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Feeding success of harbor seals in relation to hunting technique at Whatcom Creek

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Feeding success of harbor seals consuming adult salmonids in relation to hunting technique
Western Washington University, Biology Department
MacKenna Newmarch

Introduction
• Foraging behavior in carnivorous marine mammals is poorly understood despite its ecological significance.
• Studying patterns in individual foraging success may provide (1) predictive models and (2) insight to changes in ecosystem structure and function.
• Individual variability has been recorded in marine predators.
• Harbor seals frequent an estuary in Bellingham, WA hunt primarily for hatchery Pacific salmon during the annual run.
• Are there certain hunting techniques and environmental variables that allow seals to have higher feeding success?
• Does feeding success of hunting technique vary at an individual level?

Results
• Average success rate of **chase** hunting technique across all years = 15.6\% ± 36.3\% SD
• Average success rate of **bank** hunting technique across all years = 20.1\% ± 40.6\% SD
• Average success rate of **upside down** hunting technique across all years = 7.8\% ± 26.9\% SD
• Three-way interactive effect of technique, whether hatchery chum are running, and year is most influential on feeding success (Table 1)

Discussion
• Technique type does not reveal major patterns of success across years (Figure 1).
• Hatchery had ~90\% less salmon returns in 2017, no obvious effect on success (Figure 1).
• No successful bank behavior in 2016 possibly due to high success of chase; dominating behavior in each year (Figure 1).
• Technique plays a role in predicting feeding success (Table 1).
• Variation evident in feeding success for 2015 at individual level both in success of technique used and range of salmon return (Figure 3).
• Individuals 17, 56 and 105 have high success in one behavior, possibility of specialization or ‘mastering’ technique where other seals not as skilled (Figure 3).
• Future research will investigate the significance on individual specialization.

Table 1. Generalized linear model examining variables most effective at predicting feeding success. Better predicted models have comparatively lower AIC values. Likelihood describes probability of model being the best of those tested.

<table>
<thead>
<tr>
<th>Predictor</th>
<th>AIC</th>
<th>Likelihood</th>
</tr>
</thead>
<tbody>
<tr>
<td>technique<em>salmon running</em>year</td>
<td>189.12</td>
<td>0.86</td>
</tr>
<tr>
<td>technique+salmon running+year</td>
<td>192.72</td>
<td>0.14</td>
</tr>
<tr>
<td>salmon running</td>
<td>200.01</td>
<td>0.004</td>
</tr>
<tr>
<td>technique</td>
<td>221.34</td>
<td>8.6193E-08</td>
</tr>
<tr>
<td>year</td>
<td>227.75</td>
<td>3.4959E-09</td>
</tr>
</tbody>
</table>

Figure 1. Percent feeding success for all harbor seals at Whatcom creek according to technique (n=64), bank (n=67) and upside down (n=166) hunting techniques by year.

Figure 2. Heat map representing lower success rate (light) and higher success rate (dark) for three hunting techniques: chase (n=10), bank (n=9), and upside down (n=10) in 2015. X axis represents designated ID according to current catalog.

References

Acknowledgements

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**Figure 1**: Percent feeding success for all harbor seals at Whatcom creek according to technique (n=64), bank (n=67) and upside down (n=166) hunting techniques by year.

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