2022

North Sounds Baykeeper Intern - RESources

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COLLEGE OF THE ENVIRONMENT

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Internship Title: North Sound Baykeeper Intern at RE Sources

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Internship Dates: 3/31/2022-12/12/2022

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STUDENT SIGNATURE Shelby Johnson

DATE: 1/17/2023

Introduction

I was the North Sound Baykeeper intern at RE Sources for sustainable communities over the Summer 2022 and Fall 2022 quarters. RE Sources is a local non-profit organization that advocates for environmental education and works to protect the Salish Sea region. RE Sources protects the climate and takes action for the present and future generations through science-based community engagement and education. This internship involved pollution patrols, water sampling, stormwater monitoring, intertidal surveys, and beach cleanups. My educational goals for this internship included learning about water quality, data quantification, data management, choosing and conducting surveys, and community outreach. The internship also helped me prepare for an environmental job after graduation.

Pollution patrols and water monitoring

Water patrols:

I conducted pollution patrols and water monitoring with the pollution patrol specialist. We walked, kayaked, canoed, and drove around Whatcom County to document and report pollution. We monitored several locations to identify areas with pollution so that we could inform the community and prevent further pollution. The lakes that we sampled via kayak and canoe include Lake Padden, Squires lake, Beaver Pond, Lake Whatcom, Wiser Lake, Lake Terrel, Lake Fazon, and Toad Lake. We would paddle around the lake and stop at different locations to gather water quality data. We used a YSI probe to measure the water quality parameters of temperature (°C), millimeters of mercury (mmHg), dissolved oxygen (DO) percentage (% L), DO concentration (mg/L), specific conductance (SPC) (µS/cm), and pH. To measure turbidity, we used a turbidity tube that measures a height in cm, which can then convert to nephelometric turbidity units (NTU).

We tried out several methods for collecting water quality data. We considered testing for phosphorus, copper, nitrate, and zinc. We used the HANNA Instruments HI83306 Environmental Analysis Photometer to practice collecting data on these elements. These water patrols contributed to my educational goals and taught me how to monitor areas to maintain public health and conserve ecosystems.

Figure 1: Kayaking on a lake during a water patrol.

Construction Permits:

Another part of pollution monitoring is assessing construction permits and determining if construction sites follow best management practices. We would go online to find areas that were under construction and had valid permits. We would then go to those sites and patrol the area to ensure that they are following the practices correctly and not contributing to more water pollution. This experience taught me how pollution can end up in creeks and the bay and how it affects water quality. It also educated me on the importance of implementing construction site environmental impact management practices and how to monitor pollution throughout the community.

Ecology's BEACH sampling protocol:

The WA State Department of Ecology hosts a Beach Environmental Assessment, Communication, and Health (BEACH) program that monitors salt water to ensure it is safe to swim in during spring and summer. The sampling involves taking water from the bay at several points on the beach to measure the levels of fecal bacteria (Enterococcus) in the water. We used the BEACH data to inform the public about safe recreation to prevent them from getting sick from the water. We can use it to determine if the beach should be open to the public for swimming. The sites that RE Sources helps sample are Little Squalicum Beach and Wildcat Cove at Larrabee State Park. We would take a few water samples at each location following the BEACH sampling procedures and drop them off at the lab for processing. Taking water samples from the beach contributed to my educational goals by teaching me about maintaining public health in outdoor recreational activities and learning how to respond to water quality and bacteria concerns.

PIC (Pollution, Identification, Correction):

The PIC (Pollution, Identification, Correction) sampling procedure measures fecal bacteria levels in salt and freshwater around Whatcom county. Identifying sources of fecal bacteria helps determine where to focus restoration and improvement efforts. It can also inform the public about local water quality issues to help prevent disease and sickness. I helped collect water samples for the Chuckanut Bay and Ten-mile water sampling events. We would collect water samples at different points along creeks and throughout the bay and drop them off at the lab for processing**.** This experience taught me about public health and other ways to monitor and collect data on water quality.

Stormwater monitoring and sampling

Stormwater monitoring and sampling were conducted monthly, either by land or water. This monitoring aims to measure water quality data on the outfalls and creeks that discharge into Bellingham Bay. It provides an assessment of stormwater management in Bellingham, helps identify possible pollution, surveys changes in water quality over time, and helps us understand the impacts of stormwater on ecosystems.

The land-based stormwater monitoring sites are Little Squalicum Creek, Squalicum Creek, Whatcom Creek, Padden Creek, I & J waterway (Broadway St. outfall), and Willow St outfall. The water-based sites included the C. St outfall, Cornwall outfall, Cedar outfall, Boulevard Park outfall, and Bennet outfall. We used a YSI probe to measure temperature (°C), DO concentration (mg/L), specific conductance (SPC) (µS/cm), salinity (ppt), and pH. We also recorded the water's color, odor, and other visual observations. We used a turbidity tube to measure the turbidity. Lastly, we would take water samples back to the lab to measure bacteria (fecal coliform) levels. We entered the stormwater monitoring data into the Water Reporter app.

This experience contributes to my educational goals because it helped me understand local water quality issues and ways to monitor the water with different scientific instruments. It also helped me learn how stormwater and wastewater make their way into the bay and how they affect water quality and ecosystems.

Figure 2: Measuring turbidity with a turbidity tube at the Cedar St. outfall during a stormwater sampling event.

Figure 3: Kayaking at Boulevard park during a stormwater sampling event.

Intertidal Surveys

The North Sound Baykeeper and the Aquatic Reserves Americorps hosted intertidal surveys through May-August during low tides to monitor the beach and species composition changes, determine baseline information and detect the presence of invasive species.

The Cherry Point and Fidalgo Bay Aquatic Reserves have been doing these surveys as part of a monitoring program. I helped with the Clam Rock (Cherry Point) intertidal survey and the Fidalgo bay intertidal survey. Lead naturalists would identify organisms down to the species level. Using quadrats, we would gather quantitative percent cover and counts of different species at the tidal heights of -1, 0, and +1. We set out transect lines at each tide height and four quadrats on each of these transects. We also measured the elevation of the beach using profile poles. This experience helped me understand several scientific surveys and methods used to monitor and maintain healthy ecosystems. It also helps me learn how to conduct intertidal surveys and about different species identification. It helped me practice safe beach etiquette and gave me practice in collecting quality data.

Figure 3: Citizen scientists using a quadrat on a transect line to collect percent cover and counts data.

Beach cleanups and community outreach

Beach Cleanups:

RE Sources hosts monthly beach cleanups throughout Whatcom County to get community members involved in environmental projects. I helped the Community Engagement Specialist with tabling these events by setting up and taking down equipment, checking people in, and weighing and collecting trash. These beach cleanups were great opportunities to learn about citizen science and how to host events.

Figure 4: A citizen scientist using a bucket to collect trash during a monthly beach cleanup.

Escaped Trash Assessment Protocol:

The U.S. Environmental Protection Agency developed the Escaped Trash Assessment Protocol (ETAP) as a standard debris cleaning protocol to help determine waste management strategies. Citizen scientists can do this survey. The methods include setting up a site boundary and dividing participants into two teams (cleanup and sorting teams). The cleanup team collects all the trash inside the determined area. The sorting team then organizes the litter into categories

and collects data. ETAP assesses the items' degradation level and material type and determines each category's volume and weight.

I helped host an ETAP practice event with a youth organization from Trinity Lutheran Church at Locust beach. We collected trash for about an hour and sorted the debris following the ETAP procedure. I also hosted an ETAP event with community scientists at Hilton Ave. This cleanup took around two and a half hours total with sorting. This experience taught me about data collection and management. It also taught me a lot about community outreach and the effort that goes into planning an event suitable for the public.

Figure 5: The materials needed for an ETAP beach cleanup at Locust beach.

Figure 6: This shows an ETAP category for sorting and collecting litter data at the Hilton Ave cleanup.

Community outreach:

Additionally, I participated in other community outreach events. I attended the Model Toxics Control Act (MTCA) toxic waste sites kayak tour with the Community Boating Center. We paddle along Bellingham Bay, visiting and learning about the toxic waste cleanup in the Bay. RE Sources also partners with Surf rider for the monthly beach cleanups. I also helped the Aquatic Reserves Americoprs with tabling at the What's the Point Beach Event. There were low-tide beach tours, scavenger hunts, educational booths, and other exhibits at this event. These experiences helped teach me about engaging with the community and working with other local organizations. They were also excellent networking opportunities and helped prepare me for a job after graduation.

Conclusion

Overall, this internship has taught me how to monitor, protect, and restore local ecosystems. It taught me how to use many scientific instruments to collect data. I learned new

scientific methods and procedures and how to conduct surveys and cleanups. It also gave me practice entering data into online databases and how to manage the data after collection. It contributed to my educational goals of learning about water quality, data quantification, choosing surveys, community engagement, and helping prepare for an environmental job.