Waihī Estuary Community Steering Group – Data Summary

The below is a draft summary of available catchment data for the Waihī Estuary Catchment in response to the action raised at the first steering group meeting. The summary is set out with a catchment background, a monitoring summary, a summary of what results are showing and a summary of information available through the Freshwater Futures community group and associated Plan Change 12 work. This is by no means a complete summary of all catchment data but attempts to communicate the key information and links to in depth reports for further reading.

Introduction

Although water quality in the Bay of Plenty is better than many other parts of New Zealand there are a number of streams, rivers, lakes and estuaries with poor water quality or declining trends and which need specific reductions in contaminate loads in order to meet ecological, cultural and human health values. One of these catchments is the Waihī Estuary Catchment which has been identified as one of the 12 focus catchments by Bay of Plenty Regional Council (BOPRC). The Waihī estuary is a highly sensitive receiving environment and its health has been declining for a number of years. The primary issues in the Waihī Estuary Catchment are elevated levels of nitrogen, phosphorus, *E.coli* and sediment.

The Waihi Estuary Catchment falls within the Kaituna Water Management Area (WMA). BOPRC have identified 9 WMA's and the Kaituna Pongakawa Waitahanui WMA is the first priority catchment to go through the National Policy Statement for Fresh Water Management (NPS-FM) plan change process, alongside the Rangataiki WMA.

Catchment Background

Geology

Due to the location in the central volcanic zone the catchment geology is made up of various geologically young igneous deposits. The base geology is Rotoiti breccia which originates from the Ōkataina volcanic centre and represents a relatively soft rock that is poorly compacted with layers thinning towards the coast. This unit is overlain by tephra deposits up to 90m thick in places. The main tephra deposit is Kaharoa ash which is a loose white pumiceous ash resulting in low fertility soils, prone to drought.

In general the catchment geology represents soft unconsolidated material that is very deep. Susceptibility to drought, low fertility and erosion problems are all physical characteristics of this landscape.

Highly erodible, well drained soils characterise the upper catchment, areas that are poorly drained due to high water tables and wetland habit characterise the lower catchment immediately above and below SH2. Land development has been driven by these two characteristics in very contrasting ways.

Land development

Many of the catchment stressors and characteristics of today can be related back to differing values and economic drivers of the past. The most obvious being the draining of wetland areas for conversion to productive farmland that began in 1903. This was subsidised by the government, including maintenance, until 1988. The Waihī Drainage district covers 9,300 hectares and is now managed by

an incorporated society following transfer to Western bay of Plenty District council from Tauranga County in 1989. This process has resulted in the artificial channelization of the lower Kaikokopu, Wharere, Pongakawa and Pukehina canals. These operate as perched systems where water from the surrounding farmland is pumped up into the canals, via 13 pump stations operated by Waihī Drainage Society Inc. (WDS).

Over 80% of the catchment is developed pastoral, horticultural or exotic forestry land. This represents a significant conversion from native indigenous vegetation over the past 150 years. Due to current economic drivers there is a trend towards kiwifruit and there has been dairy expansion in the last 10 years.

Hydrology

The Waihi estuary catchment comprises four primary catchments which are, from largest to smallest, the Pongakawa, Kaikokopu, Wharere and Pukehina catchments. All of these catchments primarily begin as springs in the upper catchment often at the head of gullies. These drain the mid catchments with constant spring water additions to the soft bottomed surface water bodies. Where these surface water bodies hit the poorly drained soils in the lower catchment they have been artificially straitened and channelized into canal systems.

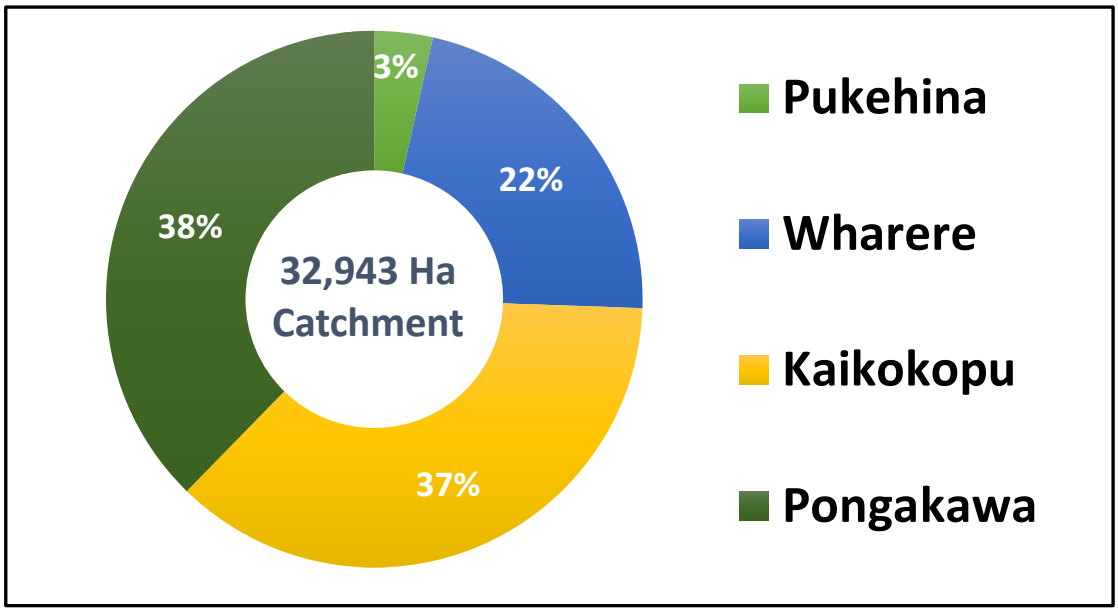


Figure 1 - Sub-catchment Areas

Current Land use

As can be seen from figure two the majority land use within the catchment is dairying with this significantly increasing down the catchment. The upper catchment is made up of small areas of sheep/beef and native forestry with larger areas of exotic forestry, especially in the Pongakawa and Kaikokopu Catchments. A clear band of kiwifruit can be seen in the mid-lower catchment.

The largest land use in the Waihī Estuary Catchment is dairying at over 38%. The other significant land uses are exotic forestry at 18.5%, sheep and beef at 10.8% native forestry at 12.6% and kiwifruit at 5.4%.

When this is broken down into sub catchments it shows that the largest area of dairying falls in the Wharere Catchment, this is significant as it is the 3rd smallest catchment, yet contains over 34.5% of the total dairy land in the Waihī Estuary Catchment.

The Waihi Estuary Catchment has a total number of 81 current or being processed dairy consents with the most, 30, located in the Wharere Catchment, 25 in the Kaikokapu Catchment, 20 in the Pongakawa Catchment and 5 in the Pukehina Catchment.

The Wharere Catchment also has, by a significant margin, the lowest amount of both exotic and native forestry excluding the smaller Pukehina Catchment.

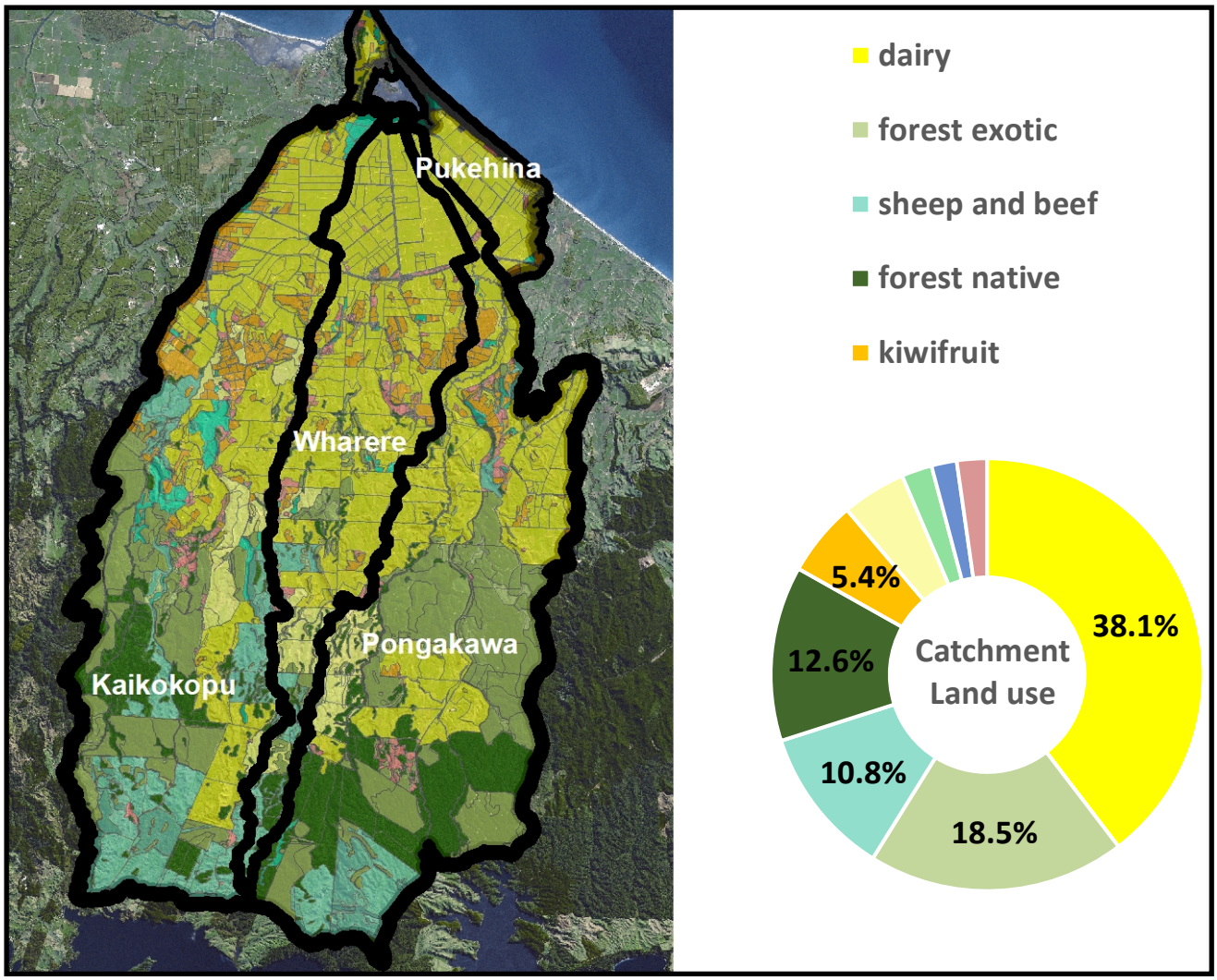


Figure 2 - Catchment Land Use

Monitoring Summary

As previously mention BOPRC have identified 9 WMA's across the region of which the Waihī Estuary catchment falls into the Kaituna Pongakawa Waitahanui WMA. Trends and reporting are at a WMA level however where there is specific information relating to the Waihī Estuary Catchment it is summarised below.

Hydrology – Rainfall, Gauging stations, flow measurements and Low flow measurements

Rainfall

There is one telemetered rain gauge located in the Waihī Estuary Catchment, the "Pongakawa at Bush Road" rainfall site is situated on a dairy farm in the Pongakawa valley, 13km from Pukehina. It forms part of a network of rain gauges located across the Bay of Plenty region that measure rainfall. The site has recorded a mean annual rainfall of 1370mm and daily falls of up to 175mm. Live data from this site can be found at: https://envdata.boprc.govt.nz/Data/DataSet/Chart/Location/GM691816/DataSet/Precip%20Total/Primary/Interval/Latest

While this gauge gives good representation of the mid to upper catchment for some situations the lower catchment maybe better repressed using the adjacent "Kaituna at Te Matai site." https://envdata.boprc.govt.nz/Data/DataSet/Chart/Location/FO620177/DataSet/Precip%20Total/Primary/Interval/Latest

Gauging Stations

A gauging station is a permanent record of water level that is related to flow measurements to produce a continuous modelled flow record for the site. This is important information for the Waihī Estuary Catchment and this project as a flow record is required to determine contaminant loads which are a key measurement for the estuarine sensitive receiving environment.

Flow measurements

In addition to gauging stations flow measurements are taken at three locations on monthly intervals on the Pongakawa River representing upper mid and lower cathment. These sites form part of the Natural Environment Regional Monitoring Network (NERM) administered by BOPRC. These sites are "Pongakawa at Forest", "Pongakawa at Old coach road" and Pongakawa at SH2.

BOPRC also monitor low flows to help set minimum flows for water allocation purposes this gauging data is less frequent and in some cases maybe over 10 years old. There are 7 sites in total located in the catchment. More information and details on these can be found in the *Kaituna-Maketū and Pongakawa-Waitahanui Water Management Area: Current State and Gap Analysis 2016*. Along with further information on the above.

http://cdn.boprc.govt.nz/media/520774/kaituna-maketu-and-pongakawa-waitahanui-water-management-area_-current-state-and-gap-analysis.pdf

Freshwater Quality Rivers and streams

Water quality is impacted by many natural factors (e.g. climate, geology) and anthropogenic factors (e.g. land use change, point-source discharges). Water quality in a river or stream can impact its ability to support healthy aquatic ecosystems and protect or provide for desired values. BOPRC there are a number of different water quality parameters. There are two modules of NERMN network that contain sites in the Waihī Estuary Catchment these are river water quality sampling and recreational bathing sampling. There is one recreation bathing site – "Pongakawa at SH2", this is monitored weekly over summer. There are three river quality sites monitored monthly and are the same three monthly gauging sites described above. "Pongakawa at Pump house", "Pongakawa at Old Coach Road" and "Pongakawa at SH2".

Further to the above NERMN sites there has been a couple of recent surveys that have involved water quality monitoring in the Waihī Estuary Catchment.

- *Ecological and water quality conditions of drains in the Rangitāiki and Kaituna plains 2018* Contains three sites located in the catchment with monthly water samples collected for 17 months during 2016 and 2017. These three sites were "Pongakawa Drain at Cutwater Road", "Pukehina Drain at Pukehina" and "Wharere Drain at Pukehina".

  https://www.boprc.govt.nz/media/2920/2018-05-drains-report-13_final-word_version2.pdf

- *Surface water quality summary of the Kaituna Maketu Pongakawa and Waitahanui WMA* This document is still in draft however it is important to note that there was valuable tributary sampling at three sites in the Waihī Estuary Catchment with monthly sampling during 2016 and 2017 over 17 months. These were "Puanene at SH2", "Wharere at SH2" and "Kaikokopu at Black Road".

Stream invertebrates

A freshwater invertebrate monitoring programme has been conducted in the Bay of Plenty since 1992 as part of the NERMN programme. This has included 4 sites in the in the Waihī Estuary Catchment which have been sampled more or less annually every summer since either 2001 or 2002. The sites include: "Kaikokopu u/s Waerenga Rd", "Mangatoetoe at Old Coach Rd", "Waiari at Roydon Downs Rd" in the Kaikokopu Catchment and "Pongakawa Trib at Rotoehu Rd" in the Pongakawa Catchment.

Fish Communities

The below is taken from *Kaituna-Maketū and Pongakawa-Waitahanui Water Management Area: Current State and Gap Analysis 2016* linked above.

"*As with many councils, BOPRC currently does not monitor fish communities as part of their annual SoE work. Any fish work conducted by BOPRC is usually for focused studies conducted as part of council investigations. Other organisations such as NIWA, DOC, and Fish and Game have also conducted numerous fish surveys throughout the region. Finally, a number of consultancies have also surveyed fish communities as part of either consent applications or for compliance monitoring. Most*

fish data collected from the region has been uploaded into the New Zealand Freshwater Fish Database (FFDB), maintained by NIWA. The FFDB contains over 30,000 records of freshwater fish observations throughout the country, and represents a nationally significant database. Data for fish surveys that have been conducted in the Kaituna WMA was obtained from the FFDB. A total of 191 sites where fish surveys had occurred were found. Seven records were from sites surveyed prior to 1980, while the most up-to-date records come from eight sites surveyed in 2010 and 2011. Most samples (90) were collected post 2000, whilst 46 and 48 sites were collected respectively during the 80s and 90s."

A fish survey to address areas where there was no data for a significant period of time was carried out in May 2016 and results were reported: *Fisheries assessment of waterways throughout the Kaituna-Maketu & Pongakawa-Waitahanui WMA.*

Linked: Email Attachment

Estuaries

There is various monitoring that occurs in the Waihī Estuary itself. This includes three NERMN sites that cover estuary water quality sampling, recreational bathing sampling and benthic macrofauna monitoring modules. These sites include "Waihī Estuary at Domain" which is an estuary water quality monitoring site monitored monthly from 1990. "Pukehina Beach at Pukehina" monitored weekly over summer since 2009 as a recreational bathing site as has "Little Waihī at Domain Boat Ramp" since 2003. There is one benthic macrofauna site that is still being monitored since 1991.

The extent of seagrass, red algae (Gracilaria chilensis) and mangroves throughout both estuaries are also mapped at five-yearly intervals based on the aerial photography flown across the Bay of Plenty.

Shellfish

BOPRC tests water quality above shellfish gathering areas for faecal coliform (FC) levels in accordance with the microbiological water-quality guidelines to indicate the presence of pathogenic bacteria, protozoa and viruses. This sampling occurs at the site "Waihi Estuary at Domain Boat Ramp".

What monitoring is showing?

As previously mentioned reporting on science information is targeted at a WMA level of which the Waihī Estuary Catchment is one part of the Kaituna Pongakawa Waitahanui WMA. *The Science Story Environmental Summary Report Kaituna - Pongakawa – Waitahanui Water Management Area* is the most recent report that summaries this information. Below are specific outtakes relating to the Waihī Estuary Catchment and the report can be accessed with the below link.

https://cdn.boprc.govt.nz/media/774580/kaituna-wma-report-2018_final_singles.pdf

Freshwater

"The NPS-FM sets compulsory national values for freshwater to protect 'human health for recreation' and 'ecosystem health'. It includes a series of 'bands' ranging from A to D, and National Bottom Lines for nitrate and ammonia (to protect ecosystem health), and E. coli and cyanobacteria (to protect human health for recreation) in rivers. Communities can choose to set levels stricter than those specified in the NPS-FM.

Other parameters we need to consider in order to safeguard ecosystem health include dissolved oxygen, temperature and sediment quality.

All of the sites monitored within the WMA in 2017 had nitrate and ammonia levels that were within the 'A' or 'B' band. This means that current levels of nitrate and ammonia in the water are unlikely to have an impact on sensitive species.

The only river site in the WMA that is monitored for swimability is the Pongakawa River at SH2. The site is graded 'B' meaning it is swimmable under the NPS-FM grading system."

***"Trends** - While water quality state provides a snapshot at a point in time, trends give an indication of whether water quality is improving or degrading. Different trends can be detected over different time periods, and using longer time periods generally increases the reliability of any trend detected. Trend information is available for five and ten year and long-term data sets where there was adequate data. In the Waihī Estuary catchment sites there are two bad trends and one good trend. Pongakawa at SH2 shows a decreasing trend in E.Coli and Pongakawa at old Coach Road shows a decreasing tend in total phosphorus and an improving trend in ammonium nitrate. "*

Invertebrates

Refer to linked document for WMA summary.

Fish

Refer to linked document for WMA Summary.

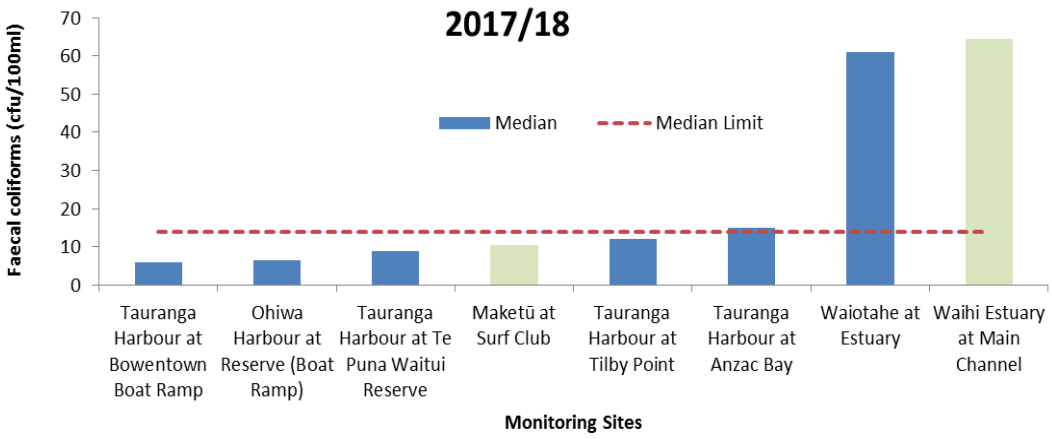
Estuary State and trends:

- ***"The ecological health of the upper estuary is declining markedly. Monitoring results are showing low oxygen levels, build-up of nutrients and organic matter, loss of native sea grasses, reduced fauna due to anoxic sediments and algal growth. Overall estuary health is considered to be poor."***
- ***"Relatively high water column sediment concentrations have been detected. This is to be expected as material is re-suspended in the water column by a combination of wind and wave action and flood flows."***
- ***"Levels of nutrients (Total Phosphorus and Nitrogen, Dissolved Reactive Phosphorus, Nitrite-nitrogen, Ammonium-N), Turbidity, Dissolved Oxygen, and algal biomass (as chorophyll-a levels) are stable."***
- ***"Concentrations of indicator bacteria such as E. coli are rising. Water quality for swimming/primary contact is generally good but it is not safe for shellfish consumption some of the time."***
- ***"The shellfish community is dominated by bivalves and polychaetes. Cockle density and size have varied over time but no significant trends are apparent."***
- ***"Microalgae (Gracilaria chilensis) in recent times has been observed at nuisance levels in the upper estuary. These algae are a feature of changing conditions such as excess nutrients and changing salinity."***

Shellfish

Below is a summary of results from various locations in the BOP for the 2017/18 season. This will be updated with more recent results when available.

Median faecal coliform concentrations at shellfish gathering locations



Freshwater Futures and Plan Change 12

As previously mentioned BOPRC have established a Freshwater Futures community group for the Pongakawa/Waitahanui catchments, to inform the development of changes to the Regional Natural Resources Plan. Plan Change 12 will implement these changes in the Kaituna and Rangetaiki WMA's.

There has been a vast amount of information shared at various workshops. This can all be found at: https://www.boprc.govt.nz/our-projects/pongakawa-waitahanui-freshwater-community-group/

A number of the reports linked above have been produced to inform this process. Of significant importance to this project is the current estimation from BOPRC scientists that to "*restore the estuaries to moderate ecological health and improve safety for shellfish gathering and contact recreation, current nitrogen loads in the Waihī and Maketū estuaries would need to be reduced by more than 60%, phosphorus loads by more than 30% and E. coli loads by 50-60%. Sediment loads are considered high compared to natural loads but load reductions have not been calculated yet. We also know that the water quality and ecological health in the lowland drainage networks is quite poor and that we need to improve this.*"

This is taken from the factsheet: Contaminant Loads in The Waihī and Maketū Estuaries and can be found here: https://atlas.boprc.govt.nz/api/v1/edms/document/A3264372/content Detailed information in how these numbers were estimated can be found in the memo's circulated with the first meeting at Comvita minutes.

BOPRC have developed a catchment model for the Kaituna WMA at a catchment scale, using all available monitoring information. This model has also been used to model likely changes in catchment water quality with various land use changes and mitigation options. There is a large amount of information available including the modelling technical reports. However the important information for this project is that *"Good practice requirements across all land uses will start to reduce contaminant loads to estuaries….. alone will not achieve anywhere near the reduction needed*

to achieve moderate estuary health". This is explained in detail in the presentation for workshop 10 linked below: https://atlas.boprc.govt.nz/api/v1/edms/document/A3230833/content