Sources of contaminants in the Waikato-Waipa catchment

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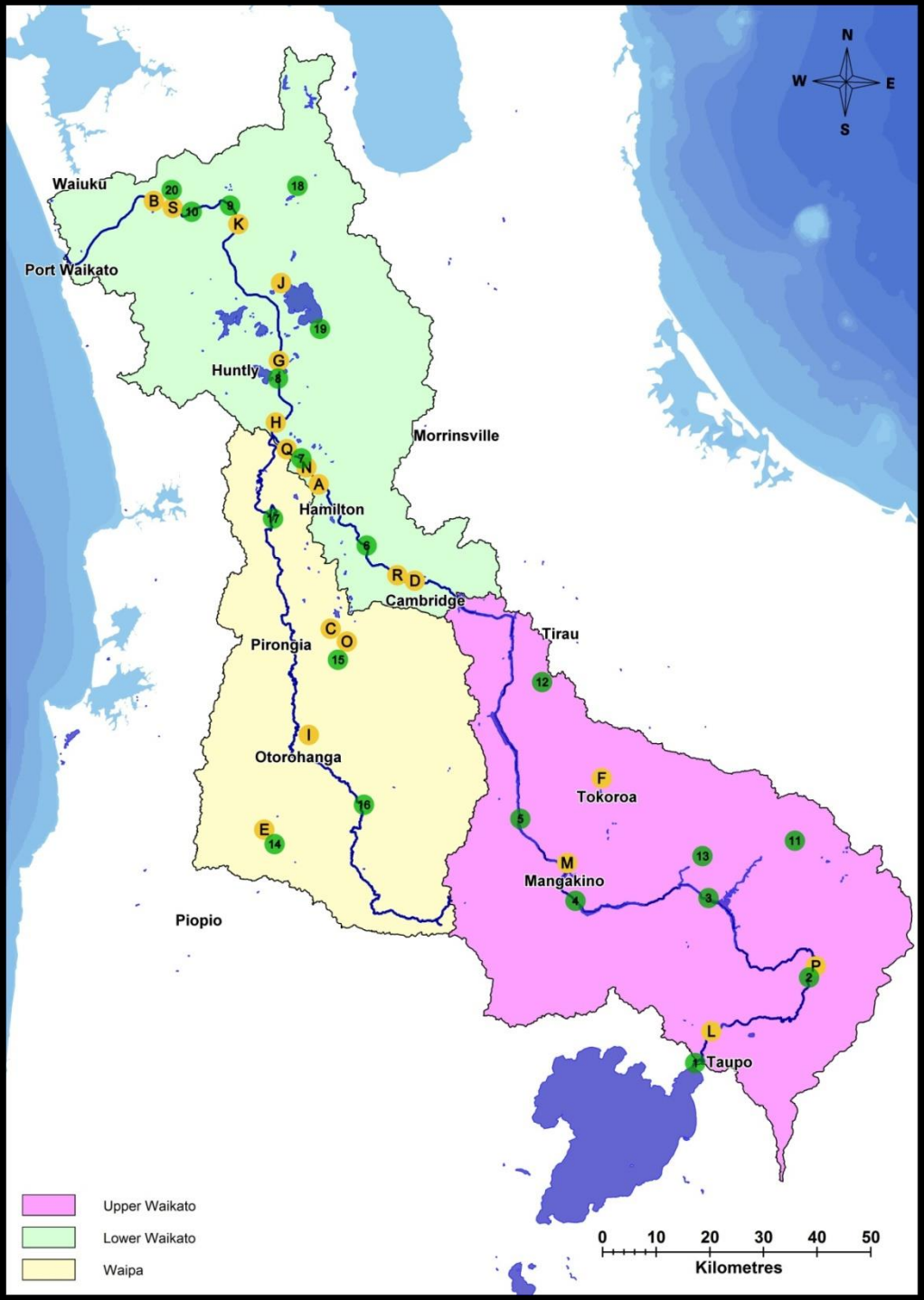
Water quality monitoring networks

- River monitoring, 20 locations (WRC, NIWA)
  - Flow – continuous (m^3/s)
  - Concentration – monthly (g/m^3)

- Point sources, 19 locations (“consent monitoring”)
  - Flow – reported daily-to-monthly
  - Concentration – daily-to-monthly

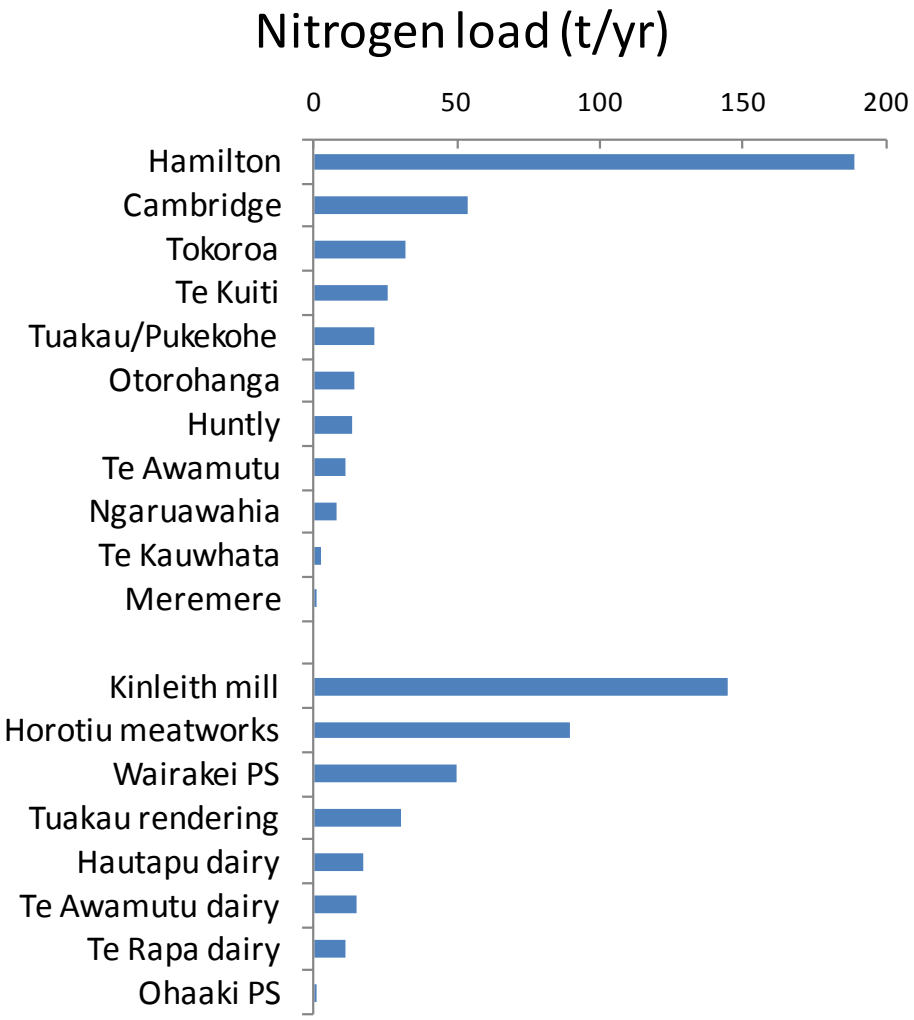
- Load = Σ(flow × concentration) (g/s, kg/d, t/yr)

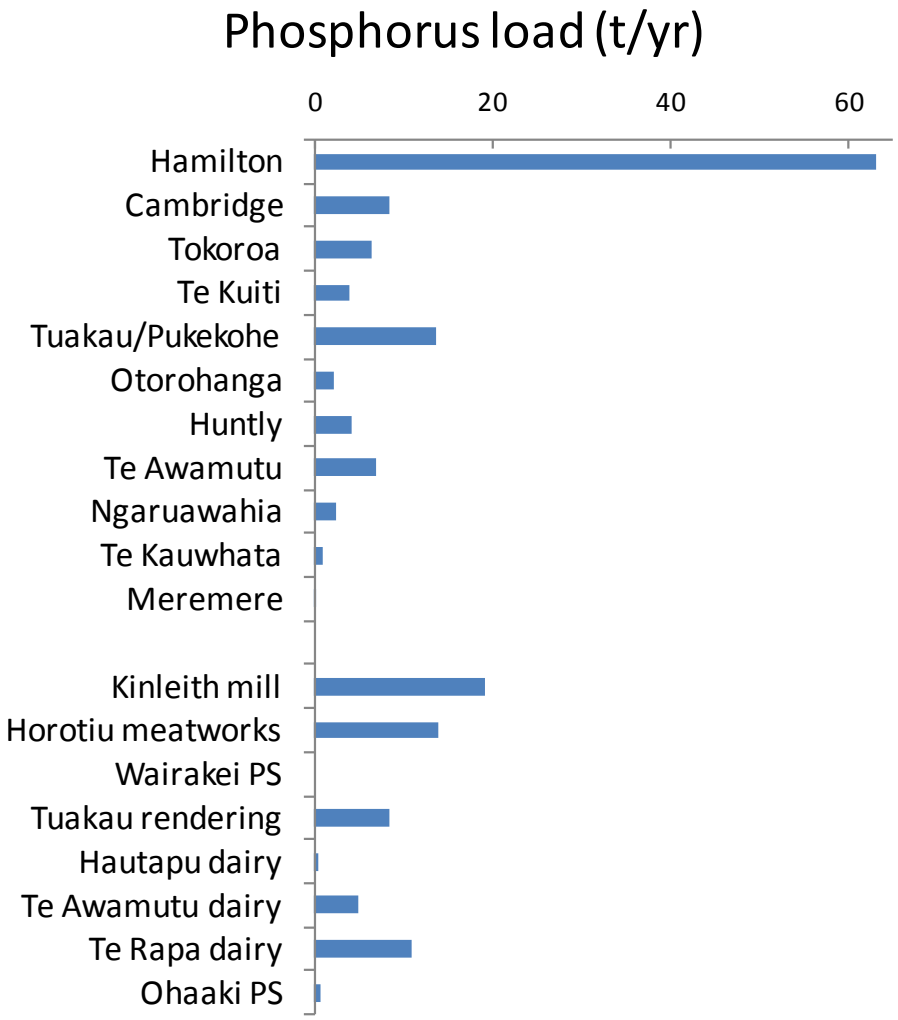

N
W
E
S
Waiuku
Port Waikato
Huntly
Morrinsville
Hamilton
Cambridge
Tirau
Pirongia
Otorohanga
Piopio
Tokoroa
Mangakino
Taupo
Upper Waikato
Lower Waikato
Waipa
0 10 20 30 40 50
Kilometres

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





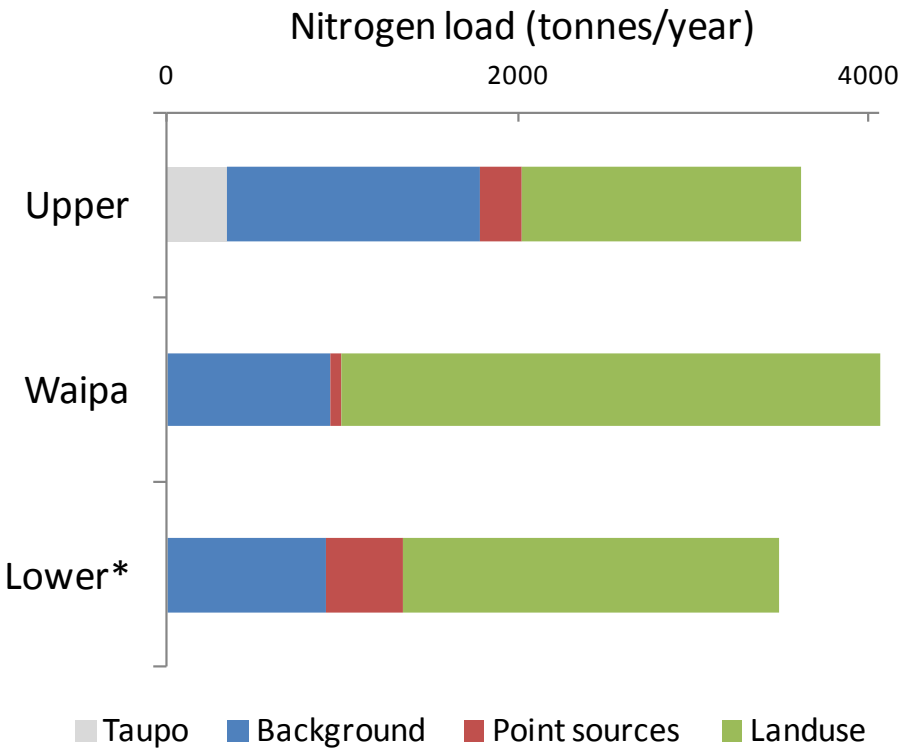
Contaminant accounting (NPS-FW 2014)

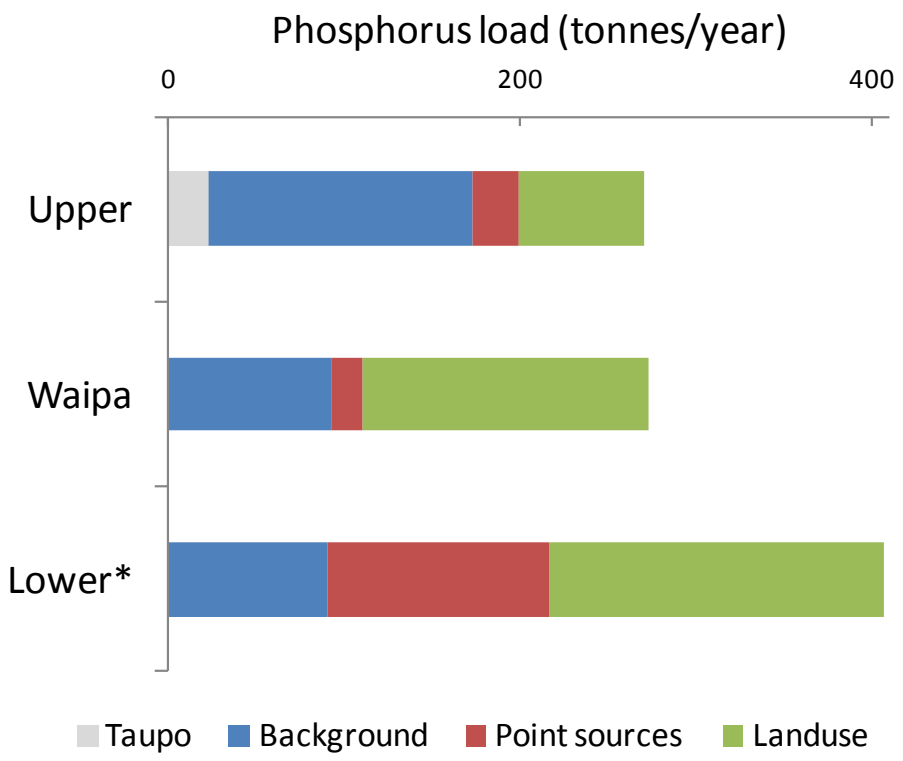
- Determine load carried by river (*A*)
- Identify background or natural contribution (*B*)
- Add up contributions from all point sources (*C*)
- Calculate contribution from landuse, *D* (= *A* – *B* – *C*)

For example, nitrogen, Waipa catchment

- *A*, Waipa-Whatawhata — 4069 t/yr
- *B*, Background — 928 t/yr
  - (= 3093 km^2 @ 0.3 $t/km^2/yr$ = 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

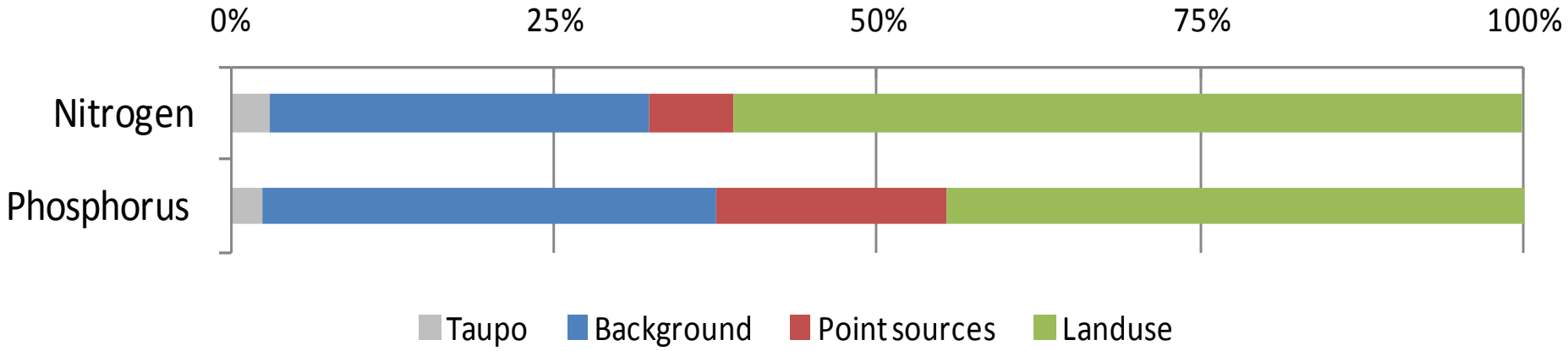




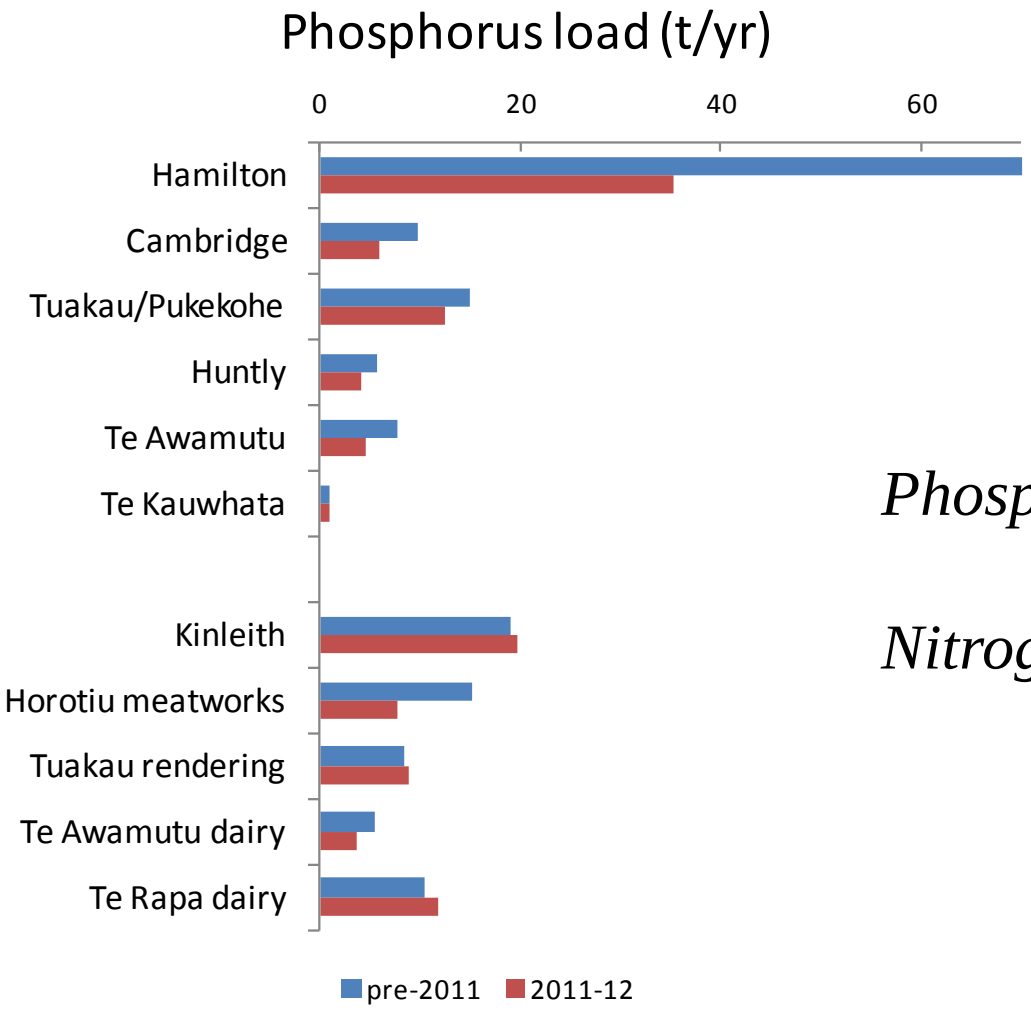
*Ignoring inputs from upstream catchments

Sources of nutrients, Waikato/Waipa, 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%



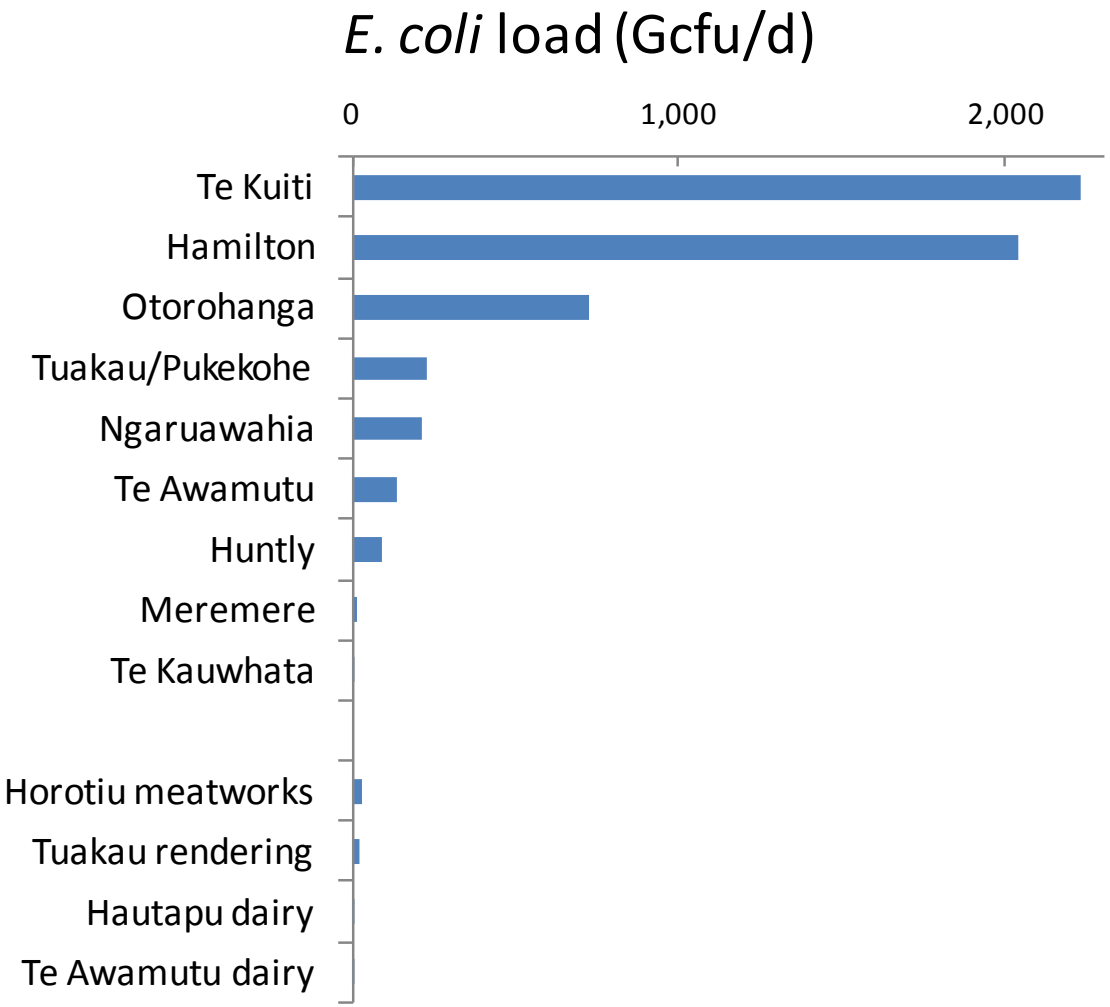
PS loads, changes during the decade



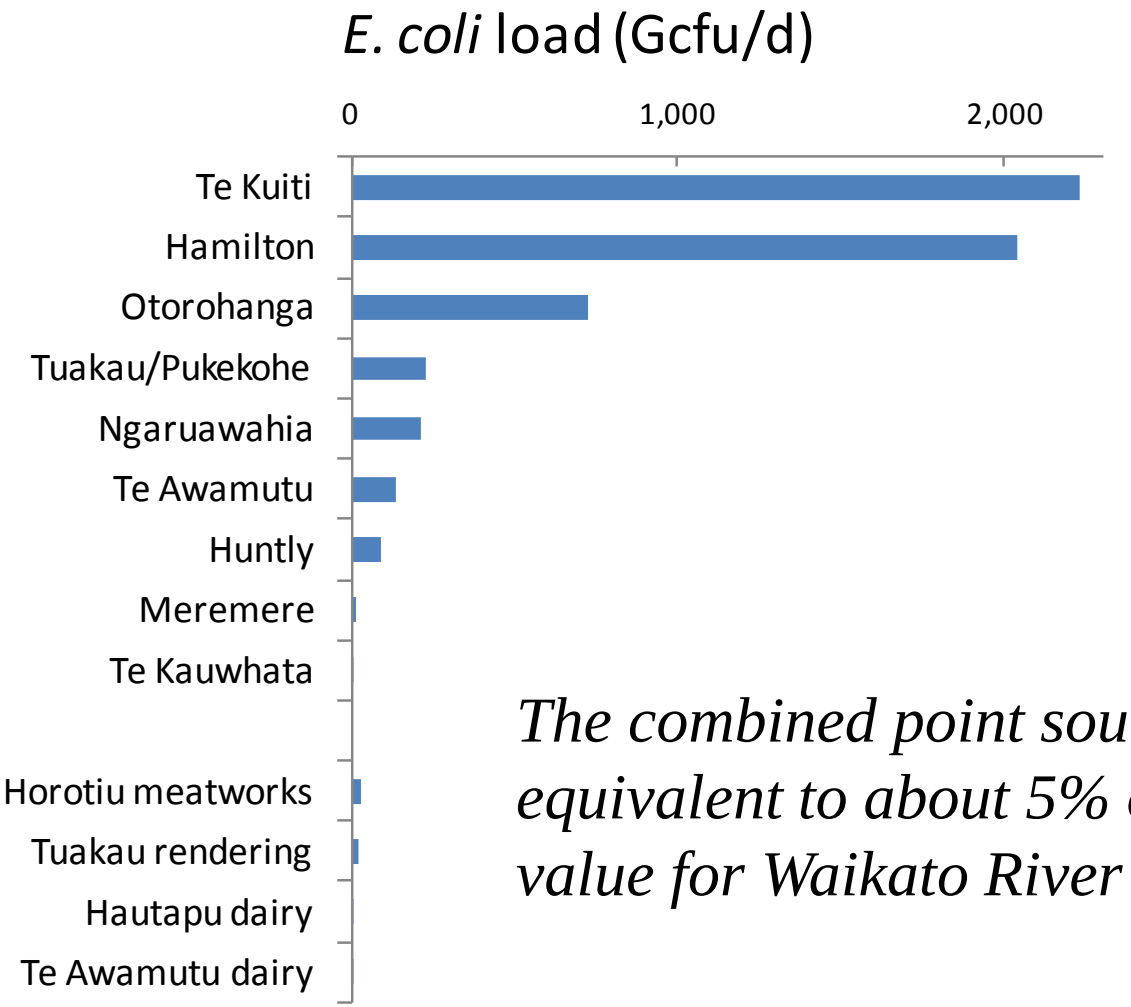
Phosphorus: 30% reduction

Nitrogen: 7% reduction

E. coli loads from some point sources

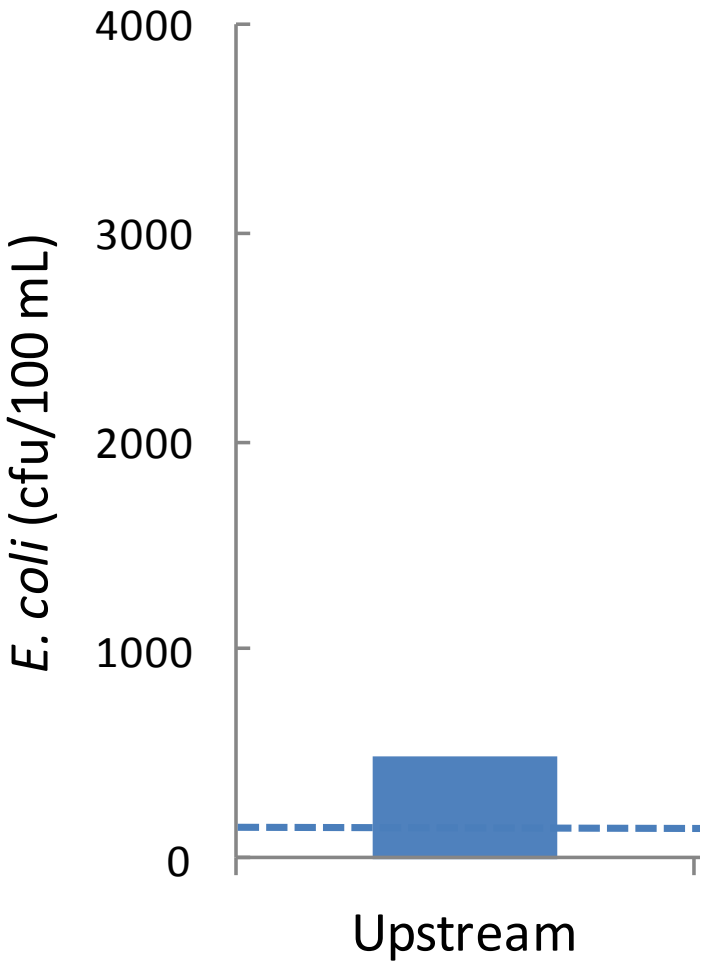


E. coli loads from some point sources

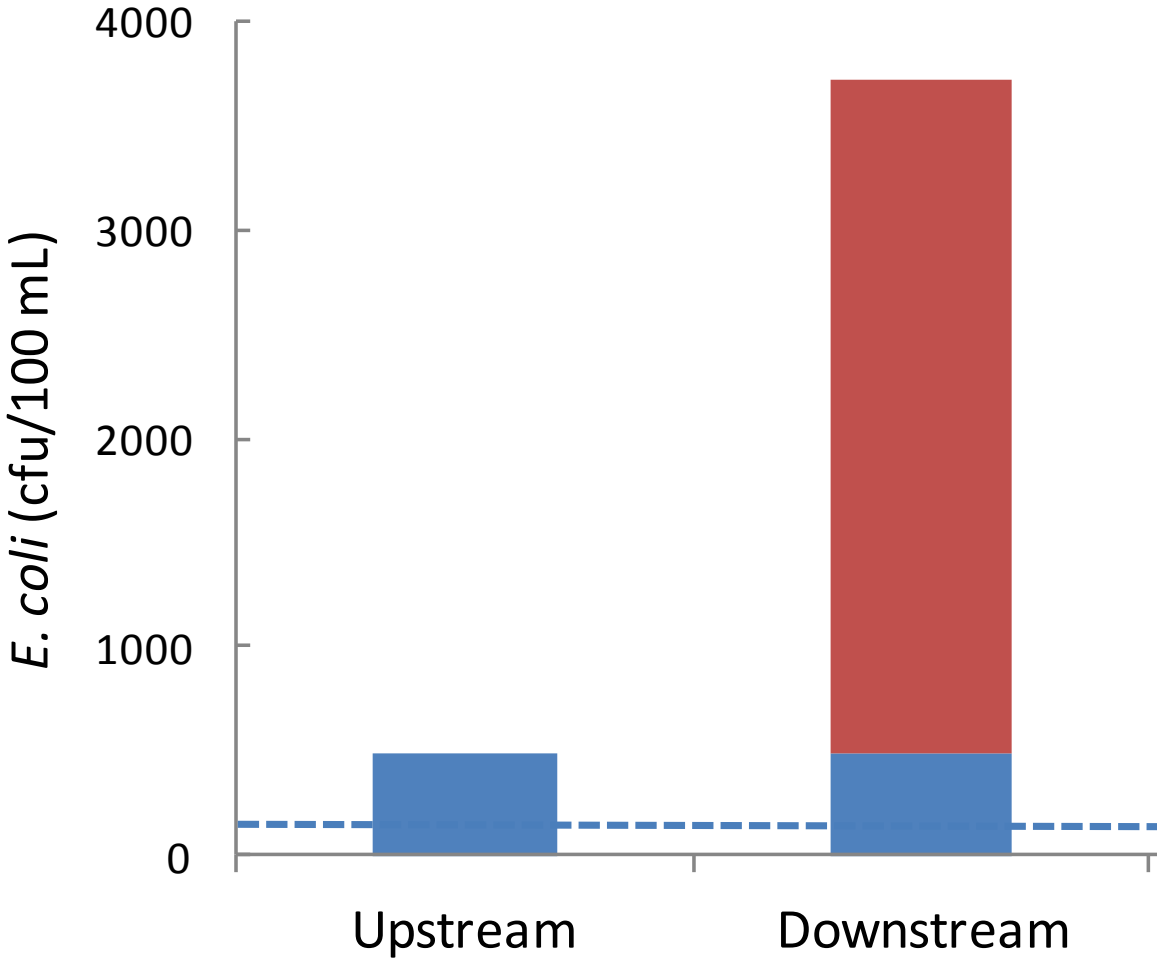


The combined point source load was equivalent to about 5% of the corresponding value for Waikato River @ Tuakau

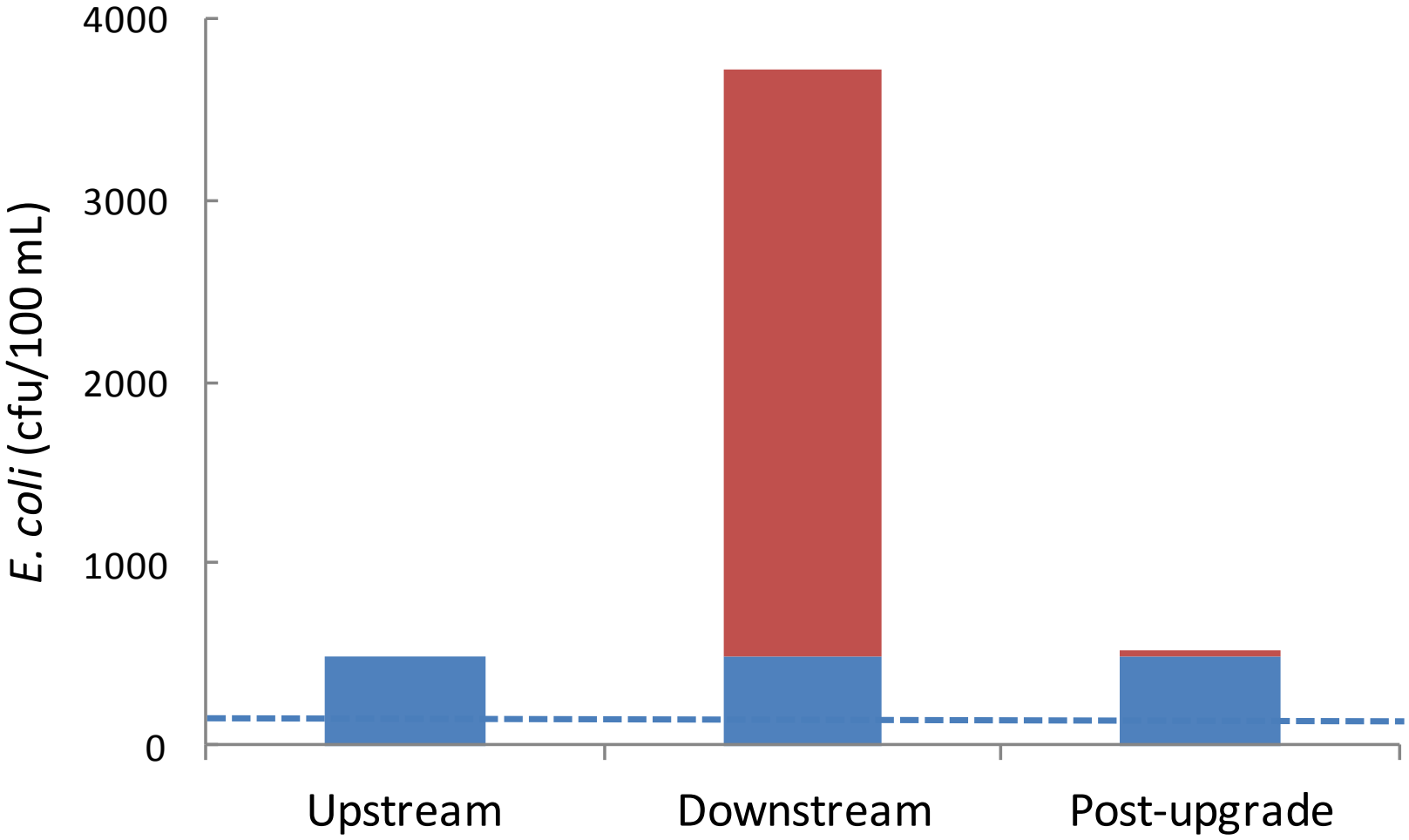
Mangaokewa @ Te Kuiti



Mangaokewa @ Te Kuiti, low flow

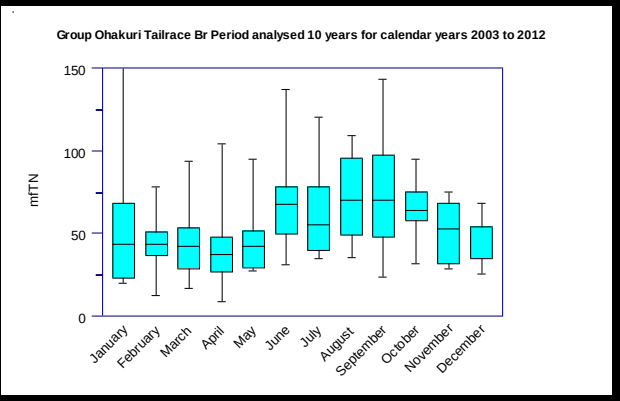


Mangaokewa @ Te Kuiti, low flow



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/Waipa (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
mfTN
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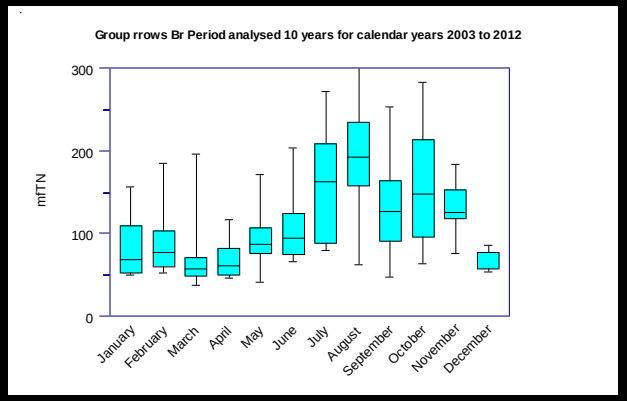
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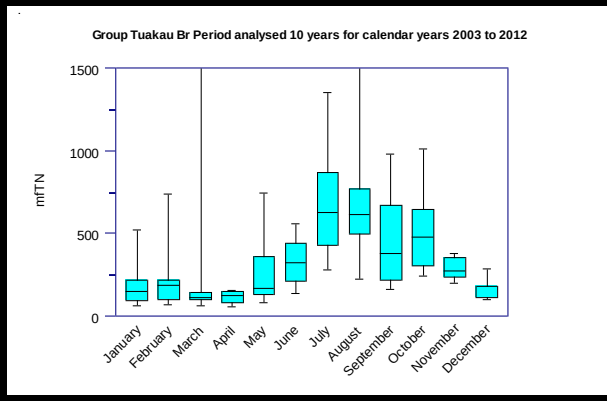
Group Tuakau Br Period analysed 10 years for calendar years 2003 to 2012
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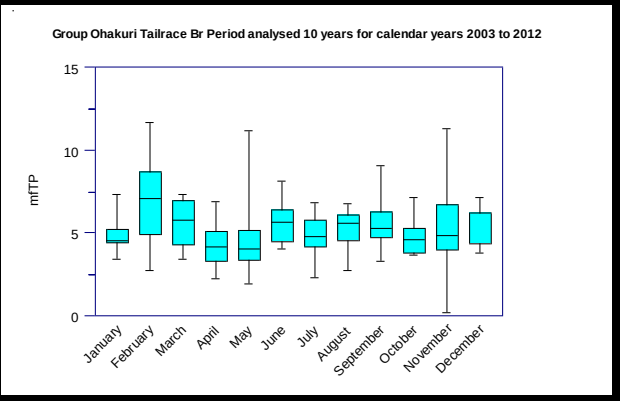
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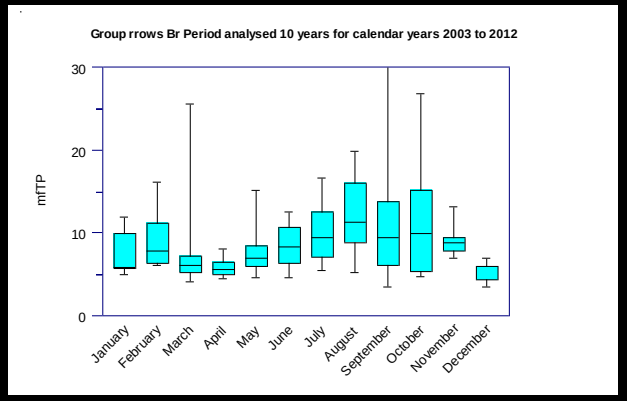
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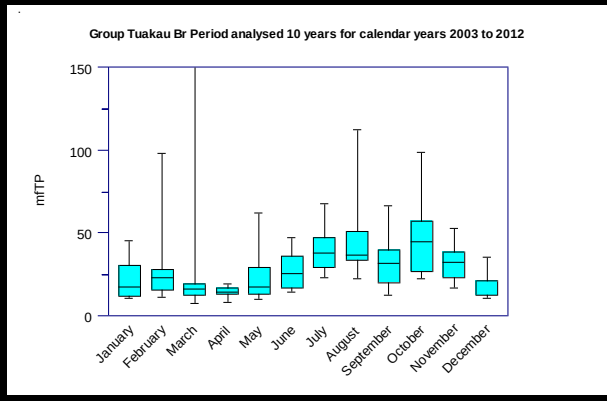
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