FURSCA End of Summer 2022 Report

Population Genetics of Wild Rice (*Zizania palustris)* in South Central Michigan

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I had two main goals for my summer 2022 FURSCA research. First of all, I wanted to better understand the genetic structure of the populations of *Zizania palustris* in Michigan. This was done by collecting samples of wild rice from different populations, extracting DNA from these samples, running a polymerase chain reaction (PCR) on the DNA, and then sequencing the PCR products. Secondly, I wanted to learn about the cultural significance of this aquatic plant to local Great Lakes Native American Tribes. This was accomplished by reading literature and watching documentaries from tribe members, as well as having several conversations with Lee Sprague and Yebishawn Oldshield, members of the Gun Lake Tribe.

I learned that in Native American culture wild rice is an extremely important food source, and it is used in some sacred ceremonies and rituals. Due to this crop's significance, there have been many restoration efforts to attempt to rebuild populations that have a decreasing amount of individuals, and to introduce new populations to habitats that could potentially sustain rice. Therefore, it was expected that there would be little genetic difference among individuals in populations that were manually seeded. Additionally, it was expected that separate populations that were seeded using seeds from the same initial population will have little genetic diversity between those populations.

The first phase of my research was to learn to identify wild rice, its three variants, and to collect leaf samples. My advisor, Dr. Sheila Lyons-Sobaski, and I were able to collect from 11 sites in South Central Michigan with the help of Lee Sprague. These sites included habitats in Battle Creek, Marshall, Hopkins, Albion, and Concord, Michigan. Ten out of the 11 sites were seeded by hand for restoration purposes, and one site in Albion is believed to be a naturally occurring, healthy population. This is significant because the individuals from the Albion site will

be compared to the “man made” populations, to see if the reseeding actually has an impact on the genetic structure.

The next phase of my research was to extract DNA from the samples collected and then run PCR on those samples. To extract the DNA a Qiagen DNeasy extraction mini kit was used. Once the DNA was extracted, PCR was run using fourteen different primers. In the earlier weeks of my research, the PCR products were run on an electrophoresis gel to determine if the DNA was amplified or not. During this process, we realized that certain primers were not working well with the wild rice DNA. We then altered the parameters of the thermocycler (the instrument that PCR is run on), which improved the amplification of a few of the primers. At the end of these tests, we decided to use 11 of the 14 primers for our final testing, those of which were working consistently.

After the DNA was amplified using the PCR with the eleven working primers, the last phase of my research could begin; running the PCR products on a genetic sequencer. For my research, we used the CEQ 8000 genetic sequencer. With the amount of time I had, I was only able to perform PCR reactions for four primer sets. Prior to completing my FURSCA experience, I performed 96 PCR reactions for each of four primer sets for a total of 384 reactions. I ran these PCR products on the Beckman-Coulter CEQ 8000 DNA Analyzer. Of the PCR reactions, three of the four primer sets yielded products. Thus, 96 of the reactions didn’t seem to work and will need to be rerun. While I haven’t yet analyzed the data, The results from the earlier PCR products appeared to be consistent to what was expected, that there was very little genetic variation between the individuals in the same population.

Although great strides were made this summer, I still have a lot I would like to accomplish in the future. First of all, I would like to analyze the results from the data that was run on my last day of work. Furthermore, I would like to run more PCR reactions using different primer sets. I am also taking ANTH 389: Archaeology of Wild Rice in MI, in the fall to gain more knowledge about the cultural aspects of this plant. Lastly, I plan to continue to share my

research by presenting at the Elkin Isaac Research Symposium, and writing about this research in my senior thesis.

Overall, this summer working with Dr. Lyons-Sobaski has been extremely valuable. It has taught me that I truly love working in a lab environment due to the constant sharing and exploration of ideas. It has also taught me the importance of working alongside those who are just as passionate about your work as you are, it makes your work experience that much more rewarding. Due to these realizations, I have shifted my career goals from one working in the field of dentistry, to one of working in a research lab; whether it be in biology, biochemistry, or chemistry. Lastly, I would like to thank the Robson Family Fellow Endowed for giving me the opportunity to participate in FURSCA research and Jason Raddatz and his crew at the Whitehouse Nature Center for helping us in the field. I am beyond grateful for this experience I gained this summer, what I learned will be beneficial in my future academic and career aspirations.