

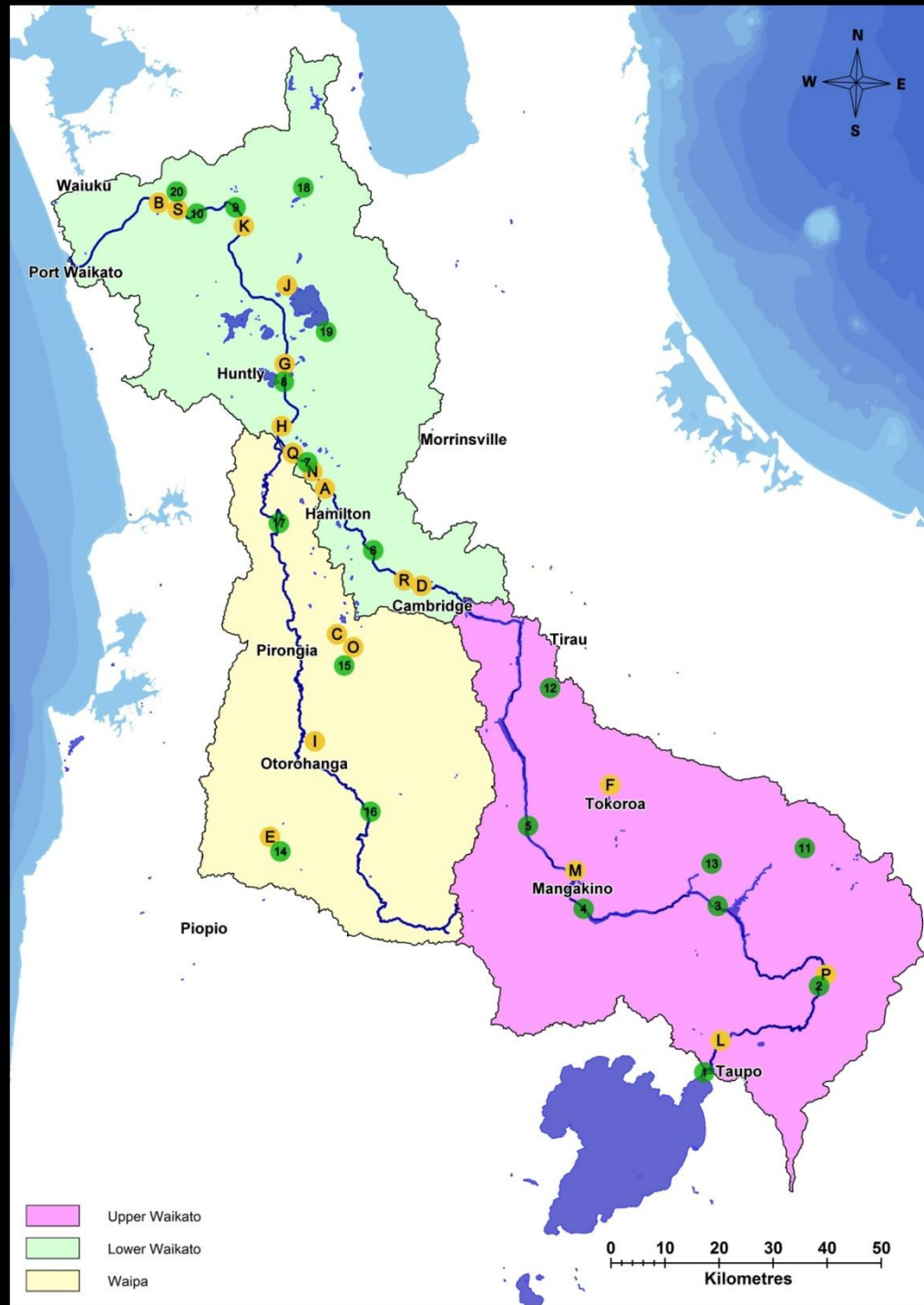
Sources of contaminants in the Waikato-Waipā catchment

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Water quality monitoring networks

- River monitoring, 20 locations (WRC, NIWA)
 - Flow – continuous (m³/s)
 - Concentration – monthly (g/m³)
- Point sources, 19 locations (“consent monitoring”)
 - Flow – reported daily-to-monthly
 - Concentration – daily-to-monthly
- Load = $\Sigma(\text{flow} \times \text{concentration})$ (g/s, kg/d, t/yr)



For example, various sites, 2003-12

	Flow (m ³ /s)	[Total N] (g/m ³)	Load (t/yr)
River sites			
Waikato-Taupo	158	0.1	339
Waikato-Narrows	235	0.5	3695
Waipa-Whatawhata	88	1.1	4069
Waikato-Tuakau	402	0.8	11,193
Point sources			
Hamilton sewage	0.48	12	189
Horotiu meatworks	0.02	114	90
Ngaruawahia sewage	0.02	14	8

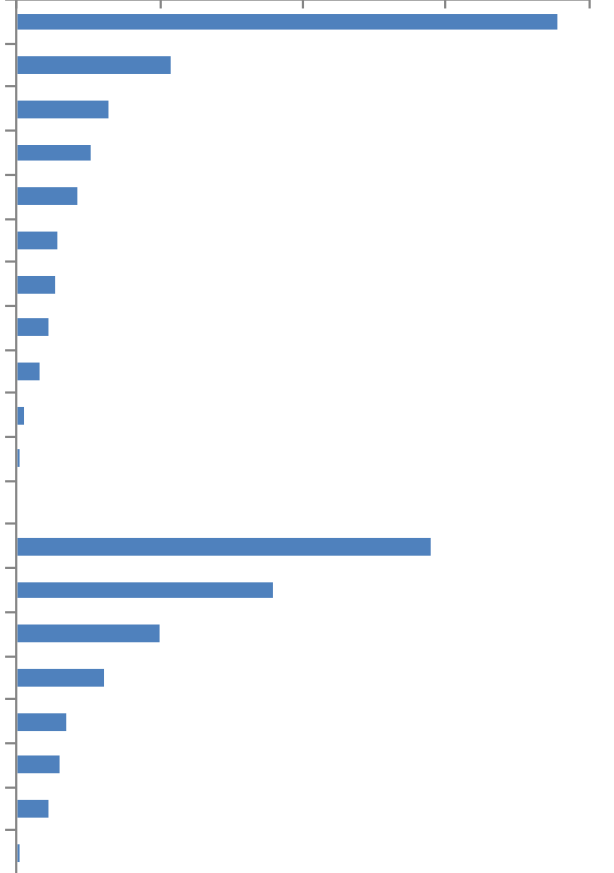
Loads from point sources, 2003-12

Nitrogen load (t/yr)

0 50 100 150 200

Hamilton
Cambridge
Tokoroa
Te Kuiti
Tuakau/Pukekohe
Otorohanga
Huntly
Te Awamutu
Ngaruawahia
Te Kauwhata
Meremere

Kinleith mill
Horotiu meatworks
Wairakei PS
Tuakau rendering
Hautapu dairy
Te Awamutu dairy
Te Rapa dairy
Ohaaki PS

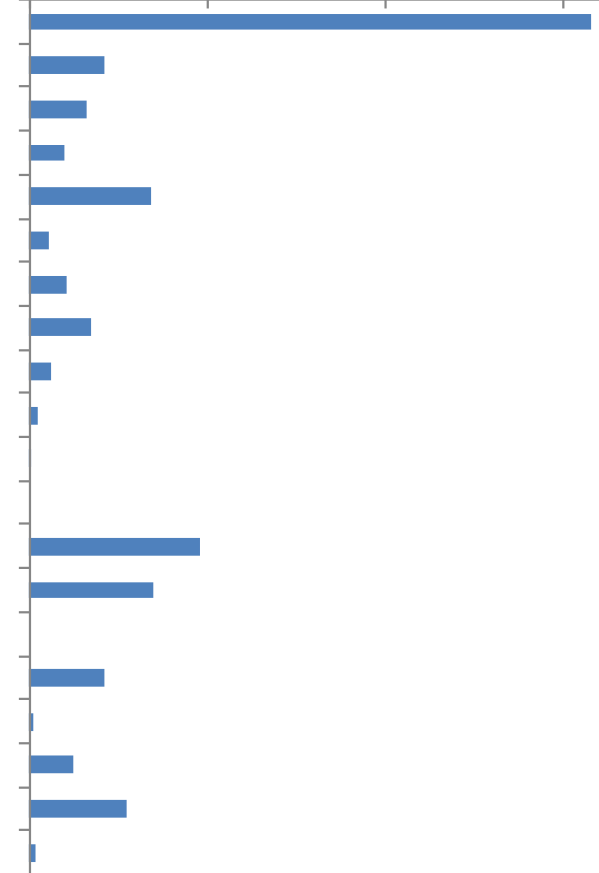


Phosphorus load (t/yr)

0 20 40 60

Hamilton
Cambridge
Tokoroa
Te Kuiti
Tuakau/Pukekohe
Otorohanga
Huntly
Te Awamutu
Ngaruawahia
Te Kauwhata
Meremere

Kinleith mill
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Tuakau rendering
Hautapu dairy
Te Awamutu dairy
Te Rapa dairy
Ohaaki PS



Contaminant accounting (NPS-FW 2014)

- Determine load carried by river (A)
- Identify background or natural contribution (B)
- Add up contributions from all point sources (C)
- Calculate contribution from landuse, $D (= A - B - C)$

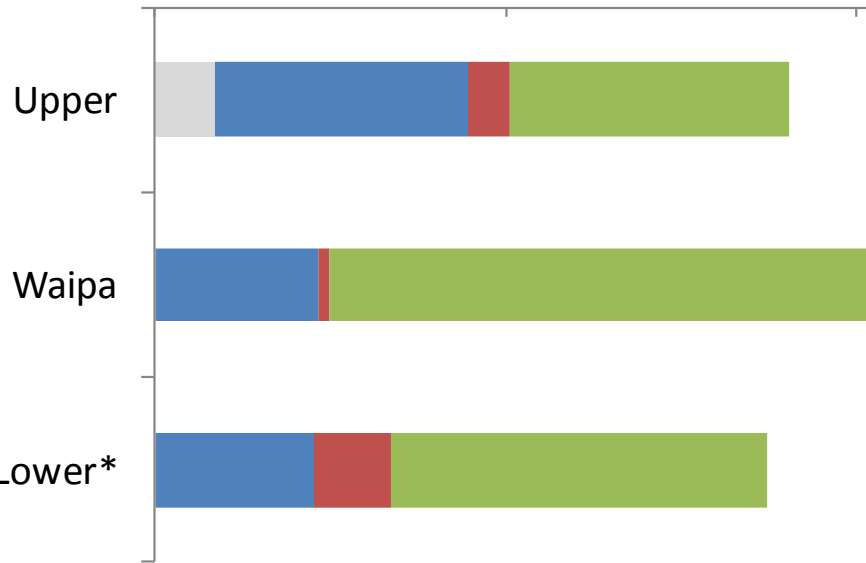
For example, nitrogen, Waipa catchment

- A, Waipa-Whatawhata 4069 t/yr
- B, Background 928 t/yr
 - (= 3093 km² @ 0.3 t/km²/yr = 928 t/yr)
- C, Point sources 66 t/yr
 - Otorohanga sewage 14
 - Te Awamutu sewage 11
 - Te Kuiti sewage 26
 - Te Awamutu dairy factory 15
 - Sum, point sources 66
- D, Landuse (= A – B – C) 3075 t/yr

Three sub-catchments, 2003-12

Nitrogen load (tonnes/year)

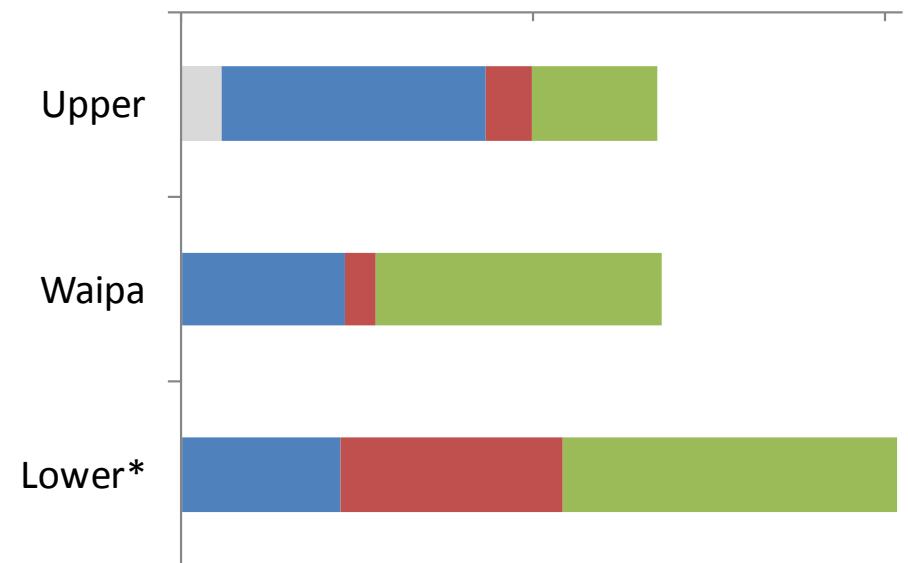
0 2000 4000



■ Taupo ■ Background ■ Point sources ■ Landuse

Phosphorus load (tonnes/year)

0 200 400



■ Taupo ■ Background ■ Point sources ■ Landuse

*Ignoring inputs from upstream catchments

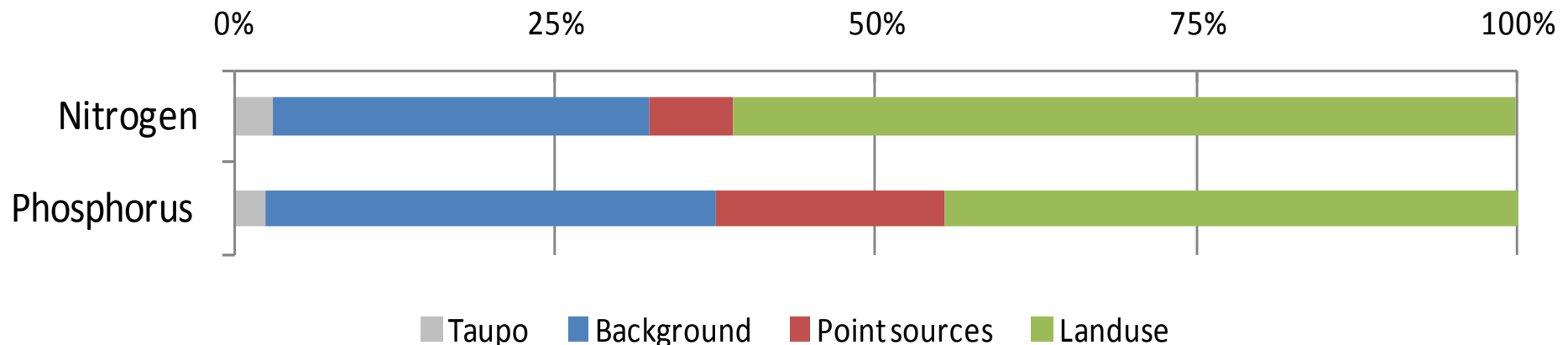
Healthy environment

Strong economy

Vibrant communities

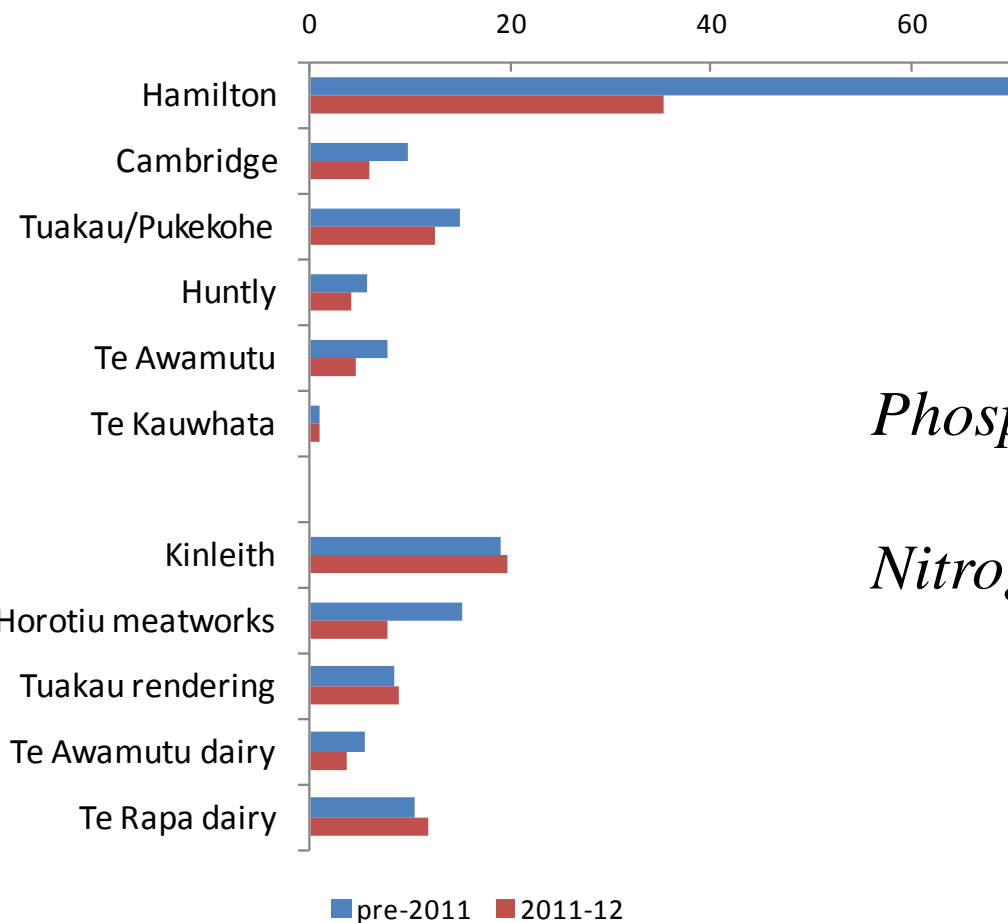
Sources of nutrients, Waikato/Waipā, 2003-12

- Loads in river and from point sources are measured
- Point sources: about 7% of the overall nitrogen load and 18% of the overall phosphorus load
- Background – 29% and 35%; landuse – 61% and 45%



PS loads, changes during the decade

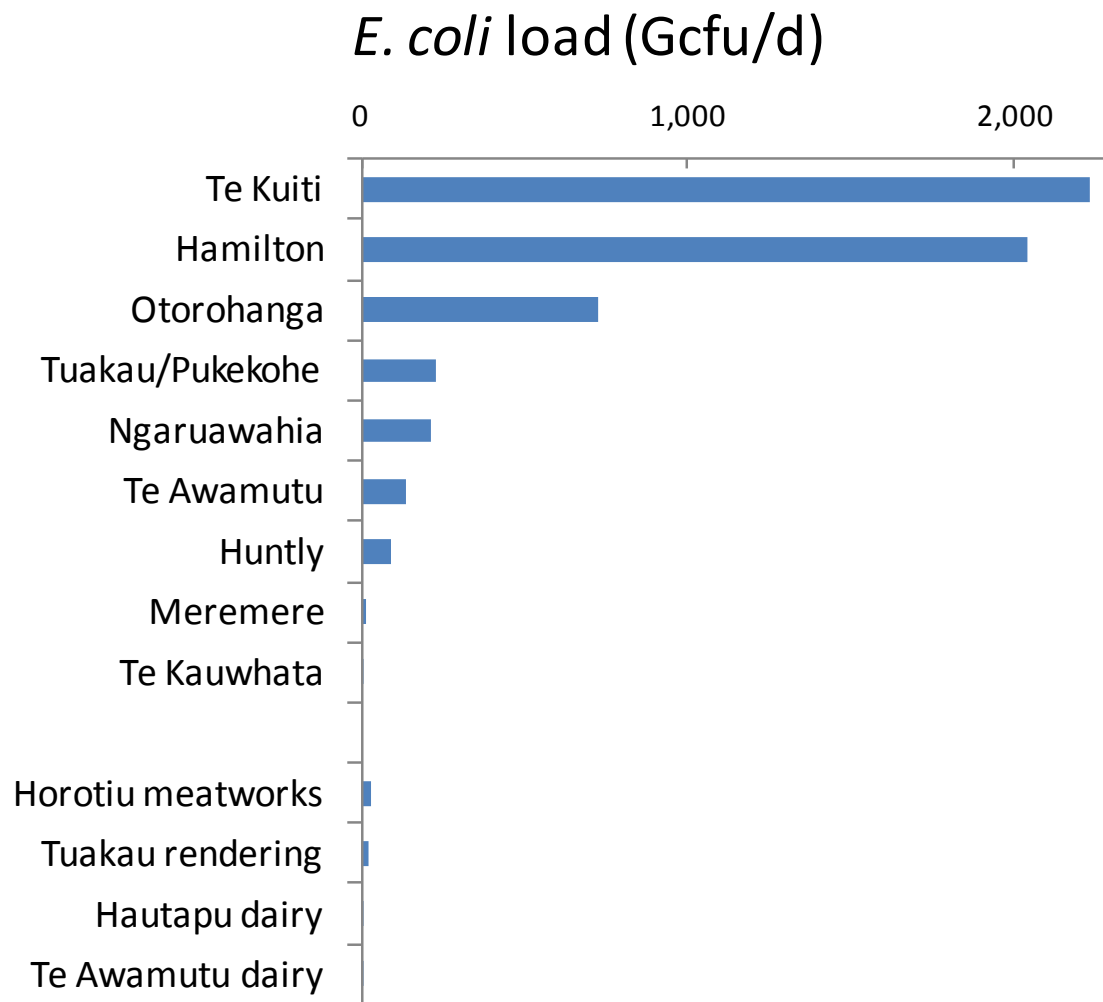
Phosphorus load (t/yr)



Phosphorus: 30% reduction

Nitrogen: 7% reduction

E. coli loads from some point sources

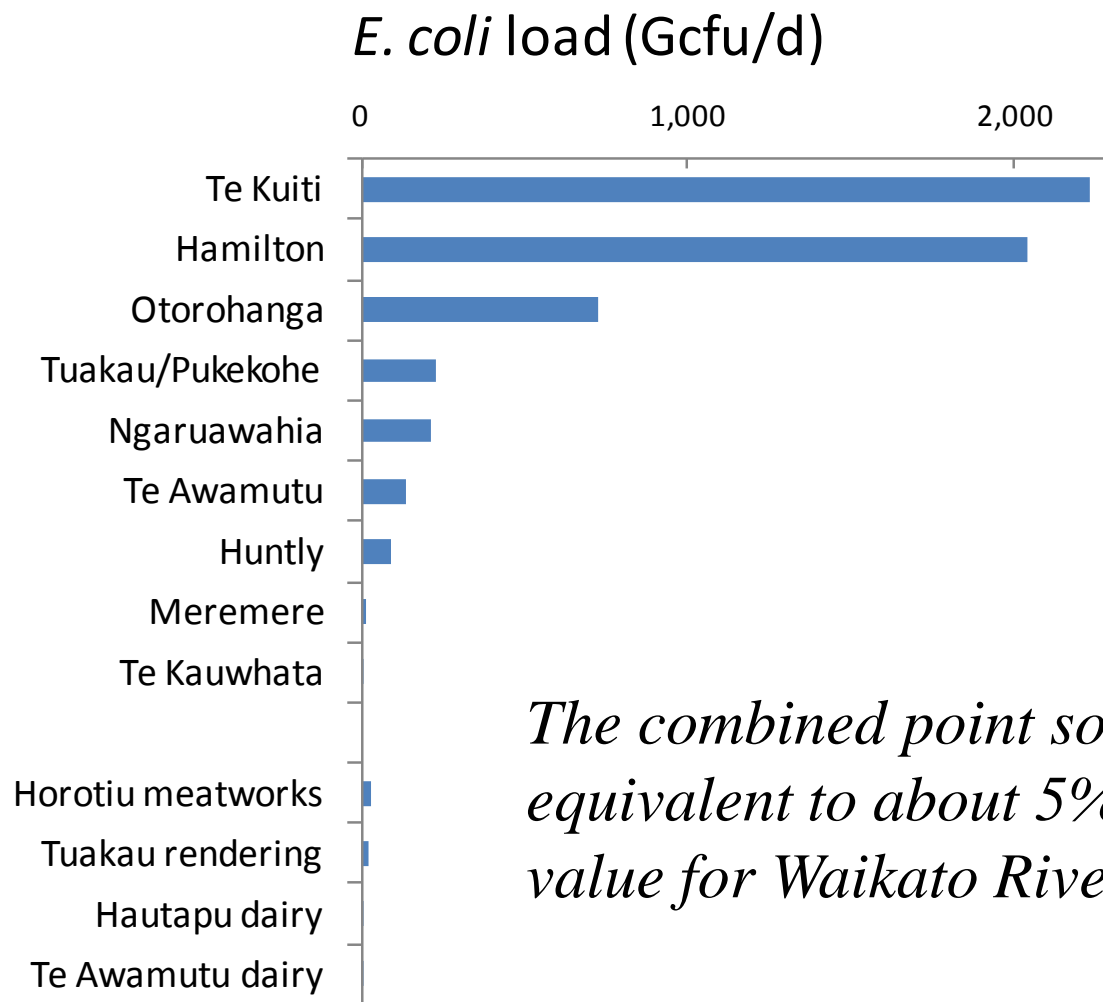


Healthy environment

Strong economy

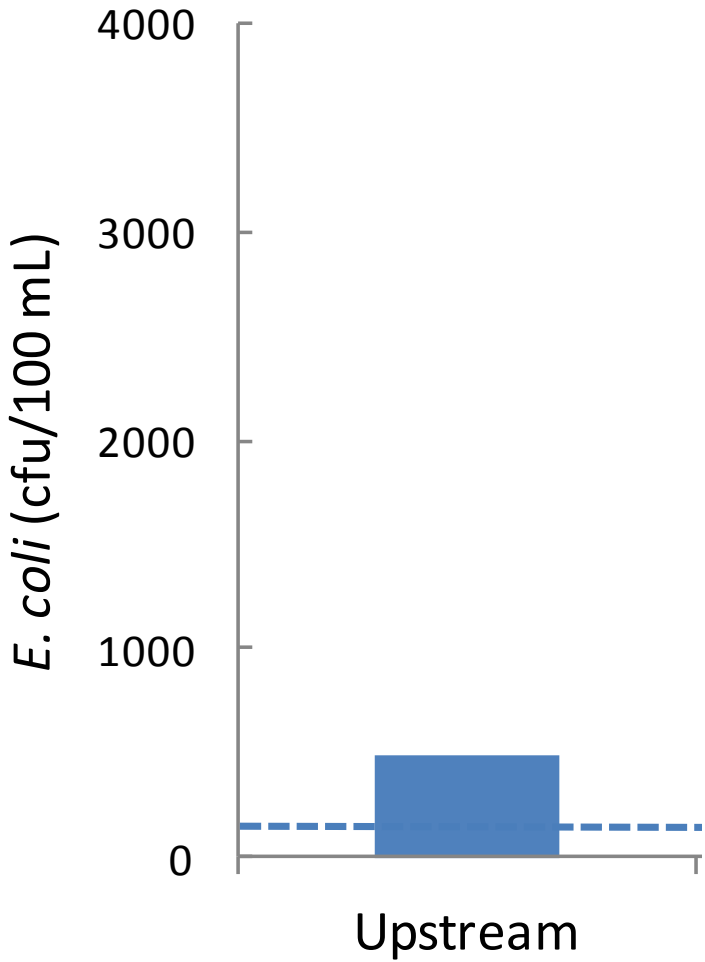
Vibrant communities

E. coli loads from some point sources

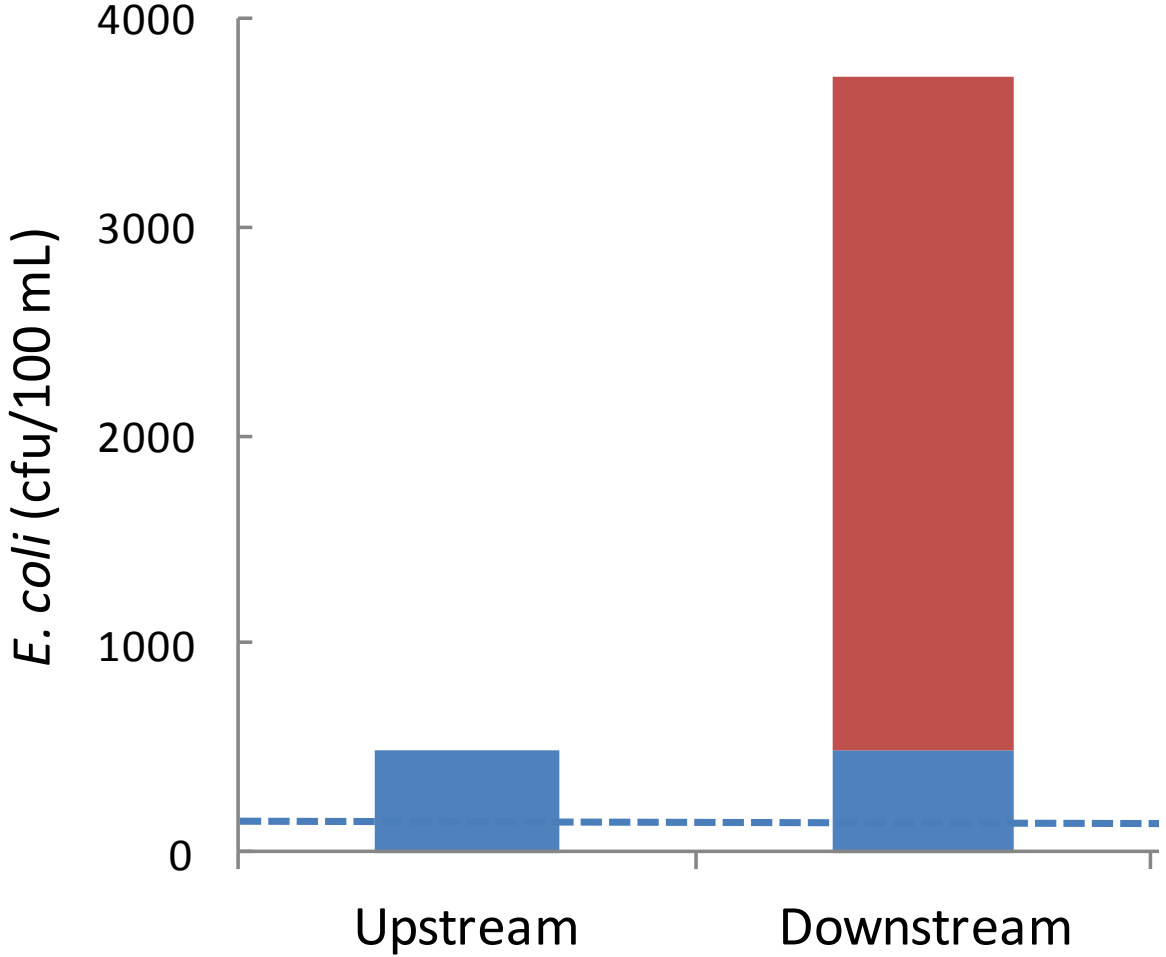


The combined point source load was equivalent to about 5% of the corresponding value for Waikato River @ Tuakau

Mangaokewa @ Te Kuiti



Mangaokewa @ Te Kuiti, low flow

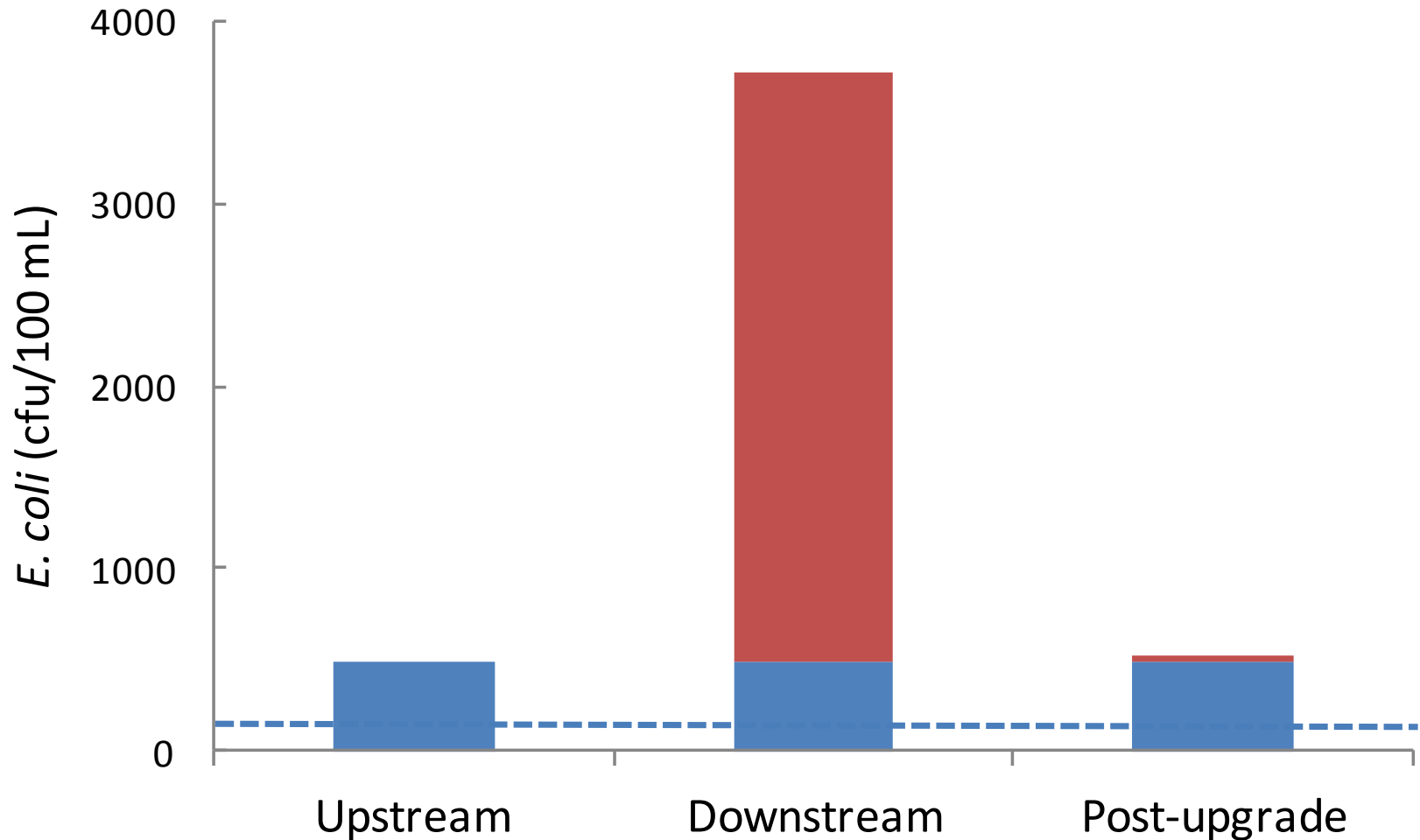


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Mangaokewa @ Te Kuiti, low flow



Healthy environment

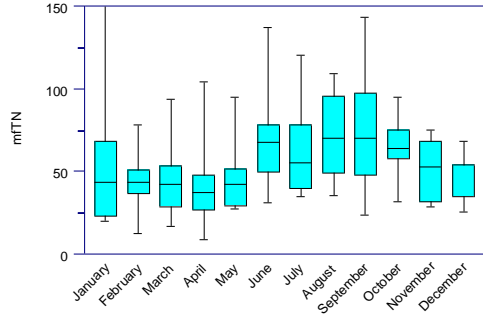
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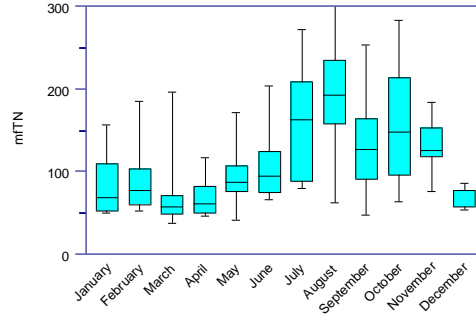
Conclusions

- Monitoring data can be used to identify the contributions of different sources of contaminants
- Overall, point source discharges contribute 7% of the N and 18% of the P to the Waikato/Waipā (at Tuakau). Landuse – mostly pastoral farming – contributes about 60% and 45%, respectively.
- “Non point sources” include background or natural sources. These can be appreciable (c. 30%).
- Overall, point source discharges are a minor source of *E. coli*. But they can be locally important.

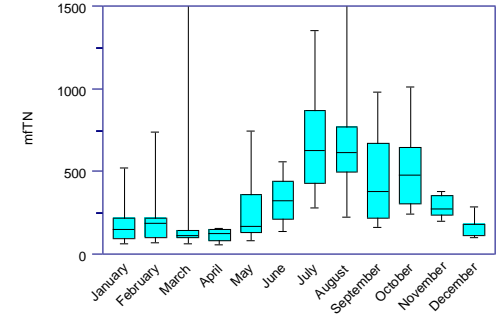
Group Ohakuri Tailrace Br Period analysed 10 years for calendar years 2003 to 2012



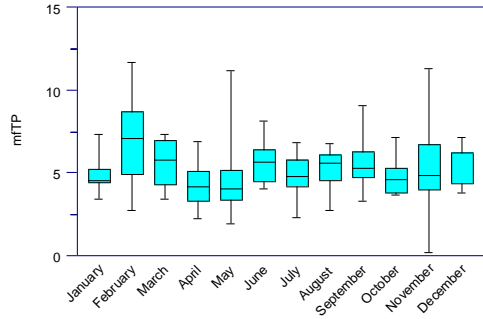
Group rrows Br Period analysed 10 years for calendar years 2003 to 2012



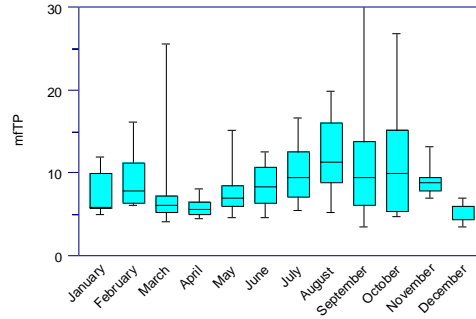
Group Tuakau Br Period analysed 10 years for calendar years 2003 to 2012



Group Ohakuri Tailrace Br Period analysed 10 years for calendar years 2003 to 2012



Group rrows Br Period analysed 10 years for calendar years 2003 to 2012



Group Tuakau Br Period analysed 10 years for calendar years 2003 to 2012

