Periphyton Comparisons Between Appomattox River and Buffalo Creek

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Introduction and Background

- Periphyton attaches to objects located above the bottom sediments in water
- Serves as a food source
- Can negatively affect water, habitats, biodiversity, and degrade the recreational aesthetic (Hoyle et al. 2017)
- Temperature, oxygen, light, and river flow can influence the abundance of periphyton (Biggs et al. 1998)
- The differences of each site and their contribution to a greater diversity in periphyton

Introduction and Background

- Importance: Periphyton and its effects on aquatic life in Prince Edward County
- Collections sampled from Buffalo Creek (BC)and the Appomattox River (AP)
- The run and riffle of each body of water were sampled for periphyton comparisons.

Hypothesis

- The population and diversity of the periphyton found will be greater in the Appomattox River than in Buffalo Creek.
- Since BC is a tributary that leads into AP it's assumed that AP is more diverse in terms of periphyton

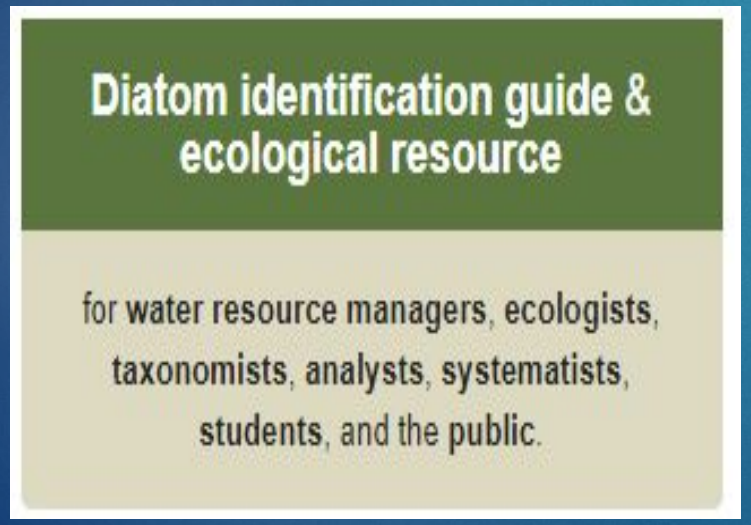
Methods

- Found accessible spots
- Dissolved oxygen sensor was used to find temperature and oxygen levels
- A total of six rocks were gathered from each site, three of which from the riffle and three from the run
- A periphyton brush was used to brush a 5.08cm by 2.54cm region on the top and bottom of each rock

Methods (Continued)

- Squirt bottle used to spray top surface of rocks, letting water collect in the containers
- Samples were taken back to the lab, for approximately 3 days
- A Compound Microscope was used to identify different species and their population sizes

Methods (Continued)



- Guidebooks and Diatoms of the United States website were used to identify species
- T-tests with JMP software and shannon's diversity index were used for analysis

Methods Pictures

Compound Microscope

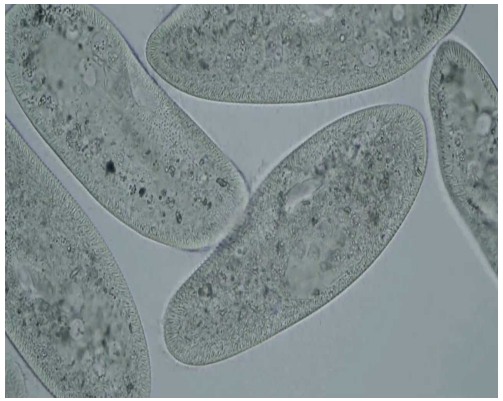
Micropipette

Specimen Container

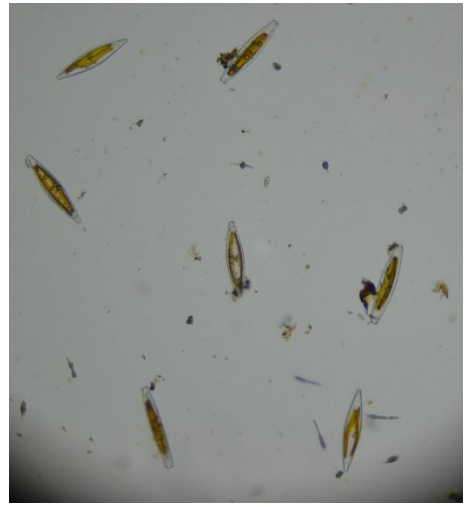
Results

Cladophora

- Total of 34 species found
- Three most abundant species observed:
  - *Navicula*- found only in Appomattox
  - *Cladophora*- found in both Appomattox and Buffalo Creek
  - *Paramecium*- found in both Appomattox and Buffalo Creek



Paramecium

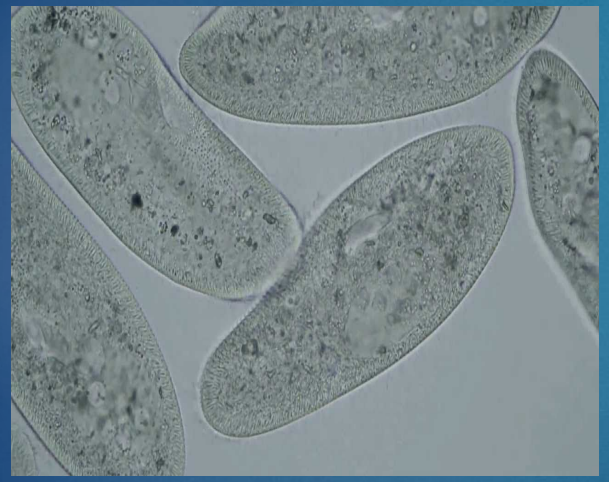


Navicula

(Diatom) Navicula

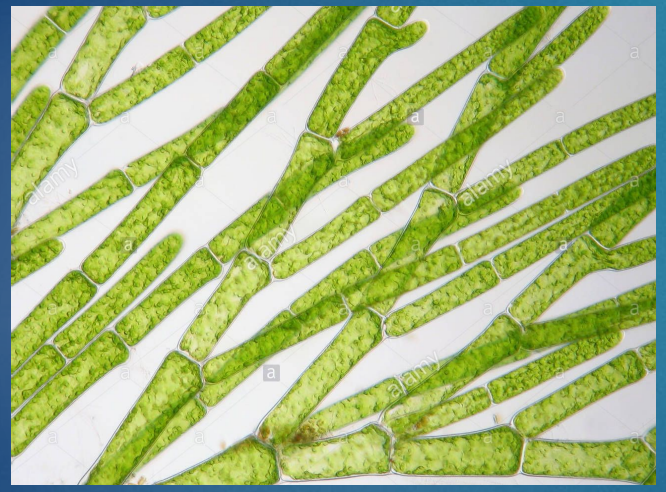
- Has over 1,200 different species
- Diatoms can produce a quarter of the oxygen in our biosphere
- Keystone species providing a stable diet for aquatic species

(Protozoa) Paramecium



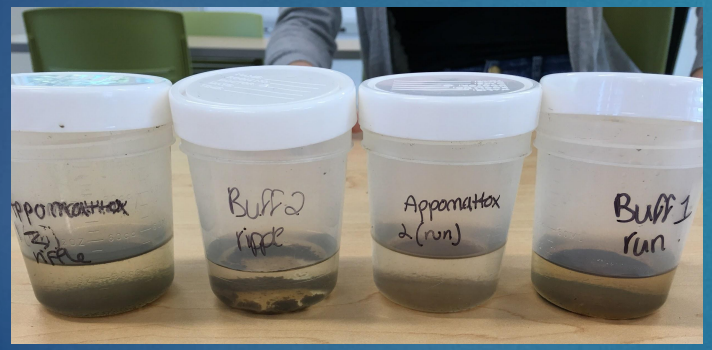
- Freshwater and marine organisms
- One of the most commonly studied organisms
- Help control algae, bacteria, and other protists in water
- Help to get rid of tiny debris in water

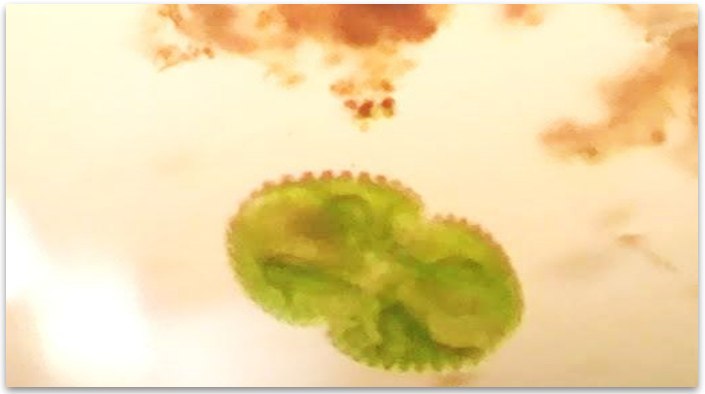
(Filamentous Green Algae) Cladophora



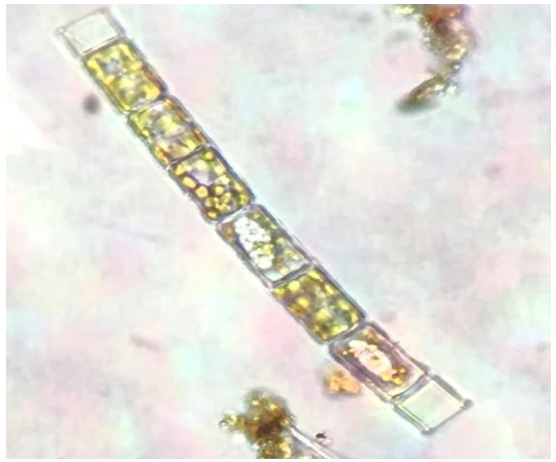
- Have freshwater and marine species
- Overgrowth has caused a rise in zebra mussels
- Food for mayflies, caddisflies, scuds and snails

Results Images



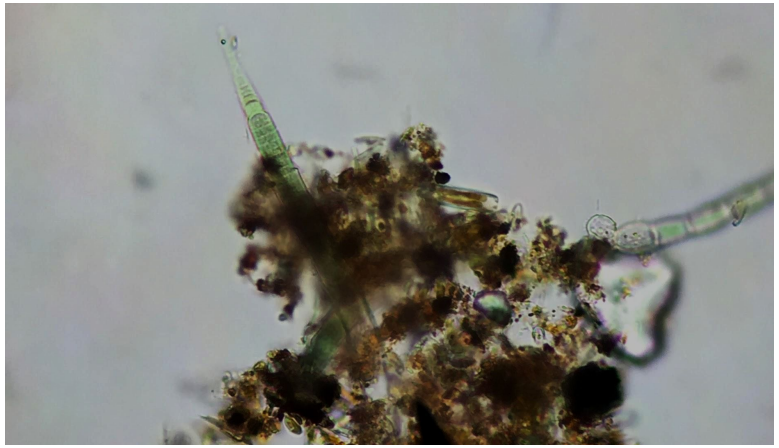


Cosmarium



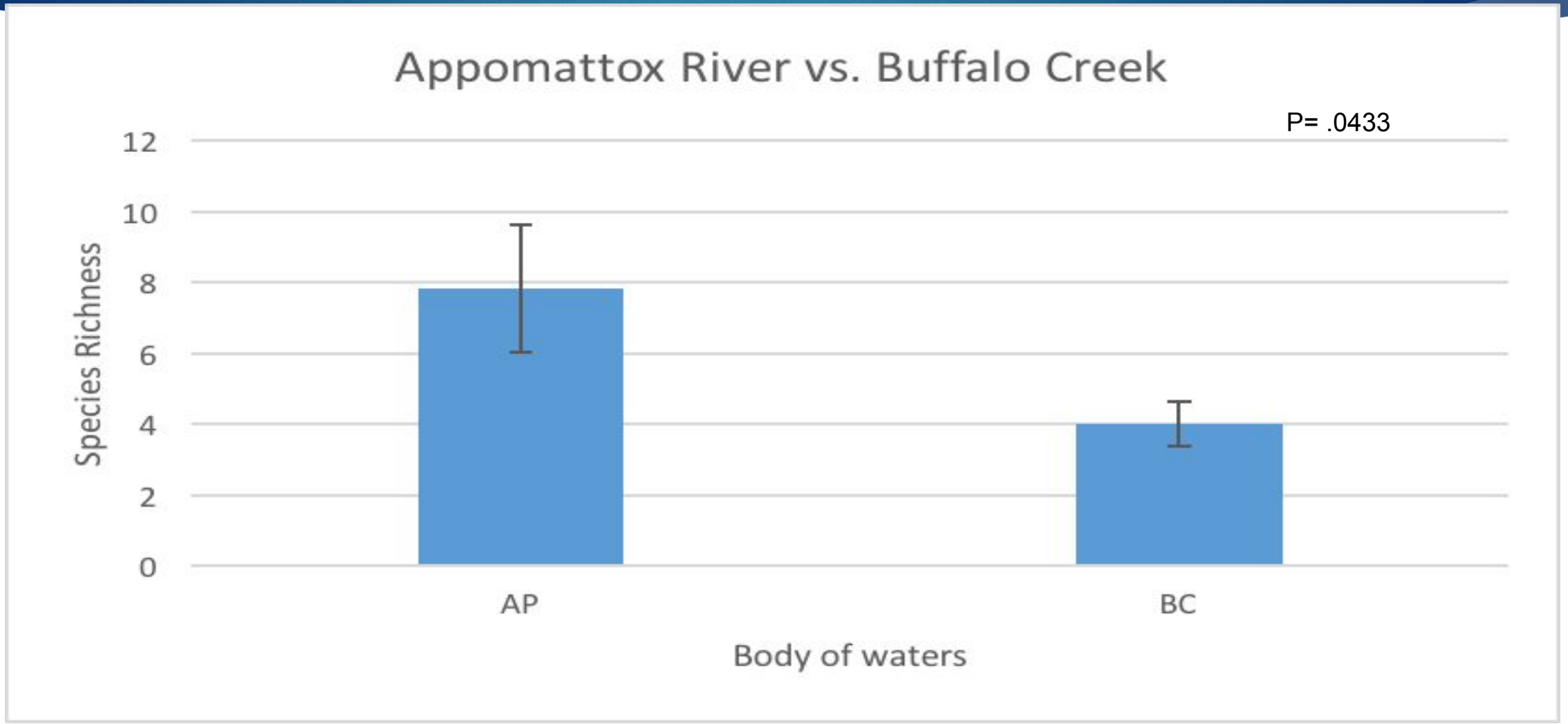
Chlorophyta

Rivularia

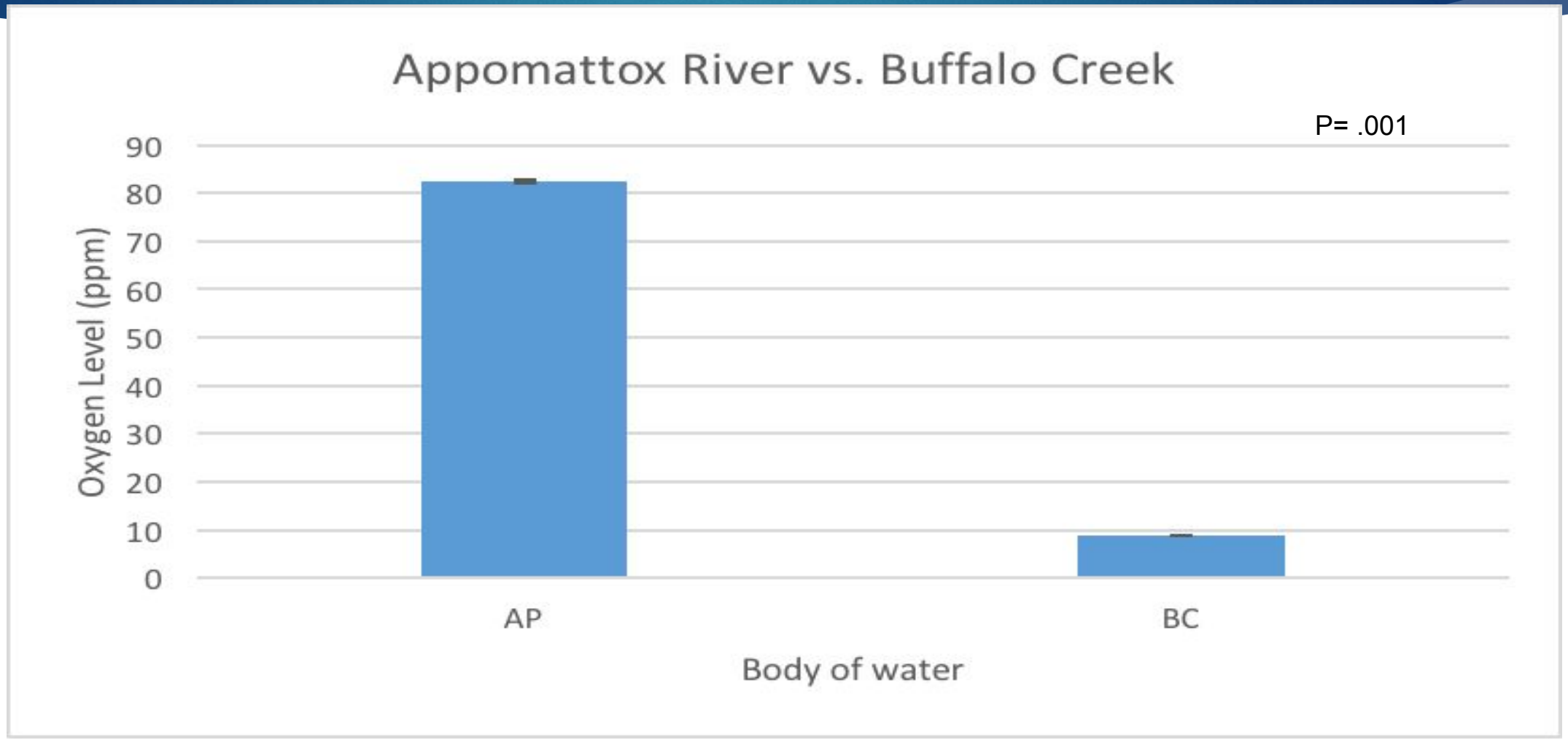


Nematode

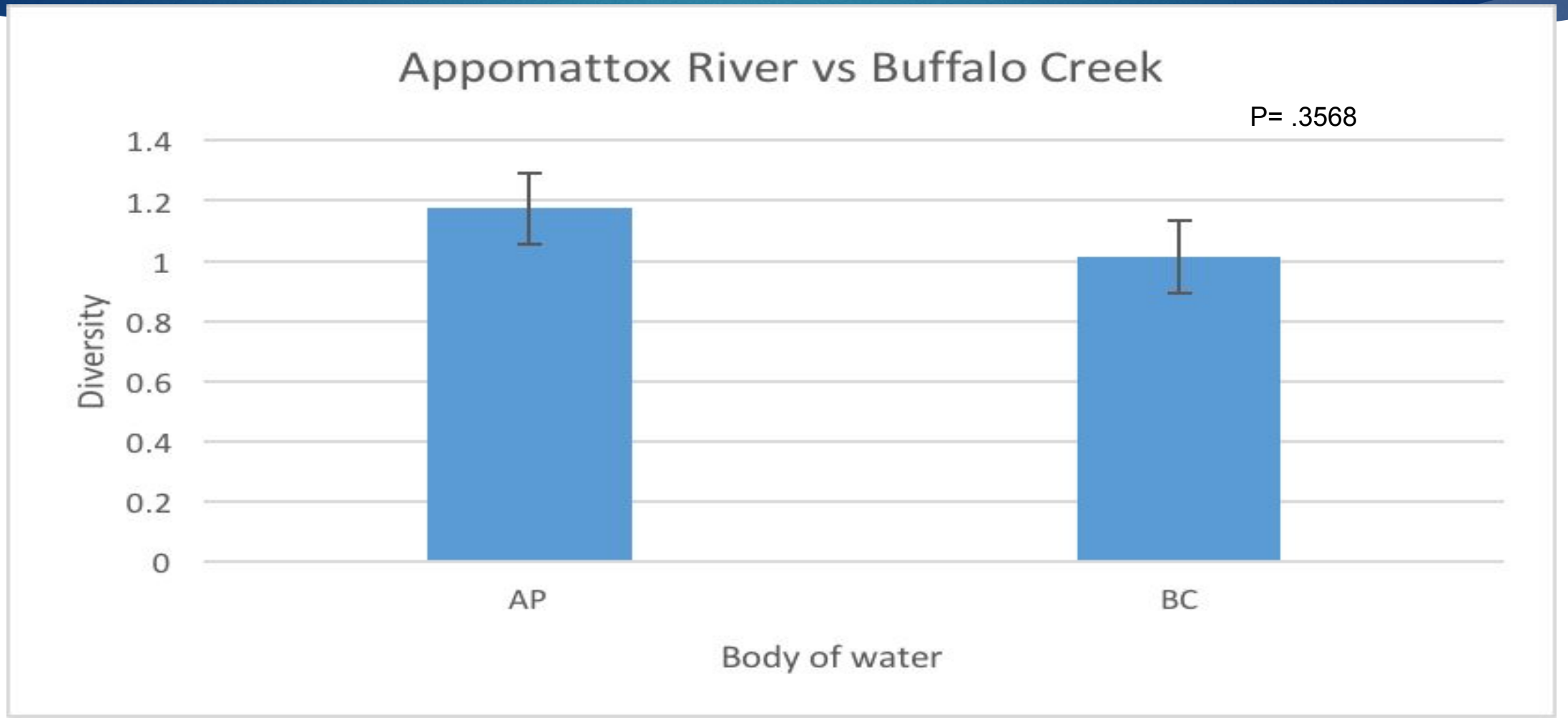
Comparison of Species Richness



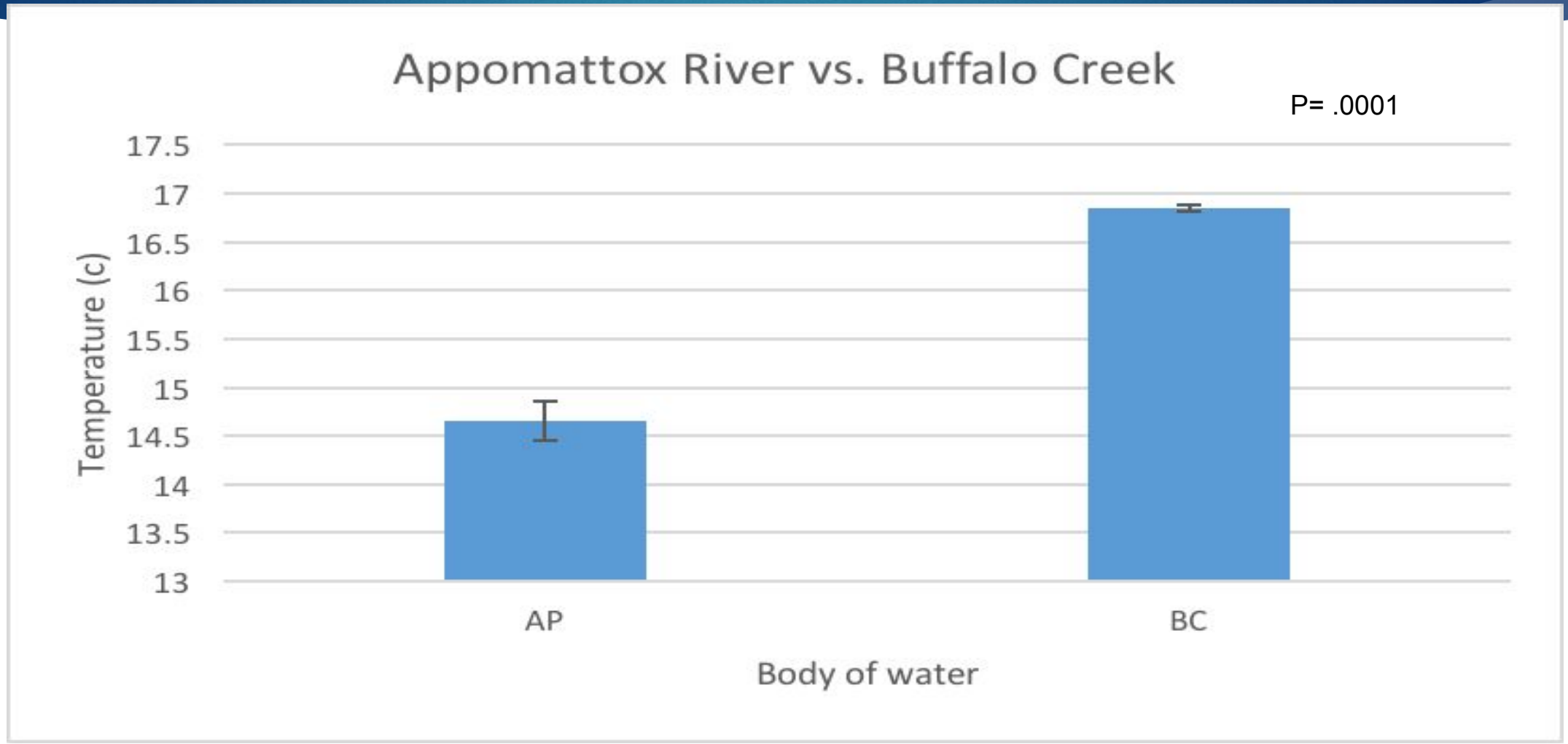
Oxygen Level Differences



Diversity Variations



Temperature comparison



Additional Results

- The flow was not a significant factor in biodiversity
- Species richness and diversity were not significant in the comparisons for flow
- Temperature and dissolved oxygen were also not significantly different for flow comparisons
- Water depth was the only significant difference between the flow
- Light doesn't seem to be a significant factor in determining species richness

Conclusion

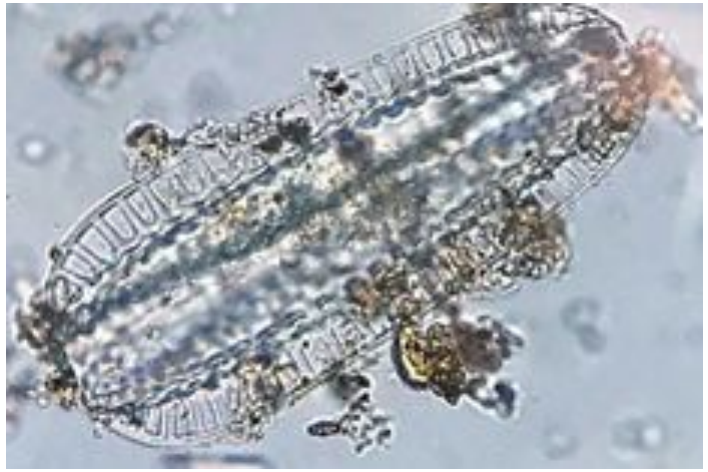
- Our hypothesis was supported through data analysis
- Biofilm growth is mainly controlled by light, temperature, velocity, etc (Wilhelm 2015)
- Further experimentation can be done to show whether or not tributaries are an important factor for AP's high diversity

Literature Citations

Hoyle, J. T., C. Kilroy, D. M. Hicks, L. Brown. 2017. The influence of sediment mobility and channel geomorphology on periphyton abundance. Freshwater Biology 62:258-273.

Wilhelm,L., K. Besemer, L. Fragner, H. Peter, W. Weckwerth, and T. J. Battin. 2015. Altitudinal patterns of diversity and functional traits of metabolically active microorganisms in stream biofilms. The ISME Journal 9:2454-2464.

Surirella



Fragilaria

May Fly Larvae

Closterium