Kevin Wooldridge

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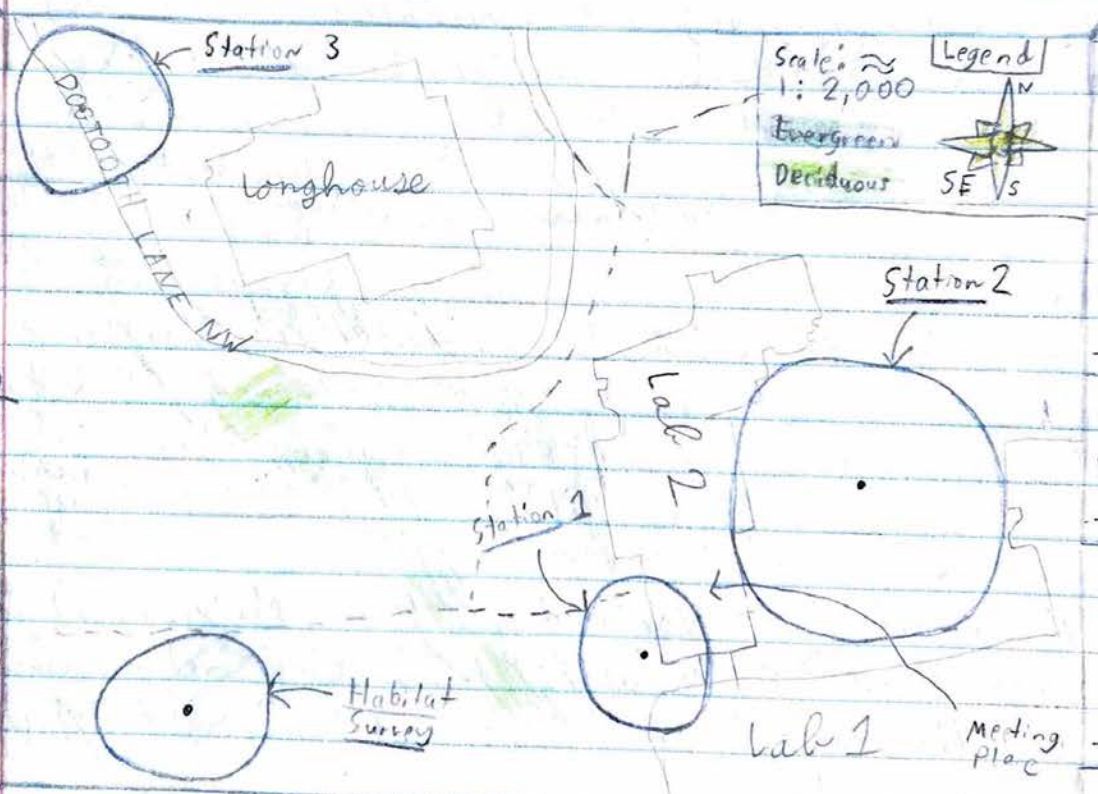
Week 1: Field Journal Exercise
Orienting, measuring distances, heights/sizes, % cover

K. Wooldridge
28 September 2023
10:30 AM

Location Descrip. The Evergreen State College (Olympia WA) south east end of campus. Met at the outside confluence of Lab 1 and 2 buildings, and did various various field activities in the surrounding red square as well as the forest behind the Longhouse and west of the Evergreen Organic Farm.

Location Map



Station 1: 47.07173, -122.97860
Station 2: 47.07202, -122.97798
Station 3: 47.07255, -122.98080
Habitat Survey: 47.07138, -122.97952

Habitat Information. Puget sound lowlands with predominantly Alderwood gravelly, sandy loam soil. The climatic conditions and geology support dense old growth conifer and deciduous forest surrounding the campus, as well as the ornamental plants in and around red square. Unique distributions of plant communities form a habitat mosaic that represent past anthropogenic disturbances, differences in soil characteristics (like PH), and differences in microclimates.

* ballpark C → F conversions: double C and add 30

climate info

* Temperature: 14.4° C (57.92° F)
Wind Condition: 0-1 (Beaufort #)
Sky condition: 1 (US Weather Bureau Code)

observations / data collected

Plant Species: Douglas Fir (Pseudotsuga menziesii), Western Hemlock (Tsuga heterophylla), Western Red Cedar (Thuja plicata), Sitka Spruce (Picea sitchensis), Grand Fir (Abies grandis), Red Alder (Alnus rubra), Bigleaf Maple (Acer macrophyllum), Salal (Gaultheria shallon), Long-leaved Oregon Grape (Berberis nervosa), Evergreen Huckleberry (Vaccinium ovatum), Salmonberry (Rubes spectabilis), Sword Fern (Polystichum munitum)

Wildlife Species: Common Raven (Corvus corax), American Robin (Turdus migratorius), Northern Flicker (Colaptes auratus), Black-capped Chickadee (Poecile atricapillus), Pacific Banana Slug (Ariolimax columbianus)

musical whistle from tree tops

flew past in air; black

"chick-a-dee-dee-dee" call in trees

loud ringing call from trees

greenish brown with black spots covering the tail

Novel Species: Norway Maple (Acer platanoides), Japanese Red Pine (Pinus densiflora), both medium confidence on the correct identification (from Katie Geist via iNaturalist)

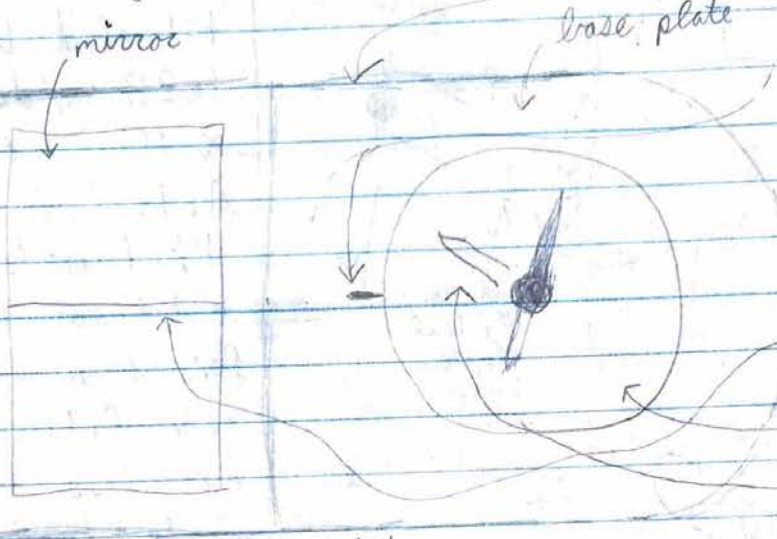
Questions: How well would a pixel-based classification methodology like Maximum Likelihood or Support Vector Machine work for figuring out the percentage of vegetation cover of moss/lichen in a quadrat tree trunk survey? How well would it work for canopy cover % using a drone with an thermal sensor (with the gimble pointed directly up) and using a classification algorithm?

Narrative:
Starting outside the Lab buildings, we met as a group and branched off to the various field activity stations. The first station I went to was the compass and estimating pace/distance. Alison Styring was leading this activity and I found it to be a very useful review using a physical compass, as I often rely on my garmin watch or phone GPS in field work or in the backcountry and they should not be fully depended on. I used a compass that had a way to set declination with a key in the back of the unit, which is a great feature for navigating the same area for an extended period of time. The second half of the station included determining pace for measurements of a set distance estimate. We used 50 m as our set distance and counted the number of paces from the start and end point, doing this multiple times and then taking the average. I tried to envision myself walking through knee-high understory with unstable footing, and kept that pace twice and got the exact same number! We then broke off from the station group to an even smaller group to estimate measurements with our pace; I was with Katie Geist and Sebastian Flores and we took turns predicting and measuring with a 50 meter tape. We were running short on time and I was

only able to do this once. I was off by over a meter and think this was due to measuring to the wrong end point; I should not have used a big leaf maple leaf as my marker! The next station was led by MES student Kayleigh Kueffner where we went over DBH/circumference and estimating heights. I have had some past experience doing this but found the review to be beneficial, especially using a clinometer. I was super intrigued by the stick method, and we ended up being 20 meters off. We also went around and estimated objects one/two meters high. Moving on to the third station with Amy Cook leading, we did canopy cover estimates / densiometer measurements at 5, 5 M increments in forested areas bording Dogtooth Lane NW. We also used transects for ground cover, indicating whether the species was moss, forbs, shrubs, ferns, or bare earth. Amy had 2 quadrats on tree trunks and we did an estimation calculation of moss/lichen cover to bare tree. The last part of the field lab involved taking what we learned and applying it to a circular area plot of 20 meters and taking quantifiables. This part did not go smoothly for my group but we learned that we need to do a better job communicating the game plan and implementing the instructions. I also noticed the tendency for people to guess values that were supposed to be measured due to time constraints. The line of good-bad faith science gets complicated!

Station 1 Part 1:
Orienting with a compass

straight plate Box lines a bearing



"Red in the shed" (Santa's workshop)

Declination: The angle difference between true north and magnetic north (somewhere in Canada). You need to adjust compass to account for distance. Depending on where you are in the country (and time), the declination will be a certain amount of degrees to the west or east (you can find this near legend in map $\overset{N}{\uparrow}{}^{MN}$, or look online)

Evergreen Declination: 15.24° E ± 0.39° changing by ° per year.

Bearing: Describes a direction in terms of degrees, more precise than cardinal directions (Eg. to get to this point from this point (you), go a bearing of x°)

Station 1 Part 2:
Estimating pace and distance

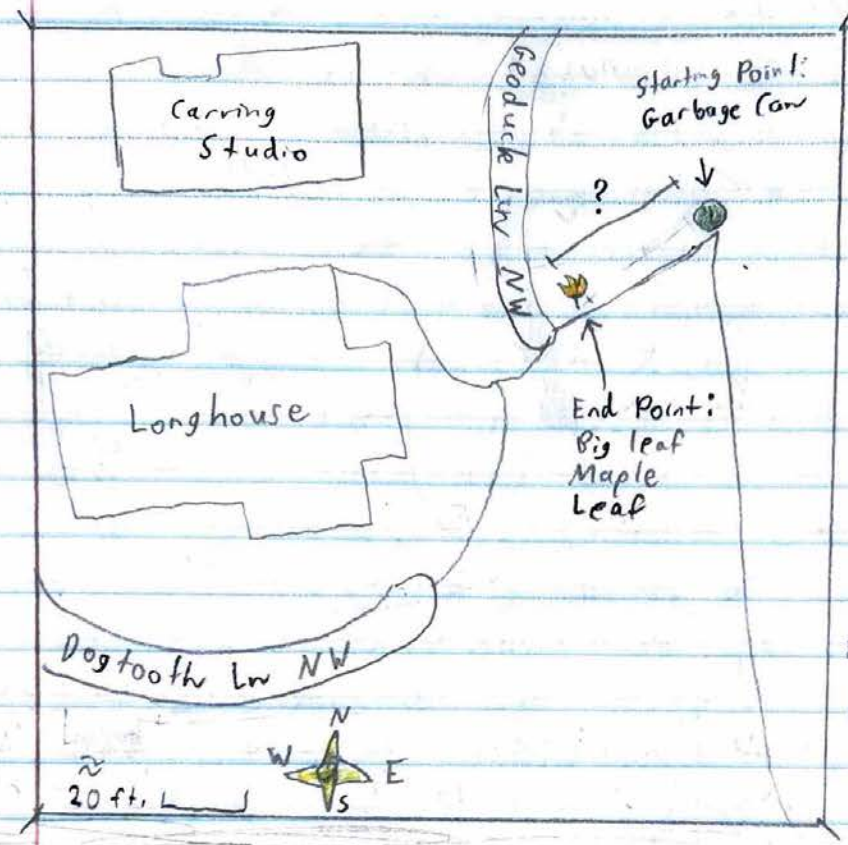
take 1 ↓ take 2 ↓

Distance Paced: 50 meters

# of Paces to Cover the distance: 39, 39 Average: (39)

Pace: 50/39 = 1.28 meters/double step

* remember: 1 meter ≈ 3.28 ft.



Trial 1

Paces: 10

Estimated Distance

1.28 m/double step

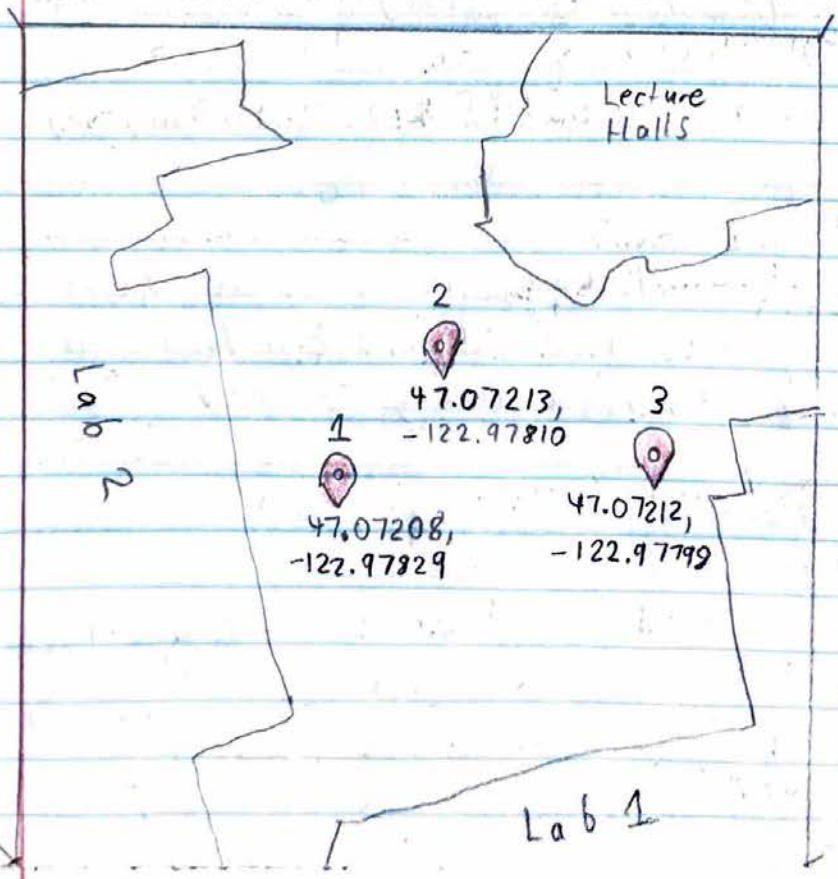
x 10 = 12.28 meters

Actual Distance: 14.1 meters

* did not have time for 2 more trials, in the future I would not use a big leaf maple leaf as an end point because there were several on the ground and I got mixed up!

Station 2:

Measuring DBH/Circumference/Height



Tree 1: Norway Maple

DBH: 25.6 cm

Circumference: 80.42 cm

Height: 17.4 m (57 ft.)

Tree 2: Japanese Red Pine

DBH: 46.3 cm

Circumference: 145.46 cm

Height: 16.8 m (55 ft.)

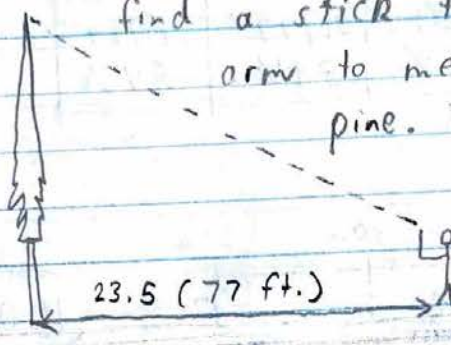
Tree 3: Douglas Fir

DBH: 86 cm

Circumference: 270.18 cm

Height: 20.7 m (68 ft.)

Stick Method: We attempted to do this, trying to find a stick the same length as Sebastian's arm to measure the Japanese red pine. Compared to the clinometer height (16.8m) the stick method was estimated at 6.7 m taller (23.5 m).



Estimating heights
One meter on me: Superior Gluteus Maximus
Two meters on me: Wingspan + 1 hand
Object one meter: Orange Cone (1.1 m)
Object two meters: Up to E of Emegency Call Light, I stood by it (1.88 m) and Katie estimated where 0.22 m would land.

Estimating tree height with 1/2 meter reference:
* my group measured the tree height with the clinometer before getting to this step since our estimate would be biased we skipped this part
Using the stick method: See bottom of pg. 8, only had time for one
Using the clinometer: See bottom of pg. 8

Station 3
Estimating Percent Cover

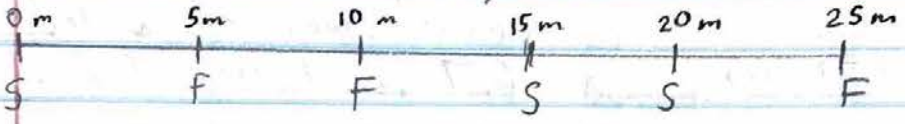
Quadrat A (with string hanging below lower tube): My estimate is that the moss is covering ≈ 71% Quadrat B (with bar code on lower tube): My estimate is that the moss is covering ≈ 37%

Canopy Cover %

	0m	5m	10m	15m	20m	25m
Guess	95%	95%	95%	95%	90%	90%
Densiometer	25/27 68%	32/37 86%	36/37 97%	35/37. 94%	31/37 84%	31/37 84%

* was not able to collect additional canopy cover & ground cover transects

Ground Cover %



100% ground cover

Key: S = shrubs, F = forbs, M = moss, FE = ferns

Reflections

Convex spherical crown densiometers have been useful to me in the past when looking at the effect of solar radiation on tower order streams. In the context of stream restoration, ↓ canopy cover % usually is considered as a bad thing in riparian zones as it ↑ water temperature and stresses fish. But I have also been involved with Taylor Checkerspot restoration where cutting encroaching trees down opens up habitat and creates a microclimate more suitable for them & the plants they rely on. I have come to appreciate the beauty of canopy cover in the forests around Evergreen, as it plays such a major role in the diversity of plant communities. It seems in wild life conservation biology, striking a balance between dense cover and sunlit areas can create conditions in temperate rain forests to support a higher levels of diversity, with some animals preferring foraging on shade tolerant ferns and mosses while others utilize sun-loving plants like shrubs and wild flowers. The forest mosaic is such a complex and alluring place to study!

Standard Habitat Survey

Katie & I did this one

	1	2	3
Point ID	47.071526	47.071196	—
Latitude (DD)	-122.479467	-122.479437	—
Longitude (DD)	64 m	80.16 m	60 m
Elevation (m)	Douglas Fir/ Salal / Fern	Douglas Fir/ Salal / Fern	Douglas Fir/ Salal / Fern
Hab. 1 - descrip.	95%	100%	100%
Hab. 1 % cover	—	—	—
Hab. 2 - descrip.	—	—	—
Hab. 2 % cover	4	2	3
# forest layers	0 cm	0 cm	0 cm
Herb. layer height	-0%	0 %	0 %
Herb. layer % cover	?	?	?
Shrub layer angle	?	?	?
Shrub layer distance	1.37 m	0.91 m	0.76 m
Shrub layer height (m)	90%	95%	98%
Shrub layer % cover	?	?	?
Lower canopy angle	?	?	?
Lower canopy distance	10.67 m	9.14 m	9.75 m
Lower canopy height (m)	?	?	?
Upper canopy angle	?	?	?
Upper canopy distance	32 m	30.48 m	35 m
Upper canopy height (m)	—	85%	—
Densio raw estimate #1	72%	81%	—
Canopy Cover # 1	—	—	—
Densio raw estimate #2	84%	—	—
Canopy Cover # 2	78%	81%	—
Canopy Cover average	No snags	No snags	No snags
No snags > 15 cm dbh			

? = ones we were unsure what it meant / how to calculate

— = null data (didn't have time to complete / not applicable to our site).

Week 1: Conservation Landscape- Brewery Park

K. Wooldridge
29 September 2023
10:00 AM

Location Description: Brewery park is located just south of Capital Lake in Tumwater, WA. It is a privately owned park bordering the Deschutes River, providing Olympia and Thurston County with riverside recreation opportunities.

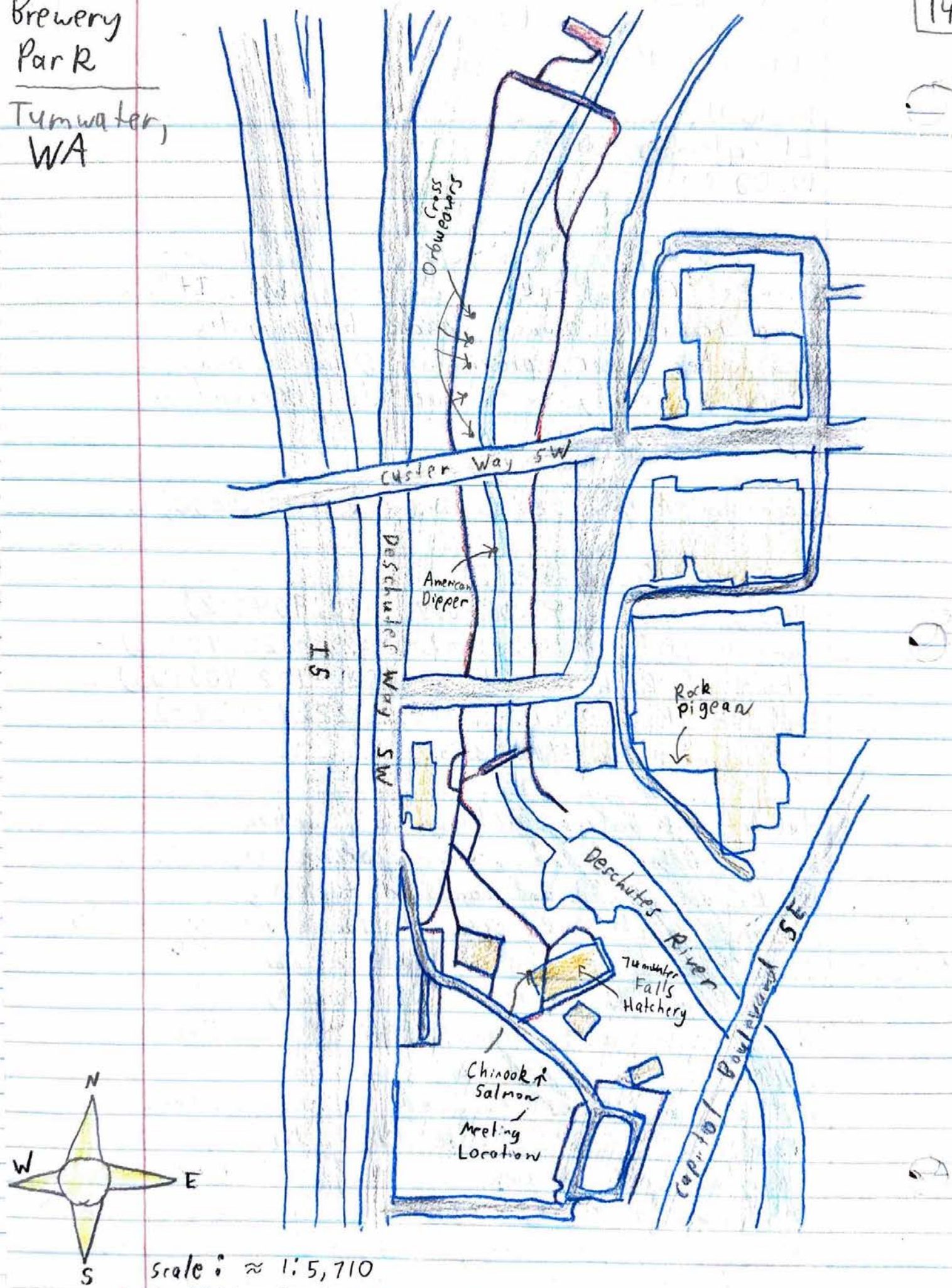
Location Map: (See on back of page)

Location Coordinates:
Meeting Location (47.014037, -122.904712)
Tumwater Falls Hatchery (47.01439, -122.90443)
Start of Path loop (47.015252, -122.905085)
End of Path (47.018460, -122.904244)
* coordinates in ESPG: 3857

Habitat Information: A blend of urban infrastructure mixed with riparian vegetation. Banks are steep and contain teritiary volcanic rocks in cresrent formations (WA DNR). They serve as critical habitat for birds, as well as the forest mix near by of deciduous and coniferous trees. The understory is mixed with a mix of native plant species and invasives. The climate is typical of the PNW; the region's abundant rainfall contributes to it's species biodiversity. Multiple overhead bridges with both car and human traffic as well as buildings are also used by wildlife in the area.

Brewery Park

Tumwater, WA



Scale: ≈ 1:5,710

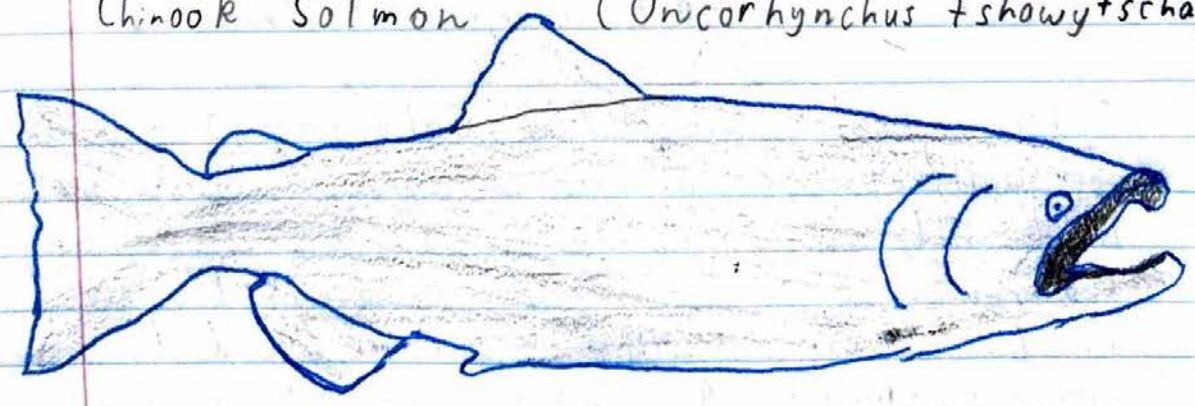
Climate Information:
Temperature- 12.2° C (54° F)
Wind Condition- 2-3 (Beaufort)
Sky Condition- 0 (US Weather Bureau)

Data Collected / Observations:

Plant Species: Douglas Fir (Pseudotsuga menziesii), Western Hemlock (Tsuga heterophylla), Western Red cedar (Thuja plicata), Red Alder (Alnus rubra), Bigleaf Maple (Acer macrophyllum), Salal (Gaultheria shallon), Thimbleberry (Rubus parviflorous), Common Jewelweed (Impatiens capensis), Sword Fern (Polystichum munitum), Oregon Grape (Berberis aquifolium), English Ivy (Hedera helix), Himalayan Blackberry (Rubus armeniacus)

Wildlife Species:

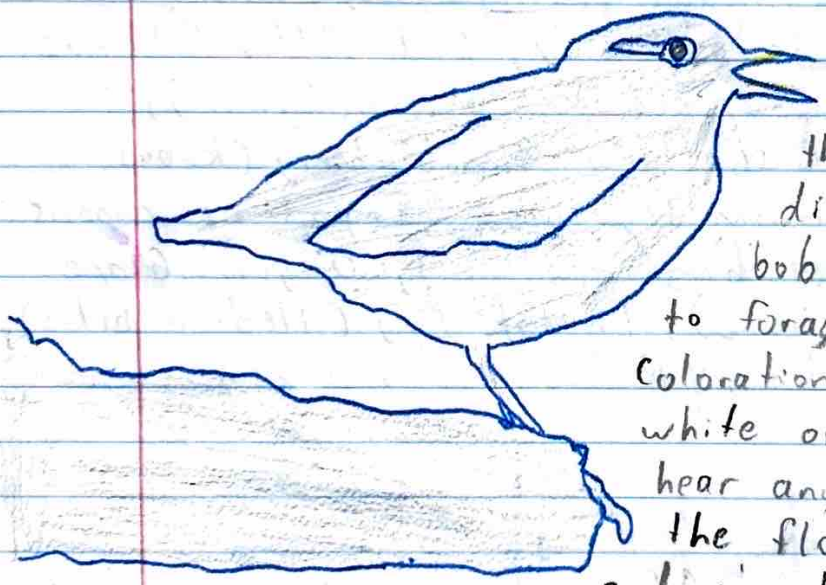
Chinook Salmon (Oncorhynchus tshawytscha)



Size estimates are 600-900 mm for mature male & females, jacks 300-600 mm. Color is olive/brown with a black pigment along the gum lines. There was a considerable amount of scars across the bodies of all the fish in the raceway viewing windows.

Below the hatchery there were many fish repeatly attempting to jump the falls, before eventually finding the fish ladder up. One fish was not so lucky; they laid dead on the rock shore getting stranded from a jump attempt. I'd say I saw over 500.

American Dipper (Cinclus mexicanus)



The one dipper I found was spotted in the Deschutes flying to different rocks and bobbing into the water to forage on aquatic insects. Coloration was dark grey with white on eyelids. I could not hear any songs from it with the flow of the Deschutes and nearby I5 traffic.

Other notable wildlife: Coho fry (Oncorhynchus kisutch) (school of 50) below the bridge farthest north, silver in appearance, Rock Pidgeon (Columba livia) (6 of 6) flock basking on the roof of old brewery building, too far for my binoculars but their appearance looked gray, Cross Orbweaver (Araneus diadematus) so many of (50+) these guys wearing their webs on plants or even the bridges, brown appearance with white markings on its abdomen, common gull (Larus canus) one perched on fish trap on far north side, white & grey in appearance.

Scale: ≈ 1:5,710

Novel species: Several species in the planters by the fish ladder including Golden-Blue Eyed Grass (Sisyrinchium californicum), Idaho Fescue (Festuca idahoensis), Oregon stonecrop (Sedum oreganum), Graceful cinquefoil (Potentilla gracilis), I could go on and on ...

Questions: Why am I not seeing any birds in the upper canopy of the forested sections? Is it too close to loud noises like the highway? Or are they present and I just can't hear or see them?

Narrative: Starting near a bench by the park toys, Amy Cook introduced us to Brewery Park and we headed to the hatchery raceways where we saw Chinook getting sorted and put into shipping containers to head to Minter Creek Fish Hatchery in Gig Harbor for artificial reproduction. After watching the fish in the raceway window for a while I headed on the trail down the Deschutes with Kaelin Andruss and Katie Geist. We watched the fish attempt to jump the falls for awhile and then headed futher down, keeping our eyes out for birds and looking at the trail signage. So many people were out today to appreciate the Chinook returns and enjoy the sun!

Important:

The Environment

Brewery Park at Tumwater Falls is an urban ecological landscape with the tradional grass lawns upland of the river for dogs to run around in to the boulder rapids drainage of the Deschutes River supporting a variety of riparia. The river is confined and relatively straight within the cityscape park boundaries, the widest point being at the waterfall section ($\approx$ 60 m) with most of the channel width being less than 25 m. Substrate transitions from bedrock and cobble on the south end to mud on the farthest north end by the fish trap. Just above the fish trap there are several interesting stream features, an outlet pond supporting amphibians, and two islands with point bars forming on the convex side of the river bend. The 6 hectares of park form an elongated boot shape, from the river and up the steep banks ($\approx$ 10 m elevation change) you find mixed conifer and deciduous forest to a hard transition of roads on both the west and east sides. There does appear to be about a 30 m buffer from the roads to the river in most sections.

Ownership

I saw a couple ways that the Olympia Tumwater Foundation encouroges donations. The main way is via signage, with bar codes you can scan on your phone

to make it easy to contribute a small donation. The sign was strategically placed by an exit to make it the last thing you think about when leaving, as well as using an image of a cute dog for attention grabbing emotional appeal. The other way was through a gift shop in the OTF office that sold posters and other swag.

Management and Regulations

The landscape seems pretty loosely managed. Rules are laid out via signage, most of which being pretty common sense. Bridged areas are marked with warnings due to mist and most areas are fenced in pretty well, with some "do not enter" signs in areas to further prevent humans from entering. I did not see any Olympia Tumwater Foundation staff in the office or on park grounds. Sitting on a park bench for awhile I noticed several times people hopped the fence and went down to the water's edge (in the middle forested section). There does seem to be past attempts to restore areas (E.g. bank stabilization using logs and rebar, native plantings and invasive removals). Most of the management seems relatively passive due to the limited hours and steep bank slopes keeping people in designated areas. Focus is kept on keeping trails clear and park grounds well maintained!

Vertebrates in the Landscape

- Species List (see previous pages)
- One species that is being indirectly supported are orcas in the Puget Sound. Due to decreased food availability, this hatchery is unique in the sense its strategy is not used for recreation stocking or focused on preservation/re-colonization/local adaptation of salmonids. The hatchery is utilized as a critical food supply for endangered Southern Resident killer whales. This is made possible through fish ladders to help returning Chinook bypass the falls and facilities to collect eggs. The other species being supported are the old growth Red Cedars, which provide habitat and food to many species, and provide refuge from the surrounding city. Some attempts have been made to remove ivy from climbing and suffocating these trees, but mostly the landscape is acting as a passive restoration site to prevent logging. Species a distributed all around, from in the water to the tops of buildings. Species tend to stay away from high use areas, however, some birds have found high use areas are great for getting food crumbs left by humans.

Education

There are a great variety of education presented in signage, lots of which are found in the south area by the hatchery

and falls. I did not see any bird signs but it might have been because I was too busy looking for birds in my binoculars. The does seem to be quite a bit of history on the the history of before the creation of brewery park, including the dams created by Olympia Light and Power company, the fish ladders, the brewery, the indigenous history, the geology, and so much more. There is also a ton of signage about salmon by the hatchery and native plant identification markers in some areas. I saw evidence of people learning through another school group but I did not notice other people reading the education signs.

Thought Question

In many ways, it was clear that the Park is successfully protecting species it was designed to protect. Being able to see birds, amphibians, insects, and fish from trails, the public can see this and it is dramatically different environment than the surrounding cityscape. The park includes a variety of native trees, shrubs, and flowers that can be seen healthy and flourishing, showing the public that the park is promoting biodiversity and supporting the local ecosystem. Bridged viewing platforms allow park visitors to view areas by water without disturbing the natural flow of it; the

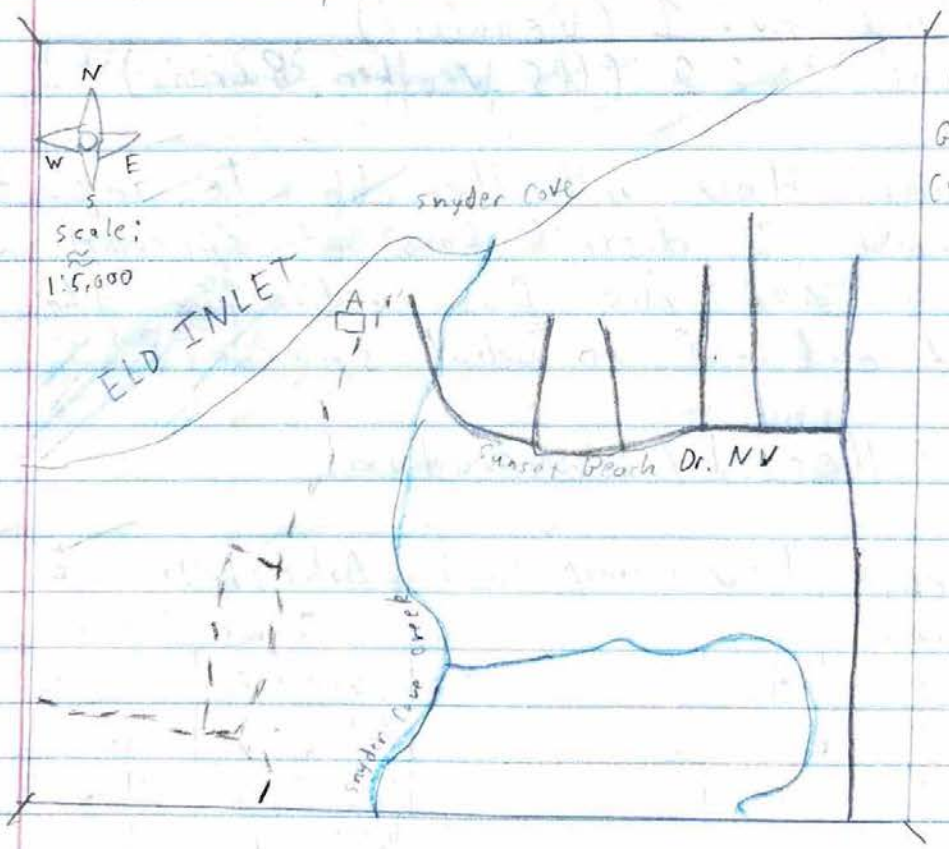
public can recognize this as a good thing. Education signage also support the views of conservation goals and can make public appreciate the park's significances. I would say the things that do not support this view are the areas and water with litter, eroded banks and unofficial trails, banks covered in English Ivy; the public can see these things and can know intuitively that these conditions should be improved. Evidence of the park's success is hundreds of Chinook returning, yet, I feel the hatchery should have signage talking about the endangered orcas and the purpose of the hatchery.
I always think of the signage at the Nisqually Wildlife Refuge as the gold standard for having info with lesser known species; I can observe them but the public will not be aware of the biodiversity that they do not know even exists.

Week 3:
Sampling Fishes

K. Wooldridge
11 October 2023
9:30 AM

Location description: Near Geoduck beach in Olympia WA, by Geoduck house located in Snyder Cove of Eld Inlet and up Snyder Cove Creek.

Location map:



Coordinates:
Geoduck house (A):
(47.08631, -122.97500)

Habitat information: Shallow intertidal zone of sandy, rocky, and muddy substrates. Habitat where species were collected was from the shoreline to waist-high water. It is assumed that there is some aquatic & semi-aquatic vegetation but I was not able to identify them. Upland transitions steeply to coniferous & deciduous forests typical of the Olympic Peninsula.

Second habitat where species were collected was a low order wadable stream (1.9 - 3.4 m wide) with substrate fine gravel (2-10 mm) and some coarse gravel (10 - 50 mm), riffles & pools, and overhanging vegetation & culvert offering significant shade to the creek.

Climate Information
Temperature: 14°C (57°F)
Wind Condition: 1 (Beaufort)
Sky Condition: 2 (US Weather Bureau)

Questions: How will the ebb tide impact the number & distribution of species in the intertidal? Are fish active in the culvert and if so what species?

Data Collected / Observations

First Seine Tow (Group: Kaelin, Ashley, Madi, Eva)

Fish

Species	Count
Clevelandia ios	116

Invertebrates

Species	Count
Unknown Shrimp	96
Unknown Hermit crab	1
Unknown Amphipod	3

Effort: 6.5 m (net length) × 44 m (tow length) = 286 m^2

Second Seine Tow (Group: Kaelin)

Fish

Species	Count
Clevelandia ios	43

Invertebrates

Species	Count
Unknown Shrimp	7

Effort 6.5 m (net length) x 47 m (tow length) = 305.5 m^2

Freshwater Species Seine

Fish

Species	Count
Cottus asper	2

Invertebrates

Species	Count
Unknown Gammaridea	2

Stream widths: 3.4 (widest), 1.9 (culvert), 2.65 (average)
Length of stream walked: 21.5
Effort: 2.65 m x 21.5 m = 55.98 m^2

Species Encountered

Arrow goby, Clevelandia ios, Oxudercidae
(small pale grey translucent fish)

Prickly Sculpin, Cottus asper, Cottidae
(brown/gray/olive body coloration, yellow ventral shade)

Common shrimp, crangon crangon, Crangonidae (sandy brown translucent coloration)

Narrative: I felt much more in my element during this seine lab, however, all past seining I have done has been in fresh water so I was interested to see what we could get! On the 1st beach seine tows, I took the role of netting out the fish & there were hundreds of arrow gobies. In the next tow further west on Geoduck beach, we got more fish, indicating a patchy distribution with the arrow gobies in Eld Inlet. I took the role holding the seine in the stream freshwater seining sample, but unfortunately we did not get much. I'm hoping we can eventually use the seine up Synder Cove Creek by the beach trail bridge; during the bioblitz I saw several groups of trout that I believe to be juvenile cutthroat.

Questions

1. Marine Fishes: $H' = 0.008$ ← Multiply by -1

(not a lot of diversity)

	Arrow Goby	Sculpin	
Group Total Tow 1	771	0	
Group Total Tow 2	1,268	2	
Total	2,039	2	-0.008

A. Goby	2,039	2,039/2,041 = 0.999	ln(0.999) = -0.001	-0.001	Sum
Sculpin	2	2/2,041 = 0.001	ln(0.001) = -6.908	-0.007	

Product → Product

2. Because we only got 1 sculpin, the Shannon Diversity Index would be 0. for freshwater fishes because their is only one species & individuals

3. Number of bycatch species: 11
Total number of species: 13

Bycatch species: 11/13 = 0.846

Number of bycatch individuals: 650
Total number of individuals: 2,689

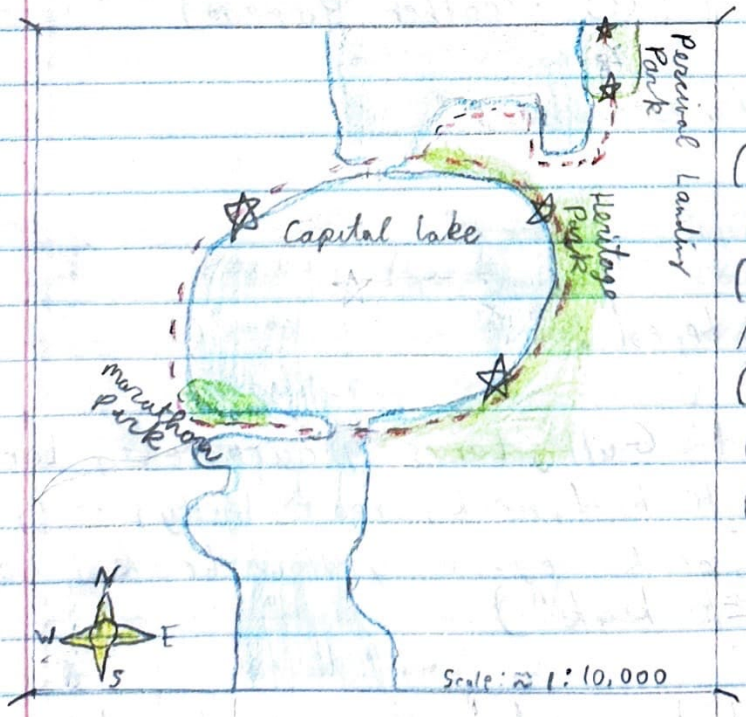
Bycatch indiv: 650/2,689 = 0.242

Week 4: Budd Inlet & Capital Lake Waterbird Survey - Gull Age Structure and Duck Sex Ratio

K. Wooldridge
10/19/23
10:15 AM

Location Description: Percival Landing Park and Capital Lake in Olympia, WA. Survey starts on north end of Percival Landing Park & follows the pedestrian trail south to Capital Lake, where it follows the full loop from Heritage Park through Marathon Park and back; looking at Budd Inlet birds.

Location Map:



Coordinates
Percival Landing Park
(47.04698, -122.90375)
Heritage Park
(47.04299, -122.90484)
Marathon Park
(47 03705, -122.91202)
Capital Lake (middle)
(47.04063, -122.90954)

Habitat Information: The areas from Percival Landing Park to Capital Lake offer a dynamic range of urban & natural environments, where forested coastlines and riparian zones interact with the aquatic ecosystems of Eld Inlet & Capital Lake. The parks contain loud and nasally "aaarrh")

mixed deciduous & coniferous trees, with species like Douglas fir, red alder, big leaf maple, and red cedar on well maintained park grass. Due to the influence of urban development, some sections have young regenerating forests and others have more mature stands. Capital Lake includes submerged aquatic vegetation which provide critical habitat for fish, invertebrates, and waterfowl.

Climate Information
Temperature: 14° C (58° F)
Wind Condition: 2 (Beaufort)
Sky Condition: 1 (US Weather Bureau)

Data Collected / Observations:

Species Encountered:

GULLS Glaucous-winged Gull, Larus glaucescens, Laridae (large gull; white head, neck, breast, belly, tail; gray wings and back; pink legs & yellow beak; low pitched "kak-kak-kak")

Ring-billed Gull, Larus delawarensis, Laridae (medium gull; white head, neck, breast belly, tail; gray wings and back; eyes yellow with red rims; bill yellow with dark ring; legs yellow)

DUCKS Mallard, Anas platyrhynchos, Anatidae (medium waterfowl; green or brown head; orange feet;

"quack" sound)

Wood Duck, Aix sponsa, Anatidae
(medium waterfowl; male multicolored plumage & red eyes; rising whistle "jeeeee")

Bufflehead, Bucephala albeola, Anatidae
(small waterfowl; male black & white with iridiescent green/purple heads; female grey-toned with white patch behind the eye)

American Widgeon, Mareca americana, Anatidae
(medium waterfowl; male mask of green feathers around eyes & cream colored cap from top of head to bill; female grey/brown plumage; "whoop-whoe-whoe")

Ring Necked Duck, Aythya collaris, Anatidae
(small/medium waterfowl; male black with two white rings on grey bill; female grayish brown body and dark bill with a light band; "trrrr")

OTHER Pied-billed Grebe, Podilymbus podiceps, Podicipedidae
(small water bird; brown with darker crown back; whooping "kuk-kuk-cow-cow-cow-coup-coup)

Pelagic Cormorant, Urile pelagicus, Phalacrocoracidae
(small sea bird; all black with metallic iridescence)

Horned Grebe, Podiceps auritus, Podicipedidae
(small water bird; red and black plumage; loud and nasally "aaarrh")

Great Blue Heron, Ardea herodias, Ardeidae
(large wading bird, grayish blue feathers, white face with black plumes)

American Coot, Fulica americana, Rallidae
(medium water bird; black plumage with white bill and red/brown spot near top; "puhlk")

Canada goose, Brant canadensis, Anatidae
(large goose; black head with white cheeks; brownish body)

Gulls

P.L. North (high tide, 10:30 AM)
Glaucous, Age: 1, Count: 1, Standing
Glaucous, Age: 2, Count: 1, Sitting
Ring-billed, Age: 3, Count: 1, Flying

P.L. Park (high tide, 10:57 AM)
Glaucous, Age: 1, Count: 1, Preening
Glaucous, Age: 1, Count: 1, Rooftop
Glaucous, Age: 2, Count: 1, Standing
Glaucous, Age: 2, Count: 1, Rooftop
Ring-billed, Age: 3, Count: 1, Standing
Glaucous, Age: 3, Count: 19, Rooftop
Ring-billed, Age: >3, Count: 5, Standing

Bayview (high tide, 11:50 AM)
Glaucous, Age: 3, Count: 1, Flying
Ring-billed, Age: 3, Count: 1, Flying

C.L. Heritage Park (high tide, 12:13 PM)
Glacous, Age: 3, Count: 1, Flying
Ring-billed, Age: 3, Count: 1, Flying

Ducks

C.L. Heritage Park (high tide, 12:13 PM)
Mallard, F, Count: 2, Swimming/Eating
Wood duck, M, Count: 1, Swimming
Bufflehead, F, Count: 1, Diving

C.L. Near Capital (high tide, 12:50 PM)
Mallard, F, Count: 31, Perched/Swimming/Preening
Mallard, M, Count: 40, Perched/Swimming/Preening
Bufflehead, M, Count: 1, Swimming
Bufflehead, F, Count: 2, Swimming
A. Widgeon, M, Count: 5, Swimming
A. Widgeon, F, Count 7, Swimming

C.L. Deschutes Way (high tide, 1:40 PM)
Ringed-Neck, M, Count: 15, Swimming/Diving
Ringed-Neck, F, Count: 9, Swimming/Diving
Mallard, M, Count: 2, Swimming

Other Waterbirds

P.L. North (high tide, 10:30 AM)
Pied-billed Grebe, Count: 1, Swimming/Diving

P.L. Park
Pelagic Cormorant, Count: 1, Flying/Swimming/Diving

Bayview (high tide, 11:50 AM)
Horned Grebe, Count: 1, Swimming / Diving
Great Blue Heron, Count: 8, Flying / Perched in tree

C.L. Heritage Park (high tide, 12:13 PM)
A. Coot, Count: 8, Swimming / Diving
Pied-bill Grebe, Count: 1, Swimming / Diving

C.L. Near Capital (high tide, 12:50 PM)
A Coot, Count: 23, Swimming / Diving / Perched
Canada Goose, Count: 20, Swimming / Perched
Pied-billed Grebe, Count: 1, Swimming / Diving

C.L. Deschute Way
Pied-billed Grebe, Count: 3, Swimming / Diving
A. Coot, Count: 10, Swimming / Diving

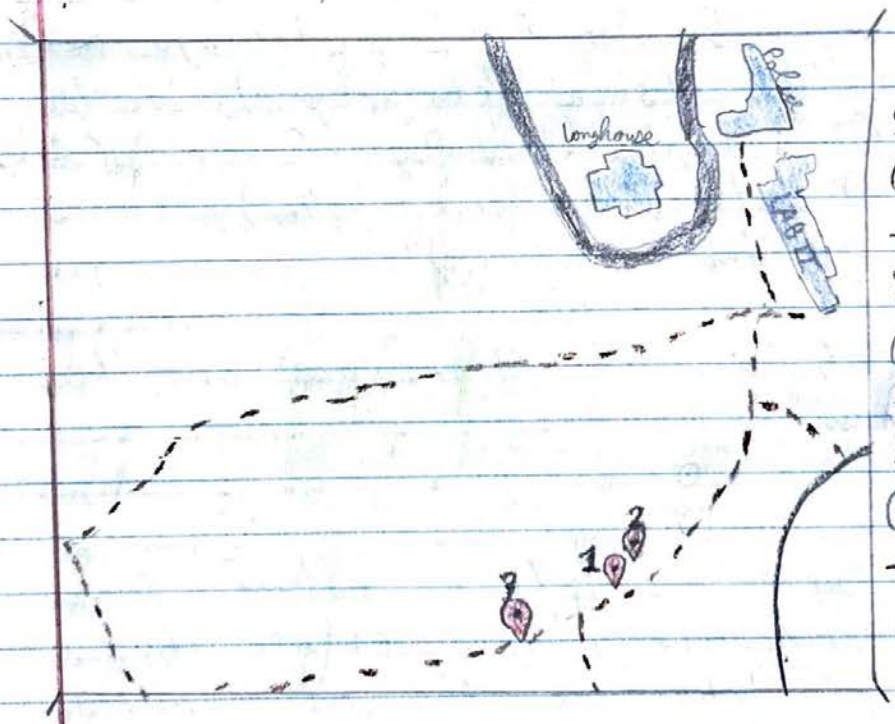
Narrative: Katie, Kaelin, and I started from the north side of and made our way through the various observation spots, finishing up at Capital Lake Deschutes Way. This was my first "serious" birding outing, so I made sure to spend extra time going for "quality" rather than "quantity" observations. I am not going to lie, I got pretty flustered at the spot, but soon started to get a better feel for it as the day progressed. I found the duck observations at Capital Lake to be much more newbie friendly than try to age gulls flying around, but by the end of the day I felt much more confident in my identification skills!

Week 5: Assessment of Wildlife Trees

K. Wooldridge
26 October 2023
10:00 AM

Location Description: The Evergreen College in Olympia, WA. Mixed conifer & deciduous forest west of Lab 1 & 2 building and east of the Evergreen Organic Farm.

Location Map:



Coordinates:
Snag 1 (47.0696185, -122.9808258)
Snag 2 (47.06955, -122.98095)
Snag 3 (47.06914, -122.98147)

Habitat Information: Dense old growth conifer & deciduous forest and predominantly Alderwood gravelly sandy loam soil. Moist, temperate, coastal climate conditions host several plant communities, fungi, and wildlife with several tree species of snags and fallen dead trees which animals use for nests, nurseries, storage areas, foraging, roosting, and perching.

Climate Information:
Temperature: 7° C (44.6° F)
Wind Condition: 0 (Beaufort)
Sky Condition: 1 (US Weather Bureau)

Data Collected / Observations:

Forgot to to tune into the bird sounds, I need to remember to do this next time!

Plant Species - Douglas Fir (Pseudotsuga menziesii), Western Hemlock (Tsuga heterophylla), Western Red Cedar (Thuja aplicata), Bigleaf Maple (Acer macrophyllum), Salal (Gaultheria shallon), Sword Fern (Polystichum munitum)

Assessment of wildlife trees are on the next following pages.

Questions: There are lots of natural & human-induced disturbance events that create snags. What are the main causes of snags in Evergreen forest: insect infestations, disease out breaks, windstorms, ice/snow damage, old age mortality, and/or climate/drought stress? Does Evergreen forest have limited or plenty of snags to support wildlife that uses them for habitat? What management strategies could be implemented if Evergreen has limited snags?

Narrative:
Headed out of Lab 1 building with Sage Jackson, Francis Luing, Hunter Stenovitch, Katie Geist, and Kaelin Andruss on the dirt trail towards the Organic Farm with our eyes peeled for some snags with some interesting cavities and crevices. We found one short and one tall snag pretty close to each other, so we set our 8 meter radius around these plot centers and split up into two groups taking general snag & plot tree characteristics. I brought out my drone in the field today and used it to observe higher up in the canopy as well as being able to accurately determine tree height. Francis worked hard getting all the dimensions of the crevices while others determined bark tightness, top morphology, evidence decay, and other attributes. Amy Cook came by and suggested a big snag further down, but we ended up finding another snag along the way that we couldn't pass up! I was super proud of our team, we had real good communication & worked very efficiently together. When we got back to the Lab 1 building after taking all the data from snag 3, we created a shared google sheet where we shared our tables, notes, and pictures.

Field Activity:

Snag 1

Site Description:
Douglas fir dominant overstory, salal dominant understory, medium canopy cover

Data Table 1

DBH (cm)	Height (m)	Snag Type	Species
25.2	1.46	8*	Douglas fir
Tree #	DBH (cm)	Species	Comments
1	66.3	Douglas Fir	Alive
2	70.1		
3	31.3		
4	17.7	Hemlock	
5	48.5	Douglas Fir	
6	34.2		
7	38.8		
8	19.6	Hemlock	
9	53.4	Douglas Fir	
10	35.2		
11	32.1		
12	37.2		
13	46.5		
14	29.3		Dead
15	17.2		Dead
16	29.4		Dead
17	27.5	Red Cedar	Dead
18	34.5	Hemlock	Dead

* Canadian classification system

Data Table 2

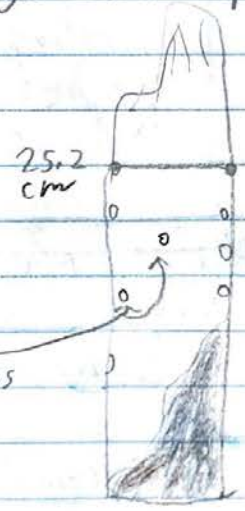
Tree	Bark Tightness	Top Morph	Evidence Decay	Natural Cavity Approx. Size	Natural Cavity Relative Depth	Comments
Snag 1	P	CBJ	Crumble, Gallery	——	——	——

P = patches of loose & patches of bare wood
CBJ = crown broken off

Data Table 3

Tree DBH: 25.2 (cm)	Width (cm)	Max Depth (cm)
Crevice A	3.8	0.9
Crevice B	2	0.8
Crevice C	5.7	0.7
Crevice D	7.4	5.7

Snag 1 had no branches and was essentially a large stump. There did not appear to be any cavities but there were several crevices providing micro habitats for different insects. It appeared that this snag had been around for a long time; decay and decomposition processes significantly reduced the density of the wood



Snag 2

Site description: Mixed forest (douglas fir, maples, and cedar) with douglas fir the dominant overstory and salal, huckleberries, and sword fern the dominant understory. Canopy cover is high.

(continued on next page)

8	56.7	↓	Alive

Data Table 1

DBH (cm)	Height (cm)	Snag Type	Species
40.2	15	4*	Douglas fir

Tree #	DBH (cm)	Species	Comments
1	40.6	Douglas Fir	Alive
2	47		Alive
3	35.4		Dead
4	66.4		Alive
5	21		Dead
6	60.7		Alive
7	34.4		Alive
8	15.8		Dead
9	27.9		Dead
10	35.4		Alive
11	17		Dead
12	32.3		Alive

* American classification system

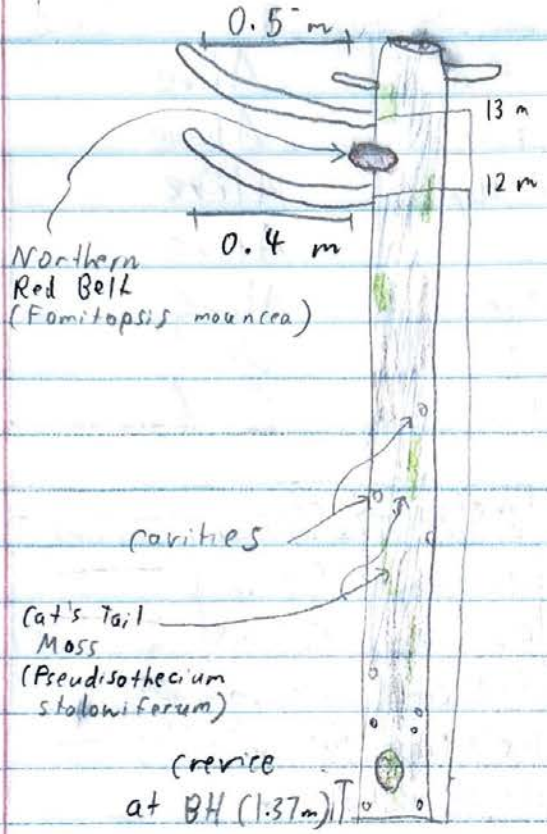
Data Table 2

Tree	Bark Tightness	Top Morph	Evidence Decay	Natural Cavity Approx. size	Cavity relative depth	Comments
Snag 2	TI	CBF	cork, insect Galleries	5.4 x 3.4 cm	3.4 cm	—

TI = tight and intact, CBF = crown broken off

Data Table 3

Tree DBH: 40.2 cm	Width (cm)	Max depth (cm)
Crevice A	3.9 cm	1.8
Crevice B	1.6 cm	1.6
Crevice C	2.5 cm	0.7
Crevice D	4 cm	0.7
Crevice E	2 cm	0.8
Crevice F	3.7 cm	1
Crevice G	2.4 cm	1.8
Crevice H	2.6 cm	1.5
Crevice I	2.5 cm	0.9



Snag 3

Site Description: Mixed dominant overstory including douglas fir, big leaf maple, and red cedar. Dominant understory includes salal & huckleberry. The canopy cover is medium.

Data Table 1

DBH (cm)	Height (m)	Snag Type	Species
39.4	3.9 (?)	7*	Douglas Fir

Tree #	DBH (cm	Species	Comments
1	28.4	Douglas Fir	Dead
2	29.3	Red Cedar	Alive
3	59.5	Douglas Fir	Dead
4	15.3	Red Cedar	Alive
5	21.7	Douglas Fir	Dead
6	37.5	↓	Alive
7	37.6		Dead
8	56.7		Alive

* Canada classification system

(?) best guess because value entered was wrong

9	77.8	Douglas Fir	Alive
10	18.2	Red cedar	Alive
11	39.7	Big Leaf Maple	Alive
12	44.5	Douglas Fir	Alive
13	36	Douglas Fir	Alive
14	17.8	unidentified	Dead
15	27.6	Douglas Fir	Dead

Data Table 2

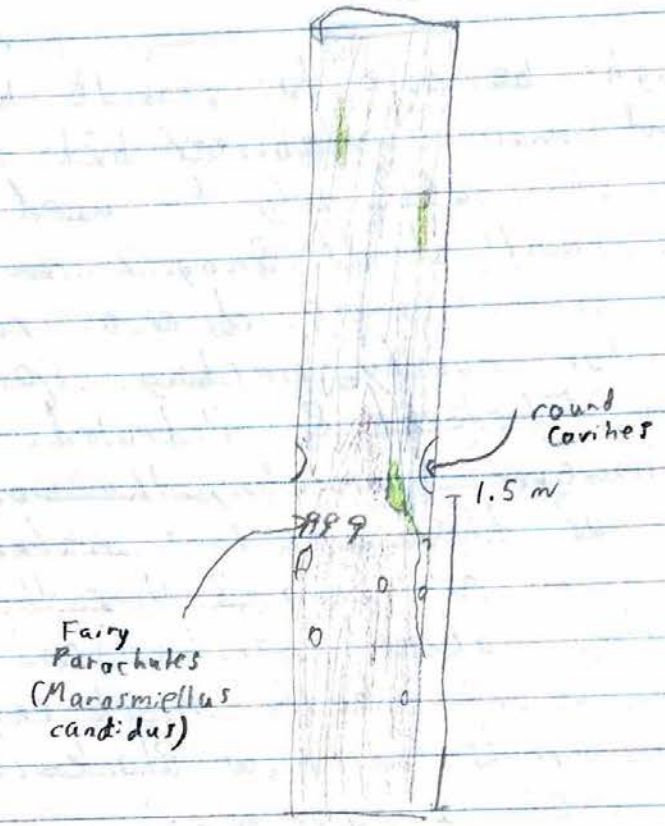
Tree	Bark Tightness	Top Morph	Evidence Decay	Natural Cavity Approx. Size	Natural Cavity cavity depth	Natural Cavity comments
Snag 3	P	CBF	Gallery, Crumbly conk	13 x 8 cm	6.8 cm	—
				5 x 4 cm	6.4 cm	—
				4 x 4 cm	6.4 cm	—
				11 x 10.9 cm	5.4 cm	—
				11 x 12 cm	8.4 cm	—
				4.1 x 6.5 cm	5.9 cm	—

P = patches of loose & patches of bare wood

CBF = crown broken off, top flat

Data Table 3

Tree DBH: 35.4 cm	Width (cm)	Max depth (cm)
Crevice A	21	5.9
Crevice B	3.4	1.1
Crevice C	1.5	0.4
Crevice D	1.6	1.2
Crevice E	2.2	0.7
Crevice F	2	1
Crevice G	1.6	0.7
Crevice H	3.5	6.5
Crevice I	7	0.6



Questions:

1. Snag 1 has the least wildlife value relative to the others. It has patches of loose & bare wood and insect galleries which indicates larger levels of decay. It is also very small in size & lacks any natural cavities. Snag 2 has the best wildlife value due to it's large diameter & height, tighter & intact bark indicating less decay compared to Snag 1. It also has both crevices & a cavity, as well as supporting shelf fungus fruiting bodies. Snag 3 although much shorter also is a close second in terms of wildlife value. It has more decay but significant numbers of cavities & crevices.

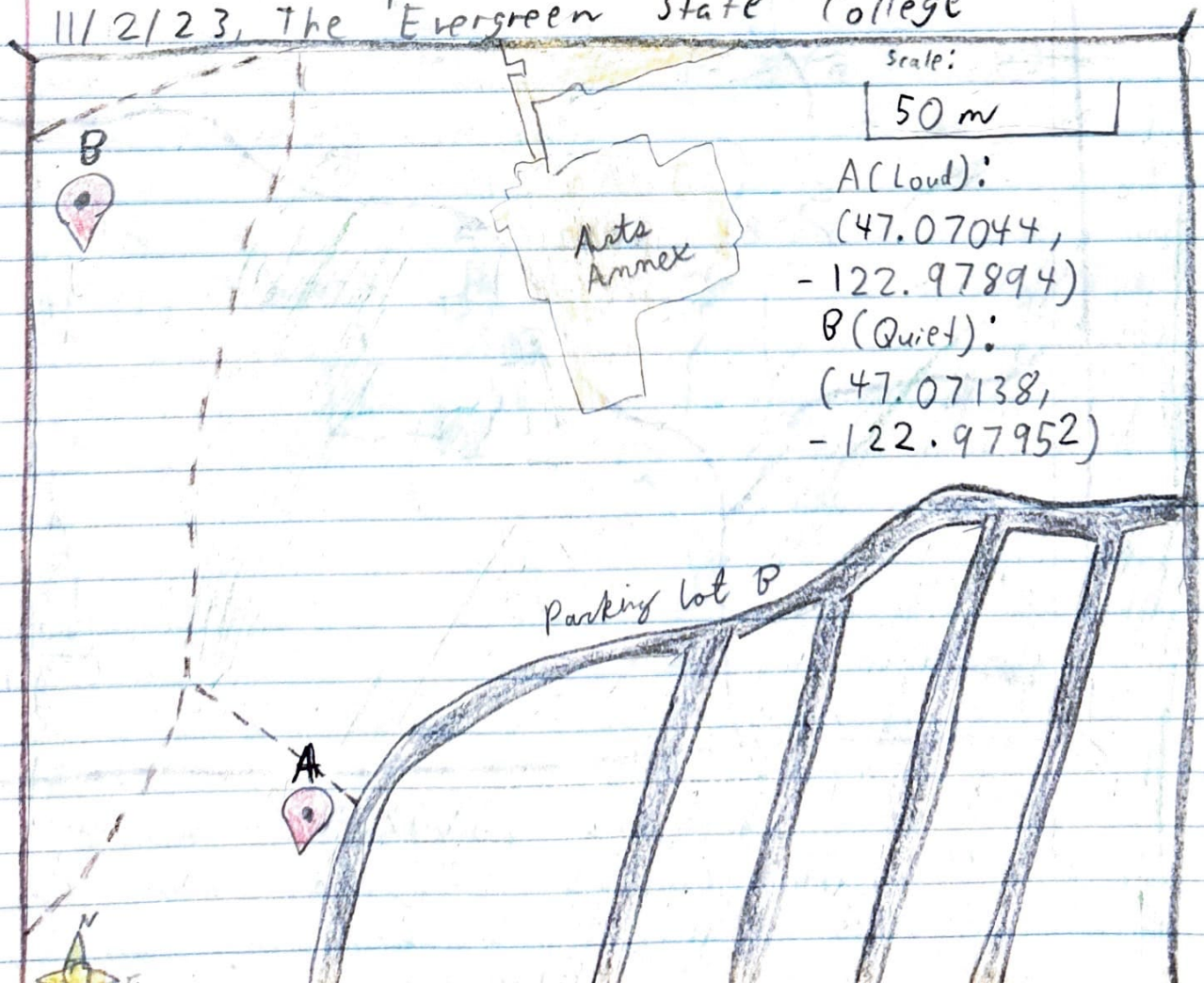
2. Snag 1 might be able to provide habitat for insects and small invertebrates but due to its size it could only be used for foraging for small birds. Snag 2 on the other hand offers more diverse range of habitats for cavity-nesting species like Northern Flickers & Pileated Woodpeckers (however benefiting the wood pecker more as there are less natural pre-existing cavities. Snag 3 has the most pre-existing natural cavities so it could accommodate both insect-eating birds & smaller mammals (like a Black-capped Chickadee or Flying squirrel).

Week 6: Soundscape Ecology Field Project

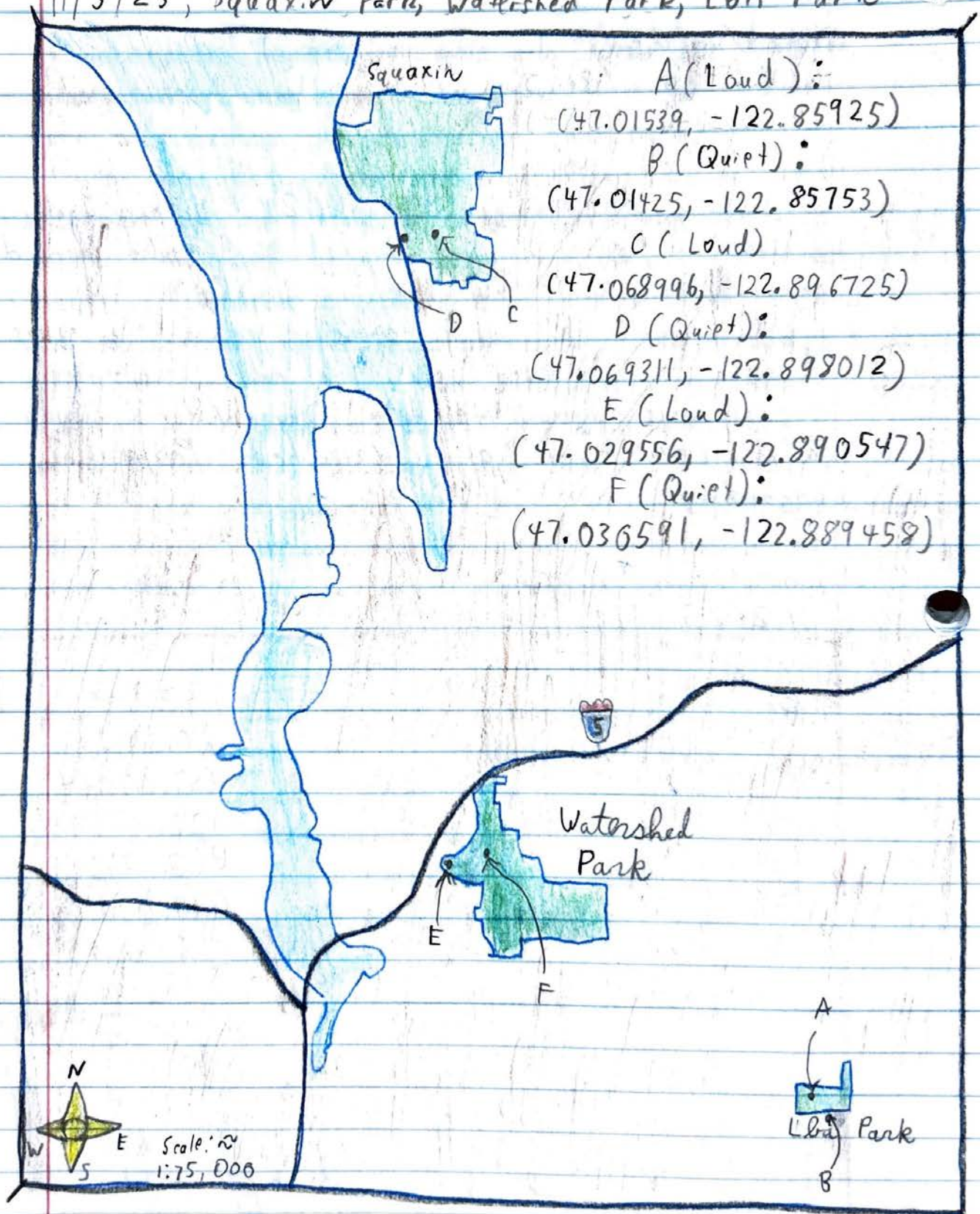
K. Wooldridge
11/2/23, 11/3/23
10:15 AM, 10:33 AM

Location Description: On 11/2/23, the Evergreen State College in Olympia WA. One recording was done in the Evergreen State College Parking Lot B, and another recording was done off the trail on the path to the sustainable agriculture lab. On 11/3/23, Squaxin Park, LBA Park, and Watershed Park (2 recordings per site.

Location Map:
11/2/23, The Evergreen State College



11/3/23, Squaxin Park, Watershed Park, LBA Park



Habitat Information: Forested fragments within the city of Olympia home to a variety of wildlife including birds, small mammals, amphibians, and insects.

The forests surrounding Evergreen College are known for it's mixed conifer & deciduous old growth forests; overstory includes Douglas fir, western red cedar, hemlock, maple, and alder. Native understory includes various ferns, salal, and mosses. Squaxin Park is most similar in habitat being directly across Budd Inlet from Evergreen State College also having steep ravines, cliffs, and streams with one mile of saltwater shoreline home to a variety of water birds, seals, and fish. LBA Park is more manicured grassy park with some wooded areas on the edges of the boundary & conifers scattered in the middle. Watershed Park is a combination of riparian habitat surrounding Moxlie Creek and steeper elevation gains to older growth coniferous & deciduous forest in the uplands by the road.

Climate Information:

11/2/23 Temperature - 12° C (53.6° F)
Wind Condition - 1 (Beaufort scale)
Sky Condition - 2 (US Weather Bureau code)

		LBA Park	Squaxin Park	Watershed Park
11/3/23	Temperature -	9.4° C	9.4° C	11.1° C
	Wind Condition -	1	1	1
	Sky Condition -	2	2	2

Data Collection / Observations:

Birds

Barred Owl (Strix varia) - size in between a Great Horned Owl & Barn Owl, mottled brown & white plumage, dark brown eyes, flying / upper canopy branch perched, "ok-ok-ok-ok ok-ok-buhooh"

Ring-billed Gull (Larus delawarensis) - medium-sized gull, yellow bill/legs, white/beige/black plumage, flying, "kree, kree"

Golden-crowned Kinglet (Regulus satrapa) - size between a chickadee & hummingbird, pale olive/gray/black/white/yellow-orange, perched in upper canopy, "tsee-tsee-tsee"

Plants

Douglas Fir (Pseudotsuga menziesii), Western Red cedar (Thuja plicata), Bigleaf Maple (Acer macrophyllum), Salal (Gaultheria shallon), sword fern (Polystichum munitum), Oregon grape (Mahonia aquifolium), Western Hemlock (Tsuga heterophylla), Pacific Trillium (Trillium ovatum), English Ivy (Hedera helix helix), Red Huckleberry (Vaccinium parvifolium), Trailing Blackberry (Rubus ursinus)

Questions

What types of species will be detected when analyzed through Arbimon? What effects does the anthrophony from I-5 have on wildlife in Watershed Park? How does the size of the different parks impact the anthrophony? How does vegetation / lack of impact the soundscape ecology?

Narrative

Meeting near the playground at Squaxin Park.

Katie Geist, Kaelin Andruss, and I hit the dirt path to our first recording spot close enough to hear the anthrophony. After taking recordings near by each other in different locations, we went to each recording spot & measured DBH, canopy cover, and understory. To find a 'quieter' spot for our next recording, we followed the beach trail down & took a detour down a game trail that headed into some thick old growth. We recorded our sounds & repeated the steps collecting the different vegetation data. We repeated this process for LBA Park & Watershed Park. I also should add we did this the previous day at Evergreen in the forest outside the CAL (computer applications lab) building as a test to make sure our equipment was working and we knew what we were doing in time for the field day!

Field Activity (Part 1)
The Evergreen State College - 11/2/23

Location (E), Recording (L), DBH 1 (30cm), DBH 2 (45 cm), DBH 3 (60 cm), Canopy Cover 1 (0), Canopy Cover 2 (26), Understory 1 (0), Understory 3 (5), Point of interest start time (0:01), Frequency of interesting sound (1017 Hz), Volume of interesting sound (-62.3 dB), Frequency of loudest volume (69 Hz), Volume of loudest sound (-28 dB)

Location (E), Recording (Q), DBH 1 (49 cm), DBH 2 (35.2 cm), DBH 3 (61.3 cm), Canopy Cover 1 (26), Canopy Cover 2 (28), Understory 1 (4), Understory 2 (6), Point of interest start time (0:37), Frequency of interesting sound (982 Hz), Volume of interesting sound (-68 dB), Frequency of loudest sound (75 Hz), Volume of loudest sound (-50.7 dB)

Field Activity (Part 2)
Squaxin Park - 11/3/23
Location (S), Recording (L), DBH 1 (153 cm), DBH 2 (73.9 cm), DBH 3 (26.3 cm), Canopy Cover 1 (35), Canopy Cover 2 (31), Understory 1 (3), Understory 2 (4), Point of interest start time (0:30), Frequency of interesting sound (366 Hz), Volume of Interesting sound (-54 dB), Frequency of loudest sound (77 Hz), Volume of loudest sound (-34.1 dB)

Location (S), Recording (Q), DBH 1 (114.7 cm), DBH 2 (15.8 cm), DBH 3 (117 cm), Canopy cover 1 (36), Canopy Cover 2 (26), Understory 1 (10), Understory 2 (9), Point of interest start time (0:29), Frequency of interesting sound (770 Hz), Volume of Interesting sound (-43.1 dB). Frequency of loudest sound (-70.1Hz), Volume of loudest sound (-43.1 dB)

LBA Park - 11/3/23
Location (L), Recording (L), DBH 1 (53.1 cm), DBH 2 (46.8 cm), DBH 3 (97.8 cm), Canopy Cover 1 (35), Canopy Cover 2 (24), Understory 1 (0), Understory 2 (0), Point of interest start

time (0:24), Frequency of interesting sound (390 Hz), Volume of Interesting Sound (-64 dB), Frequency of loudest sound (86 Hz), Volume of loudest sound (-32.9 dB)
Location (L), Recording (Q), DBH 1 (42.4 cm), DBH 2 (82.9 cm), DBH 3 (56.5 cm), Canopy Cover 1 (34), Canopy Cover 2 (35), Understory 1 (6), Understory 2 (3), Point of interest start time (0:41), Frequency of interesting sound (211 Hz), Volume of Interesting Sound (-58.8 dB), Frequency of loudest sound (71 Hz), Volume of loudest sound (-49.9 dB)

Watershed Park - 11/3/23
Location (W), Recording (L), DBH 1 (48.3 cm), DBH 2 (33.9 cm), DBH 3 (45.3 cm), Canopy Cover 1 (28), Canopy Cover 2 (34), Understory 1 (8), Understory 2 (9), Point of interest start time (0:05), Frequency of interesting Sound (411 Hz), Volume of Interesting Sound (-54.2 dB), Frequency of loudest sound (73 Hz), Volume of loudest sound (-26.8 dB)
Location (W), Recording (Q), DBH 1 (71 cm), DBH 2 (46.6 cm), DBH 3 (48), Canopy Cover 1 (30), Canopy Cover 2 (35), Understory 1 (4), Understory 2 (4), Point of interest start time (0:58), Frequency of interesting sound (393 Hz), Volume of interesting (-51.7 dB), Frequency of loudest sound (63 Hz), Volume of the loudest sound (-32.9 dB)