

***Escherichia coli* pollution of Fish Creek in Te Waikoropupū Reserve**

Friends of Golden Bay (Inc.) are aware of stream contamination by *Escherichia coli* and other human pathogens can come from farming. At Te Waikoropupū reserve the Department of Conservation had to remove an untreated drinking supply because of this type of contamination. We therefore began a sampling programme for *E. coli* as it is unacceptable to pollute a national treasure. This study is an illustration of a wider problem that needs to be addressed in Golden Bay and elsewhere.

This sampling has been supported by generous private donations. We also had help from a landowner that bordered a dairy farm and the Tasman District Council (TDC). We have made our results available to TDC and the local dairy industry.

Water samples were collected, usually during rain events, from several sites in the Fish Creek catchment. This report focuses on the sampling made in Fish Creek at the upper Te Waikoropupū Reserve Boundary, at a channel that enters Fish Springs by the Boardwalk and, in later samplings, from Fish Creek below Fish Springs. The channel at the boardwalk flows from pastures about 70 m away. For comparison we have also included the levels of *E. coli* in Fish Creek above the farms – these were collected on four occasions during rain events. All samples were analyzed by Cawthron Institute, Nelson.

In drinking water *E. coli* should be absent and for recreation should be below 540 *E. coli*/100 ml.

Results:

Table 1 summarises the data while Table 2 and Figure 1 gives the detailed results. **Clearly these results show unacceptable *E. coli* pollution.** Note that there were five occasions when we sampled when there had been very little rainfall (≤ 1 mm) in the previous 12 hours. The four samples collected from Fish Creek above the farms had **lower** *E. coli* levels (median 74 /100ml; range <10 to 100) than these samples collected between rain events in Te Waikoropupū reserve (Table 1) showing that Fish Creek

Table 1: Summary Statistics (*E. coli* MPN/100ml).

Site	Number samples	Median	Minimum	Maximum	25% percentile	75% percentile
<i>Rain events (median rainfall 28 mm; range 8 to 137mm)</i>						
Reserve Boundary	23	7400	317	87000	2700	12500
Boardwalk Channel	23	6900	205	310000	1800	31350
Below Fish Springs	4	4500	100	41000	250	24350
<i>No rainfall in previous 12 hours</i>						
Reserve Boundary	5	547	42	909	697	856
Boardwalk Channel	5	111	31	175	81	744

Table 1. *Escherichia coli* concentrations (MPN / 100 ml) in Fish Creek from 30 April 2017. Figures in red are above the recreational guideline.

Date	Reserve boundary	Broadwalk channel	Below Fish Springs	12-hr Rain (mm)	Comments
30/04/2017	2500	20000		26	59 mm over 3 days
1/07/2017	870	3200		62.1	67 mm rain over 18 hours
17/07/2017	1100	410		42.3	Short rain event
28/08/2017	6700	2400		13	Main rain 5 hours earlier
3/11/2017	>24000	>24000		35.5	Rain began 10 hr before sampling
5/01/2018	7500	24000		48.7	Heaviest rain 4 to 5 hours earlier
17/01/2018	697	111		0.5	<i>Start of rain event (next 2 samples)</i>
17/01/2018	7700	5500		136.9	<i>Peak of rain event (after 8 hours)</i>
18/01/2018	7200	2400		27.5	<i>End of rain event but creek in flood</i>
1/02/2018	11000	24000		14.5	After 6 hours of light rain
11/02/2018	7400	1600		113	Heavy rain – Creek in flood
23/05/2018	246	175		1	19.2 mm last 24 hours – Creek clear
31/05/2018	42	31		0	No rain for 5 days - Creek clear
19/06/2018	326	205		12.3	No rain last 8 to 9 hours
1/07/2018	1200	548		29	Rain peaked ~5 hours earlier
8/07/2018	317	355		87.5	Creek in flood
8/08/2018	13000	280		29	Creek discoloured
14/08/2018	3200	39000		19	Creek discoloured
20/08/2018	16000	33000		96.2	Creek high and discoloured
17/09/2018	13000	41000		8.2	22 mm rain in last 24 hours
11/10/2018	10000	8900		39.7	Creek discoloured
9/11/2018	26000	73000		12	Creek slightly discoloured
26/11/2018	5500	4100	100	8.5	Creek very low; light rain
20/12/2018	9300	52000	410	15	Creek low; heaviest rain 7 – 9 hours earlier
23/03/2019	839	98	158	0	Fish Creek very low and clear
27/03/2019	5400	6900	7700	17.5	Creek high and very discoloured
28/03/2019	909	134	1100	0	Creek low and clear
1/04/2019	87000	310000	41000	28	Creek in flood; peak of runoff

Figure 1: *Escherichia coli* concentrations in Fish Creek from 30 April 2017

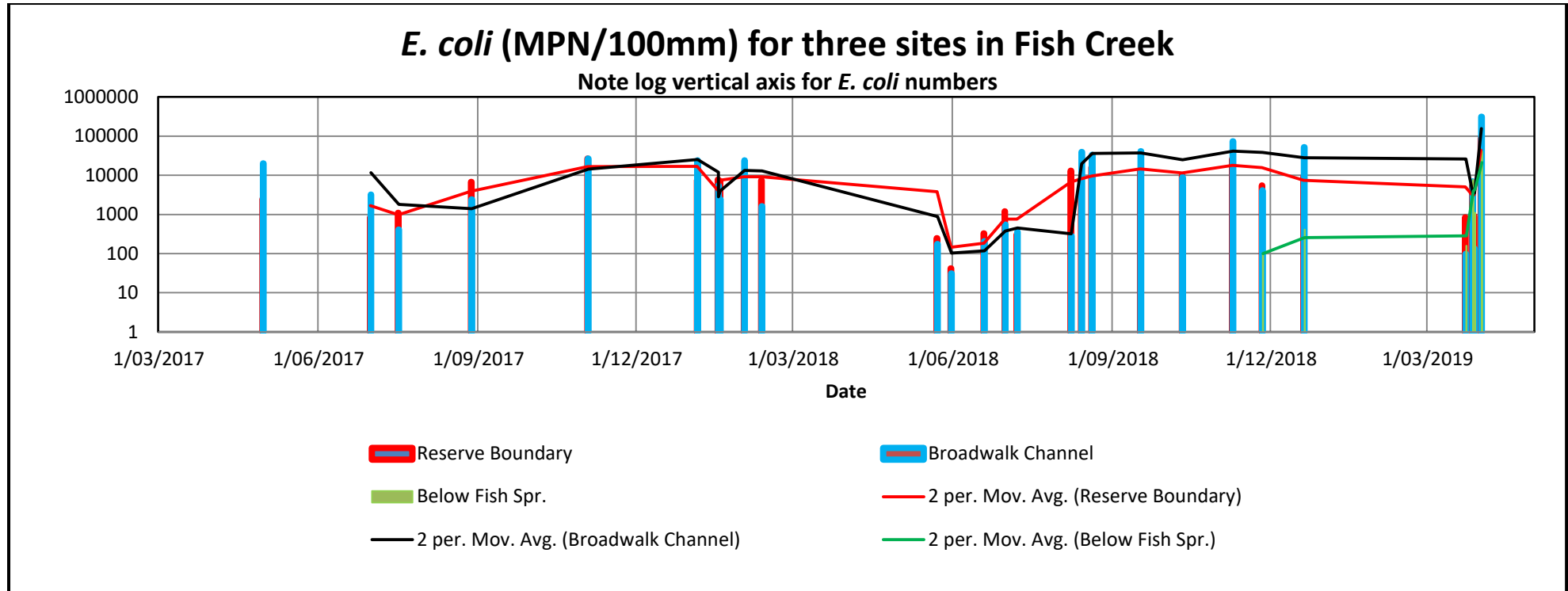


Figure 1 summarises the data graphically and include moving averages The figure indicates that *E coli* in Fish Creek tends to be lower in the winter when the cows are not being milked. During the summer dry periods when there is little runoff from the farms and Fish Creek at the Reserve Boundary and the Channel are often dry or barely flowing at this time so were not able to be sampled.

A statistical analysis of the data does not suggest that there is a consistent difference between the Reserve Boundary and Boardwalk Channel sites. This is not surprising as the pollution at any particular time is dependent on where the cows have been grazing or other farm activities.

Conclusion:

It is unacceptable that extremely high levels of pollution by pathogens are common. Mitigation measures are urgently needed.



Fish Creek pollution at the Reserve boundary during a rain event



Polluted channel entering Fish Springs at boardwalk.
Channel runs through about 70 m of scrub from the farms.