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

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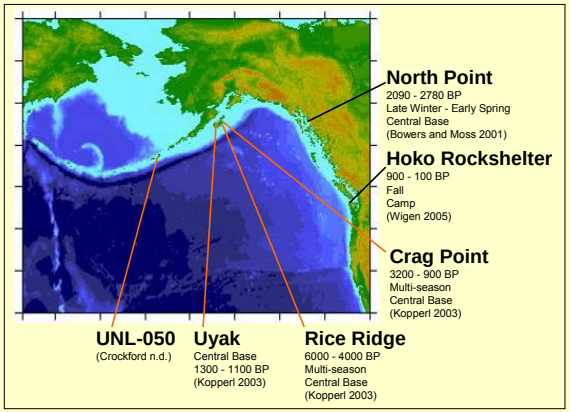
INTRODUCTION

- 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.**

METHODS & MATERIALS

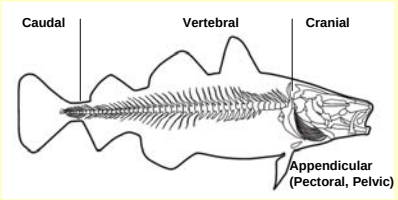
1. Organize Body Part Representation Data Set for North Pacific Archaeological sites
2. Group Observed Elements by Body Part
3. Compare Observed vs. Expected Element Proportions
   - Visual Comparison to Identify Major Trends
   - Chi-Square Goodness-of-Fit Test: Compares Observed Body Part Frequencies with Expected Proportions (Whole Individuals)

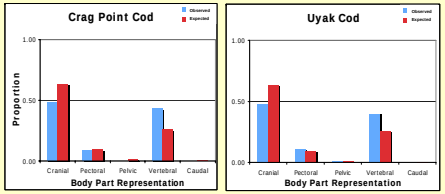
Sample of North Pacific Archaeological Sites

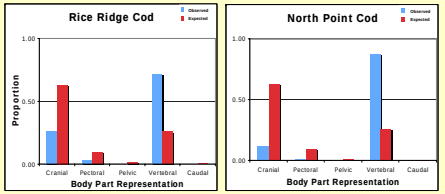


PACIFIC COD AND HALIBUT BODY PART REPRESENTATION IN NORTH PACIFIC ARCHAEOLOGICAL SITES

Pacific Cod Body Part Representation



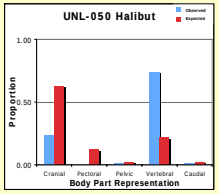


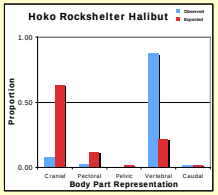


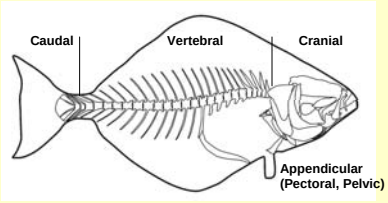
Pacific Cod Element Frequencies

Body Part	North Point	Rice Ridge	Uyak	Crag Point
Cranial	251	692	343	442
Pectoral	16	75	78	77
Pelvic	0	0	7	1
Vertebral	1819	1917	288	391
Caudal	0	0	0	0
Total (n)	**2086**	**2684**	**716**	**911**

Pacific Halibut Body Part Representation







Pacific Halibut Element Frequencies

Body Part	North Point	Rice Ridge	Uyak	Crag Point	UNL-050	Hoko Rockshelter
Cranial	1	10	2	1	34	59
Pectoral	0	0	1	2	0	22
Pelvic	0	0	0	0	1	0
Vertebral	5	17	9	29	105	642
Caudal	0	0	0	0	2	15
Total (n)	**6***	**27***	**12***	**32***	**142**	**738**

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

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**

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 I 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.

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

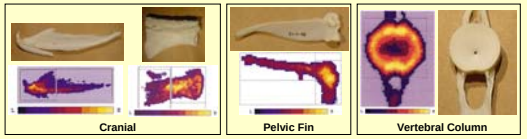
Makah women butcher halibut, Neah Bay, Washington (Curtis).

Huna Tlingit summer halibut processing camp, Bartlett Cove, Southeast Alaska (Emmons 1991).

Nootka halibut drying racks, British Columbia (Sely 1902)

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.



Salmon Bone Density: Element Photos and X-ray Radiographs. Light-colored areas in the radiograph image represent the densest portions of the element.

If bone density is responsible for fish element representation:

- **Bones with the highest density should be the most common; increasing abundance should positively correlate with increasing bone density.**
- **Currently there are no comparable bone density data sets for Pacific cod or halibut.**

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

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