Whatcom COMMUNITY COLLEGE

A Tale of Two Beaches


Birch Bay Looking South with View of Shoreline



1 Research Question & Background

How has armoring impacted the erosion of soft sediments at Whatcom?

Starting with what seemed to be a simple question, “How has armoring impacted the erosion of soft sediments at Whatcom County beaches?”, it turned into a much greater endeavor than we were expecting. Drawing from previous research done by Asher, Barret, and Sáng (2023) titled “Riprap, Sediment Size, and Slope, Oh My!” in which they measured the slope and sediment sizes at Boulevard Park and Locust Beach to see the general effects of armoring, given Boulevard Park has armoring and Locust Beach does not. We took a different approach, in which we sought to find differences in erosional processes between different types of armoring, since there seems to be a correlation between larger and less permeable armoring systems and higher ecological impact (Dugan et. al, 2019). This being, the larger and more intrusive armoring systems, such as groins, disrupt the natural movement of soft sediments downshore, causing sediments to build up in upcurrent areas and to become depleted downcurrent (Smith & Pun, 2006).

2 Methodology and Equipment

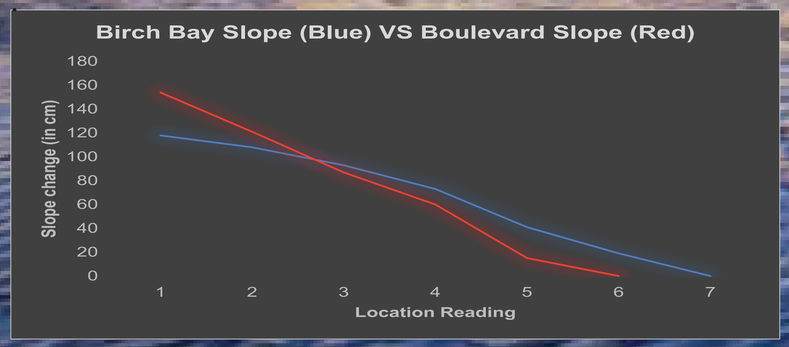
- We had two teams, Birch Bay team and Boulevard Park team.
- Jacob’s staffs and quadrats to measure slope and sediment sizes in the areas (See Figure 1).
- Measuring 150cm between each measurement
- Calculate the slope at each interval
- Examine rock size at each intersection of the quadrat at the end of the 150cm section for a total of 16 size measurements, put into two groups
- >64mm is large, <64mm is small.
- Each team took 6 slope measurements and 6 quadrat measurements.

3 Birch Bay History

The beach has been almost entirely changed by humans.
Formerly had massive groins jutting into the water.
The groins caused widespread problems in terms of erosion and the overall ecosystem at the beach.

Birch Bay Data

Birch Bay showed very poorly sorted gravel and sediment, a very steep profile and odd flat areas before the slope continued.



Boulevard	Quadrat Sediment Measurements	Birch Bay Park	Quadrat Sediment Measurements
1	< 64mm	1	Small
2	< 64mm	2	Small
3	< 64mm	3	Small
4	Average: 4.5 Largest: 6.5 Smallest: 2	4	> 64 mm
5	Average: All Large	5	> 64 mm
6	Average: 6.9 cm Largest: 7.5 cm Smallest: 0.6 cm	6	> 64 mm

5 Interpretations of Both Data Sets

Boulevard Park and Birch Bay both have histories of large-scale erosion which the armoring projects set to correct, however the steep slopes at both beaches, poorly sorted sediments, and large sums of money spent on upkeep suggest that the man-made changes to these beaches have not benefited the shoreline as it set out to do. We noted one outlier in the Boulevard Park data, that being a boulder that took up the entirety of the quadrat (Figure 3) which is likely evidence of the glacier that once advanced and receded in and out of Canada (Reasoner et al., 2001). While our data and research is limited, from what we’ve collected, it can be assumed that the use of groins at soft sediment beach environments disrupts the natural movement of these sediments, creating an artificial beach with unevenly distributed sediments and a surplus of erosion downshore. It seems that human interference in this land-sea transitional environment, while well-intentioned, often disrupts the naturalnatural processes that occur here.


Boulevard Park Looking South with View of Beach

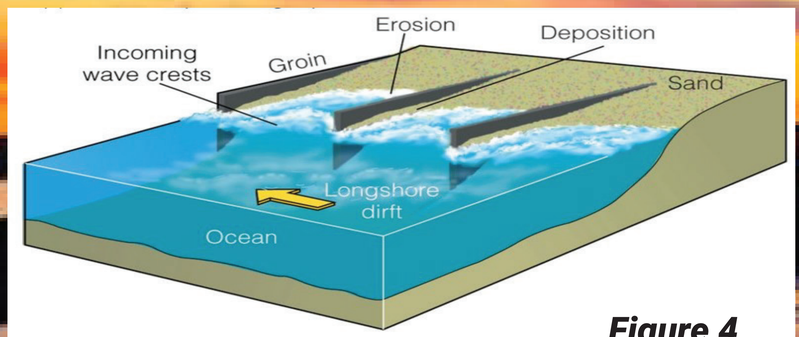


Figure 4
Image source: https://geophile.net/Lessons/coasts/coasts_04.html

4 Boulevard Park History

Boulevard Park suggests at least a partially man-made beach.
In 2013, $500,000 was spent on building Boulevard Park’s armored beach we see today (Schwartz, 2022).

Boulevard Park Data

The profile included a flat, sandy area (artificially made) that gave way to a steep berm and a steep, gravely lower beach (Graph A).
The lower beach area consisted largely of gravel <64mm, with two quadrats containing a cobble (>64mm) each. (Graph B).

6 *Acknowledgements*

We thank:
Kaatje Kraft, who provided us with ample support and feedback, and taught us everything we know relating to geology.
Kris Harrell for doing so much for our Geology 211 class, from preparing the supplies needed for our labs to transporting us to and from Locust Beach for our field trip.
The Whatcom Community College Geology Dept. or funding this class and providing all of the supplies we used throughout the quarter.
Those in our class who gave us feedback during our peer reviews for our poster, as it allowed us to think critically about our own work in a way that we wouldn’t have been able to otherwise, which led us to create a better version of our poster.

References

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Efforts are being made to explore alternative solutions, such as "soft armoring" or living shorelines, which aim to balance property protection with ecological preservation.