



# Our freshwater 2020 Summary

New Zealand's Environmental Reporting Series



Ministry for the  
Environment  
*Manatū Mō Te Taiao*

Stats <sup>NZ</sup>  
Tatauranga Aotearoa

# Our freshwater 2020 is the latest in a series of environmental reports produced by the Ministry for the Environment and Stats NZ.

It builds on information that has been presented in previous reports, adding some new and updated data and more analysis to explore the most significant issues affecting freshwater today.

As a nation, we care deeply about our freshwater. Māori tribal identity is linked to freshwater with each water body having its own mauri (life force). Great care must be taken in managing human impacts on freshwater.

This report can help us understand how the way we live affects our freshwater, and provides evidence to decide where we want to make changes.

This is a summary of the [full report](#).

## FRESHWATER IS IN MANY DIFFERENT BUT CONNECTED FORMS

Ki uta ki tai – from the mountains to the sea – describes the journey that water makes across land as small streams combine and grow bigger, become rivers that reach estuaries, and eventually meet with the sea. Lakes, wetlands, and underground aquifers are also part of this connected system.

## EACH CATCHMENT IS DIFFERENT

A catchment gathers and funnels water downstream. Each catchment in Aotearoa New Zealand has a distinct mix of climate, geology, biodiversity, and land uses (like cities, towns, farms, horticulture, and plantation forests) that all influence the state of the water within it.

## NOT ALL WATER MOVES QUICKLY

It can take decades or more – the lag time – for rainwater to move through the soil and into aquifers, sometimes back to rivers and lakes, then exit the catchment. Some of the effects we see today are legacies from previous generations.

## INDIVIDUAL ACTIVITIES AND CHANGES CAN ADD UP

Activities that happen in a large part of a catchment can add up to a substantial pressure, even if each one seems to have a small effect on its own. The story of īnanga (one species caught as whitebait) illustrates this concept through the report. It shows how pollution, habitat changes, and a changing climate for example, can compound and cause cumulative effects on this taonga fish species.

## HEALTHY ECOSYSTEMS

Ecosystems are a complex tangle of relationships between living things and the environment. Five components are used to assess the health of an ecosystem – aquatic life, habitat, water quality, water quantity, and ecological processes (how things interact). Although it can be hard to measure every component in each catchment, understanding the health of an ecosystem as a whole is important when we are assessing the state of our freshwater.

## OUR FRESHWATER SOURCES AND STORES

- ▶ 70 major river systems run for more than 425,000 kilometres.
- ▶ New Zealand has 249,776 hectares of wetland.
- ▶ We have more than 50,000 lakes – 4,000 are larger than 1 hectare.
- ▶ 440 billion cubic metres of water flow in our rivers and streams.
- ▶ 711 billion cubic metres of water are stored in underground aquifers.

## ISSUE 1

### ► Our native freshwater species and ecosystems are under threat

**Our native freshwater species, habitats, and ecosystems are affected by the way we use our land, the species we have introduced, and the modifications we have made to natural waterways.**

New Zealand has a diverse and unique range of freshwater species, habitats, and ecosystems but many are under threat and continue to decline. These declines are the result of:

- converting land to cities, towns, farms, and plantation forests by clearing native forest and draining wetlands
- changing waterways from their natural form and building in-stream structures like weirs
- reducing flows
- bringing new species into the country intentionally or accidentally.

Collectively these changes put our species at risk, reduce the benefits we receive from nature, and affect our way of life and connection to freshwater.

#### **Freshwater fish**

In 2017, 76 percent of our native freshwater fish (39 of 51 species) were either threatened with or at risk of extinction. Most of these species (32 of the 39) are members of the galaxiidae family, which includes all mudfish and four whitebait species.

#### **Lake health**

Computer models estimate that 46 percent of lakes larger than 1 hectare (1,758 lakes) are in poor or very poor ecological health.

## ISSUE 2

### ► Water is polluted in urban, farming, and forestry areas

**The way we live and use our land can result in excess nutrients (like nitrogen), chemicals, pathogens (disease-causing microorganisms), and sediment entering freshwater and causing harm.**

Pollution affects almost all of our rivers and many of our lakes and aquifers. Groundwater quality is mixed but is improving in many places.

- Pesticides have been detected in groundwater at many sites.
- Concentrations of pollutants (nutrients, chemicals, pathogens, and sediment) in freshwater are higher in urban, farming, and forestry areas than in natural conditions – sometimes many times higher.
- Some freshwater contains emerging contaminants but mostly at low levels.

Water pollution is not the result of any single land use, but comes from the mosaic of cities, farms, and plantation forests we have in most catchments.

Applying pesticides and fertilisers, increasing the number of cattle per hectare, felling and replanting pine trees, and faulty wastewater and stormwater infrastructure are all examples of activities that contribute to water pollution.

#### **Rivers in urban areas**

Estimates from computer models show that most of the rivers in catchments where urban land cover is dominant, are polluted with nutrients and suspended sediment. Many are polluted with pathogens and heavy metals.

#### **Lake pollution**

Computer models estimate that 77, 70, and 67 percent of lakes with upstream catchments dominated by urban, pastoral, and exotic forest land cover respectively are polluted with nutrients.

#### **Emerging contaminants**

In a national survey of 29 different emerging contaminants in groundwater, the plasticiser bisphenol-A, active ingredients of sunscreen, and sucralose (an artificial sweetener) were detected most often, but all were at low concentrations.

## ISSUE 3

### ► Changing water flows affect our freshwater

**The changes we have made to the water levels, flows, and courses in our rivers and aquifers are affecting our freshwater.**

We use and store large quantities of freshwater for irrigation, hydroelectricity generation, and in our homes.

Low river flows reduce the habitat for freshwater fish and other species. The journeys that native fish need to make up and downstream to complete their life cycles are more difficult or impossible when there are low flows and barriers like weirs and dams in rivers and streams.

Reduced or less variable flows can increase the temperature and the concentration of nutrients and pathogens in a waterway, and increase the chances of harmful algal blooms.

#### **Irrigated land**

The area of irrigated agricultural land almost doubled between 2002 and 2017 (from 384,000 hectares to 747,000 hectares), with irrigated land in Canterbury rising from 241,000 to 478,000 hectares.

#### **Rain and snowfall**

Annual precipitation (from rain, hail, sleet, and snow) was below average in nine of the years between 2000 and 2014.

#### **Drained land**

About 10 percent of New Zealand's land is estimated to be artificially drained to make it more suitable for agriculture.

#### **Water allocated**

In 2010, 10 of the 29 allocation zones in Canterbury were fully allocated and six were above 80 percent of the allocation limit.

## ISSUE 4

### ► Climate change is affecting freshwater in Aotearoa New Zealand

**Changes to our climate are already being observed. Some changes are significantly different from pre-industrial conditions (temperature, glacier ice extent, sea level), while others (extreme rainfall) cannot be detected consistently yet.**

Climate change is expected to affect when, where, and how much rainfall, snowfall, and drought occur. This may change the amount of water in our soil and in glaciers, lakes, rivers, and groundwater.

The frequency of extreme weather events is expected to increase. The flows, mixing, and temperature of water in lakes, rivers, and groundwater is also projected to change.

How much our climate and oceans warm and change depends on global emissions, but how emissions will change into the future is unknown.

Ultimately all these changes will affect what we do (including where and how we produce food), our economy, and how and where we live. The things we value, including our health, culture, and opportunities for recreation may also be affected.

#### **Droughts**

Droughts may cause communities that depend on rain for drinking water to run out. The cost of treating water during a drought may increase, and droughts are also likely to cause food shortages.

#### **Soils**

Since 1972/73, soils at a quarter of monitoring sites around New Zealand have become drier.

#### **Glaciers**

From 1977 to 2016, glaciers are estimated to have lost almost 25 percent of their ice.

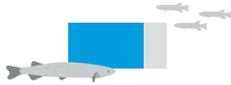
## ► Issues that affect our freshwater environment

Our activities and climate change are putting our freshwater ecosystems under pressure.



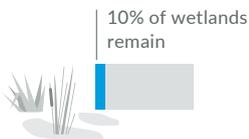
ISSUE 1

**Our native freshwater species and ecosystems are under threat**



**76%**

of our native freshwater fish were classified as threatened with or at risk of extinction in 2017.



**90%**

of freshwater wetlands, particularly swamps, have been drained since pre-human settlement.



ISSUE 2

**Water is polluted in urban, farming, and forestry areas**



**95–99%**

of river length in urban, pastoral, and exotic forest areas exceeds water quality guidelines (according to computer models).



**67–77%**

of lakes in urban, pastoral, and forestry areas are in poor ecological health (according to computer models).



ISSUE 3

**Changing water flows affect our freshwater**



**58%**

of water allocated for consumption (excluding hydroelectricity) was for irrigation — our highest allocated use.



**About 100**

large dams are used to generate electricity. Others are used for irrigation, flood control, water supply, or a combination.



ISSUE 4

**Climate change is affecting freshwater in Aotearoa New Zealand**



**¼**

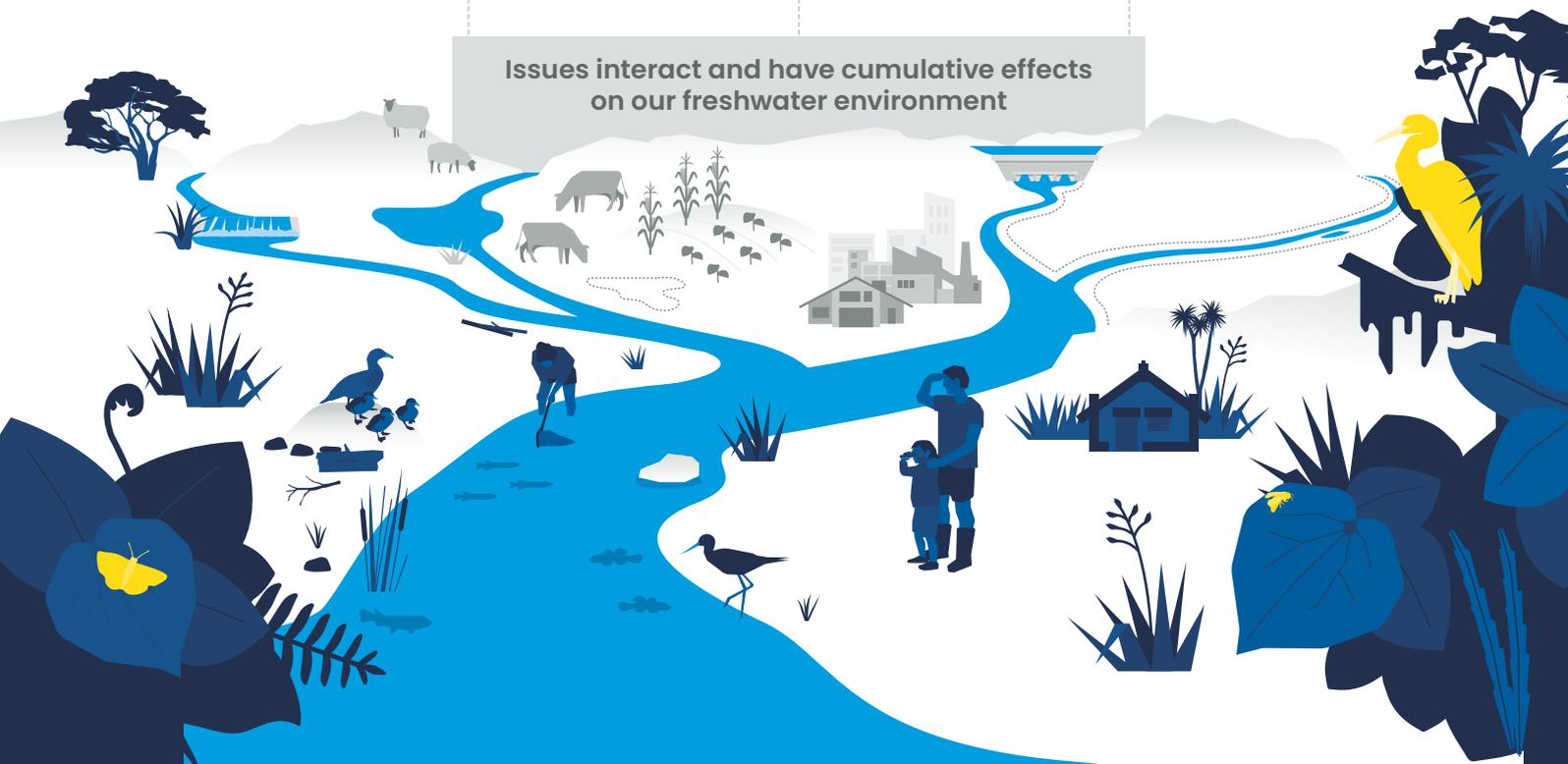
of monitoring sites around New Zealand have soils that are drier since 1972/73.



**25%**

of the ice in our glaciers is estimated to have been lost from 1977 to 2016.

Issues interact and have cumulative effects on our freshwater environment



# ► Issues overlap and have cumulative effects on īnanga

Our native fish known as īnanga shows how the issues highlighted in this report overlap and have cumulative effects. All its life stages are affected.

## ISSUES

### 1. Habitat changes



Changes in habitats, spawning areas, and populations



### 2. Pollution



Water quality reduced



### 3. Use of water



Changes in flow and in-stream barriers affect habitats



### 4. Climate change



Temperature and rainfall changes, and more variable water flows



Follow the īnanga story through the issues in the report.

### CULTURAL IMPACT

Fewer īnanga decreases the mauri of a waterway and take away opportunities to express kaitiakitanga, provide mahinga kai, and share intergenerational knowledge.

