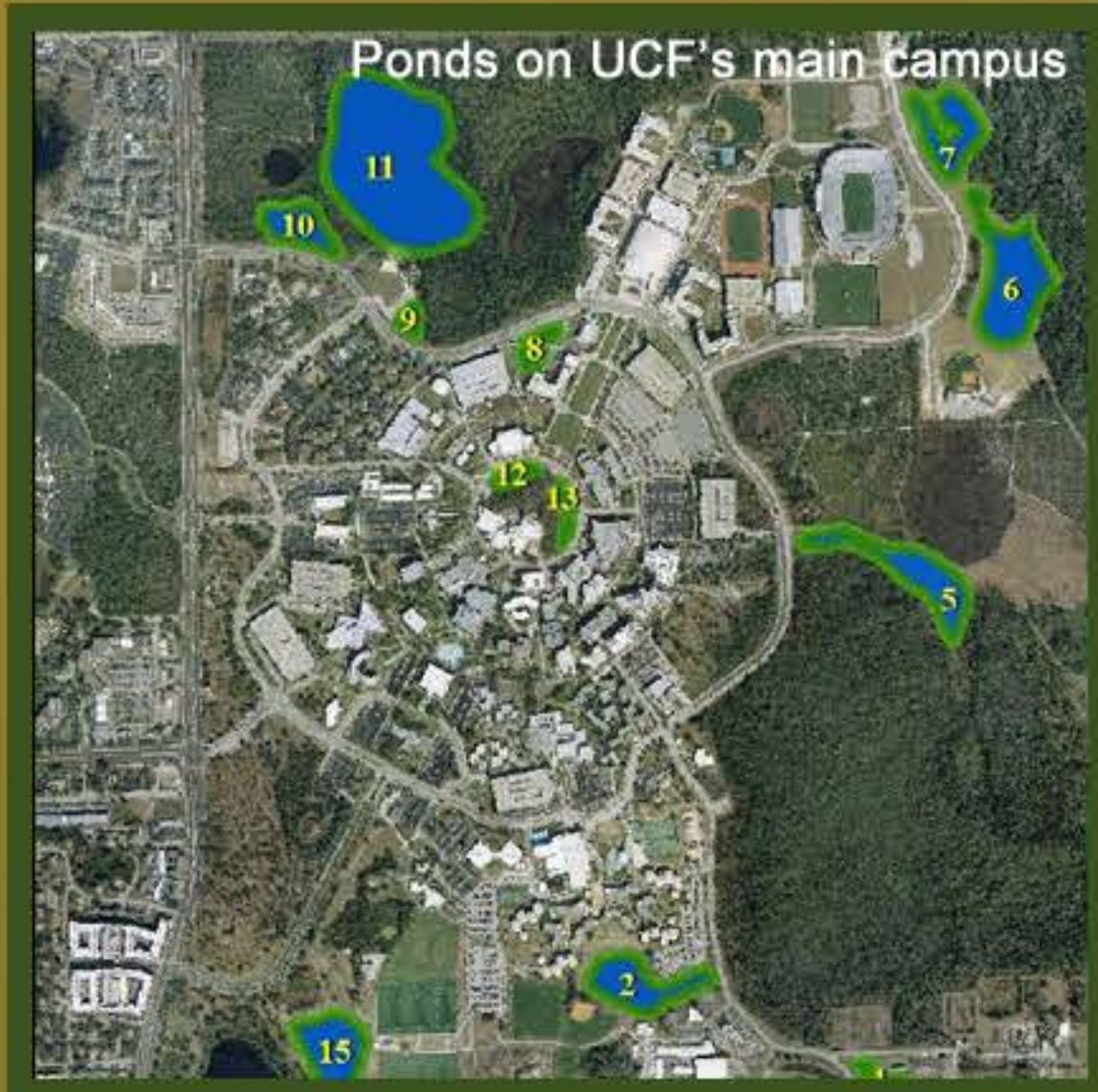




Pistia Stratiotes and Pomecea Insularum's Ability For Bioremediation of Copper

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Juvenile Island Apple Snail (*Pomacea insularum*)

Hypothesis

The presence of *P. stratiotes* and *P. insularum* will bioremediate the copper treated pond water better than just *P. stratiotes* or *P. insularum*.

Abstract

Central Florida's waters are in critical need of restoration. Recognizing which plants and animals help in restoring our waters will provide a realistic and cost efficient solution. Our research focused on the capacity of the *P. stratiotes* and *P. insularum*, which are both classified as invasive, to improve water quality in lake systems contaminated with Cu. To perform this project, we created an environment suitable for the animals involving a recirculating system. Overall, the system contained 8 tubs; a control, plants, snails, and plants and snails. Out of the six weeks of expected research only four weeks were conducted due to the initial spraying of Cu and lack of health of the snails. After reestablishing the tubs we were able to conduct four weeks of data. We assessed the efficiency of bioremediation by testing the levels of Cu within each of the eight tubs. The water from each tub was tested for the concentration of Cu and was read using a photometer. The results showed that *P. insularum* were more efficient than *P. stratiotes* and together they were less efficient than *P. insularum* alone. Further research will be required to determine if the classified invasive species *P. stratiotes* and *P. insularum* are sufficient at the removal of Cu in lake systems.



Water quality testing, week 3



Water quality sampling at pond #9

Introduction

- Invasive species are defined as a nonnative species that outcompetes a native species for resources (USDA, 2006).
- Water lettuce (*Pistia stratiotes*) is considered an invasive weed in Florida because of its ability to form thick mats that clog water ways and block light which can kill submerged plant communities. However water lettuce is also well known for its water purifying ability (Reddy et al., 1982) and can outcompete algae for nutrients in the water and prevent algae blooms (Pirie, 1960).
- Island Apple Snails (*Pomacea insularum*) grow to the size of a small orange and are voracious herbivores who dine on native and non-native plant species alike (Barker, 2002).
- Copper (Cu) is a pesticide that is commonly used to rid lakes and ponds of an overgrowth of algae called "algae blooms".
 - Copper triggers oxidative stress in water lettuce, and can affect on the biochemistry (Upadhyay, 2009)
 - Apple snails have developed ways to regulate internal copper concentrations by storing it (Hoang, 2008)

Discussion

- *P. insularum* were more efficient than *P. Stratiotes* at the removal of Cu.
- *P. insularum* and *P. Stratiotes* together were less efficient than *P. insularum* alone
- *P. insularum* bioaccumulate Cu most significantly through the diet and soil
- *P. Stratiotes* has a lower biomass than *P. insularum*, possibly attributing to its efficiency in bioremediation.
- Technical difficulties of the YSI 9500 for testing of Cu concentrations.
- Salt Sprays could be an effective alternative to sprays containing Cu
- It is also important to note the condition of the *P. stratiotes* over the four weeks was browning, wilting and showing signs of dying.
- In addition to the *P. Stratiotes* dying some of the *P. insularum* showed decreasing health.



Water Lettuce (*Pistia stratiotes*)

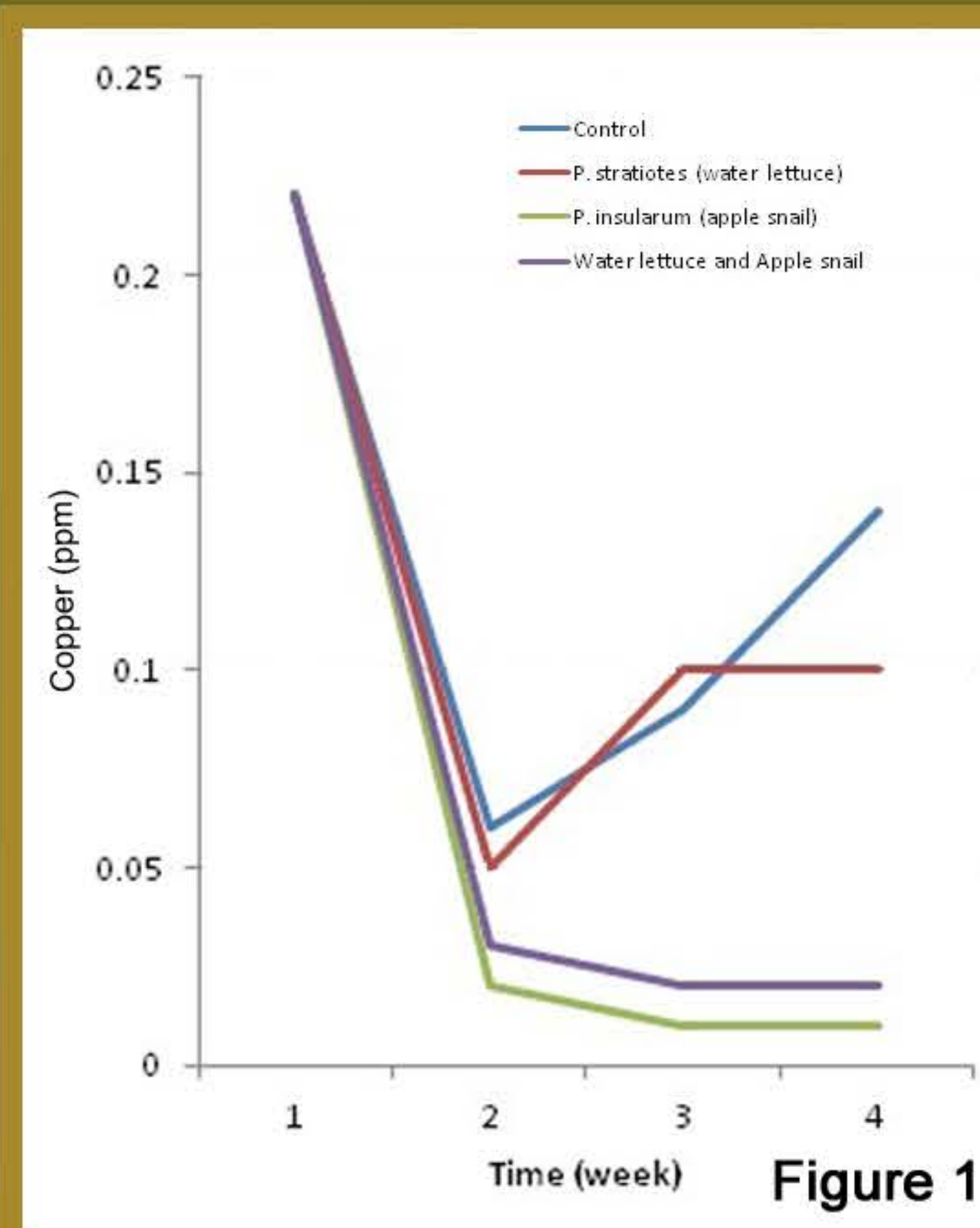


Figure 1

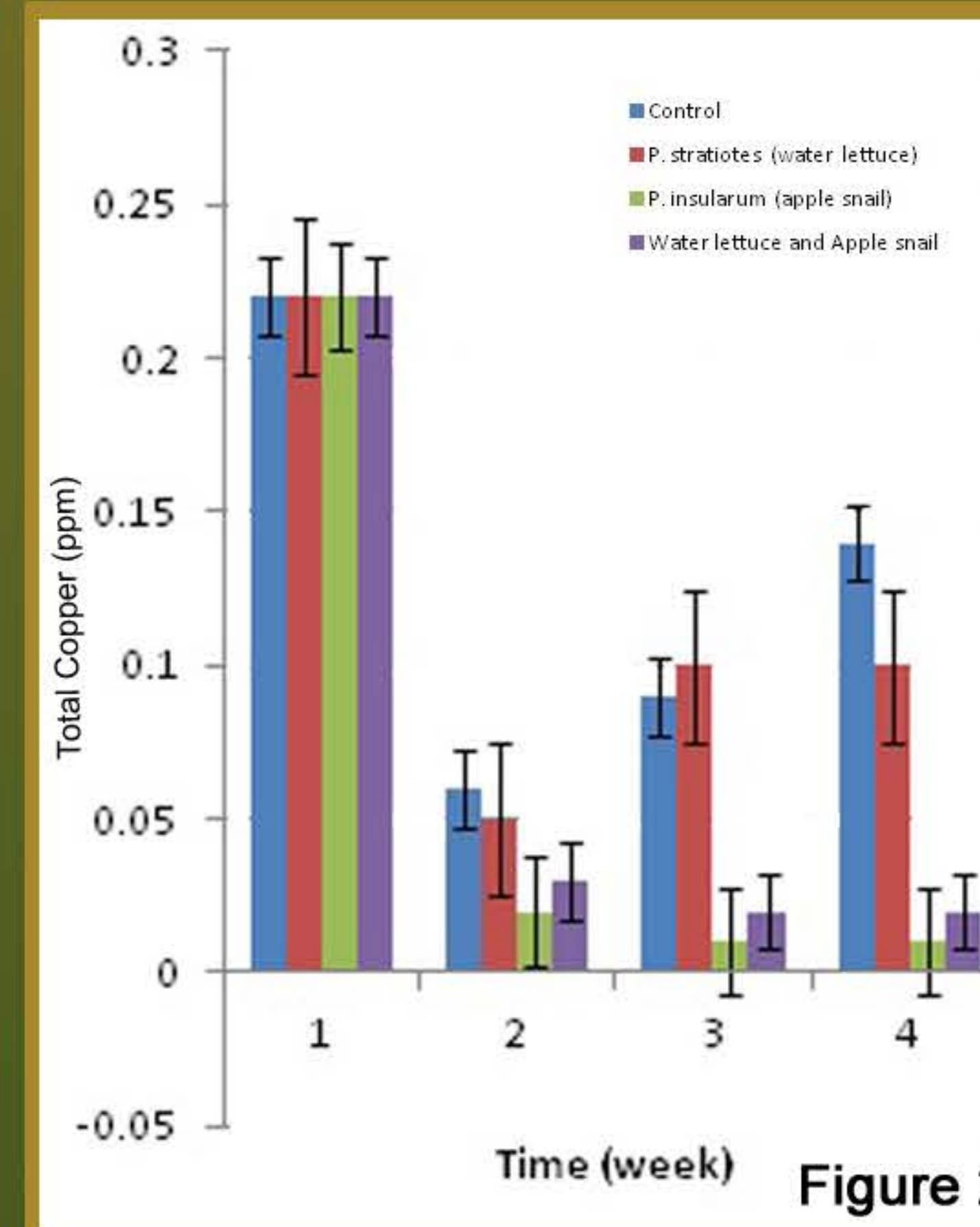


Figure 2

Results

Figure 1 shows the trends of total copper in parts per million (ppm) over a four week time period. In the four different trials the amount of copper went down each week and got the lowest in the tank with only *P. insularum* and remained the highest in the control. Figure 2 shows the standard error and that there is no significant difference between the results.



Initial water quality sampling



P. insularum and *P. Stratiotes*

Methodology

- 8 tubs were filled with 10 gallons of Cu treated pond water from pond 9 at UCF
- Two tubs with only *P. insularum*, two with only *P. stratiotes*, two with both *P. stratiotes* and *P. insularum*, and two control tanks with just pond water
- Water tested every week with urban water testing kits and 9500 YSI Photometer

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