

# Environmental Predictors of Zooplankton Biodiversity Across a Series of Polymictic Reservoirs



Alyssa Koshy, Kingsley Ike-Anyanwu, Aaron Korbman, Michael Grove, Courtney Richmond, and Nathan Ruhl  
Department of Biological Sciences, Rowan University, Glassboro New Jersey, USA 08028

## Background

- Polymictic reservoir series
- Beta-biodiversity: differences in species composition between sites.
- Zooplankton provides insight in seasonal succession of biodiversity for each ecosystem

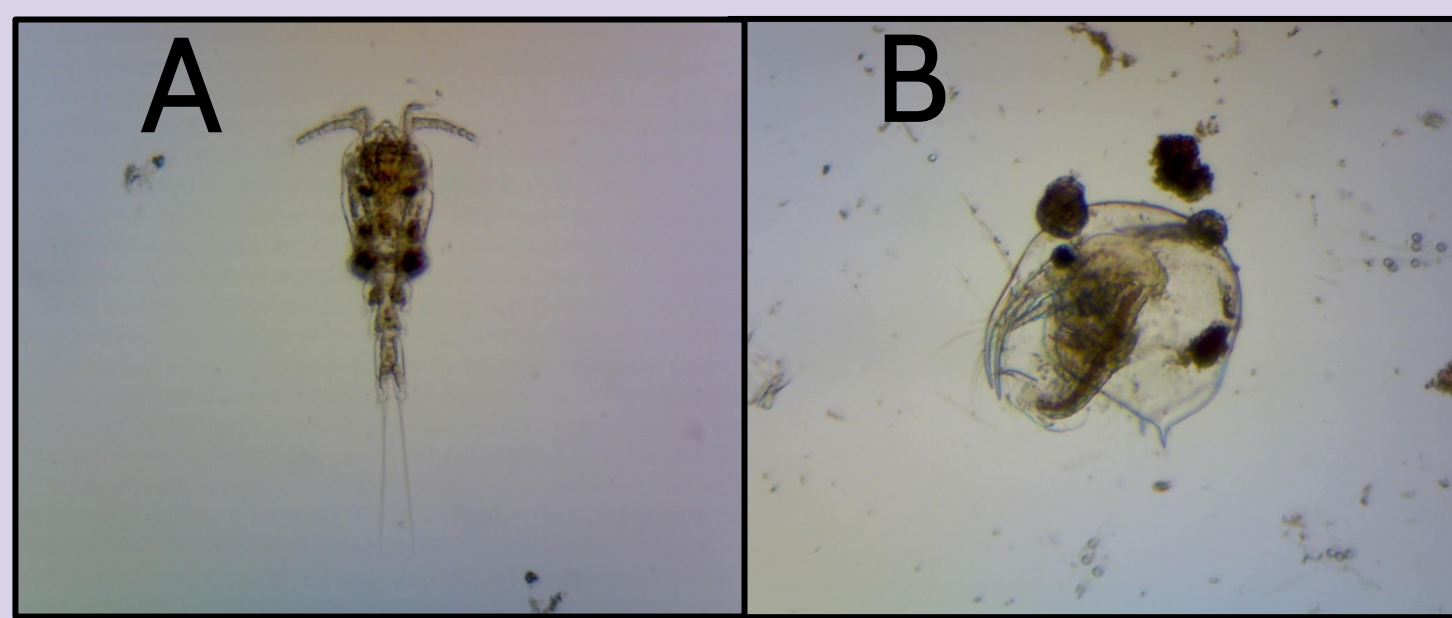


Figure 2: Copepod (A) and cladoceran (B) at 40x magnification

## Methods

- Weekly samples from lacustrine zone and adjacent outflow of NJ reservoirs.
- Environmental samples collected using hand-held meters.
- Zooplankton quantified under microscopy
- Statistical analyses in R



Figure 3. Sampling at Palatine (A) and Parvin Lakes (B)

**Q2:** What environmental factors explain zooplankton biodiversity across a connected series of reservoirs?

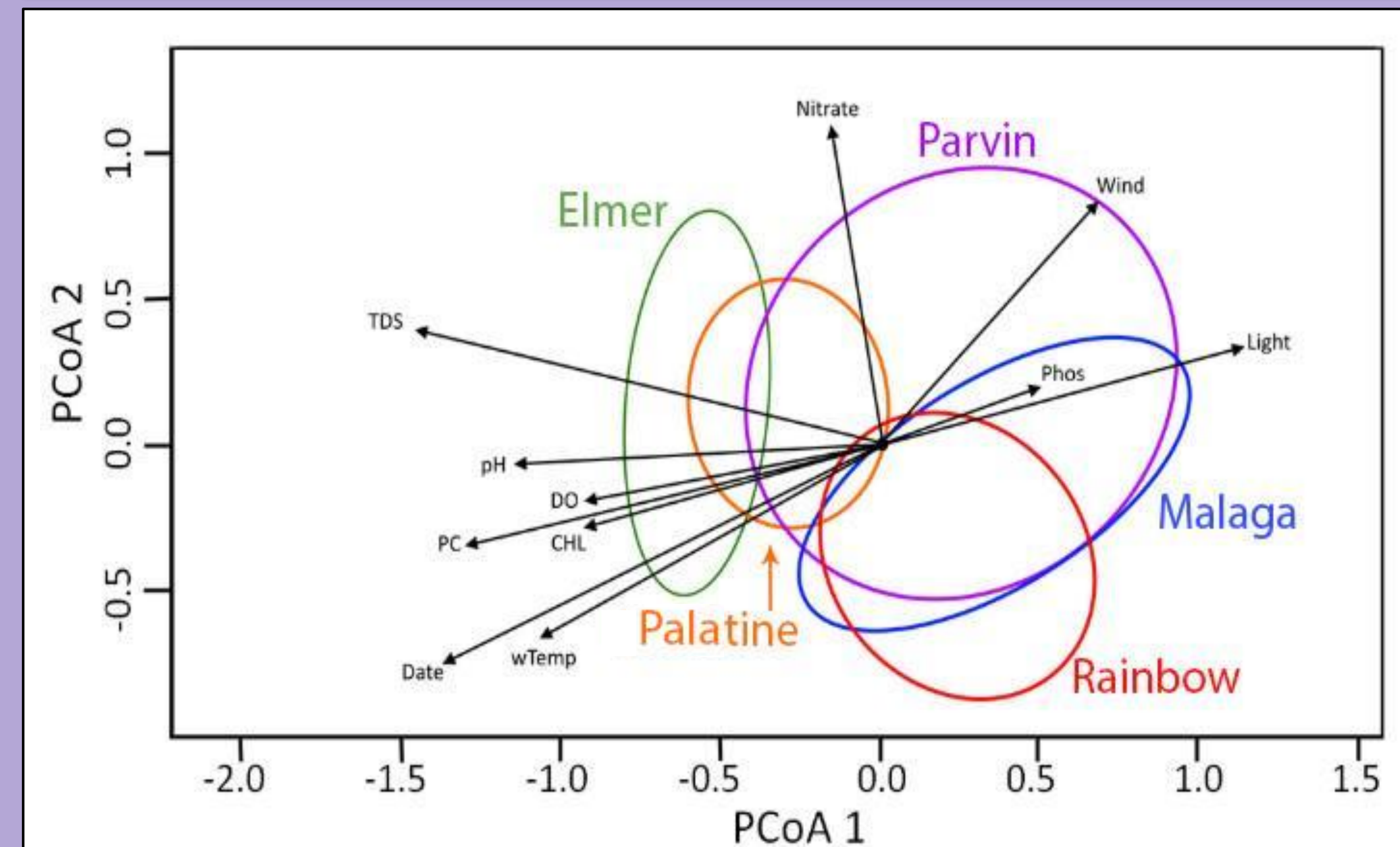


Figure 4: Partial canonical PCoA of zooplankton biodiversity in 2018 across dam sites with environmental vectors fitted

**Q1:** Does zooplankton biodiversity differ across reservoirs connected in series?

Table 1: A PERMANOVA with pairwise contrast for dam samples in 2016, 2017, and 2018.

Lake Pair		2016		2017		2018	
Lake 1	Lake 2	R <sup>2</sup>	P-value	R <sup>2</sup>	P-value	R <sup>2</sup>	P-value
Elmer	Malaga	0.16	***	0.212	***	0.186	**
Elmer	Parvin	0.136	***	0.187	***	0.178	***
Elmer	Rainbow	0.178	***	0.218	**	0.19	***
Malaga	Parvin	0.266		0.055		0.059	
Malaga	Rainbow	0.035		0.042		0.037	
Parvin	Rainbow	0.015		0.007		0.06	
Palatine	Malaga	n/a	n/a	0.19	**	0.126	
Palatine	Parvin	n/a	n/a	0.188	***	0.09	
Palatine	Rainbow	n/a	n/a	0.204	***	0.115	
Palatine	Elmer	n/a	n/a	0.085		0.075	

Blank space > 0.05, \* ≤ 0.05, \*\* < 0.01, \*\*\* < 0.001

## Environmental Predictors of Biodiversity 2018

- Significant predictors that help explain biodiversity differences, (i.e.) nitrate, wTemp, and Date (figure 4).
- A transition in the quantity of nitrate throughout the season at Elmer
- wTemp, Date, phosphate and light impacting Malaga
- Phosphate had a higher presence in Malaga, and Parvin than Elmer
- Rainbow experience minimal levels of nitrate

## Zooplankton Biodiversity 2016

- Elmer different from Parvin, Rainbow and Malaga (Table 1)
- cHAB at Elmer

## Zooplankton Biodiversity 2017 and 2018

- Elmer and Palatine different from Parvin, Rainbow and Malaga (Table 1)
- No cHAB in study system

## Next Steps?

- Plotting secondary productivity gradient
- Use updated taxonomy listy to generate more accurate predictors in seasonal transition of biodiversity
- Analyzing 2019 summer data and incorporating data
- Further data collection of qPCR and cyanobacteria counts

## Acknowledgements

We would like to thank PLVHA and the other research assistants for their help