

Presence of Macroinvertebrates in Restored and Riprap Sites

Mini Choi, Elizabeth Johnson, Alexander Mazza, Winford Rule

School of Biological Sciences, University of Northern Colorado



UNIVERSITY OF
NORTHERN COLORADO

ABSTRACT

Macroinvertebrates play a critical and overall important role in river health and dynamics. Their inclusion helps a river ecosystem to maintain a healthy balance of both chemical nutrients and river stability within an ever-changing environment. In this experiment the main goal was to prove and give validity to the idea of restoring previously non restored river sites. River restoration has been a widely used process for the simple purpose of structurally supporting a river portion that has deteriorated due to lack of support and structure from fauna and macroinvertebrates. Through catching and counting the macroinvertebrates in the restored section and the section that is being bioengineered to become a restored site (riprap), the total amount of macroinvertebrates was larger in the restored site than the riprap site. The findings of this experiment which were taken out in the field using a quadrant system helped to prove the overall hypothesis. This showed that the efforts put forth by others helped to increase the overall structure, health, and increased the total growth of macroinvertebrates by mimicking the natural environment that they would normally be seen in.

INTRODUCTION

- Macroinvertebrate communities play an important role in biodiversity of lotic and lentic ecosystems.
- These rivers and small communities can play a large role in contributing to the overall ecological success of an environment.
- Restored sites are areas of rivers that were previously damaged but have been fully restored through restoration efforts and are like normal, undisturbed sites.
- Riprap sites are sites where manmade processes of erosion prevention have been used for short-term success.
- Ripraps are important because they can prevent and slow erosion through stabilization of riverbanks, keeping rivers clean of dirt/mud, debris, and potential introduction of invasive species.
- Restoring a geographical site in any way has been shown to increase the overall presence of macroinvertebrates.



Figure 1.3 The area the plots were sampled from.

OBJECTIVES

- Count macroinvertebrates at the restored site and riprap site
- Run statistical tests to analyze our results
- Create visual graphs of our results
- Determine which site has more macroinvertebrate diversity

HYPOTHESIS

- There will be a significant number of macroinvertebrates observed at the restored site compared to the riprap site.

MATERIALS AND METHODS

- 24 plots 50cm x 50cm, with 12 plots sampled at the restored site and 12 plots sampled at the riprap site
- 4 plots above the site, 4 plots at the site, 4 plots below the site
- We took samples with a D-net and measured the depths of the samples with a meter stick. The width of the flat side of the D-net was used to measure the size of the plots (the flat side was roughly 50cm).
- We counted 3 species of macroinvertebrates at varying life stages: mayfly, caddisfly, and midge larvae.



Figure 1.1 A collage of images taken at the restored site.

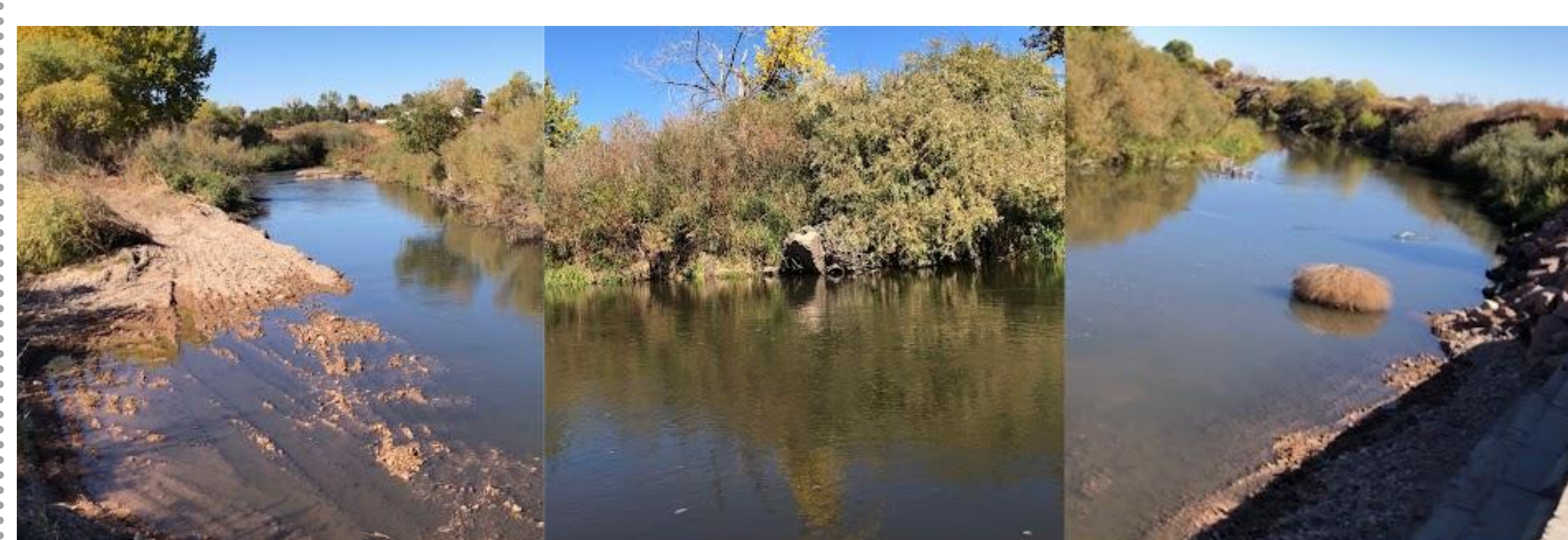


Figure 1.2 A collage of images taken at the riprap site.

RESULTS

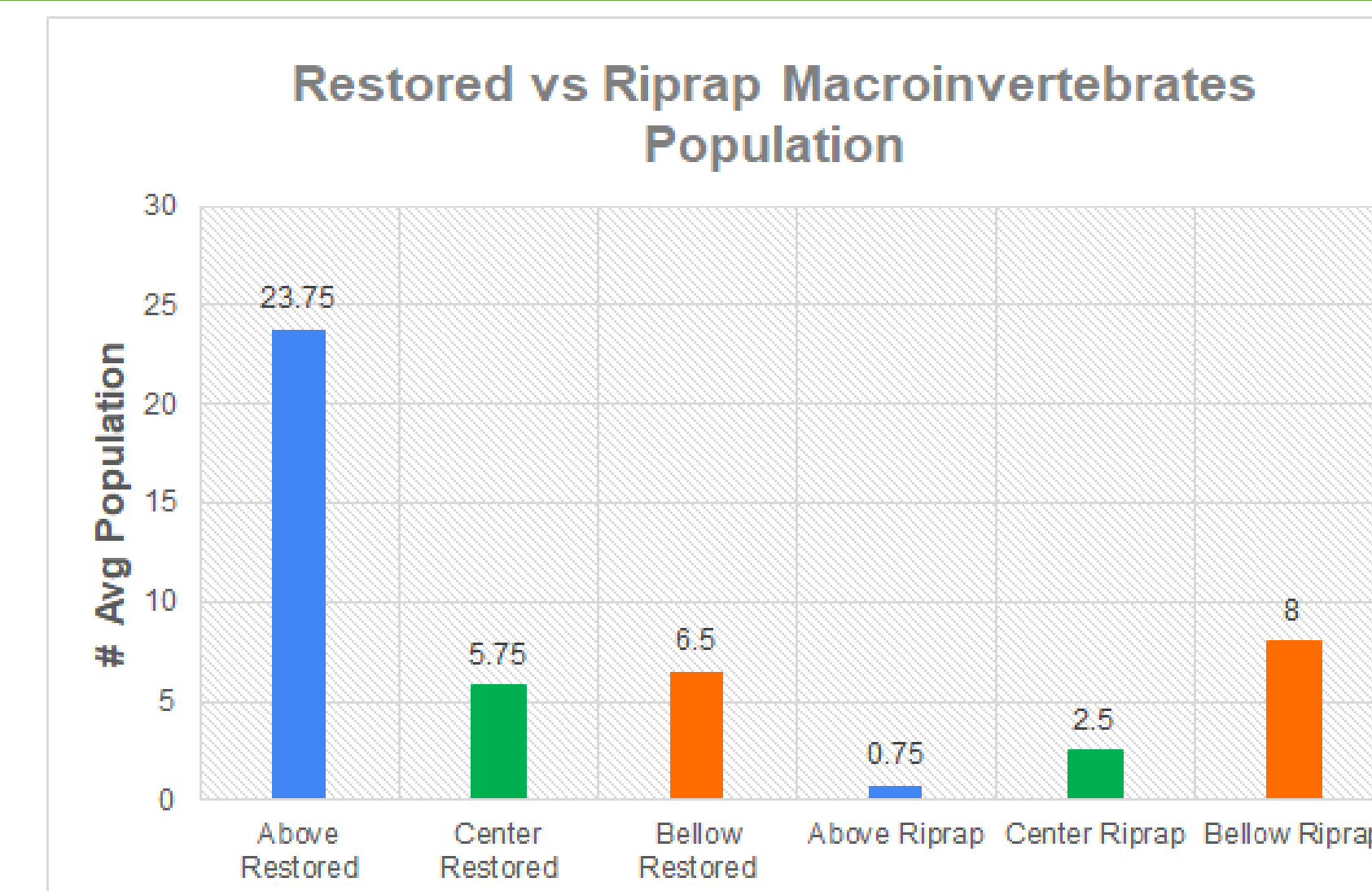


Figure 2.1 The relationship between macroinvertebrate populations and the restored site versus the riprap site.

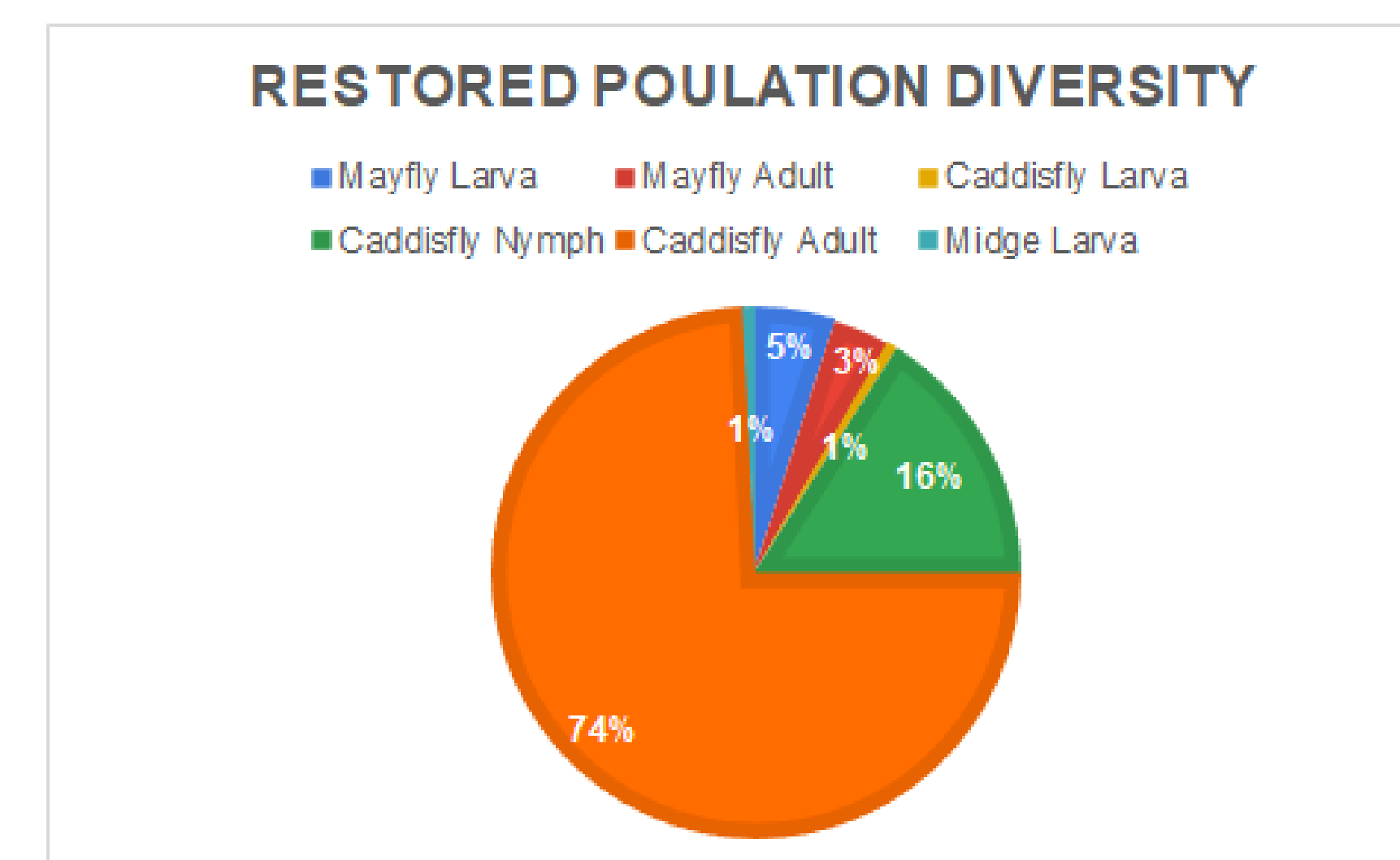


Figure 2.2 Restored Population Diversity

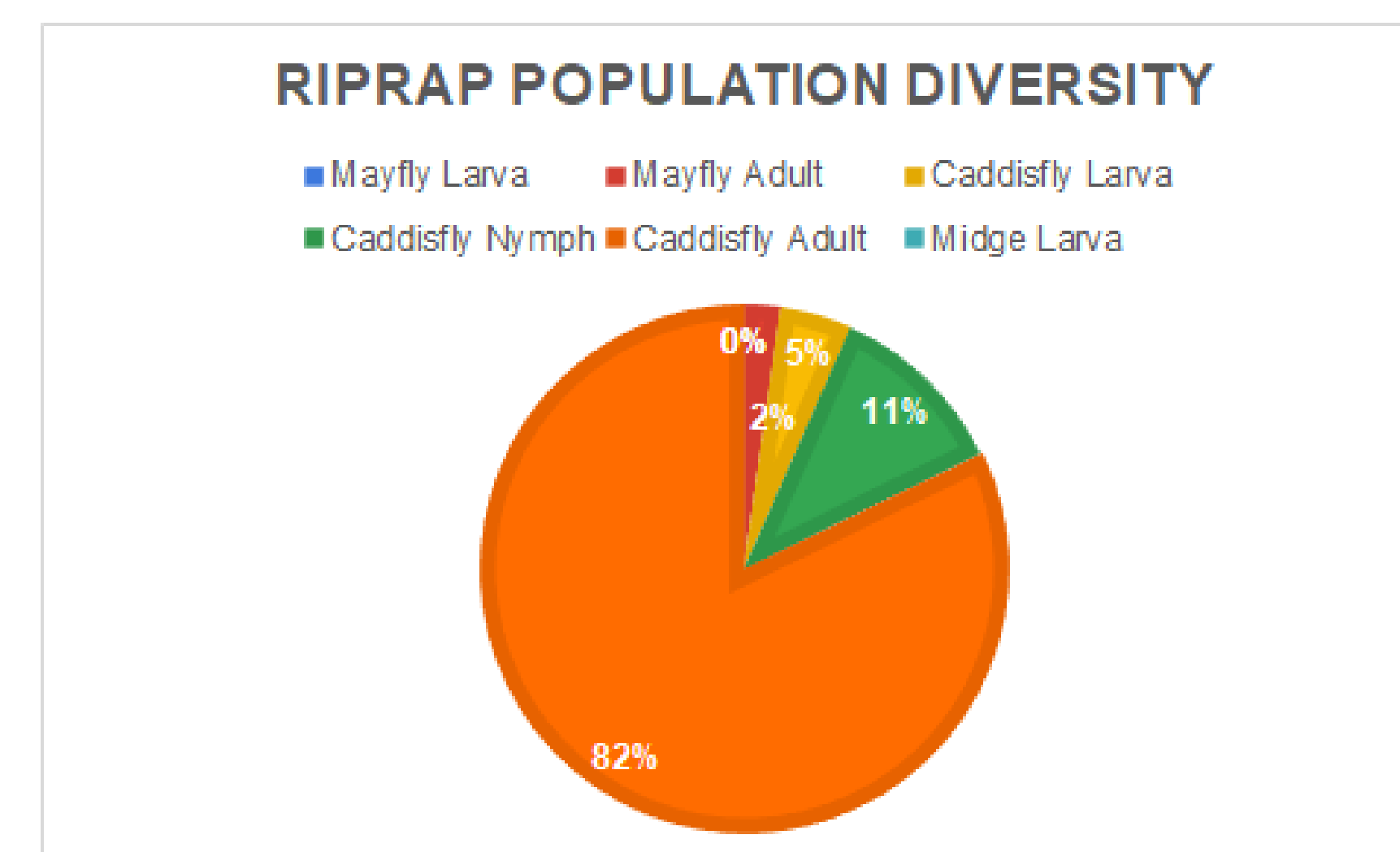


Figure 2.3 Riprap Population Diversity

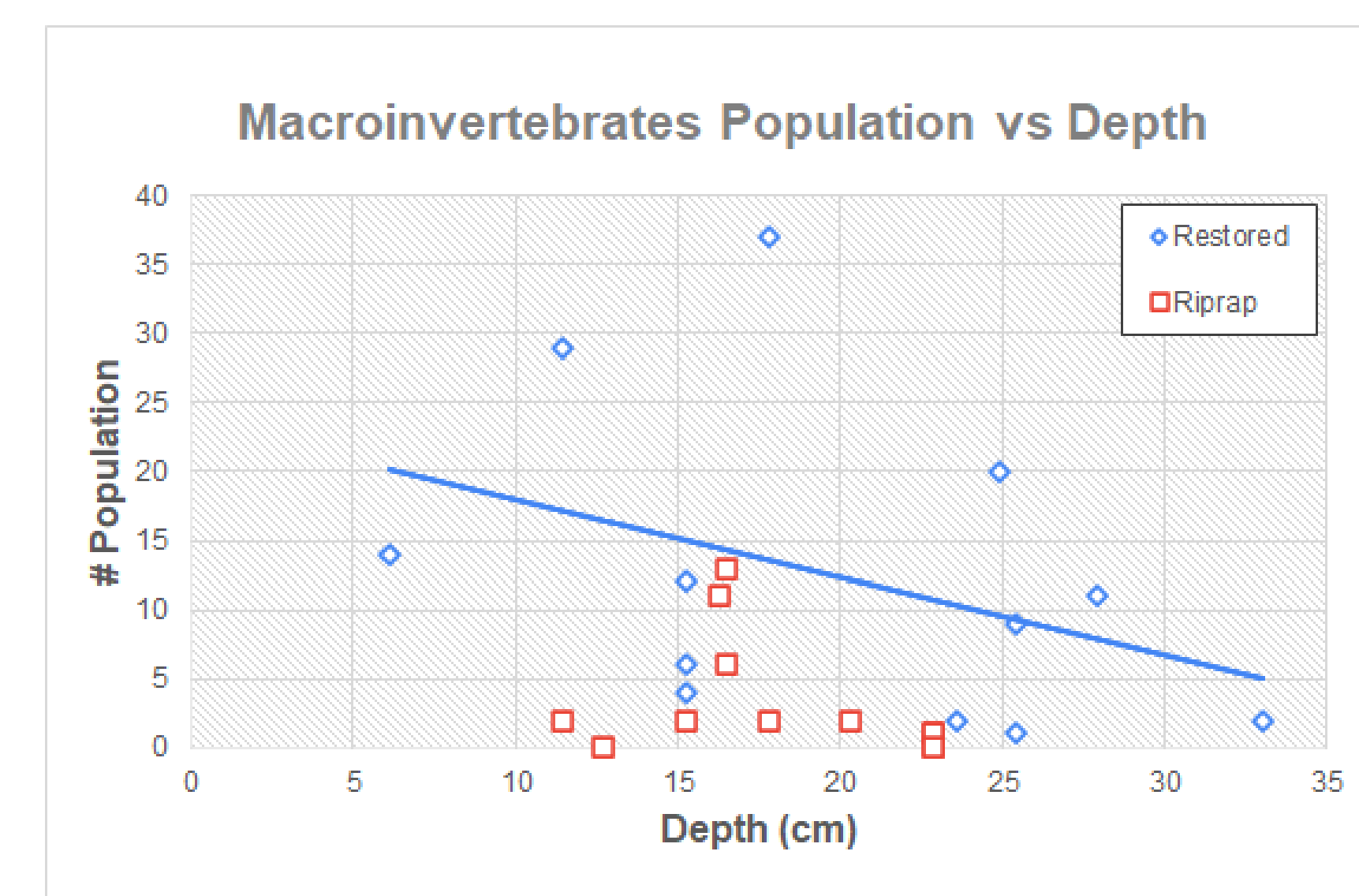


Figure 2.4 The relationship between macroinvertebrate populations and the depths of the river at the restored site versus the riprap site.

RESULTS

- Running a two-sample t-test of the total macroinvertebrates collected at the restored site and riprap site resulted in a p-value of 0.018.
- Because the p-value is less than 0.05, this meant the results were significant, meaning the natural areas, like the restored areas, contained more macroinvertebrates than any bioengineered sites (like riprap sites).

CONCLUSIONS

- Our data indicated a notable increase in the total number of macroinvertebrates at the restored site compared to the riprap site.
- There was no significant difference between the three selected areas at each site, leading to the conclusion that the specific location isn't as important as the overall area.
- The diversity of macroinvertebrates was not affected by the site locations between the restored and riprap, but mostly by temperature and time of year.
- Previous research suggested that we would have seen more macroinvertebrates in general during summer months.
- We observed a lot of caddisflies at both the restored and riprap sites because they are the most abundant during the fall months, which is when we collected our data.

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