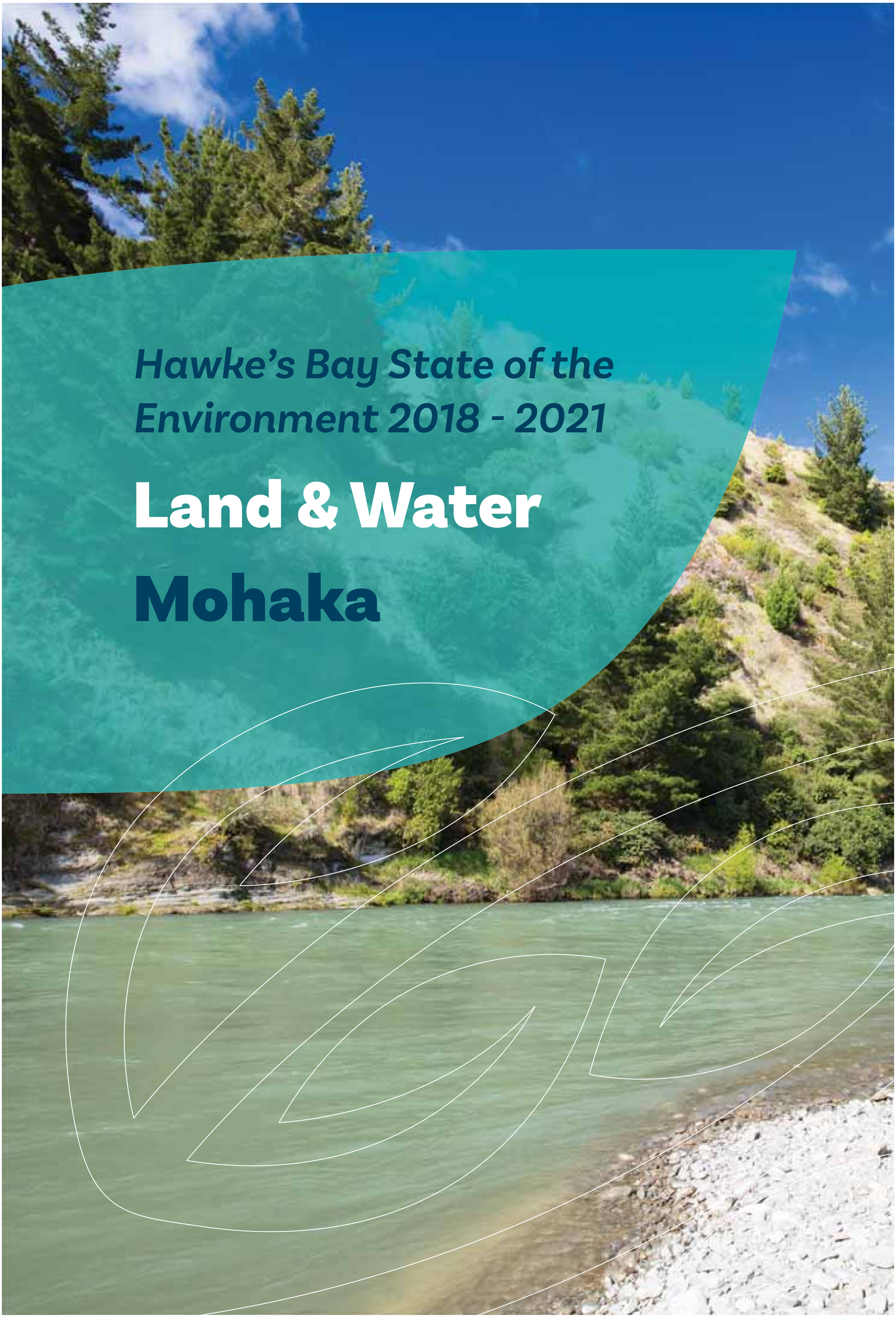


Hawke's Bay State of the Environment 2018 - 2021

Land & Water

Mohaka

Key points:

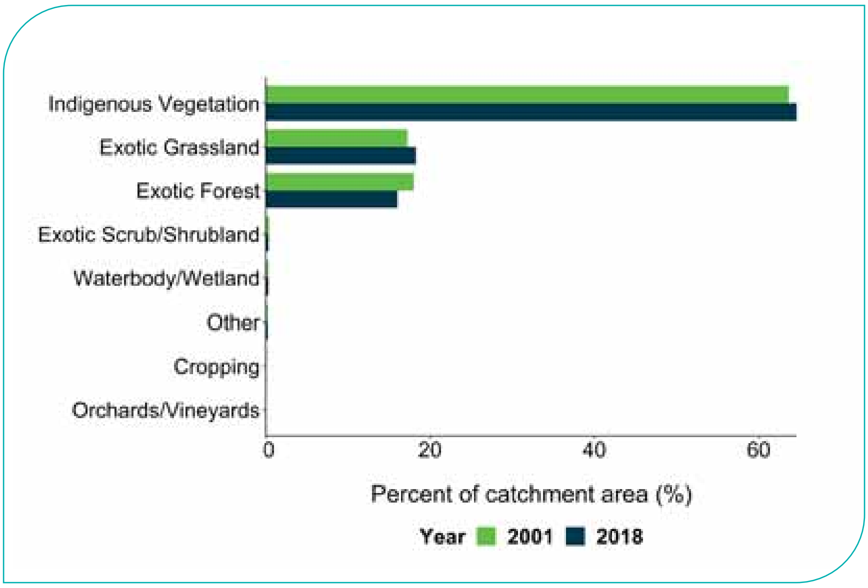
- Sediment lost from the land into streams and rivers is one of the main stressors on aquatic ecosystems in these catchments. The sediment also contributes dissolved reactive phosphorous to the system.
- Summer and autumn droughts in 2019-20 and 2020-21 lowered surface water flows.
- The quality of groundwater in shallow unconfined aquifers in Taharua is vulnerable to contamination from land-use activities, particularly nitrate-nitrogen.

16. Mohaka and Waihua catchments

Land Cover

Over the past two decades, the Mohaka and Waihua catchments have experienced relatively small increases in indigenous vegetation and exotic grassland cover, with a small decrease in exotic forest (Figure 16-1). The major land cover in the Mohaka catchment is indigenous vegetation, while the Waihua catchment is dominated by exotic grassland and exotic forests (Figure 16-2).

Despite the high proportion of indigenous vegetation in the Mohaka area, localised reaches of the Mohaka River have elevated concentrations of nitrogen and phosphorus in areas where intensive agricultural land use activities are occurring in the upstream catchments. These nutrients can fuel nuisance periphyton growth and impact ecosystem health. Increasing nitrogen levels in the Taharua, Ripia, and Waihua sub-catchments may be occurring from land-use activities, although a recent, widespread increase in phosphorus is most likely the result of natural processes.



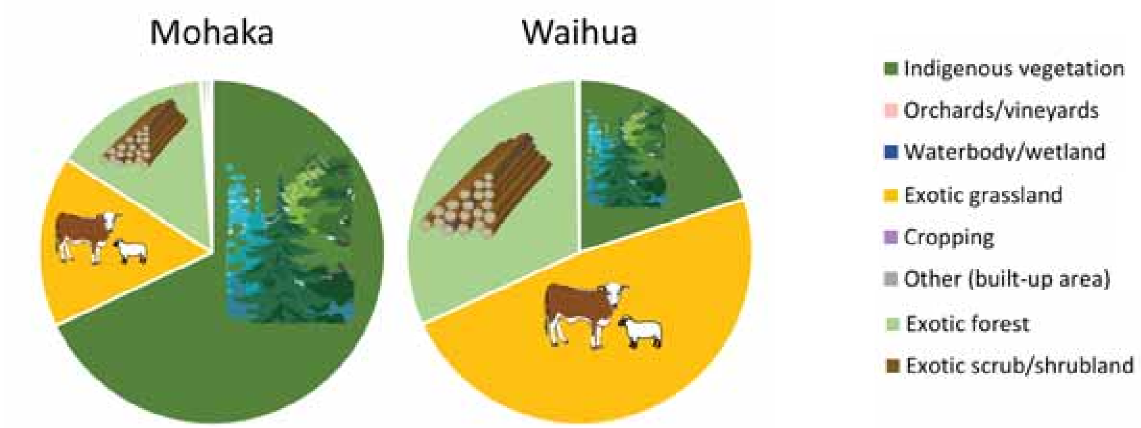


Figure 16-1. Land cover change in the Mohaka and Waihua catchments (262,584ha) between 2001 and 2018. The 'other' category includes built-up areas (settlements, urban parkland, and transport infrastructure) and bare surfaces such as bare soil, gravel, and rock.

Climate

Annual rainfall in the Mohaka catchment in 2018-19 was similar to the long-term average, but rainfall in the subsequent two years was below normal (Figure 16-3). Seasonal rainfall in this catchment, like elsewhere in Hawke's Bay, has been characterised by consecutive dry autumns for the last three years, preceded by dry summers for the last two years.

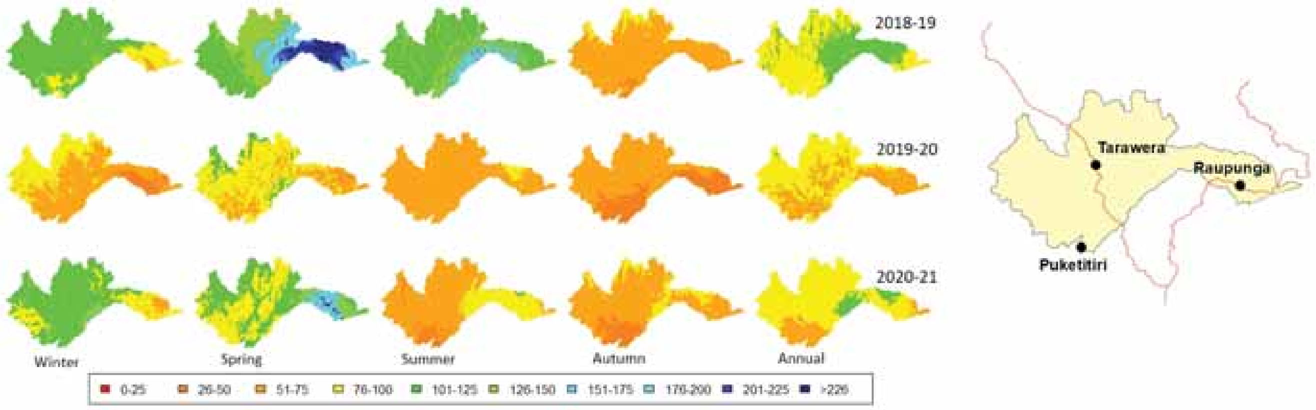


Figure 16 3. Seasonal and annual rainfall from 2018 to 2021, shown as a percentage of the long-term average.

Unfortunately, HBRC does not have rainfall records for a long period of time, so long-term trends in rainfall are uncertain for this catchment, and trends in temperature are difficult to find. However, satellite images suggest potential evapotranspiration has increased over the last 20 years.

We expect potential evapotranspiration to continue to increase as temperatures increase with climate change. Rainfall is expected to decline by more than 5% in parts of the catchment by the end of the century, with a more than 10% reduction in average spring rainfall. While projections suggest that summer rainfall may increase in other areas of Hawke's Bay, it is expected to decline by 2% in the Mohaka catchment.

Surface water flows

The long-term average flow at river monitoring stations indicates that from 2018-2021, particularly during summer, the Mohaka River experienced below normal minimum flow conditions (Figure 16-4). This trend reflects the dry conditions in the region during this time. There are some areas within the catchment (e.g., Taharua) where intensive land-use activities could require sizable volumes of water for irrigation. However, the volume of surface water taken by consented users is very low compared to the mean monthly flows of the river system.

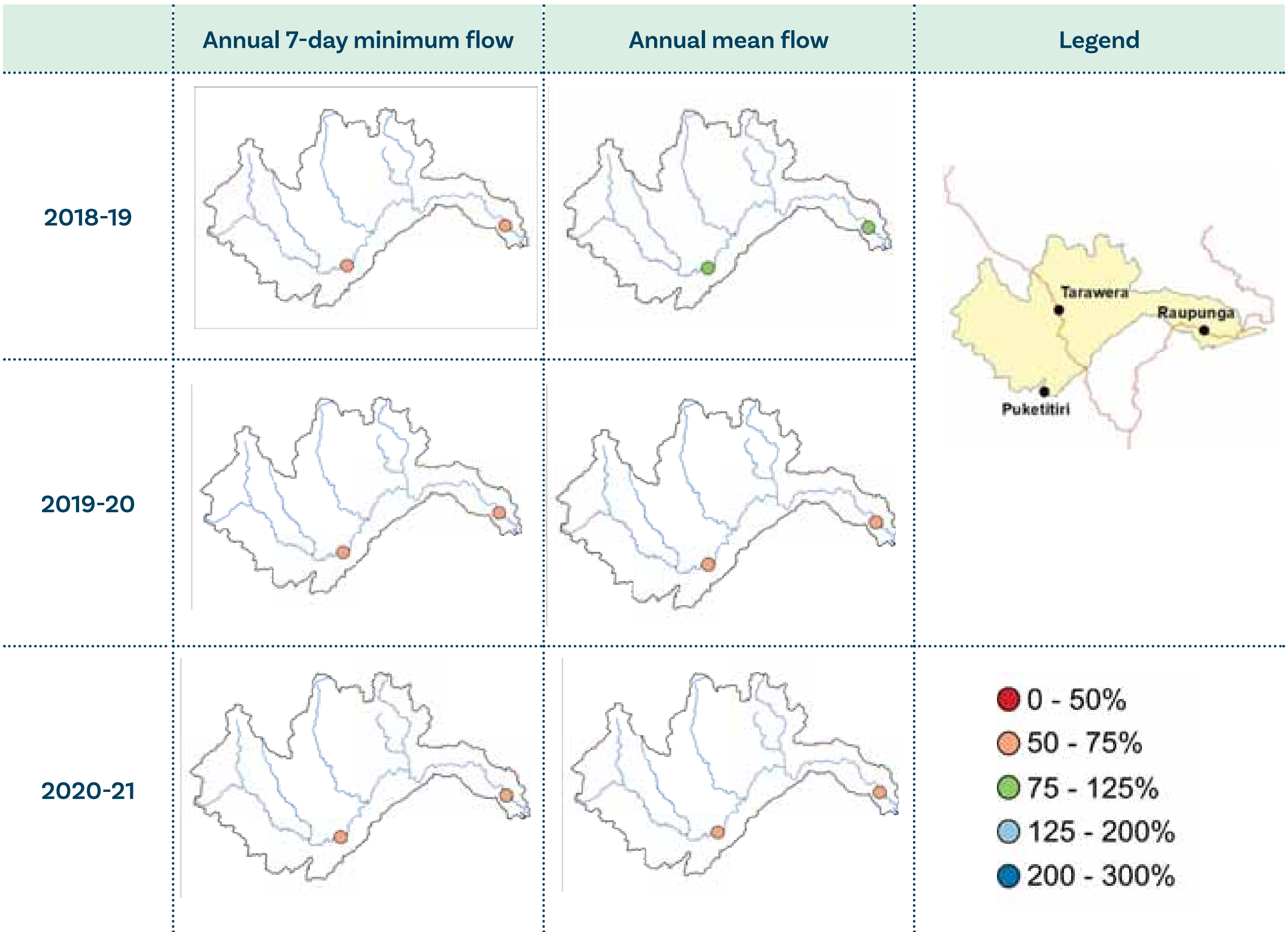


Figure 16-4. River flows as a percentage of the long-term average.

River water quality

Mohaka and Waihua Rivers

The Mohaka River is arguably Hawke's Bay's wildest river. The outstanding trout fishing, rafting, and scenic values of the Mohaka mainstem upstream of Willowflat, as well as Te Hoe River, are recognised and protected under a Water Conservation Order.

HBRC regularly samples water quality at 13 locations in the Mohaka and Waihua catchments. Four of these sites are on the Taharua River, despite it being a relatively short waterway compared with the entire Mohaka catchment. HBRC chose to monitor this area closely because of high instream nitrogen concentrations caused by adjacent dairy and sheep/beef farming. During summer low-flow periods, water temperatures increase, and the elevated nutrient concentrations can generate nuisance algal growth in the Mohaka below the Taharua confluence (Figure 16-5 to Figure 16-7).

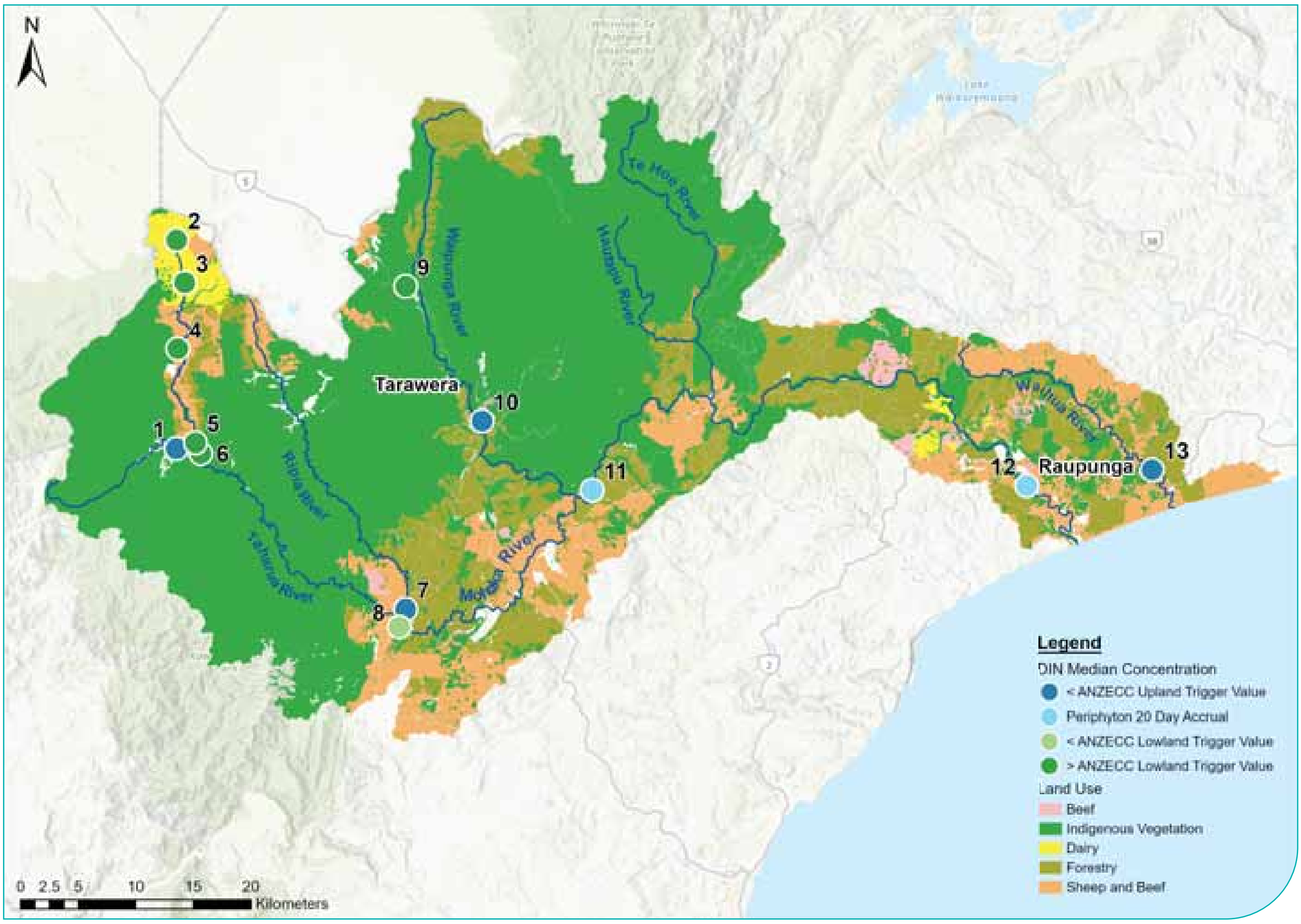


Figure 16-5. Median dissolved inorganic nitrogen (DIN) concentrations in the Mohaka catchment relative to ANZECC upland and lowland (2000) or Biggs (2000) periphyton trigger values. 1: Mohaka River u/s Taharua, 2: Taharua River at Wairango Rd, 3: Taharua River at Twin Culverts, 4: Taharua River at Henry's Bridge, 5: Taharua River at Red Hut, 6: Mohaka River d/s Taharua, 7: Mohaka River d/s Ripia, 8: Ripia River u/s Mohaka, 9: Waiarua Stream at SH5, 10: Mokomokonui River u/s Waipunga, 11: Mohaka d/s Waipunga, 12: Mohaka at Raupunga, 13: Waihua River at Waihua Rd.

Water clarity in the lower Mohaka catchment is poorer than in the upper catchment, which may be partly because of natural features such as the Te Hoe Gorge. However, erosion from forestry and farmland in steep parts of the catchment also contributes sediment to the system. The high flow rate in this catchment provides a large and steady supply of sediment to the coast, affecting coastal water turbidity (Figure 16-8). Recent surveys of the nursery fish habitat south of the Mohaka River mouth at Wairoa Hard show areas of coarse cobble persisting in the area of the Wairoa Hard to the south of the river mouth (see Marine and coastal environments chapter). The fate of sediment from the Mohaka River after it enters the ocean is currently unknown, and the topic of a current programme of work supported by HBRC.

Further up the coast, the Waihua is a relatively small, steep-sided catchment with extensive sheep/beef farming and production forestry. Erosion is high in this area, leading to poor water clarity and elevated DRP concentrations. Sediment is also likely impacting on macroinvertebrate communities, as macroinvertebrate community index (MCI) scores for the Waihua are in the D (poor) band. Reducing sediment loss in both catchments is likely to improve ecosystem health.

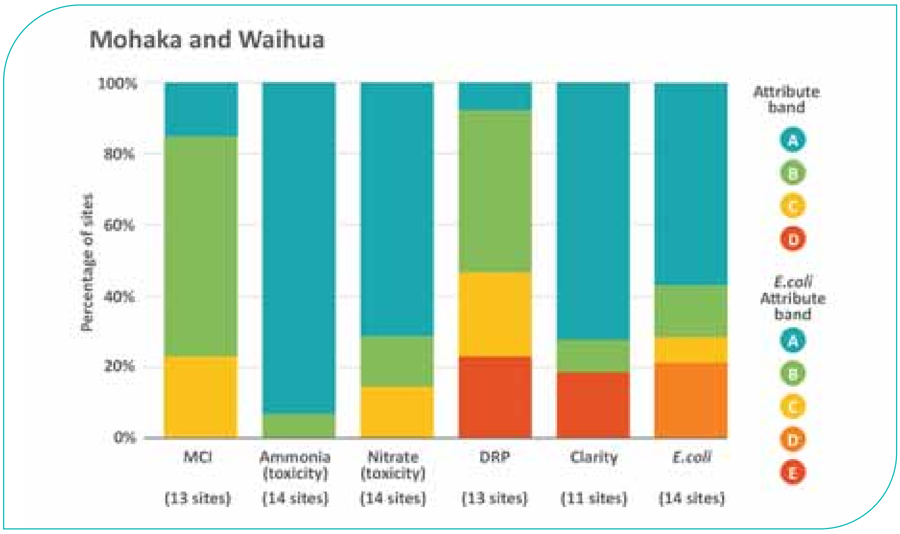


Figure 16-6. Bands (A = Good, D/E = Poor) in the National Policy Statement for Freshwater Management (NPS-FM) for river attributes in the Mohaka and Waihua catchment. DRP = dissolved reactive phosphorus. MCI = macroinvertebrate community index. Grading based on latest five years of available data.

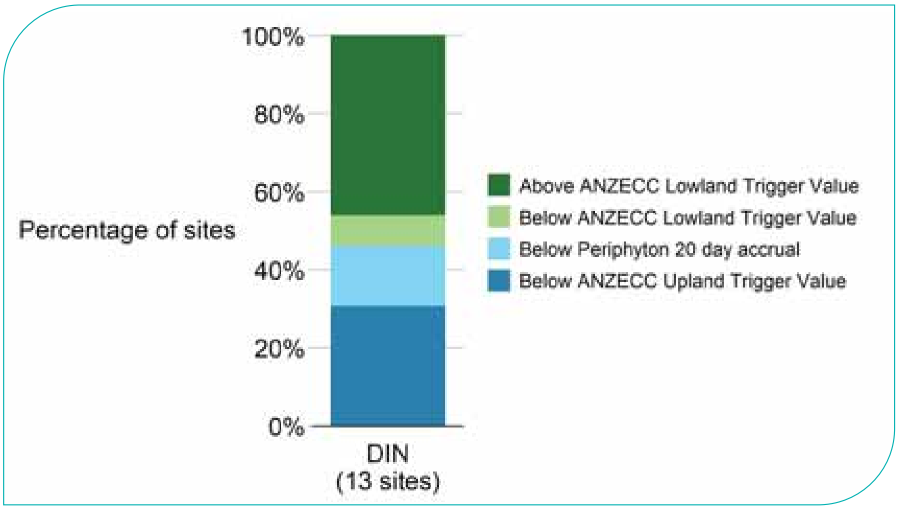


Figure 16-7: Median dissolved inorganic nitrogen (DIN) concentrations for sites in the Mohaka and Waihua catchments, relative to ANZECC upland and lowland (2000) or Biggs (2000) periphyton trigger values.

Figure 16-8. Sentinel 2 satellite imagery of sediment from the Mohaka River discharging to the coast on 10 September 2017.

Taharua River and Groundwater

The Taharua River is fed by cool clean groundwater and bush-clad tributaries flowing from the Kaimanawa Ranges. It has some of the clearest water in Hawke's Bay. The free-draining pumice soils and a shallow groundwater layer make the catchment both challenging to farm, and prone to nitrogen leaching.

Nutrients from land-use activities that make their way through the soil layer to the unconfined groundwater system can move through the aquifer and be discharged as springs or diffuse seeps into surface waters. This pathway can deliver nutrient contamination from land-use activities to the tributaries and mainstem of the Taharua River.

The connection between groundwater and surface water in this catchment means that groundwater quality can impact on surface water quality. The data suggests that this can occur over relatively short time periods, and that nutrients move from the land surface to groundwater systems over a period of months, and groundwater flows to surface water over a few years.

Land use around the Taharua River has intensified over the past 40 years. Native scrub was converted to sheep and beef farming in the 1980s, and then to dairy in the early 2000s. This change has resulted in a significant increase in nitrogen loss from the catchment.

High nutrient concentrations are likely to be driving nuisance periphyton growth in the otherwise nearly pristine upper Mohaka River into which the Taharua River feeds. Monitoring data from the Taharua River shows a substantial increase in dissolved inorganic nitrogen (DIN) since sampling began in 2001 (Figure 16-8). DIN in the Taharua dropped between 2010 and 2014, when changes in land management practices were implemented, leading to a reduction in nitrogen. Subsequent changes in land ownership, land management, and catchment group activity occurred after 2014.

Figure 16-9. Dissolved Inorganic Nitrogen (DIN) concentrations in the Taharua River at the Twin Culverts monitoring site from 2001-2020. See Figure 16 5 site 3 for location.

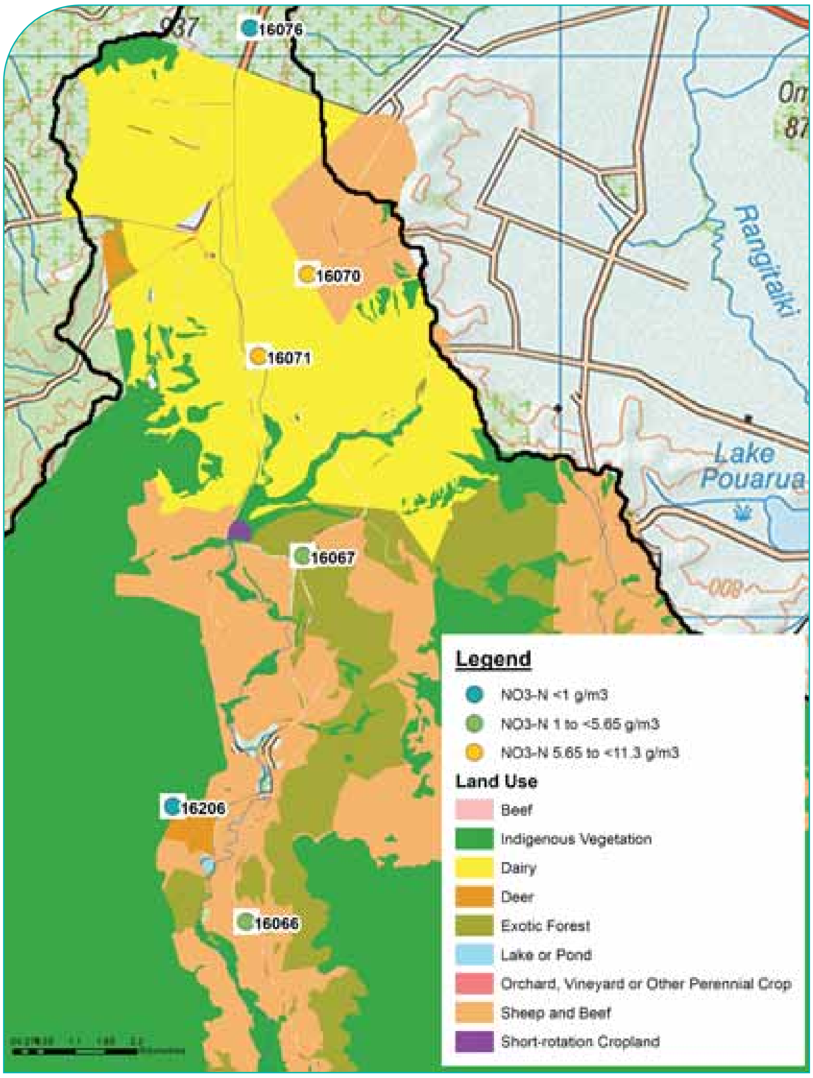


Figure 16-10. Median nitrate-nitrogen (NO3-N) concentrations in Taharua monitoring bores and associated land cover types. Orange dots are less than the DWSNZ limit but exceed the Tukituki indicator value for NO3-N.

Groundwater quality monitoring of wells in the Taharua catchment show that groundwater meets the health limits for Drinking Water Standards (DWSNZ) (Figure 16-10). However, Nitrate-Nitrogen (NO_3-N) concentrations in groundwater are concerning when looking at the potential environmental impacts as groundwater makes its way into surface water in this highly connected system. The elevated NO_3-N concentrations are associated with dairy, sheep and beef farming activities (Figure 16- 10).

The monitor wells capture a range of typical land-use activities in the catchment. The NO_3-N concentrations in groundwater under indigenous forest (well 16206) and exotic forest (well 16076) serve as benchmarks of natural background concentrations, compared to the high NO3-N concentrations under dairy farmland (wells 16070 and 16071;Figure 16-11).

Groundwater quality reacts relatively quickly to changes in land use or management practices. For example, the variation of NO3-N concentrations over time in wells 16066 and 16067 reflect changes in exotic forests that were harvested and converted to sheep/beef farming for a time (Figure 16-12). These NO_3-N concentrations are considerably lower than those observed under dairy farming.

As part of an imminent change to the RRMP, community engagement and planning process will establish targets and policy frameworks to manage and reduce the risk of nitrogen and other contaminants from entering local waterways.

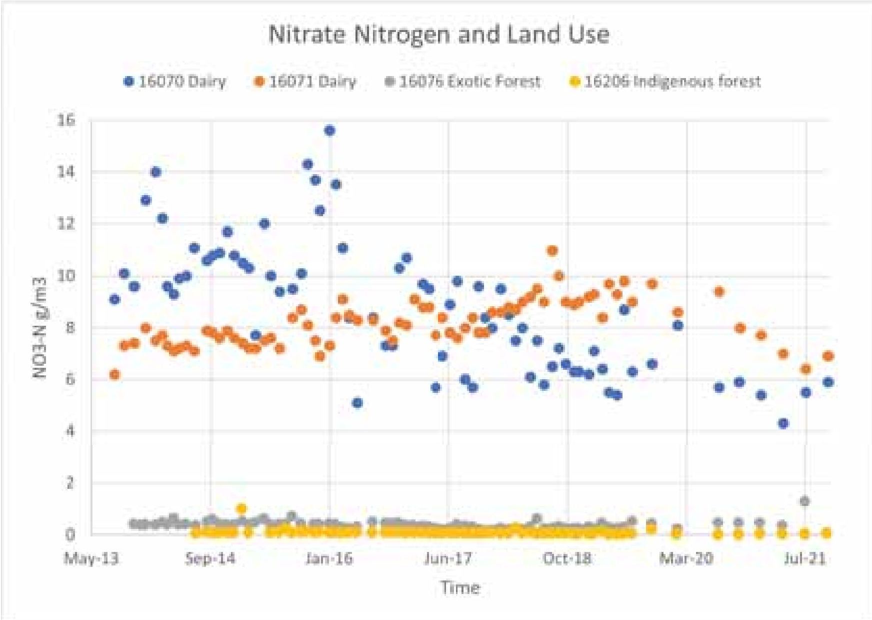


Figure 16-11. Nitrate-nitrogen (NO3-N) concentrations under dairy land use, exotic forest, and indigenous forest land use from 2013-2021. Well numbers, locations, and associated land use are shown in Figure 16-9.

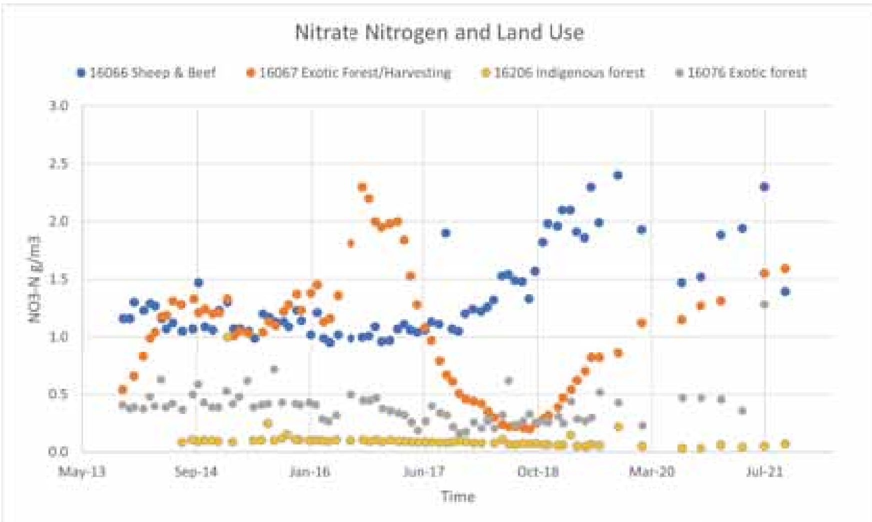


Figure 16-12. Nitrate-nitrogen concentrations under sheep and beef farming, exotic forest with harvesting, exotic forest without harvesting, and indigenous forest from 2013-2021. Well numbers, locations, and associated land use are shown in Figure 16 9.

Coastal water quality

In Mohaka coastal waters, suspended sediment, dissolved oxygen, chlorophyll-a, and nitrogen and phosphorus levels are within the ranges observed in other New Zealand open coast sites (Figure 16-13). However, turbidity (visual clarity) is slightly elevated, which is likely to be linked to the high supply of sediment discussed earlier.

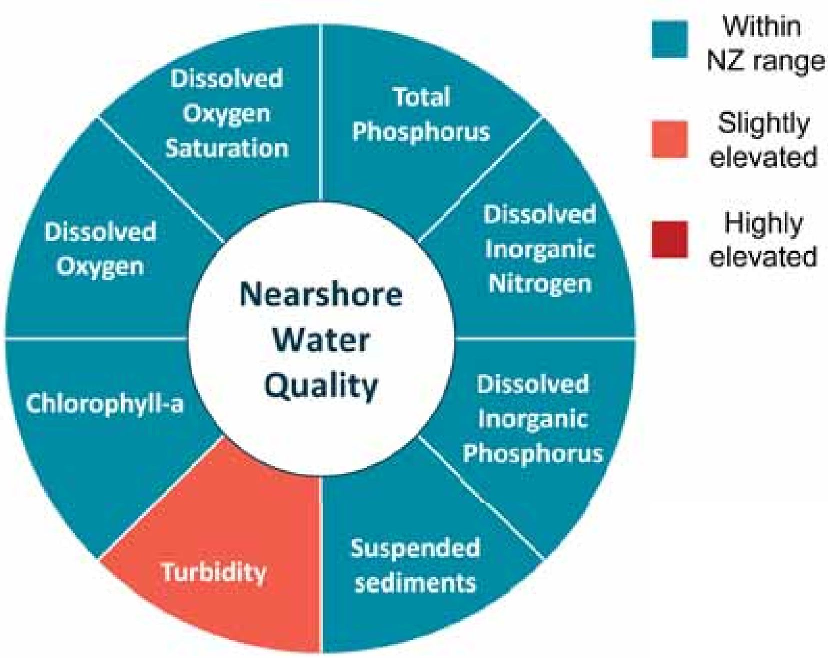


Figure 16-13. Coastal water quality indicators in the Mohaka catchment, compared to other coastal sites around New Zealand.