

MOT4Rivers:

Monitoring, modelling and mitigating pollution impacts in a changing world: science and tools for tomorrow's rivers

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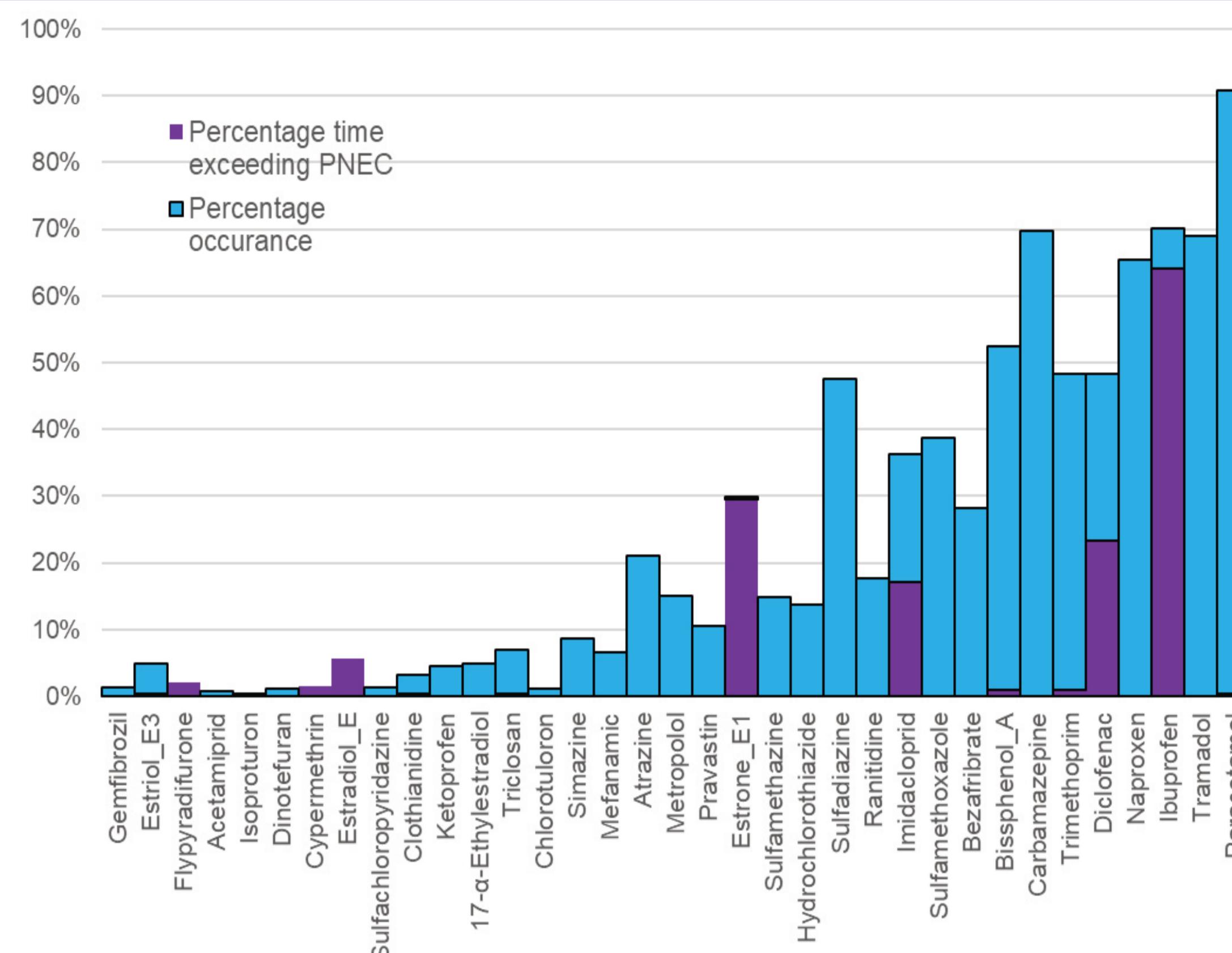
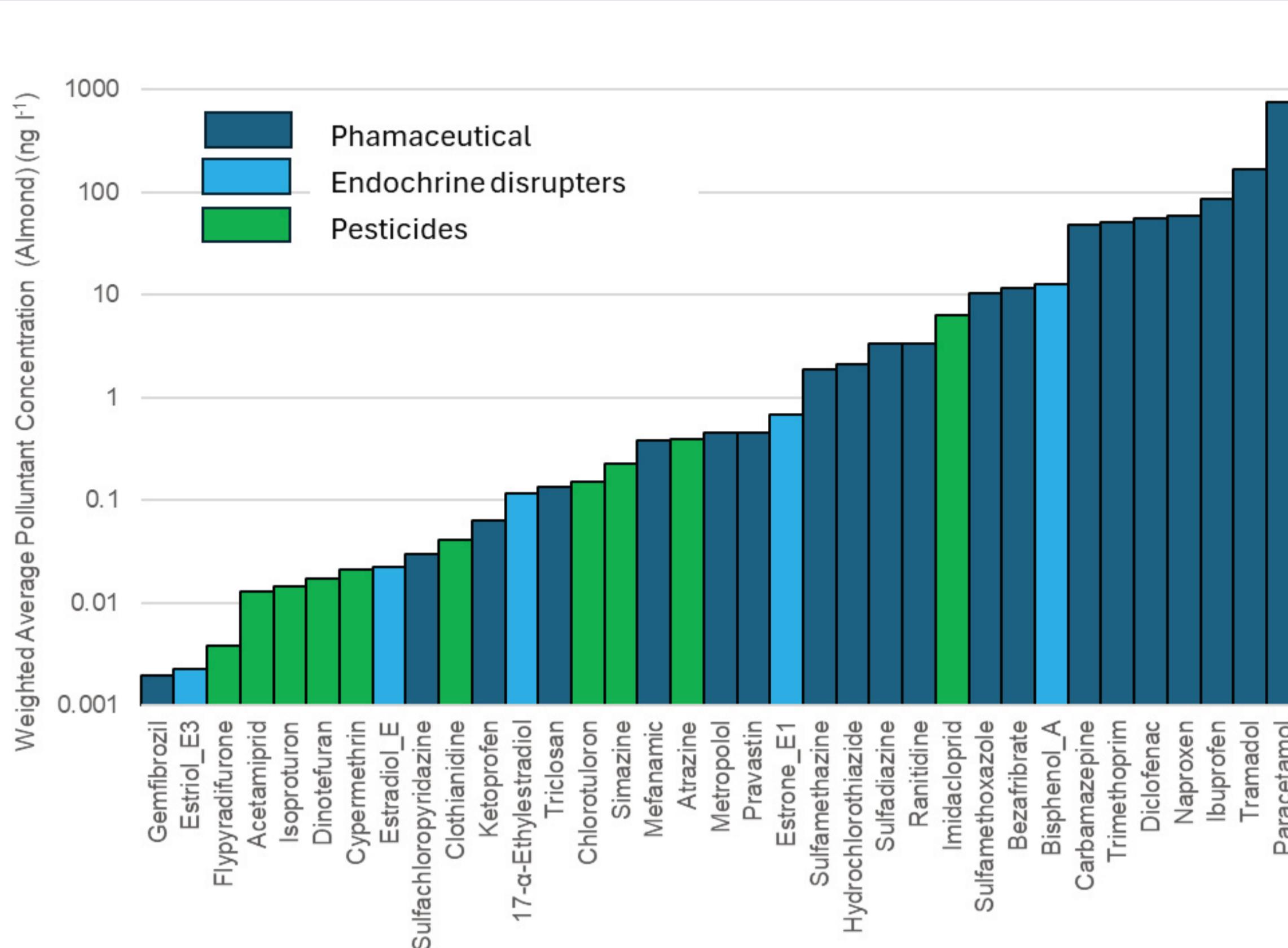
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Background:

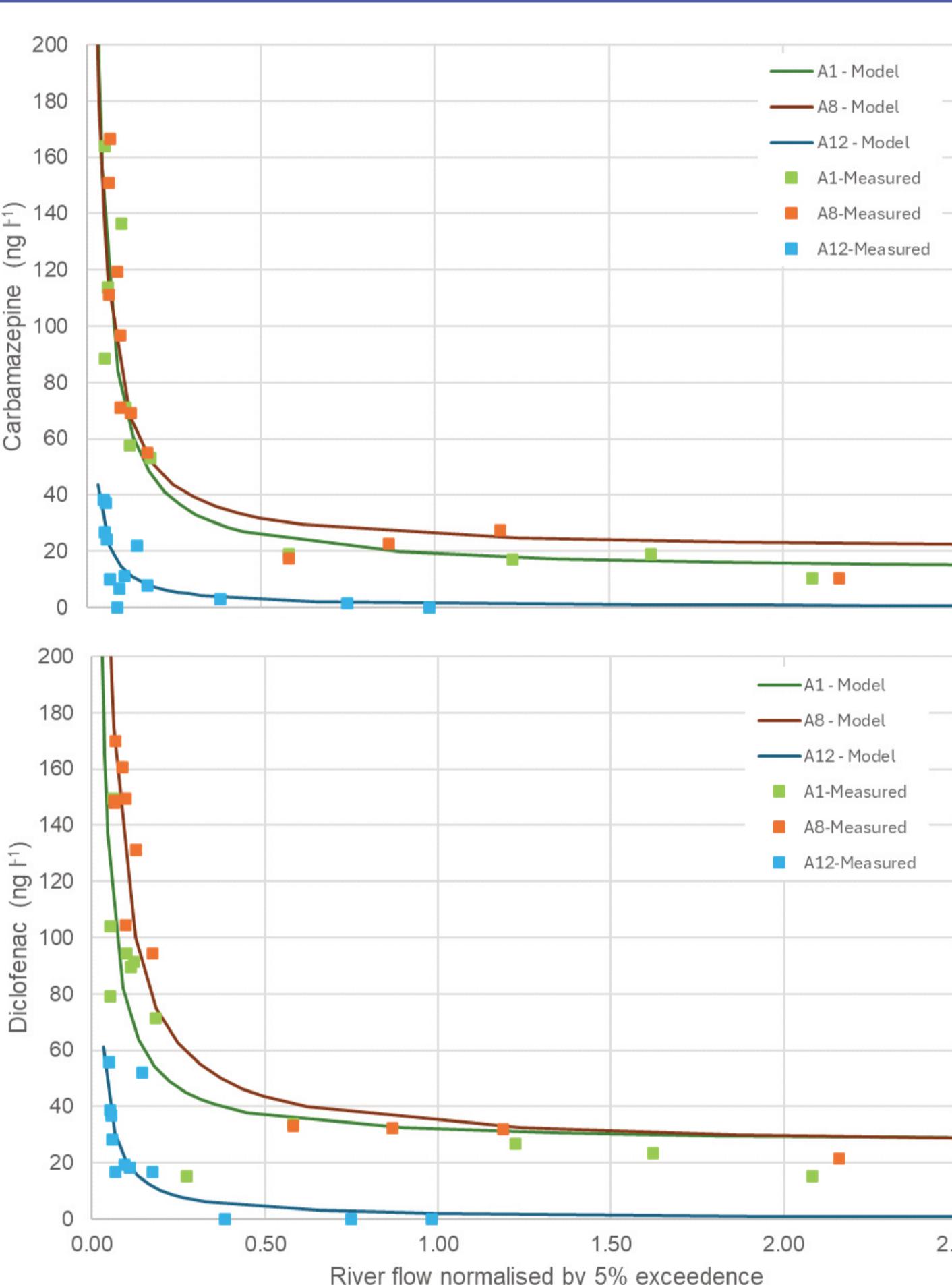
- While significant reductions in some regulated pollutants (industrial chemicals, nitrogen and phosphorus) have been achieved, we are still witnessing declining river water quality and the resulting loss of freshwater species
- Emerging contaminants (pharmaceuticals, pesticides, illicit drugs, microplastics) challenge our freshwater species with combinations of pollutant cocktails
- Additionally, climate-change driven shifts in water quantity (larger floods, more run-off, longer droughts and warming waters) stress freshwater ecology

Emerging Contaminant Concentrations

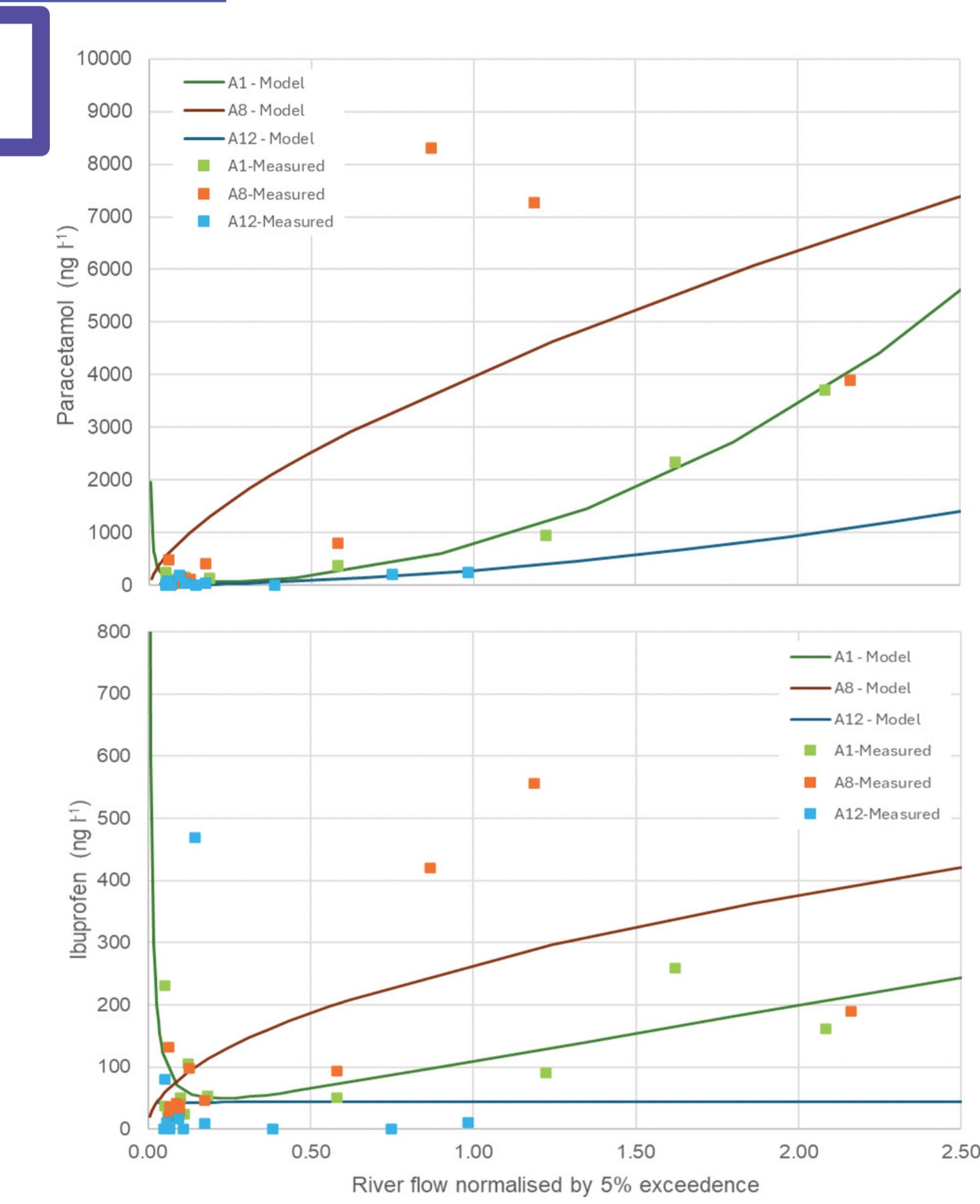
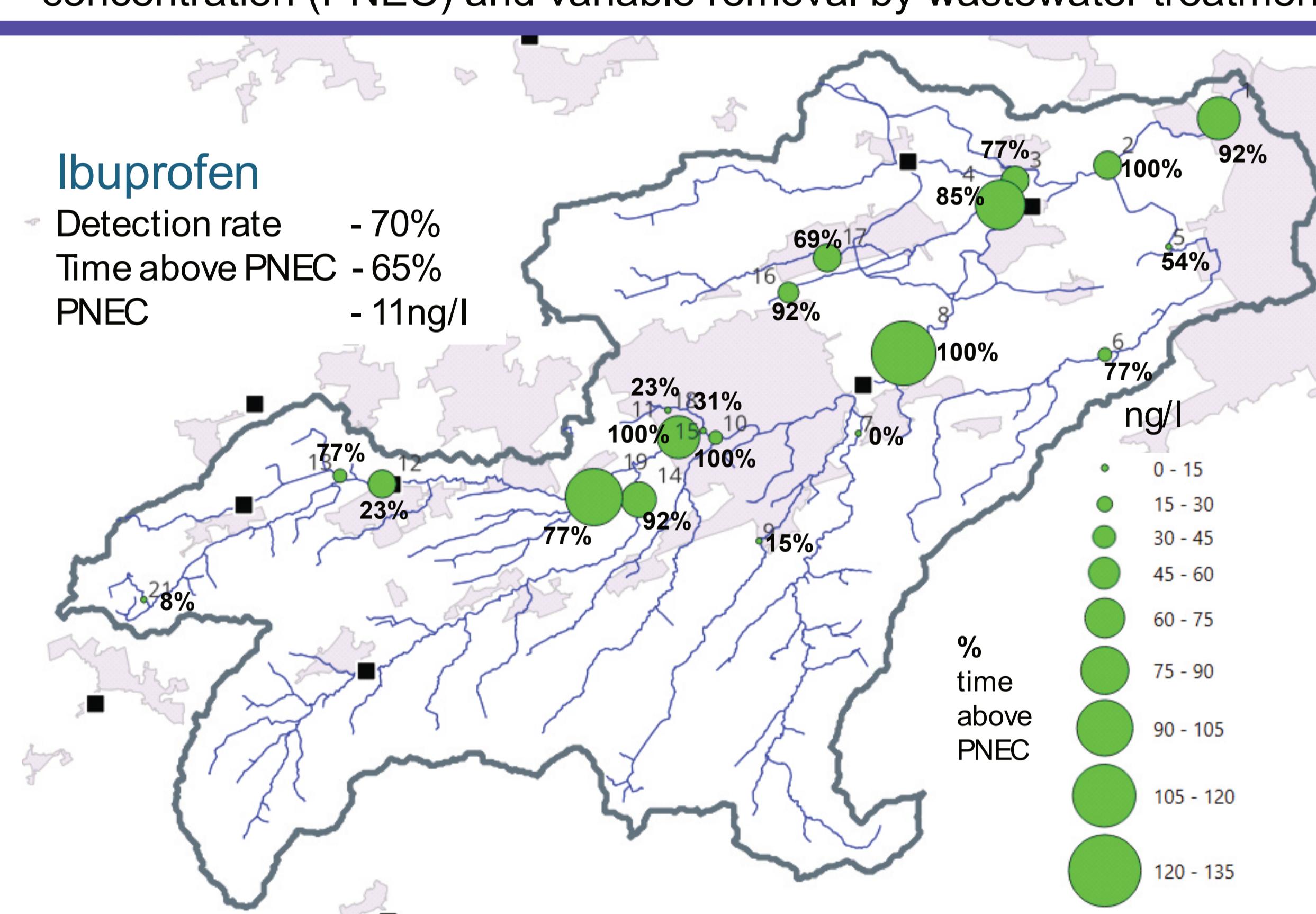


- Pharmaceuticals have the highest concentrations of emerging contaminants.
- The impact of emerging contaminants depends on their Predicted No Effect Concentration (PNEC). If they exceed this they will negatively impact the environment.
- Ibuprofen may have the biggest impact. It exceeds its PNEC 65% of the time.
- Diclofenac and Imidacloprid are also a concern

Pharmaceuticals: Sources and behaviour



Ibuprofen is the biggest challenge due to its high usage, low impact concentration (PNEC) and variable removal by wastewater treatment.

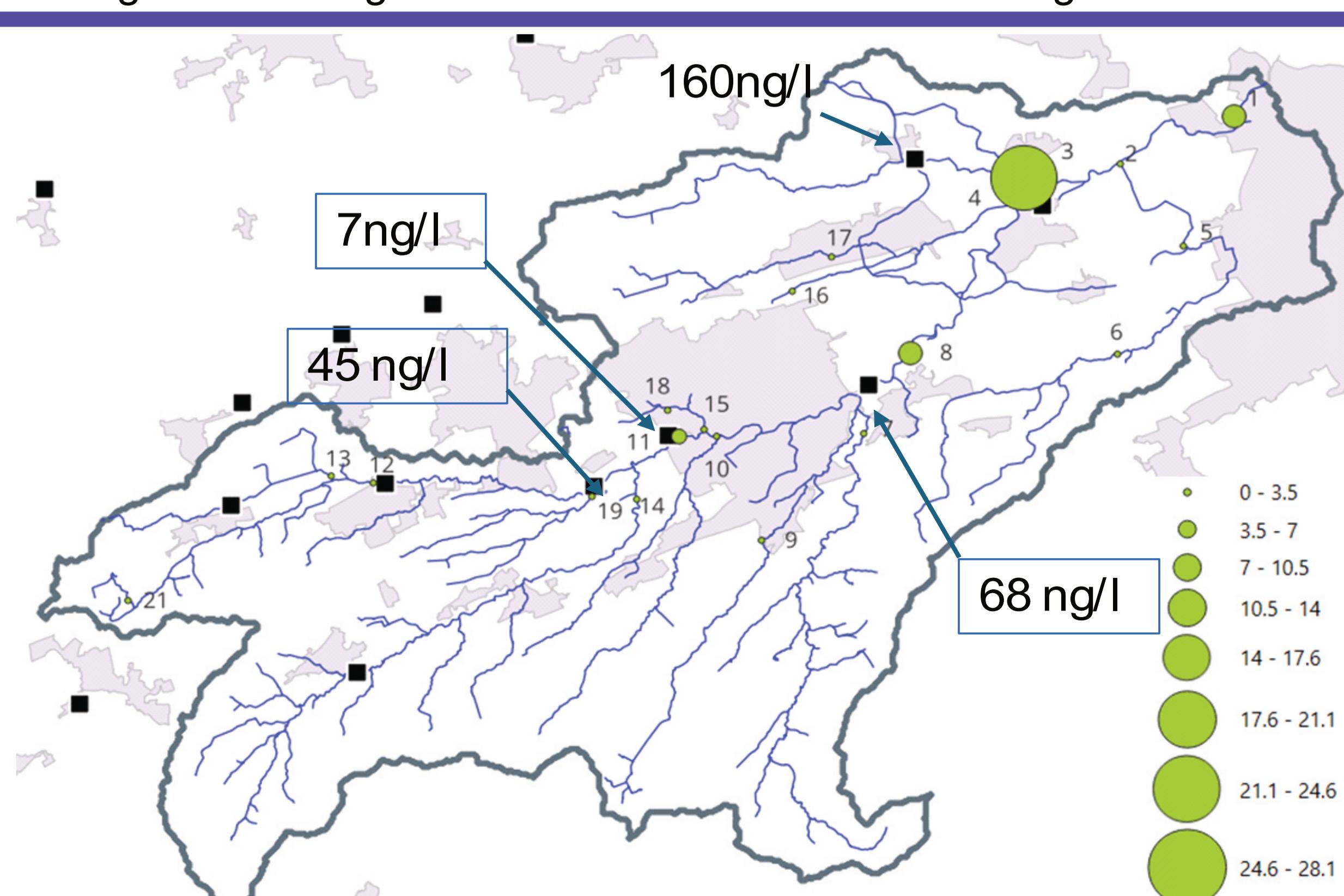


Non-biodegradable pharmaceuticals are not removed by wastewater treatment. Dilution by river flow is the main remediation causing a problem in droughts

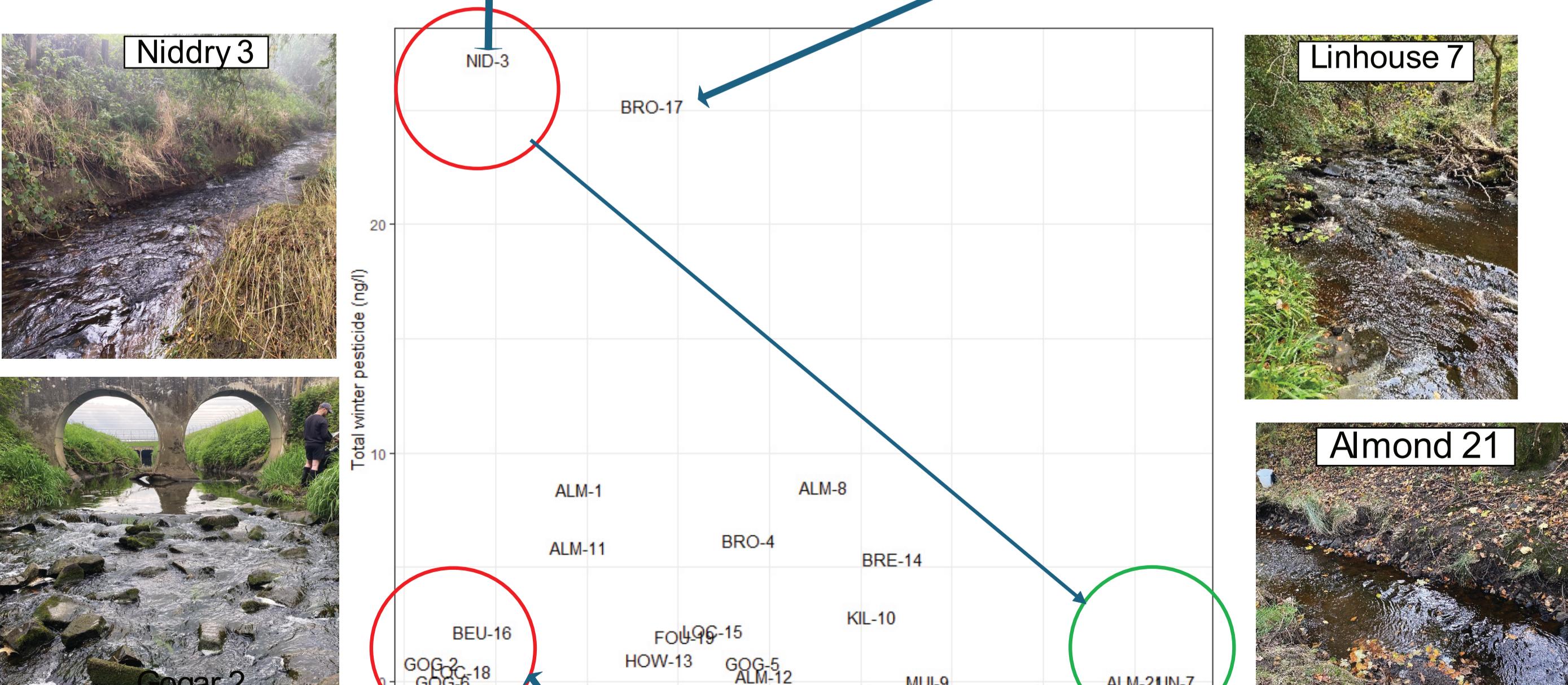
Biodegradable pharmaceuticals are effectively removed by wastewater treatment, but enter rivers during high rainfall when treatment is overwhelmed

Pesticides: Pet parasite treatments

Pesticide Imidacloprid (banned for use in agriculture in 2018) is used as a pet parasite. One monthly flea treatment can kill 25 million bees. It is entering rivers via wastewater treatment from washing of pets, pet's bedding and clothing and owners hands. It is not biodegradable.



Niddry burn is being damaged by pet parasite treatments,



Brox burn experiences higher levels of agricultural pesticides

The Beugh, Gogar and Lochshot burns are impacted by Bisphenol-A from industrial areas and pharmaceuticals from septic tanks / cross connections