



2023

RE-Sources North Sound Waterkeeper

Hannah Miller
Western Washington University

Follow this and additional works at: https://cedar.wwu.edu/cenv_internship



Part of the [Environmental Sciences Commons](#)

Recommended Citation

Miller, Hannah, "RE-Sources North Sound Waterkeeper" (2023). *College of the Environment Internship Reports*. 139.

https://cedar.wwu.edu/cenv_internship/139

This Article is brought to you for free and open access by the College of the Environment at Western CEDAR. It has been accepted for inclusion in College of the Environment Internship Reports by an authorized administrator of Western CEDAR. For more information, please contact westerncedar@wwu.edu.

COLLEGE OF THE ENVIRONMENT



Internship Title: North Sound Waterkeeper

Organization Worked For: Resources

Student Name: HannahMiller

Internship Dates: 1/4/20 6/9/20

Faculty Advisor Name: David Shull

Department: ESCI

I grant to Western Washington University the non-exclusive royalty-free right to archive, reproduce, distribute, and display this Report document in any and all forms, including electronic format, via any digital library mechanisms maintained by WWU.

I represent and warrant this is original work, and does not infringe or violate any rights of others. I warrant that I have obtained written permissions from the owner of any third party copyrighted material included in this document.

I acknowledge that I retain ownership rights to the copyright of this work, including but not limited to the right to use all or part of this work in future works, such as articles or books. Library users are granted permission for individual, research and non-commercial reproduction of this work for educational purposes only. Any further digital posting of this document requires specific permission from the author.

Any copying or publication of this document for commercial purposes, or for financial gain, is not allowed without my written permission.

Hannah Miller

STUDENT SIGNATURE _____

DATE: 6/8/20 _____

HUXLEY COLLEGE INTERNSHIP REPORT

I. STUDENT/INTERN INFORMATION

NAME: Hannah E. Miller	W#:01413954
MAJOR: Environmental Science	CONCENTRATION: Marine Emphasis
INTERNSHIP TITLE: North Sound Bay Keeper	
PERIOD OF INTERNSHIP: 1/4/2023-6/9/2023	
AVG. HRS. PER WEEK: 7	TOTAL HRS. WORKED: 152

II. HOST INSTITUTION INFORMATION

INST. NAME: Re-sources	
INST. ADDRESS: 2309 Meridian St. Bellingham, WA 98225 US	
INST. MISSION: We mobilize people in Northwest Washington to build just and thriving communities and to protect the land, water, and climate on which we all depend.	
SUPERVISOR NAME: Kirsten McDade	SUPERVISOR TITLE: Pollution Prevention Specialist
SUPERVISOR CONTACT INFORMATION: Email: kirstenm@re-sources.org #: (360)220-0556	

III. INTRODUCTION

[Provide an introductory description of your internship, including a brief overview of the project or program on which you worked, the objectives of that project or program, and your role as an intern within that project or program; max. 250 words.]

My internship was with Re-sources, a non-profit company that dedicates it's time to protecting the central Salish Sea Region through education, cleanups, and community science. Specifically, they aim to create a healthy, clean society that is accessible to all people. They do this work by following 5 values: interdependent ecosystems and communities, accountability, justice, impact, and hope.

My role specifically was as the North Sound Water Keeper. I assisted in various activities that helped monitor, restore, and measure local water ecosystems and engaged with local community members. I created a stormwater pollution permit project to compile data on local facilities in Bellingham. Every month, I assisted in stormwater monitoring of 7 outfalls in Bellingham. The data we collected was entered onto Water Reporter where the public has access. I attended training to learn about the DOE, NPDES, EPA, and beach cleanups. I assisted the Pollution Prevention Specialist on pollution patrols via canoe. The locations we observed were North/South Lake Whatcom and Lake Terrell. In mid-May, I attended an EPA microplastic protocol training and participated in a cleanup at Golden Gardens Beach in Seattle.

HUXLEY COLLEGE INTERNSHIP REPORT

IV. DESCRIPTION OF DUTIES AND RESPONSIBILITIES

[Provide a detailed description of your duties and responsibilities, including any relevant background information; max. 1,250 words.]

Permit project

The first task given to me during my time at Re-sources was to create a supplementary project to the Resources Water Quality Permit Holders map. In Washington State there are two types of Water Quality Permits, being State Waste Discharge permits and National Pollutant Discharge Elimination System. The goal was to learn about these different Pollution Permit Holders in Bellingham. Specifically, I wanted to find where the facilities were located, what contaminants were used, how many exceedances the facility has had over the past 10 years, and where they discharge to. To get started, I looked through the PARIS system (Water Quality Permitting and Reporting Information System). Through this, I was able to find what facilities in Bellingham hold Industrial to POTW/Private SWDP IP (Publicly owned treatment works, State Waste Discharge, Independent Permit), Industrial NPDES IP (National Pollutant Discharge Elimination System), and Industrial SW GP permits (Storm Water General Permit). I separated them all out onto google excel sheets, removing the inactive permits. I alphabetized the facilities to check for duplicates and create an organized template. From here, I collected data such as Industrial and Class codes, addresses, facility descriptions, exceedances, and possible contaminants. This information was then compiled onto a Google My Map and separated per logo with each permit type distinguished.

Research of elevated levels of PFAS in the Bellingham area prompted me to add a new layer to the project. Finding documents with accounting if presumptive PFAS, I added an extra layer to the My Map with facilities of interest.

Water patrols

More throughout the Spring quarter, I was a part of monitoring local waterways in Bellingham. This entailed driving to different sites, rowing around waterbodies, and observing for visible pollutants as well as collecting water quality data. At the Lake Terrell site, we canoed around to 5 different sections. Here we collected parameters such as dissolved oxygen (DO), temperature, turbidity, pH, and conductivity. We also monitored reported harmful algal blooms that had been seen. At Lake Whatcom, we monitored for potential floating foam from old docks and any oil sheens from boats.

Stormwater monitoring

One of the most important responsibilities I undertook as the North Sound Water Keeper was carrying out stormwater monitoring. As rainwater makes its way through the streets of Bellingham, it picks up thousands of pollutants that are often unseen. This water goes untreated as it pours directly into our streams and waterways. Per the stormwater section on the Re-sources website, there has been limited research carried out to evaluate the stormwater quality in Bellingham Bay (resources). What is known is that stormwater is the number one source of pollution in the Salish Sea (Resources). Re-sources created a study in 2020 that would regularly track water quality parameters that became seven outfalls and four urban creeks to improve monitoring in the Bellingham region. Included in these locations are Broadway Street Outfall, C Street, Cornwall Street, Cedar Street, Boulevard Park, Bennett Street, Willow, Squalicum Creek, Little Squalicum Creek, Padden Creek, and Whatcom Creek. Carried out monthly, I helped measure parameters such as dissolved oxygen (DO), temperature, conductivity, pH, turbidity, and E. coli. On top of these numerical data values, we looked out for parameters such as odor, color, and flow. After each visit, I recorded the compiled data onto Water Reporter and in the public has access to the information. Based on the results of these parameters, we can see which outfalls are exceeding water quality standards and contact the appropriate agencies to pursue further action.

Many parameters were taken with a pre-calibrated YSI, which I would help do before each monitoring. At each site, we rated the flow as low, moderate, or high. The color was assessed visually and rated on a scale of 0-3 or none, slight, moderate, and strong. The odor was measured based on intensity and type, also on a scale of 0-3 being none, faint, or strong. Any other visual indicators including sheen or foam were rated on a 0-3 scale. Using a YSI multimeter, we measured parameters in a bucket of sample water. Turbidity was measured with a turbidity tube. A small nutrient bottle was used for the E. coli sample and taken back to the lab for further analysis.

Various pieces of training

Throughout the internship, I was able to attend or watch various trainings. These included online training about SEPA, the EPA, and ETAP. On Saturday, May 20th, Puget Soundkeepers held an EPA microplastics training in Seattle. We went over the new protocol in the office and took the supplies to Golden Gardens Park. Separating into four transects each with three quadrats, we sifted the top inch of the sand for microplastics. They were then sorted out, counted, and disposed of properly.

Water patrols

More throughout the Spring quarter, I was a part of monitoring local waterways in Bellingham. This entailed rowing around waterbodies and observing for visible pollutants as well as collecting water quality data

V. OUTCOMES

[Provide a detailed description of the results of your internship work, including all relevant data in tables and figures; max. 750 words.]

To start my industrial stormwater permit project, I was able to determine what facilities have permits and where they are in Bellingham by using PARIS. Individual searches of facility websites can be used for future contact and helped me understand more about what the facility does or manufactures. With the PARIS website and exploring supplementary documents, I was able to list possible contaminants at each facility as well as for each permit type. For the industrial NPDES IP permits, contaminants included BOD, Oil/Grease, pH, turbidity, flow, zinc, ammonia, phenol, chloride, N+N, solids, hydrocarbons, mercury, and TPH. Industrial IU to POTW permits have possible BOD, TSS, flow, pH, Oil/grease, solids, lead, zinc, ammonia, phosphorus, N+N, and phenol. The industrial SWGP permits overall have turbidity, pH, oil sheen, copper, and zinc.

Using the same PARIS system, recorded exceedances were counted for the past ten years. More than not, facilities had an alarming number of violations, reaching as high as 40 (NPDES IP). Researching class and industrial codes allowed insight into if the facility has possible PFAS. This is going to help inform Re-sources for future PFAS testing.

HUXLEY COLLEGE INTERNSHIP REPORT

With information about each facility, I compiled it all into a Google My Map to get a visual representation. From this, we can see where clumps of companies tend to be and tell us areas of concern. Down near the docks ended up being a hotspot for facilities with permits and exceedances.

The two-year summary for the Stormwater Outfall Monitoring Program outlined the results for the seven outfalls I helped monitor. Each site was rated as either Threat, Watch, or Good. All sites except Willow were rated as Threat or Watch. E. coli was the most common issue across all of the sites, with color, visuals, and conductivity ranking the next highest. The worst outfall is the C street outfall, which consistently exceeds in color, odor, visuals, E. coli, and other bacterial presences. Bennett outfall rates near the top of the list consistently measuring high E. Coli levels, with as much as seven times the standard. Even with continuous monitoring and reporting, the data I helped collect on water quality is often overseen. No water work has been done to improve the water going into the Bay and better enforcement of the Clean Water Act is needed.

With the training I received from Puget Soundkeeper's, the Pollution Prevention Specialist and I have planned a local cleanup on H Street beach in mid-June. Collecting volunteers from school and work, we will conduct a four-transect-long cleanup to assess the microplastics in the area. Any information we collect will be reported to not only Puget Soundkeepers but the EPA.

https://www.google.com/maps/d/edit?mid=1JQ1e_nkvabpmFxn-kSsuZ-RamF4Kfj8&ll=48.79192146547444%2C-122.43448745&z=12

<https://docs.google.com/spreadsheets/d/1zsUQepBcx9CAhIPX7D3nW2guzVXI-bmD/edit#gid=79919913>

<https://docs.google.com/spreadsheets/d/1qqmkORpZ7Rjww1O-W--j1a8d-81b6-1l/edit?pli=1#gid=133250169>

<https://docs.google.com/spreadsheets/d/1-41HuG0bzFDI9nIN3sZ-JI9DQb0ZrGsr/edit?pli=1#gid=765942799>

https://www.re-sources.org/wp-content/uploads/2023/05/2023-Project-2-yr-Summary_reduced.pdf

VI. ASSESSMENT

[Provide an evaluation of (a) the success of the project(s) on which you worked and/or the effectiveness of your host institution; (b) your contributions to the project(s) and/or fulfillment of the host institution's mission; and (c) the skills and experience you gained through this internship; max. 750 words.]

Throughout my time as an intern at Re-sources, I felt that every project we worked on was successful. Combatting the never-ending battle between the growing industrial age and protecting the natural environment takes effort from all people. That's where I came into play, as I became part of the team to help protect the environment on which we all depend. I helped teach two freshman classes at Sehome Highschool about stormwater and Salmon. This was my first experience teaching a class of students about local waterways and it gave me practice in teaching others about our community.

For my permit project, the goal was to determine possible hotspots in Bellingham and areas where we should watch out for contaminants. The lack of someone to put the time and effort into the research put it off. The opportunity for me to learn not only about stormwater but how management and permitting work for different facilities made me very intrigued to see what the project outcome would be. Using DOE websites and reading permits, I learned about the possible contaminants in the Bay, how to read industrial/class codes, and PFAS. At the end, I was able to obtain data that could help not only Re-sources but others fight for better management of permits, clean-ups in at-risk areas, and education for others. Although the project could be carried on and added to, my goal was met in learning about the permit holders and compiling it into a system that is more easily understood.

The stormwater monitoring that we conducted throughout my internship gave me insight into the impact that Re-sources have on the community. When I learned that they were the only ones who conducted monitoring on the outfalls in the Bay, I was very surprised. Based on my knowledge of water quality and the detrimental effects it has on our waterways, I was more than devastated to find out there were no resources allocated to our stormwater. Our monthly monitoring allows the public to have access to real water quality data from areas around Bellingham. This is important for not only the health of the Bay but for those who use it recreationally or for food.

Individually, I met many goals that I set for myself before starting the internship. I have come out with a plethora of new experiences and knowledge about our local waterways. Just recently moving from the Midwest, my background knowledge of not only water pollution, in-person advocacy for waterways, and hands-on experiences were limited. This internship not only taught me basic research skills but taught me how to think critically about our environment. I have learned where the outfall locations in Bellingham Bay are located, and which water quality parameters are of high concern. Areas such as Bennett and Boulevard are of concern for recreational reasons as there are high levels of E.coli. C street indicates high industrial activity with odors of gas and visible sheens.

Overall, I believe my contributions at Re-sources helped fulfill their mission of mobilizing people in the NW to help protect the land, water, and climate. With the uncertainty of weather, I did not have the opportunity to do any intertidal survey. I watched all the training needed to carry out a survey for future potential use. The same went to the ETAP beach cleanups, as the number of scheduled cleanups was cut in half compared to last year. I intend to continue my contributions with Re-sources and look forward to making more of a difference in our community, no matter how little.

VII. LITERATURE CITED

[Provide bibliographic information for references, where applicable.]

<https://apps.ecology.wa.gov/paris/PermitLookup.aspx>

Salvatore, D. *et al.* (2022). Presumptive Contamination. A New Approach to PFAS Contamination Based on Likely Sources. *Environmental Letters: Science & Technology*. 9, 983-990.

HUXLEY COLLEGE INTERNSHIP REPORT

<https://maps.waterreporter.org/6HrDeasTadU7>

VIII. APPENDICES

[Attach copies of relevant supporting documents. Include as Appendix I a signed letter from your supervisor, on the host institution's letterhead, stating that you have completed the internship according to the organization's expectations and that you have completed the required number of hours of internship work.]



2309 Meridian St
Bellingham, WA 98225
(360) 733-8307
Re-sources.org

7 June 2023

To whom it may concern;

This letter is to confirm that Hannah Miller has completed the North Sound Waterkeeper Internship as described and expected for Winter and Spring quarters. She has completed the required number of hours for the internship work.

Thank-you,

Kirsten McDade
Pollution Prevention Specialist
RE Sources
kirstenm@re-sources.org

HUXLEY COLLEGE INTERNSHIP REPORT

Intern Name: Hannah Miller			
Intern Job Title: North Sound Waterkeeper			
Date	Hours Volunteered	Summary of Tasks	Learning Target
1/4	0.75	Met with Kirsten to get a tour of the office as well as meet other faculty members and set up my office area. Went through the of	This experience helps me create new relationships with those in real world environmental jobs
1/7/2023	2	Reviewed onboarding materials laid out on the intern work plan	This experience taught me more about current stormwater issues in the Bellingham region and governmental agencies that are a part of the monitoring processes
1/10/2023	2.5	SEPA workshop (overview and applicability)	This experience taught me more about the basis of SEPA as well as the rules and regulations that can go into a SEPA.
1/11/2023	1	Overview of industrial pollution permit project	This overview set me up to learn about not only how pollution permitting works in Bellingham but how to identify the permits
1/12/2023	1.66	Clean water act and NPDES training videos	These videos trained me on the history and implementation of the Clean Water Act as well as how NPDES play into this
1/15/2023	1.5	Sorting industrial permits on the google doc and finding the EPA websites as well as the links to the companies	This experience taught me how to research permits on Washington EPA website
1/16/2023	0.75	Sorting industrial permits on the google doc and finding the EPA websites as well as the links to the companies	This experience taught me how to research permits on Washington EPA website
1/17/2023	0.5	Sorting industrial permits on the google doc and finding the EPA websites as well as the links to the companies	This experience taught me how to research permits on Washington EPA website
1/21/23	3.75	Night low tide walk	This experience taught me how to help lead groups in identification walks and organize volunteers
1/22	0.5	Sorting industrial permits on the google doc and finding the EPA websites as well as the links to the companies	This experience taught me how to research permits on Washington EPA website
1/24/23	2.5	Visited construction sites to identify possible pollution	This experience taught me how to spot possible pollution at construction sites and what is considered clean practices or bad practices
1/27/2023	3.5	Working on setting up drone/flight plans	During this I was able to learn how to run a more complex drone and teach Eleanor how to run it so that she can use it for possible surveys
1/30/23	1.5	Sorting industrial permits on the google doc and exceedences as well as the links to the companies/descriptions	This experience taught me how to research permits on Washington EPA website
1/31/23	1.1	Creating a drone flight plan as well as set out instructions for drone set up. Sort out industrial permits	During this I was able to research how drone permits work and the type of air space you are allowed to fly in
2/1/23	1	Sorting industrial classes and contaminants on spreadsheets	This experience taught me how to find industrial classes on permits as well as known contaminants
2/2/23	1	Searching for violations and contaminants for industrial permits	This experience taught me how to find violations of permits on the EPA website
2/3/23	2.75	Organize SOP for drone usage and make specific flight plan for Lake Padden	I learned how to write a standard operating procedure (the baseline for the drone) as well as make a set up for our first flight
2/5/23	1.5	Searching for specific outfalls for industrial permits and reading what industrial classes/codes mean	This experience taught me how to look for noted outfalls in documents on permits
2/7/2023	2.75	Met with Kirsten to go over progress on industrial permit project. Analyzed proper ways to find exceedences as well as read ind	Kirsten helped me get back on track with identifying exceedences as I was looking at the wrong total
2/10/2023	3	Flying the drone with Eleanor	I learned how to fly the new drone and test out the camera
2/14/2023	1.5	Searching for industrial outfalls for the Pu to Puhw and verifying contaminants. Created a folder with important documents for a vi	I learned how to search through permit specific documents for outfalls
2/15/2023	4	Stormwater monitoring	I learned how to monitor the stormwater outfalls in Bellingham as well as measure water parameters like oxygen, temperature, bacteria, salinity, and PSU
2/17/2023	2.5	Researching more about aeronautical mapping for drones, possible sites as well as going through provided data for bird monitor	This experience taught me how to read data from bird monitoring
2/21/2023	2.25	Finished inputting industrial classes/codes as well as exceedences for the industrial SWGP3 permit spreadsheet	This experience taught me how to research permits on Washington EPA website
2/24/2023	5	Worked on the logistics on how to QC the FBAR and CBAR bird data. Assisted Eleanor and Hannah P with forage fish survey	This experience taught me how to QC bird monitoring data. I also learned how to go out and do forage fish monitoring to collect possible fish eggs
2/28/2023	3.25	QC Master CP bird survey data	This experience helped me practice QC'ing data
3/1/2023	1.5	QC Master CP bird survey data	This experience helped me practice QC'ing data
3/2/2023	2	QC Master CP bird survey data	This experience helped me practice QC'ing data
3/3/2023	3	QC Master CP/FB bird survey data	This experience helped me practice QC'ing data
3/7/2023	3	QC Master FB bird survey data, go over next steps for industrial stormwater permit project (PFAS), watch meeting with Kirsten at	This experience taught me about a program called Green Marine
3/10/2023	2.5	Canoe around bellingham harbors to look for outstanding sheens on water, peeling paint, debris. Also get a grasp of where the	This experience helped me practice paddling as well as identifying possible pollution around the harbor
3/15/2023	2.5	Stormwater monitoring	This experience helped me practice monitoring the stormwater outfalls in Bellingham as well as measure water parameters like oxygen, temperature, bacteria, salinity, and PSU
3/16/2023	1.5	Work on adding the NAICS and pfas codes to the industrial permit folder, read Appendix 3 in the PFAS action plan	This experience taught me more about PFAS and where it could be located
3/30/2023	1.15	Creating a my google map of the industrial permits	This helped me learn how to make a map and visualize where all the permits are located
4/2/2023	1	Working on my google map of industrial permits and assigning possible PFAS	This helped me learn how to make a map and visualize where all the permits are located
4/3/2023	1	Visiting construction sites and looking for possible pollution, any red flags	This helped me learn how to look for pollution and monitor construction sites
4/4/2023	1	Visiting construction sites and looking for possible pollution, any red flags	This helped me learn how to look for pollution and monitor construction sites
4/6/2023	1.33	Working through some roadblocks in My Mapping pollution permits as well as classifying NAICS codes. Updating construction lo	This experience taught me how to read NAICS class codes
4/7/2023	1.25	QC Master FBAR bird survey data	This experience helped me learn how to QC data and learn how bird monitoring is carried out
4/10/2023	1.5	QC Master FBAR bird survey data	This experience helped me learn how to QC data and learn how bird monitoring is carried out
4/11/23	6.5	Terminis water sampling and stormwater outfall sampling	This helped me learn how to monitor water quality and where the terminis sampling locations are
4/14/2023	3	SW data entering, bacteria photo labeling, industrial permit PFAS work	This helped me learn what the bacteria counts look like and how to enter the stormwater data
4/17	2	Started working on the PFAS column in the industrial stormwater spreadsheets and matching codes, drove and took pictures of	This helped me learn how to use class and industrial codes to try to find presumptive PFAS sites
4/18	1	QC Master FBAR bird survey data and explore PFAS sites/community resources website	This helped me practice how to QC data as well as look for PFAS
4/19	1.5	QC Master FBAR bird survey data and input more data into the industrial permit holder map	This helped me learn how to put together a resource map
4/21	4	Paddle Lake Terrell and collect 5 water sample parameters	This experience taught me how to do a monitoring paddle and take water samples from a canoe
4/24	2.25	Help Kirsten and Eleanor film videos for the Whatcom waterway	This experience taught me how to take footage for educational and informational videos
4/25	3	Input location specific data onto the industrial permit holder map/ drive to the presumptive PFAS sites to scout and get exact loc	This taught me how to look at presumptive PFAS sights and possible clues
4/28	2.75	Planning the second drone flight with Eleanor for the Whatcom Waterway video	This experience helped me how to fly a drone over industrial zones and take footage
5/1	2.25	Input location specific data onto the industrial permit holder map	This helped me build a resource map
5/2	5.5	Flying drone with Eleanor at Waypoint Park to get footage of Whatcom waterway/water patrol lake Whatcom with Kirsten/enter la	This experience helped me how to fly a drone over industrial zones and take footage and carry out water patrols
5/8	2.5	Aquatic invasive species training/water intertidal monitoring refresher training (in case I end up going out/visit industrial permit m	This experience taught me about aquatic invasive species and the intertidal monitoring protocol
5/15	1.15	Watch ETAP litter/plastics assessment as well as reading the ETAP protocols/report/materials	This experience refreshed me on the ETAP protocol
5/16	8	Enter stormwater monitoring data/attend Restore meeting/water patrol south Whatcom basins	This experience taught me how to look out for pollution on large bodies of water
5/20	3	Attend Puget Soundkeepers ETAP microplastics training in Seattle with Kirsten	This experience was my first official training. I learned about EPA protocols and how to carry out a microplastics cleanup
5/22	2.15	Set up Coho Conundrum Sehome Highschool Teaching in Seattle with Kirsten	This experience taught me how to set up a lesson for kids
5/23	4.15	Seahome Highschool teaching with Kirsten	This experience taught me how to teach younger students about stormwater and local species
5/25	1	Read through EPA microplastics protocol, start planning cleanup, and working on permit project	This experience taught me more about the EPA microplastics protocol
5/26/23	1	Work on internship report	This experience helped me reflect on my time at resources
5/29	1.5	Work on internship report	This experience helped me reflect on my time at resources
5/30	3.5	Attend Re-sources staff meeting, work on setting up microplastics cleaning	This experience helped me learn how staff hold meetings and communicate as well as set up my own cleanup
5/31	1	Work on internship report	This experience helped me reflect on my time at resources
6/6	2.5	Stormwater monitoring	This experience helped me practice collecting water samples and monitoring water quality
6/8	4	Last minute items, go over projects, microplastics clean up	This experience taught me how to set up a cleanup, recruit volunteers and teach others how to do a microplastics cleanup
Total Hours Volunteered		151.44	
Supervisor Signature			
Learning Objectives			