

Variability of *E. coli* in Rivers during base-flow conditions

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Introduction

Faecal microbe concentrations in rivers vary considerably

Not all related to flood events (2 orders of magnitude)

Base-flow conditions (3 orders of magnitude)

Samples are typically collected fortnightly or monthly

Some at different time-scales

No systematic studies across multiple time scales

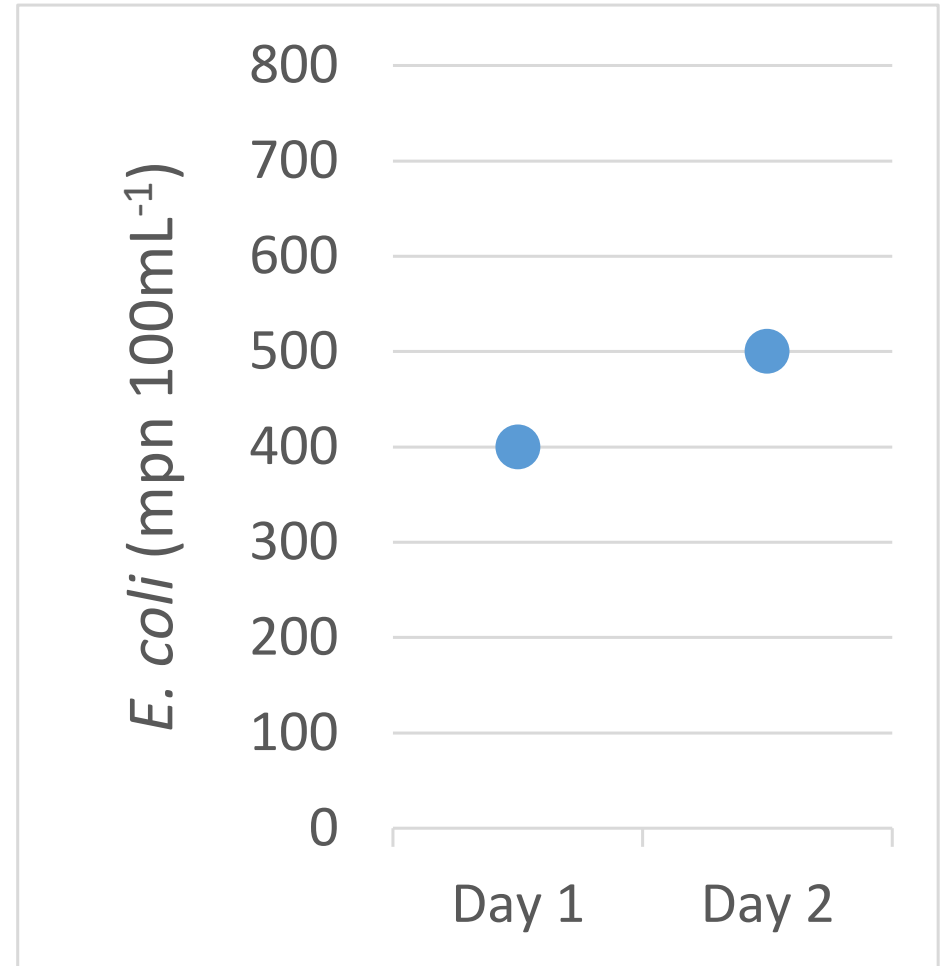
Development of real-time or near-real-time measurement technologies?

Decision support

Interpretation of grab samples

Decision support tools

Meeting standards

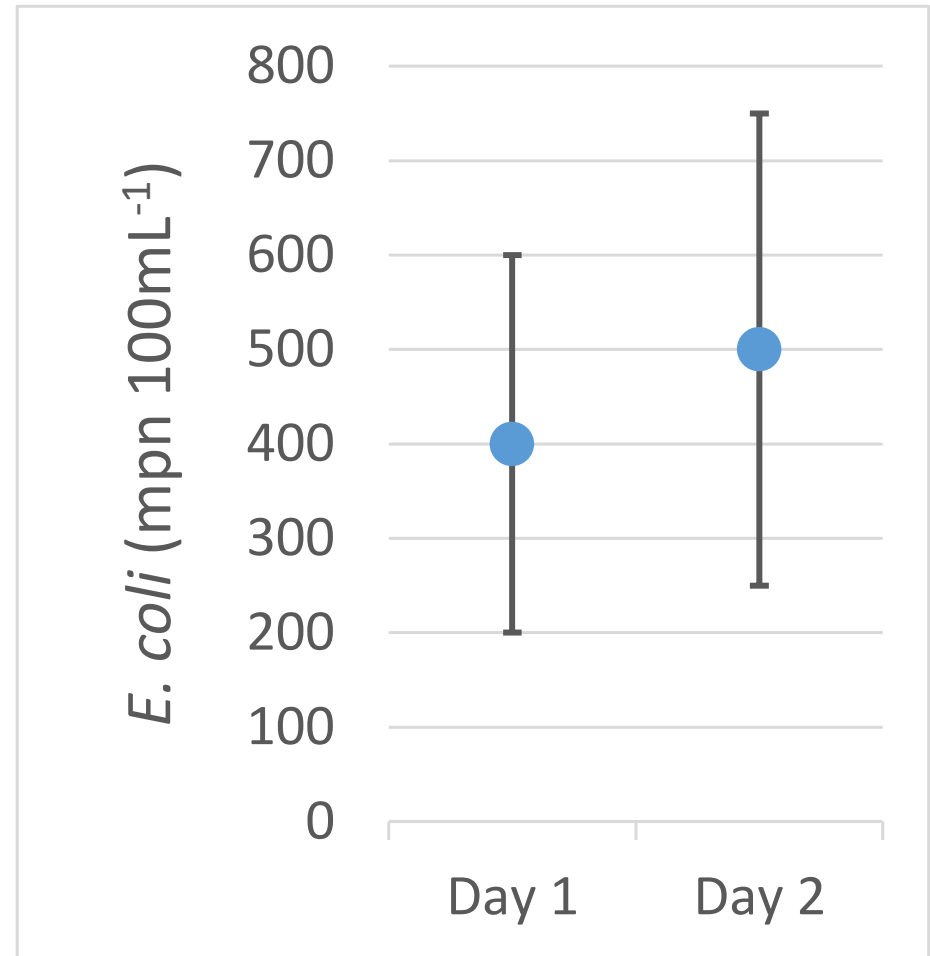


Decision support

Interpretation of grab samples

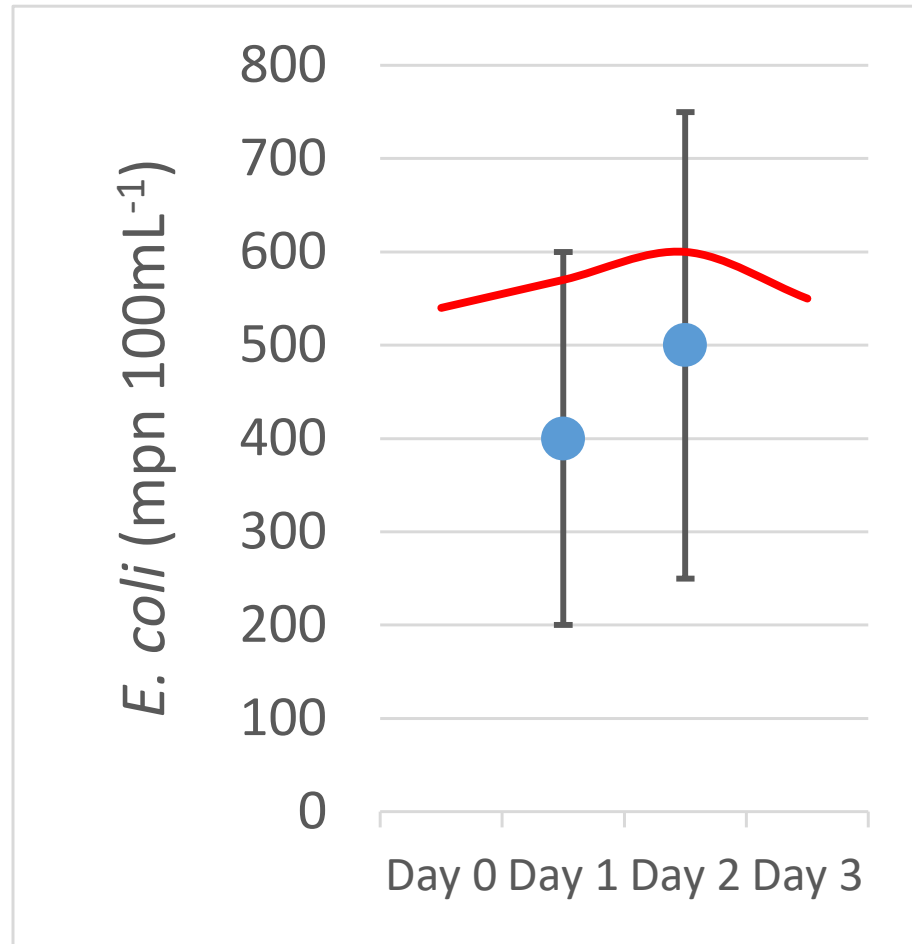
Decision support tools

Meeting standards



Model calibration

Model calibration
daily average concentrations
vs
grab samples



What we did and hypotheses

Winter and Summer

3 Rivers

small (1st order) to large (6th order)



What we did and hypotheses

Winter and Summer

3 Rivers

small (1st order) to large (6th order)

Lab replicates

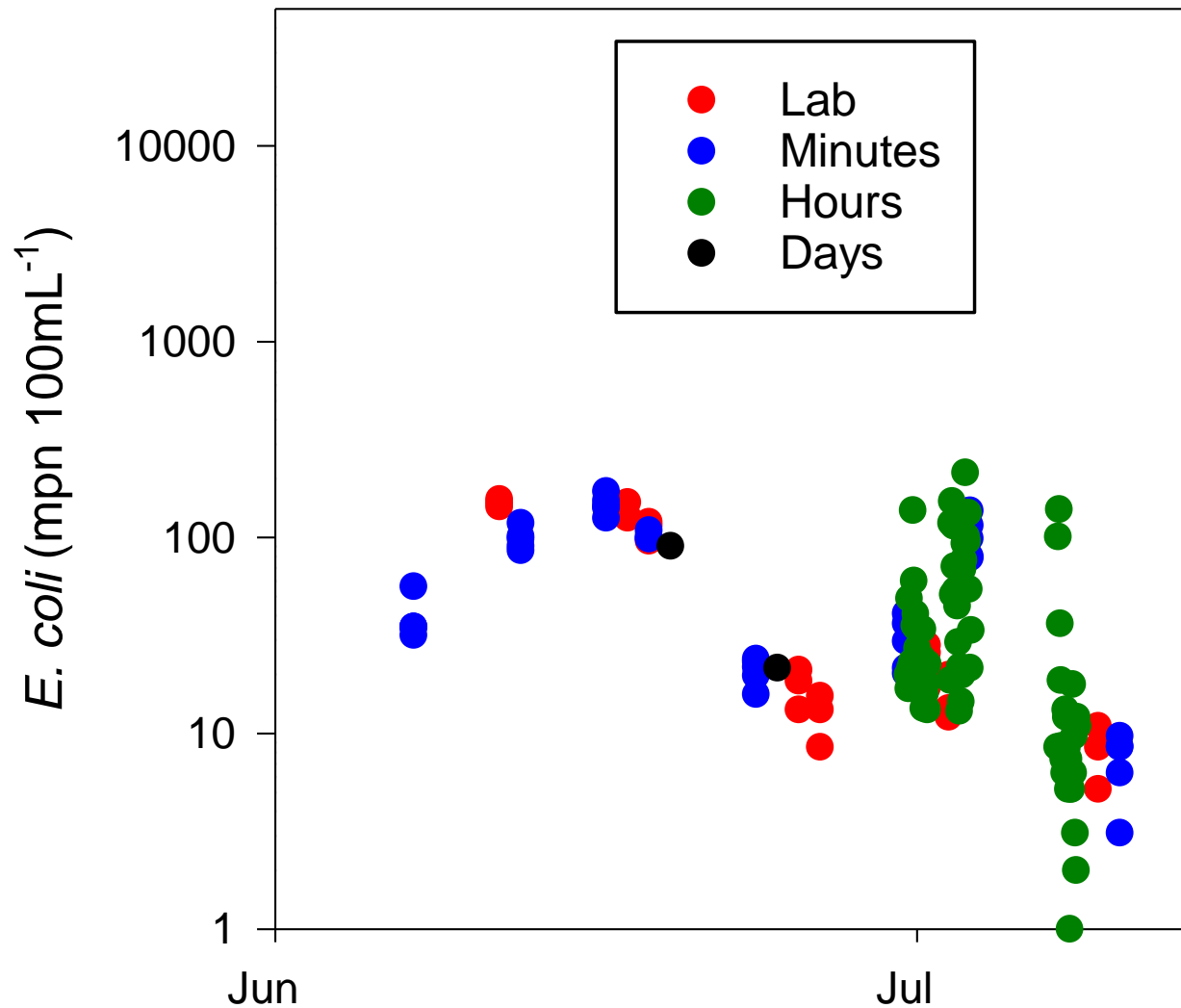
Colilert and Quanti-tray 2000 method

Temporal scales:

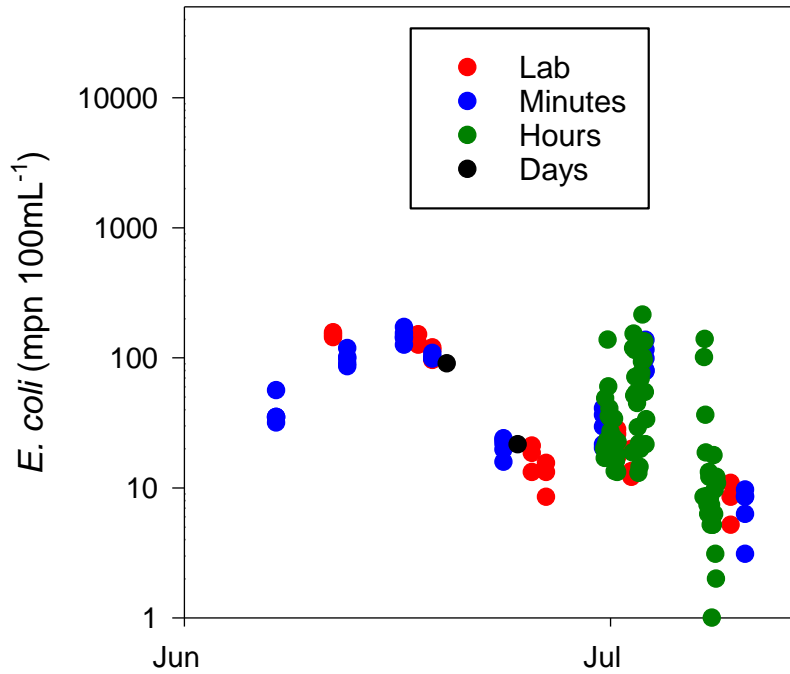
minutes, hours, days

Compared: $CoV = Stdev / Mean$

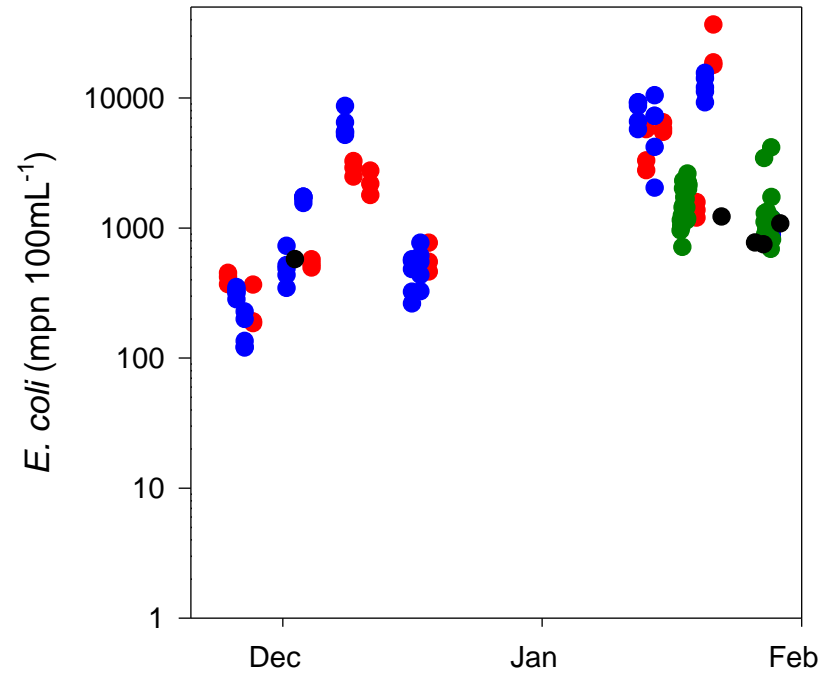
Small Trib – winter



Small Trib

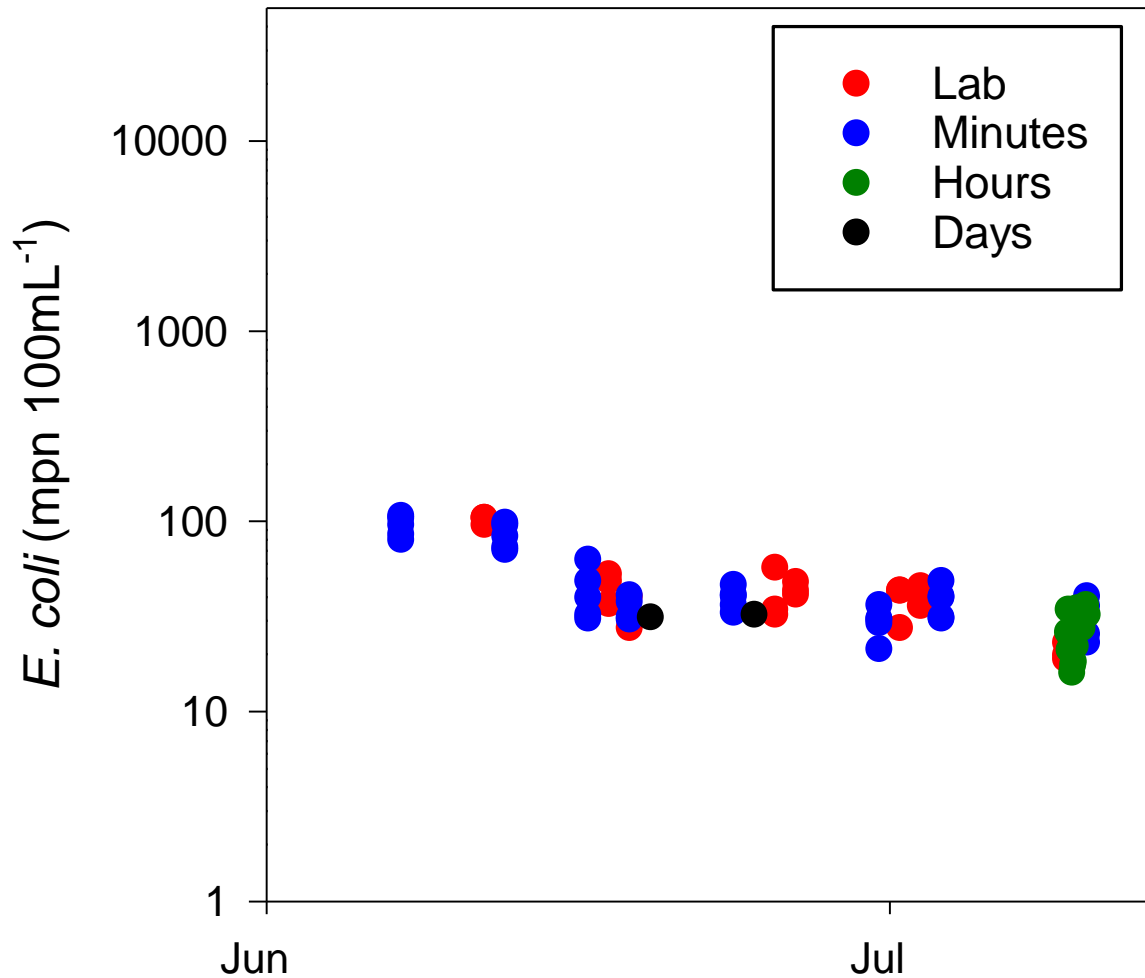


Winter

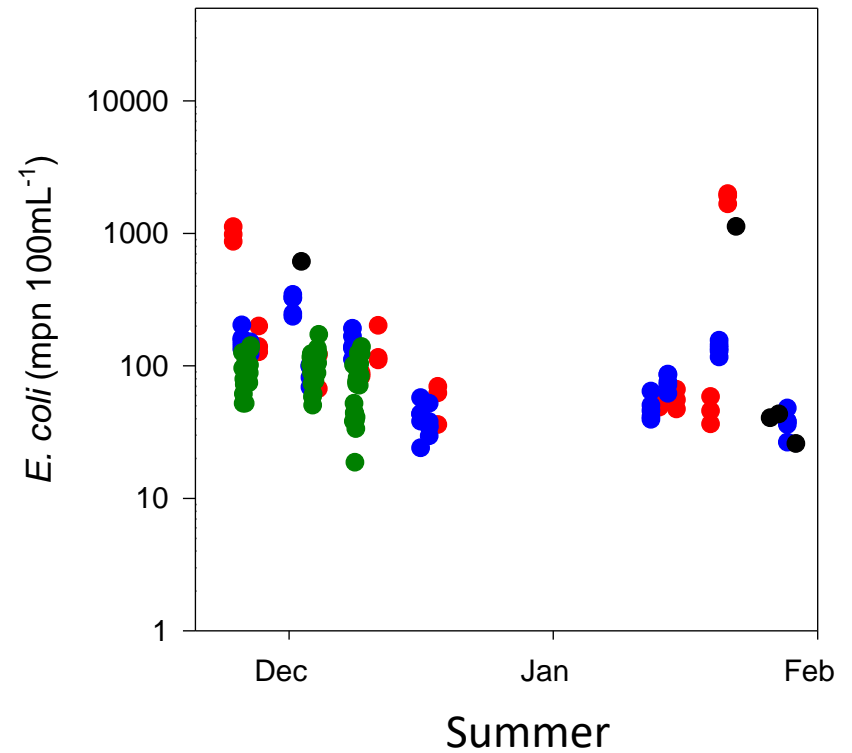
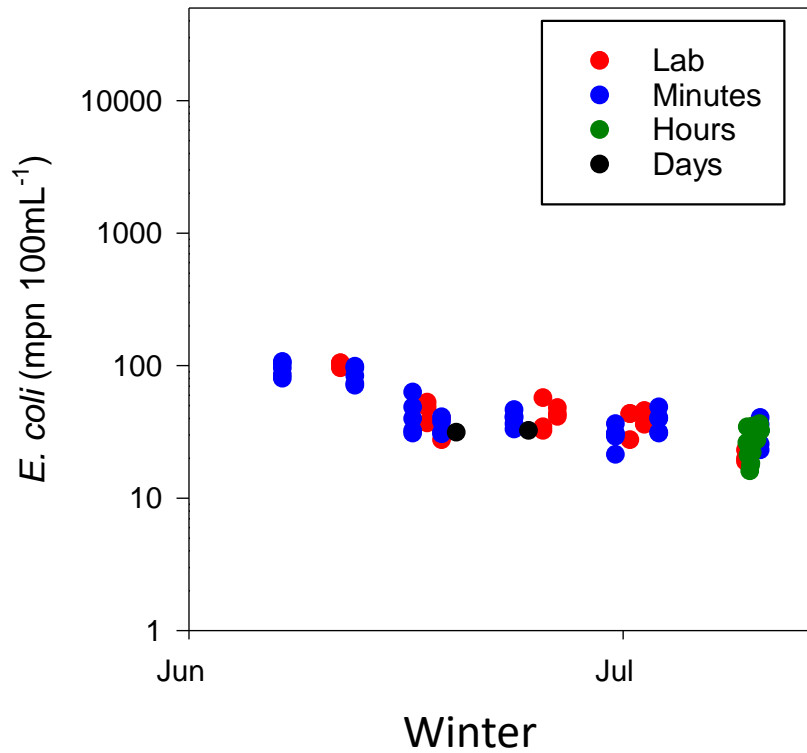


Summer

Large River – winter

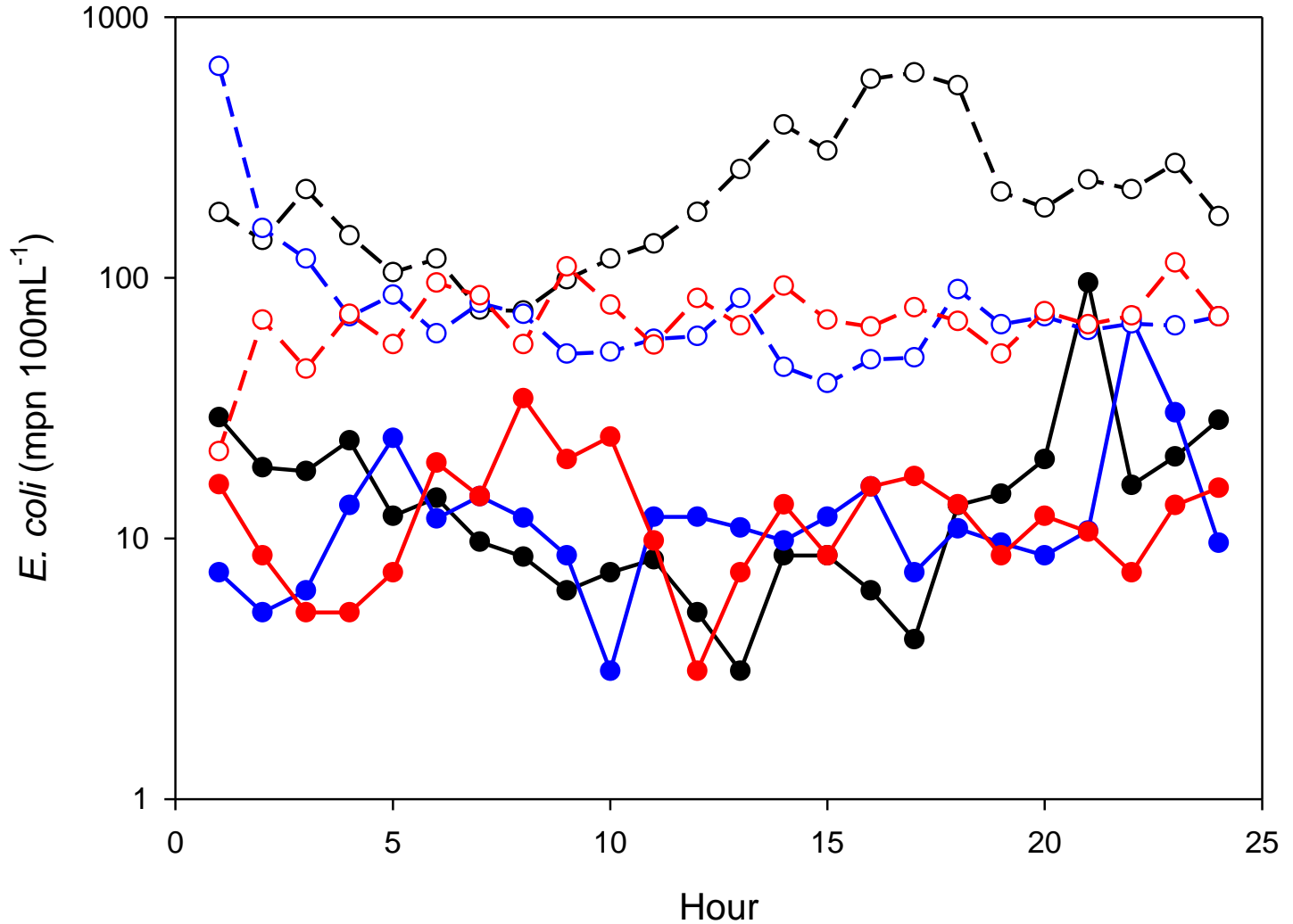


Large River

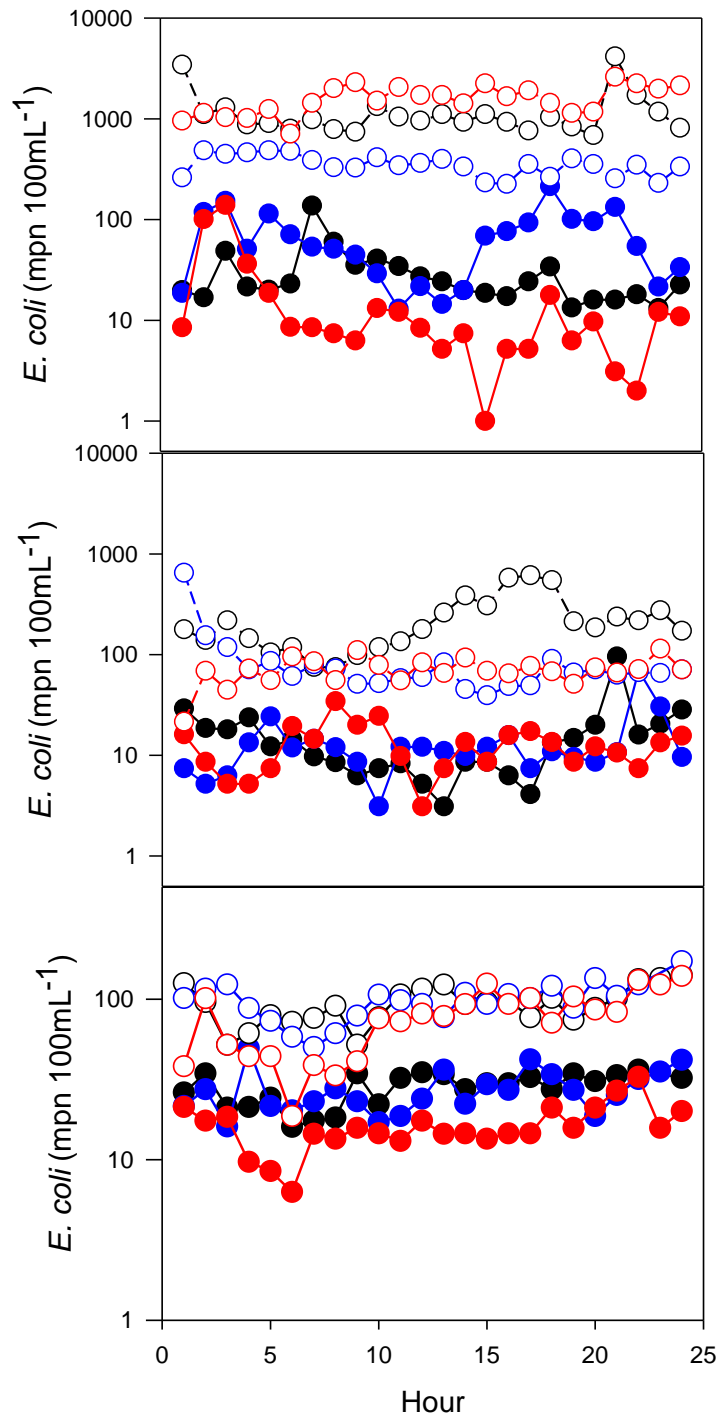


24 hours

Silver Stream



24 hours

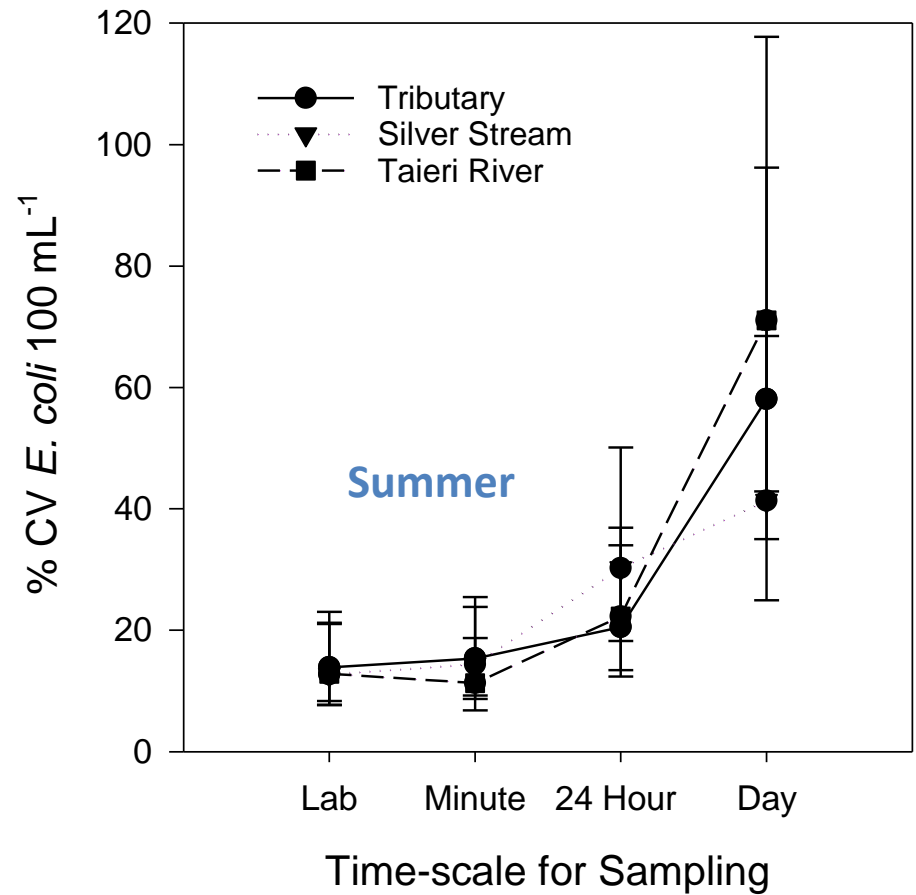
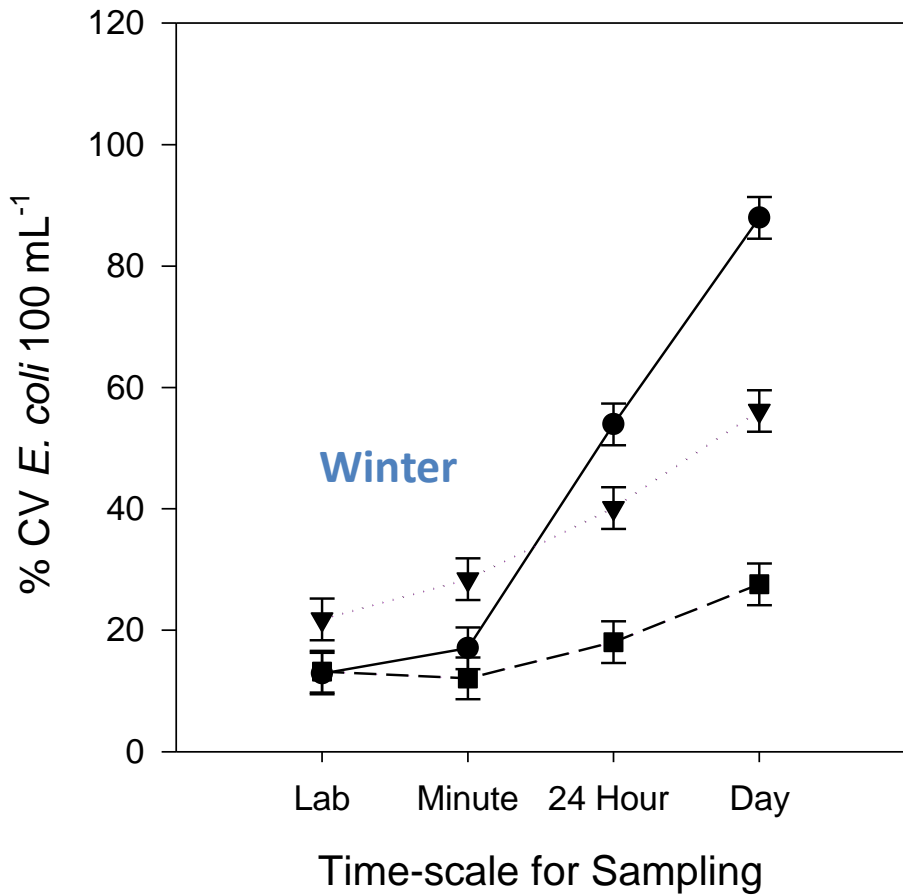


Small

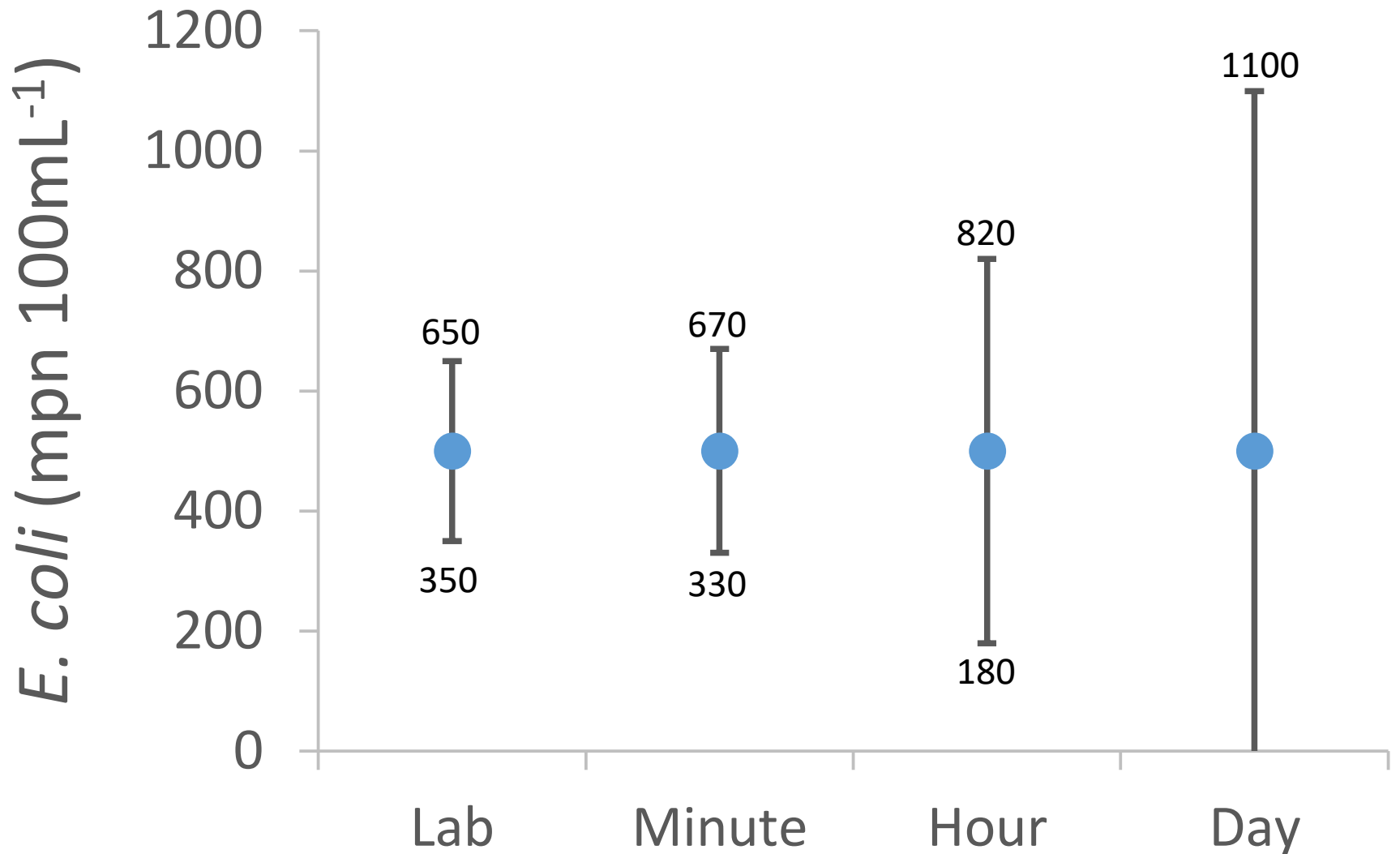
Silver
Stream

Large

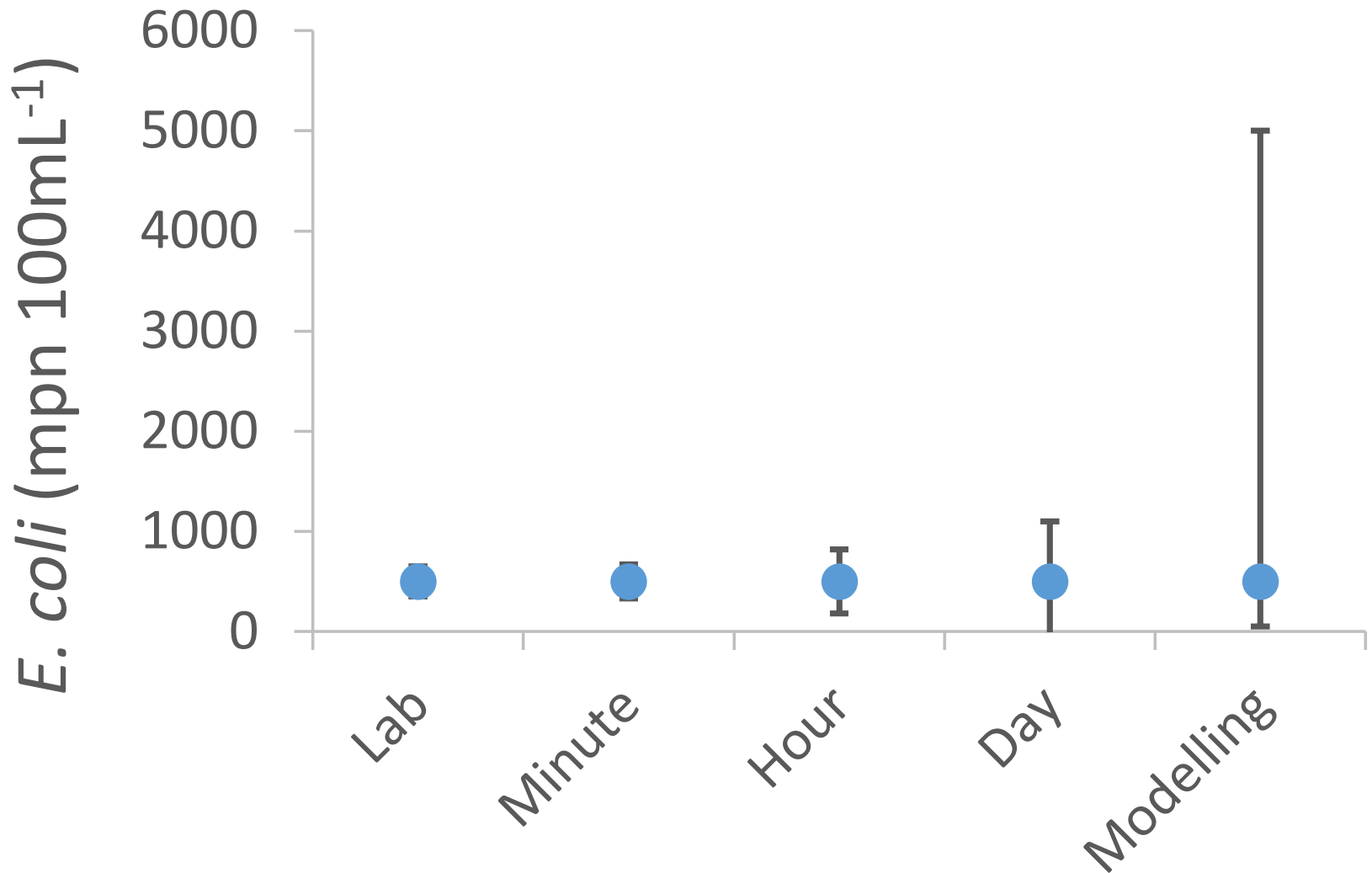
Coefficient of Variation



Implications: 95% confidence intervals



Implications for model calibrations



Conclusions

High natural variability under base-flow conditions

Variability increased with increasing time-scales

Some interactions with season and size of river

Variability is exaggerated in small streams

- effect of different sites
- implications for interpretation of grab samples

Challenges for model calibration

Final thoughts

Variability of pathogens will be even greater

Microbial WQ guidelines are based on data from large rivers

What are the Implications for applying these numbers to small streams?

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