COMPARING SIGNS OF EROSION NORTHERN WHIDBEY'S WEST SIDE VS EAST SIDE

Geo 211

Salish Sealions

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Whatcom COMMUNITY COLLEGE

Introduction

- Whidbey is comprised of quaternary surficial deposits (USGS, 2016). These deposits are often composed of unsorted clay, silt, sand, and gravel-sized sediments. Surficial deposits come about most often from the erosion and transportation of sediments, and in Whidbey's case its geology was heavily impacted by the Cordilleran ice sheets advances and retreats in the Puget lowland area (Easterbrook, 1968). Most relevant to our research, surficial material is known to be susceptible to erosion, landslides, and earthquakes.
- Research question: Do the west facing shores of Northern Whidbey Island show more evidence of beach/shoreline erosion than the east facing shoreline?
- Our hypothesis is that the west shore of Whidbey Island will be higher energy and more eroded due to the wind and waves coming in off the Strait of Juan de Fuca.

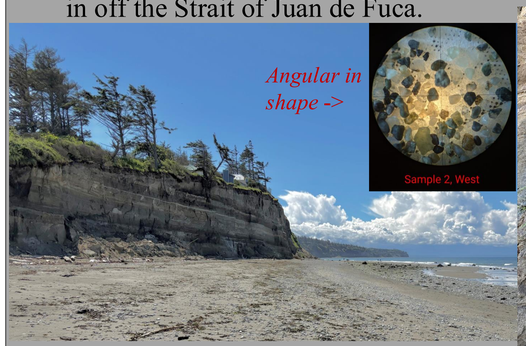

Image 1. West Beach

Image 2. Possible Exposed Ground Water at West Beach

Methods

- Collected data from 6 beaches across Northern Whidbey, 3 east facing beaches and 3 west facing beaches (see Figure 1)
- Filled 6 sample cups of sediments from each beach, collecting from 3 different spots on the beach from backshore -> water.
- Measured beach slope using Jacob staff
- Sieved sediments to separate and quantify the varying grain sizes.
- Analyzed sediments under microscope.

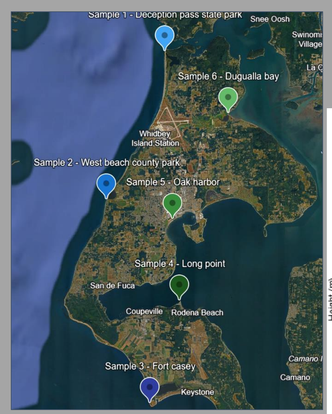

Figure 1. Sample collection locations

Limitations

- Due to rising tides some of our slope data is incomplete.
- Our inexperience with graphing means there may be an error we did not catch.

Discussion

We found from our research that the western shores of Northern Whidbey indeed exhibited more advanced signs of erosion than its eastern shores.

West beaches have the highest presence of sand the size of 0.250mm (Figure 2), indicating impact from erosion. Fort Casey is an outlier in sediment size, with 80.4% of its sediment being 2.00mm and larger. This is potentially a result of the tides rising as we collected data, inhibiting our range of sediment collection. One of our team members, Morgan, said she went back to Casey and noted that she could see sand underneath the cobble and gravel that we weren't able to see before. Possible interpretations could be glacial deposits of cobble and gravel sized sediment eroding in place, or being uplifted by the force of the waves. The visual disparity between West Beach's cliff bluffs and Fort Casey's gradual grassy bluffs is quite the sight, it's possible the differing erosional results may be due to varying stratigraphy, wind and surface currents, and/or tidal range.

East beach samples were dominated by coarse sand and larger sediments, Oak Harbor being the outlier in this group with 45.9% being medium sand. While gaps in data exist, the full slopes we recorded show clear differences (Figure 3). Western slopes have a more gradual decline, while eastern slopes appear more angular, suggesting less impact of erosion that would smooth out the slope of the beach i.e., wave impact.

Beach Slope

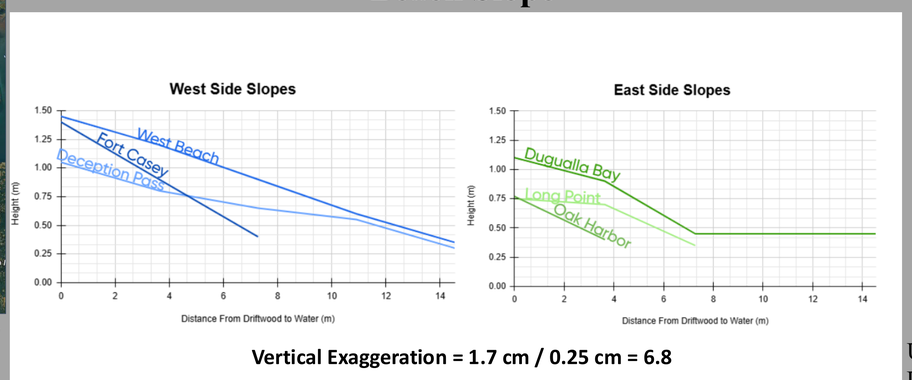

Figure 3. West Side vs East Side Slope Graphs

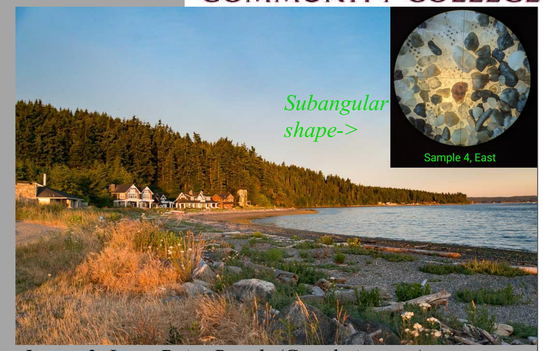

Image 3. Long Point Beach (Google images)

Composition of Sediment Samples

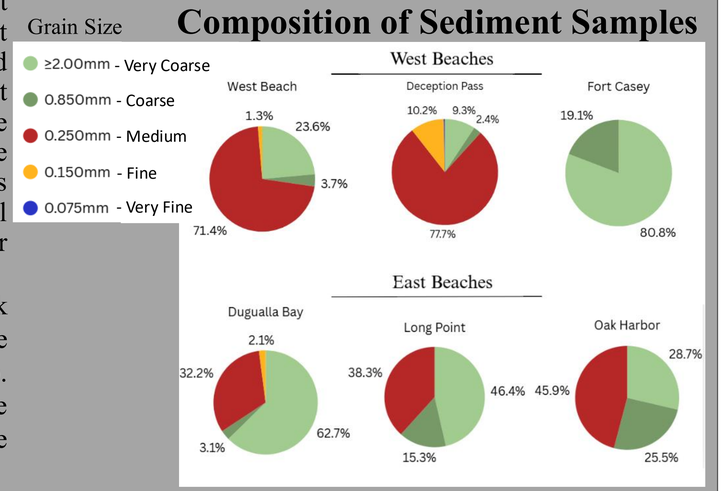

Figure 2. Pie charts comparing sediment composition

It would've been a challenge to collect and comprise data from the Northern and Southern halves of Whidbey, which is why we decided to limit our study to its northern half. Further south, I'd say erosion would be similar if not somewhat tamer the farther you go. If we could redo our data, it might be smart to split collections between 2 days so that we get fully fleshed slope and sediment data, along with ensuring all sediment samples weigh the same to lessen margin of error.

Acknowledgements

Kaatje Kraft for providing necessary tools for our project.

Fort Casey Sealions for showing up!

Work Cited

USGS. "Devils Mountain Fault -- Online Professional Paper FIGURE 1." Usgs.gov, 2016, pubs.usgs.gov/pp/p1643/fig1.html. Accessed 4 June 2026.

Easterbrook, Don J. "Pleistocene Stratigraphy of Island County." Ecology.wa.gov, Department of Water Resources, 1 Jan. 1968, apps.ecology.wa.gov/publications/documents/wsb25.pdf. Accessed 12 June 2026.