

POLLUTION + CLIMATE CHANGE

THE EFFECTS OF AN HERBICIDE ON AQUATIC COMMUNITIES UNDER CLIMATE CHANGE WARMING SCENARIOS

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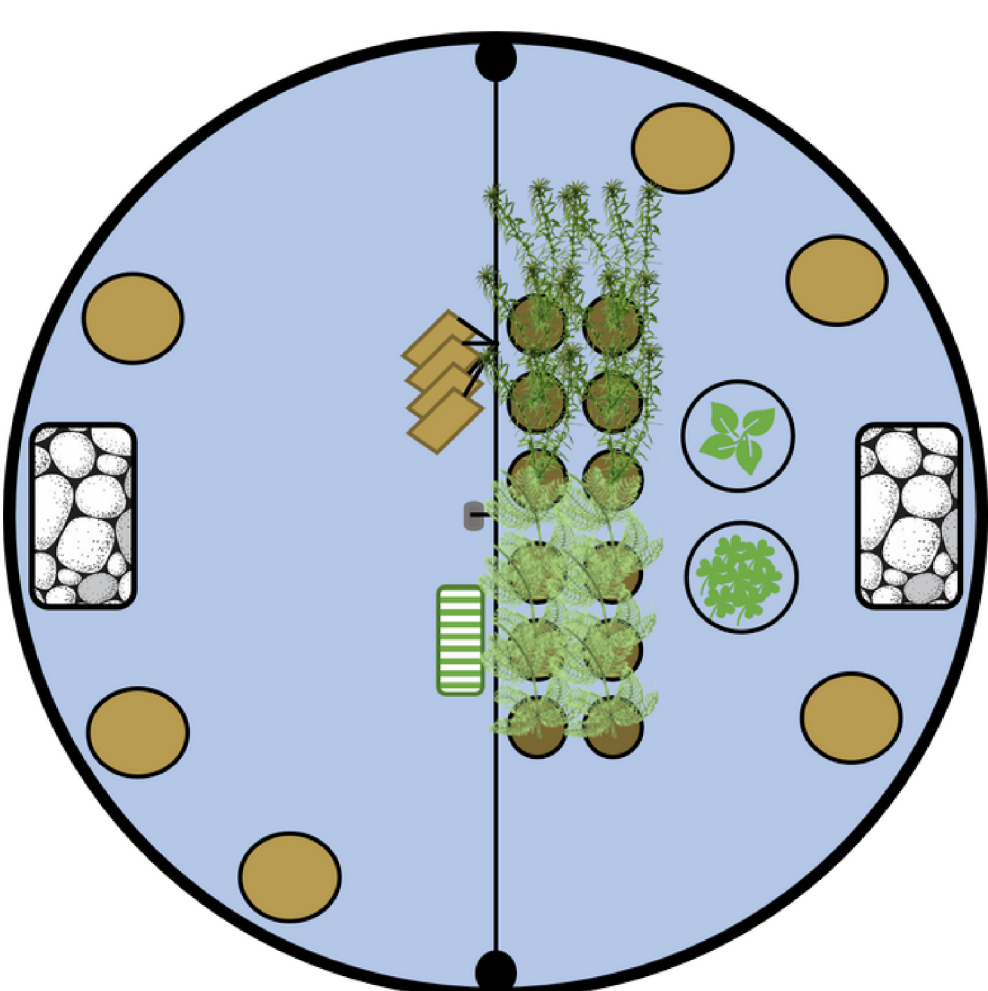


To assess the single and combined effects of the herbicide Terbutylazine (TBA) and Climate Change warming on freshwater communities using a realistic set-up

Background

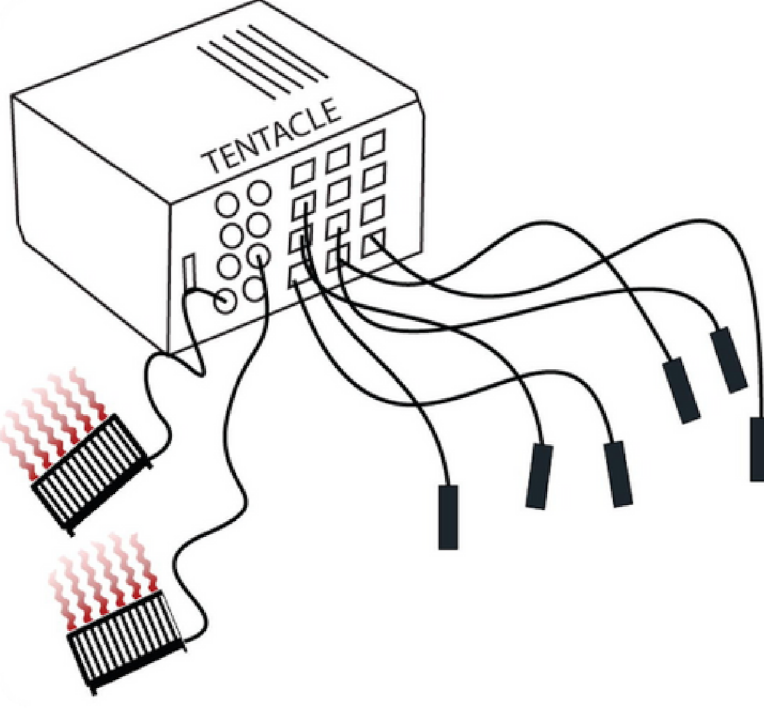
- Standard tests overlook environmental stressors interactions with chemicals.
- Studies often use fixed high temperatures.
- Lake Heatwaves are projected to intensify.
- Limited research on herbicide toxicity under Climate Change warming scenarios.
- Terbutylazine is a widely-used photosynthesis inhibiting herbicide.

Set-up



30 Mesocosms

3 Temp. scenarios (Amb, Elev, HW)
3 TBA conc. (0, C1=10, C2=100 µg/L)
= 9 treatments



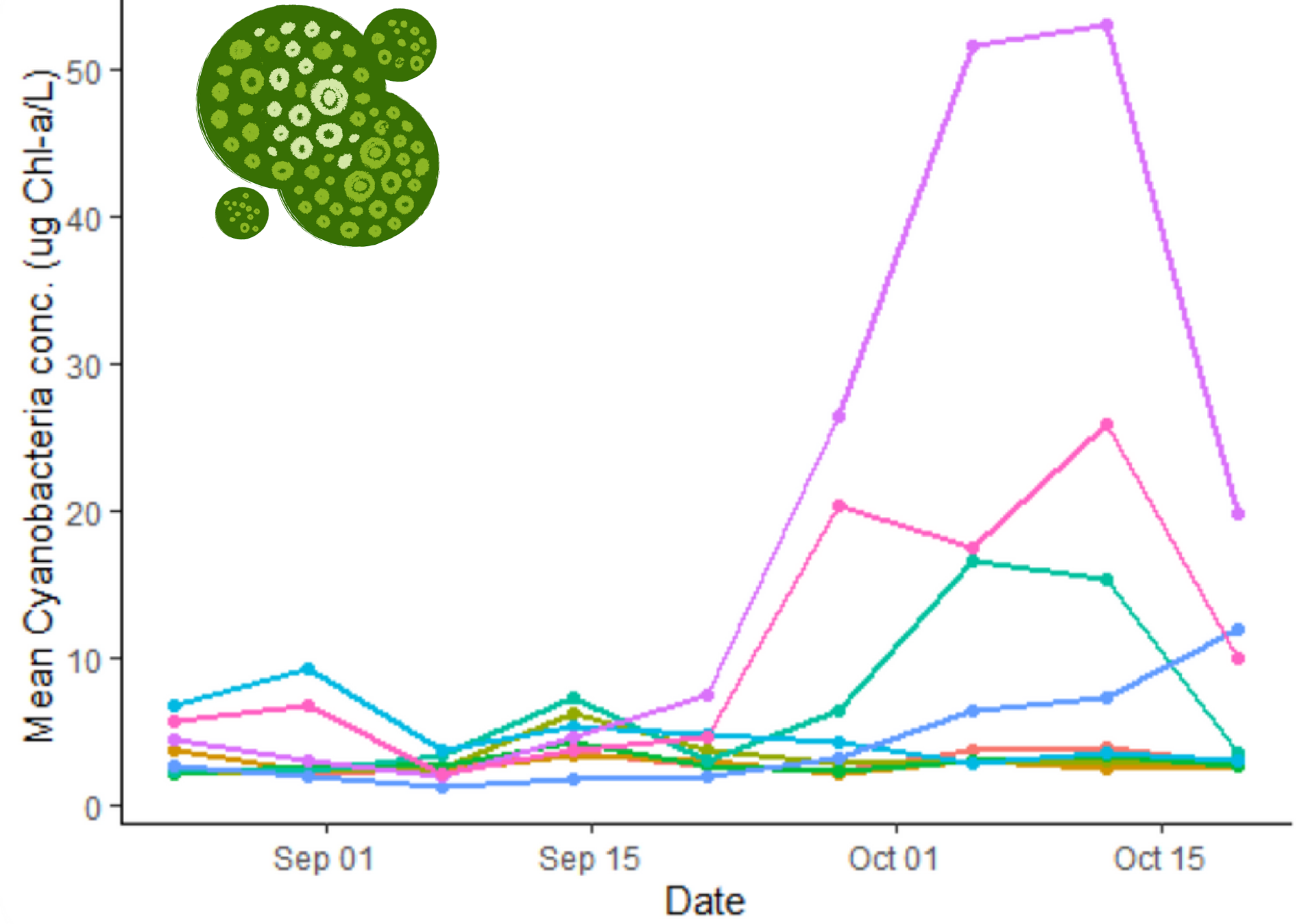
Hermann et al. (2022)

Results

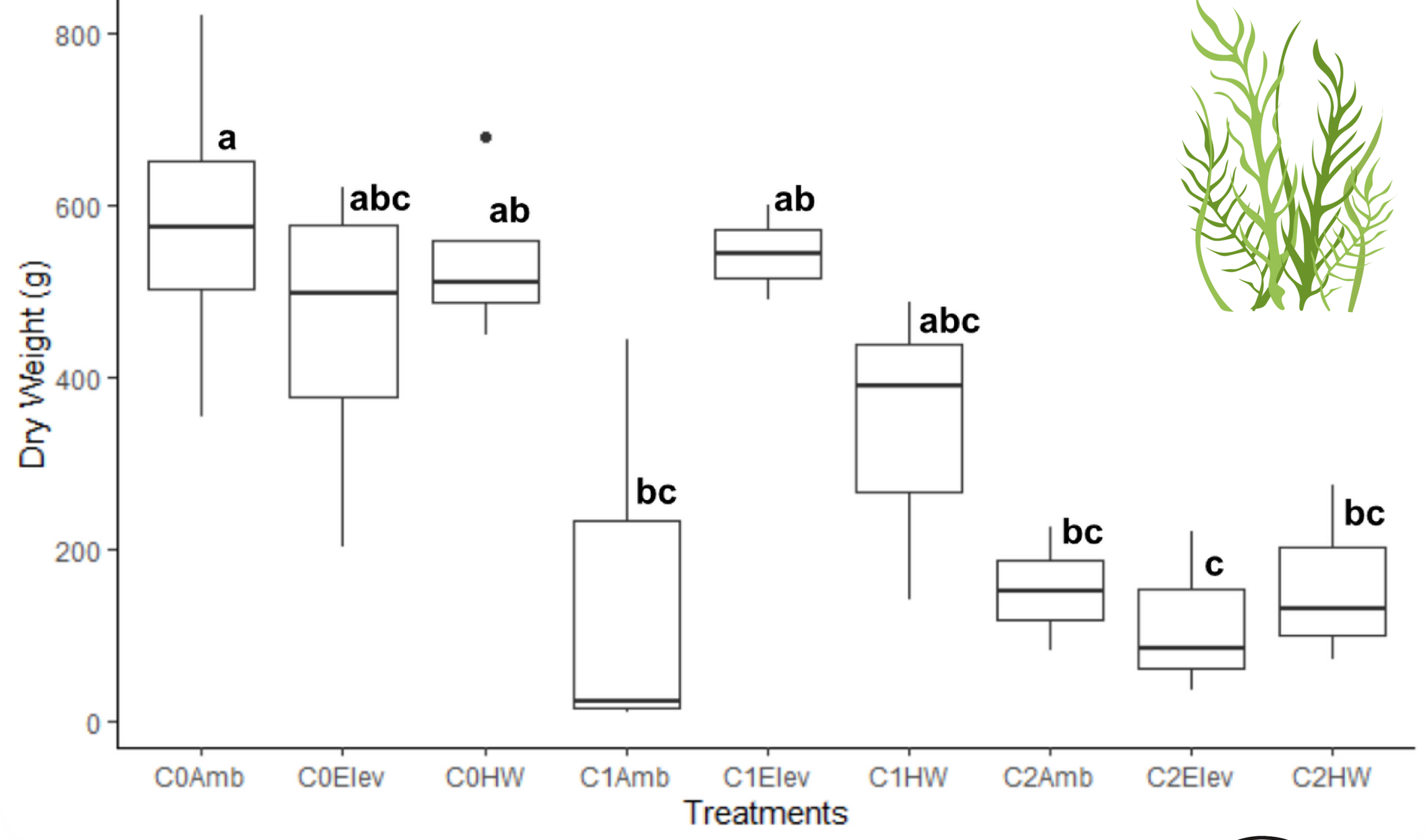


- Combined effects of Elevated Temp. + High TBA conc. (C2) benefitted Cyanobacteria growth.
- Antagonistic effects on macrophytes of warming (Elev, HW) + Low TBA conc. (C1)
 - Same trend in bio-assays.
- High TBA Conc. (C2) completely inhibited macrophyte's photosynthesis and growth, causing a severe decrease of DO levels.
- Indirect effects on the Macroinvertebrates community also due to Temp. + Chemical interaction.
- Future analysis of Phyto- and Zoo-plankton communities will be carried out.

Phytoplankton



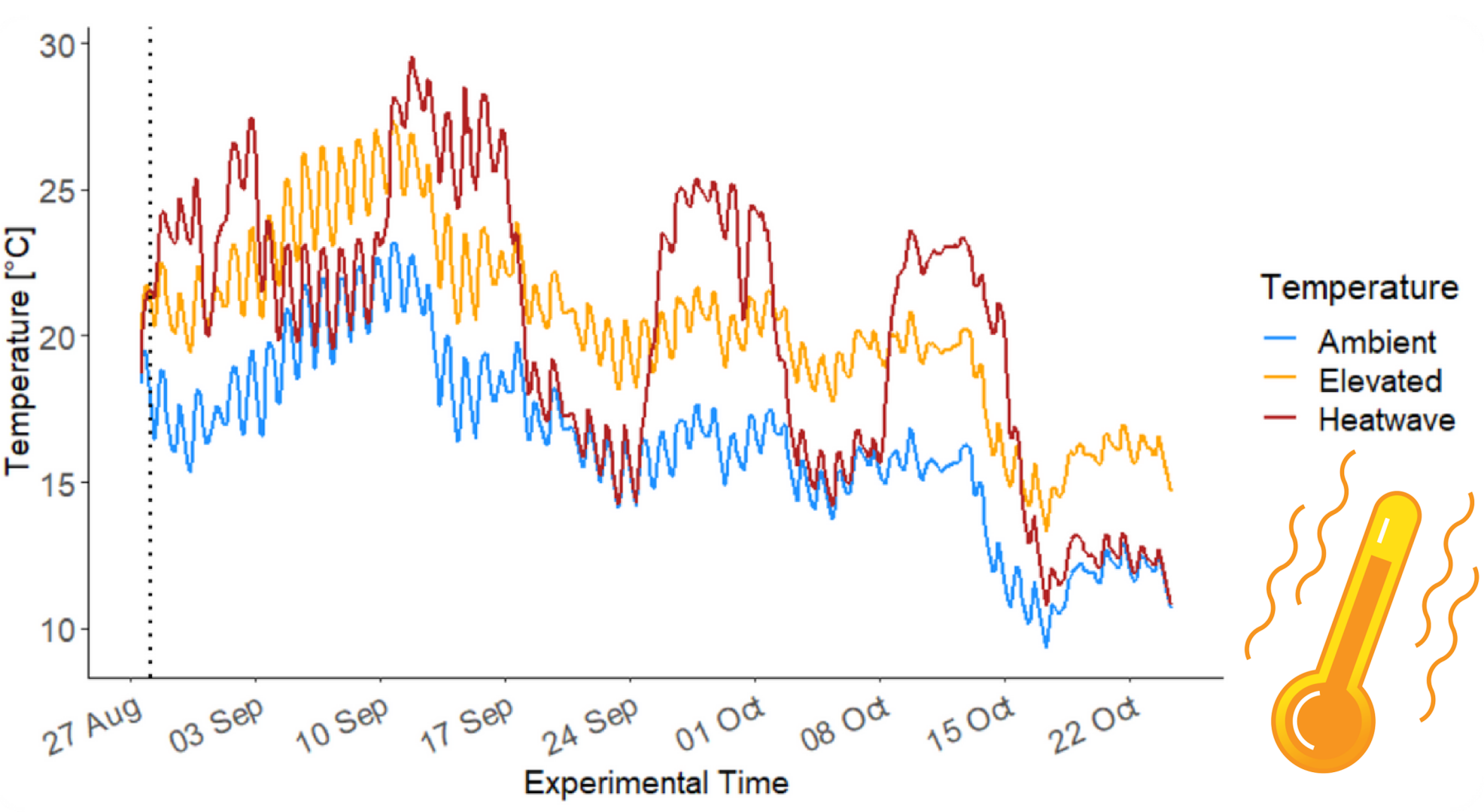
Macrophytes



Macroinvertebrates

	C0-C1				C0-C2				Interaction Temp.
	Amb	Elev	HW	AEHW	Amb	Elev	HW	AEHW	
Week -1									
Week 3					*			**	
Week 7	*	*		*	*			*	*

Redundancy Analysis (RDA), significance over time. Codes: "." 0.1, "*" 0.05, "**" 0.01



Conclusions

- Antagonistic effects only found at low TBA concentrations (environmentally relevant).
- Indirect effects on macroinvertebrates community due to combined effects on macrophytes.
- Further analysis will be done to improve the understanding of the mechanistic pathways of these stressors' interactions.

Literature cited

- Dinh, K. V. et al. (2022). Interactive effects of warming and pollutants on marine and freshwater invertebrates. Current Pollution Reports, 1-19.
- Hermann, M. et al. (2022). A transportable temperature and heatwave control device (TENTACLE) for laboratory and field simulations of different climate change scenarios in aquatic micro-and mesocosms. HardwareX, 11, e00307.
- Woolway, R. I. et al. (2021). Lake heatwaves under climate change. Nature, 589(7842), 402-407.



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