



STILLWATERS ENVIRONMENTAL EDUCATION CENTER

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Hello!

I consider myself incredibly fortunate to be taking over Stillwaters' science and education programs at this particular time in the organization's history. I have had the privilege of working with Joleen for two years now. She has been an awesome mentor in her enthusiasm for and experience in our monitoring efforts, and I've been grateful for her patience and wisdom in helping me get up to speed on everything Stillwaters has accomplished over the last 20 years.



With the removal of two restrictive culverts under S. and W. Kingston Roads, the estuary and salt marsh are now fully available to salmonids, forage fish, and other organisms who rely on these special brackish water environments. This opportunity for discovery, as the estuary and marsh recover, is what makes this such an exciting time to be a scientist or citizen scientist at Stillwaters! Our contributions matter, and nature is revealing the answers right here in Kingston. We just need to be here to observe these "answers", record them accurately, and interpret them honestly so that we can learn and show others what we've learned.

We are very grateful for your support of the monitoring program, and the corresponding community and university education. Below is a summary of our activity in the last two years. Over the next few months, I'll be trying out various platforms for getting more information about the recovery out to you, our supporters and volunteers. In this way, I hope to create more of a dialogue with you and the rest of the community about what being stewards of the environment means today in this place that we and so many other creatures call home.

Melissa Fleming, Program Director

STILLWATERS' MONITORING & SCIENCE ACTIVITY IN 2018-2019:



Green Crab Monitoring continued in 2018 and again in 2019, under the direction of the University of Washington Sea Grant and WDFW. This is part of a regional project to watch for the appearance of the very invasive European Green Crab in Puget Sound waters. We continue to do monthly trapping, identification, and counting of crabs from April through September. In July, 2019, an additional intensive survey was done in our entire estuary, under the direction of the SeaGrant staff and with the work of our volunteers and staff. No green crabs were found here, and we did get useful data on how our native crabs and fish are faring.

Amphibian Monitoring was done in 2018 in stormwater ponds in our watershed, working with Kitsap County Stormwater staff. In 2019, we focused on the Green Frog, a non-native. After confirming the species by DNA samples, and consulting with the state amphibian biologist, we concluded we could not eliminate the invasive Green Frog population that is appearing in our watershed at this time.



Instead, we actively educated our volunteers and supporters about what to look and listen for in their area, to try to determine the extent of the range of the frog. When we get a better picture of the spread of this invasive species, we'll confer with the state amphibian biologist again for any suggestions.

Fish Presence Survey: An addition in 2019 was the work of our talented photographer

volunteer, Art Lee, who has used the photo cube constructed by intern Brandon Kindschy, and our underwater GoPro camera, to get excellent photos of fish in the salt marsh, estuary, and cove. Art's work will provide basis and justification of more rigorous future studies of fish use of various parts of the watershed. He has captured on film sculpins, two species of perch, sticklebacks, young salmonids, and adult Coho. His work has demonstrated need for an underwater fish ID guide, as opposed to the guides showing only fish out of the murky waters.



Macroinvertebrate Study & Methodology: In 2018 UW intern Colin Piwtorak helped us establish protocols and develop modified equipment for sampling macroinvertebrates in salt marsh channels. Drainage channels in the marsh and Carpenter Creek itself run too deep and narrow for sampling methods involving traditional surber nets; Colin created a modified net design that allows it to be rapidly swept along the bottom of the channel to capture benthic macroinvertebrates in the disturbed sediment. These studies will continue in 2020.



Vegetation Survey of the Marsh & Eliminating Invasives:

In 2018, WWU intern Jonathan Olsen used ArcGIS software to create a 10 m² gridded map of the Salt Marsh divided into three zones based on elevation. Five random 1 m² sample plots were established by volunteers in each of the zones and the plant composition of each plot was documented. In July, 2019, nine volunteers spent five days surveying the vegetation plots with a tested methodology that will keep the survey data consistent over time. We got a large number of new volunteers for vegetation surveys, many of whom were new to monitoring in the marsh.

We also produced a map of dominant plant species throughout the marsh. In 2019, vegetation plots near areas high in invasive species (like reed canary grass) were established to monitor the spread of invasives. We want to determine whether the culvert restoration will change the marsh hydrology enough to limit the spread of invasives.

In 2019, we fought invasives by planting more shade-producing willow stakes, which seems to be working. Also, we dug out a patch of yellow flag iris that was discovered by a monitoring volunteer.

Pore Water Sampling:

Another 2018 WWU intern, Cory Osterhoudt, developed a protocol to withdraw water from the soil around the roots in these vegetation plots (pore water) which will document the salinity the plants are experiencing and resulting soil chemistry changes. We want to better understand how the vegetation is responding during Salt Marsh recovery. In 2019, the protocol was refined through experimentation (including constructing a special pump and a new water quality meter) until it became efficient and relatively simple.

We will start documented sampling in January, 2020. Pore water sampling



will be done in winter during first sprouting, in spring during fast growth, and in July at maturity. Already we have discovered that pore water around the roots of reed canary grass was less saline than next to the reed canary patch, suggesting that tidal inundation might limit the spread of the noxious reed canary.

Tidal elevation readings: We had two Water Level Data Loggers deployed on the upstream and downstream sides of the undersized culvert on West Kingston Road before bridge construction began in 2017. Data analyses show water levels were backed up behind the culvert during the winter, particularly in high rainfall years. Therefore, the salt marsh was experiencing more freshwater inundation some winters and early springs, which may have favored the establishment of less salt tolerant invasive plant species, like reed canary grass, in the marsh.

Inundation Study : To get an idea of how long different parts of the marsh, and our vegetation plots in particular, are covered with salt water at a given tide height, we decided to measure the depth of water at the highest tide levels to produce ‘inundation maps’ of the salt marsh. These measures, in combination with the data from our two water level loggers, will allow us to determine how much time a particular part of the marsh is submerged on a daily, seasonal, or annual basis.



In summer, 2019 we experimented with measuring depth with markings on posts in each of the 30 plots, but had to switch to measuring with a meter stick at high tide in the fall. Two staff and two volunteers collected measurements in November and December. In January, 2020, a UW intern will create a map that will include these 30 points, and then train staff and volunteers to add more points to generate a finer scale map as needed in the future.

Water Quality Monitoring (estuary and stream) and the Birding Survey are activities that continue monthly, using many citizen scientist volunteers.

Photo Logs: The annual pictures of the estuary were taken each summer. There are 8 sites and 3-4 photo angles from each site. We also do a Photo Survey of the salt marsh.

Soil & Sediment samples were collected and painstakingly analyzed by citizen scientists.

Data Management continues to be a significant focus. With every new facet of monitoring, and with the expansion of monitoring in the salt marsh, not only more data is being collected, but more kinds of data are being collected.

In 2019 we were happy to add skilled volunteers to data management work, including Renee Amicucci who is experienced in data management. She is developing efficient data bases and teaching other volunteers, such as Shari Evans, how to enter data.



Field & Lab Protocol: Each of the monitoring tasks above involves Stillwaters’ staff time for scheduling of monitors, preparation of equipment, supervision of volunteers and interns, frequent lab analysis work, writing or recording reports, and sharing of data. Maintenance of equipment and supplies is a significant, ongoing task.

We are continuing to work on a protocol and procedure manual for all of the monitoring tasks we have done and continue. Our protocols are being posted online, as a guide for other Puget Sound organizations.

EDUCATION & OUTREACH in 2018-2019:
Stillwaters generated about 600 hours of education and community outreach related to watershed education. In addition, we provided 650 hours of internship and field studies.

Internships: We are excited to be providing internship sites for students in the University of Washington Program on the Environment and Western Washington University-Huxley College of the Environment on the Peninsula. In 2018, we directed the field studies of 5 interns, who spent over 450 hours working here, under our staff supervision and guidance. Coincidentally, neither UW nor WWU sent any interns in 2019, but we ended up with 3 Post-Graduate Students who worked with us for several months, as interns would, independent of their various universities, and getting field experience.



WWU-Huxley Environmental Classes have come here every year for regular class field trips, to practice their skills in field science.

High School/Middle School Students — Two high school students, Tor Sather and Kat Ellsworth, became very active in monitoring at Stillwaters in 2018-2019, participating in monthly stream, estuary and bird surveys, green crab monitoring, helping with pore water sampling and vegetation mapping, and generating descriptive statistics for some of our 19 years of stream water quality data and graphs for our data from water level loggers.



- ◊ Kingston Middle School Students were in the watershed for two days in 2018 doing field studies.
- ◊ Kingston High Students came in March, 2019, to practice surveying the large wood in the marsh.
- ◊ St. Cecelia's Middle School Students observed the Green Crab survey in May, 2019.
- ◊ Summer, 2019 brought a large multi-age group from the Kingston Library Summer Program to learn about the marsh in person.

Newspaper articles about monitoring, science, and sustainability appeared monthly in the widely read Kingston paper and our own newsletter.

Field training for citizen volunteers included both basic instruction to perform specific monitoring tasks, and special opportunities to learn to use special equipment.

Outreach to the community, with monitoring and Puget Sound information, accessed over 300 people at various public events.

Again, thank you so much for your part in making Stillwaters into a vibrant and busy science research, education, and restoration organization in Kitsap, on the shores of Puget Sound.

