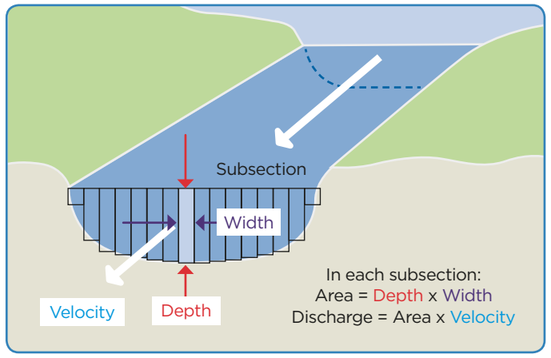
Case study – measuring stream flow

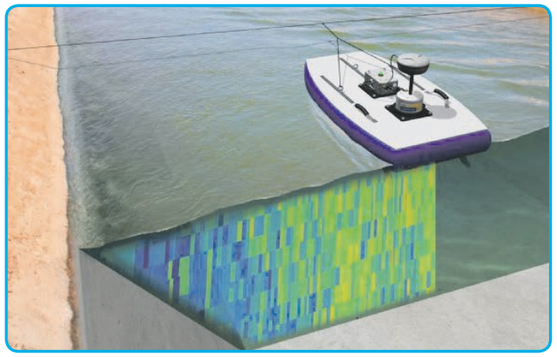
There are four steps to measure stream flow:

1. Monitoring the height of the river. This can be done with equipment that monitors the height of the water surface, such as floats, pressure transducers or radar type sensors.

2. Measuring actual flow by manually measuring river width, depth and water velocity which then give a flow rate at a point in time. Technology has made this easier by using acoustic instruments (such as an ADCP) that detect the doppler effect of sound waves to measure the bed of the river and water velocity with more detail.



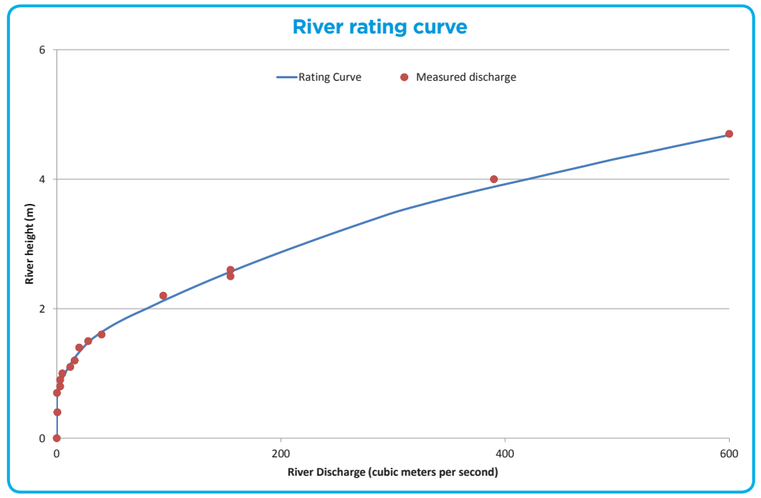
Parameters used in measuring river flow.



An acoustic profiler (ADCP) measuring parameters for determining stream flow.

3. Relating river heights to actual flow measurements at a point in time to construct a 'rating'. The rating shows how much water is flowing in the river when it is at a specific height. Natural changes in river shape, roughness or slope mean these ratings need to be checked and maintained to give accurate flows.

4: Combining measured stream height with the rating enables us to easily derive measured flow in the river at all stream heights.



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For more information

Visit www.boprc.govt.nz/rangitaiki
Phone 0800 884 880
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Freshwater is essential to life; it sustains the things we value

BAY OF PLENTY REGIONAL COUNCIL TOI MOANA

Rangitāiki surface water and groundwater

Water availability and use

In the Rangitāiki catchment there is:

- 4.18 billion m^3 of rainfall per year - that's 76 times the volume of Matahina dam!
- 2.13 billion m^3 of runoff to the sea per year.

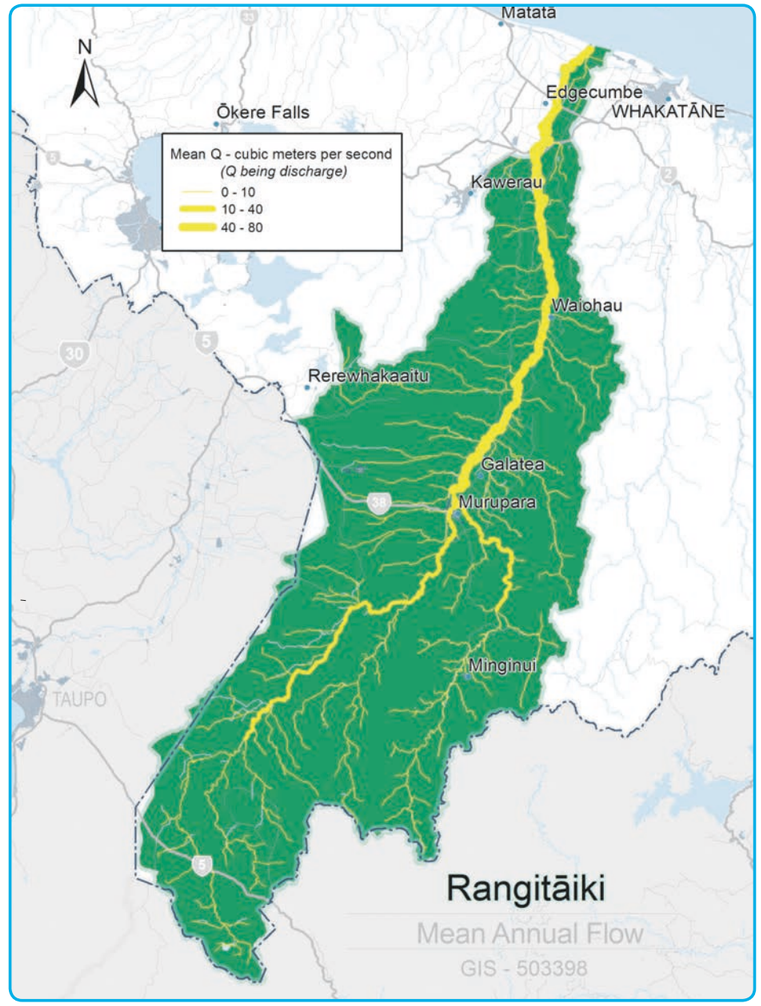
The Rangitāiki is the Bay of Plenty's largest catchment, covering more than 20 percent of the region.

The Rangitāiki catchment has large areas of exotic forestry and supports three hydro-electric dams: Flaxy-Wheao, Aniwhenua and Matahina.

Major water users include

- Exotic Forestry
- Farms
- Recreation
- Three hydro systems

The rivers and streams in the Rangitāiki catchment have different amounts of water flowing through them. The map (right) shows the modelled mean (average) discharge from the different rivers and streams in the catchment.



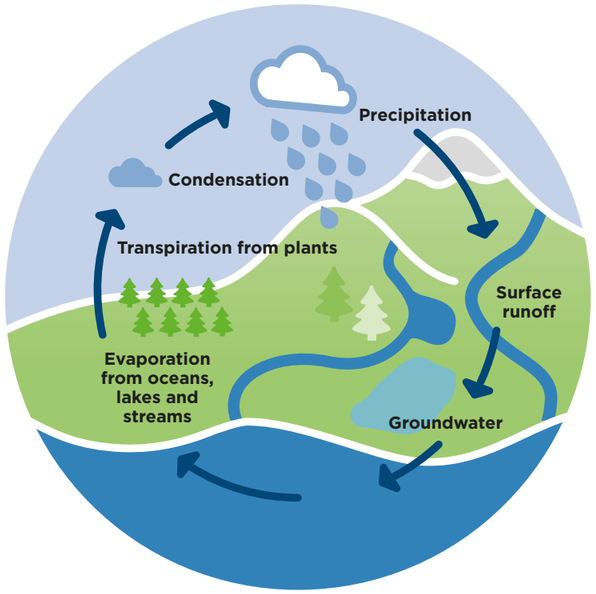
The water cycle

The water cycle explains how water moves around in the environment.

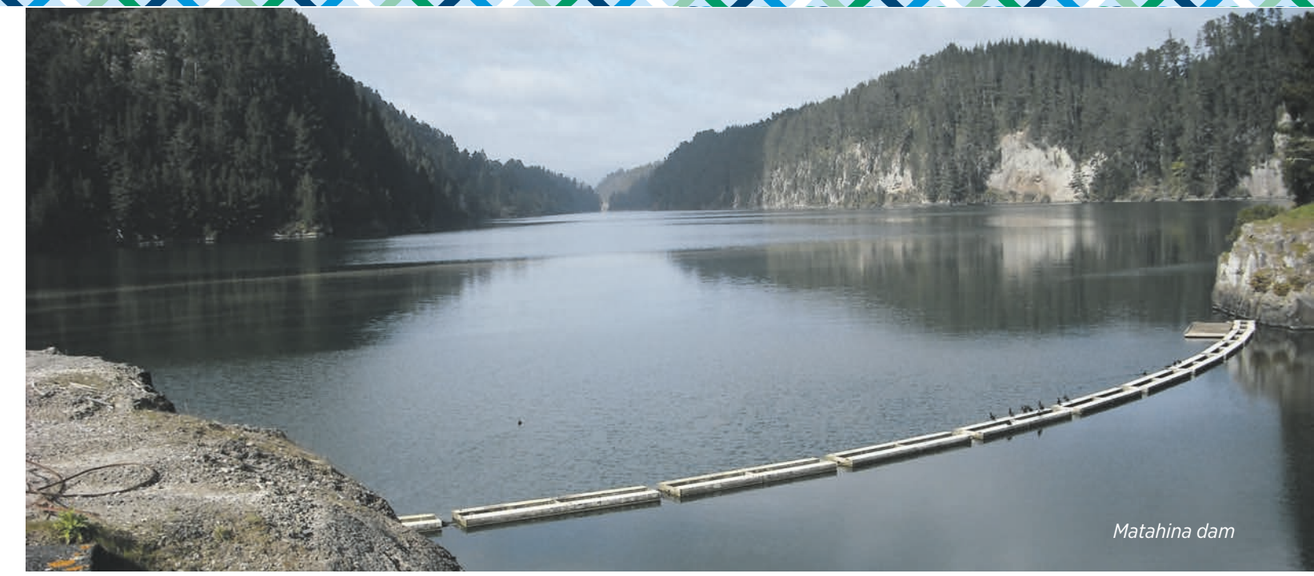
Water on the surface of the earth (surface water) such as from lakes, rivers and the ocean, evaporates into the air where it cools down and then falls as rain.

Rain either soaks into the ground and becomes groundwater or flows over the land into lakes, rivers and streams. Most surface water and groundwater then ultimately flows back out into the ocean where it will evaporate again.

As water moves around the land surface and through the ground, it transports contaminants like bacteria, sediment and nutrients.



Water cycle

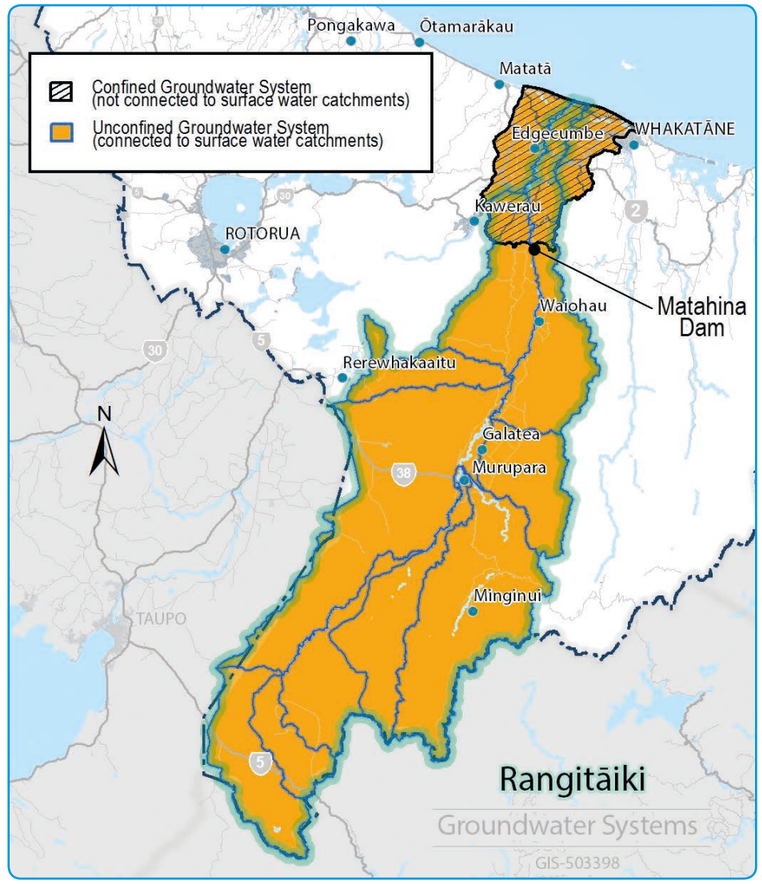


Matahina dam

Groundwater

In the Rangitāiki catchment, the groundwater catchments are largely the same as the surface water boundaries (see map). On the plains however, the groundwater systems extend beneath the Tarawera and Whakatāne-Waimana catchments (shown as black cross-hatch on map), that border the Rangitāiki.

Groundwater catchments are connected to surface waters (such as drains, streams and rivers), so abstraction from groundwater could affect surface water flow.



Research

Water is a limited resource. To be able to make the best use of what we have, we need to fully understand what affects water availability.

To help us improve our knowledge of local water resources, the Regional Council is gathering information on:

- the interaction between groundwater and surface water.
- the importance and uniqueness of springs.
- how much water is currently taken from our rivers, streams, lakes and groundwater eg. through unconsented permitted and illegal takes.
- groundwater flow and availability.

Glossary

Groundwater – all the water that is contained in the void spaces within rocks.

Surface water – means freshwater in a river, lake, stream, pond or wetland, that is not located within the Coastal Marine Area.

Flow (or discharge) - refers to the volume of water in the river flowing past a point in one second and is given in cubic metres of water per second. A cubic metre per second can be written as m^3/s, or cumecs, and equals 1000 litres per second. To give you an idea about how much water that is, 0.7 m^3/s would fill an Olympic swimming pool in an hour. A flow of 42 m^3/s would fill the same pool in a minute.

ADCP - stands for an Acoustic Doppler Current Profiler. This is a special instrument that uses the changes in sound waves to measure the cross-section area of a river, and water speed, which are then combined to give a river flow.