

This report card is one in a series produced to explain the current state of Northland's environment. The cards are based on the 2007 State of the Environment Report and keep you up to date on the work being done to improve our environment.

## What is the current state of Northland's water resources?

Surface and groundwater resources are influenced by a variety of factors including rainfall, the type of soil and rock structures, and vegetation types, which vary throughout the region.

The Northland Regional Council has responsibility under the Resource Management Act 1991 (RMA) to control water use and to monitor the level and flow of water bodies in Northland.

### Rainfall

Rainfall patterns over Northland vary greatly due to the shape of the land (topography). Annual rainfall ranges from 900mm in low-lying coastal areas to over 2900mm at higher altitudes.

Rainfall is usually highest in winter and lowest in summer. Northland also experiences high-intensity rainfall events, associated with tropical and sub-tropical storms, which pass over Northland during the summer months.

Monitoring and obtaining information about Northland's rainfall resource is very important so that short and long-term changes in rainfall – which have the potential to affect water availability – can be detected.

The National Institute of Water and Atmospheric Research (NIWA) and the MetService collect rainfall data at various locations in Northland. Historic rainfall data – with records greater than five years – is available for over 260 Northland stations, of which 88 have records greater than 30 years.



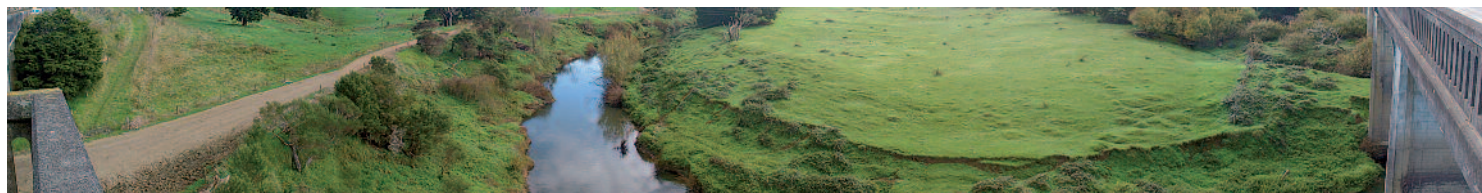
Storms in July 2007 caused flooding across the region and a civil defence emergency response for several days.

In Northland, rainfall patterns have a major impact on water quantity. Too much rainfall causes widespread flooding and too little causes drought conditions. Northland experiences two types of drought: regional and localised. Northland's climate means it will experience a regional drought, on average, once every three years at east coast and inland locations, and once every four years at west coast and high altitude locations.

## What are the pressures on freshwater quantity?

- **Abstraction** – Northland's water resources are under increasing pressure to meet demands from a variety of users. These include agriculture, horticulture, tourism, heavy industry and domestic uses. Taking water has to be balanced against how much water must remain to sustain the ecological, aesthetic and cultural values of a water body. Water takes can be consented (controlled) or permitted (allowed) under the Resource Management Act.
- **Dams and diversions** – Northland has an increasing number of dams, ranging in size and purpose. Dams can affect the ability of fish to travel up or downstream, sediment transport, downstream water availability and the natural flow of a water body. Diversions occur when existing river channels are straightened, meanders removed, channels created to divert water from the natural water course or stop banks built to contain floodwater. Diversions can lead to erosion of river beds and banks, inhibit fish movement, disrupt aquatic environments and affect natural flow.
- **Land-use** – land-use changes have a direct effect on river flow and water balance. Land-use trends for the past 30 years indicate increased subdivision and development. This 'urbanisation' increases demand for water. Where water supply is not provided, there can be an increase in the number of small 'permitted' takes, which can have a large collective impact on water levels. In addition, an increase in nonpermeable surfaces – pavement, buildings etc – associated with development, increases runoff and decreases groundwater recharge from rainfall.
- **Climate change** – an assessment of the potential effects of climate change on water resources in Northland was undertaken by the National Institute of Water and Atmospheric Research (NIWA) in 2006. This showed that a predicted increase in temperature and high intensity rainfall events would lead to less groundwater resources, lowering of the water table and increased potential for saltwater in coastal water sources.





Before and after – flooding of the Mangakahia river at Titoki.



In contrast, flooding occurs as a result of prolonged periods of heavy rainfall or high intensity rainfall events. Flooding tends to occur during the winter months when flows are higher and soils are already saturated but it can also occur in the summer during storms. Flooding is the most common reason for civil defence emergencies in Northland. Major floods have been recorded in Northland since 1917.

### Surface water quantity

Northland has a dense network of rivers and streams, many of which are relatively short with small catchments. Most major rivers in the region drain into harbours, with few discharging water directly to the coast. The Kaipara Harbour represents the lower reaches of Northland's largest river, draining 29% of the land area of Northland.

The difference in flows between the catchments can be caused by rainfall patterns, catchment size and catchment geology, i.e. the structure and type of soil and rock. Catchment geology greatly influences low flows. For example, fractured basalt rock absorbs rainfall and slowly releases it through springs, which sustains water levels during extended dry periods. In contrast, catchments with rocks that are less able to absorb rain have less water stored for drier periods, meaning they are more susceptible to low flows.

Northland has a large number of small and generally shallow lakes and associated wetlands, most of which have been formed between stabilised sand dunes along the west coast. These "dune lakes" are generally fed by rainfall and as a result, their levels are heavily influenced by climate and rainfall.

There are many remnant areas of wetland in Northland however the original area of wetland has been greatly reduced by drainage and changing land-use.

Water quantity is also influenced by human activity, particularly water-use and the amount that is taken. The Council requires resource consent for most major surface water takes in the region. Agriculture uses the most water in Northland, accounting for 38% of water allocated for use. Horticulture is the next biggest single user at 34%.

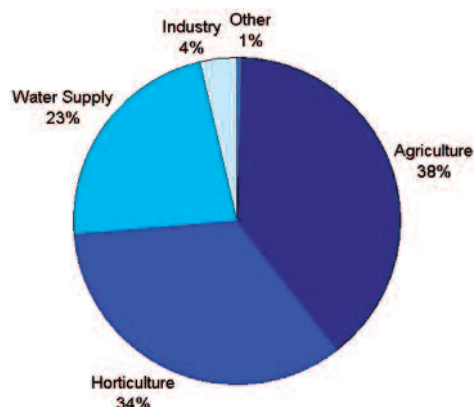
Water can also be taken as a 'permitted activity', providing certain rules – contained in the Regional Water and Soil Plan (RWSP) – are met, including stock drinking water and reasonable levels for domestic needs.

During the relatively dry summers of 2004-2005, several incidents relating to low flows raised awareness of the combined effect of permitted water takes on water levels in smaller streams and rivers. The Council is currently investigating methods for closer monitoring of water resources.



Data collection station at Maungakawakawa.

Percentage of water allocated under resource consents in Northland.





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## What is the current state of Northland's groundwater resources?

### Groundwater quantity

Testing has been carried out throughout Northland to identify the basic characteristics of groundwater resources in the region. Some aquifers have been identified as being 'at risk'. This means they are under pressure because too much water is being taken from them, or at risk from environmental factors such as salt water intrusion.

A map (opposite) has been developed to show the 'at risk' aquifers. It is used by the Council when considering resource consent applications for activities which may further impact on these resources.

The main source of recharge for aquifers in the region is rainfall. The majority of groundwater recharge occurs in winter due to higher seasonal rainfall and lower evaporation. A drier than normal winter can therefore have a huge impact on groundwater levels.

As with surface water, groundwater levels depend on the type of soils and rock within each catchment. Groundwater level monitoring is essential in order to calculate groundwater quantity.

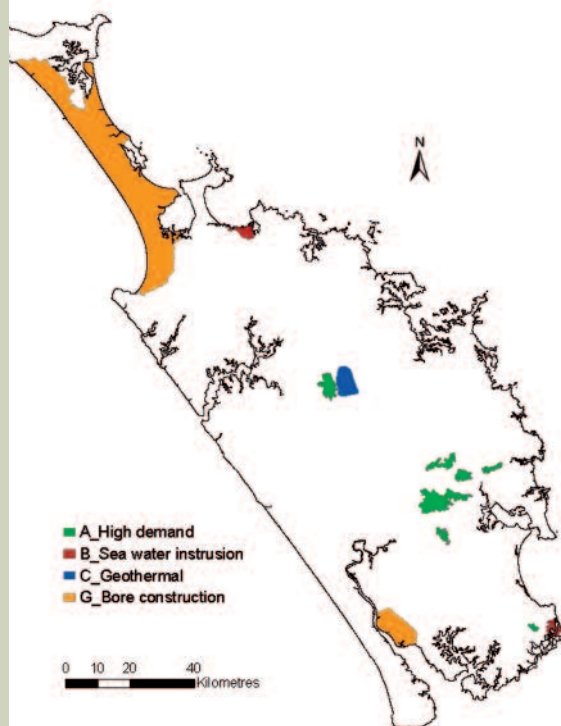
Groundwater levels can vary significantly over time and season depending on rainfall, the amounts taken and the discharge from the aquifer to surface water. There are currently 85 groundwater level sites monitored throughout Northland which record changes over time. The results from this monitoring can be used to inform sustainable management of groundwater resources in the future.

The distribution and movement of groundwater within the soil and rocks is also being investigated where specific issues have been identified. These investigations include assessments of the Three Mile Bush, Glenbervie, Maungakaramaea, Kaikohe, Aupouri, Coopers Beach and Mangawhai aquifers. For more information on these projects, please refer to the main SoE Report: [www.nrc.govt.nz/soe](http://www.nrc.govt.nz/soe)

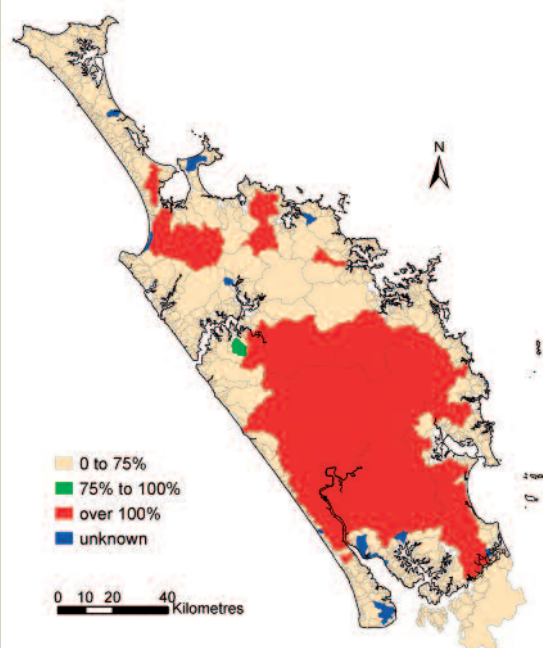


Northland Regional Council monitoring officer recording data at a monitoring bore.

'At risk' aquifers in Northland.

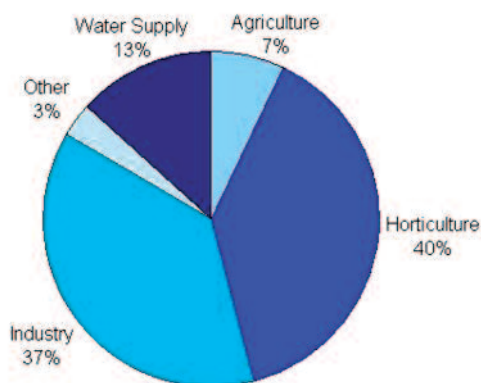


Allocation of groundwater by catchment.





Allocation of groundwater in Northland by resource consents.



## What is the response of the Council?

### Regulation

The Regional Policy Statement (RPS) for Northland contains policies and methods to achieve sustainable management of the region's freshwater resources. In Northland, there are many significant problems and potential conflicts between use, development and protection of the region's water resources. The Regional Water and Soil Plan (RWSP) contains rules for permitting, restricting or prohibiting activities affecting freshwater quantity.

In response to a serious temporary water shortage in the region, the Council can also issue a water shortage direction which allows it to restrict or suspend water takes until the threat has passed. Compliance with resource consents, efficient water use and voluntary reductions are all looked at prior to taking this action. Only when these are insufficient to prevent a severe shortage of water is a water supply direction necessary. The maintenance of people's health is given the highest priority.

### Monitoring

The Council operates a hydrometric network consisting of 60 sites throughout Northland, which collect continuous data at intervals of between 5 and 15 minutes. This includes 30 river level sites, 6 tidal monitoring sites and 24 rainfall sites. Of these sites, 54 are part of a telemetry system where data can be sent via radio or cell phone to a base station at the Council office in Whangarei. During periods of extreme rainfall, these sites play an important role, ensuring that both the Civil Defence and the general public are kept well informed of flooding in Northland.

During periods of drought, water levels are monitored across the region and when a low threshold is reached, a low-flow monitoring programme is undertaken in the affected river catchments. These manual flow measurements allow flow to be accurately determined and are used to monitor water usage. There are over 11,700 flow-gauging records held by the Council for 1503 Northland sites.

Groundwater level monitoring has been undertaken in Northland since the mid 1970s. Groundwater level monitoring is currently undertaken in all principal aquifer systems in Northland. Levels are monitored on a monthly or quarterly basis. The monitoring wells have been selected to provide regional coverage and to target specific areas with environmental concerns.

In addition to the above monitoring, all resource consents to take or use water are also monitored to some degree, depending on the conditions of the consent. Monitoring is undertaken to ensure that the conditions of the consent are complied with and that the consented activity is not having an adverse impact on the environment.



Protecting Northland's water resources – Waipoua Forest.

## What can you do to help?

- Help the Council better manage Northland's freshwater resources by registering your 'permitted' water take.
- Make sure you obtain resource consent if your water take exceeds the volumes allowed by the permitted activity rule in the RWSP.
- Ensure the location of your bore is registered with the Council.
- Make sure your bore meets requirements and is maintained appropriately.
- Use water sustainably. Leaflets are available from the Council with tips on how to conserve water. For more information, go to:  
[www.nrc.govt.nz/conservewater](http://www.nrc.govt.nz/conservewater) or  
[www.nrc.govt.nz/saveourgroundwater](http://www.nrc.govt.nz/saveourgroundwater)



Lake Owhareiti provides valuable habitat for endangered birds.