Does Trophic Status or Mixing Regime Alter Zooplankton-Driven Clear Water Phases in the Reservoirs of the Midwestern United States?

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Introduction

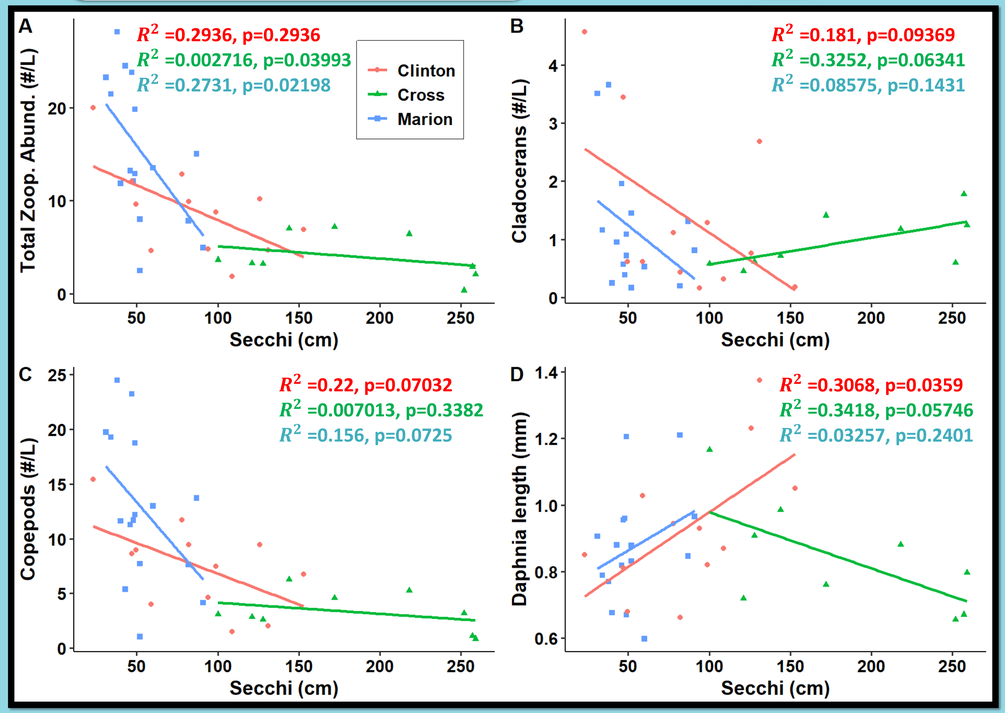
Zooplankton can cause a substantial reduction in algal biomass and an increase in water clarity in lakes due to herbivory. This frequency of lower biomass is known as a the "clear water phase". However, the timing and magnitude of the clear water phases have rarely been compared in lakes with different trophic states and mixing regimes, particularly in Midwestern reservoir systems. Here, we sampled three reservoirs with different mixing regimes and trophic states in Kansas to determine relations between water clarity and zooplankton abundance, and *Daphnia* size.

Objective:

The objective of this study was to evaluate how zooplankton abundance and *Daphnia* size affect water clarity in the Kansas reservoirs.

Results

Negative relations were observed between total Cladocera, copepod zooplankton abundance, and Secchi depth in the hypereutrophic and eutrophic, polymictic, Marion and Clinton reservoirs, respectively (Fig. A-C). In contrast, the mesotrophic, dimictic, Cross reservoir had a marginally significant positive relation between Cladocera abundance and Secchi (Fig. B; $R^2 = 0.33$, $p = 0.06$). However, *Daphnia* size was positively related to Secchi in Clinton and Marion, whereas Cross showed a negative relation (Fig. D).

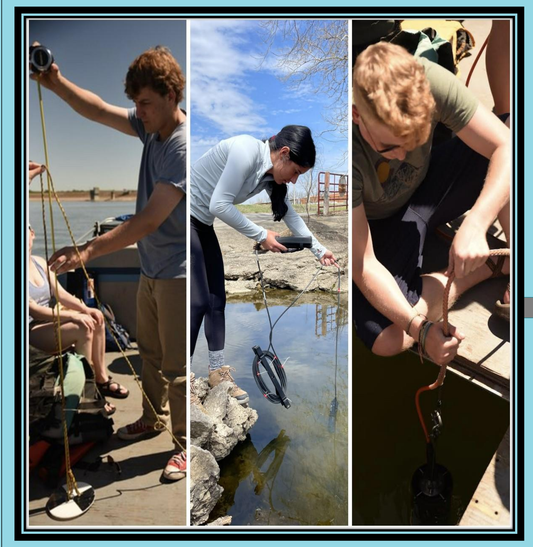


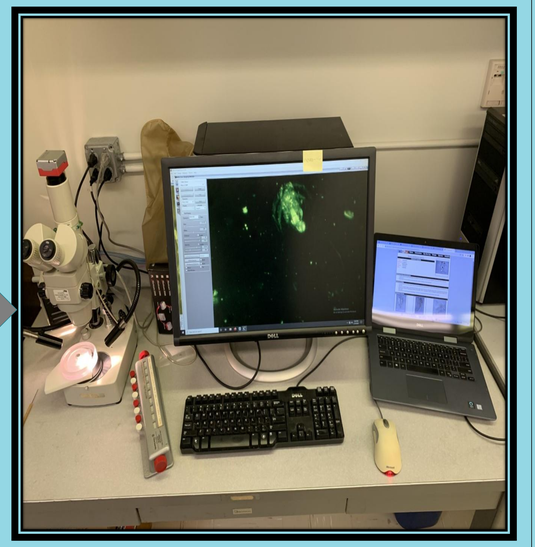
Methods

A. Secchi depth, and other water quality metrics, were collected concurrently with zooplankton hauls.

B. Zooplankton were sampled with a 64µm mesh net with a vertical haul of the water column.

C. Zooplankton were identified, counted, and measured to determine size using ImageJ software.





Conclusions and Future Work

- Despite zooplankton being primary herbivores in aquatic systems, increases in abundance were negatively correlated with water clarity in Marion and Clinton, while Cladocera abundance was positively related to Secchi in Cross.
- Increases in Cladocera abundance seemed to help drive the clear water phase in Cross, while increases in Cladocera size helped drive clear water phases in Clinton and Marion.
- A future study on the extent of the influence planktivorous fish have on zooplankton size and community composition would offer more insight.

References: