Project Summary. Nguturoa SUB Project

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Purpose

To support the vitality of te Taiao (our land, water, air and all living communities) by:

- Packaging practical methods for farmers to self-monitor waterway condition and ecological health and integrate the results with strategic-farm and catchment planning.
- Increase farmer understanding of the linkages between management of their farming systems and water quality outcomes

The project will focus on building capability and capacity for change in the farming sector, and will assist in creating new pathways towards future landscapes, by identifying on-farm barriers limiting farmers' abilities to plan for change, along with how they might be overcome in future applications.

Method

The three farmers in this project will work alongside NIWA scientists in the Nguturoa catchment, Manawatu. They will co-design a monitoring programme for on-farm monitoring using the well-established Stream Health Monitoring and Assessment Kit (SHMAK). This will enable the farmers to assess the impacts of their own farming systems on waterways, measuring ecological health, nutrient and sediment status in water that drains critical source areas on their farms.

Stream water quality and ecological condition will be measured at four sites on multiple occasions: (i) at the top of the catchment, where the stream begins, (ii) at a drainage point for each of the farms, where they enter the stream, and (iii) at the lower end of the catchment, downstream of the second farm.

Catchment Results

Figure 1 summarises selected water quality results for two sites in the catchment. Target values are also included from the Horizons One Plan and median values from Horizons monitoring of the Manawatu River at Opiki Bridge. These are provided for context. The median values that exceed a One Plan target are indicated in bold font.

Dissolved reactive phosphorus (DRP) is highly soluble and is rapidly taken up by algae and aquatic plants where growth can, in the right conditions, reach nuisance levels. The median DRP concentration is higher than the One Plan target at both sites suggesting that DRP may be naturally elevated at the source above the upstream site.

The median E. coli count at the downstream site is significantly higher (by 'an order of magnitude') than the median count upstream. E. coli is an indicator of faecal contamination in fresh waters from warm blooded animals such as humans, animals or waterfowl. E. coli is useful for indicating the suitability of a stream for contact recreation and other uses such as potable or stock water supply. E. coli counts of the order recorded at the downstream site could reflect many potential inputs to the stream, although all of these appear intermittently. Environmental DNA results indicate that most of this is coming from cattle and ducks, but some is from human sources.

Figure 1. Selected water quality results for the Nguturoa Stream as it enters and leaves the catchment.

Measurement and units	One Plan target*	Manawatu R at Opiki Br**	Nguturoa Upstream		Nguturoa Downstream	
			Median	Range	Median	Range
Turbidity (NTU)		4.27	3.16	1.92 – 6.31	4.45	2.52 – 5.52
Nitrate N (mg/L)		0.306	0.013	<0.005 – 0.080	0.157	<0.005 – 0.440
Ammoniacal N (mg/L)	<0.400	0.080	0.016	0.012 – 0.023	0.024	0.011 – 0.044
Dissolved inorganic N (mg/L)	<0.444	0.430	0.026	0.017 – 0.077	0.181	0.016 – 0.393
Total N (mg/L)		0.76	0.19	0.13 – 0.34	0.72	0.50 – 1.0
Dissolved reactive P (mg/L)	<0.010	**0.019**	**0.013**	0.008 – 0.022	**0.055**	0.026 – 0.116
Total P (mg/L)		0.053	0.04	0.02 – 0.05	0.11	0.04 – 0.25
E. coli (MPN/100mL)	< 260	160	97	<5 – 146	**682**	10 – 3,870

* These are not absolute standards that must be met on every sampling occasion. Typically, the median value of a dataset for one or more complete 12 month periods would be compared against these values.

** Median values from monthly sampling by Horizons RC staff over the last five November to June periods (36-37 data points).

Farm Management Results

Farm 1

Potential critical source areas on the farm are likely to be where:

(a) Effluent is currently stored and treated. For this farm it is at the farm dairy in lined ponds and applied to paddocks only when soils are below field capacity.

(b) Historical effluent ponds. These may leak into groundwater. Over time these are being allowed to silt-up and this is being accelerated by adding raupo along the edges.

(c) Silage is being stored. In this case it is being stored more than 25m from the nearest waterway and stormwater runoff is kept at the silage stack.

(d) Storm water from vehicle races and stock lanes. On this farm stormwater runs off tracks across nearby paddocks, or is diverted across paddocks.

(e) Stormwater from Highway 57. This is likely to be a source of sediment and heavy metals – zinc, and copper. At present some of this is diverted by NZTA through culverts and into streams running through the farm.

(f) Water running off down steep slopes. This may be a problem if winter grazing removes the vegetative cover and pugs the soil. On this farm 2/3 the herd are winter grazed on mainly pasture through the flatter Runoff Block paddocks. The rest of the herd maintain pasture cover on the milking platform and are kept on the standoff pad during adverse conditions.

(g) Vehicles and livestock crossing waterways. All waterway crossings have been culverted.

(h) Direct access of livestock to streams. All streams are fenced.

(i) Stream bank erosion. The waterways on the milking platform where this may be a problem are being fenced off and the riparian areas are being planted.

(j) Cultivation during cropping. Full cultivation is only carried out when paddocks have become 'runout'. Otherwise direct drilling is used to reduce the risk of wind erosion.

Over the next year Farm 1 plans to complete fencing all the waterways on the runoff, and add riparian planting for sediment and nutrient filtration and to increase biodiversity values.

Farm 2

For Farm 2 critical source areas are likely to be where:

(a) Animals can access stream banks, particularly cattle, increasing bank erosion and raise E.coli levels from faecal contamination.
(b) There is animal movement on slopes above waterways, mobilising sediment in water runoff. Particularly where heavy cattle are grazing steep hill land paddocks during winter.
(c) There are tracks with fords for animal and vehicle crossing points, adding sediment in the runoff coming from the tracks.

Over the next two years Farm 2 have plans for extensive fencing for grazing management and riparian protection. Farm 2 will install a farm water supply so that their animals have less need of natural water. Farm 2 will also be fencing and planting riparian areas to trap sediment and nutrients and increase their biodiversity value.

Farm 3

Farm 3 critical source areas on the farm are likely to be where:

(a) Effluent is currently stored and treated. This farm has a clay-lined pond and a spray irrigator dispersing effluent on flat paddocks over 50m from the stream.
(b) Storm water from vehicle races and stock lanes. There are several bridges, culverts, and races alongside the Nguturoa Stream. Not all the storm water is diverted away from the stream.
(c) Water running off down steep slopes. Most stormwater on slopes runs through pasture before reaching waterways
(d) Direct access of livestock to streams. All streams are fenced.
(e) Stream bank erosion. The waterways on the milking platform where this may be a problem are being fenced off and the riparian areas are being planted.

Over the next year Farm 3 plans to continue riparian planting for sediment and nutrient filtration and to increase biodiversity values. Installing two wetlands is being considered to trap nutrients, and pathogens.