HAWKES BAY REGIONAL COUNCIL
TE KAUNIHERA Ā-ROHE O TE MATAU-A-MĀUI
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What's going on Papanui sub-catchment?

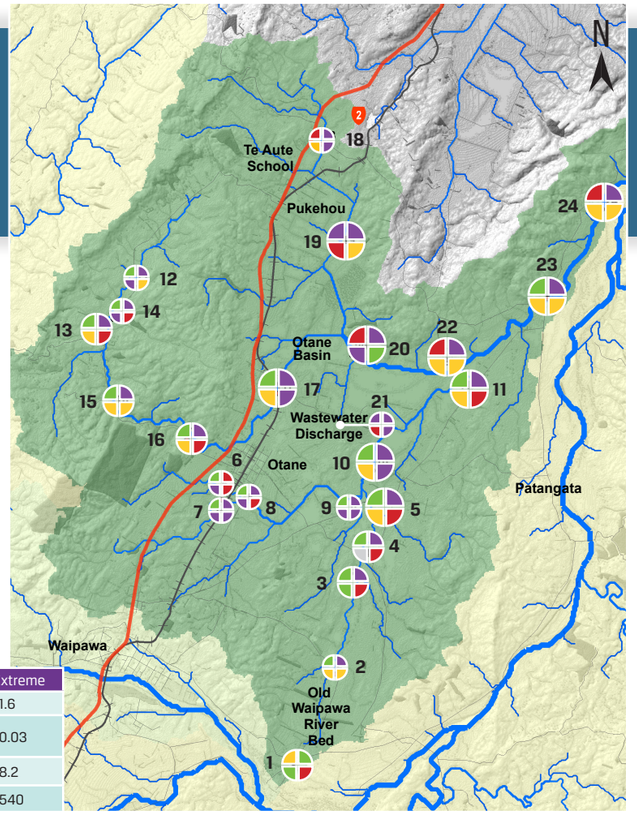
Above: Flooded fields in the Otane Basin. Below: Papanui Tributary at Te Kura Road

Papanui results

DIN and DRP fuel algal growth, turbidity shows how muddy the water is, *E. coli* indicates risk of pathogenic infection

Flow < 50 l/s
Flow 50-100 l/s
Flow > 100 l/s

N P
Sed Faecal



Indicator	Unit	Statistic	Good	Warning	Bad	Extreme
Nitrogen[1]	mg/l	Mean	<0.64	0.64 - 0.8	0.8 - 1.6	>1.6
Phosphorus[2]	mg/l	Mean	<0.012	0.012 - 0.015	0.015 - 0.03	>0.03
Sediment[3]	NTU	Median	<0.9	0.9 - 4.1	4.1 - 8.2	>8.2
Faecal[4]	cfu/100ml	Median	<130	130 - 260	260 - 540	>540

[1] Dissolved Inorganic Nitrogen [2] Dissolved Reactive Phosphorus [3] Turbidity [4] *Escherischia coli*

Sampling undertaken 2012-13 u/s = upstream

SITE	NITROGEN	PHOSPHORUS	SEDIMENT	FAECAL	FLOW	SAMPLES
1. Papanui Stream opposite Walker Rd	0.782	0.009	0.46	310	56	6
2. Papanui Stream at Homewood Rd	0.545	0.055	1.78	140	26	6
3. Papanui Stream at Hollycombe Farm	0.592	0.054	0.76	280	79	6
4. Papanui Stream at Tod Rd	0.393	0.067	n/a	285	63	4
5. Papanui Stream at Elsthorpe Rd	0.546	0.047	1.1	410	108	6
6. Papanui W Tributary N at Knorp St Track	0.372	0.030	25.5	270	8	5
7. Papanui W Tributary S at Knorpes St	0.512	0.310	20.1	760	5	5
8. Papanui W Tributary at White Rd	0.410	0.070	27.4	300	4	5
9. Papanui Trib at Elsthorpe Rd	0.572	0.073	27	800	15	6
10. Papanui Stream at Wainui Stn	0.474	0.057	1.89	800	108	6
11. Papanui Stream u/s Kaikora Strm	0.434	0.070	2.8	510	113	7
12. Kaikora Stream d/s Hopedale Cnfl	0.215	0.133	7.9	130	18	6
13. Kaikora Stream at College Rd	0.188	0.140	2.3	390	50	6
14. Kaikora Tributary at Ohutu Stn	0.137	0.058	8.65	380	7	5
15. Kaikora Stream at NIWA Gauge Stn	0.392	0.082	2.7	220	61	6
16. Kaikora Stream at Broomeknow Farm	0.289	0.065	1.05	270	62	6
17. Kaikora Stream at Drumpeel Rd	0.380	0.064	1.5	590	198	6
18. Kaikora N Tributary at Boundary Rd	0.915	0.058	3.9	700	34	6
19. Kaikora N Tributary at Brownrigg's	2.287	0.085	4.1	140	293	6
20. Kaikora Stream at Kahotea Stn	0.832	0.213	16.1	100	342	6
21. Kaikora Tributary at Drumpeel Rd	4.609	1.511	4.9	1000	8	6
22. Kaikora Stream u/s Papanui Strm	0.831	0.149	3.2	140	473	6
23. Papanui Stream at Middle Rd	0.637	0.147	1.93	200	434	6
24. Papanui Stream at Camp David	0.963	0.096	2.2	140	865	6

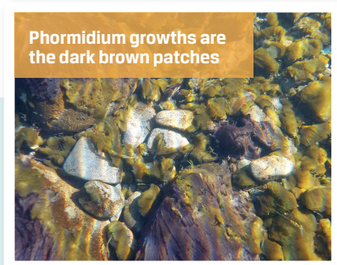
cfu = colony forming units NTU = nephelometric turbidity units

For more information contact one of our catchment advisors at the HBRC Waipawa office on 0800 108 838

The Papanui is a subcatchment in the Tukituki covering 16,400 hectares.

There are about 80 farms in the Papanui subcatchment over 4 hectares in size. Farming is mainly sheep and beef, with some cropping, deer, dairy and forestry. Maori considered the area a 'bread basket' and the catchment and surrounding area has a rich cultural history. It has been heavily modified since European colonisation. The Otane Basin used to be the location of Lake Roto-a-Tara and extensive wetlands, but was drained in the 19th century via 'Big Cut' to leave productive peat flats behind. The Waipawa River used to flow into the Papanui Stream, but was diverted in the late 1880s from Walker Rd. A small volume of Waipawa water still seeps through the diversion bank.

Riparian health is particularly poor in the Papanui, with 62% of small streams having moderate to high disturbance from stock and 80% having fair or poor vegetation quality. Long term water quality monitoring has shown dissolved organic nitrogen (DIN) and dissolved reactive phosphorus (DRP) failing to meet targets under the Tukituki Plan. These two nutrients help fuel excessive algae and phormidium growth, which cause problems in the Tukituki River.


Phormidium growths are the dark brown patches


Slime algae in the Tukituki River

The Regional Council has carried out a targeted monitoring programme across 14 sites to identify water quality patterns and help identify solutions.

This was a short term investigation to understand water quality patterns in greater detail, but may be repeated again in future.

What did we find? All sites sampled had elevated levels of at least one contaminant of concern.

Phosphorus levels were elevated at all but one site in the subcatchment. Phosphorus was extremely elevated in areas draining the peat soils north of Otane, which was also the area where nitrogen was problematic. Faecal contamination and sediment levels were high at many sites throughout the subcatchment. The best site for water quality in the subcatchment was at Walker Rd where Waipawa water still seeps through the diversion bank.

Although there is evidence for naturally elevated phosphorus in deep groundwater, the bulk of phosphorus in surface water is attributable to human activity. Contamination from human activity is sourced from within the Papanui catchment, and not from further afield (i.e. not from the Waipawa River). Concentrations of all contaminants were high near the Otane wastewater discharge, but the volume of this contamination is small in comparison to the volume of contamination derived from the broader farming landscape.

Overall, phosphorus, sediment and faecal contamination were widespread problems, and will need to be a focus for farm management. The most extreme phosphorus loads emerge from the peat soil area north of Otane, which is also where nitrogen was most elevated. A lot of mitigation effort will be required on these peat soils.

The long-term water quality compliance monitoring site for this subcatchment is the Papanui Stream at Middle Road.

What can you do to improve the water quality in this sub-catchment?

Your tailored Farm Plan will identify approaches to reduce nutrient and sediment loss on your property.

Some common solutions include:

Managing Critical Source Areas

Anywhere with exposed soil is likely to be a 'critical source area'. Most of sediment and phosphorus losses (around 80%) come from a small part of the landscape (around 20%). They may include areas of erosion, stockyards, tracks, races and intensively grazed areas. Critical source areas should be targeted as a priority and their impact can be reduced through improved management techniques.

Riparian management and stock exclusion

Stock exclusion will contribute to improving stream health. Riparian areas along the Papanui showed plenty of room for improvement, with 62% of small streams having moderate to highly disturbed banks*.

Wide buffer areas near streams and substantial planting will benefit these waterways by reducing phosphorus, sediment and bacteria levels.

The Papanui is singled out in the Tukituki Plan as especially needing riparian planting to improve ecosystem health.

*Riparian assessments were based on imagery from 2013/14.

Poor riparian habitat (right), and below an example of good riparian planting.

The greatest threats to stream health are usually sediment and poor riparian management.

Reducing nutrient loss (Nitrogen and Phosphorus)

Test your soil before you fertilise it. Olsen-P is a measure of the more mobile fraction of applied phosphorus (P) that is readily available to plants. It is this type of P that is easily lost to water if not taken up by vegetation. Olsen-P should be maintained at an economic and productive optimum, a higher level indicates a risk of surplus P that could be lost to waterways. Test your soil before you fertilise it.

As the Olsen-P increases above 20 mg/kg, the risk of phosphorus loss to waterways increases sharply. So, if you don't need Olsen P to be above 20 mg/kg for production, then don't be. There may be no benefit to production, it costs you more, and there is a big cost to waterways.

- Avoid applying nutrients when plants are not actively growing (i.e. not between May and August), or when heavy rain is forecast
- Winter crops can account for half of your farm's annual nutrient losses - follow best practice guidelines to minimise losses from this critical source area
- Locate silage pits away from waterways
- All else being equal, more stock units = more risk of nutrients lost

Reducing sediment loss

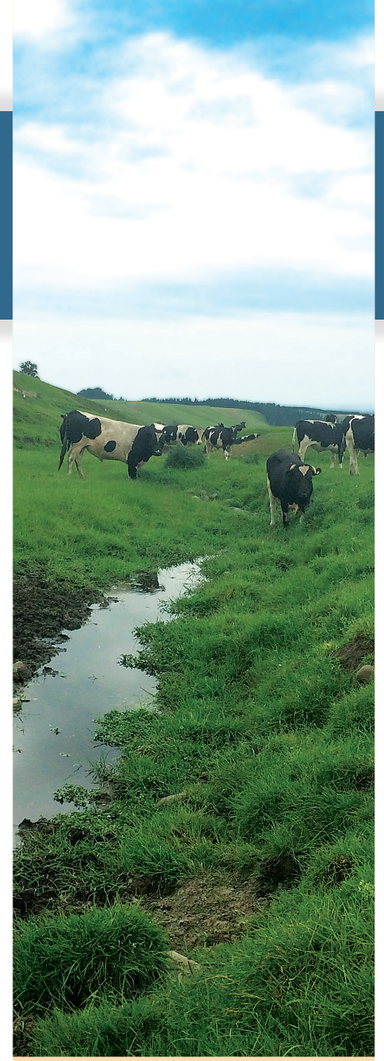
The greatest threats to stream health are usually sediment and poor riparian management.

- Exclude stock from waterways and plant along stream banks wherever practical
- Incorporate buffer strips - thick grass or other heavily vegetated areas - between waterways and tracks, lanes or any other sources of sediment such as worked paddocks or winter crops
- Discuss soil conservation techniques with your Regional Council Catchment Advisor or FEMP provider
- Do not position winter crops near waterways or on steep hills
- Cultivate along the contour, not downhill

Reducing faecal contamination *(E. coli)*

***E. coli* in water is an indicator of bacteria from excrement.**

- Prevent direct stock access to waterways wherever practical
- Faeces is concentrated on tracks, races, laneways, stockyards and around woolsheds - manage these so runoff does not flow straight into a waterway
- Clean your septic tank regularly and ensure it does not receive storm water
- Don't put offal pits near waterways



Stock exclusion (not happening above) and pole planting (below) are two ways to help improve water quality.