainage. On steep or marginal land, retiring areas from grazing and planting erosion-control trees like poplars helps reduce degradation and protect waterways.

Mature semi-volcanic soils

Mature semi-volcanic soils, formed from weathered volcanic materials like lava, breccia, scoria, and ash mixed with sedimentary rock, have shallow, drought-prone topsoils over dense, sticky clay subsoils. These subsoils are acidic and rich in iron and aluminium, which can be toxic to plants unless pH is corrected. Poor drainage, pugging, compaction, and surface sealing are common in wet conditions. Erosion risks include sheet erosion and large slips on steep or bouldery terrain.

Management includes maintaining dense pasture, avoiding overgrazing, using no-till practices, planting erosion-control trees like poplars or willows, and retiring marginal land to stabilise slopes and reduce sediment loss.

Young mudstone

These soils, derived from mudstone or claystone, are high in clay and prone to erosion. They have poor drainage, becoming sticky when wet and hard when dry. They are vulnerable to gully erosion, slips, and earthflows, especially on steep, sparsely vegetated slopes. Fine clays can stay suspended in water for long periods, reducing water clarity.

Management strategies include avoiding winter grazing, using subsoil drainage, and adopting no-till methods like direct drilling. Erosion control involves planting poplars or willows and retiring marginal land. Due to clay binding, nutrients are often limited, requiring pH correction and targeted fertilisation for optimal soil health and productivity.

Old podzol

Very old podzol soils – also known as gumland or pipe clay soils – developed under kauri forests and originated from various materials, such as sands, mudstones, sandstones, and volcanic rocks. They are strongly leached, acidic, and poorly structured, with thin, pale topsoils over a dense, silica-rich pan. Beneath this, clay has leached into a subsoil that is highly erodible. These soils are prone to severe gully erosion, compaction, and seasonal extremes – wet in winter, hard in summer.

Management includes careful winter grazing, maintaining dense pasture to build organic matter, and using no-till methods. Erosion-prone areas benefit from willow planting in gullies and retiring vulnerable land.

Old mudstone

Old mudstone soils, formed from weathered sedimentary rock on rolling terrain, are pale due to iron leaching and clay loss. Their structureless, low-clay topsoils are easy to cultivate but prone to turning into dust when dry. These acidic, low-fertility soils have poor drainage, leading to winter wetness and summer drought. Gully and sheet erosion are major risks due to a columnar subsoil structure.

Management includes avoiding heavy winter grazing, maintaining dense pasture, using no-till methods like direct drilling, and planting erosion-control trees such as willows. On steep or marginal land, retiring areas from grazing may be necessary to prevent further degradation.

Mature sand

Mature sands are older, consolidated coastal dune soils that have undergone moderate leaching and podzolisation. They are typically drought-prone with weak structure, low water and nutrient retention, and are highly variable across the landscape. Some areas have iron pans or podzolised layers that impede drainage. These soils are vulnerable to wind and gully erosion, especially when subsoils are exposed.

Maintaining dense vegetation is essential to build organic matter, reduce erosion, and improve structure. Cultivation should be minimal to avoid compaction and dust formation. Careful land use planning is needed to manage their fragility and variability.

You can find more information about soil types and how to manage them in our soil fact sheets.

Soil fact sheets

www.nrc.govt.nz/CCCVResources

Drainage

Large parts of the FMU have poorly drained soils. This reduces deep drainage and increases overland water flows, surface water, and subsurface flows through the soils. These flows can transport nutrients, such as nitrogen, into other areas or waterbodies.

Artificial drainage

There are artificial drainage schemes in the lower reaches of the Northern Wairoa River, such as Ruawai, Hoanga, and the Kaihu Valley. The Hikurangi Swamp scheme is another significant artificial drainage area.

Drainage schemes can expand farmable land and boost economic gain, but they can also have negative impacts. For instance, artificial drainage can contribute to water pollution, sediment transport, and nutrient loading in waterbodies.

If you have drains on your property you need to consider when and how you undertake drain maintenance to reduce sedimentation and if can you exclude stock from the drains.

Waterbodies

The Northern Wairoa freshwater management unit (FMU) supports rivers, lakes, dune lakes, wetlands, and saltmarshes.

Good water quality translates into high biodiversity of healthy indigenous plants, insect, fish, and bird life. These are essential to support community values such as collection of food and aesthetic value. A healthy freshwater environment is valuable for tourism, swimming and public wellbeing.

There are many swimming holes in the FMU. Some are mapped but many are not. For current swim suitability you can use Safeswim or Land Air Water Aotearoa's long term recreational swimming site information. These are available through the Te Taitokerau CCCV viewer, or you can access the direct links below.

Safeswim

www.nrc.govt.nz/CCCVResources

Some monitored swim sites include:

- Lake Waro Hikurangi – Lake Waro is a four-hectare lake, just over five metres deep. It is in the Waro Limestone Scenic Reserve near Hikurangi township. Good quality water for swimming.
- Kaihu River at Whatoro – poor quality water for swimming.

- Mangakahia River at Twin Bridges – good quality water for swimming.

Long term recreational swimming site information

www.nrc.govt.nz/CCCVResources

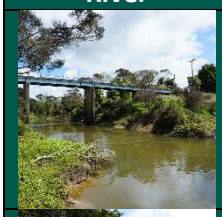
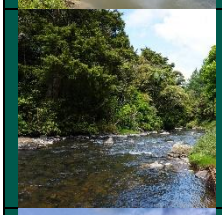
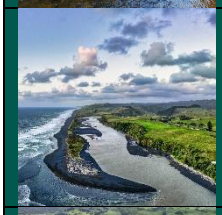
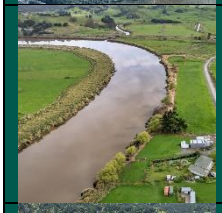
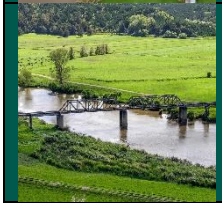
It is important to recognise the community values associated with water quality and understand how your farming activity can affect them.

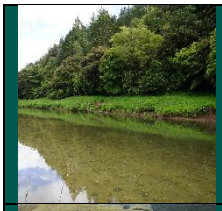
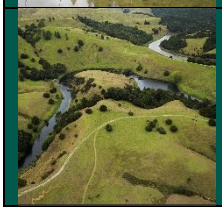
Rivers and lakes

Water quality declines from the upper reaches to the lower reaches of a catchment due to impacts from nitrogen, phosphorus, *E. coli* and sedimentation. Consider the location of your farm in your risk assessment to guide the actions and priorities of your freshwater farm plan.

Northland's largest river is the Northern Wairoa. It drains a catchment area of 3,650 square kilometres. The Northern Wairoa has a large estuary and is tidal for about 100 kilometres upstream. Such tidal influence is ideal spawning habitat for native īnanga/whitebait. They typically spawn between early March and late September in vegetation on the margins of waterbodies flooded during spring high tides. Special care is needed in these areas if undertaking earthworks, clearing vegetation, or installing structures that can affect īnanga spawning or reduce access of īnanga to these sites.

Table 2: Rivers that contribute to the Northern Wairoa River

River	Description
	**Manganui River** This river drains a 409 square kilometre catchment of low rolling hill country, most of which is less than 150 metres above sea level, except for the northern boundary of the catchment, which is formed by the Tangihua Ranges. The Manganui is slow flowing and meanders through swampy valleys subject to frequent flooding. It has many threatened and rare species of animals and plants.
	**Kaihū River** The Kaihū River drains 324 square kilometres north of Dargaville. It includes the western edge of the Tutāmoe Ranges back to the Tutāmoe settlement and the edge of the Waipoua Forest. It features a series of rocky gorges, boulders, waterfalls.
	**Awakino River** This river drains a catchment area of 116 square kilometres, including the western and southern slopes of Tutāmoe.
	**Tangowahine River** The Tangowahine drains a catchment of 125 square kilometres. It flows through a gorge at the northern end of the Mangaru Range and then opens out into a broad, easy valley.
	**Kirikopuni River** The smallest river in the Northern Wairoa FMU, the Kirikopuni drains a narrow valley between the Mangaru Range and the Mangatipa River and Houto. The Kirikopuni frequently floods the whole valley floor.

	**Mangakāhia River** The Mangakāhia River drains about 800 square kilometres of central Northland, bounded by the Tutāmoe Range in the west and the Wairua River catchment in the east. It has the largest and most rapid flood discharge of any river in the Northern Wairoa system.
	**Wairua River** The Wairua River drains the north-eastern corner of the Northern Wairoa FMU via the Hikurangi Swamp, which was drained and turned into farmland in the 1970s. Once a lakebed, the swamp is susceptible to heavy rainstorms from the north-east and a restricted outlet, making flooding common. The catchment covers 750 square kilometres.

Lakes Humuhumu, Rotokawau, and Kanono, are outstanding freshwater bodies as defined in the Regional Plan, largely based on their ecological values. These lakes are very sensitive to activities in their catchments that can impact water quality, such as earthworks, cultivation, vegetation clearance, or drainage. These activities result in sediment entering lakes and elevated nutrients due to fertiliser use or farm effluent discharges.

Outstanding Freshwater Bodies are mapped in the Te Taitokerau CCCV viewer.

www.nrc.govt.nz/CCCVResources

The Regional Plan also applies rules specific to Outstanding Freshwater Bodies including activities in the beds of lakes and rivers (Section C.2), damming and diversion of water (Section C.3), land drainage and flood control (Section C.4), taking and use of water (Section C.5), discharges to land and water (Section C.6), and land disturbance (Section C.8).

Wetlands

The FMU hosts a variety of wetlands with significant ecological and recreational value. Wetlands are home to many threatened plant and animal species.

In the past, wetlands in Northland covered approximately 258,451 hectares, or 32 percent of the land area. Today, only 5.5 percent, or 14,114 hectares, of the original wetland area remains. Many of these lost wetlands were unique and irreplaceable. Wetlands (repo) are highly valued by Māori for a range of reasons, including as a source of mahinga kai, traditional materials and medicines.

Wetlands are important because they can:

- improve water quality by removing contaminants before they enter the wider catchment
- mitigate extreme weather conditions such as flooding, by slowing down flow of water; and drought, by releasing water to maintain water flows
- trap topsoil erosion, preventing it from entering the Kaipara Moana (harbour)
- help filter nutrients from fertilisers, chemicals, and animal wastes
- provide biodiversity hotspots and be highly valued by the community for cultural and recreational reasons (for example, tuna/eels and gamebird hunting). Eels and freshwater crayfish thrive in some wetlands. Wetlands are home to threatened species such as bitterns and native plants.

- reduce downstream flooding in high rainfall by absorbing water and slowing the flow into lower flood prone areas.

Table 3: Significant freshwater wetlands by subcatchment

Sub catchment	Significant freshwater wetlands
Kaihu	Kaihu Forest 5,155.7 ha forest; 106.7 ha shrubland swamp. Maitahi Wetland Scientific Reserve and Surrounds– Fen pakihi and gumland
Mangakahia	Kaihu Forest 5155.7 ha forest, 106.7 ha shrubland swamp. Mangaroa group of wetlands (William Upton Hewett Memorial Reserve, Mangaroa Stream Riverine Forest and Gumland, Mangaroa Wetland)
Awakino/ Tangowahine	Kaihu Forest 5155.7 ha forest, 106.7 ha shrubland swamp. Awakino and Flaxmill Swamps
Wairua	Otakairangi Peat Bog – bog Wairua River Wildlife Management Reserve - swamp
Poutō Peninsula Harbour	Dune lakes (Lake Humuhumu, Rotokawau, Kanono, Rotopouua etc) and their associated wetlands
West Coast/ Wairoa	Kaipara Moana, Shrubland and Rushland – saltmarsh
Manganui	Tokatoka Road Remnant – Marsh
Otamatea	Arapoa River Wetland – salt marsh Te Ope Stream Remnants Various smaller salt marshes

For more information:
Looking after your wetland

www.nrc.govt.nz/CCCVResources

Restoring wetlands and their ecological functions is essential for sustainability, benefiting both farming and indigenous biodiversity in the FMU. Even small wetlands can improve biodiversity and act as a filter for sediment and nutrients. Restoration efforts may include managing pests and weeds, excluding stock, and creating new wetlands. If you have a wetland on your property, your freshwater farm plan needs to consider your contribution to restoration efforts.

Biodiversity

Indigenous habitats in the Northern Wairoa freshwater management unit (FMU) have suffered extensive loss and modification due mainly to historical land clearance for agricultural activities. However, the FMU still contains large areas of indigenous forest, shrubland, wetlands, dune lakes and dunelands. These habitats support indigenous ecosystems and unique plants and animals, many of which are classified as threatened or at risk. Your freshwater farm plan needs to recognise and provide for them.

You can find the conservation status of a species in the New Zealand Threat Classification System (NZTCS).

www.nrc.govt.nz/CCCVResources

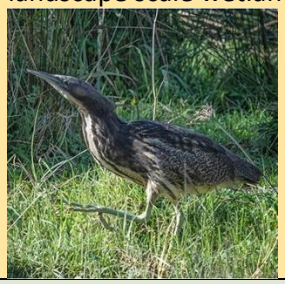
The NZTCS website has links to other data sources, such as the NZ Freshwater Fish Database. You can also access current NZTCS reports.

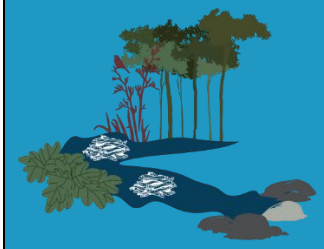
The FMU drains into the Kaipara Moana (harbour), the largest harbour in the Southern Hemisphere. The harbour provides a nationally and internationally important habitat for many species. While public conservation land supports a significant proportion of the FMU's indigenous biodiversity, much of the habitat is in the rural landscape, and many species rely on moving through farms.

Recreational, commercial and customary harvest of tuna/eels is common in the wider catchment.

There are a wide range of native species that live in and/or use the FMU. The table below describes some of the more iconic native species that are indicators of ecosystem health – looking after these will provide for a wide range of other species as well.

Table 4: Significant native species found in Northern Wairoa FMU

Significant species	Habitat and characteristics
Australasian bittern (Mataku-hūrepo) *Nationally critical (highest threat status), 250-1000 remaining* 	Apex predator found in wetlands lakes, slow moving streams, farm drains, ponds and paddocks. Bitterns are rarely seen as they are shy, camouflaged and spend much of their time hidden in dense aquatic vegetation. Bitterns use a range of habitat across a wide landscape and can travel long distances for food and breeding, so all wetlands should be treated as potential bittern habitat. Bitterns are a key species for indicating landscape scale wetland health. 
Banded rail (Moho pererū) *A risk – declining* 	Disappeared across most of Northland but still found in Kaipara Moana coastal wetlands. Banded rails consume snails, crabs, insects, worms and spiders. They also feed on dead fish, seeds, and fruit.  ***Photo credit: JJ Harrison - www.jjharrison.com.au***
Eel (Tuna) – Longfin and shortfin *Longfin eels – At risk* *Shortfin eels – not threatened* 	Tuna are a taonga species highly valued by tangata whenua. There are two freshwater eel species – the shortfin and the longfin. There are fewer eels today because of the loss of wetlands, fish passage barriers and historical commercial fishing. Eels migrate up streams as elvers to find suitable adult habitat. Longfins are one of the largest, slowest growing and longest-lived eel species in the world. Changes caused by drainage, irrigation schemes, and river diversions reduce eel habitat. Culverts and dams can prevent eel migration. Eels can be susceptible to pollution and their health may be used as an indication of the ecosystem health. 

Īnanga/whitebait *At risk – declining* 	Īnanga, often called whitebait, use grasses growing on riverbanks for reproduction. Īnanga can use several species of grasses to deposit their eggs but water levels must be sufficient to inundate the grasses at the correct height for the eggs to hatch. Īnanga spawning sites are found on the margins of rivers and estuaries that are inundated by spring high tides. Īnanga are caught recreationally and are an important part of freshwater food webs.  ***Photo credit: Jane Bennett***
Freshwater mussels (Kākahi/torewai) *Threatened, declining* 	Freshwater mussels (kākahi/torewai) live in habitats ranging from small, fast-flowing streams to lakes. They are a valuable mahinga kai resource for many Māori. They are important filter feeders that can clean water and are an indicator of good water quality and habitat. Unlike marine mussels that attach themselves to surrounding rocks or other substrates, kākahi use their foot to move around, anchor themselves and burrow into sediment. Freshwater mussels are under threat and declining due to loss of habitat, high nutrient levels, and high levels of sediment. 
Native insects 	Insects are widely accepted as indicators of stream health in water quality monitoring, as many species are known to be sensitive to pollution or habitat modification. They are also important food sources for fish and birds. Streamside vegetation, in-stream habitat complexity and stability are important for their lifecycles.  ***Photo credit: Olly Ball Steve Pohe Collection***

Protecting and enhancing freshwater habitat and biodiversity on farms can lead to better water quality outcomes. It falls within the whole-of-farm or integrated farm planning approach. Actions to consider include:

- fencing off waterbodies, wetlands and remnants of native bush
- stabilising eroding streambanks with vegetation
- Planting shade species for exposed waterbodies
- planting and protection or creation of wetlands
- removing barriers to fish passage
- controlling pest plants and animals
- improving or restoring connections between native bush, wetlands and waterbodies.

Further information on species and ecosystems relevant to Northern Wairoa FMU is available online.

www.nrc.govt.nz/CCCVResources

Climate

Climate is a major influencer of risks and impacts. It needs to be considered when you write your freshwater farm plan. For example, high rainfall in areas with poorly drained soils equals a high risk of erosion and runoff of contaminants to fresh water. Climate also impacts whether you have good grass cover going into winter, and the ability to leave adequate residuals to protect soils.

Temperature

In general, in the Northern Wairoa freshwater management unit (FMU), summers are warm and humid, while winters are mild with only a few light frosts each year. The average annual temperature in Dargaville, for example, ranges from 10°C in winter to 22°C in summer, and the town enjoys around 2,395 hours of sunshine annually.

Changes to our climate are projected to increase temperatures in the FMU by 0.5-1.0°C for all seasons by 2040. This temperature rise may lead to a change in the crops that can be grown and an increase in related pests and diseases. Higher temperatures might shorten crop maturity periods but can also lead to lower yields due to droughts and floods. Extreme weather events could stress or even kill livestock. An increase in temperature negatively affects freshwater environments. It can increase the risk or scale of algal blooms, which are detrimental to people, stock and freshwater plants and animals. It can increase the breeding rate of exotic pest species, such as gambusia. Shading streams is an important tool for reducing water temperatures.

Rainfall

Rainfall is generally plentiful throughout the year, with occasional heavy downpours. Dry spells can occur, especially during summer and autumn. The catchment area has a median annual rainfall of 1,216 mm, which is higher than the national median of 1,070 mm. Rainfall varies within the catchment, with the Poutō Peninsula and Ruawai areas receiving the least rainfall, and the northern parts receiving the most. Exposed areas can be very windy, and Northland sometimes experiences gales, often linked to tropical depressions. Northland is prone to droughts and floods, which impact on both farming and freshwater systems.

It is important to adapt to temperature increases and rainfall changes. You should plan for how to manage these in your freshwater farm plan. Actions to consider include:

- fencing off waterbodies, wetlands and remnants of native bush to allow plants to shade the waterbodies
- stabilising eroding streambanks with vegetation
- planting waterbodies and protecting or creating wetlands
- controlling pest plants and animals around waterbodies
- ensuring you have a water management plan during droughts
- providing shade for stock to reduce heat stress and water consumption.

Further information

NIWA has regional weather and climate information for Northland.
NIWA Northland weather and climate information

www.nrc.govt.nz/CCCVResources

Stats NZ has rainfall data.
Rainfall data

www.nrc.govt.nz/CCCVResources

Tāngata Whenua

The Northern Wairoa freshwater management unit (FMU) has areas of interest for many Te Taitokerau iwi. Māori have a long heritage in this FMU as kaitiaki over the waterbodies, taonga species, and preservation of kōrero toku iho (historical kōrero passed down through generations) and pūrakau (knowledge holders) that have shaped the cultural identity for each iwi.

Your freshwater farm plan needs to consider how to protect and/or enhance tāngata whenua values and sites of significance on your property, such as wāhi tapu (cultural and spiritual areas of significance) and wāhi tupuna (landscapes and places of significance) sites and areas for gathering māhinga kai (food sources) and habitats and freshwater migration pathways of taonga species.

For example, you may have an important waterbody that is a migratory pathway for tuna or banded kōkōpū on your farm. You might create an action to check any river crossings or culverts to make sure that they are compliant with fish passage rules so migratory pathways are not compromised. This enhances cultural values like mauri and manaakitanga by ensuring that the whakapapa of these taonga can continue and your actions are looking after them and preserving their life.

Iwi of Northern Wairoa FMU

Many iwi have associations to the Northern Wairoa and iwi may have overlapping areas. Each iwi has significant ongoing interests in maintaining and restoring the health of freshwater and freshwater ecosystems of the FMU, as well as economic interests through land ownership.

Learn about iwi freshwater values and interests in online iwi story maps.

www.nrc.govt.nz/CCCVResources

Iwi for the Northern Wairoa FMU are:

- Te Rūnanga o Ngāti Whātua
- Te Uri o Hau
- Ngāpuhi
- Te Roroa
- Ngatiwai
- Ngāti Hine

www.nrc.govt.nz/CCCVResources

Indicative iwi boundaries can be found in the Te Taitokerau CCCV viewer.

www.nrc.govt.nz/CCCVResources

More information about formally recognised iwi groups

www.nrc.govt.nz/CCCVResources

Information resources

Statutory Acknowledgements

Treaty Settlements and the related Statutory Acknowledgements provide more detail on the specific connections that the respective hapū and iwi have with particular sites and places, as well as their historical associations with the entire catchment area.

Statutory Acknowledgement Document

www.nrc.govt.nz/CCCVResources

Te Uri o Hau have statutory areas in the Northern Wairoa FMU. One lies in the Kaipara Moana (SO Plan 70053). The Kaipara Moana is a primary source of life and well-being for Te Uri o Hau, providing kaimoana (seafood) and communication routes. The whaikorero (oral history) of Te Uri o Hau tupuna

tells of the Kaipara Moana as a ‘flowing together’ of many rivers, including the Oruawharo, the Wairoa, the Arapaoa, and the Whakaki Rivers.

Iwi and Hapū Environmental Management Plans

Iwi and Hapū Environmental Management Plans (IHEMPS) and other related iwi planning documents also provide useful information and direction as to when iwi and hapū wish to be consulted, what is of importance to them, and their aspirations.

Iwi environmental plans:

- Te Uri o Hau
- Te Roroa
- Ngati Hine

Hapū environmental plans:

- Whatiritiri
- Patuharakeke

Other useful resources

The New Zealand Archaeological Association maintains a website which is a good source of recorded archaeological sites.

The Regional Plan for Northland includes maps of some sites and areas of significance to tāngata whenua in fresh and coastal waters (see section Regional Council and Central Government Rules, for more information).

The resources provided in this document do not give a complete picture. It is recommended that you contact your local marae to enquire about sites relating to freshwater on your property, and for advice to help protect and enhance them. Visit Te Puni Kōkiri (Ministry of Māori Development) for contact information, or Te Kāhui Māngai and Māori Maps to find lists of representative groups for the iwi and hapū in your area.

www.nrc.govt.nz/CCCVResources

Mauri of water

Tāngata whenua spiritually identify with wai (water) in their lands. Healthy communities benefit from healthy waters. Rivers have spiritual significance to Māori as well as being a valuable food and water source for many marae. To Māori, water is a taonga or treasure. It must be safeguarded for future generations.

Water has mauri, which connects its ability to sustain life and healing properties, to its vitality. To Māori, any discharge of contaminants into water, no matter how well purified in a treatment process, reduces the water's ability to sustain life. It thereby reduces its mauri.

Sites and species of significance

Historical and archaeological sites, ancestral lands, waterbodies, wāhi tapu and other taonga are significant to Māori. There are numerous pa sites, terraces, pits and middens along the coasts, and further inland in some areas. Kaipara was one of the first areas settled by Māori in New Zealand.

Your freshwater farm plan should consider how your farming operations could affect sites of significance and how to protect them.

Table 5: Sites of significance to tāngata whenua in Northern Wairoa FMU

Site	Significance to Māori
Hikurangi Repo	Traditionally, the Hikurangi Repo was a pātaka kai to mana whenua, a major food gathering site for local hapū to harvest tuna (eels) and other aquatic life such as kākahi (freshwater mussel) and kēwai (freshwater crayfish) – its waterways teeming with native flora and fauna. The hapū Ngāti Hau, Ngāti Kahu o Torongare and Te Parawhau, collectively referred to as Ngā Hapū o te Reponui, claim status as mana whenua or kaitiaki of the area. According to WAI 1040, when Europeans first encountered the swamp, it was heavily forested, chiefly with kahikatea. The Hikurangi Swamp, which is dominated by a large drainage scheme, is now an ecosystem under duress. Before upwards of 96% of the area was drained, the Hikurangi Repo was one of the largest wetlands in the Southern Hemisphere. These days, sprawled across the Hikurangi Repo is a network of farms. Each of these contribute to the state of the repo.
Poroti Springs	Whatitiri Maunga erupted in pre-colonial times. This eruption was unique as it didn't erupt through the top, but through its puku. When the powerful eruption settled, the top of the maunga plunged, creating a bowl. During the winter, the bowl filled and spilled over in five different places creating the five awa that come out of Whatitiri: Kauritutahi, Waipao, Tapahina, Okoihu, and Karukaru. Of the five awa, Waipao is known to have the best drinking water. This awa is named after the flush of water from the Whatitiri Springs. It was said that the matapuna of Waipao was so powerful, the motion caused boulders and rocks to clash and clatter into one another. Pao refers to the striking smashing motion of the water driving these rocks (Rangihīroa Panoho). It is from this awa that Porotī Springs is replenished. The puna emerges from the ground on a two-acre block of Māori reserve land at the base of the gently sloping Whatitiri Maunga. The flow at the spring varies depending on the season, however, there is a three-month lag between the rainfall and a rise in the groundwater near Whangārei known as Whatitiri.
Lake Humuhumu	Te Uri o Hau traditionally used Lake Humuhumu for kai gathering. Te Uri o Hau has a special relationship with this area, and it is recognised as a significant wāhi tapu (sacred area) as there are many tūpuna are buried here. There were many battles that took place in this region throughout Te Uri o Hau history and during extreme weather events wheua (human bones) are often exposed. The lakes and environment are also a source of weaving materials and for rongoa (medicinal plants). While there are impacts which have degraded the state of the environment for Lake Humuhumu, there are restoration

	programmes in place to enhance biodiversity and cultural harvest of flora and fauna. Lake Humuhumu is currently mapped in the proposed Regional Plan at Northland Regional Council. This means that there is more regulation for the activities that can be undertaken in this space. There is more information available here.
Wairua River	The Wairua River begins at the heart of Ngāti Hau, in the hills of Whakapara, with its headwaters formed by the Waiotu and Whakapara Rivers. It threads its way across the Hikurangi Repo, flowing through south-west Kaipara before joining the Wairoa River at its confluence at Mangakahia River near Tangiterōria. Ngāti Hau considers the Wairua River to be a whanaunga, a tūakana in the long line of whakapapa that connects tangata to atua. The Wairua River has a strong connection the Hikurangi Repo where people would come from afar to enjoy tuna from the pātaka kai. The tuna population is also a bioindicator for healthy waterways and ecosystems.
Wairoa River	The Wairoa River is a significant waterway of the Te Taitokerau region. It begins at the confluence of the Wairua and Mangakahia Rivers. The Wairoa makes its way south-westerly toward the township of Dargaville where it flows into the Kaipara Harbour. The Kaihū River with a host of other tributaries flow through areas of swamps and wetlands. The Wairoa was used for kai, water travel and connecting mana whenua from around the rohe. The Wairoa River is also home to two taniwha who are said to frequent the waters of the Kaipara and Wairoa and there is more information in the Te Kawa Wairoa Report.

More sites of significance are listed in the iwi story maps.

www.nrc.govt.nz/CCCVResources

Kaipara Moana Remediation

Kaipara Moana Remediation (KMR) encourages and supports landowners and groups to take action to restore the mauri of the Kaipara Moana (harbour). It works in both Northland and Auckland regions, across more than 600,000 hectares that flow into the Kaipara Moana. This includes all the Northern Wairoa freshwater management unit.

KMR invests in action on the land to reduce sediment losses to nearby streams, rivers, estuaries, and coastal waters. Projects include restoring wetlands, fencing off and planting the margins of rivers and streams, and planting or regenerating forest on highly erodible land.

KMR provides free advice, walking the land with you to discuss your aspirations and project options. They prepare a plan to access KMR funding and provide support throughout the project. KMR can contribute to the cost of eligible sediment reduction projects.

For further information on how KMR can support you to improve the quality of local waterbodies and the Kaipara Moana, go to the Kaipara Moana Remediation (kmr.org.nz) website.

Ngā Wero Challenges

The Northern Wairoa freshwater management unit (FMU) suffers from poor freshwater quality. The biggest challenges our freshwater waterbodies face are sedimentation, *E. coli*, elevated nutrients (phosphorous, and nitrogen), wetland loss, riparian vegetation loss and the changing climate. For a summary of these challenges refer to the table in Section 1. More detail on each of these challenges can be found below.

Identifying your on-farm risks, having regard to these challenges and the actions you can take to address them, should be priorities as you create your farm plan.

Consider where you are in the catchment. Overall, sites higher in the FMU with predominantly bush headwaters have better water quality. As these waterbodies move down the FMU and into farmland there is a greater accumulation of contaminants as the waterbodies are affected by land use activities. However, there are exceptions, so check your individual location: some waterbodies can be degraded even high in the FMU due to intensive land use. For example, monitoring of the Mangere Stream near Kokopu shows it has poor water quality with excessive sediment, *E. coli*, phosphorous, and nitrogen in it.

Northland Regional Council monitoring data for contaminants

Raw data (Environmental Data Hub)

www.nrc.govt.nz/CCCVResources

Sediment in waterbodies

An average of 700,000 tonnes of sediment flows into the Kaipara Moana (harbour) each year – seven times the natural rate – due to decades of deforestation and land-use intensification, bare stream banks, and stock access. The major challenge for farmers in the Northern Wairoa freshwater management unit (FMU) is managing sediment run-off into waterbodies when it rains. A significant portion of the FMU is identified as high-risk for erosion.

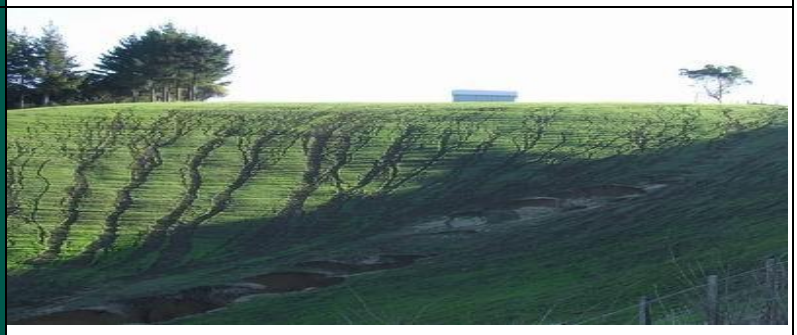
www.nrc.govt.nz/CCCVResources

Slope, soil type, and vegetation affect erosion risks. Hill slope erosion is particularly problematic, with 23% (over 102,000ha) of the FMU classified as high erosion risk. This area accounts for about 72% of the annual sediment loads entering the moana.

Erosion degrades both land and freshwater, as eroded materials end up in waterbodies. Heavy rain, land use practices, pugging from stock, low pasture cover, deforestation, and development-related disturbances exacerbate soil erosion, especially in hill country and stream banks. Managing land use is key to controlling erosion.

Your freshwater farm plan should consider the following sources of sediment and how these can be managed on your farm.

Table 6: Sources of sediment

Surface erosion This occurs when soil particles are detached from the surface and carried across the ground by water, wind or gravity.	
Fluvial erosion This happens when running water gouges shallow channels or deeper gullies into the soil. On sloping land, the gullies can cut deep into the subsoil or undermine the surrounding soils.	
Mass movement Otherwise known as slips, slumps or landslides, this is the most common form of erosion in hill country. It is most common after heavy rain.	

Stream bank erosion

Stream bank erosion is a natural process but can be exacerbated by a lack of vegetation and disturbance of the stream bank (e.g. by stock). Faster run-off from pastoral land can also lead to higher flow velocity that can worsen stream bank erosion.

Faecal contaminants (*E. coli*) and other pathogens in waterbodies

E. coli comes from the excreta of warm-blooded animals and is an indicator of the risk of infectious disease from contact with freshwater. Key sources are run-off from farm animals, stock in waterbodies, and discharges of human or animal effluent. Wild birds and pest animals are also a common source in Northland. All monitored river sites in the Northern Wairoa freshwater management unit (FMU) typically grade as poor or very poor for *E. coli* (median), making them unsuitable for human contact or swimming. Additionally, *E. coli* pollution from effluent discharges to water is unacceptable to tāngata whenua.

The areas in the FMU with lower levels of *E. coli* tend to be in the unmodified bush areas. In pasturelands, sediment and nutrients, along with *E. coli*, runs off into waterbodies, especially where there is limited filtering by vegetated riparian buffers.

Northland Regional Council has collated *E. coli* monitoring data and modelled estimated *E. coli* concentrations across the region.

E. coli monitoring data

www.nrc.govt.nz/CCCVResources

The council has also commissioned research into the state and sources of *E. coli* in Northland. Research indicates that Northland has high levels of *E. coli* in the river networks across the region that appear to be generated from diffuse pollution sources from intensive land uses.

Access the research

www.nrc.govt.nz/CCCVResources

When you create your freshwater farm plan, you will need to consider both diffuse and point source discharges of *E. coli* in waterbodies. Diffuse sources are widespread or dispersed sources, such as runoff from pasture. They include (but are not limited to):

- rainfall/ overland flow/ run-off from pastureland, especially erosion-prone land in extensive or intensive land-use with high connectivity to waterbodies
- poorly drained lowland pasture (e.g., floodplains with shallow water tables)
- application of farm dairy effluent (FDE) to land, generating runoff from poorly drained or saturated soils.

Point sources are from a single fixed point, such as a pipe or drain or dairy shed outfall. They include (but are not limited to):

- direct stock access to water bodies
- FDE discharges to water
- farm infrastructure/practices with high connectivity to waterbodies e.g., stock drinking troughs, races, wintering pads, stream crossings and the outfall of drains.
- storm water, storm water systems cross-contaminated with sewerage
- poorly constructed or maintained human wastewater systems.

Source tracking and *E. coli* monitoring in our region show that diffuse sources of *E. coli* from pastureland need prioritised management to reduce *E. coli* loads in waterbodies. Ruminants (cattle, sheep) are typically the dominant source of *E. coli*, but this can vary with location and land cover.

The Regional Plan for Northland requires stock to be excluded from specified waterbodies (see Section C.8.1) There are also catchment-specific stock exclusion rules that apply in the Mangere catchment (see Section E.3.4).

Northland Regional Plan

www.nrc.govt.nz/CCCVResources

Stock exclusion by effective fencing, riparian planting, and use of wetlands or detention bunds to intercept overland flow from *E. coli* sources are very effective in reducing faecal loads in waterbodies. Afforestation in highly erodible land and eliminating farm dairy effluent discharges to waterbodies are also encouraged to eliminate *E. coli* pollution.

Elevated nutrients in waterbodies

Dune lakes in the part of the Poutō peninsula that drains into the Kaipara Moana (harbour) are surrounded by pastureland and forestry. The world's rarest habitat, dune lakes are under threat from intensive land use. Activities such as cultivation near lake edges and drains discharging to lakes can increase nutrient and sediment loads. Unlike rivers, lakes hold nutrients running off from surrounding land uses. These can lead to accelerated aging of the lake. Lake Rototuna and Lake Humuhumu, for example, suffer from eutrophication (accumulation of nutrients) and have a high trophic level index. Trophic level index (TLI) is an indication of the overall condition of a lake. It is based on the concentrations of nitrogen and phosphorus, water clarity, and algae levels.

Kahuparere dune lake, Pouto

Wetland and habitat loss

Land use change, intensification, deforestation, drainage, reduced flows, pollution, sedimentation, nutrient enrichment, and spread of invasive species have had significant consequences for our freshwater species. Many species have declining or threatened populations. Stress from compromised habitat reduces immunity and can cause flares of fungal or parasitic diseases in fish populations.

If your farm has a river or stream with tidal influence, it is a potential habitat for īnanga/whitebait spawning (egg laying). Protecting and improving habitat in these areas is important to ensure that these fish can breed. If your farm includes such an area, the activity you are planning to undertake on your farm may have additional rules.

Wetlands

Wetlands were once extensive across the Northern Wairoa freshwater management unit (FMU) but have been lost due to drainage for farming, cropping/horticulture, forestry and urban development (around 5.5 percent, or 14,114 hectares, of the original wetland area remains).

Your freshwater farm plan should identify any wetlands on your farm and set out actions to protect them and, if necessary, restore them. There may also be opportunities to create wetlands to help reduce sediment, *E. coli*, or nutrient loss to freshwater.

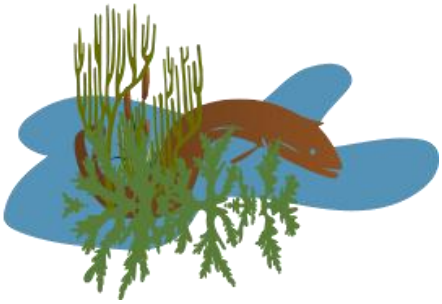
Fish passage

Culverts, weirs, fords, dams, and tide and flood gates are common in streams and rivers throughout the FMU. Many native fish species are migratory. For example, eels need to swim to the ocean for spawning and the elvers back to the rivers for reaching adulthood. If instream structures are not designed, maintained and installed correctly, they can stop fish migrating and spawning.

NIWA have developed a fish passage assessment tool which helps to show the barriers to fish passage and how to assess the structures on your farm.

NIWA fish passage assessment tool

www.nrc.govt.nz/CCCVResources



Riparian vegetation loss

Vegetation on the margins of waterbodies is an important part of freshwater ecosystems. Most of our aquatic native species are adapted to bush clad waterbodies that provide shade, cooler water temperatures and good connections between freshwater and land that many species rely on for feeding and lifecycles. The loss of this riparian vegetation can reduce habitat quality for native species and result in lower dissolved oxygen, warmer water, and more frequent algal blooms. This is one of the reasons why around 50% of Northland rivers do not score well against the macroinvertebrate community index (MCI), an indicator of aquatic ecosystem health. The MCI measures the variety and abundance of small animals without backbones that live on or just below the stream bed. In the Northern Wairoa freshwater management unit, none of the river monitoring sites score better than 'fair' and most are in a 'poor' state.

More detail on the state of our rivers

www.nrc.govt.nz/CCCVResources

The state of our rivers as measured by MCI

www.nrc.govt.nz/CCCVResources

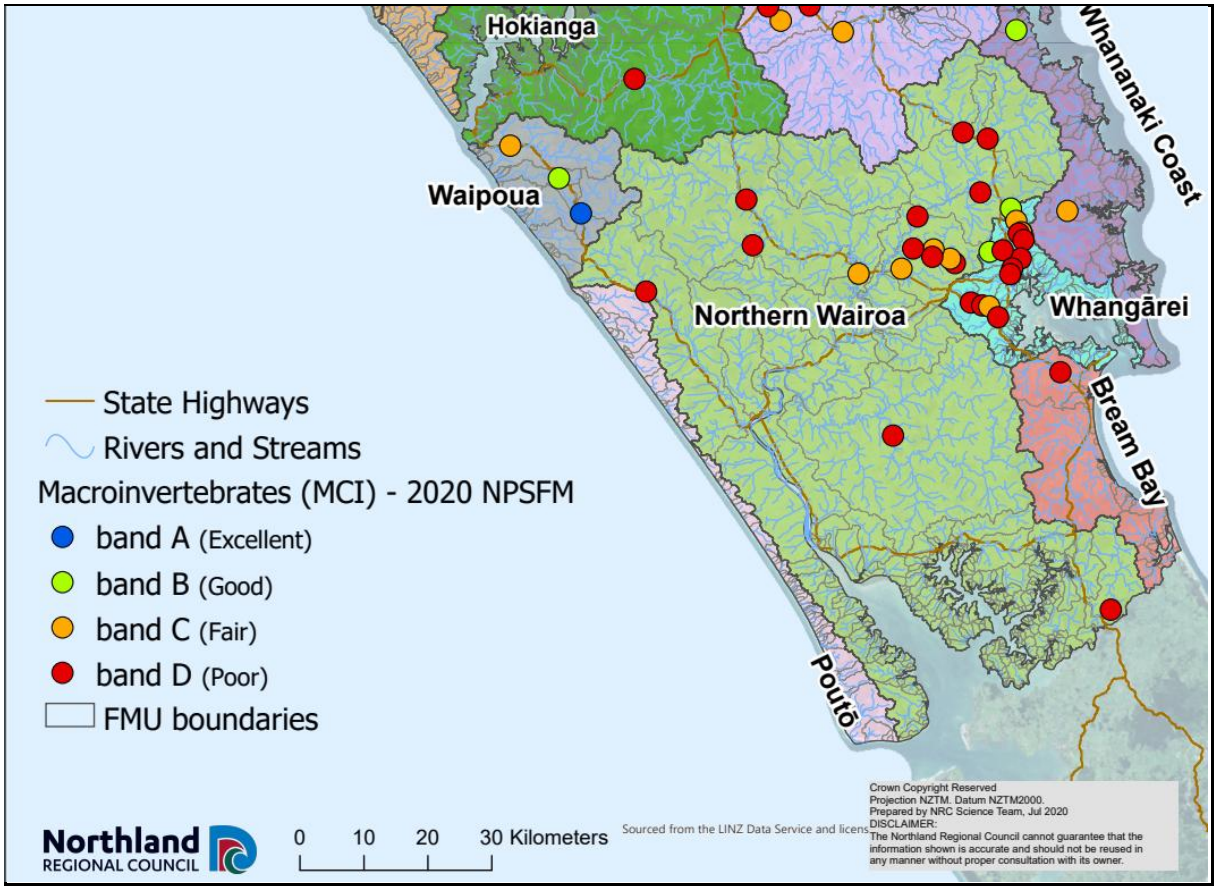


Figure 3: Macroinvertebrate Community Index scores

Changing climate

Your freshwater farm plan should consider challenges due to climate change, such as drought, extreme weather events, and increased water temperatures.

Drought potential is projected to increase due to higher accumulated evapotranspiration, reduced rainfall, and drier soils. It is most accurately projected through potential evapotranspiration deficit accumulation, which considers the difference between water demand for plant growth, soil water capacity, and water loss through evaporation and transpiration.

Much of Northland's primary sector relies on takes from rivers and streams, which can be unreliable water sources during drought. This can have significant economic and social impacts. Reliability of supply from rivers and groundwater is likely to reduce with climate change.

Dry periods can lead to soils cracking. When rain does occur on cracked soils there is greater movement of nutrients into the water systems.

Increased severity of storms, including wind strength and intensity of rainfall, is likely to cause significant slips and erosion, damaging forests and farm infrastructure like fencing and roads. High rainfall in areas with weak bedrock and soils increases the risk of erosion, landslides, stock damage, and runoff of contaminants into freshwater.

Flood hazard zones are shown in the Te Taitokerau CCCV viewer.

www.nrc.govt.nz/CCCVResources

Take care with the timing and location of the application of farm dairy effluent to avoid transport of nutrient and *E. coli to* water during rain events. Flooding can also transport sediment from exposed earth/cultivation if adequate sediment controls are not in place.

Climate change predictions also include rising water temperatures. Higher ocean temperatures causing sea level rise may increase salinity upstream, potentially moving coastal and estuarine habitats and requiring water intakes to be relocated.

Warmer water temperatures also increase the frequency of algal blooms in rivers and lakes (especially when flows are low and nutrient levels are high). These blooms can limit the ability to take and use water and affect recreational and cultural values for water.

Many of our native freshwater species are adapted to cooler water and shaded waterbodies. Climate change is therefore likely to make current issues facing native species even worse. This makes it important to restore riparian cover, increase the area of wetlands to supplement flows in rivers, and use freshwater efficiently.

You can find more info at Northland ClimateWEB.pdf (niwa.co.nz)

www.nrc.govt.nz/CCCVResources

Ngā ture kāwanatanga ā-motu, ā-rohe hoki
Central government and regional council rules

There are both national and regional rules that are relevant to freshwater farm plans. National rules include:

- The Resource Management Act 1991 Part 9A Freshwater Farm Plans
- The Resource Management (Stock Exclusion) Regulations 2020
- Resource Management (National Environmental Standards for Freshwater) Regulations 2020

www.nrc.govt.nz/CCCVResources

The Ministry for the Environment provides additional information about freshwater farm plans.

Ministry for the Environment – Freshwater Farm Plans

www.nrc.govt.nz/CCCVResources

Regional rules are applied through the Regional Plan for Northland.

Northland Regional Plan

www.nrc.govt.nz/CCCVResources

There can be overlaps between national and regional rules – in these cases the most restrictive rule applies. For more guidance, please see the Northland Regional Council Farmers Hub webpage.

www.nrc.govt.nz/CCCVResources

The sections of the regional plan most relevant to freshwater farm plans are listed below:

C.2 Activities in the beds of lakes and rivers and in wetlands
C.3 Damming and diverting water
C.4 Land drainage and flood control
C.5 Taking and use of water
C.6 Discharges to land and water
C.8 Land use and disturbance activities (including livestock exclusion, earthworks, cultivation and vegetation clearance). There are also catchment specific livestock exclusion rules that apply in the Mangere and Whangarei Harbour catchments – see Rules E.3.4.1 and E.3.5.1

In some cases, rules apply to areas identified on regional plan maps. The regional plan maps most relevant to Freshwater Farm Plans are:

Hill Country and Lowland Areas – these relate to livestock exclusion rules (the rules differ for Hill Country and Lowland areas depending on livestock type). Please note there are also catchment specific livestock exclusion rules that apply in areas mapped as Whangarei Swimming Sites Stock Exclusion Areas.

Erosion Prone Land – tighter controls on earthworks and cultivation are applied to these areas mapped in the regional plan.

Outstanding Freshwater Bodies – these maps identify lakes and rivers (and their catchments) that have very high ecological, cultural, recreational or landscape values and are therefore subject to specific rules.

Priority Drinking Water Abstraction Points - these identify drinking water takes where particular controls on farm wastewater discharges and livestock exclusion are applied upstream of the water take (under Rules C.6.3.1 and C.8.1.2).

Mapped Sites of Significance to Tāngata Whenua – these maps show sites and areas of significance to tāngata whenua in the regional plan that are in freshwater bodies or the coastal marine area. Note: the maps do not reflect all sites that are important to tāngata whenua in the region as many are not mapped or included in the regional plan. It is recommended that the relevant hapu is contacted for information on such sites.

Regional Plan maps

www.nrc.govt.nz/CCCVResources

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Northland
REGIONAL COUNCIL
Te Kaunihera ā rohe o Te Taitokerau