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Analysis of Tidal Stage Impact on Harbor Seal Haul-Out Behavior in the Snohomish River Estuary of the Salish Sea

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Introduction

The Snohomish River feeds into Possession Sound and provides multiple locations for Harbor Seals (Phoca vitulina) to lay on logs, docks and barges. This behavior is referred to as Hauling-Out. The sites used in the Snohomish river are mainly log pile ups from nearby industry sites that are unique to the Everett area. The semi diurnal tide cycle of Possession sound plays into the unique water circulation of this river. This study explores how the harbor seal's haul-out behavior is influenced by the tidal stages.

Fig. 1 (Left): A baby harbor seal lays next to another harbor seal on the Jetty Island boat launch. Photo courtesy of Lani Baird (2021).

Study Site

Fig. 2: Map showing Possession Sound (top) with the Snohomish River marked by a red box. The close up of the Snohomish River Estuary system in Possession Sound (bottom) shows the three study sites: Log Skid , North Jetty, and Log Boom Jetty.

Methods

This study analyzed data compiled by the Ocean Research College Academy (ORCA) at multiple log boom seal haul-out sites in the Snohomish River from 2016-2022. Multiple counts of harbor seals were conducted as well as the use of a clicker to obtain the highest degree of accuracy. These data were synthesized with tide data from the National Oceanic and Atmospheric Administration (NOAA).

Fig. 3 (Right): ORCA students use the research vessel *Phocena* to travel down the Snohomish River to collect data. Photo courtesy of Lani Baird.

ORCA

The Ocean Research College Academy is a dual enrollment program where high school juniors and seniors experience innovative, interdisciplinary and student-centered learning. A longitudinal study of the local estuary forms the backbone of the first-year experience, and leads students to conduct independent research in their second year of the program. ORCA has received grants for a research lab, research vessel, and summer research funded by the National Science Foundation.

Results

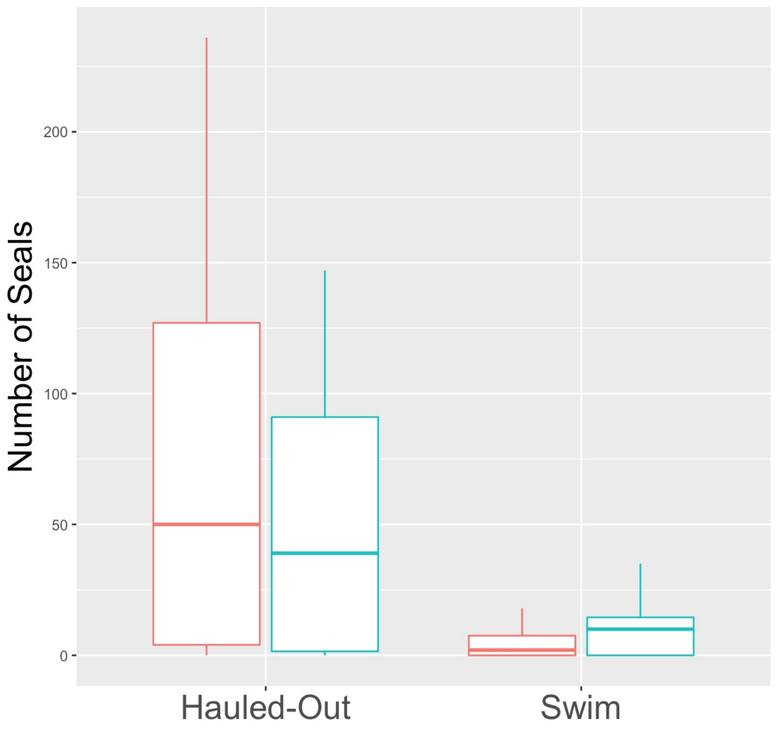
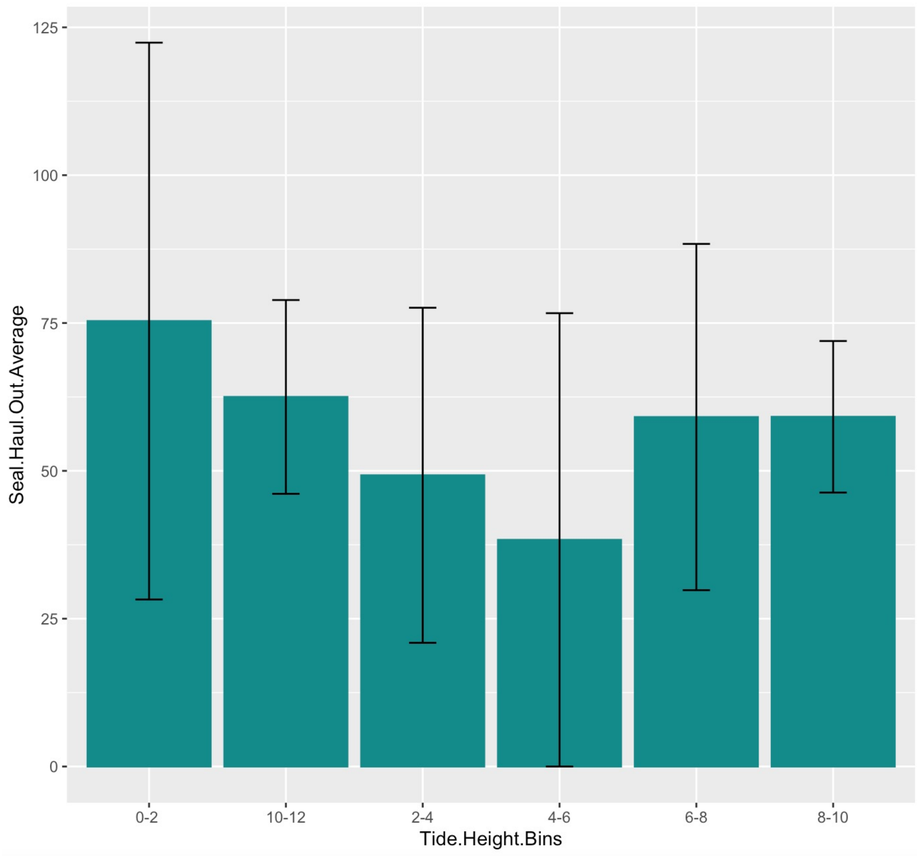


Fig. 4 (Above): Boxplot of the number of harbor seals recorded at ebb and flood tides sorted by their behavior (hauled-out and swimming). Data were taken between October 2016 through March 2022 at all three sites.

Fig. 6 (Above): Harbor seals displaying swimming and hauled-out behavior at Log Ski. Photo courtesy of the Ocean Research College Academy (2021).

Fig.7 (Above): Harbor seals hauled-out at Log Skid looking at the camera. Photo courtesy of the Ocean Research College Academy.

Fig. 5 (Below): Bar graph depicting average harbor seal counts at binned tide heights. Data were taken between October 2016 through March 2022 at all three sites.



Early Conclusions

Figure 4 results suggest harbor seals are more likely to be hauled-out at ebb rather than flood tide. However, defining seal preference by flood and ebb is not specific enough to fully understand this behavior. Figure 5 further differentiates seal behavior within specific tide height bins. The average number of seals hauled out occurred during the lowest tide heights with large variation. More seal behavior observations over a longer period of time may reduce the margin of error.

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