

## THESIS AND DISSERTATION ABSTRACTS

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This section consists of abstracts of newly finished theses and dissertations on Arctic anthropological research relevant to Alaska. The goal of this section is to highlight new circumpolar research by students. In this issue, there are eight dissertation and thesis abstracts addressing archaeological and cultural anthropological research topics from Portland State University, University of Alaska Anchorage, University at Buffalo, University of California Davis, and the University of Michigan. Doering's dissertation explores the roots of the ancestral Athabascan migration from Alaska to the American Southwest. In his thesis, Erickson examines the relationship between the Iñupiat of Utqiagvik and scientists who conduct research in the community. Harmston experimented on historic caribou teeth from Northwest Alaska using chemical processes to identify extinct caribou herds in his research. For her dissertation, Hornbeck archaeologically investigates earthen mounds on Rat Island to determine whether they're the result of cultural or natural processes. Miszaniec employs zooarchaeological methods to examine ancestral fishing over the last 2,400 years in Norton Sound. Parson's thesis research assesses the use of portable three-dimensional (3D) modeling techniques for archaeological site documentation. Reed's thesis explores the capabilities of geochemical analysis to assess whether features at Cape Krusenstern are a result of natural or cultural processes. In the last dissertation, Taivalkoski examines the role of birds in the diets of ancestral Unangan of the Rat Islands through zooarchaeological methods.

On another note, it is time to hand off the Dissertations and Theses section of the AJA to a new editor. It's time for a new perspective to grow and continue developing the section. It's been an honor to hunt for and gather abstracts across the Internet's fruited plains since the founding of this section in 2014. I feel this section has been a great venue for getting student research out to a broader audience and an opportunity for students to get their research into an academic journal. I look forward to working with and reading the efforts of the new editor for this section. If you're interested in editing this section (students I encourage you to apply, because you'll get experience with editing an academic journal), please contact Ken Pratt and Brian Wygal. Thank you for reading.

**EVALUATING THE SOCIAL AND  
ENVIRONMENTAL PROCESS OF THE  
DENE/ATHABASCAN MIGRATION FROM  
THE SUBARCTIC**

**Briana N. Doering**

PhD dissertation, 2020, Department of Anthropology,  
University of Michigan

**ABSTRACT**

Approximately 1,500 years ago, Dene/Athabascans radically altered their lifestyle in central Alaska and Yukon, and many ultimately left this region entirely. In my dissertation, I evaluate the causes of this drastic transition using a multiscalar archaeological dataset that draws from excavation, geospatial, and ethnographic data. Specifically, I consider whether either a massive volcanic eruption or population change led to a sudden, wide-scale shift in Subarctic technology, diet, and trade, and an ultimate southward migration. The results of technological, isotopic, and geospatial analysis presented here strongly suggest that Dene/Athabascans responded to a regional population increase, likely driven by a shift in group organization predicated by the Dene/Athabaskan kinship structure. In response, Dene/Athabascans became increasingly specialized and territorial until some Dene/Athabascans began a southward migration that finally terminated in the American Southwest over 500 years ago. The diachronic nature of my multiscalar research allows me to model this transition as a process, rather than an event, that can be compared to similar cultural processes to provide a comprehensive understanding of resilience, adaptation, and migration at different periods of history and around the world.

**SUCCESSFUL ENGAGEMENT BETWEEN  
IÑUPIAT AND SCIENTISTS IN UTQIAĠVIK,  
ALASKA: A SOCIOCULTURAL PERSPECTIVE**

**Kaare Ray Sikuaq Erickson**

Master's thesis, 2020, Department of Anthropology,  
University of Alaska Anchorage

Online at <https://dissexpress.proquest.com/dxweb/doc/2404340221.html?FMT=AI&desc=Successful+Engagement+between+I%C3%Blupiat+and+Scientists+in+Utqia%C4%A1vik%2C+Alaska%3A+A+Sociocultural+Perspective>

**ABSTRACT**

Climate change has become a global threat that the world is struggling to grasp. At the frontlines of these changes, the Arctic warms at an amplified rate. U.S. research funding agencies have taken unprecedented and aggressive measures to steer Arctic sciences to not only consider its impacts on Indigenous communities in the Arctic, but to work with those communities in producing research that benefits locals in the Arctic. Barriers have prevented positive engagement between scientists and Indigenous communities, including the irrelevancy of research to locals' daily lives and wide cultural and geographical gaps between research institutions and Indigenous entities. There are few models of successful and mutually beneficial relations between Indigenous communities and scientists in the Arctic. This project focuses on the extremely unique and historic example of relations between local Iñupiat and Arctic scientists in Utqiaġvik, Alaska. This thesis provides both a detailed history of the relations between Iñupiat and scientists in Utqiaġvik and a snapshot of how Indigenous science specialists and Arctic researchers in Utqiaġvik view cross-cultural knowledge exchange as they experience it in 2020. Three primary findings of this research include: first, that multiple forms of successful engagement exist between Iñupiat and academic scientists in Utqiaġvik, two of which include co-production of knowledge and contractual logistical service; second, relevancy of research is an extremely important precursor to successful engagement between scientists and communities; and third, both Iñupiat science specialists and Arctic researchers must possess unique sets of skills for long-term success in working together. This research has the potential to have broad implications for how Indigenous contributions are acknowledged, compensated for, measured, and valued in the face of increasing scientific research in the Arctic.

**CARIBOU TEETH, STABLE ISOTOPE  
ANALYSIS, AND ARCHAEOLOGICAL  
CARIBOU HERD IDENTITY: EVIDENCE FOR  
PERSISTENCE OF THE WESTERN ARCTIC  
CARIBOU HERD, ALASKA**

**Nathan Isaac Harmston**

Master's thesis, 2020, Department of Anthropology,  
University of Alaska Anchorage

**ABSTRACT**

Caribou (*Rangifer tarandus*) is a keystone species in the Arctic and Subarctic. Caribou have played an essential role in human life in the far North for millennia as a source of hides, meat, and tool materials. Without a scientific method to identify a herd in an archaeological context herd identity is not addressed or assumed based on a site's proximity to extant herds leaving gaps in archaeological site location models. Thousands of years of data on caribou herd distribution and responses to climatic and ecological changes are contained within archaeological and paleontological specimens.

Two experiments were conducted on caribou teeth. The first was an examination of how stable carbon and nitrogen isotopes in dental tissues of modern caribou were affected by being embedded in polymethyl-methacrylate (PMMA), an organic polymer often used to stabilize fragile archaeological specimens for histological examination. Two methods for mitigating those effects were tested. PMMA embedding increased carbon consecration and  $\delta C^{13}$ . It did not affect the nitrogen. Sequential acetone baths and sequential acetone baths combined with Longin collagen extraction were both found to mitigate the effect PMMA has on carbon. Sequential acetone baths with Longin collagen extraction was the more effective of the two methods. In the second experiment, the herd identity of five 200 $\pm$ 30 year old archaeological caribou teeth from northwestern Alaska, stabilized in PMMA, was determined by sampling them for stable strontium, including samples taken from the neonatal line (NNL), a pathological marker of birth found in the first permanent molar. The author compared testing results to a strontium isoscape of Alaska to identify caribou herds.

The effects PMMA embedding has on carbon in dental tissues can be mitigated, though the effects it has on oxygen and hydrogen need to be examined. Archaeological caribou herds can be identified via stable strontium analy-

sis. The NNL strontium signature needs to be contextualized by the signatures of the other permanent molars. The antiquity of extant caribou herds can now be established and the calving grounds of now-disbanded herds can be determined. This carries implications for human land use models and wildlife management.

**UNANGAN MONUMENTALITY:  
HUNTER-FISHER-GATHERER  
TRANSFORMATIONS OF THE RAT ISLANDS,  
ALASKA, C. 4,000 BP–1,000 BP**

**Bobbi Hornbeck**

PhD dissertation, 2020, Department of Anthropology,  
University at Buffalo

**ABSTRACT**

This dissertation research project tested hypotheses about the relationships between hunter-fisher-gatherers and the landscape through an archaeological investigation of earth mounds in the western Aleutian Islands. These mounds were historically believed to be natural places of plant overgrowth that occurred in response to accumulations of bird guano. This project was developed after preliminary studies indicated that these earth mounds had cultural origins and that at least one earth mound was constructed by humans rather than birds. The goal of this project was to further explore the depositional history of the earth mounds and to investigate their relationship with known monumental construction in the eastern Aleutian Islands. The research focused on an investigation of how monumental earth mound constructions can signal and reinforce expressions of group-identity among prehistoric hunter-fisher-gatherer communities.

The project combined archival, field, and laboratory research to investigate the cultural Rat Islands landscape. Field research occurred on Kiska and Amchitka over 18 days in June 2019. Four earth mound clusters were archaeologically tested with a soil probing auger, shovel tests, and trench excavations. Two earth mound soil columns were collected for soil chemistry analysis. Stratigraphic analysis and radiometric dating were employed in the investigation of the depositional history of 18 earth mounds. The spatial and temporal relationships between prehistoric occupation sites and earth mound clusters were examined through GIS based mapping. Comparative and statistical analyses were utilized to investigate the regional differences in

mound deposition to provide insight to Unangan expressions of group-identity.

Five new cultural earth mound sites were defined in the Rat Islands. Unprecedented high-resolution aerial imagery was captured at two of these sites by drone. Archaeological subsurface testing confirmed a cultural origin for at least three additional earth mounds. Organic materials were sent to the KECKS-CCAMS facility for radiocarbon dating, which resulted in a project contribution of five new noncontemporaneous radiocarbon dates for the Rat Islands. Soil columns were sent to the Rutgers Soil Testing Laboratory and analyzed for available nutrients. The results revealed significant spikes in phosphorus that potentially aligns with the stratigraphic and material evidence of human activity.

Results indicate that monumental earth mound construction is a pan-Aleutian tradition dating back to at least 3,700 years ago. The distribution of internal materials and the overall size and shape of the earth mounds were compared with data from eastern Aleutian monumental mounds. This comparative analysis highlighted regional trends in mound variation that align with the known proto-historic territorial boundaries of distinct identity-groups. The variations in earth mound style across the Aleutians are reflective of localized expressions of a broad trend. Broad but variable monumental earth mound construction is a well-known Indigenous American practice that spans the United States. This project extends the discussion of socionatural theories about hunter-fisher-gatherer impacts and monumental manipulations of the landscape into the western Aleutian Islands.

## **AN ECONOMIC CLASSIFICATION OF PRE-INDUSTRIAL FISHERIES AND SUBSISTENCE ECONOMIES IN NORTON SOUND, ALASKA: A FAUNAL ANALYSIS OF INTENSIFICATION**

**Jason Ian Miszaniec**

PhD dissertation, 2020, Department of Anthropology,  
University of California, Davis

### **ABSTRACT**

This dissertation investigates the development of intensive fishing-based economies in Norton Sound, Alaska, over the past 2,400 years. Previous archaeological studies of Indigenous Arctic fisheries have been based largely on inferences using artifacts and site-settlement locations

rather than on the animal remains themselves. Data are derived from over 40,000 specimens of animal bone and shell recovered during archaeological test excavations at two large village sites located near the Native Village of Shaktoolik in 2014–2017: Difchahak (49-NOB-005) and the Shaktoolik Airport Site (49-NOB-072). Faunal remains were recovered using a combination of ¼-inch field screening and collection of bulk sediment samples for laboratory flotation. The assemblages are organized into four periods based on radiocarbon age, stratigraphy, and temporally sensitive artifact styles: (1) Norton (400–40 BC), (2) Nukleet (AD 1100–1400), (3) Yup'ik (AD 1450–1840), and (4) Inupiat (AD 1850–1900). Changes in resource specialization and diversification over time are analyzed using taxonomic abundance indices and various measures of species richness, evenness, and heterogeneity.

Faunal remains from these two sites demonstrate that Indigenous subsistence in the Shaktoolik Bay area was highly varied but focused on salmon and saffron cod, mass-capture of Pacific salmon in the spring and summer, and the pursuit of saffron cod during fall and winter. Early use of high-investment, net-based technology on non-salmon fish resources has enabled year-round occupation of this region since the early Norton period. In addition to fish, netting would have improved the capture of seasonally available waterfowl as well as ptarmigan and hare. Fish diversity, specifically flatfish and herring, increased around AD 1550–1650 and coincides with the expansion of dog traction. Additional calories required by large dog teams were offset by improved logistical mobility, which resulted in a shift from a specialized to a diversified economy. Fur-bearing animals appear in much higher numbers after AD 1800 and coincide with colonial trading activities. Analysis of zooarchaeological remains has highlighted the resilience and flexibility of Indigenous peoples in the Shaktoolik region who have adapted their subsistence to external stressors by modifying their technology, settlement patterns, and prey sources over the past 2,400 years.

## LOW-COST 3D MODELING FOR ARCHAEOLOGICAL SITES

**Ted Parsons**

Master's thesis, 2020, Department of Anthropology,  
University of Alaska Anchorage

### ABSTRACT

This thesis assesses the use of portable three-dimensional (3D) modeling techniques including PhotoScan/Metashape Structure from Motion (SfM) photogrammetry, short-range laser scanning, and infrared (IR) depth mapping. Chapters 2 and 3 are articles already submitted for publication in academic journals.

The first article reports on a case where low-cost, highly portable, three-dimensional modeling techniques documented surface and subterranean sites in a rugged and remote landscape in Hawai'i. Photogrammetry and IR depth mapping were used. Final drawings prepared from 3D models were more aesthetically pleasing and accurate than those produced with traditional field recording techniques.

The second article tested 3D techniques in a controlled outdoor setting, adding a NextEngine short-range desktop laser scanner with color imaging capability to SfM and IR depth mapping. Evaluation criteria included suitability for transport and use in rugged settings, subjective model appraisal, and several comparative quantitative measurements.

All three methods met a generally accepted measurement error-standard for site documentation. The NextEngine produced high-quality models but required significant in-field support, including a heavy battery pack. IR depth mapping, in the form of a repurposed Microsoft Kinect for Xbox 360 video game controller, created lower-quality models but worked very quickly, producing models in near-real-time. SfM scored best for mobility and overall model quality, while requiring significant computing resources.

## ARCHAEOLOGICAL FEATURE IDENTIFICATION THROUGH GEOCHEMICAL ANALYSIS OF ARCTIC SEDIMENTS FROM THE CAPE KRUSENSTERN NATIONAL MONUMENT, NORTHWEST ALASKA

**Patrick William Reed**

Master's thesis, 2020, Department of Anthropology,  
Portland State University

### ABSTRACT

Identification and interpretation of archaeological phenomena is typically based on visual cues and the physical presence of "something archaeological," such as diagnostic artifacts, landscape modification, or structural element. Yet many archaeological features, i.e., the discrete archaeological deposits related to past human behavior, lack clear indicators of human activity that provides clues to the feature's origin. At the Cape Krusenstern beach ridge complex, located in northwest Alaska, ambiguous features, that could be natural or anthropogenic (vegetation anomalies), or are of unknown cultural function (indeterminate), comprise 60% of the identified features at the complex. These ambiguous features represent a large gap in our understanding and interpretations of the occupation history of Cape Krusenstern and the Arctic. My goal was to identify anthropogenic features and interpret the original human behaviors that contributed to their formation, through soil geochemical analysis. I sought to identify (1) which features are natural and which are anthropogenic, and (2) what behaviors created the cultural features (e.g., occupation of houses or caching of marine versus terrestrial food resources). I used photometric phosphates spot tests and inductively coupled plasma mass spectrometry (ICP-MS) to geochemically characterize bulk sediment samples from ambiguous features. I then used a variety of statistics, including principal component and discriminant function analysis, to identify patterning in elemental compositional data. I compared results to geochemical expectations for different types of cultural features based on prior research and my own analysis of cultural and non-cultural control samples.

Analysis indicated that a single feature is natural, and the other tested features are anthropogenic features. However, the analysis did not aid in definitely identifying specific human behaviors (i.e., house/occupation versus storage activities) that could have created the ambiguous anthropogenic features. Broadly, food storage features



showed slightly greater enrichment levels and less overall variation than house/occupation feature samples. In addition, food storage features showed very low variation between one another for several elements (Cr, Al, Ni, K, Co, Mg, and -Fe). My analysis did indicate that between 10 to 13 of the tested ambiguous (or indeterminate) features may be house features, and between four and 15 may be some form of storage feature. Analysis to identify caching of marine versus terrestrial resources, using the ratios of Ba/Ca, Sr/Ca, and Ba/Sr, suggest that potentially six features may have held marine resources, while the remaining either held terrestrial resources or had their contents emptied prior to abandonment.

Overall, this thesis indicates that there are likely more house (7.9 to 10.2% increase) and food storage features (1.5 to 5.2% increase) present at the Cape Krusenstern than previously thought. Increasing the number of house and food storage features suggests that the occupation history at the complex is potentially more intense than previously established. These results also suggest that geochemical analysis has potential use for feature identification at a broader landscape scale than previously performed in other archaeological applications of soil geochemistry. Last, this thesis shows there is potential in using previously collected bulk samples to gain in-depth information that can guide future work at the complex.

## **TECHNOLOGICAL CHOICE AND HUMAN-ANIMAL RELATIONSHIPS: A BIRD'S EYE VIEW FROM THE RAT ISLANDS, ALASKA**

**Ariel Taivalkoski**

PhD dissertation, 2020, Department of Anthropology,  
University at Buffalo

### **ABSTRACT**

Human groups have used birds in a variety of ways, from food, to raw material for tools, to clothing. In addition to their more practical usages birds often play a significant role in cosmologies and myths. However, due to poor preservation and excavation bias (many bird bones are small enough to slip through even ¼-in screens) bird remains have only recently begun to be studied in depth. The archaeological sites of the Aleutian Islands have very large avian bone assemblages due to excellent taphonomic conditions. The large size and excellent preservation of these assemblages allows rigorous study from which we can study not only local relationships with birds but also

develop models for other times and places. Comparing the patterns of skeletal part representation with oral histories and ethnographies will reveal the interplay of the symbolic and 'material' aspects of the relationship between birds and the residents of the Aleutian Islands.

The relationship between the prehistoric inhabitants of the Rat Islands, the Unangan, and birds was maintained by a suite of continual and often daily practices, from hunting, to story-telling, to subsistence acts. The resulting artifacts of these day-to-day activities, in this case the avian bone assemblage, play a significant role in the reproduction of social and cultural values. By studying the technological choices that the Unangan made regarding birds we can begin to examine the more social and even symbolic aspects of the Unangan-bird relationship. This can be accomplished by comparing the skeletal part representation, i.e., which species/families were used for which technology, which parts of the birds were exploited, etc., to the expected patterns of usage based on oral histories and ethnographies. Technological acts are a medium "through which social relationships, power structures, worldviews, and social production and reproduction are expressed and defined." Thus, in order to understand the complex relationship of the Unangan with birds, we must incorporate not only a discussion of human-animal relationships via social zooarchaeology but also a discussion of practice and technological choice.