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College of the Environment

Summer 2024

WWU Marine Geochemistry Lab Intern

Kyle Wisner
Western Washington University

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COLLEGE OF THE ENVIRONMENT



Internship Title: Internship with Marine Chemistry Lab

Organization Worked For: WWU Marine Chemistry Lab

Student Name: Kyle Wisner

Internship Dates: 6/26/24 9/1/24

Faculty Advisor Name Kathryn Sobocinski

Department ESCI



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STUDENT SIGNATURE Kyle Wisner Digitally signed by Kyle Wisner
Date: 2024.08.27 12:59:10 -07'00'

DATE: 8/27/24

COLLEGE OF THE ENVIRONMENT



Section 1 – Student Identification

Last Name, First Name:	Wisner, Kyle	Western ID:	W01536371
Email Address	wisnerk@wwu.edu	Major/PreMajor	Environmental Science - Marine Emphasis

Section 2 – Registration Information

Total Credits:	5	Faculty Advisor:	Kathryn Sobocinski
Internship Start Date:	June 25	Internship End Date:	September 1
Number Credits Per Quarter (F/W/S/Sum):	Sum: 5		
<p><i>Note: You must be registered for credits during quarters you perform any part of the internship work (Including Summer Session) to include writing of reports...this can be spread over multiple quarters. You are expected to register an appropriate number of credits based on anticipated hours worked BY Quarter (Example: Working 120 hours during Summer = 4 Credits Summer Enrollment).</i></p>			

Section 3 – Organization for Internship

Organization Name:	Department of Environmental Science - David Shull's Lab
Intern Supervisor Name:	David Shull
Mailing Address:	516 High Street - MS 9181 Bellingham, WA 98225
Email Address:	shulld@wwu.edu
Phone Number:	3690
<p>Description of Duties (Or Attach Job Description):</p> <p>Building acrylomide and agarose gels, qpcr dna work, sediment core incubation, deployment</p>	

Section 4 – Learning Objectives

What do I intend to learn from this experience: (Be as specific as you can)

I intend to learn about sediment chemistry and molecular biology through the study of the two-dimensional distribution of nitrogen in sediment around the Salish sea and how the sequestering of nitrogen in these sediments affects processes like eutrophication. I also intend to gain knowledge of professional field work through tasks relating to this study such as acrylamide gel diffusive equilibrium sensors and helping to deploy them in specific sampling sites around the Salish Sea.

How does this experience contribute to my educational or career goals:

This experience will allow me to build and apply technical skills that will be important in work as a field or research technician. Additionally, I will be able to apply the knowledge I have gained through academic instruction to assist a professional research project while also broadening my understanding of marine chemistry and general marine processes.

Quarter by Quarter Requirements for Satisfactory Grade for Internship (Faculty MUST specify their requirements):
Annotated Log of Activities - how they tie into learning objectives. Can be creative.

Section 5 - Deadlines, Evaluation, and Assessment (Completed by faculty advisor)

Meet with Advisor: <u>5/9/2024</u>	Yes	No
First Draft Due: <u>8/25/2024</u>	<input type="radio"/>	<input checked="" type="radio"/>
Final Draft Due: <u>9/1/2024</u>	<input checked="" type="radio"/>	<input type="radio"/>
Additional Learning Objectives (as assigned by faculty)	<input type="radio"/>	<input checked="" type="radio"/>
Oral Presentation Required	<input type="radio"/>	<input checked="" type="radio"/>
Daily/Weekly Log Require	<input checked="" type="radio"/>	<input type="radio"/>

Section 6 – Students Certification

I certify that I have read the University Policy on Risk Management Considerations for Student Internships and I will report any injuries suffered while performing internship promptly to WWU.

<https://policy.wvu.edu/POL-U2100.03-Managing-the-Risk-of-Off-Campus-Experiential-Learning-Programs>

I will endeavor to represent myself and my college well and will abide by the relevant policies, procedures and ethical standards of the university and my internship organization.

I understand that **30-hours of work per credit earned is expected** for an internship. I understand that I am expected to enroll in a number of credits commensurate with hours worked each quarter.

Student's Signature/Date	<i>Kyle Wisner 5/10/2024</i>
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Section 7 – Internship Site Supervisor Certification

I have reviewed the student's indicated learning objectives and on behalf of my organization agree:

- To enrich the Student's knowledge by orienting him/her to the occupation, the work setting, and the responsibilities relating to the assignment
- To regularly evaluate/provide feedback to student on progress, projects and areas of growth
- At or near the completion of the assignment to provide an evaluation of the student's performance
- To review and approve the Student's Learning Plan and communicate with the college if areas are not going to be met.
- To supply the student with, and abide by the organization's policy against discrimination and/or harassment in the workplace
- To contact the instructor or the College of the Environment Internship Coordinator (360) 650-3646, ed.weber@wvu.edu should any problems arise

Internship Site Supervisor Signature/Date	David H Shull	 Digitally signed by David H Shull Date: 2024.04.23 19:06:54 -07'00'
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Section 8 – Faculty Advisor Certification

I certify that the student intern and I have reached agreement on the learning objectives and academic expectations for this experience. I have assigned appropriate educational requirements for each quarter of the experience. These objectives are challenging and enriching to the student's academic and/or career goals. I will award grades after satisfactory completion of all learning objectives assigned for each quarter registered by student. I have counseled student on registration requirement during quarters in which work is done.

Faculty Advisor's Signature/Date	
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Section 9 – College of the Environment Internship Coordinator

Actions:

1. Review Agreement
2. Update Course Override
3. File Agreement in Student Records
4. Communicate with Employers as necessary during internship

Introduction

My internship for the summer of 2024 was with Dr. David Shull and the Marine Chemistry Lab of the Environmental Science Department at WWU. The purpose of my internship was assisting in the research project of one of his graduate students, Jessica Scotten. Jessica acted as my main advisor and mentor throughout the internship, with occasional check-ins with Dr. Shull. The focus of the project was to quantify the amount of nitrogen sequestered in the sediment surrounding major agricultural areas. In fact, Jessica's project is partially funded by the Padilla Bay National Estuarine Research Reserve with the main goal of finding out how much nitrogen gets into the surrounding sediment from agricultural runoff. The larger theme of this project is tackling Puget Sound's nitrogen problem. Waste water from agricultural runoff and wastewater treatment plants have dissolved nutrients (nitrogen being the main focus of our project) which in excess can cause eutrophication, leading to bottom-water hypoxia. Through this research we hope to collect data to put on paper the amount of nutrients escaping through these routes, the potential damage it is causing, and in the future contribute to a solution for this problem. I assisted Jessica and Dr. Shull by conducting and assisting in lab work and field work throughout the summer. This was a very enriching experience and was a great way to gain experience working in a professional research environment.

Lab Work

Nitrogen concentration in sediment was measured using diffuse equilibrium sensors deployed into the sediment. The sensors were essentially two types of gels on a plexiglass plate mount that gradually equilibrated with the concentration of nitrogen in the sediment over the course of a day. Each of the two gels, with specific preparations, were able to detect a certain type of nitrogen molecule. Agarose gels were able to detect nitrite (NO_2) and nitrate (NO_3) while acrylamide gels were able to detect ammonium (NH_4). Detection worked through the reaction of various reagent-soaked gels with the nutrients dissolved in the gels. Agarose gels used Griess reagents, while acrylamide gels used two reagents, one consisting of sodium hydroxide, sodium hypochlorite, and etidronic acid while the other consisted of thymol and sodium nitroprusside. When combined with reagent-soaked gels, the sensor gel would develop a

distinctive color, pink for NO_2 and NO_3 and blue for NH_4 . The gels were then analyzed for absorption values using ImageJ and then concentration determined with a specific equation. In the lab, I was responsible for making both types of sensor gels and mixing reagents for testing. Additionally, I assisted with research and development for methods that either did not work or were not working effectively.

Field Work

Our field work days consisted of trips to Padilla bay and boat trips in Bellingham Bay and lab work post-sample collection. Padilla bay field research was conducted during low tide to make walking out to sampling locations easier. We took sediment samples at three locations which were chosen for their proximity from Joe Leary Slough, a major source of agricultural runoff to Padilla Bay. For each sample, we would walk out to a certain point in the bay which was cataloged in a GPS device and place a sample sediment core. Our first deployment we placed the gel frames directly into the sediment and waited a whole tide cycle before retrieving the core, but we found that collecting the cores with the frame in them often damaged the gels irreversibly. After figuring this out, we switched to placing the gels in the cores after collecting them and incubating them in a refrigerator. Bellingham Bay trips were much more enjoyable, and consisted of trips aboard Shannon Point Marine Center's RV Magister. After sample collection, we processed each gel at Shannon Point using the aforementioned reagent soaked-gels. After developing, each gel was scanned using a flatbed scanner if it was an NH_4 gel or the hyperspectral camera if it was a NO_2/NO_3 gel. Overall, fieldwork days were a great way to apply the knowledge I had been building in the lab and build upon my lab skills, not to mention getting quality time outside surrounded by tidal flats and the water.

Coursework and Experiential Application

This internship gave me the amazing opportunity to directly apply the knowledge I gained from coursework into practice. I would say the three most impactful classes I have taken in relation to the subject of my internship were Oceanography with Dr. David Shull, Water Quality with Dr. Marco Hatch, and Marine Fish Ecology with Dr. Kathryn Sobocinski. Each of these classes covered specific topics that

would go on to benefit my internship experience. In Oceanography I learned about sediment physics and chemistry and learned about the grand processes that would affect the distribution of nutrients in our sediment core samples. Water Quality taught me about the impacts that excess nutrients can have on overlying water quality and where these excess nutrients often originate from. Marine fish ecology taught me about the importance of estuaries, the main focus of my internship research, and how an imbalance in the natural processes surrounding them can have catastrophic consequences for their health. These classes taught me valuable information and served to improve my internship experience. Without them, I feel I would have been more lost and would not have been able to be as independent as I have been while working. The opportunity to apply my coursework to a professional situation strengthened my confidence in pursuing a career in environmental sciences. I am incredibly grateful for the experience I gained and would like to thank Dr. Shull and Jessica Scotten for mentoring me through it.

WORK LOG

DATE	TIME		TTL. HRS	WORK TYPE	
4/27/2024	10am-3:30pm		5.5	lab	
4/28/2024	9am-2:30pm		11	lab	
7/1/2024	9am-2pm		16	lab	
7/2/2024	9am-2:30pm		21.5	lab	
7/8/2024	10am-4pm		27.5	lab	
7/9/2024	10am-10:30pm		40	Field+lab	
7/10/2024	10am-2pm		44	lab	
7/11/2024	9am-2pm		49	lab	
7/16/2024	9am-3:30pm		55.5	lab	
7/17/2024	9am-3:30pm		62	lab	
7/18/2024	7:30am-4pm		70.5	Field	
7/19/2024	3pm-5am		84.5	Field+lab	
7/22/2024	9am-3pm		90.5	lab	
7/29/2024	9am-3pm		96.5	lab	
7/31/2024	9am-3:30pm		103	lab	
8/2/2024	9am-3pm		109	lab	
8/19/2024	10am-3:30pm		114.5	lab	
8/20/2024	11:30am-3:30pm		118.5	lab	
8/21/2024	10:30-am-3:30pm		123.5	lab	
8/22/2024	9:30am-3:30pm		129.5	lab	
8/26/2024	9:30am-3:30pm		135.5	lab	
8/29/2024	7:30am-2:30pm		142.5	Field	
8/30/2024	11:30am-10pm		153	Field+lab	