



Longitudinal Study of Lanana Creek

Bayler Barnes, Jackson T. Ortiz, Trace Washburn, Dr. Alyx S. Frantzen

Department of Chemistry and Biochemistry
College of Sciences and Mathematics
Stephen F. Austin State University, Nacogdoches, TX

CHEMISTRY

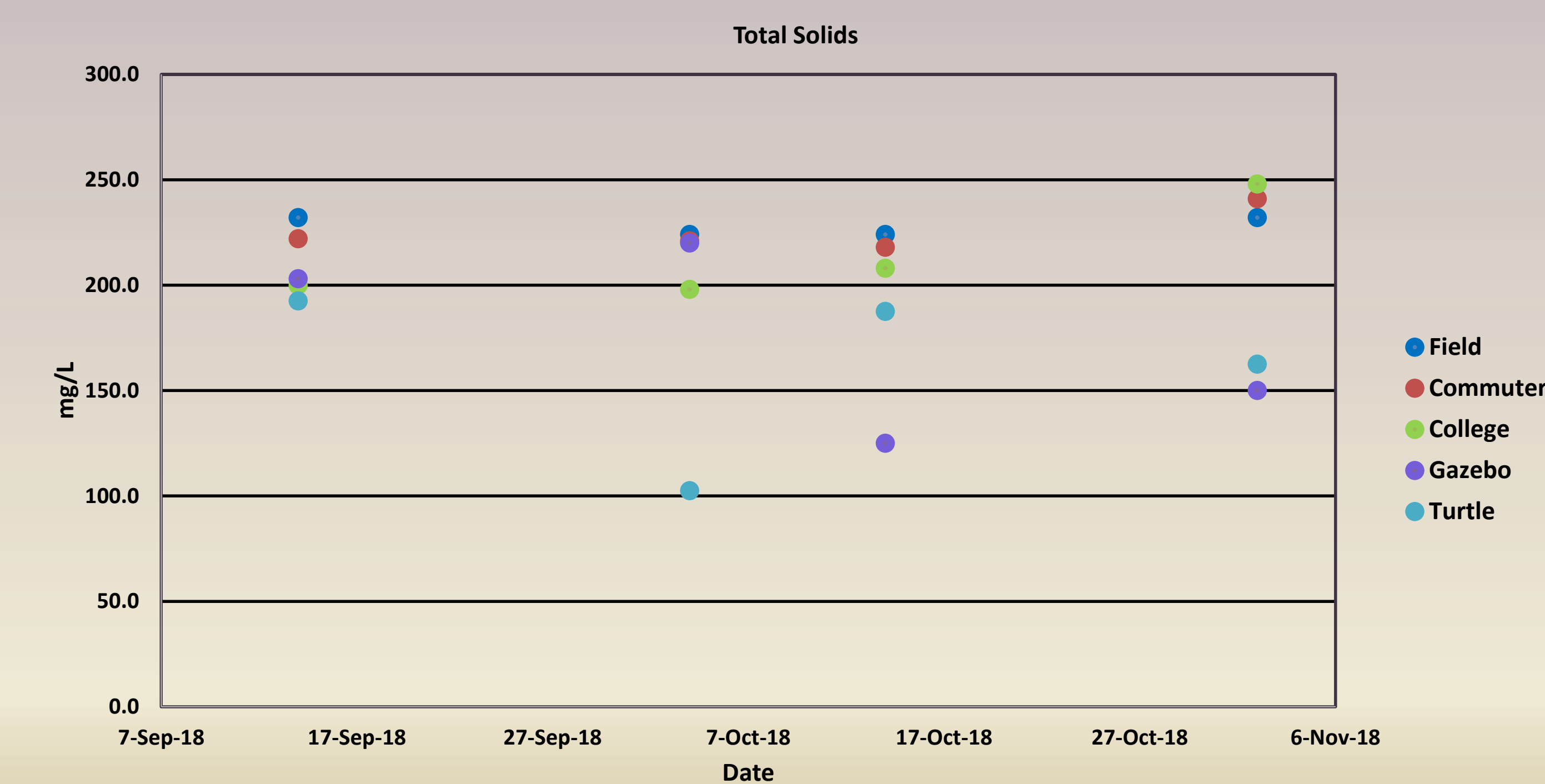
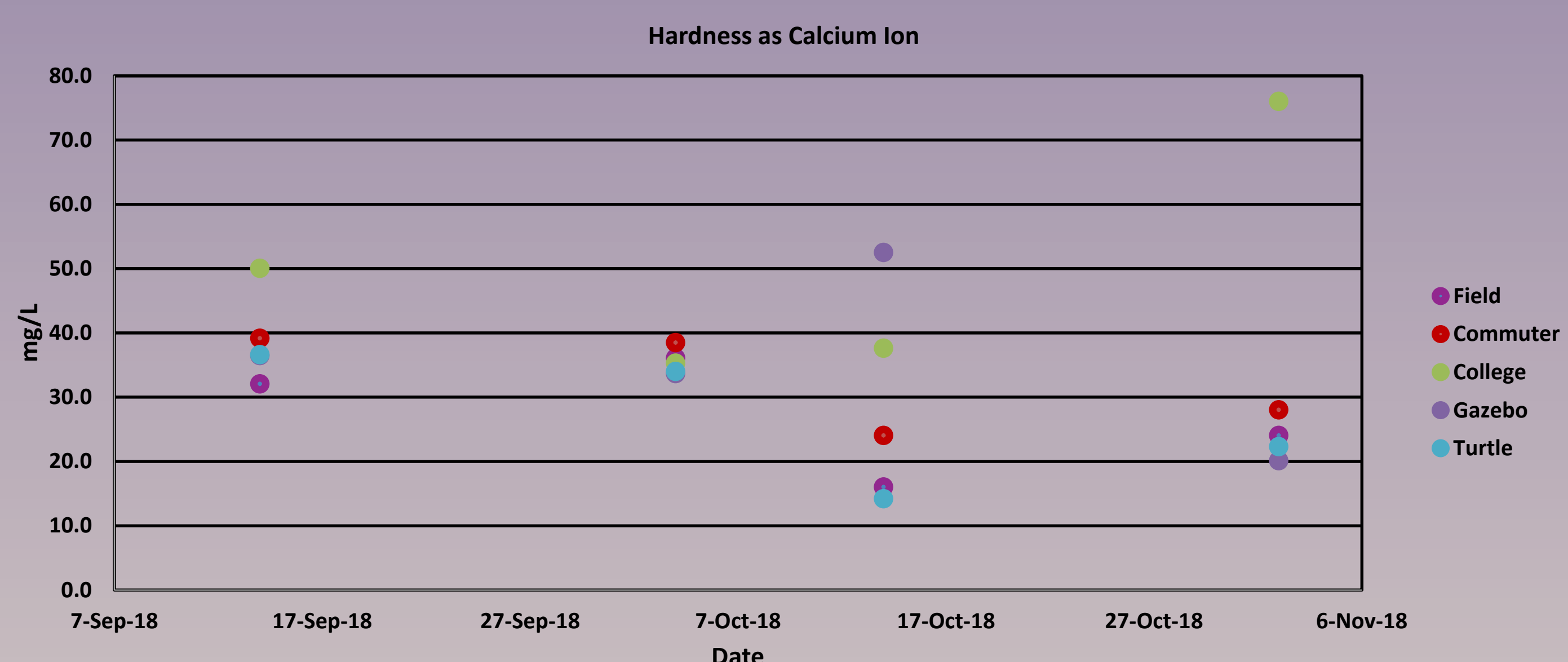
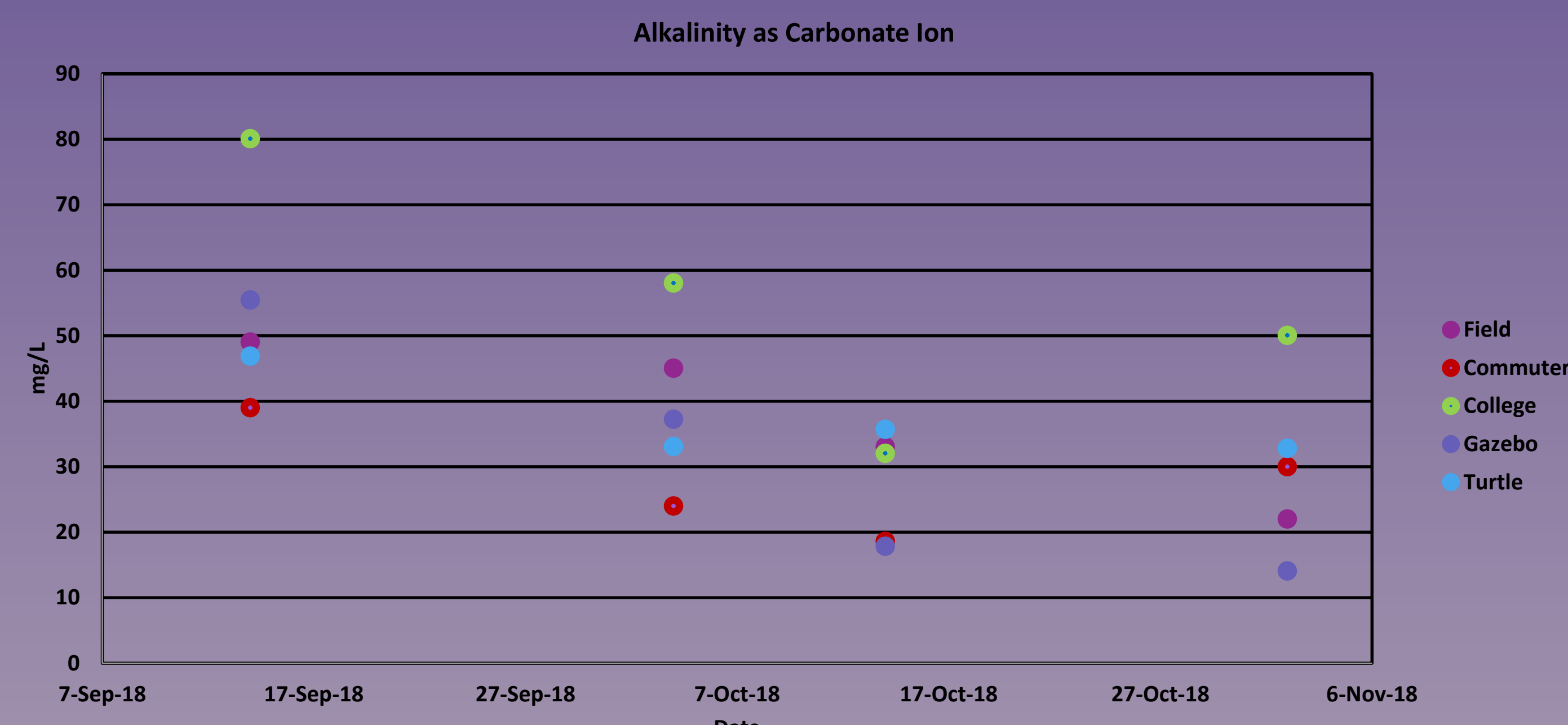
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BIOCHEMISTRY

Abstract

A longitudinal study was done to collect data on the various conditions of Lanana Creek in Nacogdoches, Texas over a seven week span from September 14 to November 2, 2018. The part of the creek studies is a 3.5 mile stretch from East Austin Street to Hoya Soccer Complex, mostly located on the campus of Stephen F. Austin State University. There were 6 different testing sites selected along this expanse. Collection of samples was performed by the General Chemistry I Honors class as part of the laboratory experience. Once collected, the samples were transported back to the lab for testing. The tests performed on the samples included determination of the pH, total solids, total dissolved solids, water hardness, anion concentration, and alkalinity. Each of these tests analyzes for a different parameter that is essential in evaluating the health of the ecosystem as a whole and gives a good reflection of the overall health of the creek's surrounding environment. The results were compared to EPA standards. During the testing period, there were significant rain events generating variable results after each sampling, but the overall study shows that Lanana Creek is healthy.

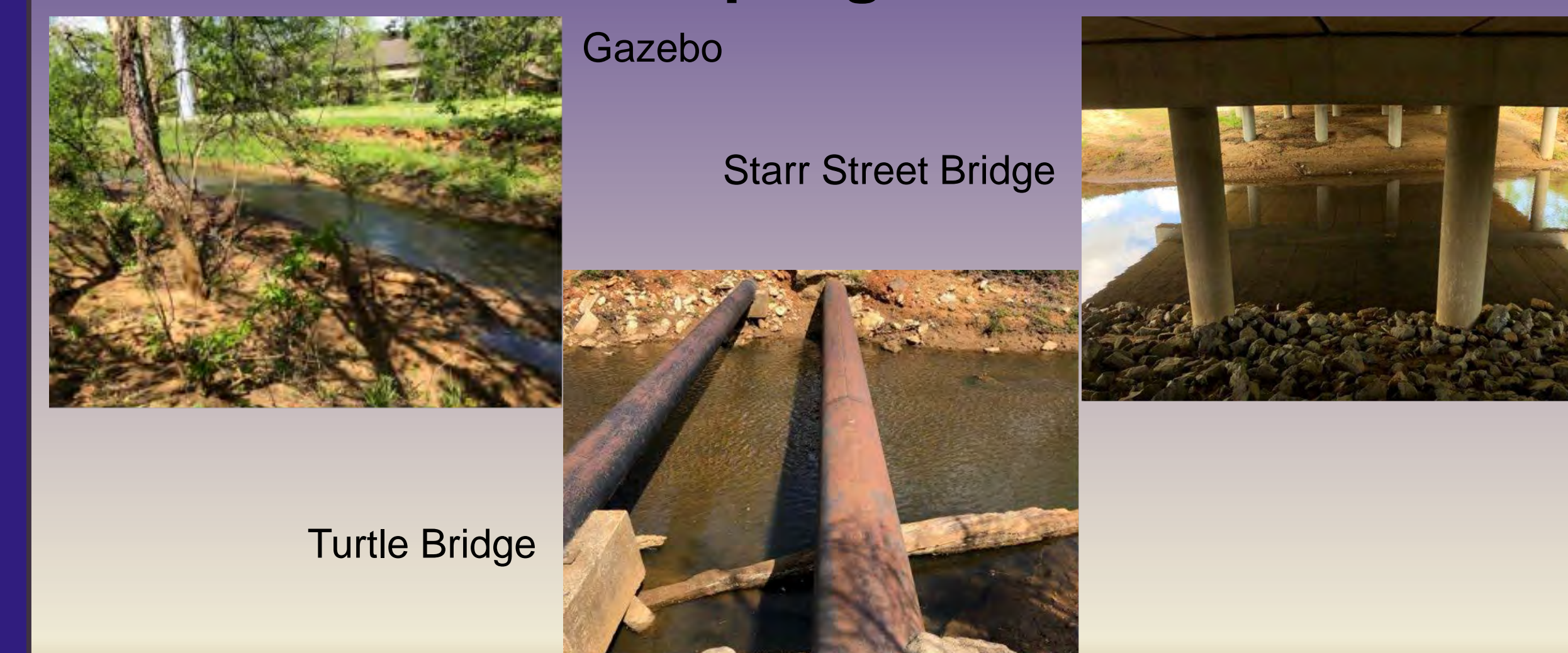
Results



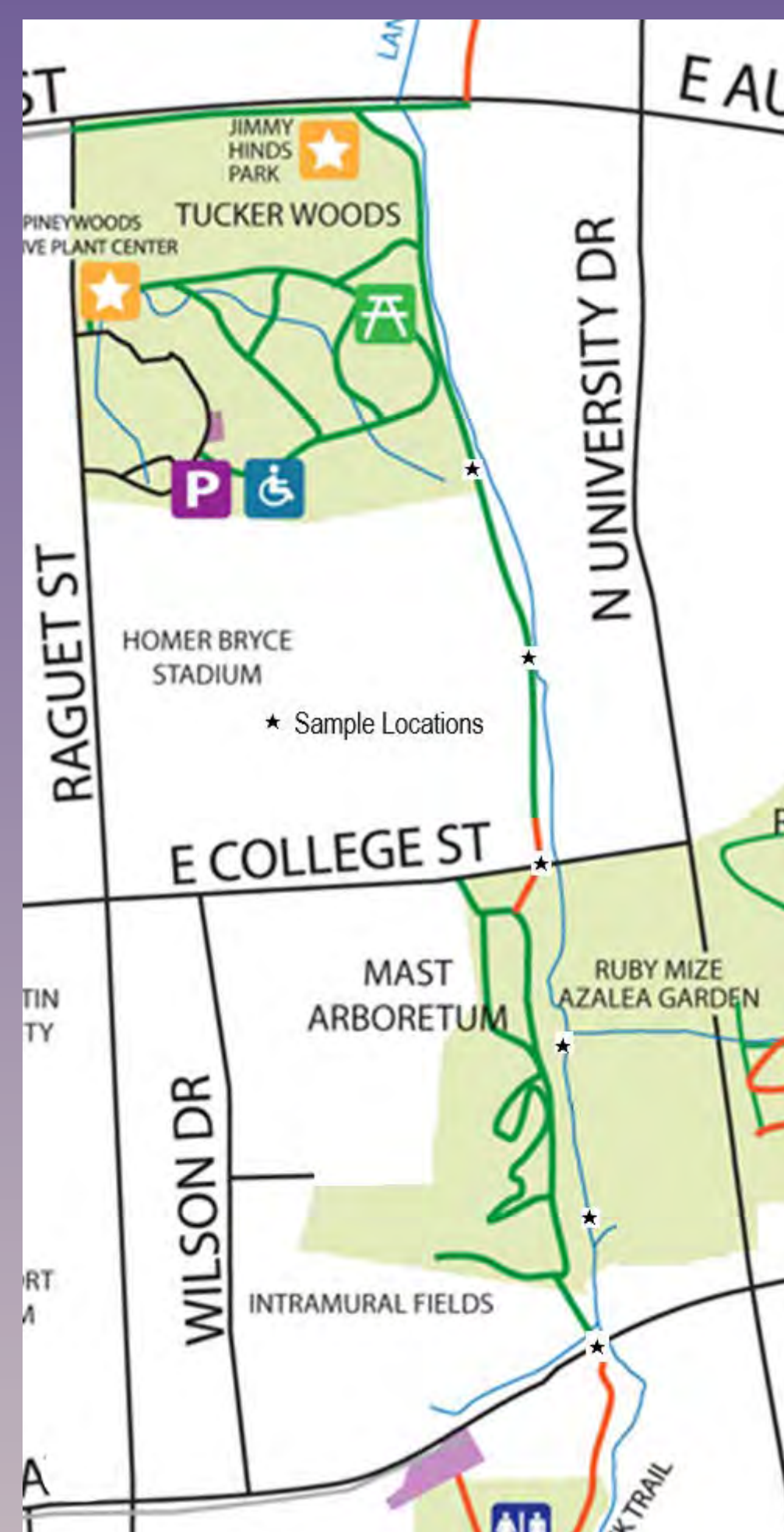
Methodology

Initially, students were taught the techniques and analyses they would be using during the semester long project. Students were shown how to collect and store water samples before analyses were conducted. The different tests that were done included pH, dissolved oxygen, total solids, total dissolved solids, alkalinity, water hardness, and anion analysis. Samples were collected by submerging them under the surface of the water and closing them before pulling the bottle out of the water. This prevents air from interacting with the sample to skew the dissolved oxygen results. The rest of the tests were done once the sample was transported back to the laboratory. All instrumentation was calibrated prior to use. A Vernier LabQuest was used in many of the analyses. Probes used with the LabQuest include; pH, dissolved oxygen, conductivity, and colorimeter. Shown in the Results section are three of the main analyses done; alkalinity, determined as mg/L CO_3^{2-} through titration; hardness, determined as mg/L Ca^{2+} through titration; and total solids, determined as mg/L.

Sampling Sites



Study Area



Six sites were selected for sampling. These are indicated on the map with black stars. The locations ranged from the Starr Street Bridge to Tucker Woods. Sites were sampled a total of 4 times over the course of the Fall 2018 semester as a requirement of the Chemistry 133 Honors Laboratory. Samples were taken: under the Starr Street Bridge; at the bridge that crosses over to the Ruby Mize Azalea Garden, this site was called the turtle bridge due to the number of turtles that like to hang out; near the gazebo in the Mast Arboretum; under the College Street Bridge; at the Commuter Lot Bridge; and at the beginning of Tucker Woods, just past where the field events are held during Track and Field. This covers approximately 1.5 miles of Lanana Creek.



Field Events



College Street Bridge

Commuter Lot Bridge



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Discussion/Conclusions

The overall results of the study indicate that Lanana Creek is fairly healthy and able to support living organisms. The pH measurements show that Lanana is slightly acidic, making it perfect for aquatic organisms and the alkalinity is in the acceptable range for drinking water. During the testing period, there were significant weather events, with it raining significantly. Lanana Creek flooded several times during the semester, with the amount of trash found in the creek increasing greatly. The results of the flooding can especially be seen in the alkalinity and hardness measurements. Both of these values go down significantly over the testing period as the amount of water in the system increased. For the studies on the anions present in Lanana Creek, two simple tests were done for phosphates and sulfates. The tests that were done did not show significant levels of either anion, except near the Turtle Bridge, which is located immediately below the Azalea garden. The concentration of both could be a result of fertilizer run off from the gardens. In addition, the instruments used to measure sulfates and phosphates were not highly sensitive. Additional testing was to be done using an Ion Chromatograph found in the Department of Chemistry and Biochemistry, however, it was not functional during the testing period. The dissolved oxygen test was also inconclusive as the probe was very erratic in taking measurements. Finally, the samples taken at the Starr Street Bridge were completely removed from this study. Most likely the construction of the new bridge caused some irregularities in the water samples causing very erratic measurements. The weather events that occurred over the semester caused expected fluctuations in all of the parameters studied. In general, the sites located after areas with high run off (ie College Street Bridge, the Azalea garden) showed increases in most of the tests. Overall, Lanana Creek is in good health and supports various aquatic species.