Inferring Prehistoric Butchery, Transport and Storage from Fish Body Part Representation?
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INTRODUCTION

- Prehistoric processing techniques allowed storage of seasonally available resources in the North Pacific region. Stored foods promoted growth of prehistoric populations and contributed to increasing cultural complexity. It is therefore important to identify markers of storage in prehistory.

- Body part representation is commonly used to document fish processing and storage. However, both cultural and natural processes affect body part representation and must be distinguished to understand prehistoric subsistence behavior.

- My proposed thesis research will examine the effects of bone density on Pacific Cod (Gadus macrocephalus) and halibut (Hippoglossus stenolepis) in North Pacific archaeological sites and how these data can be used to identify prehistoric processing, transportation and storage.

- The goal of this poster is to examine body part representation from multiple North Pacific sites and explore explanatory hypotheses.

PACIFIC COD AND HALIBUT BODY PART REPRESENTATION
IN NORTH PACIFIC ARCHAEOLOGICAL SITES

ALTERNATIVE HYPOTHESES

Cultural Behavior

- Body part representation is affected by human processing, consumption and discard behaviors. Most researchers have focused on this hypothesis to explain patterns of body part representation.

- If cultural behavior is responsible for fish body part representation, then element abundance should vary independent of bone density (and will address with future work).

- Field Processing sites vs. Central Bases should exhibit different patterns of body part representation.

- For instance: Halibut size and the distance between habitation sites and the fishing grounds likely contributed to processing and selective transport decision-making.

- Majority of large excavations and analyses focused on Large Central Base Habitation sites; little systematic excavation and analysis of Field Processing Camps.

Histologically, Pacific cod and halibut were dried and stored for later consumption.

METHODS & MATERIALS

1. Organize Body Part Representation Data Set for North Pacific Archaeological sites

2. Group Observed Elements by Body Part

3. Compare Observed vs. Expected Element Proportions
   - Visual Comparison to Identify Major Trends
   - Chi-Square Goodness-of-Fit Test: Compares Observed Body Part Frequencies with Expected Proportions (Whole Individuals)

Sample of North Pacific Archaeological Sites

Pacific Cod Element Frequencies

<table>
<thead>
<tr>
<th>Body Part</th>
<th>North Point</th>
<th>Rice Ridge</th>
<th>Uyak</th>
<th>Crag Point</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cranial</td>
<td>257</td>
<td>892</td>
<td>343</td>
<td>442</td>
</tr>
<tr>
<td>Pelvic</td>
<td>16</td>
<td>73</td>
<td>77</td>
<td>7</td>
</tr>
<tr>
<td>Vertebra</td>
<td></td>
<td>131</td>
<td>17</td>
<td>288</td>
</tr>
<tr>
<td>Total</td>
<td>2088</td>
<td>2684</td>
<td>711</td>
<td>911</td>
</tr>
</tbody>
</table>

Pacific Halibut Element Frequencies

<table>
<thead>
<tr>
<th>Body Part</th>
<th>North Point</th>
<th>Rice Ridge</th>
<th>Uyak</th>
<th>Crag Point</th>
<th>UNL-050</th>
<th>Hoko Rockshelter</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cranial</td>
<td>1</td>
<td>12</td>
<td>2</td>
<td>1</td>
<td>34</td>
<td>29</td>
</tr>
<tr>
<td>Pelvic</td>
<td>0</td>
<td>0</td>
<td>1</td>
<td>2</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Appendicular</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Vertebra</td>
<td>1</td>
<td>12</td>
<td>9</td>
<td>20</td>
<td>105</td>
<td>563</td>
</tr>
<tr>
<td>Caudal</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>2</td>
<td>15</td>
</tr>
<tr>
<td>Total</td>
<td>0</td>
<td>27*</td>
<td>12*</td>
<td>32*</td>
<td>142</td>
<td>738</td>
</tr>
</tbody>
</table>

* Excluded from Chi-Square analysis due to small sample sizes

FUTURE RESEARCH

1. Measure Pacific Cod and Halibut Bone Density
   - Select Representative Elements from Each Body Part (Cranial, Pectoral and Pelvic Girdles, Vertebral, Caudal Fin)
   - Use Dual X-Ray Absorptiometry (DEXA) to Measure Bone Mineral Density (g/cm3)

2. Use Bone Density Data to Determine if Bone Density is Responsible for Body Part Representation in North Pacific Archaeological Sites
   - Measure Correlation between Bone Density and Element Survivorship
   - Identify Sites where Bone Density is not Responsible for Body Part Representation
   - Use Body Part Representation to Test Explanatory Hypotheses

3. Compare Body Part Representation from Multiple Contexts within and between Sites (Houses, Processing Areas, Exterior middens)

4. Refine Behavioral Models of Fish Butchery, Transport and Storage

ACKNOWLEDGMENTS

Portland State University, Department of Anthropology: Virginia Butler for her assistance and encouragement
Pacific Rim, Susan Crowder, Brady Willard for access to the UNL-050 data set
Brock for access to the Rice Ridge, Uyak and Crag Point data sets
To Native Park Service, Lower Chinook Indian Tribes, and George Shadov
Heather University: Brian Holford and 2004-2005 AMIA Field School Students

PRELIMINARY BODY PART ANALYSIS SUMMARY

Chi-Square Goodness-of-Fit Test

1. Cod (Cranial vs. Appendicular vs. Vertebral/Caudal Fin)
   - Observed Values from All Sites are Significantly Different from the Expected Proportions (p < 0.001)

2. Halibut (Comparison of Cranial vs. Post-Cranial)
   - Observed Values from Hoko Rockshelter and UNL-050 were Significantly Different from Expected Proportions (p < 0.001)

For Both Pacific Cod and Halibut:
   - Vertebral representation is Higher than Expected
   - Cranial representation is Lower than Expected

BONE DENSITY

Bone density is a proxy measure for preservation potential; elements with higher bone densities are more likely to be preserved than those with lower bone densities.

Pacific Halibut Body Part Representation

Pacific Cod Body Part Representation

 historical images of salmon, rice, and halibut butchering.