

Lead Accumulation in Crayfish of the Lake Waco Wetlands



Blake Hughes, Kelley Kieser, Jason Lambert
Baylor University, Waco, Texas 76798

Abstract

The goal of this project was to compare lead accumulation in tissues of crayfish within the Lake Waco Wetlands. Crayfish¹, as well as plants², have shown to accumulate lead within their tissues. Crayfish were captured, kept in cages for 4 weeks, had their tail tissues extracted, and sent to a lab for analysis. The results showed that there was lead in the tissues, but there was no statistical difference from cell to cell. However, this does not prove nor disprove the hypothesis. This preliminary trial was successful, but more trials and larger samples are needed to accurately compare cell to cell accumulation of lead.

Introduction

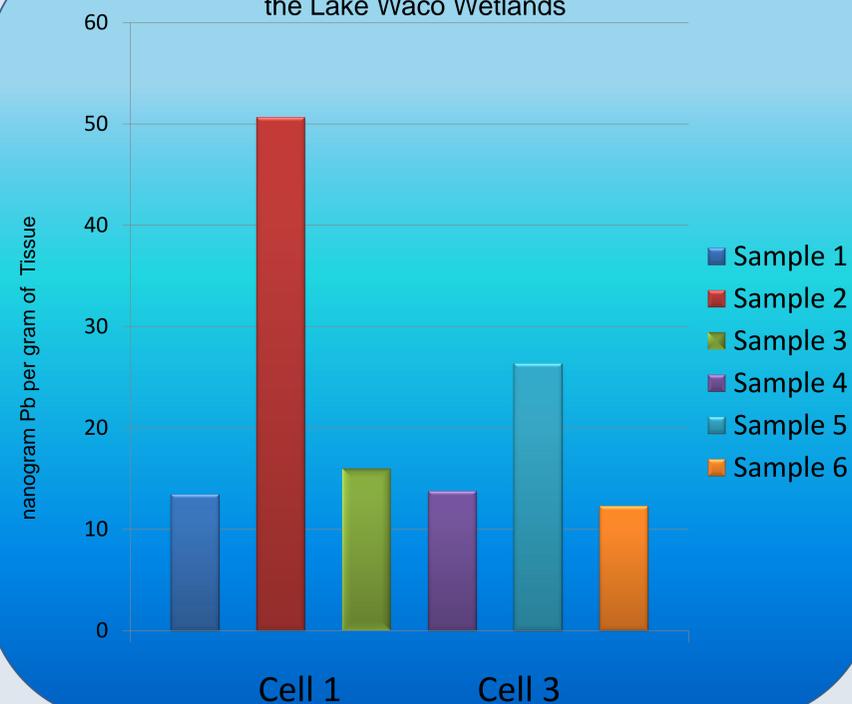
Previous research² in the Lake Waco Wetlands has proven that heavy metals were accumulated by the plants that lived in the waters, and that as water flowed through the wetlands, the levels of heavy metals decreased. This preliminary research continues the investigation from plants to crayfish that live within the wetlands. Crayfish occupy a very significant percentage of the invertebrate population, and therefore are good subjects to test accumulation of heavy metals in animal tissue. Since plant tissues accumulated heavy metals, then the tissues of crayfish, in the same location, should do the same.

Materials and Methods

- Two enclosures made from mesh netting and T-Posts each located in cells 1 and 3 (Figs. 3 and 4)
- 25 crayfish from cell 1 and 25 crayfish from cell 3 were kept in traps within their respective enclosures (Fig. 5)
- Crayfish were counted and fed weekly for 4 weeks
- 9 crayfish were obtained from each cell for tissue samples
- Place 10 grams of tail tissue inside vials labeled according to their cell location (Fig. 6)
- Frozen tissue samples were shipped to University of Texas Medical Branch to test for lead accumulation
- There, diluted digested samples were analyzed using a Perkin Elmer Model 5100 graphite furnace atomic absorption spectrophotometer (GFAAS).

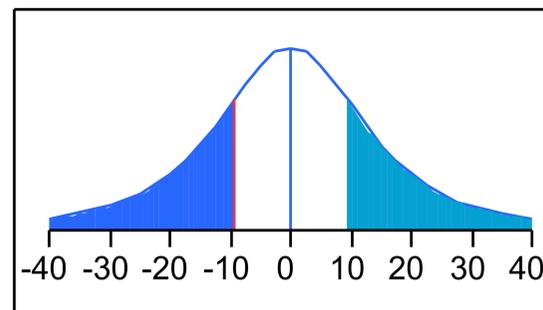
Results

Figure 1 Lead accumulation in tissues of crayfish within the Lake Waco Wetlands



Sample 1: 13.44 ng Pb/g	Sample 4: 13.72 ng Pb/g
Sample 2: 50.62 ng Pb/g	Sample 5: 26.34 ng Pb/g
Sample 3: 15.94 ng Pb/g	Sample 6: 12.25 ng Pb/g

Figure 2 T-Test Analysis of Data



Prob < t 0.2657

The p-value of 0.2657 is statistically insignificant, therefore, it cannot be concluded that the mean lead accumulation is lower in cell 3 than in cell 1

Conclusion

After statistical analysis, the results showed that there was no true difference in lead accumulation between cells. The crayfish did, however, show fluctuation in lead levels. More trials and larger sample sizes would allow for more accurate comparison of the cells. This preliminary research has proven to be a success because it shows that organisms in the wetlands do absorb lead in the water. It also has set up a framework for future researchers wishing to test the same hypothesis by using larger sample sizes and more trials.



Figure 3: Enclosure and Cell locations



Figure 4: 0.76 m x 0.76 m



Figure 5: Crayfish Traps



Figure 6: Vials of crayfish tissue

Acknowledgements

Marty L. Harvill, PhD; Shannon K. Hill, PhD; Baylor University Biology Dept.; Baylor Dean of Arts and Sciences; Dr. V.M. Sadagopa Ramanujam, Professor, Dept. PM&CH, University of Texas Medical Branch; Mrs. Nora Schell, Lake Waco Wetlands; Corbin Goerlich; Don Gray; Nikesh Patel; Kenneth Habetz; Kristen M. Rose

Literature Cited

- ¹ Joel C. Richert, Joseph Sneddon. "Determination of Heavy Metals in Crayfish (*Procambarus clarkii*) by Inductively Coupled Plasma-Optical Emission Spectrometry: A Study over the Season in Southwest Louisiana." *Analytical Letters*. Vol 41. Issue 17. Jan 2008. Pg 3198-3209
- ² Corbin Goerlich, Don Gray, Nikesh Patel. *Bioaccumulation of Heavy Metals in Schoenoplectus californicus of Lake Waco Wetlands*. Baylor university undergraduate research May 2009