## Community Ecology

Professor Rachel Hartnett is a new professor to Oklahoma State University and teaches the “Experimental Design and Analysis in Biology” class. When she was in graduate school she was very interested in community ecology which is the study of an organization and the functioning of many communities, “which are assemblages of interacting populations of the species living within a particular area or habitat” (John Thompson). From this interest she became even more interested in how communities function and how species interacted. Her PhD advisor at the time focused on population genetics, and also focused on single species and the interactions of individuals in the same species or same genetic identity. Within her PhD she looked at how population dynamics affected community properties. With the information her PhD advisor had, she wanted to link the advisors research and findings with her research to observe what was happening at the community level.

Now studying the community level, she has begun to scale upward due to the interest at the community level, and is now studying Oklahoma reservoirs and the whole zooplankton community. The zooplankton that is specific to the research and being observed are the Daphne Zooplankton. Daphnia are a small crustacean that are usually 0.2-5 millimeters in length. Commonly known as water fleas they are the smallest of the crustaceans and their swimming movements resemble how fleas move. Knowing the species that are being studied and observed professor Hartnett is

still trying to keep into account, the variation within the community.

In order to check the variation within the community professor Hartnett will look into the richness and evenness. Richness is a very common metric in community ecology, its number of species in a community and evenness is the relative abundance of each of the species. The idea is to be looking at what’s the effect of each of those species weighted by how many individuals there are in that community. Observing over the growing season how the richness and evenness change in a reservoir, and also look at the rate of that change. Looking at the rate of change ties back to climate change, ecosystem processes, and environmental change because the rate of change is what’s predicted to cause the most species extinctions. Knowing this information professor Hartnett hypothesized that if the rate is too quick of either the zooplankton or the algae, they’ll become unlinked, so there will more likely be extinction because the food source that is feeding the zooplankton is not where it needs to be in time, so the peak of algae is before the peak of zooplankton causing decline over multiple growing seasons.

The information that is gather is being used because there’s a lot of work on different organisms, especially migrating birds, that due to climate change, they are arriving after they’ve migrated all this way to their northern environment, but because its warmer temperatures, the peak of bug densities such as crickets or worms are already gone because the temperatures have warmed up to quickly. This then causes there to be a lot of work on declining bird populations and the asynchrony between their prey item. With this example about birds and migrating to quickly due to temperatures, professor Hartnett is hoping to see with her research what the natural and less extreme setting what this might look like in a different environment because aquatic systems are different than terrestrial systems.

Professor Hartnett has not yet conducted this exact experiment and is planning to begin this summer along with an undergrad student to sample sights around Stillwater, which include 8 reservoirs, alga samples, zooplankton samples, and environmental data. Due to the collection of data being more complicated professor Hartnett will have environmental parameters including temperature, conductivity (measuring ion concentration in water), pH, taking into account how much water is let out of the dam because that could be a big difference on the environment, size of each reservoir, and matrix environmental variables. She will also be using a mantel test, which is comparing how the environmental parameters are correlated with the biotic parameters. With this information she will be able to see what environmental drivers are leading to high species richness, evenness, and a measure of productivity which is alga biomass.

Because Professor Hartnett has not completed this research there are no publications yet and the research is still in journal.

References

“Daphnia.” Wikipedia, Wikimedia Foundation, 1 Apr. 2019, en.wikipedia.org/wiki/Daphnia.

Thompson, John N. “Community Ecology.” Encyclopedia Britannica, Encyclopedia Britannica, Inc., 15 Jan. 2019, www.britannica.com/science/community-ecology.