BAY OF PLENTY REGIONAL COUNCIL
TOI MOANA

Ōhiwa Harbour and Catchment

Interim Report 2020

Bay of Plenty Regional Council
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Prepared by Lisa Bevan (Environmental Data Officer)

5 Quay Street
P O Box 364
Whakatāne
NEW ZEALAND

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Contents

Part 1:
Introduction

A monitoring programme is in place to track the ecological and physical health of Ōhiwa Harbour and its catchment over time. There are 47 measures, mostly involving various aspects of biodiversity and water quality, which are monitored, some annually and some less frequently. The monitoring is undertaken by a range of agencies, organisations and individuals. A report summarising the results of the monitoring that has taken place is produced each year. This report summarises the monitoring results from the 2018/2019 financial year.

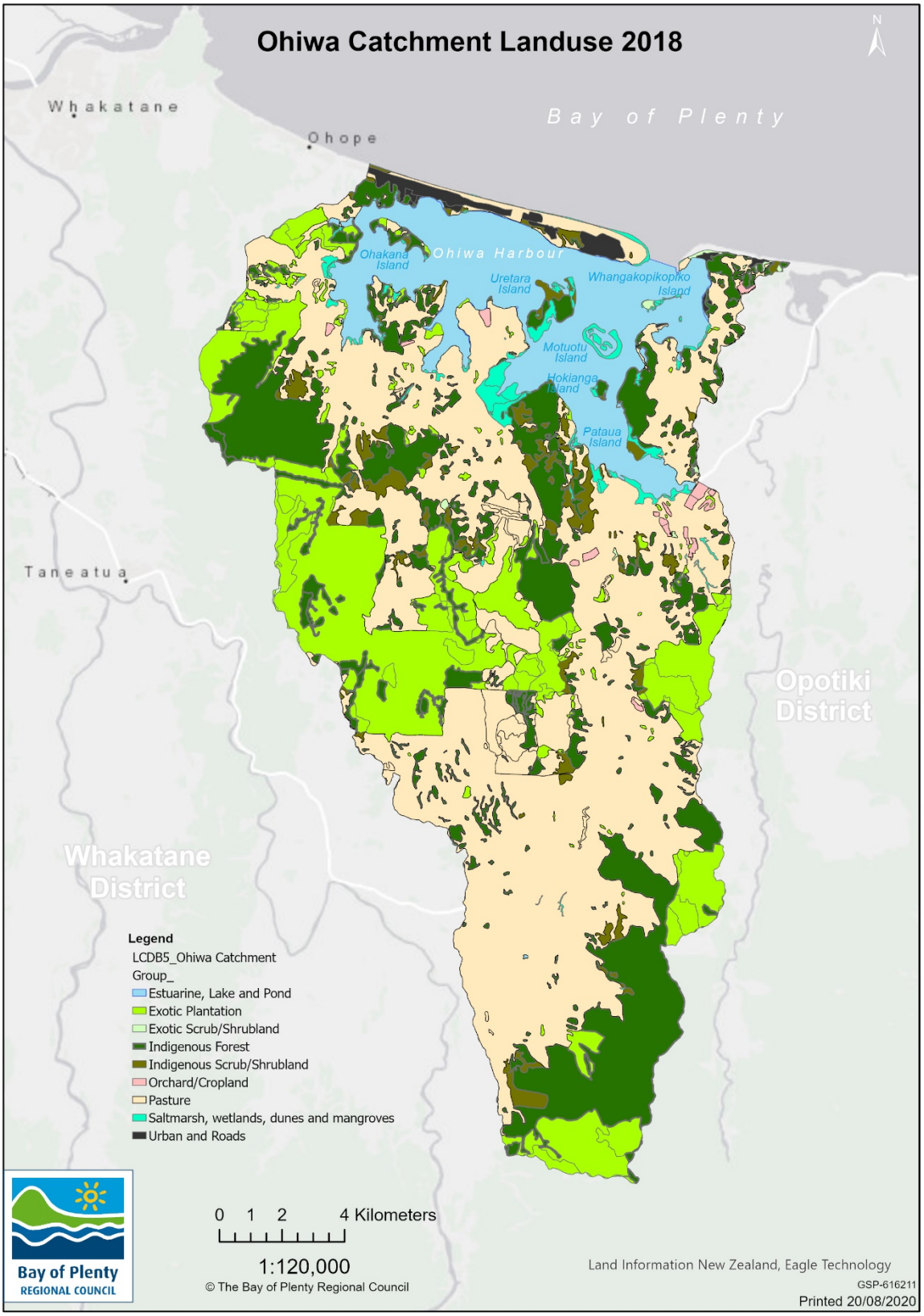
Every five years, a more comprehensive state of environment report is compiled for Ōhiwa Harbour and catchment which contains a complete set of monitoring results from the five year period and provides a more detailed analysis of trends over time. The next such report is due for completion in 2023.

Part 2: **Land**

Land cover

Snapshots of New Zealand's land cover have been captured in Landcare Research's, Land Cover Database (LCDB), to understand how our landscape is broadly changing over time. This is a nationally recognised approach to monitoring land cover and land use over time, to provide an indication of the change in the level of risk or vulnerability to the land. Snapshots were taken in 1996, 2001, 2008, 2012 and 2018. The latest 2018 snapshot (LCDB5) was released in January 2020.

The map below (page 7) shows land use in the Catchment as mapped in the 2018 version of the LCDB. Comparison of the 2018 and 2012 versions of LCDB suggest some losses of indigenous ecosystems particularly indigenous scrub, but further analysis is required to verify whether this is real loss or simply the result of mapping error.


Ohiwa Catchment Landuse 2018
N
Whakatane
Ohope
Bay of Plenty
Ohakana Island
Ohiwa Harbour
Uretara Island
Whangakopikopiko Island
Motuotu Island
Hokianga Island
Pataua Island
Taneatua
Opotiki District
Whakatane District
Legend
LCDB5_Ohiwa Catchment Group_
Estuarine, Lake and Pond
Exotic Plantation
Exotic Scrub/Shrubland
Indigenous Forest
Indigenous Scrub/Shrubland
Orchard/Cropland
Pasture
Saltmarsh, wetlands, dunes and mangroves
Urban and Roads
Bay of Plenty REGIONAL COUNCIL
0 1 2 4 Kilometers
1:120,000
© The Bay of Plenty Regional Council
Land Information New Zealand, Eagle Technology
GSP-616211
Printed 20/08/2020

Riparian Fencing

A further 9.2 km of riparian fencing has been completed over the past year bringing the total amount of riparian fencing to 460.9 km. There is 268.5 km of riparian fencing still required to be completed.

These figures relate to fencing that was completed with the use of grant funding from Bay of Plenty Regional Council. Landowners themselves may have carried out further riparian fencing without assistance but the length of this fencing is unknown.

Part 3: **Terrestrial biodiversity**

Fauna

Wading birds

The Ornithiological Society of New Zealand (BirdsNZ) carry out biannual bird counts of Ōhiwa Harbour. This year an additional site was added to the survey; Goodwin Landing.

The latest June 2020 count recorded several highest numbers on record. These include royal spoonbills with a count of 52 (Figure 1), South Island pied oystercatcher with a count of 1002 (Figure 2) and variable oystercatcher with a count of 436 (Figure 3).

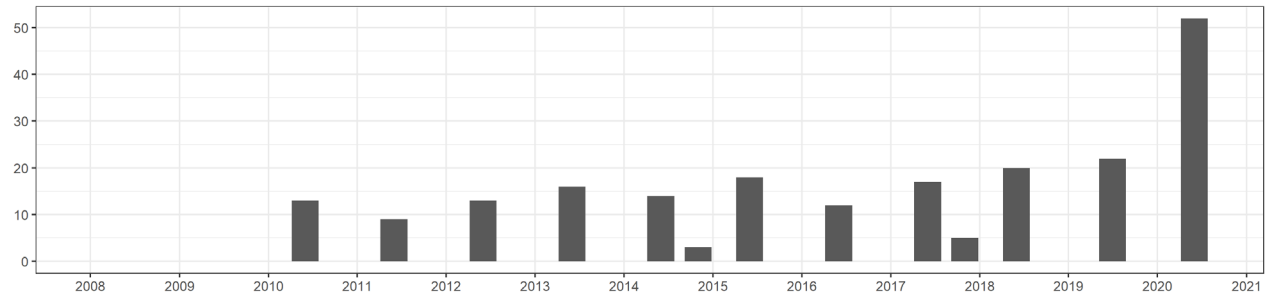


Figure 1 *Royal spoonbill counts.*

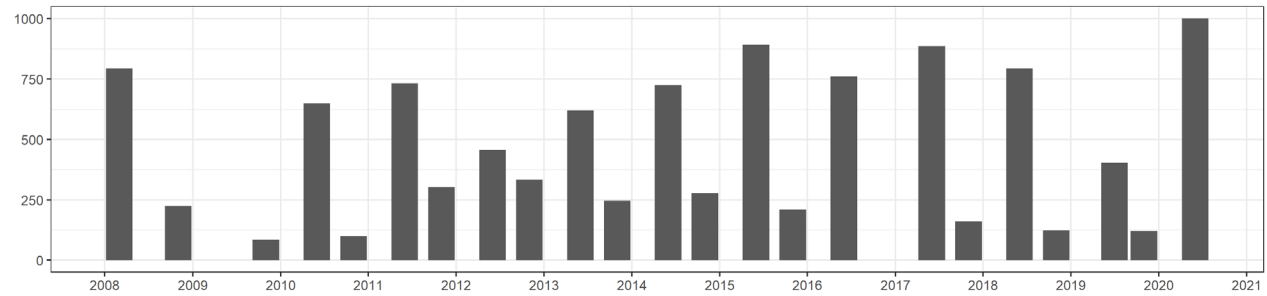


Figure 2 *South Island pied oystercatcher counts.*

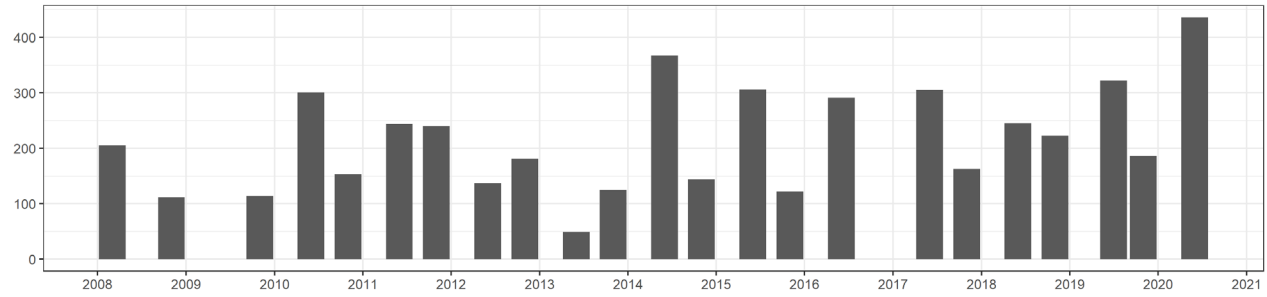


Figure 3 *Variable oystercatcher counts.*

New Zealand dotterel have continued to increase and have now reached numbers seen back in 2016 (Figure 4). This increase is likely due to the successful management by (DOC).

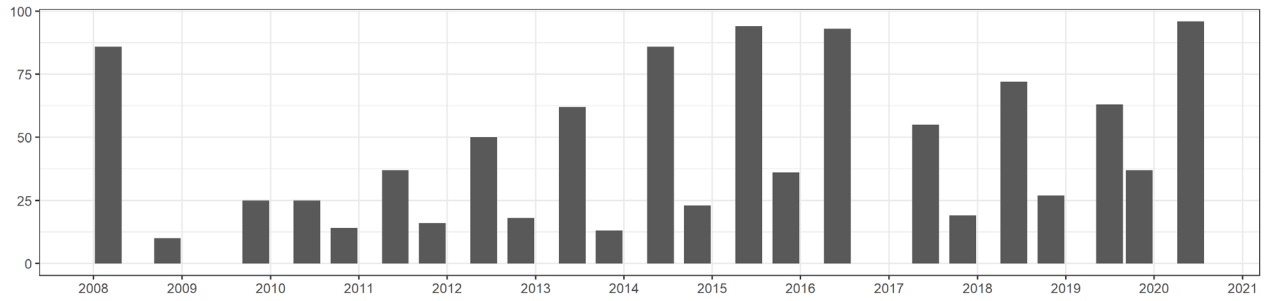


Figure 4 New Zealand dotterel June counts.

New Zealand Dotterel

The Department of Conservation monitor the nesting success of New Zealand dotterel in the Harbour as an indicator of management effectiveness. Nests on Ōhope Spit, Whangakopikopiko Island, an unnamed islet off Ōhiwa Loop Road, Ōhiwa Spit and the Ruatuna Shellbank are monitored. Over the 2019/2020 breeding season, the following breeding pairs and chicks were recorded:

Table 1 New Zealand dotterel nesting results for the 2019/2020 breeding season.

Location	Breeding Pairs	Chicks	Productivity rate	Comments
Ōhope Spit	11	6	0.55	
Whangakopikopiko Island	7	1+	0.17	Erosion over the years has reduced available nesting area for shorebirds. Consequently, dotterels and oystercatchers' nest in close proximity to a large black-backed gull population. Although four dotterel chicks were observed at Whangakopikopiko, only one was confirmed to fledge.
Inamed Islet off Ōhiwa Loop Road	2	2	1.00	This was the first time in four years that chicks have successfully fledged at this site. Flooding prevented fledging on this low-lying site in previous years. Although sand bagging was attempted during the 2019/20 season, one nest survived during a period of calm weather in the third clutch.
Ōhiwa Spit	2	1	0.50	

The overall fledging rate for New Zealand dotterel chicks monitored across the Harbour sites is above the 'productive' threshold of 0.5 fledged chicks per pair per season and has been maintained since 2015.

This year's breeding season had multiple challenges. Nesting was delayed because of the cold temperatures and strong winds which meant vulnerable nests and young chicks coincided with an increase in beach use. Also an increase in predators has resulted from the 2019 mega-mast. Nests on Ōhope Beach from a re-clutch in January disappeared and was likely due to predation.

Variable Oystercatcher

The Department of Conservation monitor the nesting success of variable oystercatcher in the Harbour as an indicator of management success. Nests on Ōhope Spit, Whangakopikopiko Island, an unnamed islet off Ōhiwa Loop Road, Ōhiwa Spit, Ōhiwa beach and the Ruatuna Shellbank are monitored. Over the 2019/2020 breeding season the following breeding pairs and chicks were recorded:

Table 2 Variable oystercatcher nesting results for the 2019/2020 breeding season.

Location	Breeding Pairs	Chicks	Productivity rate
Ōhope Spit	10	15	1.5
Whangakopikopiko Island	13	16	1.0
Inamed Islet off Ōhiwa Loop Road	4	2	0.5
Ōhiwa Spit	2	1	0.5
Ōhiwa Beach	4	2	0.5

Variable oystercatchers were not as affected by the cold and windy weather as breeding was successful early in the season. Most pairs fledged one or two chicks.

Pests

Black-backed gulls

The Department of Conservation, with the help of care groups, control the black-back gull population in Ōhiwa for the protection of nesting shorebirds.

Over the 2019/20 breeding season, 55 black-backed gull eggs were picked on Whangakopikopiko Island by the Ōhiwa Reserves Care Group. Nesting habitat on the island has been reduced over the last five years due to erosion. There is now little separation between black-backed gulls and other nesting shorebirds on the island increasing the risk of predation on vulnerable chicks.

The eggs of a black-backed gull nest on Ōhope Spit was also pricked as this nest was in close proximity to other nesting shorebirds.

Black swans

Black swans graze on seagrass, *Zostera capricorni,* which is native marine plant that serves an important role in stabilising sand flats and providing habitat for juvenile fish. There is concern that swan grazing may be causing permanent damage to the seagrass beds in Ōhiwa Harbour.

Bay of Plenty Regional Council staff have regularly monitored black swan numbers in Ōhiwa Harbour since 2019 (Figure 5). Swans are consistently observed in the area between Ohakana and Uretara islands (Figure 6), which is also the main seagrass bed in the harbour.

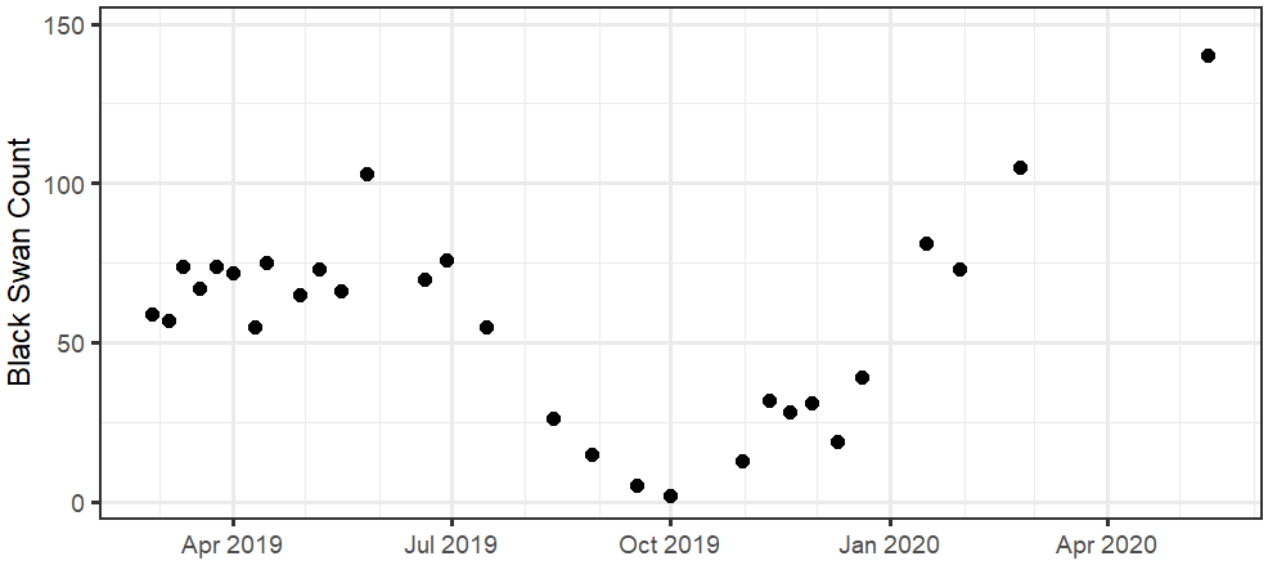


Figure 5 *Black swan counts in Ohiwa Harbour over time.*

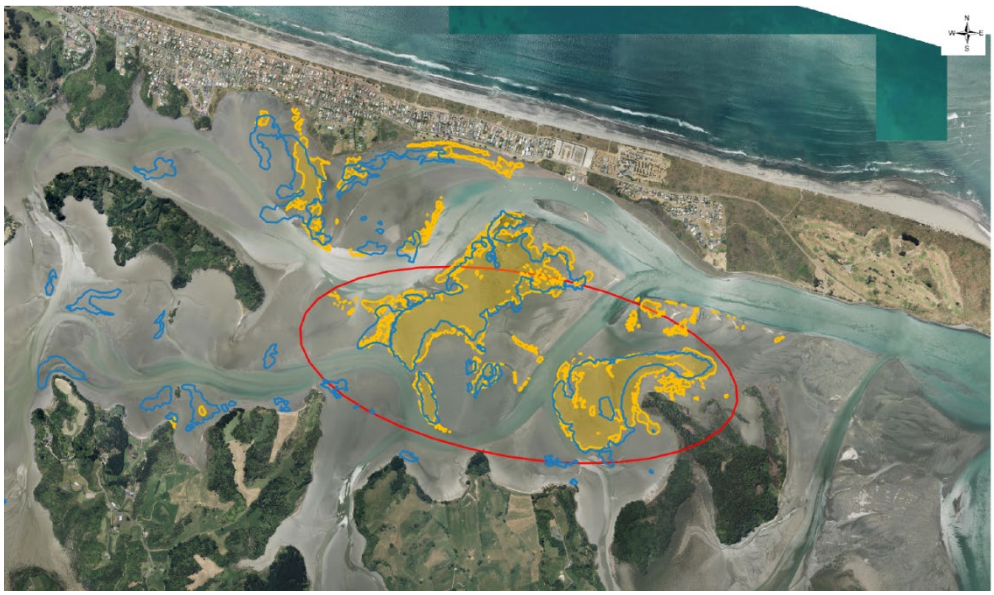


Figure 6 *Red ellipse shows area were black swans have been sighted since 2019. Yellow shading shows current seagrass extent.*

Care Groups

Over the past year, one new care group has been established, carrying out rat control on 20 ha of native bush. This brings the number of active care groups around the harbour to nine. There is also the Ōhiwa Headland Sanctuary Trust that carry out comprehensive pest control over most of the Ōhiwa headland. Several of the care groups have extended their pest control operations and are joining up their work in some areas. For example, pests are now controlled along the entire harbour margin from Ōhiwa spit to Ruatuna Road. The care groups have planted another 1500 native plants over the past year.

Part 4:
Water

Harbour water quality

Water quality trends

Bay of Plenty Regional Council monitors water quality of the harbour at two locations; Port Ōhope Wharf and at Ruatuna Road. These sites have been monitored monthly since 2015 for nutrients, faecal matter, sediment contamination and algal productivity. Prior to 2015 sampling was bi-monthly.

Nitrogen

Nitrogen results show that total nitrogen (TN) has increased at both sites since 1994 but levels appear to have stabilised over the last 10 years (Figure 7). Inorganic nitrogen (DIN – total of nitrate-nitrite nitrogen and ammoniacal nitrogen) remains fairly stable.

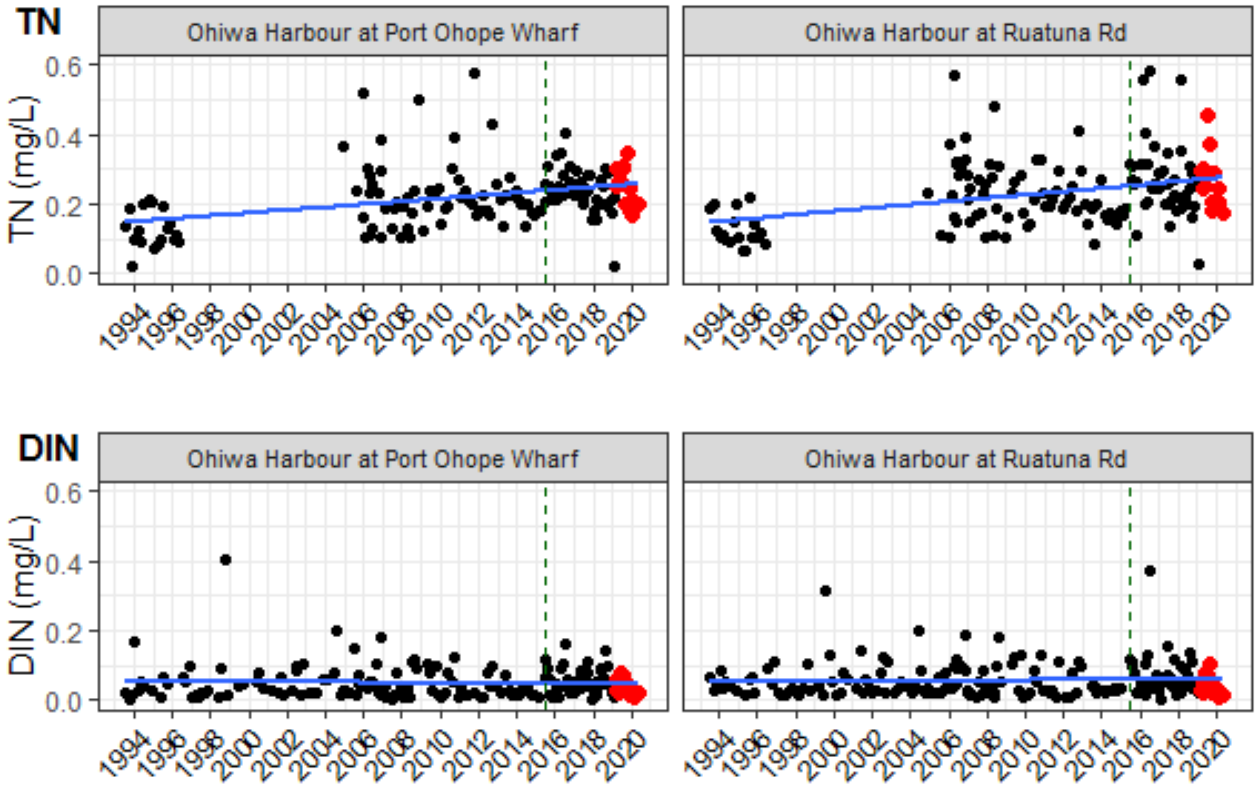


Figure 7 *Concentration of total nitrogen (top) and dissolved inorganic nitrogen (bottom) over time. The blue line represents a fitted linear model. The vertical green line represents the change in sampling time from high tide to an outgoing mid-low tide. The red data points are samples taken over the last year (2019/2020).*

Phosphorus

Total phosphorus (TP) has increased at the Ruatuna Road site within the last 10 years, however, dissolved reactive phosphorus (DRP) levels show no significant trend over the entire period of recorded data (Figure 8).

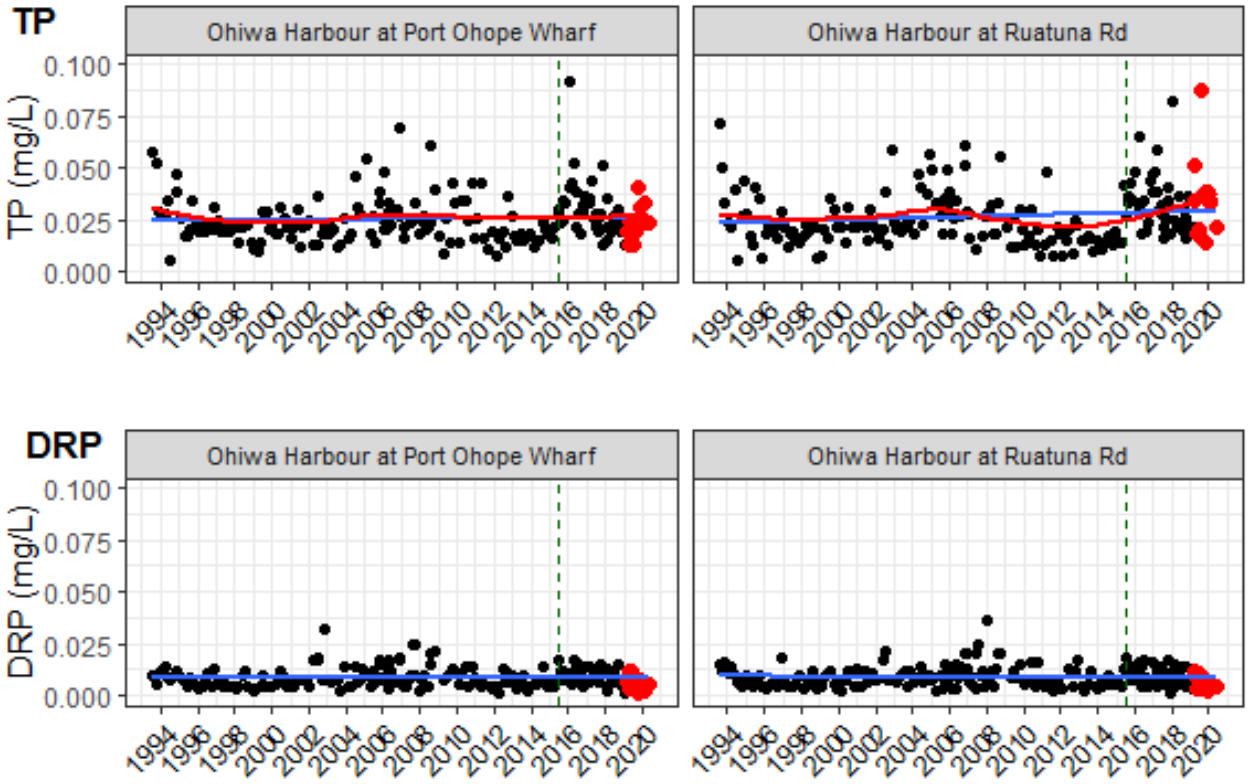


Figure 8 *Total suspended solids over time. The blue line represents a fitted linear model, while the red line is a fitted loess model. The vertical green line represents the change in sampling time from high tide to an outgoing mid-low tide. The red data points are samples taken over the last year.*

Suspended solids

Results of total suspended solids (TSS) show no trend at the Port Ōhope Wharf site over the last 10 years (Figure 9).

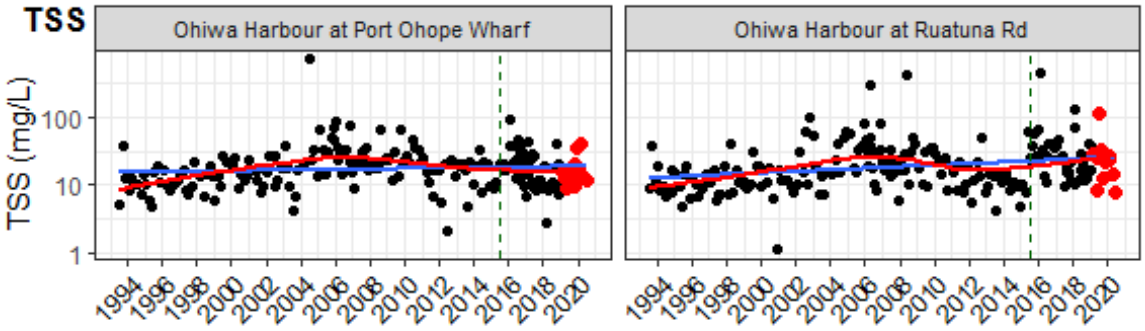


Figure 9 *Total suspended solids over time. The blue line represents a fitted linear model, while the red line is a fitted loess model. The vertical green line represents the change in sampling time from high tide to an outgoing mid-low tide. The red data points are samples taken over the last year.*

Faecal contamination

Faecal coliforms (FC) and enterococci (ENT) are two indicators of faecal contamination. Both indicators have continued to increase at the Ruatuna Road site since 1994, however, no trend is apparent at the site over the past 10 years (Figure 10).

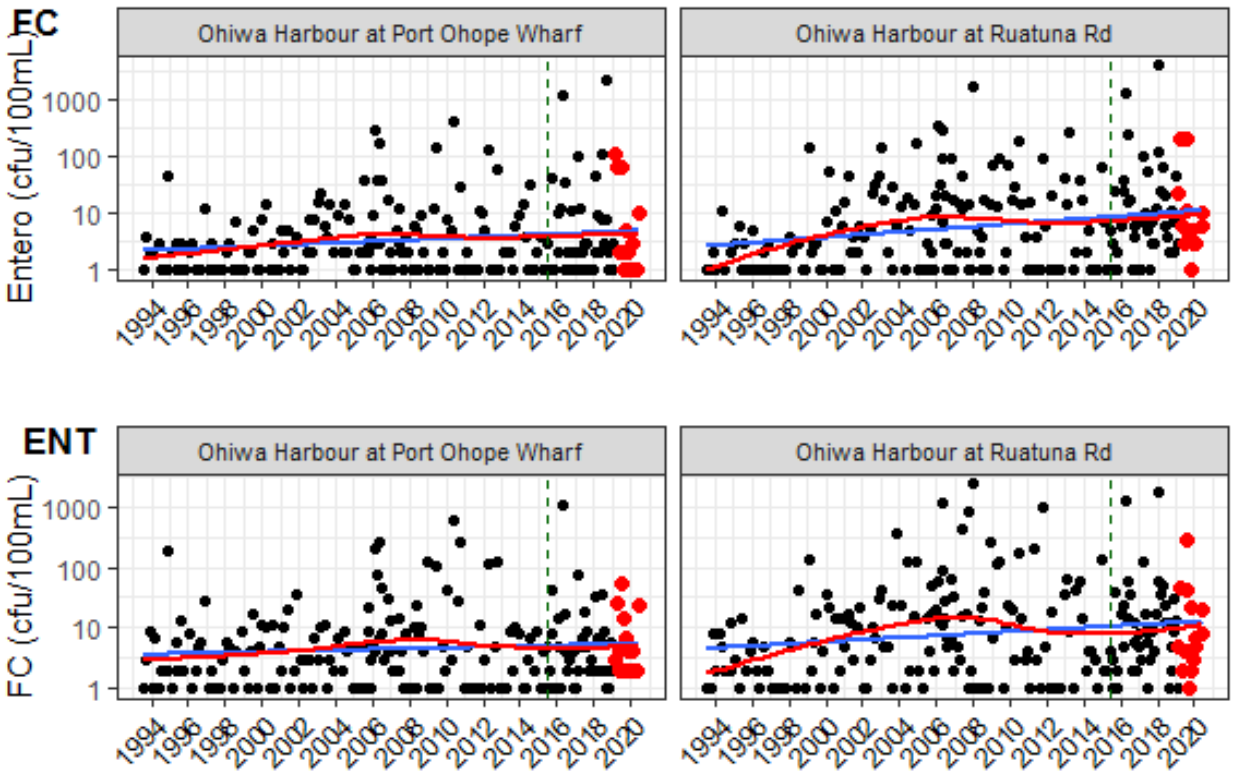


Figure 10 *Concentration of faecal coliforms (top) and enterococci (bottom) over time. The blue line represents a fitted linear model, while the red line is a fitted loess model. The vertical green dashed line represents the change in tidal timing.*

Bathing water quality

The Ministry for the Environment's (MfE) guidelines for swimming in marine environments are based on the amount of enterococci bacteria that is present in 100 ml of water.

The MFE system has three categories, and two thresholds. A site can be defined as being in: an acceptable 'green' state if the number of enterococci per 100 ml is lower than 140; an 'orange' alert mode if numbers of enterococci are between 140 and 280 per 100 ml; or a 'red' action mode if enterococci numbers of two consecutive samples exceed 280 per 100 ml.

Figure 11 shows a summary of enterococci data collected at this site since 2003. Results for the most recent 2019/2020 season show that 100% of samples were in the green category, 0% were in the amber category, and 0% exceeded the red threshold.

Bathing water quality has been good during the last year.

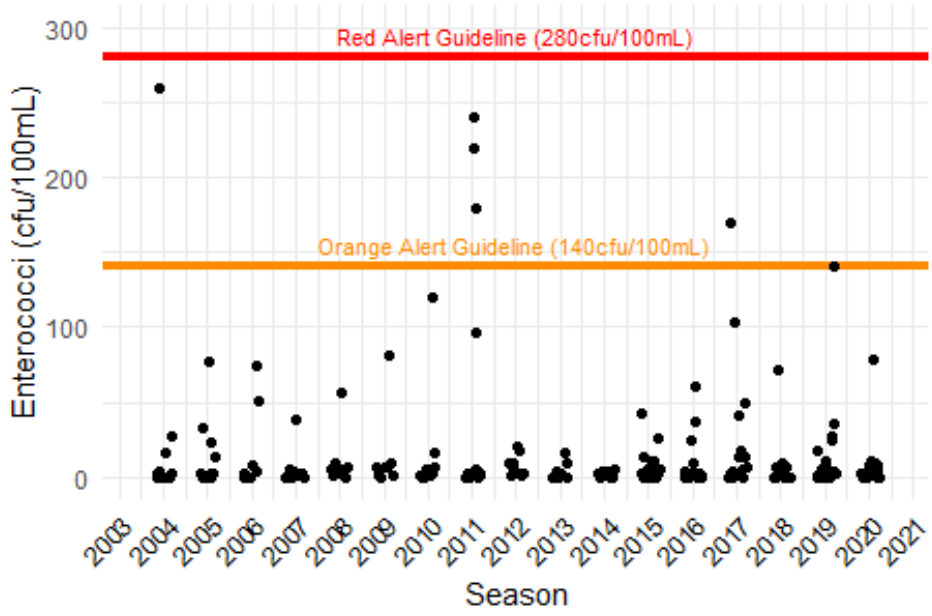


Figure 11 Enterococci results for Ōhiwa Harbour against safe swimming guidelines.

Nukuhou River water quality

The health of freshwater in the Ōhiwa Catchment is monitored for its ability to sustain life (plants and animals), whether it's fit for purpose.

The following indicators are monitored monthly at the long-term monitoring site, Nukuhou River at Glenholme Road:

	Measure	Impact
Total suspended solids (TSS)	Measure of sediment in the waterway.	Excess TSS can limit light penetration into the water impacting photosynthesis of plants and algae. Sediment can clog spaces used as habitat and shelter by invertebrates and fish as well as making the water unsuitable for drinking and swimming.
Dissolved Oxygen	Oxygen levels.	Depleted oxygen levels can reduce the river's ability to sustain life.
Escherichia coli (E.coli)	Faecal contamination.	Indicates the level of harmful pathogens in the waterway and whether there is a risk to users such as for drinking water or for recreation.
Ammonium (NH-4)	Form of nitrogen. Common waste product of domestic, industrial and agricultural wastewater.	Excess nutrient can cause increased growth of aquatic plants and algae. Excessive filametous algae can smoother habitat, impact oxygen and pH levels, can be detrimental to invertebrate and fish communities, and can have a negative impact on asthetics.
Nitrite and nitrate as nitrogen (NNN)	Form of nitrogen. An important bioavaliable plant nutrient.	
Total nitrogen (TN)	Measure of all types of nitrogen.	
Total phosphorus (TP)	Measure of all types of phosphorus	Can cause rapid weed growth and algae blooms which can choke streams and deplete oxygen.
Dissolved reactive phosphorus (DRP)	Measure of readily available phosphorus to plants and algae	

Nukuhou River water quality trends

Table 3 *Nukuhou at Glenholme Road water quality trends for the period 2010–2018. ↗ improving or ↘ degrading trend (p<0.05); ▫ not statistically significant.*

	Total suspended solids	Dissolved Oxygen	E coli.	Ammonium	Nitrate-nitrite nitrogen	Total nitrogen	Total phosphorus	Dissolved reactive phosphorus
Trend	▫	↘	▫	▫	▫	↘	↘	↘

Water quality data for Nukuhou at Glenholme Road was analysed for the period 2010 to 2020. During this period, four water quality parameters showed slight (but statistically significant) degrading trends. These parameters include dissolved oxygen, total nitrogen, total phosphorus and dissolved reactive phosphorus.

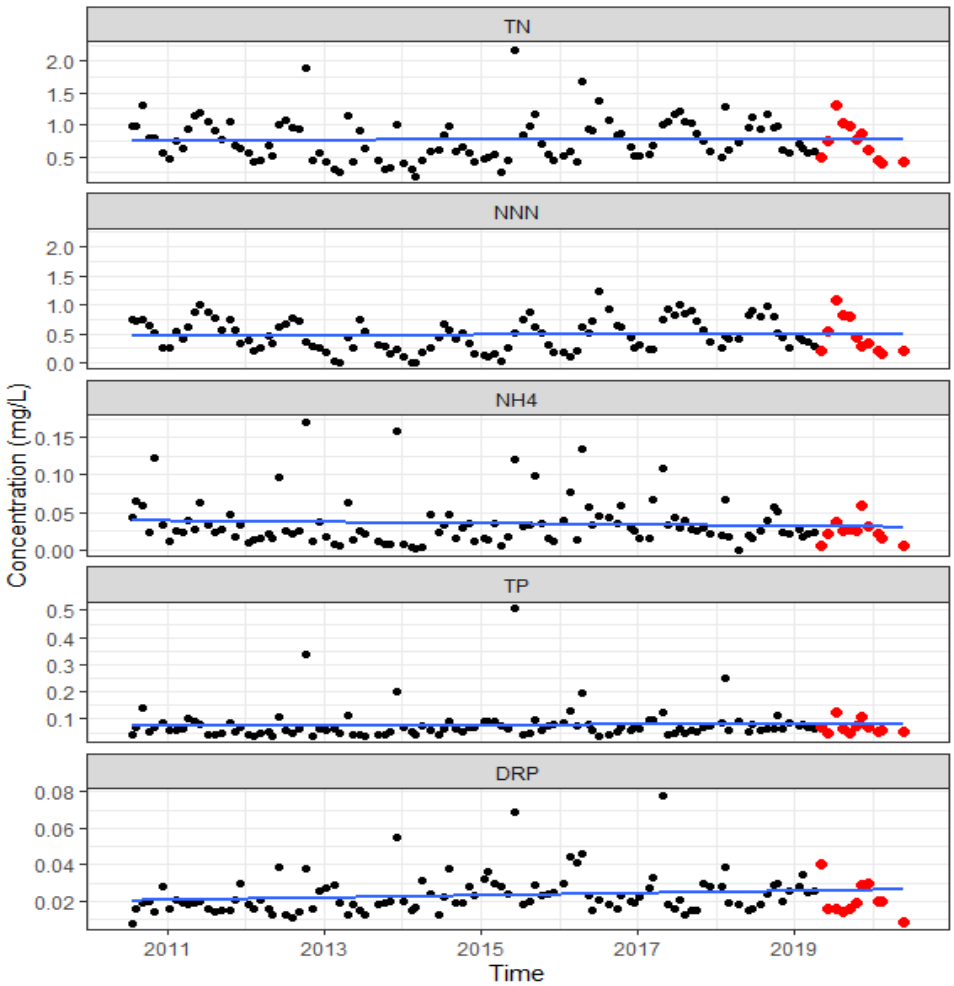


Figure 12 *Time series of nutrient concentration data at the Nukuhou at Glenholme Road water quality site. The red dots represent data from the most recent year.*

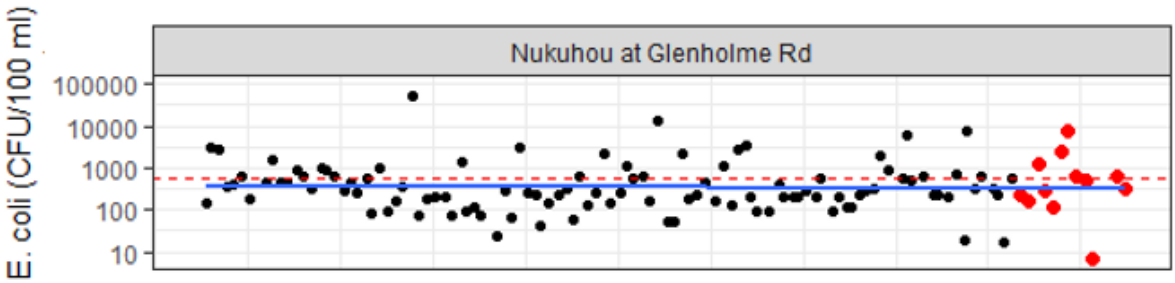


Figure 13 *Time series of Escherichia coli concentrations at Nukuhou at Glenholme Road. The red dots represent data from the most recent year, and the red dashed line represents the red threshold in the Microbiological Guidelines (550 cfu/100 ml).*

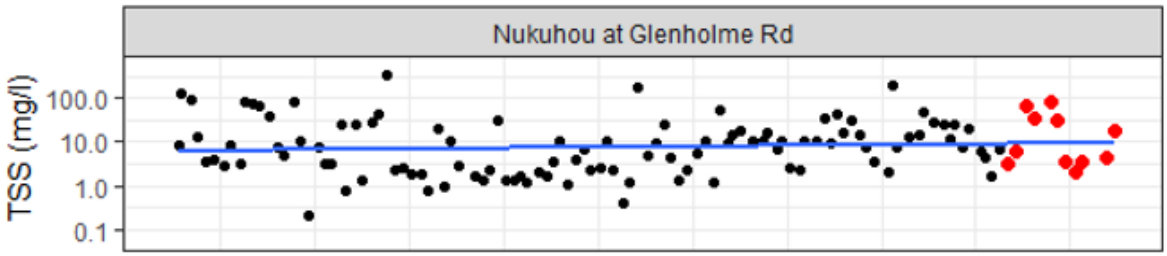


Figure 14 *Time series of total suspended solids concentrations at Nukuhou at Glenholme Road. The red dots represent data from the most recent year.*

Part 5:
Estuary

Estuary bed health

The estuary bed health has shown no change in the last year and has remained stable for some time.

The overall habitat quality remains in a moderate to poor state due to high levels of mud present. Sediment remains the biggest issue for the ecology and habitat of the harbour. Total organic content, total nitrogen and heavy metals remain low. Total sediment phosphorus remains at moderate levels.

Shellfish

Water samples from the Ōhope Reserve are analysed for Faecal Coliforms (FC), an indicator that is used to determine if shellfish are safe to eat.

The guidelines for safe shellfish consumption, set by Ministry for the Environment (MFE) and Ministry of Health (MoH), are as follows:

- The median FC content should not exceed 14 cfu/100 ml, and
- No more than 10% of samples should exceed a threshold value of 43 cfu/100 ml.

Results show that median FC was 6 cfu/100 ml which is below the guideline criteria while the percentage of samples exceeding 43 cfu/100 ml was 0% which is also below the guideline criteria (Figure 16). Ōhiwa Harbour remained safe for shelf fish consumption over the 2019/2020 season.

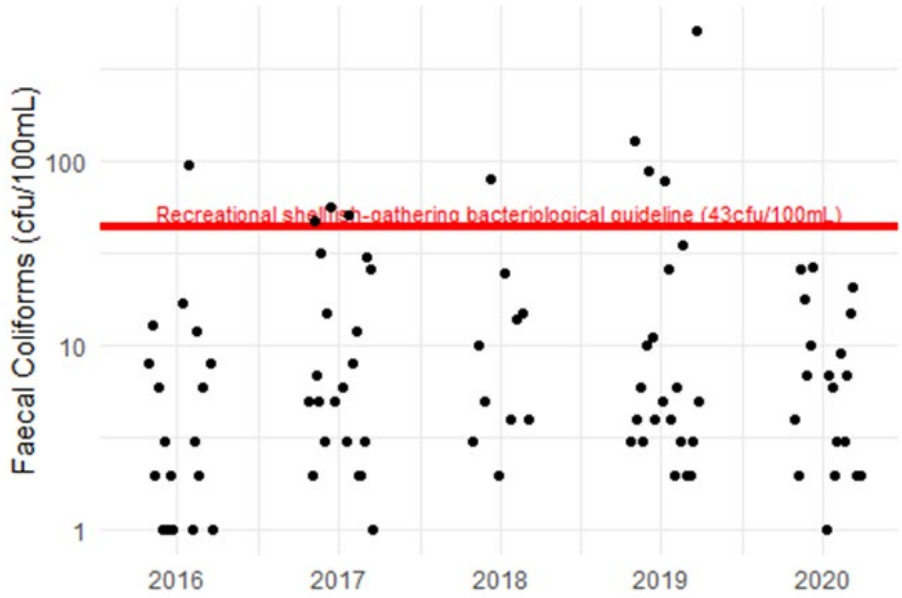


Figure 15 *Faecal Coliforms (cfu) by year, collected from Ōhiwa Harbour at Ōhope Reserve Boat Ramp site. The red dashed line represents the MFE/MoH guideline threshold that should be exceeded by less than 10% of samples each year.*

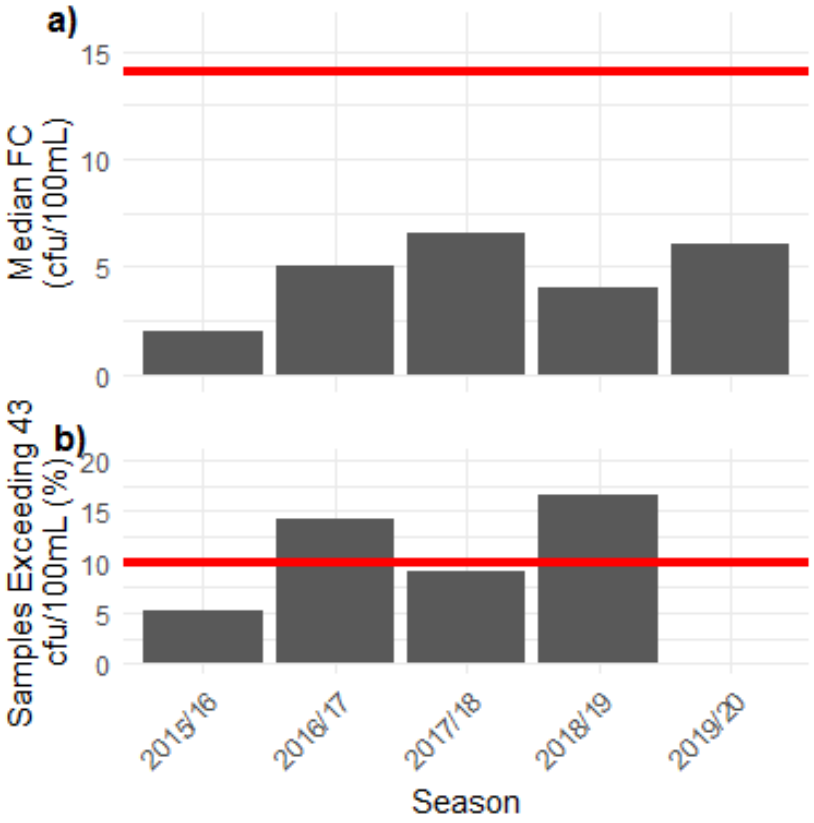


Figure 16 ***a)*** *The median faecal coliform value per bathing season. The red line represents the 14 MPN/100 ml limit.*
b) *The percentage of samples that exceed the 43 MPN/100 ml threshold. The red line represents the 10% limit.*