



WRPC1 Microbial Evidence:

Post Expert Conferencing E.coli Issues

Chris Dada (PhD)

E.coli Attribute

Key Issues:

1. Metrics to determine current and future state for the PC1 sites
2. Considerations for flow in the PC1 Attribute State Classifications
3. Uncertainties around the source of faecal pollution at PC1 sites and modelled future 'improvements'

E.coli Attribute

Key Issues:

- Metrics to determine current and future state for the PC1 sites

Att. State	%Exc 540	%Exc 260	Med	95 th P
A (Blue)	<5%	<20%	≤130	≤540
B (Green)	5-10%	20-30%	≤130	≤1000
C (Yellow)	10-20%	20-34%	≤130	≤1200
D (Orange)	20-30%	>34%	>130	>1200
E (Red)	>30%	>50%	>260	>1200

Site Station	PercExc260	PercExc540	Median	95th Percentile
Awaroa River (Waiuku) at Otau Rd Br opp Moseley Rd (41_9)	43%	17%	240	990
Awaroa Stm (Rotowaro) at Sansons Br @ Rotowaro-Huntly Rd (39_11)	62%	18%	290	1,580

Mangakara Stm (Reporoa) at SH5 (380_2)	26%	13%	140	1,700
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Mangaohoi Stm at South Branch Maru Rd (411_9)	18%	8%	70	875
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Mangakara Stm (Reporoa) at SH5 (380_2)	26%	13%	140	1,700
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Mangatawhiri River at Lyons Rd At Buckingham Br (459_6)	30%	13%	190	1,056
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Mangauika Stm at Te Awamutu Borough W/S Intake (477_10)	13%	8%	33	1,015
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Waipa River at SH3 Otorohanga (1191_12)	36%	18%	180	3,190
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Pokaiwhenua Stm at Arapuni - Putaruru Rd (786_2)	23%	13%	150	1,410
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Waikato River at Tuakau Br (1131_133)	18%	12%	80	1,600
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Key Issues:

➤ Considerations for flow in the PC1 Attribute State Classifications

Site Station	Count	Exc260	Exc540	PercExc260	PercExc540	Median	95th Percentile
Waikato River at Tuakau Br (1131_133)	60	11	7	18%	12%	80	1,600

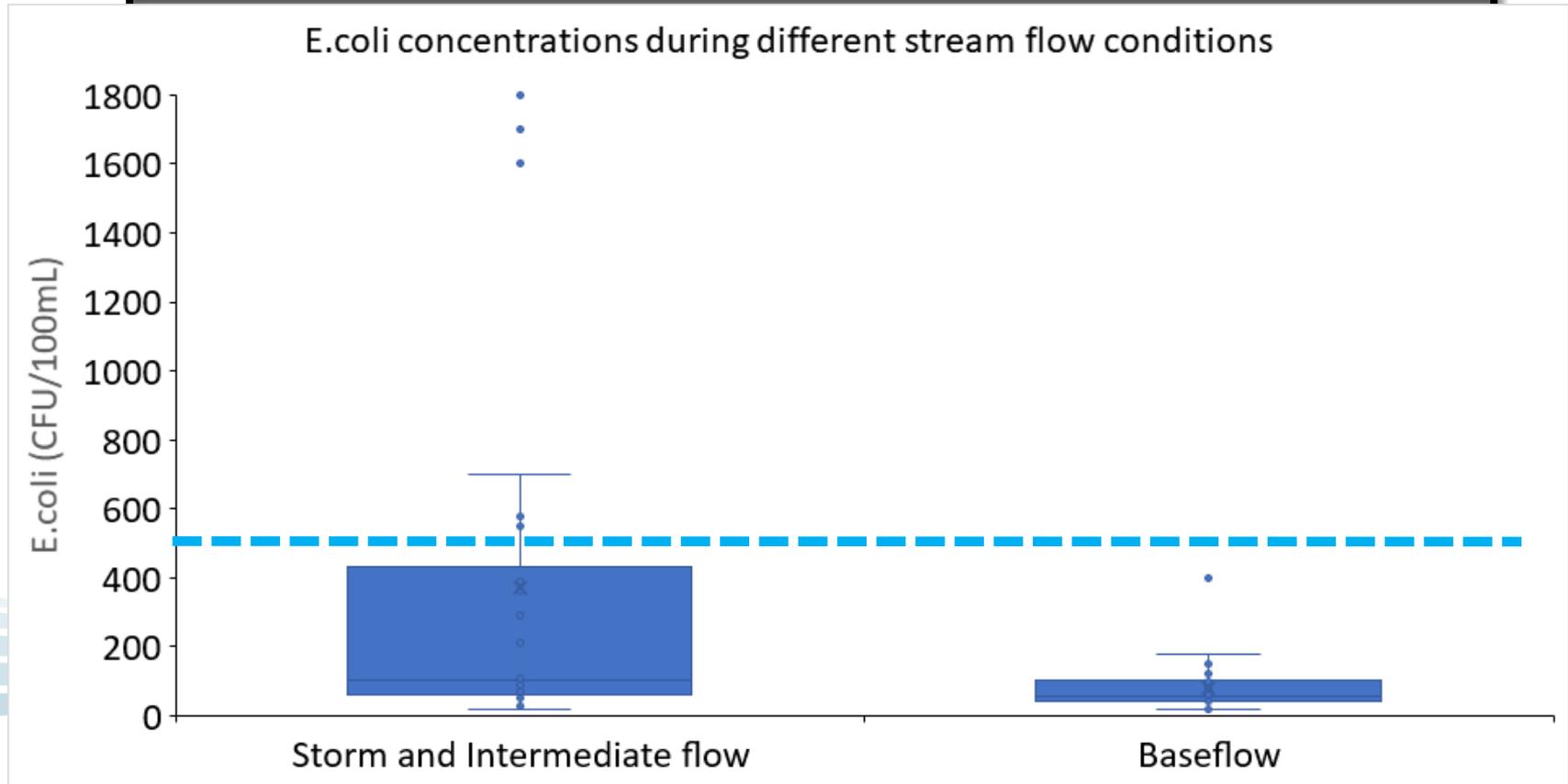
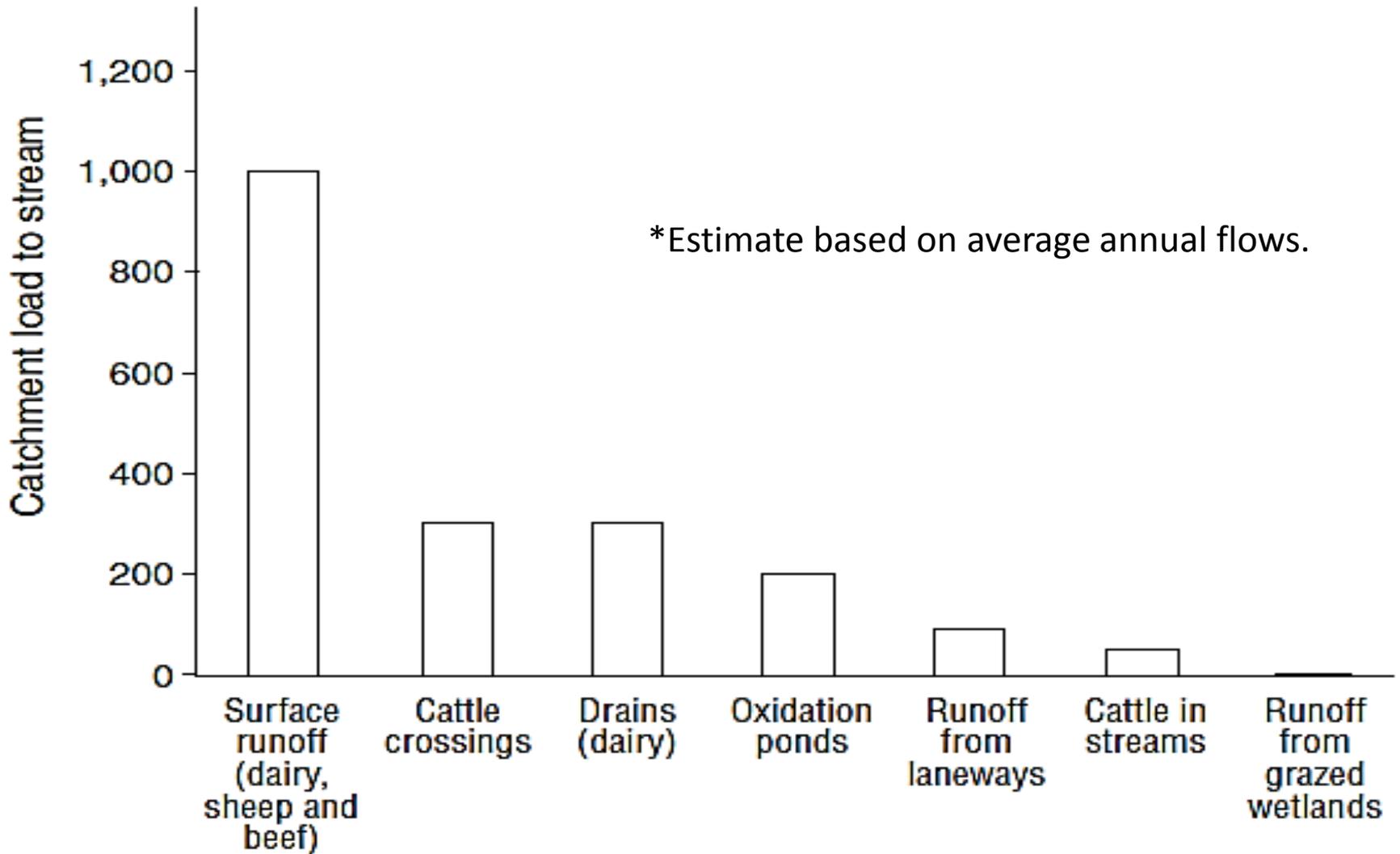


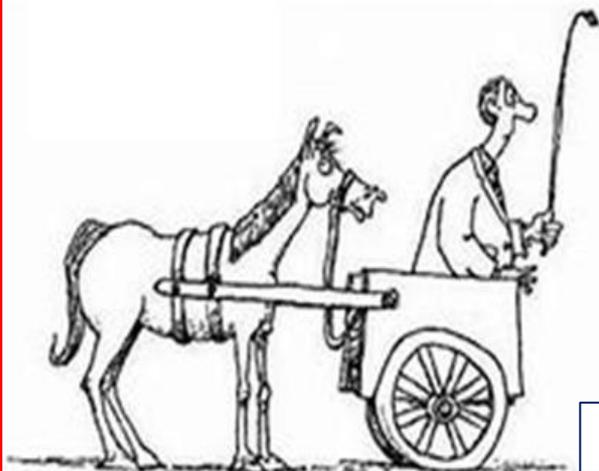
Figure 1: Comparison between storm flow and base flow E.coli concentrations at Waikato River at Tuakau Br)



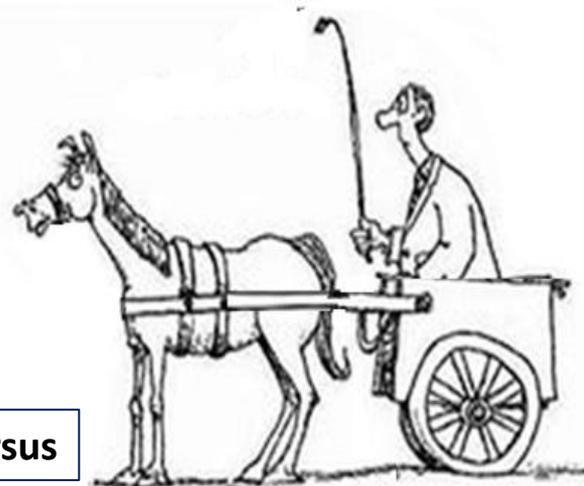
Waterway loadings of *Escherichia coli* (CFU x 10⁸/ha./pasture/year for major sources of faecal matter in the Waikato Region, New Zealand. Source: McDowell and Wilcock 2008)

- Uncertainties around the source of faecal pollution at PC1 sites and modelled future 'improvements'

**PC1 *E.coli*
reduction
target
setting
approach**



versus



- ❖ Uncertainties about source of faecal pollution in the PC1 streams
- ❖ Target reductions for sites in Table 3.11.1) are not based on scientific evidence, and are at best 'Blanket' or 'one-cap-fits-it-all' approach

- ❖ Microbial source tracking techniques are applied to identify major host sources of faecal pollution in the PC1 streams. Phylogenetic studies applied to distinguish if elevated *E.coli* for PC1 sites are due to faecal sources or non-faecal environmental *E.coli* from natural stream processes.
- ❖ Management solutions aimed at mitigating *E.coli* levels are more appropriate, site/catchment-specific, more effective and offer value for resources expended.

Table : *E. coli* and faecal source tracking results for Karapiro, Komakorau, Mangaone, Mangaonua and Mangawhero Streams (5 PC1 streams)

Discharge condition	Faecal Pollution Source	No. of samples positive for marker	Total No. of observations	Prevalence (%)
Low flow	Wildfowl	11	14	78.6
Low flow	Cattle	6	14	42.9
Rainfall-impacted	Wildfowl	15	15	100
Rainfall-impacted	cattle	11	15	73.3

(adapted from Moriarty, 2015)

Key Highlights from the Moriarty study

- only 5 out of 62 PC1 streams were included in the study
- High prevalence of wildfowl markers during conditions of low flow (the most critical times for public exposure to health risk) coupled with the comparatively low prevalence of cattle markers during conditions of low flow

Recommendations

I therefore recommend that authorities:

- ❖ Delete requirements to fence hill country streams, considering that it is a counter-intuitive approach to stopping overland flow
- ❖ Increase requirements to identify and manage critical source areas and overland flow pathways. This will then lead to catchment-specific management intervention(s) rather than a blanket approach to effect fences for stock exclusion which only stops direct deposition.
- ❖ Commission longitudinal site-specific MST studies targeted for each identified site in the WRPC1 Table 3.11.1.
- ❖ Until such time as reliable microbial source tracking is undertaken I propose that long term targets should be deleted from Table 3.11-1. and that the E.coli freshwater objectives be included in Table 3.11-1 in a way that
 - ❖ includes consideration for flow or
 - ❖ 'realistically' meets the requirements of the NPS-FM.