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Shannon Point Marine Center Research Intern

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COLLEGE OF THE ENVIRONMENT

WESTERN WASHINGTON UNIVERSITY
MAKE WAVES.

Internship Title:

Organization Worked For:

Student Name:

Internship Dates:

Faculty Advisor Name

Department

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DATE: _____

College of the Environment Internship Report: Shannon Point Marine Center

Sam Clement

4/30/24 - 8/23/24

ESCI 498b

For the past two quarters, I have worked with Professor Morgan Eisenlord on two experiments involving eelgrass wasting disease. In both experiments, samples were collected from Padilla Bay. One, which dates back to the Summer of 2023, analyzes how the protist *Labyrinthula zostera* (which causes eelgrass wasting disease) presents itself in eelgrass when compared to algae. Another, primarily worked on by two students at the Shannon Point Marine Center during the Summer of 2024, analyzed differences in eelgrass wasting disease between two different species of eelgrass in Padilla Bay: *Zostera marina* and *Zostera Japonica*. My contributions included measuring the area of eelgrass leaves, measuring the area of eelgrass wasting disease on individual leaves, using scanning electron microscopy (SEM) to capture images of possible *L. zostera,* preparing samples for analyzation via SEM, preparing eelgrass samples from Padilla Bay to be experimented on, and writing a protocol in ImageJ to speed up the process of measuring the area of leaves and disease area.

One of my learning objectives was to develop skills related to the projects I worked on, one of which used the software ImageJ to analyze images of eelgrass samples and identify diseased areas. ImageJ enables users to determine real-world areas from an image based on a selection of pixels. I had to measure the area of hundreds of eelgrass leaves and the area of disease found within individual leaves. For about a month, I focused only on

the area of entire leaves because it was time-consuming to measure each leaf by hand. I then realized I could likely speed up the process if I could write a protocol that automatically selects each leaf when they are clicked on. It took a few days of tweaking, but I eventually devised a script that consistently selects the area of each leaf, dramatically speeding up the process of measuring their areas. I tried to do the same process with the diseased area, but due to the color scheme of the disease on each leaf, was unable to replicate the macro in the same way. As a result, I did all of these by hand, which was a significantly more time-consuming process. I sent the macro I wrote to Professor Eisenlord, along with a guide I wrote on how to use it so that those who may work on the project in the future can also take advantage of the optimized workflow. Overall, I think I did well in completing both of these objectives, especially considering this is where I spent the majority of my time during the internship.

Figure 1: Using ImageJ to measure the area of eelgrass wasting disease.

Another one of my learning objectives was to learn sampling techniques for eelgrass culture onsite at Padilla Bay. Due to scheduling conflicts, I couldn't participate in actually collecting the samples from the bay. However, I did lots of work preparing the samples collected by others to be experimented on. I traveled to Padilla Bay twice to help with

preparing the samples. On the first day, I helped sort through the two species of eelgrass samples collected by eliminating ones that were deemed unsuitable for the experiment as they were either contained disease, were too small, or otherwise damaged in some way. For the usable samples, I prepared them for the experiment by cutting off the roots and extra leaves and acclimating them in freshwater. The next day, I helped further prepare the samples by filtering out the best ones, cutting them all to the same length, and then placing each leaf in its own bag with freshwater so that they're ready to be experimented on. While I didn't gain experience in the field collecting samples, I gained many new skills relating to preparing eelgrass samples for experiments, so I would say I still completed this learning objective even if it wasn't exactly how I anticipated.

The last skill I wanted to improve was analyzing and visually representing the collected data. While I didn't end up doing any visualization, I spent lots of time using SEM to analyze samples of eelgrass and algae for *L. zostera*. I worked with Michael Kraft of WWU Scientific Technical Services to develop my skills using the SEM throughout about ten sessions, each spanning 2 to 3 hours. I learned how to load a sample in the SEM, prepare the SEM for use, focus the electron beam and navigate by moving the stage, capture images, and shut down the SEM. Additionally, I spent two days learning how to prepare samples to be used for SEM. I practiced critical point drying and sputter coating and I prepared sixteen sample stubs by myself. I think this is where I gained the most new skills –

Figure 2: WWU's JEOL JSM-7200F Field Emission SEM that I used for research.

I had never done anything related to SEM before the internship, and I am now confident in my abilities to both prepare samples for and operate the microscope. At the beginning of the internship when writing the objectives, it was still slightly unclear exactly what my role would be, so I didn't end up contributing any data visualization. However, I am still satisfied with what I did contribute in terms of analyzing data, so I feel that I still succeeded in the core of this objective.

My last learning objective was to learn how to work in a team conducting research and understand how my contributions fit into the broader picture. I do think I succeeded in this objective, though not exactly how I expected to. While I did contribute to research conducted by a team, much of the work I completed was done by myself. My time spent on ImageJ and most of my time spent on the SEM I spent alone. While I understand how I contributed to the overall projects, I think a big takeaway is that much of conducting research can be individual and monotonous. That's not to say it's inherently negative, but I think it's good that I got a taste of working by myself on the same task for a while so that I understand what it feels like. That said, I also got to work in a team while preparing the samples at Shannon Point, and that was a refreshing break from the work I had done by myself. I think it taught me that ideally, I will have a position in which I have both solo and team opportunities because I think I do best with a balance of both.

One way that my coursework prepared me for the tasks I encountered in my internship is that many of the labs I've taken had skills that were directly applicable to the work I did. For instance, I had experience in ImageJ from my microbiology lab which gave me a headstart on using the software to measure eelgrass. I had experience preparing plants to experiment on from multiple biology labs. Being in a lab environment helped me to understand the workflow in a lab which enabled me to be more efficient. I also think that I benefitted greatly from doing homework in all of my classes because it helped instill patience and discipline for the prolonged individual work. Additionally, the hands-on experience I gained with the SEM, critical point dryer, gold coater, and sample preparation was all relevant experiential application work. This was all new to me, so I'm excited to be able to apply those skills and list them on a resume. Overall, my coursework gave me foundational knowledge and skills, my internship allowed me to apply them, and that combination has given me a more well-rounded understanding of conducting research.