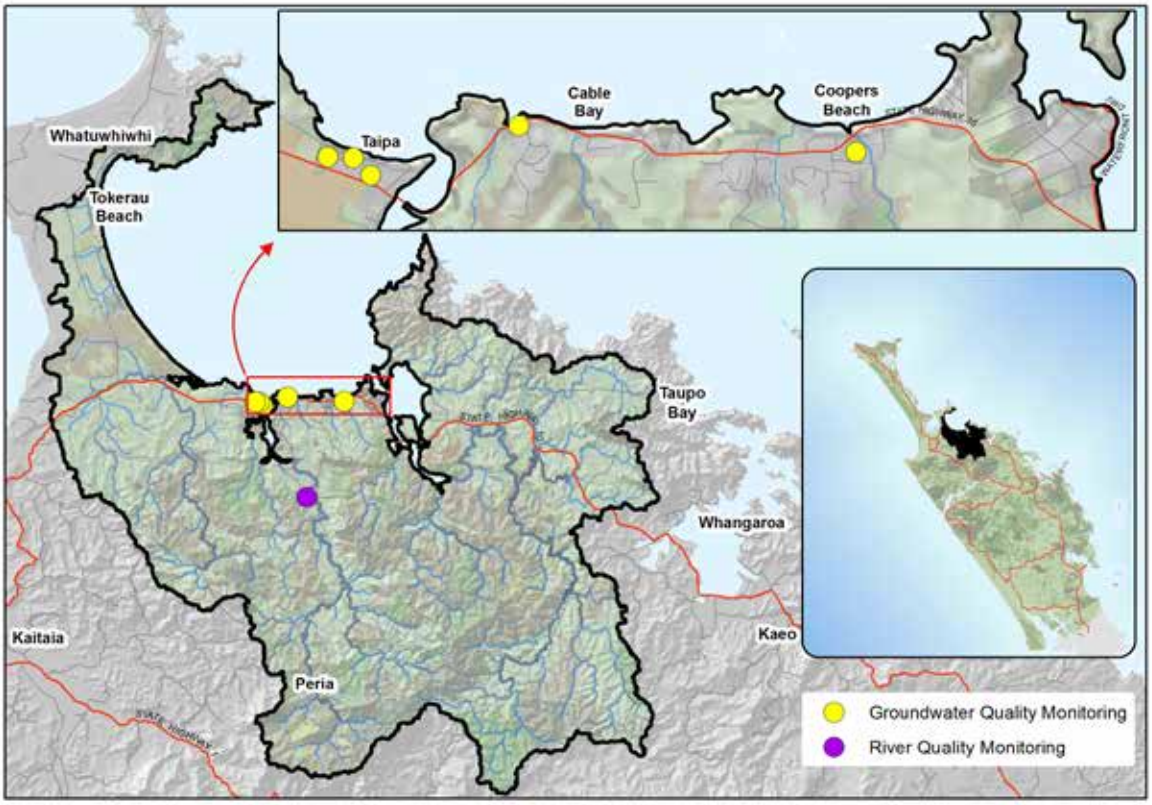
Water quality and ecology

State of water quality in Doubtless Bay / Oruru River catchment

At present only one river site is regularly monitored for water quality in the Doubtless Bay catchment – the Oruru River at Oruru Road. Based on results from 2007-2011, the Oruru is classified as having fair overall water quality. The river has issues with some aspects of water quality and ecological health; however, there is currently insufficient data for meaningful trend analysis.



Water quality issues

E. coli bacterium is an indicator of the presence of human or animal faecal contamination. Of Oruru River samples, 85% exceeded the national guideline for stock drinking water with a median of 292 MPN/100ml, well above the guideline value of ≤126 MPN/100mL (Table 2).

Dissolved Reactive Phosphorous (DRP) is a measure of the soluble phosphorus compounds readily taken up by plants and algae. Dissolved reactive phosphorus concentrations provide a useful indication of a waterbody's ability to support nuisance algal or plant growths. 98% of samples exceed the national guideline for phosphorus (DRP) at the Oruru River site (Table 2).

Turbidity indicates how much suspended sediment is in the water. Sediment is associated with runoff from the land and erosion. As well as making the water unsuitable for drinking by stock, turbid water can also make areas unsuitable for swimming and can harm aquatic life. 58% of turbidity samples exceeded the national guideline at the Oruru River site (Table 2).

Water quality index

A water quality index is used to enable comparison between Northland's rivers and streams. The water quality index is calculated using the median values for six variables (see identifiers inTable 1).

Using the water quality index, water quality at each site can be classified into one of four categories according to how many medians meet national guideline values.

Excellent: median values for all six variables meet guidelines.

Good: median values for five variables (one of which must be dissolved oxygen) meet guidelines.

Fair: median values for three or four variables (one of which must be dissolved oxygen) meet guidelines.

Poor: median values for less than three variables meet guidelines.

Table 1: Ministry for the Environment water quality guideline values

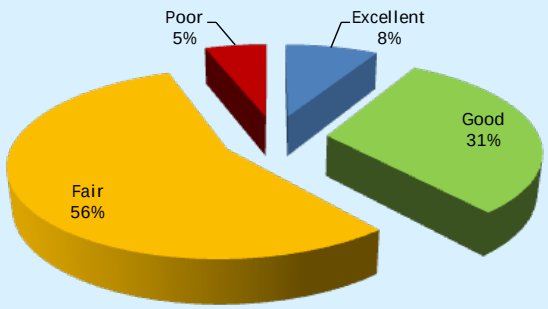
Identifier (+unit)	Abbreviation	Reference	Guideline value
Dissolved Oxygen	DO	RMA 1991 Third Schedule	≥80 (% saturation)
Dissolved Reactive Phosphorous	DRP	ANZECC (2000)	≤0.010 (mg/L)
Escherichia coli	E. coli	ANZECC (1992)	≤126 (cfu/100 mL) Stock Drinking Water
Ammoniacal Nitrogen	NH_4	ANZECC (2000)	≤0.021 (mg/L)
Nitrite-Nitrate Nitrogen	NNN	ANZECC (2000)	≤0.444 (mg/L)
Turbidity	TURB	ANZECC (2000)	≤5.6 (NTU)

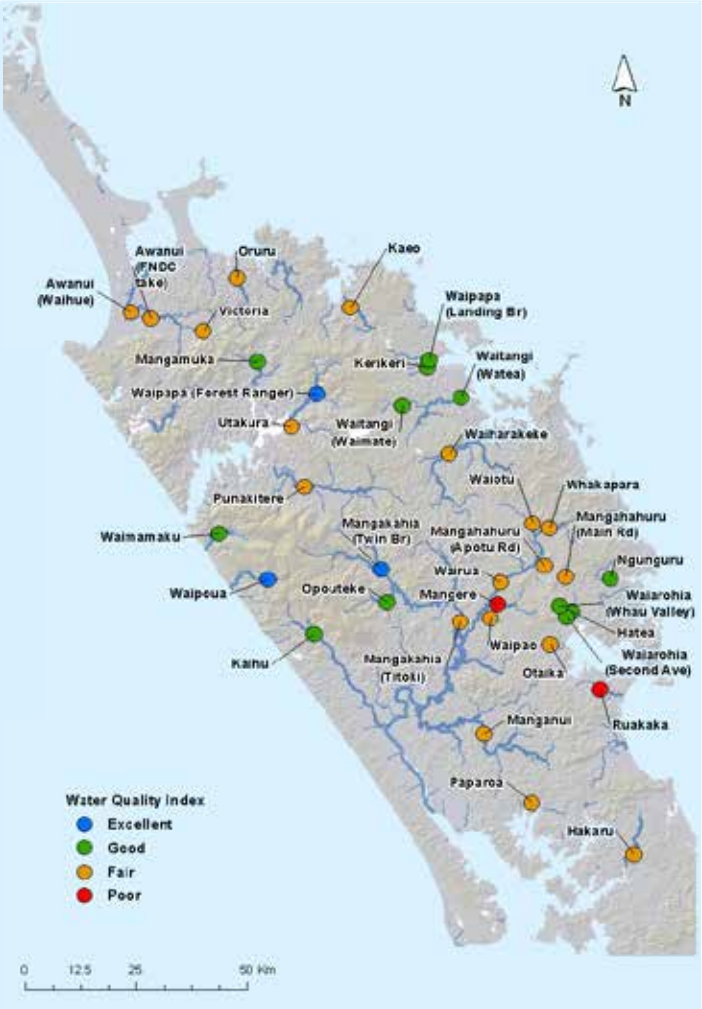
Table 2: Water quality results for Oruru River at Oruru Road (2007-11)

	DO % sat	DRP mg/L	E. coli MPN/100 mL	NH4 mg/L	NNN Mg/L	TURB NTU
Median	84.2	0.021	292	0.01	0.026	6.65
Minimum	9.5	0.01	63	0.008	0.002	2
Maximum	120.5	0.145	17329	0.05	0.592	180
Number meeting guidelines	52	51	53	53	53	50
% meeting guidelines	67.3%	2.0%	15.1%	88.7%	96.2%	42.0%
Mean within guidelines	yes	no	no	yes	yes	no
Classification: Fair						

Regional comparison

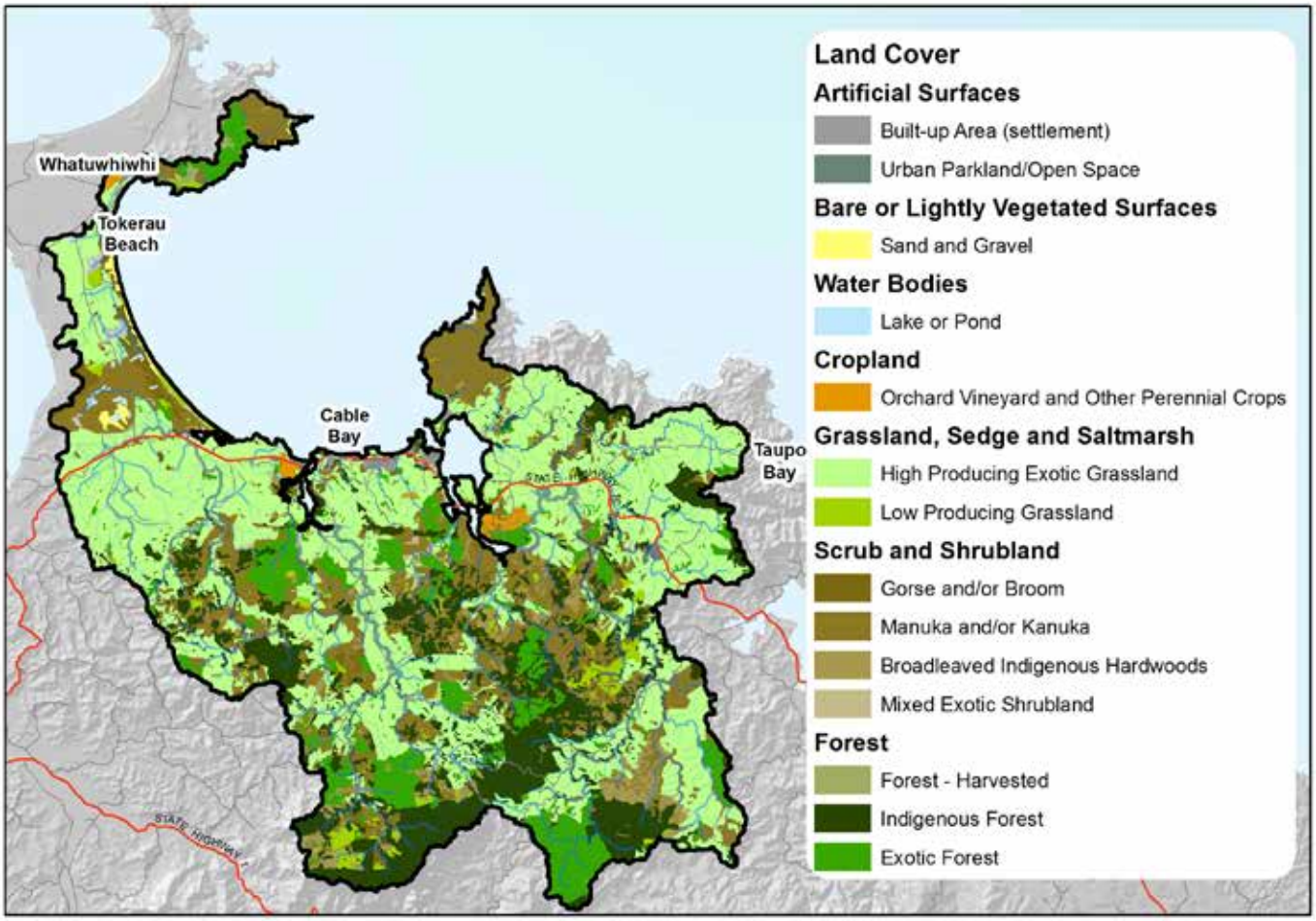
With its 'FAIR' water quality index score, the Oruru River has similar water quality to the majority of Northland sites and is typical of lowland rivers impacted by intensive land use activities.





Land use and water quality

The red volcanic soils in the Doubtless Bay area are very prone to erosion. They are made up of very fine textured clay sediment, much of which stays suspended in water reducing water clarity. These soils require careful land management practices to avoid further deterioration of water quality.



Land use in Northland

Northland has a variety of landforms, soil types and associated land uses. In Northland, farming, forestry and horticulture collectively contribute 13.7% of the Gross Domestic Product (GDP) of the region.

The future of these industries depends on maintaining the productive capacity of Northland's soils. The consequence of poor soil management is not only the loss of productivity but also an increased environmental impact including the downstream degradation of water quality.

Land use pressure on water quality and biodiversity

Intensification of land use can impact on water quality and indigenous biodiversity in a number of ways. Although in recent years there has been retirement and regeneration of some areas of marginal land, this has often been negated by the intensification of land use on the more productive areas.

Increased fertiliser use and the corresponding increase in stocking rates can lead to higher levels of loss of effluent and nutrients from farms to surrounding areas.

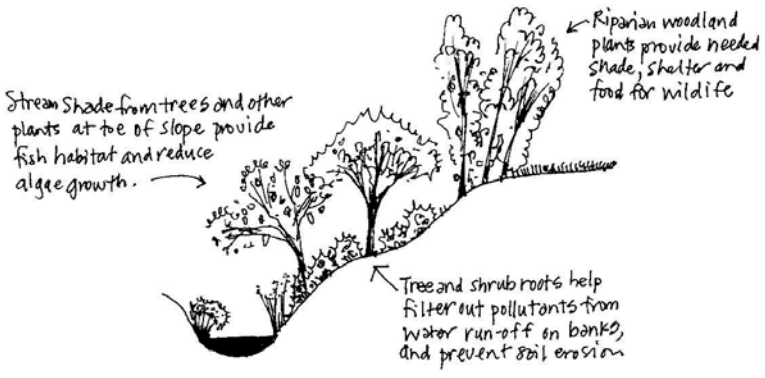
Dune lakes, gumlands, bogs and fens are examples of some of the habitat types in Northland that are particularly at risk. These ecosystems have developed under naturally low fertility conditions and the plant and animal species present are adapted to these conditions.

Nutrient enrichment brought about through the intensification of land use within the catchment can lead to rapid invasion by weeds leading to a system dominated by introduced species.

Freshwater ecology

Habitat quality

Where there is a diverse habitat available with a variety of flow types (runs riffles and pools) and good quality riparian vegetation, there tends to be high ecological health.



The habitat at the Oruru River site is described as MARGINAL based on NRC's habitat survey programme. The land use is forest and scrub (53%) in the upper catchment and mainly pasture (43%) in the lower catchment. Livestock have access to the river and there is very little vegetation cover. The river banks are relatively unstable and the river shows evidence of high sediment loads.

The effect of inappropriate land management on soil erosion in this catchment is exacerbated by the fact that 33% of the catchment's substrate is composed of highly erodible sediment/sand which can create high turbidity (TURB) levels.

Invertebrates

The fair water and marginal habitat quality at the Oruru River site is reflected in a degraded invertebrate community, dominated by pollution-tolerant species such as snails and the pollution-tolerant caddisfly *Oxyethira.*

Oxyethira larva (credit Landcare Research)

Fish

The greater Doubtless Bay catchment has records of nine native fish species on the National Freshwater Fish Database. These include longfin eel, shortfin eel, inanga, giant bully, common bully, smelt, torrent fish, redfin bully and banded kokopu. The pest fish gambusia is also recorded in the catchment.

Banded kokopu (credit TerraNature Trust)

Lake Waiporohita

This is a small dune lake (5.6 ha) located near Tokerau Beach on the Karikari Peninsula. Lake Waiporohita is classified as 'supertrophic' which means it is fertile and saturated in phosphorus and nitrogen, with very high algae growth and blooms during calm sunny periods. High nutrient loads are likely to be associated with nutrient run off from pastoral land as well as high densities of bird life on the lake. However, the whole catchment has been fenced and there are signs of improving trends in water quality.