March 6, 2025

Toxicity and chemical analysis of treated PW

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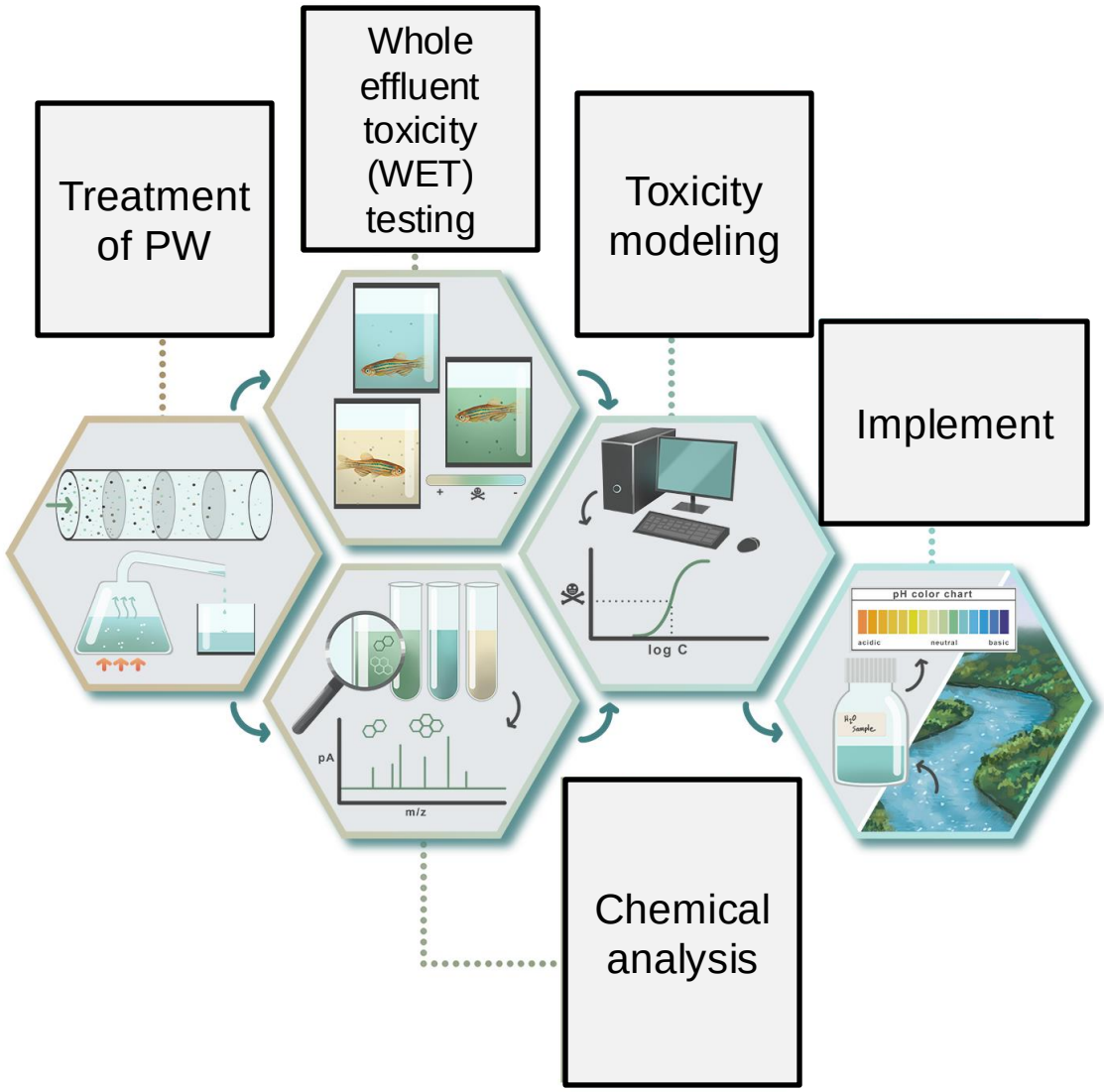
Integrated analysis of treated PW: chemistry and toxicity

Objective:
develop a methodology to identify relevant *constituents* and *toxicity tests* to support beneficial reuse of treated PW

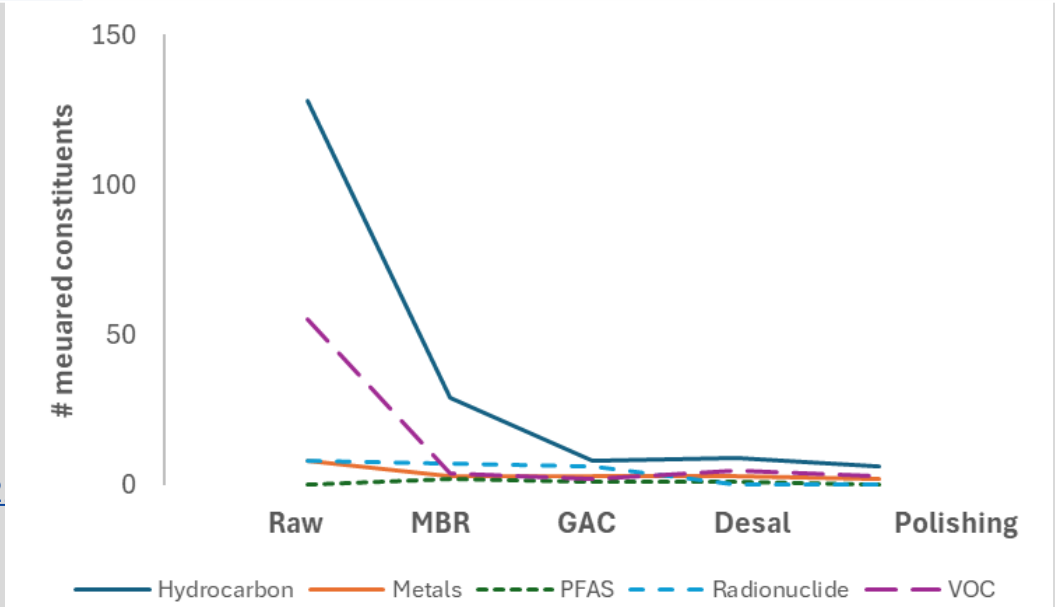


Redman et al *submitted* 2024
Van Houghton et al 2024
https://pubs.acs.org/doi/abs/10.1021/acsestwater.3c00407

Summary of chemistry results

- Potential to streamline testing programs (400+ analytes)
  - Not detected in polished water: Acids, Alcohols, Dioxin, PCB, Pesticides
  - Subsets of chemistry could be used as surrogates (e.g., TPH, BTEX, …)

Number of analytes above the reporting limits					
Category	Raw	Membrane bioreactor (MBR)	Granular activated carbon (GAC)	Desalination	Polishing to remove ammonia
Hydrocarbon	128	29	8	9	6
Metals	8	3	3	3	2
PFAS	0	2	1	1	1
Radionuclide	8	7	6	0	0
VOC	55	4	2	5	3



Redman et al *submitted* 2024
Van Houghton et al 2024
https://pubs.acs.org/doi/abs/10.102
/acsestwater.3c00407

Toxicity analysis

- Toxic units (TU) used to analyze mixture toxicity

$$\mathrm{TU} = \sum \frac{C_W}{\mathrm{Tox.\ Limit}}$$

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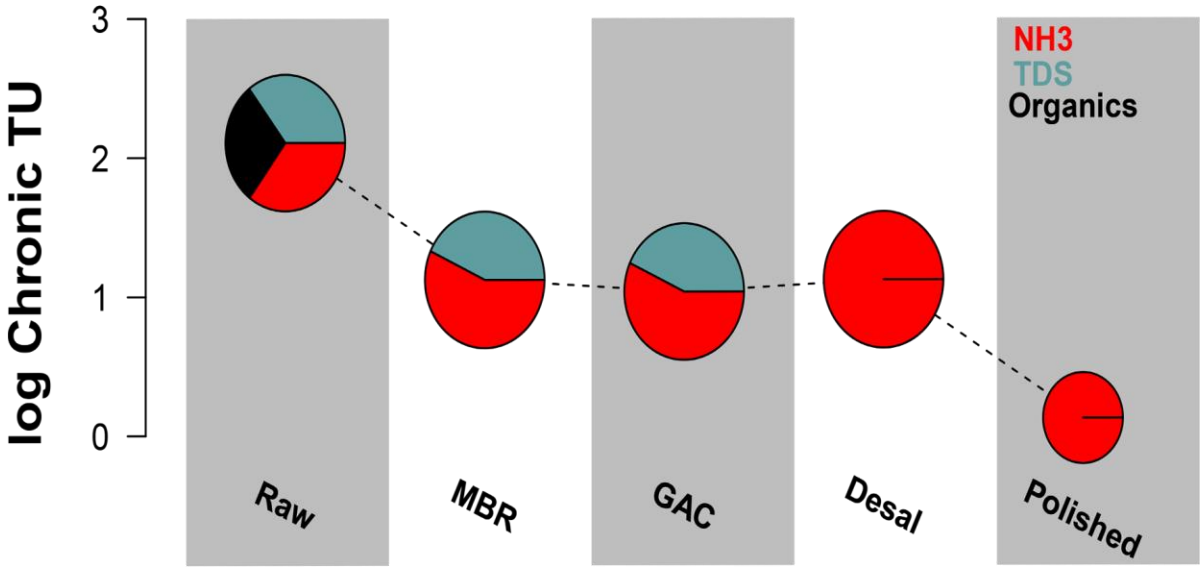

- TU decline >90% through treatment
- Ammonia is a likely stressor in this system

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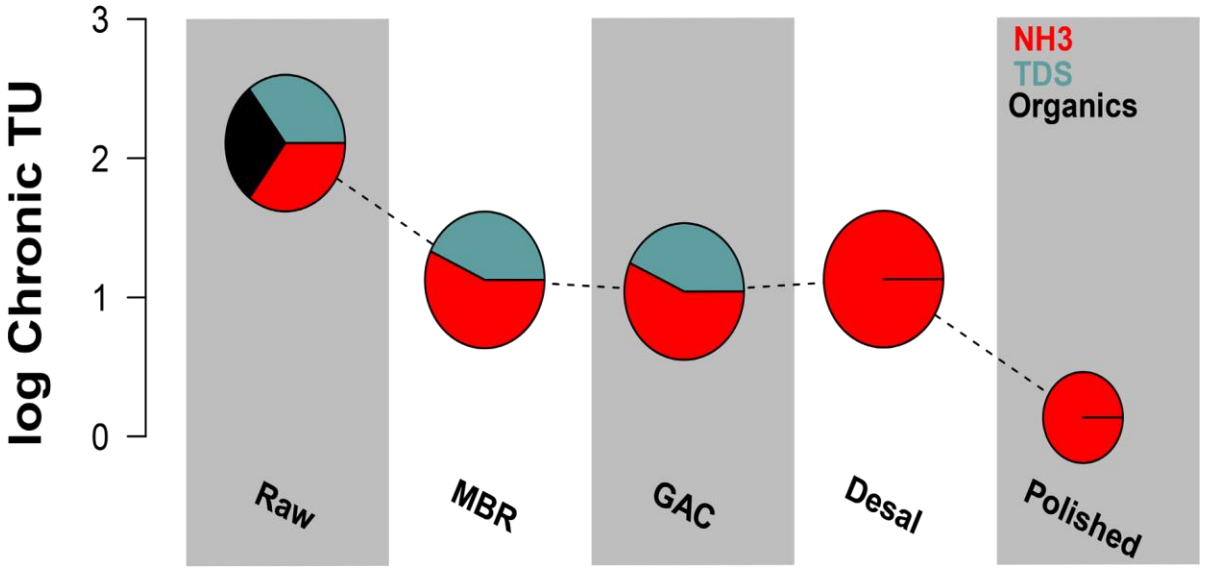

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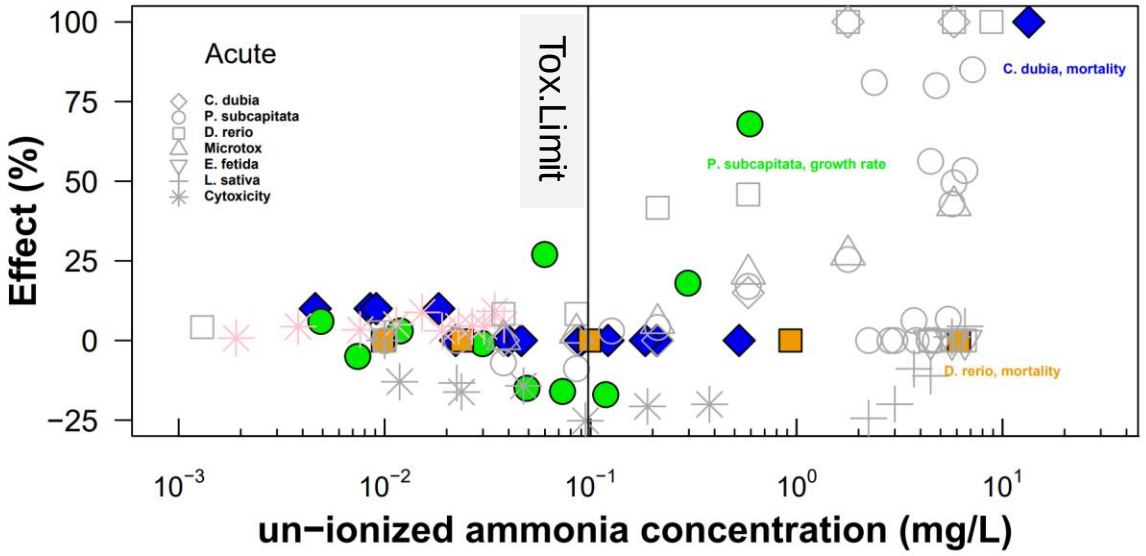

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Questions?
Thank you

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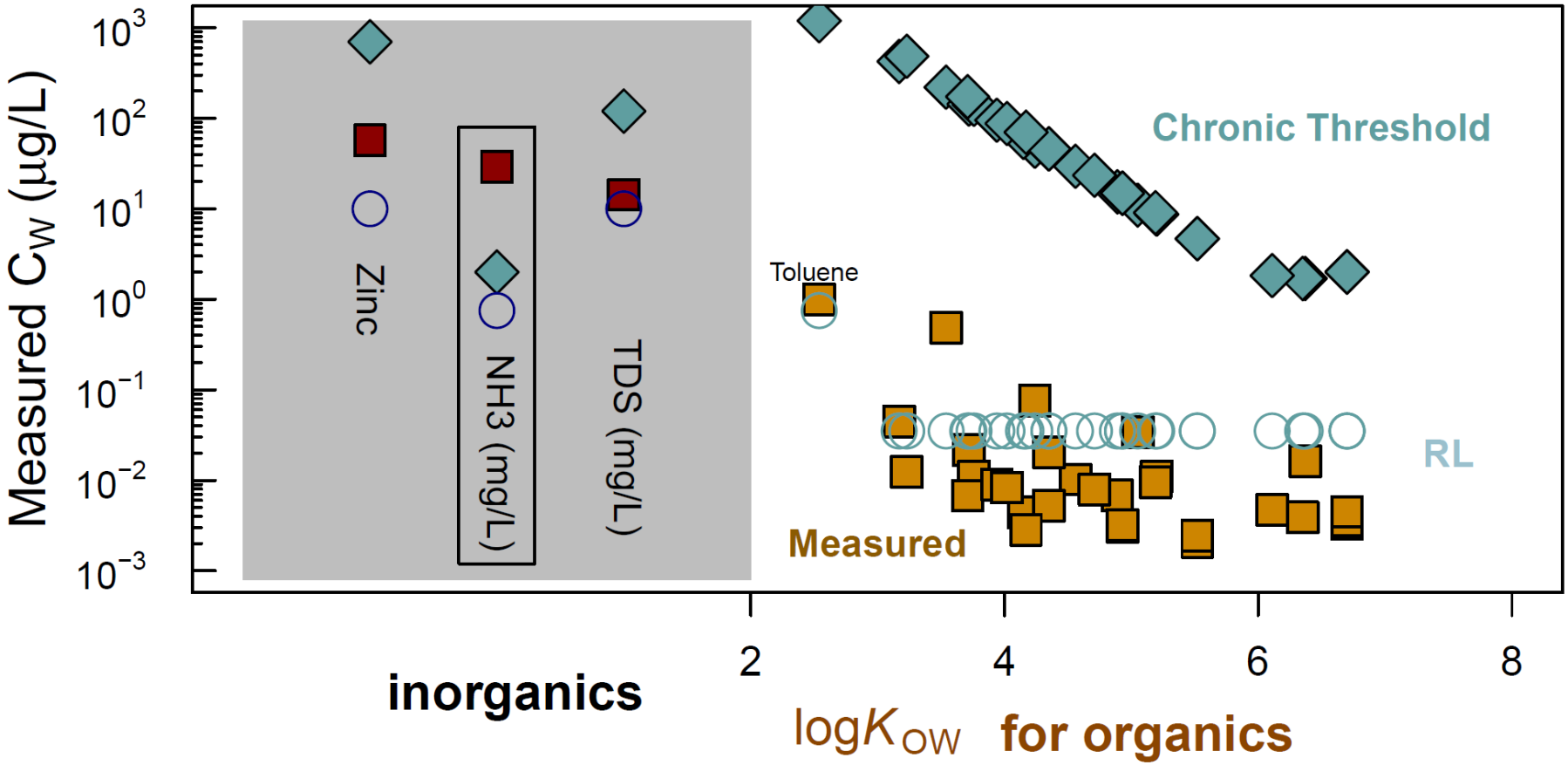
Outline

- Data analysis workflow
- Chemical characterization
- Toxicity characterization

Toxicity analysis



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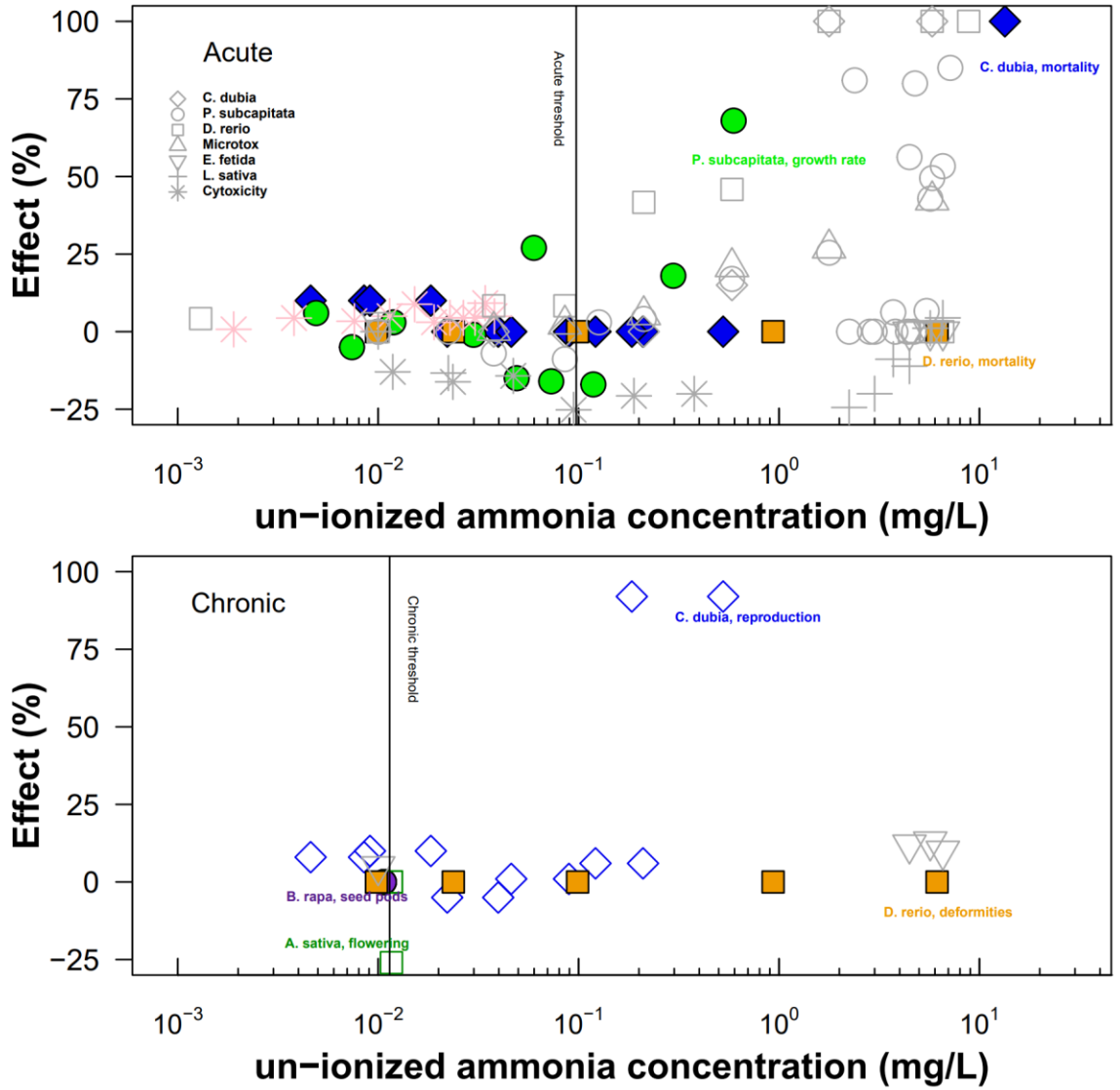
Toxicity results

- WET test data appear consistent with ammonia toxicity in this system



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