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The effect of anthropogenic noise disturbance on day-time haul out patterns of harbor seals (Phoca vitulina) at two sites available at all tide levels.

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The effect of anthropogenic noise disturbance on day-time haul-out patterns of harbor seals (Phoca vitulina).

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Introduction

• Harbor seals are one of the most abundant pinnipeds in the northeast Pacific.

• Harbor seal haul out patterns are affected by several factors, including anthropogenic disturbance (Becker et al. 2009).

• One component of anthropogenic disturbance is an increase in ambient noise due to human activities such as traffic and construction.

• There is evidence that noise disturbance can affect harbor seal hearing (Kastak et al. 2005; Kastelein et al. 2018) as well as cause changes in haul-out behavior on the order of hours (Andersen et al. 2012; Henry & Hammill 2001).

• It is unclear how noise disturbance affects harbor seal haul-out patterns over long temporal scales.

• I aim to investigate the effect of ambient noise level on harbor seal haul-out patterns at two sites available at all tide levels over the course of a year.

Methods

• Two study sites: Bellingham Waterfront and Semiahmoo Marina
  o Both sites are available at all tide levels to account for the confounding factor of tidal height.
  o The Waterfront is much closer to active construction and human activities.
  o Historically, there have been more seals present at the Marina.

• 15 minute day-time surveys will be conducted three times per week at each site for one year.
  o Observe seals from land, no further than 300 meters from the haul out site.
  o Surveys will record data on the number of seals hauled out, temperature, weather, and tidal height.

• Noise levels will be recorded at five minute intervals during each survey using a NoiseMeters NM102 hand-held omnidirectional noise meter.
  o The meter has a resolution and accuracy of 0.1 dB ± 1.5 dB (re: 94 dB @ 1 kHz, in air), a frequency range of 31.5 Hz to 8 kHz, and a noise level range of 30 to 130 dB re 20 μPa.

• An ANOVA will be used to compare the mean number of seals hauled out and mean ambient noise level at each site. An ANOVA will also be used to determine the significance of the relationship between ambient noise level and number of seals hauled out.

Study Sites:

• Bellingham Waterfront:

• Semiahmoo Marina:

Preliminary Results

• Mean ambient noise level at the Waterfront and Marina in April 2019 (n=9). Error bars are standard error.

• Mean number of seals hauled out at the Waterfront and Marina in April 2019 (n=9).

• Relationship between ambient noise level and number of seals hauled out in April 2019 (n=18).

Future Directions

• Collect more data.

• Assess the importance of ambient noise relative to other factors affecting harbor seal haul-out using a generalized linear model.
  o Other factors will be time of day, tidal height, year, season, temperature, space availability, and food availability.

References