Original Study **Open Access**

Lauren E. Y. Norman, T. Max Friesen, Claire Alix, Michael J. E. O'Rourke, and Owen K. Mason

An Early Inupiaq Occupation: Observations on a Thule House From Cape Espenberg, Alaska

DOI 10.1515/opar-2017-0002
Received January 15, 2016; accepted February 17, 2017

Abstract: This paper describes and interprets a well-preserved early Thule semi-subterranean dwelling from Cape Espenberg, Alaska. The house architecture is similar in many respects to other early Thule dwellings with a sub-rectangular main room, long sunken entrance tunnel, and associated kitchen area. However, the presence of narrow side benches and associated flooring differences adds significantly to the variability present in Thule house form. Radiocarbon dates indicate occupations spanning 1300 to 1450 cal CE. Wood analysis suggests that the house underwent at least one rebuilding episode, which seems to have extended the house occupation into the early 15th century. People acquired mostly small seals for their subsistence, but supplemented their diets in the spring and fall with migrating birds, fish, terrestrial mammals, and other marine mammals. This house represents a fairly typical early Thule coastal winter occupation, but careful excavation of a well-preserved house reveals interesting details in house form, wood use, and subsistence patterns.

Keywords: Thule, dwelling, Alaska, Kotzebue Sound, wood architecture, zooarchaeology

1 Introduction

Across the North American Arctic, from Bering Strait to Greenland, one of the most ubiquitous and prominent classes of archaeological remains is the Thule semi-subterranean house. These generally large, deep structures have a common origin in the dynamic social milieu of the 1st millennium CE Bering Strait region, but show a great deal of regional variability over time and space due to factors such as construction materials, social organization, and demography. Over the last century, many have been excavated, primarily because their length of occupation and frequent incorporation into permafrost yields large and diverse artifact samples that can be used to reconstruct culture history, artistic traditions, and many other aspects of past Arctic societies. Ethnographically, the cold-season semi-subterranean house is the nexus of domestic life, where food is prepared and eaten, work occurs, and social interactions take place. The house and its material remains would have structured and been structured by the daily life of the people who occupied it.

Article note: This article is a part of Topical Issue on Advances in Arctic Archaeology

***Corresponding author: Lauren E. Y. Norman,** Department of Anthropology, University of Kansas, 622 Fraser Hall, 1415 Jayhawk Blvd. Lawrence, KS, USA, 66045, E-mail: lauren_norman@ku.edu
T. Max Friesen, Michael J. E. O'Rourke, Department of Anthropology, University of Toronto, Canada
Claire Alix, Université Paris 1, Panthéon Sorbonne / CNRS UMR8096, France
Owen K. Mason, INSTAAR, University of Colorado, USA

In this paper, we will provide a detailed overview of the occupation of an early Thule dwelling in Alaska, where the architectural tradition first developed. Following a review of what is known about the region's house occupations, we will describe and interpret Feature 87 at Cape Espenberg, located on the south shore of Kotzebue Sound in northwest Alaska. This semi-subterranean house was particularly well preserved, and contained several unusual elements; thus it adds significantly to our understanding of variability in Thule dwelling form and material remains.

2 Western Thule Semi-Subterranean Dwellings

The Thule culture was originally defined by Mathiassen (1927a: 1-2), based on his fieldwork in the eastern Arctic. Thule material culture was subsequently identified in Alaska, where it was given the name Western Thule (Larsen and Rainey 1948: 170-175). Although there are regional differences, Thule culture is broadly similar from the coast of Siberia to eastern Greenland. Artifacts, dwellings, and subsistence practices identify Thule as the ancestors of modern Inuit, Inuvialuit, Iñupiat, and Yupik peoples. With their elaborate technology, Thule people acquired a wide variety of marine mammals, terrestrial mammals, birds, fish, and vegetable foods, though in many areas they are particularly well known as hunters of large whales. In most cases, early Thule subsistence was based on stored food for all or part of the winter in villages of semi-subterranean dwellings. These houses were part of the Thule way of life for the first few hundred years; after this period, Thule people started to regionalize, with local populations developing subsistence patterns, dwellings, and artifacts to suit the local social and physical environment.

Thule Inuit semi-subterranean dwellings are often both the most visible structures in the ancient Arctic landscape and the most archaeologically rich. Therkel Mathiassen (1927a: 149, 152-153) originally described these houses as part of the Thule culture based on excavations north and west of Hudson Bay. His synthesis compared the expedition's findings to excavated remains from Siberia to East Greenland and to contemporary cultures in Alaska and Greenland (Mathiassen 1927a: 153), recognizing surprising similarity in house form of the ancient Thule people across a 6000 km span (Collins 1937: 266-268). Although broad similarities in semi-subterranean house form can be traced back to the beginning of the Northern Maritime Tradition (or the Inuit tradition) at the turn of the 1st millennium, the rectangular form with a long entrance tunnel and separate kitchen was thought by Larsen and Rainey (1948: 52) to have its origins in the Birnirk house form. It is difficult to compare the Birnirk house forms to the early Thule forms, as there are limited numbers of Birnirk houses excavated (Slaughter 1980: 155-156).

Collins (1937: 256-286) placed ethnographically and archaeologically identified houses from the Northern Maritime Tradition into a number of Old Bering Sea, Punuk, and Thule house types based on structure and construction material. One commonly found along northwest Alaskan coasts from the Thule period to the historic period was called the Point Barrow type (Slaughter 1980: 141-142). This highly recognizable structure was a semi-subterranean dwelling comprised of a relatively long, sloping entrance tunnel that led to the main living room (Collins 1937: 264, Slaughter 1980: 149-150, Lee and Reinhardt 2003: 78-79). People entered the living area through an opening in the floor near the front wall (katak). This house form could also include a number of small annexes or storage alcoves along the tunnel, as well as a kitchen. The kitchen itself was a separate space where much of the cooking and food preparation was done. These houses were constructed of driftwood and whale bones and were covered in sod blocks for insulation (Lee and Reinhardt 2003: 78). Many houses across the Arctic during the early Thule period have been identified as Point Barrow style houses.

Despite the extensive research conducted in Alaska, there is a paucity of fully excavated early Thule Inuit houses. Much of our knowledge of house form comes from Cape Krusenstern houses and Thule houses from the western Canadian Arctic, described below. Many Thule houses in the eastern Arctic have also been well described, however they will not be covered here because a lack of abundant driftwood led to significantly different architectural constraints. Most fully excavated houses in Alaska have been of the late Thule/early historic period (e.g. Ford 1959: 67-69, Newell 1984: 16-22). Subsistence information and artifact descriptions mostly come from test pits in houses or middens, often with their locations within houses

uncertain (i.e. Stanford 1976: 10-16). Feature 87 at Cape Espenberg, therefore, offers new insights into early Alaskan Thule house construction and form, as well as aspects of life in the house.

Feature 87 at Cape Espenberg is described below, followed by a brief overview of previously excavated houses from the early Thule period in coastal Alaska and northwestern Canada. For this paper, early Thule refers to both early and late Western Thule periods as described by Giddings and Anderson (1986: 58-60, 71-71, 108, 110-113) that extend from the beginning of Thule ca. 1200 cal CE to the mid-15th century. Late Thule is equivalent to Giddings and Anderson's (1986: 107-108, 113-114) Kotzebue period that is dated from 1450 cal CE to the historic period.

3 Cape Espenberg Site Description

The Cape Espenberg spit lies on the border between two ecological regions, Seward Peninsula and Kotzebue Sound, which shaped its past and present physical environment. It is situated on the southeast shore of the Chukchi Sea, north of the Bering Strait, where it straddles the Arctic Circle (66°30'N, 163°30'W), 100 km beyond the treeline (Figure 1). Over the last 5000 years, the coastline at Cape Espenberg has been built through the formation of beach ridges and dunes, and modified by erosional agents such as wind and storm surges (Mason 1990: 110-112, Mason and Jordan 1993: 65). Feature 87 is part of site KTZ-087, on dune ridge E-5. Dune ridge E-5 was deposited between 1100 and 1300 cal CE under the influence of occasional storm surges and onshore winds (Mason 1990: 101). This process isolated a landward swale and prompted seawater intrusion due to heightened storm waters. By 1300 cal CE, the swale was sufficiently dry for peat formation, co-occurring with the initial occupation of ridge E-5 (Bigelow et al. 2013, Alix et al. 2015: 8).

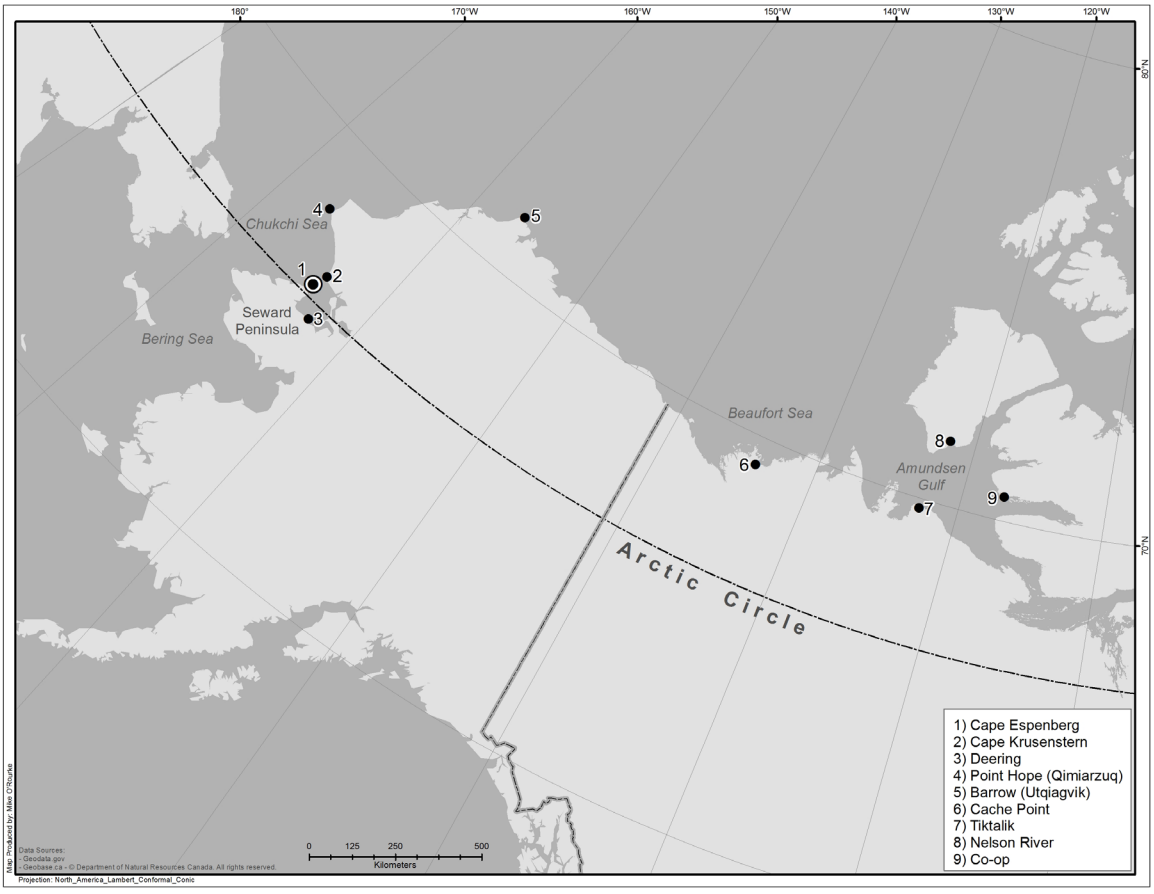

Figure 1: Location of Cape Espenberg and other sites from the text.

The paleoclimate between 1000 and 1400 CE can be inferred from proxy climate data from the Seward Peninsula and the northwest Alaska region (Giddings 1952, D'Arrigo et al. 2005). During the 12th to 14th centuries temperatures alternated between warmer and cooler, with a shift to the Little Ice Age ca. 1400 CE (Mason and Jordan 1993: 64-65, D'Arrigo et al. 2005: 234). These oscillations may have had adverse effects locally, while opening other areas up to human occupation. Cape Espenberg may have benefitted from onshore late winter winds that stranded pack ice during warmer years and attracted small seals, birds, and other resources while large sea mammals, such as whales and walrus, were following different pathways during break-up (Mason 2009: 110-111, Mason and Bowers 2009a: 34, 37). Exploring this hypothesis was one of the goals of the first phase of the Cape Espenberg Project that extended from 2009 to 2011 (Hoffecker and Mason 2010: 144).

Previous work by J. Louis Giddings (1967, Giddings and Anderson 1986), Jeanne Schaaf (1988) and Roger Harritt (1994) established that the Cape Espenberg spit was occupied intermittently from around 4000 years ago to the 20th century. Research from the Cape Espenberg Project has refined but not drastically altered the basic chronologies, with work on chronologies still being conducted in the area. One striking result is evidence that Birnirk people occupied the Cape potentially as early as 800 to 1000 CE. Although there is much work to be done on the origins of Thule, current research indicates that Thule culture emerged during a time of complex, in some cases ethnically diverse, communities and shifting networks of trade, alliance, and conflict in northwest Alaska, the Bering Strait region, and the eastern coasts of Siberia (Ford 1959, Mason 1998, Bronshtein and Dneprovsky 2002, Mason 2012, Mason 2016). These interactions played out against the backdrop of an increased regional focus on whaling during the period of Thule culture development and expansion (Stanford 1976, Krupnik 1993). Thule culture emerged from a complex milieu that saw Birnirk, Punuk, and early Thule groups inhabiting the Bering Strait region. After the emergence of Thule in Alaska, some groups migrated rapidly through the central Canadian Arctic to Greenland, arriving in these areas by the mid-13th century. Expansion also seems to have taken place within Alaska itself, with Thule groups expanding along the coasts and into the interior (i.e. Giddings 1952). It was at this time of expansion that early Thule groups occupied Cape Espenberg ridge E-5.

4 Feature 87 House

Feature 87 has had a complex history of investigation. First, in 1986, in association with a regional National Parks Service (NPS) archaeological survey, Jeanne Schaaf noted the effects of uncontrolled avocational excavations at the margins of the structure. Although the house lies outside of the original survey boundaries, the objective in 1986 was to document its undisturbed extent and to establish its age and cultural affiliations (Schaaf 1988). Unfortunately, the feature was imprecisely located in site KTZ-088 on the younger ridge E-4, rather than the adjacent KTZ-087 on ridge E-5. Schaaf identified a number of pits on the surface, along with scattered cultural remains. Examination of the surface materials led Schaaf (1988: 261) to suspect the house dated to the Birnirk period.

Roger Harritt (1994: 105-108), reinvestigating the archaeology of Cape Espenberg, provided the house with its first designation as Feature 30 (now labelled as Feature 87) and excavated a 2 x 1 m trench adjacent to the entrance tunnel (see Figure 3 for location of excavation). The feature continued to be misidentified as part of KTZ-088, a circumstance that affected zooarchaeological interpretations by Saleeby (1994). Harritt's (1994: 105) excavations of Feature 87 recorded whale bones on the modern surface, as well as small piles and scatters of bone and pottery. The trench excavations identified two stratigraphically discrete activity areas, labelled upper and lower (Harritt 1994: 106-107). The upper activity area was a sparse deposit of bones and artifacts while the lower level was interpreted as wooden roof debris overlying at least two occupation surfaces with a significant number of objects, including bone and pottery. Of the artifacts recovered, the most noteworthy was a section of antler slat armor. Some potsherds also had curvilinear paddled surface decoration, which Harritt identified as a variant of Oswalt's (1955: 36) Barrow Curvilinear Paddled and Ahteut Curvilinear Paddled types based on temper and decoration. The antiquity of the occupation was assessed from a charcoal sample 20 cm above the basal layer, 30 cm below the roof fall. This assay offers a calibrated age range of 1150 to 1412 CE (730±90 Beta-28011) (Harritt 1994: 109). Harritt (1994: 108) concluded

that the assemblage was consistent with the late prehistoric Western Thule, as defined by Giddings and Anderson (1986: 110-111), dating to 1200-1300 cal CE. Based on the whale bone visible on the surface, Harritt argued that the occupants were whaling, as per the description of early (Western) Thule in Giddings and Anderson (1986: 110-111).

A new round of excavations of Feature 87 was initiated at the beginning of the NSF funded project, "Human Responses to Climate Change at Cape Espenberg" directed by John F. Hoffecker and Owen K. Mason in 2009. In 2011, continued excavation of Feature 87 directed by Max Friesen revealed an extremely well-preserved house feature. Excavations proceeded exclusively by trowel, and all contents from primary contexts were screened through 1/8" mesh. An extensive photo record was kept and all structural wood, whale bone, and artifacts were mapped in three dimensions. Harritt's test excavation was completely re-excavated in an attempt to understand how the kitchen, tunnel, and house were linked together. Following excavation, all maps were digitized and imported into ArcGIS, to allow for their further analysis and the production of the house plans presented in this paper.

Radiocarbon dating analyses employed nine samples from different areas of the house including the kitchen area, midden, and main room (Table 1, Figure 2). In total, four different laboratories were used and three materials were assayed: *Picea* wood (n=2), caribou bone (n=6), and unidentified deciduous wood charcoal (n=1). Seven samples fall within the 14th century, although a bimodality is observed in the calibrated ages, with most of the distribution in the latter part of the 14th century. In addition, two dates are firmly within the early 15th century; a caribou bone from the house fill and the outer growth ring of one split log board of the rear platform. Both of those ages are unimodal and span shorter ranges; at the youngest, the log dated between 1415 and 1445 cal CE, slightly younger in comparison to the other caribou or charcoal dates that fall between 1290 and 1416. As explained in the description of the house, this could represent a late repair episode of the platform, thus extending the use of the house into the first part of the 15th century. Notably, the new dating program overlaps the range obtained by Harritt (1994: 109).

Feature 87 exhibits a fairly typical early Thule house floor plan; however, the preservation and completeness of the house is unique for early Thule in Alaska. Despite the overall excellent preservation, wood preservation was not uniform throughout the house. Wood in the upper levels was in poor condition in comparison with wood in the lower levels, which was mostly frozen in permafrost. In particular, the wood of the walls was not as well preserved and fell apart during excavation. Other elements were in such good condition that tree-ring crossdating was possible. The wall planks, floor boards, and structural supports were all preserved *in situ*, as were the large back platform planks. In many houses, finished wood elements, especially platform logs, were often removed for reuse in other houses or as raw material for manufacture of other tools. Re-use of wood has been suggested for Point Hope where some houses had very few *in situ* wood elements (Larsen and Rainey 1948: 47). This is not the case at Cape Krusenstern, as most houses had a large number of *in situ* architectural elements (Mason 1998: 289). At Feature 87, the presence of *in situ* architectural elements also suggests that later inhabitants of the site did not scavenge architectural elements from this house. However, notches preserved on some of the architectural elements that did not seem to have any logical architectural functions could indicate that some had been recycled from other contexts to be used in Feature 87. This excellent preservation also permits a detailed description of the house including the refitting of some logs using internal tree-ring crossdating[1], without resorting to the documentary record to fill in the blanks.

1 Disks were sampled from each well-preserved wood element. Disks were dried and sanded. A minimum of two rays were measured for each disks on a VELMEX laser traveling stage plate system to micron-level precision (thousandths of mm). Measurements were then run through the COFECHA software program for quality control (Holmes 1983). Multiple ray measurements were then averaged and individual tree-ring chronologies were built. These floating individual chronologies were cross-dated using TSAP-Win program (Rinn 2003). Crossdating was checked visually for year to year congruency and cross dating indices are reported in the caption of Figure 4. So far none of these floating chronologies could be successfully matched with the existing 900-year long tree ring chronology from the Kobuk and Noatak Rivers (D'Arrigo et al. 2005; Giddings 1952; Graumlich and King 1997). Many of the modern driftwood logs from Cape Espenberg come from the Yukon River drainage where trees carry different tree ring signals and the master chronologies only extend back to the 18th century (Alix and Juday 2012). This probably explains the lack of successful match with existing master chronologies.

Table 1: Radiocarbon dates for Feature 87.

Sample Number	Dated Material	Radiocarbon Age BP	1 SD	$^{13}C/^{12}C$ Ratio	Location
NOSAMS-96130	spruce, outer ring	485	20	-22.04	back platform split log
UCIAMS-112660	caribou bone	535	15	-17.99	fill, upper level
AA-97491	caribou bone	551	42	-18.50	fill, upper level
UCIAMS-112618	caribou bone	570	20	-17.61	back platform, floor
Beta-347938	spruce, outer ring	600	30	-24.30	entrance tunnel, upper level
UCIAMS-112659	caribou bone	625	15	-18.26	midden, lower level
UCIAMS-112346	deciduous charcoal	640	25	N/A	kitchen, lower level
UCIAMS-112619	caribou bone	650	20	-18.20	west side bench, floor
UCIAMS-112658	caribou bone	680	15	-17.69	midden, upper level

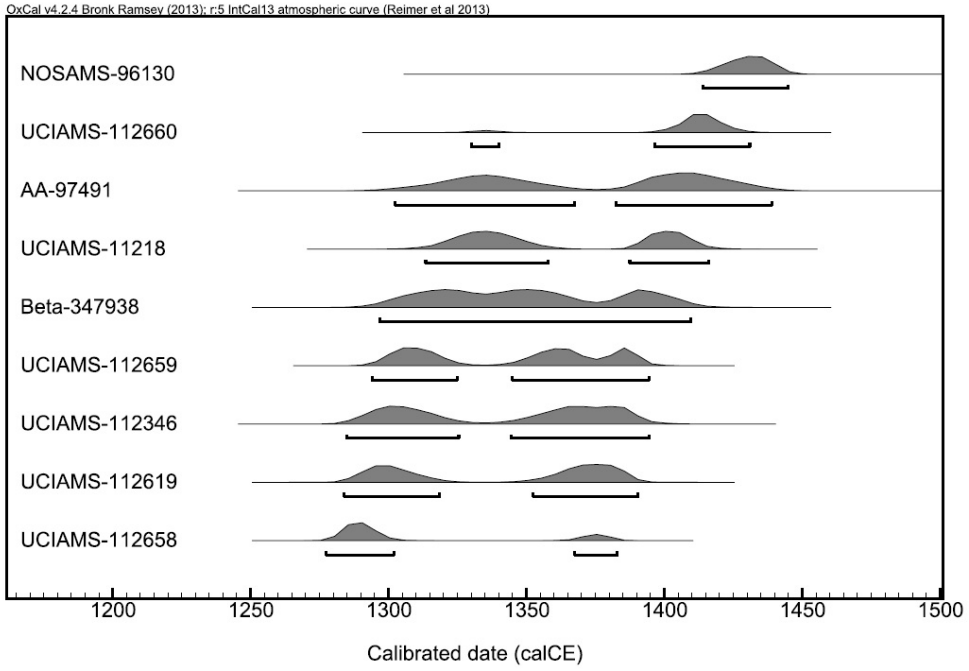

Figure 2: Calibrated radiocarbon dates for Feature 87.

4.1 Architecture

Feature 87 (Figure 3) is a semi-subterranean wood-framed structure. The sub-rectangular main room is 3.5 m wide by 4 m long and was composed of a wide platform at the rear that originally would have been raised, and two narrow benches located against the two side walls. The floor was built with split logs and wooden planks that ran from front to back between the side benches; under the two side benches the floor was cemented, likely with sea mammal oil. The eight-meter long sunken entrance tunnel joins the main room in the middle of the front wall. It was not fully excavated so its depth is not known. A kitchen area is to the southeast of the main room and was likely contemporaneous, although its articulation with the house or tunnel could not be established unequivocally due to the location of Harritt's earlier test excavation (Figure 3). At the start of excavation, a number of large whale mandibles were thought to be part of the house structure, but excavation showed them to be later additions, likely part of a rack structure unrelated to and following the Feature 87 occupation.

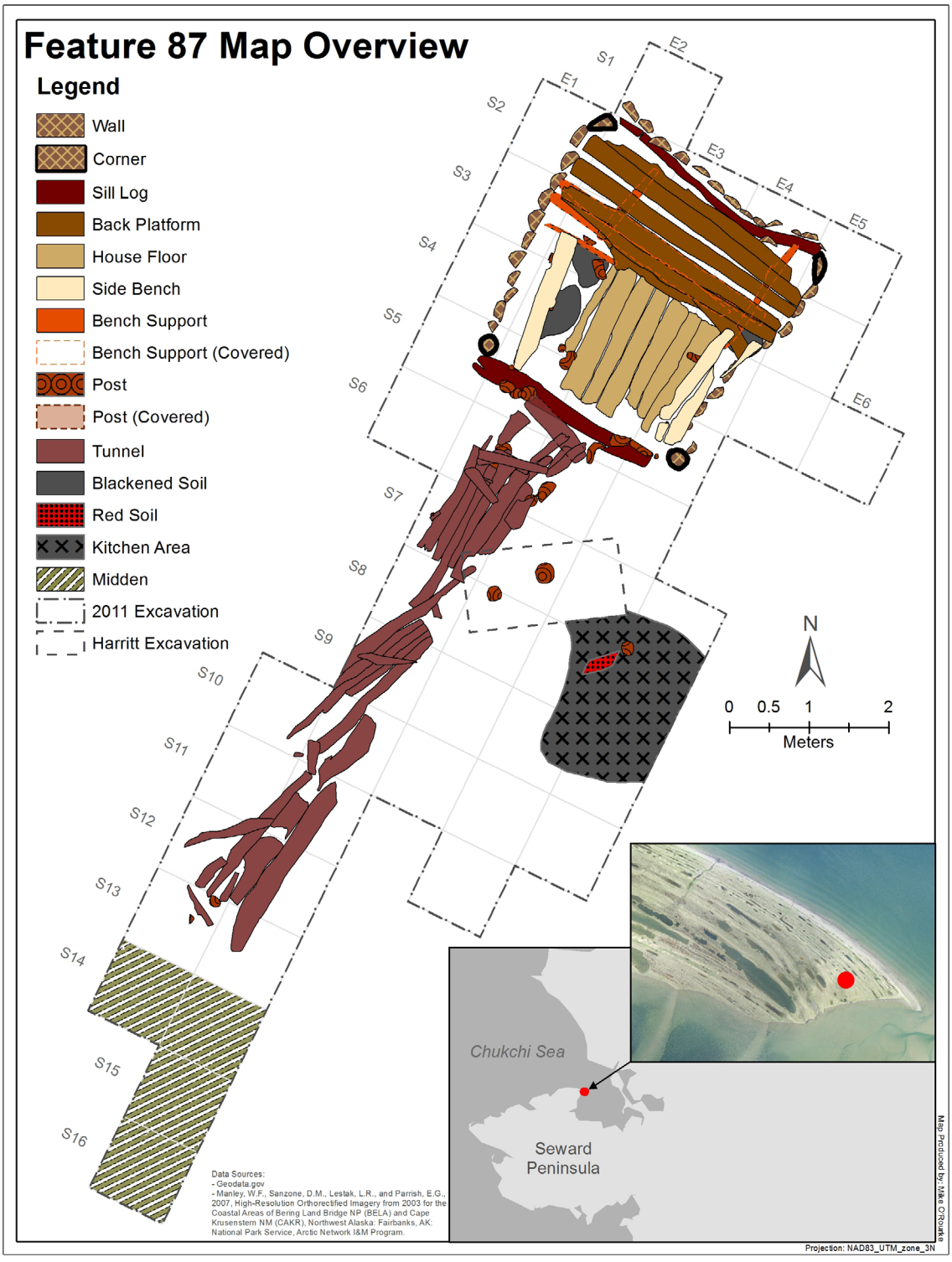

Figure 3: Feature 87 map overview.

4.1.1 Walls and Roof

In each corner, a large complete post or split post was uncovered; the north corners each had a robust split post, while the south corners each had a complete post (Figure 3). These posts were embedded in sterile soil between 20 and 30 cm below floor level. In between these posts, the walls were composed of vertically-placed split logs with their flat, adzed sides facing inwards (Figure 3 and 5). Between 10 and 11 split coniferous logs, 20 to 25 cm wide, made up the back wall and each side wall; the southwest side wall was intentionally cemented into sterile sand, likely through the use of sea mammal oil. To the west of the tunnel, the front wall was made of four continuously placed whole upright logs that sat on top of the sill log (Figure 5b). To the east of the tunnel, there were a number of whole upright logs, but their placement was discontinuous and often difficult to determine, although they also were situated above the sill log. Several larger upright posts were situated at the join between the tunnel and front wall. These posts were never completely excavated, but extended into the sunken tunnel floor and beyond into the permafrost, and likely acted as support posts for the entrance.

Compared to the other three walls composed of very uniform wood elements, the front wall construction was noticeably different with more irregular logs and fragments. Large horizontal logs were probably used to buttress a number of the walls. They were found outside the southwest wall and at the north end of the back wall; excavations did not uncover any buttressing logs associated with the southeast side wall. The posts and large split logs in each of the four corners are assumed to be a framework for a square driftwood roof against which the wall logs were placed (Figure 5a). As is often the case with Thule houses, the roof cannot be reconstructed with confidence. While occasional roof fall elements were encountered during excavation, its poor state of preservation precluded a precise reconstruction.

4.1.2 Floor

The house was built on sterile dune sand, into which the house depression was dug about 1 m below surface level. The main part of the floor was covered by split logs and adzed planks (140 to 180 cm long, 20 to 27 cm wide, and 8 to 13 cm thick) that ran parallel to the long axis of the house laid over sterile sand (Figure 3, 4, and 5c). There were four split logs with their flat surface upward, two flat plank boards, and two smaller un-split logs on the west and east side of the boards, 9.5 and 13 cm in diameter respectively, all of which were very closely fitted (Figure 5c). Wood identification of the boards shows both spruce (*Picea* sp. cf. *P. glauca*) and poplar (*Populus* sp.) were used for the floor. Tree ring crossdating shows perfect crossdating of two spruce split logs and two poplar boards (flat-sawn split) indicating that the logs were probably split on the spot and fitted side by side (Figure 4i-l and 5c). At the front, there was a sill log placed inside the front wall boards and corner posts (Figure 5b).

The floor under the back platform was composed of sterile, loose sand, covered in vegetation such as crowberry bushes, grasses, and mosses. There were also furs and hides between the sterile sand and the back platform planks. All of these materials would have served as insulation.

The floor under the two side benches was very different; although the matrix was sterile sand, it was cemented in place, likely with sea mammal oil, and was the consistency of soft rock. There was no evidence of vegetation or hides on the floor under either of the side benches. Small pieces of wood were situated under these benches right above the cemented sterile soil, possibly part of the bench support structure. A burnt area extended under each of the side benches leading towards the floor boards. Under the west bench, the compact soil was burnt, while the east bench had burning on the floor planks adjacent to the bench (Figure 3 and 5c). Extensive white rot was also found in the area of the east bench which altered some of the associated wood and artifacts.

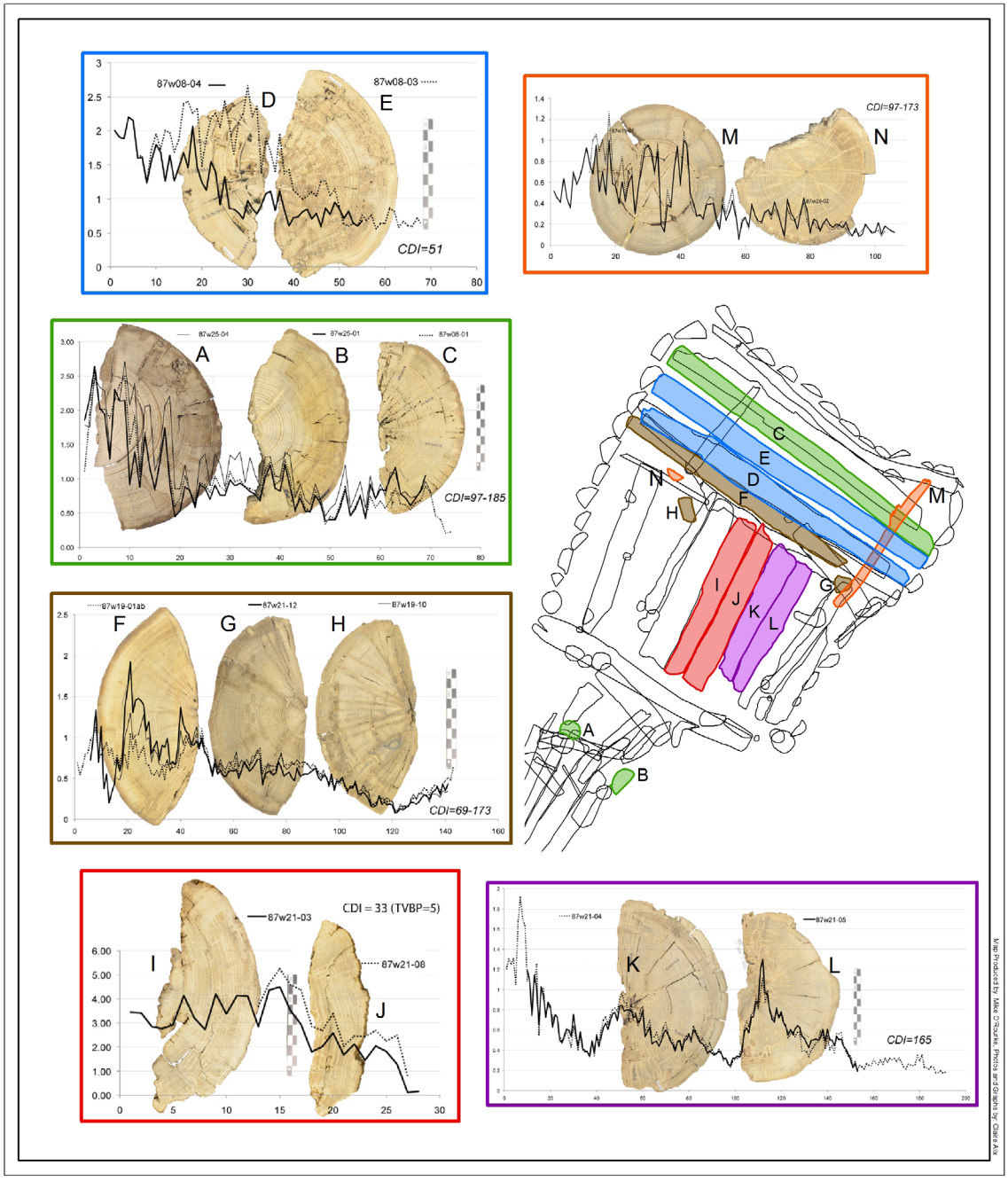

Figure 4: Crossdating of wood samples across the house. Tree-ring sequences are in raw ring width (in hundredth of mm). CDI=Cross Dating Index.

Figure 5: Feature 87 main room features. A: Back and side walls at north east corner; B. Front wall, including sill log and front wall posts; C. Main room floor; D. Back platform and side benches; E. Back sill log and back wall; F. Katak matrix and front sill log in main room; G. Tunnel articulation, with supporting posts/split logs.

4.1.3 Back Platform

The back platform was constructed out of five 3.5 m long by 20 cm wide split spruce logs (*Picea* sp. cf. *P. glauca*) placed perpendicular to the tunnel and floorboards; the total width of the bench from front to back was approximately 1.5 m (Figure 3, 4, and 5d). The front of the bench was between 15-20 cm above the floor boards and the back of the bench was approximately 10-15 cm above sterile sand. Crossdating of these very well-preserved logs shows that the two middle boards were originally from the same log split in half and placed side by side (Figure 4a-c). Another log placed at the back, slightly higher than the rest of the platform boards, and partially above the other planks, crossdates perfectly with two split posts that were placed on each side of the tunnel (Figure 4). Two thick support logs (approximately 10 cm in diameter) were placed perpendicular to the platform boards underneath each side of the platform. At least three of the five boards had been notched to fit these support logs. The west support may also have been supported with a sub-adult baleen whale humerus. These two perpendicular support logs were in turn placed on thick, round logs approximately 3 m long running east to west at the front of the platform and along the back wall. At the back wall, the north-south supports were embedded in the wall between the split wall logs on top of the buttressing log. This back buttressing, or sill, log also supported the back wall (Figure 3 and 5e). At the front of the platform, there were two platform supports that ran from east to west. The southern east-west support was a full, unsplit spruce log; the one just north of it was a split spruce log with the flat side upward. These logs supported the north-south back platform supports and the side bench supports. A smaller log, also 3 m long, was placed in front of the two front buttressing logs and under the floor planks. Between the smaller log and the larger buttressing logs were upright posts, likely supports for the front of the platform or possibly for racks, lamp stands, or other features. The northernmost posts are made of the same log as the split east-west support log at the front of the platform (Figure 4f-h).

4.1.4 Side Benches

The two side benches were both encountered at a higher elevation than the back platform, and were distinct from the back platform construction (Figure 3 and 5d). The wood used in their construction was poorly preserved especially in comparison to the floor, the back platform, and the inner posts of the house. The east bench was about 70 cm below surface level, about 30 cm above the floor; the west bench was about 65cm below surface level, about 35 cm above the floor. Both side benches are similar in width (just under 0.5 m), with the west bench composed of one plank about 2 m long and the east bench composed of one plank about 1.5 m long – this east plank appears to have split after the house was abandoned. The east bench width matches the cemented sand width and has two post supports, one at each end. The west bench is narrower than the cemented sand area; the bench supports are at the edge of the floor/cement sand boundary, making the original bench potentially a meter wide. If this was the case, there is likely one bench plank missing at the front of the west bench.

4.1.5 Kitchen Area

Excavations in front of the house revealed an amorphous area consisting of burnt sea mammal oil, crushed burnt bone, and charcoal, measuring 2 by 2 m, about 2 m to the southeast of the main room and 1.5 m east of the tunnel (Figure 3). The multiple layers of burnt material in this kitchen area indicate that it was deposited rapidly, which raised the floor above its original construction surface. Concrete evidence for an articulation between the kitchen and house is unclear, despite the very high likelihood that the kitchen was directly attached to the house; an interpretation suggested both by its proximity, position, and associated radiocarbon dates. This confusion results from the 1 x 2 m test excavation lying between the kitchen and the remainder of the structure (Figure 3). The stratigraphy of the walls of the test excavation indicates that a number of discrete burnt layers lie under the present ground surface, east of the tunnel. These layers are

difficult to interpret, but most likely represent either the margin of a surface-level connection between the kitchen and the house's main room, or else several episodes of surface level deposition of burnt material as the kitchen was repeatedly used and cleaned over the course of the house's occupation. Thus, we cannot be sure if the kitchen articulated with the entrance tunnel, or directly with the house's main room via the front wall. Two posts mapped in Harritt's test excavation are possible remnants of a connection to the tunnel; however, there is no discernable gap in the tunnel architecture indicating where it would have connected. At the same time, the lack of a gap in the front house walls, near the katak area, suggests that the house possibly underwent a rebuilding episode resulting in the removal of a kitchen entry and articulation.

In terms of the actual structure of the kitchen, no discernible wall features were located, though there is evidence of a post near its center. Thus, it is not clear in which seasons it was used, though it seems most likely that it was used during the cold season, as was the case for roofed kitchen areas described from documentary sources in the Mackenzie Delta and the Bering Strait regions (Simpson 1875: 256, Petitot 1887: 138 Fig. IV, Murdoch 1892: 63, 73, Spencer 1984: 327, Polglase 1990, Lee and Reinhardt 2003: 80, 91).

4.1.6 Katak

The katak (Iñupiaq for an entrance, consisting of an opening in the floor leading down into the inner end of the entrance tunnel) remains imperfectly understood. The well-made floorboards in the main room extend to the front wall, and therefore seem to cover the normal location of a katak (Figure 3 and 5c). However, once the floor planks were lifted, the underlying dark soil contained artifacts, bones, and wood, sloping to the tunnel at a 45° angle, located precisely where a katak was expected (Figure 5b and 5f). This hole could not be fully excavated due to permafrost, but the organic soil matrix and artifacts went more than 0.5 m below the sterile sand of the rest of the floor, and extended under the sill log at the front of the house. It seems unlikely that people stepped over this log to exit, since knots and branch stubs were visible and sticking out of its superior surface. Such protrusions likely hindered movement, making it inconvenient at best and harmful at worst; however the smooth, rounded lower surface of the sill log would have allowed clear access through the hole. At the base of the tunnel along the front house wall, a short log potentially formed a step into the house itself; the log was worn smooth, potential through use (Figure 5g).

The depression in the soil matrix and the smooth lower surface of the sill log are consistent with the conventional Thule placement of a katak; however, the placement of the floorboards does not leave space for a katak inside of the sill log. A number of potential explanations can be offered for this apparent contradiction. First, the floorboards may have shifted or moved after abandonment: an unlikely occurrence, since all still abut the horizontal rear platform support log. Additionally, the excavation strongly indicates that all planks were *in situ*; none were buckled, warped, or overlapping. Alternatively, the floorboards could represent a rebuilding episode in the house where the original floor, with room for entry to the tunnel, was replaced with floorboards that covered the katak. This renovation may represent the change from a cold-season occupation to a warmer-season occupation that required a ground-level entrance. Finally, the house possibly contained two entrances: a tunnel with a katak for the cold season, and ground-level for the warm season, with the floor reconfigured twice a year as the season changed (e.g. Nelson 1899: 243, 244, 247 Fig. 77—note this figure pictures a qargi). However, the front of the house did not yield any direct evidence for a ground-level entrance, so this reconstruction is still a hypothesis.

4.1.7 Tunnel

The tunnel extended for approximately 8 m from the front of the house, at an 80° horizontal angle from the front wall (Figure 3). Only the first 2.5 m of the tunnel closest to the main room were excavated below tunnel roof fall. It seems probable that the tunnel floor was not reached by our excavation; permafrost inhibited excavation beyond 164 cm depth below surface, and 65 cm below the house floor (Figure 5g). Thus, the walls of the tunnel cannot be fully reconstructed with confidence. Nonetheless, the portions excavated indicate

construction with upright posts that support both the inner and outer sides of the horizontal wall logs, a technique that is identical to that of the slightly younger house features (Feature 68a and b) excavated on ridge E-5 (Hoffecker and Mason 2010: 144). The tunnel likely did serve as an effective cold trap, considering it was built on a gradient, sloping southward from the front of the house well below the level of the main room floor in the north.

4.1.8 Midden

In front of the entrance tunnel, a midden was indicated by a slight raised area. Two square meters were excavated to sterile sand; two other meters square were only partially excavated (Figure 3). Two samples, from an upper and lower layer, were radiocarbon dated and fall within the calibration curve for the main room occupation in the 14th century (Table 1 and Figure 2). Thus, the midden material is considered directly related to the house occupation.

4.2 Artifact Assemblage

Nearly 3700 artifacts were recovered in association with Feature 87 and the portion of the midden to the south (Table 2). Stone tools predominated (n=1815, 51%), with an array of bifaces and bifacial points, as well as amber beads, nephrite, and iron pyrites. A wide variety of rock types, mostly exotic to Cape Espenberg, were present, including chalcedony, chert, basalt, sandstone, pumice, mica, schist, graphite, ochre, granite, slate and quartzite. Debitage was overwhelmingly chert (n=776) and slate (n=622), with some nephrite (n=19) indicating tool manufacture occurred in the structure. Ceramics formed the second largest class of objects (n=1282, 36.7%), consisting mostly of body sherds, only two of which were decorated. Organic objects, ivory and antler, were a small but significant portion of the collection (n=398, 11.4%) and also included antler (n=128) and ivory debitage (n=12). Three teeth, of beaver, bear and dog, were employed as pendants. Whale bone was negligible in the artifact assemblage. Significant organic objects included a fish lure, an engraving tool, a labret, sled runner parts, and several leister prongs and arrow points. Wood artifacts (n=257) are mostly coniferous (cf. *Picea* sp.) although we also identified a birch wood fragment (*Betula* sp.) of a snow shoe frame and a number of birch bark fragments including container side rims. Archery equipment is represented by arrow shafts (n=8), a bow fragment, a sinew twister and a bow brace. Other shaft fragments (n=72) and wick trimmers (n=40) form the core of the wooden artifacts which is typical for a collection of this time period and cultural affiliation. The most noteworthy wood artifacts are two identical and highly smoothed knife handles, a series of model or miniature harpoon heads, and a wooden doll that was found underneath the platform bench.

Feature 87 and its associated midden contained eight harpoon heads, including Thule 2, Sicco, and Nunagiak types (cf. Ford 1959: 85, 88, Fig. 30, 31), as well as five multi-barbed closed (Utkiavik type) (cf. Ford 1959: 94, Fig. 33) and open socketed heads. Two noteworthy objects indicate conflict: a polar bear dagger found in the midden (Brown et al. 2012) as well as the slat armor from the kitchen area excavated by Harritt (1994: 107).

All in all, the assemblage from Feature 87 exhibits an expansion in the use of exotic lithics similar to the Arctic Woodland culture of the Kobuk drainage (Giddings 1952). Evidence of fishing technology and of dog traction also parallels the technological transition of the 14th century. In terms of harpoon heads, Feature 87 resembles western Thule assemblages at Utqiagvik mound 44 slump (Mason et al. 1991: 66-69), and Cape Krusenstern House 7-8 cluster (Giddings and Anderson 1986: Pl. 35).

Table 2: Artifacts associated with Feature 87, recovered from 2011 excavations.

Material	Description	KTZ-087 Feature 87
Ceramic		
Pottery	body sherd	1184
	body sherd, decorated	2
	base sherd	1
	rim sherd	81
	rim sherd, decorated	14
Total ceramic		**1282**
Stone		
Amber	bead	18
	fragment	5
Chalcedony	debitage	4
Chert	biface	3
	bifacial point	7
	core	5
	drill	1
	end scraper	1
	retouched flake	8
	scraper	2
	unifacial tool	3
	debitage	776
Granite	fire-altered rock	1
Graphite	ground	1
	unmodified	11
Fossilized horse molar	curated piece	1
Fossilized mammoth ivory	curated piece	7
	modified	13
Iron pyrite	fragment	14
Mica	fragment	6
Nephrite	adze	1
	blade	3
	debitage	19
	point	1
Ochre	fragment	1
Pumice	fragment	1
Rose quartz	debitage	1
Quartz	debitage	1
Quartzite	debitage	6

continued **Table 2:** Artifacts associated with Feature 87, recovered from 2011 excavations.

Material	Description	KTZ-087 Feature 87
Sandstone	adze	1
	ground	1
	whetstone	1
Schist	cobble spall scraper	1
	fragment	50
	ground	3
	whetstone	9
Slate	blade	21
	debitage	622
	drill	1
	endblade	10
	fire-cracked rock	4
	knife	2
	grinding stone	1
	point	4
	scraper	6
	ulu	9
	wedge	1
	whetstone	3
	ground fragment	75
Vesicular basalt	cobble	6
	fire-altered rock	8
Unidentified lithic	cobble	3
	debitage	30
	fire-altered rock	13
	lamp stand	1
	net sinker	1
	whetstone	8
Total stone		**1815**
Hard osseous and other faunal material		
Antler	arrowhead	11
	awl?	1
	barbed point	4
	barbed dart	1
	bead	1
	bird arrow point, blunt	2
	bow stabilizer	1
	dart	5

continued **Table 2:** Artifacts associated with Feature 87, recovered from 2011 excavations.

Material	Description	KTZ-087 Feature 87
	debitage	50
	engraving tool	2
	fish lure	3
	foreshaft	7
	gull hook	1
	handle	3
	harpoon	10
	harpoon head blank	3
	ice knife	1
	ice pick	7
	labret	1
	leister prong	4
	net sinker	1
	point	12
	pressure flaker	2
	sled cross piece	2
	sled shoe/ runner	1
	socket piece	1
	wedge	6
	worked antler	128
Bone	arrowhead	2
	bead	1
	beamer (hide scraper)	1
	boot creaser	1
	caribou scapula knife	1
	decorated object	1
	foreshaft	1
	handle	1
	harpoon head	2
	ice pick	1
	leister prong	2
	point	4
	sinew twister	1
	worked bone	35
Ivory	arrowhead	1
	bead?	1
	bow stabilizer	1
	bow tensioner	1
	debitage	12

continued **Table 2:** Artifacts associated with Feature 87, recovered from 2011 excavations.

Material	Description	KTZ-087 Feature 87
	decorated object	2
	decorated pendant	1
	fish hook shank	1
	fish lure	2
	fish spear barb	1
	foreshaft	1
	inflation nozzle	1
	labret	1
	point	1
	worked ivory	22
Tooth	bear canine pendant	1
	beaver incisor	4
	dog/wolf canine pendant	2
Whale bone	modified	4
	unidentified	2
	mandible	3
Baleen	fragment	2
Fur/hair	sample	6
Hide	modified?	1
Total hard osseous and other faunal material		**398**
Wood		
Archery	bow fragment	1
	bow brace	1
	sinew twister	1
	arrow shafts	8
	feather cutting board	1
Other shafts	unspecified	72
	pointed/prong	8
Other hunting related equipment	dart	1
	drag mouth piece	1
	snow goggles	1
	snow shoe frame (*Betula* sp.)	1
Container	bentwood rim (wood)	1
	birch bark rim	2
	base	2
	bucket handle	3
Handle	engraver tool	1
	awl	2
	ladle	1
	knife	2

continued **Table 2:** Artifacts associated with Feature 87, recovered from 2011 excavations.

Material	Description	KTZ-087 Feature 87
	ulu	1
Carving/ornament	doll	1
	ornament	1
	unspecified	1
Miniature/model	knife blade	1
	boat	1
	harpoon head	4
	bow	1
Other	wick trimmer	40
	frame fragment	1
	slat	2
	stakes	1
	pegs	4
	wedge	1
	unidentified object	4
Worked wood and fragments	worked	54
	burnt	1
	branch	4
Birch bark	fragment	22
Total wood		**256**
Total Artifacts		**3751**

4.3 Faunal Analysis

High resolution faunal samples, recovered through 1/8" (3mm) mesh screening, were obtained from the entire main room floor, two meter squares of the tunnel floor, and samples from levels in the kitchen and midden that are contemporaneous with the floor material. Table 3 shows the taxonomic distribution of the combined house and midden assemblage, expressed as number of identified specimens (NISP) and minimum number of individuals (MNI). A detailed analysis will be presented elsewhere; the present analysis is an overview to indicate the general subsistence economy of the house's inhabitants.

As in many Thule assemblages, small seals were the main and likely most reliable source of food at Cape Espenberg when people occupied Feature 87. Age-at-death profiles based on epiphyseal fusion (Storå 2001, Storå 2002) show a bimodal distribution, with yearlings and adult seals making up the majority of the assemblage. The presence of very young seals indicates that seals were caught in the spring through the fall, within three to six months of their birth in March or April. Since the house was not likely occupied in the summer, it is likely that most of these seals were hunted in the late spring and early fall in the open water and along ice edges. Seals were also hunted throughout the cold-season, with ringed seals (*Pusa hispida*) being hunted through the sea ice via breathing holes and spotted (*Phoca largha*) and ribbon (*Histriophoca fasciata*) seals acquired in open water or while they were basking. The abundance of seal remains and the evidence that they were caught throughout the year indicates that seals were the focus of subsistence at Feature 87.

Table 3: Taxonomic frequencies. Class %NISP is the percentage of each class within specimens identified to class and lower; taxon %NISP is the percentage of each taxon within its class.

Taxa: Scientific name (common name)	NISP	%NSP	%NISP*	MNI	%MNI	%MNI**
Gastropoda	78	0.32		33	18.13	
Bivalvia	181	0.75		19	10.44	
Gastropoda/Bivalvia	385	1.60				
Mollusca (Shell) Total	**644**	**2.67**		**52**	**28.57**	
Clupea pallasii (Pacific herring)	4	0.02	0.06	1	0.55	0.77
Oncorhynchus spp. (Pacific salmon/trout)	1	0.00	0.02	1	0.55	0.77
Salvelinus alpinus (Arctic char)	1	0.00	0.02	1	0.55	0.77
Salvelinus spp. (char)	1	0.00	0.02	0		
Coregoninae (whitefish)	1	0.00	0.02	1	0.55	0.77
Salmonidae (salmonid)	45	0.19	0.72	3	1.65	2.31
Salmoniformes	3	0.01				
Gadus spp.(cod)	3	0.01	0.05	2	1.10	1.54
Gadidae (cod)	88	0.37	1.41	3	1.65	2.31
Actinopterygii	208	0.86				
Actinopterygii (Ray-Finned Fish) Total	**355**	**1.47**	**2.31**	**12**	**6.59**	**9.23**
Anser spp.(goose)	1	0.00	0.02	1	0.55	0.77
Goose	5	0.02	0.08	1	0.55	0.77
Cygnus columbianus (tundra swan)	1	0.00	0.02	1	0.55	0.77
Somateria spp. (eider)	6	0.02	0.10	1	0.55	0.77
Melanitta spp. (scoter)	1	0.00	0.02	1	0.55	0.77
Clangula hyemalis (long-tailed duck)	3	0.01	0.05	2	1.10	1.54
Duck	16	0.07	0.26	0		
Anatidae (goose/duck)	9	0.04	0.14	0		
Lagopus muta (rock ptarmigan)	1	0.00	0.02	1	0.55	0.77
Lagopus spp. (ptarmigan)	7	0.03	0.11	0		
Gavia stellata (red-throated loon)	2	0.01	0.03	1	0.55	0.77
Gavia adamsii (yellow-billed loon)	2	0.01	0.03	1	0.55	0.77
Gavia spp. (loon)	5	0.02	0.08	2	1.10	1.54
Podiceps spp. (grebe)	1	0.00	0.02	1	0.55	0.77
Buteo lagopus (rough-legged hawk)	1	0.00	0.02	1	0.55	0.77
Grus canadensis (sandhill crane)	1	0.00	0.02	1	0.55	0.77
Calidris alpine (dunlin)	1	0.00	0.02	1	0.55	0.77
Calidris spp. (sandpiper)	1	0.00	0.02	1	0.55	0.77
Larus hyperboreus (glaucous gull)	2	0.01	0.03	1	0.55	0.77
Laridae (gull)	2	0.01	0.03	1	0.55	0.77
Sterna paradisaea (Arctic tern)	4	0.02	0.06	1	0.55	0.77
Sterna spp. (tern)	2	0.01	0.03	2	1.10	1.54
Aves	53	0.22				
Aves (Bird)Total	**127**	**0.53**	**1.19**	**22**	**12.09**	**16.92**
Spermophilus parryii (Arctic ground squirrel)	13	0.05	0.21	4	2.20	3.08
Castor canadensis (beaver)	3	0.01	0.05	1	0.55	0.77
Cricetidae (voles/lemming/mice)***	1			1		
Lepus othus (Alaskan/tundra hare)	2	0.01	0.03	1	0.55	0.77
Lepus spp. (hare)	5	0.02	0.08	0		
Canis lupus (dog/wolf)	181	0.75	2.90	6	3.30	4.62
Vulpes vulpes (red fox)	2	0.01	0.03	2	1.10	1.54
Vulpes lagopus (Arctic fox)	21	0.09	0.34	4	2.20	3.08
Vulpes spp. (fox)	114	0.47	1.83	1	0.55	0.77
Canidae (canid)	9	0.04	0.14	0		

continued **Table 3:** Taxonomic frequencies. Class %NISP is the percentage of each class within specimens identified to class and lower; taxon %NISP is the percentage of each taxon within its class.

Taxa: Scientific name (common name)	NISP	%NSP	%NISP*	MNI	%MNI	%MNI**
Ursus spp. (bear)	1	0.00	0.02	1	0.55	0.77
Odobenus rosmarus (walrus)	8	0.03	0.13	1	0.55	0.77
Erignathus barbatus (bearded seal)	73	0.30	1.17	4	2.20	3.08
Histriophoca fasciata (ribbon seal)	5	0.02	0.08	2	1.10	1.54
Phoca largha (spotted seal)	49	0.20	0.79	9	4.95	6.92
Phoca/Histriophoca spp.	5	0.02	0.08	0		
Pusa hispida (ringed seal)	201	0.83	3.22	20	10.99	15.38
Pusa/Phoca spp.	181	0.75	2.90	3	1.65	2.31
Pusa/Phoca/Histriophoca spp.	4928	20.45	79.06	26	14.29	20.00
Phocidae (phocid)	2	0.01	0.03	0		
Neovison vison (mink)	1	0.00	0.02	1	0.55	0.77
Carnivore, marine	3	0.01				
Carnivore, terrestrial	1	0.00				
Carnivora	22	0.09				
Alces alces (moose)	2	0.01	0.03	2	1.10	1.54
Rangifer tarandus (caribou)	199	0.83	3.19	5	2.75	3.85
Ovibos moschatus (muskox)	4	0.02	0.06	1	0.55	0.77
Artiodactyla	4	0.02				
Balaena mysticetus (bowhead whale)	2	0.01	0.03	1	0.55	0.77
Mysticeti (baleen whale)	3	0.01				
Delphinapterus leucas (beluga whale)	5	0.02	0.08	1	0.55	0.77
Cetacea (whale)	19	0.08				
Marine mammal	91	0.38				
Terrestrial mammal	152	0.63				
Mammalia	4414	18.31				
Mammalia (Mammal) Total	**10725**	**44.50**	**96.50**	**96**	**52.75**	**73.85**
Mammalia/Aves	11877	49.28				
Vertebrates	373	1.55				
Indeterminate Vertebrate Total	**12250**	**50.83**				
Total	**24101**			**182**		

*%NISP calculated for specimens identified to family or lower
**%MNI without shell (MNI=130)
***Probable intrusive taxa; excluded from all calculations

Whale remains are few, but those that are present indicate that they were hunted and not just scavenged. A successful hunt of a large whale would have drastically impacted the community's subsistence resources for the season. The elements present are all forelimb elements, which have been suggested as an indicator of whaling at Thule sites (Whitridge 1999b: 220-221, 224, 227, Betts and Friesen 2013: 63-64). Cutmarks, in conjunction with element representation, have also been used as evidence for whale hunting. In Feature 87, two of the five large baleen whale elements exhibit extensive cutmarks. Whales may have been hunted and processed away from the site, with only selected elements brought back. Thus, whales may have contributed more to the diet than their bones suggest; however, the bones present may have also been curated and recycled over generations, which confounds an easy interpretation of the contribution of whales to the diet based solely on faunal evidence. The lack of large baleen whale bones in general in the house and around the site does suggest that whales were not regularly hunted, but rather hunted on occasion. In addition to whales, other large marine mammal remains such as walrus and bearded seal are present in the Feature 87 assemblage. As with whales, the other large marine mammal remains are scarce which indicates that they were not the focus of subsistence at Cape Espenberg.

Caribou contributed the most to the economy of the land mammals, with furbearers a close second. Element representation indicates that caribou were primarily hunted away from the site, with only the high-utility elements brought back to the camp. Furbearers were brought back whole, and were likely hunted year-round. Birds, fish, and molluscs round out the remainder of the faunal assemblage. The identification of some forest-dependent species such as moose, beaver, and mink suggests either trading relationships with people from the interior of the Seward Peninsula, or seasonal movements to the interior.

The faunal assemblage supports the interpretation of the house as a cold-season dwelling. Most of the subsistence focus was on small seals throughout the year; during the spring and fall, people would have caught migrating birds, terrestrial mammals, other marine mammals, and occasionally whales.

5 Early Thule Dwellings in the Western North American Arctic

Feature 87 is a well-preserved dwelling that is one of only a few recently excavated semi-subterranean early Thule features in Alaska. Other published house features are described below in order to place Feature 87 in context in the western Arctic and to explore similarities and differences of occupation. House construction details are summarized in the supplemental material[2]. We focus on house occupations from the early Thule period; in the late Thule period (starting around 1450 CE), house shapes change and diversify. Prior to ca. 1450 CE, most of the coastal houses in northwest Alaska across to East Greenland are of the Point Barrow type (Collins 1937: 264-266, Mathiassen 1927b: 152-153, Slaughter 1980: 141-142). Many of these houses are dated based on artifact types, house form, and association with other early Thule occupations. More precise dating would be needed in order to adequately compare early Thule dwellings throughout the western Arctic. Despite this imprecise chronological control, these houses are all considered early Thule.

5.1 Cape Espenberg

The Cape Espenberg Project has excavated a number of houses at the spit that are both older and younger than Feature 87 (Hoffecker and Mason 2010, Alix et al. 2015, Méreuze 2015). Comparison between excavated houses both on the same ridge and between ridges is needed in order to further investigate similarities and differences in house form, construction, and occupation through time (c.f. Darwent et al. 2013).

5.2 Cape Krusenstern

Some of the defining work on Western Thule comes from Giddings and Anderson's (1986) work at Cape Krusenstern. Cape Krusenstern is directly north of Cape Espenberg, across Kotzebue Sound. One of the main features Giddings and Anderson (1986) noted was the fact that early Thule regularly hunted large baleen whales in addition to other marine and terrestrial resources, while later Thule (Kotzebue period) obtained a broader array of resources with little evidence for procuring large baleen whales. Giddings and Anderson also noted that house form changed over time. Based on large numbers of semi-subterranean houses, storage features, and sites, they also suggested that the early Thule settlement had been occupied by a relatively large number of people (Giddings and Anderson 1986: 107, Harritt 1994: 251, Anderson and Freeburg 2014: 313). Although there is no conclusive evidence for whaling, large storage pits and multi-room houses that often cluster together led Giddings and Anderson to suggest that whaling occurred in the area. Harritt (1994: 253) questioned this interpretation despite his own interpretation of whaling at Feature 87 based on surface bone remains. Harritt (1994: 253) proposed that evidence for a whaling focus only occurs around Wales, and not at other early Thule sites; he attributed whale bone at Cape Espenberg to either scavenging or occasional whaling. Late Thule (Kotzebue period, dating from the 15th to the 19th century) is described as a local variant of broader late prehistoric Thule culture (Giddings and Anderson

2 Supplementary material attached online: https://www.degruyter.com/view/j/opar.2017.3.issue-1/opar-2017-0002/suppl/opar-2017-0002_sm.pdf

1986: 55-57). At Cape Krusenstern, house form changes significantly in the late Thule period, from a typical Thule Inuit form (square with a rear platform) to a local form (trapezoidal with a central hearth) (Giddings and Anderson 1986: 55, 91).

Giddings and Anderson (1986) excavated ten early Thule houses at Cape Krusenstern; all houses followed the Point Barrow style with a main room, kitchen, tunnel, and in some cases a side room (Giddings 1967; Giddings and Anderson 1986). Details of the house structures, dates, and dimensions are summarized in the supplemental material and pictured in Figure 6; below is a summary of variability and trends over time.

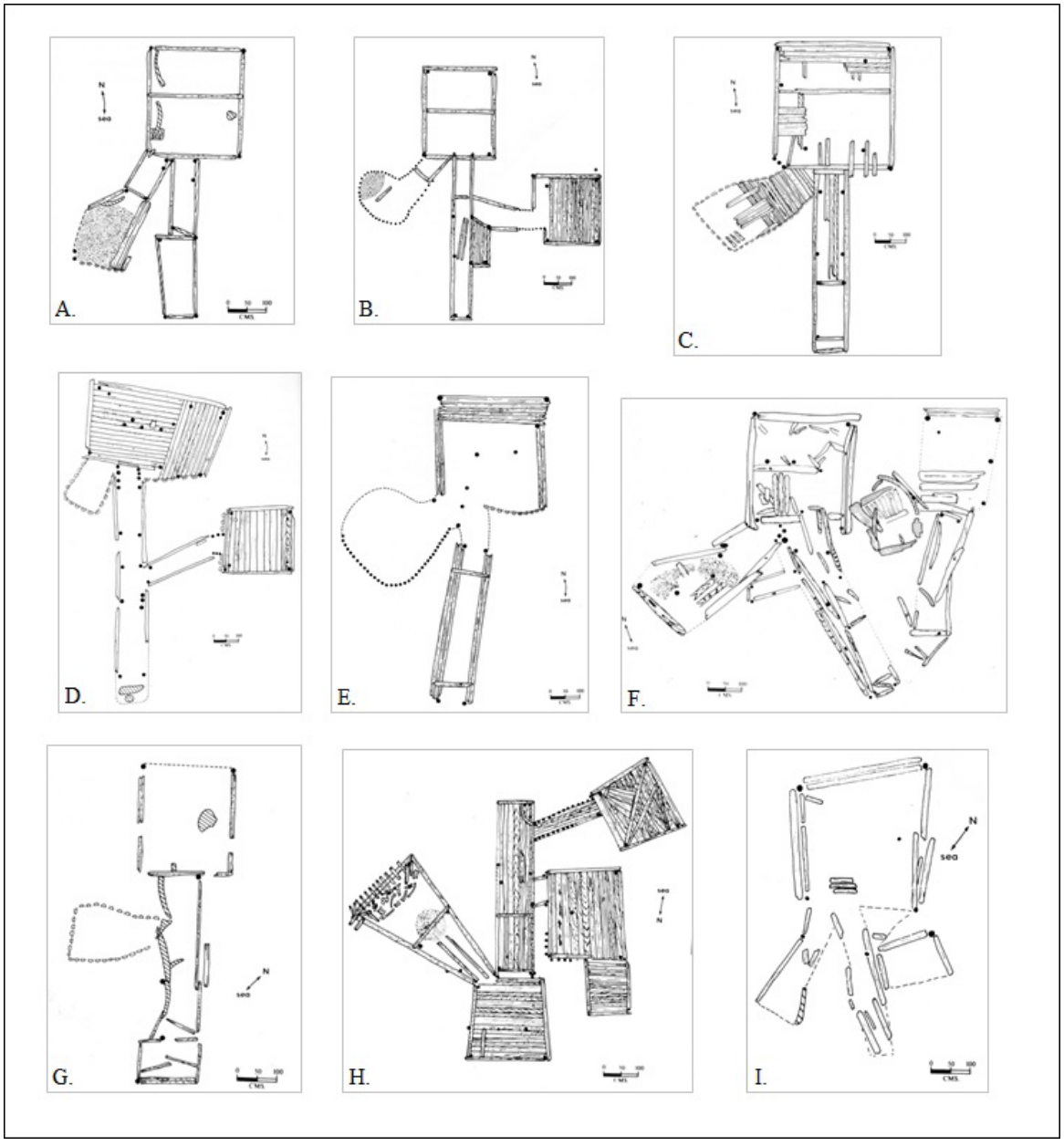

Figure 6: Cape Krusenstern early Thule houses (from Giddings and Anderson 1986: 61-79). A. House 4; B. House 5; C. House 6; D. House 7; E. House 8; F. House 25 (25a on left, 25b on right); G. House 26; H. House 27; and, I. House 29.

Based on their artifact types and location, the earliest Thule houses at Cape Krusenstern are Houses 4-8,

which Giddings and Anderson (1986: 72-73, 78-79) dated between 700 and 1400 CE (Figure 6a-e). All of these houses follow the typical Point Barrow house structure with a main room, attached kitchen, and sunken entrance tunnel. All of the houses have indications that they had raised back platforms, either in the form of posts or logs that demarcated the front of the house from the back. House 7 is the only exception to this, with a wide platform on the side, rather than at the back (Figure 6d). House 5 is also slightly different, with an additional side room reached through a tunnel off the main tunnel and a small rectangular alcove off the main tunnel near the entrance to the side room (Figure 6b).

Giddings and Anderson (1986: 58-60, 65-66) identified a number of later early Thule settlements at Cape Krusenstern based on arrowhead morphology (ca. 1300-1400 CE). If these dates are correct, these houses are closer in time to Feature 87 at Cape Espenberg. They excavated five houses from the largest of these settlements in a cluster of six house depressions: Houses 25a, 25b, 26, 27, and 29 (Giddings and Anderson 1986:59-60). The house depressions were large and deep, with well-preserved logs and planks as well as posts. All of the houses had the typical structure: main room, attached kitchen, and sunken entrance tunnel (Figure 6f-i). Most of the rooms had either fully or partially planked floors, which were often covered in a midden. This suggested to Giddings and Anderson (1986: 59-60) that the floors were layered in dirt during later occupations or that the midden was part of the roof debris. None of the houses had walls that were built like those at Feature 87 with upright split logs reinforced by buttressing horizontal logs. The artifacts were mostly found in the floor planks and roof midden, with no artifacts found under the floor in the sterile gravel. Houses 25b and 26 (Figure 6f and g) were not as well preserved as the other houses, with no clear indication of a back platform. House 29 (Figure 6i) was similar in construction to Houses 25b and 26, with a single main room, entrance tunnel, and kitchen. Unlike any of the other Western Thule houses excavated at Cape Krusenstern, the kitchen of House 26 articulated with the entrance tunnel and not the main room (Figure 6g). House 27 is the largest and most complex house excavated at Cape Krusenstern with five individual rooms (Figure 6h). There is a main room with a kitchen area attached to the front right corner and two side rooms adjoin the tunnel on the opposite side as the kitchen. The side rooms did not have a rear platform demarcation. The larger side room, closer to the main room has a smaller room extending off the rear corner.

5.3 Deering

Excavations at Deering, on northern Seward Peninsula, 70 km southeast of Cape Espenberg, have uncovered two Thule semi-subterranean houses. The Thule economy at Deering was based on a broad-spectrum subsistence strategy that did not focus on whaling despite the ethnographic importance of beluga whaling in the area (Bowers and Mason 2009: 19-20; Saleeby et al. 2009: 198-199). The subsistence at the site focused more on the terrestrial resources than other sites in the region, with large numbers of birds, hares, and caribou (Moss and Bowers 2007: 45-46, Bowers and Mason 2009b: 280-281, Saleeby et al. 2009: 196-197). The faunal remains also indicate that the houses were occupied in the late winter to spring (Moss and Bowers 2007: 46, Saleeby et al. 2009: 199-200). Thule people at Deering seem to have been influenced by groups to both the north (similarity in harpoon heads) and south (artistic traces of Punuk) (Mason and Bowers 2009b: 282). Materials such as obsidian, nephrite, and wood show evidence for the extensive social and trade networks in which these early Western Thule people were situated. At Deering, the two houses were excavated in 1998 and 1999 and a series of dates place them approximately between 1000 and 1300 CE (Moss and Bowers 2007: 41, Bowers 2009: xv). Both houses were made of driftwood, whale bone, and sod. House 1 was more fully excavated and is composed of a single main room, a poorly defined entrance tunnel, and a side area with a hearth, most probably a kitchen area (Williams et al. 2009: 108). It is constructed of driftwood, whale bone, and sod (Moss and Bowers 2007: 41-42, Williams et al. 2009: 99-100, 108). House 2 was partially excavated; only the main room and part of the entrance were uncovered so the presence/absence of a full tunnel and of a side room/kitchen is unknown (Williams et al. 2009: 100-101, 114).

5.4 Qimiarzuq

The term Western Thule was first used to describe two burials and the excavation of Qimiarzuq (previously Jabbertown) House 2 at Point Hope (Larsen and Rainey 1948:170-175). Mason and Bowers (2009a: 29-30) describe the artifacts but not the architecture from the smaller House 1, previously excavated by Larsen and Rainey but undescribed in their report. Mason and Hoffecker re-visited the site where they observed that the Thule dwellings were quite variable. This variability at Point Hope may indicate that these houses were built at different times, or that individual construction decisions varied more than previously recorded (Mason and Bowers 2009a: 31-32). The occupation itself is proposed to be quite small (Mason and Bowers 2009a: 32). Beyond a description of the house architecture and artifact types, very little on the subsistence strategies or broader house occupation was given for the Western Thule at Point Hope. House 2 (Figure 7) was a large, multi-roomed house at the base of Point Hope spit, which is dated between the 11th and 13th centuries (Mason and Bowers 2009a: 32). The house had two main rooms that each had a kitchen attached to it. Both main rooms were attached to the entrance tunnel. The final room in the house structure was attached to the tunnel and was classified as a storeroom (Larsen and Rainey 1948: 170-172). Although the excavated area was quite large, the liveable space in House 2 was quite small in comparison to the space represented by hallways, kitchens, and entrances (Mason and Bowers 2009a: 30). Mason and Bowers (2009a: 30) hypothesize that it would have only housed one or two families.

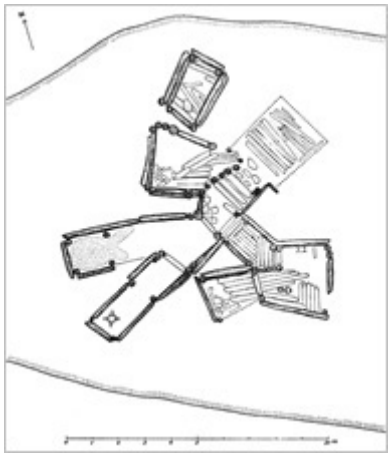

Figure 7: Qimiarzuq (Jabbertown), House 2 (from Larsen and Rainey 1948: 171).

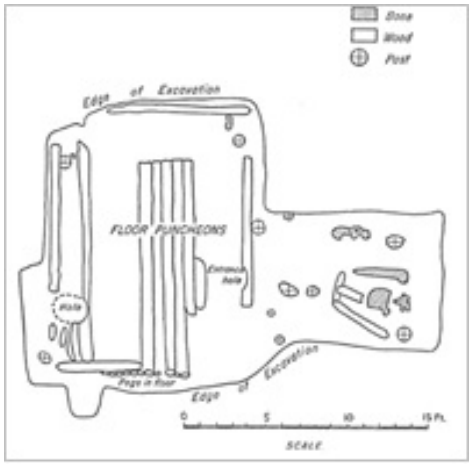

Figure 8: Utqiagvik, House A (from Ford 1959: 68).

5.5 Utqiagvik

Along the North Slope, Ford (1959) partially excavated the early Thule period House A at Utqiagvik (Figure 8). Other later Thule and prehistoric Iñupiat dwellings have been excavated at Utqiagvik (Hall and Fullerton 1990), but are not within the scope of this paper. The site at Utqiagvik was not the focus of Ford's excavations or analyses, so very little subsistence or occupation information is provided, other than a list of artifacts. The artifacts at Utqiagvik represent a wide variety of subsistence practices, including a few whaling implements, many seal hunting tools, and a variety of fishing, terrestrial hunting, and birding tools. Ford (1959) uncovered very little architectural information about House A as most of it was scavenged or not well preserved. With very little remaining of the superstructure, Ford (1950) established only the presence of a main room with an entrance tunnel (Ford 1959: 69-70). The entrance tunnel was disturbed, but Ford estimates that it extended at least 9 feet (2.7 m) to the south. There was no clearly defined entrance from the tunnel to the house, but Ford surmises that it must have been well below the floor of the house. Entry to the main room was through a hole in the floor; evidence for this comes from the well-worn segment of an oval hole in one of the front floor planks.

5.6 Other Sites in the Western Arctic

Almost all of the beach ridge complexes in Kotzebue Sound have Thule occupations evident on them, although the dating of these is imprecise at best, with few house descriptions or figures appearing in print. The Sisivik beach ridges on the north shore of Eschscholtz Bay have almost 100 depressions that are no older than 1210 to 1452 cal CE (Mason and Bowers 2009a: 37). Smith [(1989) in Mason and Bowers 2009a] identifies a possible early Thule site near the town of Kotzebue. Giddings (1952, Giddings and Anderson 1986) and VanStone (1955) excavated late Thule houses at Kotzebue, but did not uncover any early Thule dwelling structures. Similarly, Harritt (2010) has described some interesting architecture from Wales, but it is all from the later Thule period. Sisualik spit has four small houses with long entries and side rooms. They are presumed to be early Thule and produced a large inventory of artifacts and several diagnostic harpoon heads (Thule 2, Sicco, and Natchuk) (Giddings and Anderson 1986: 88). Although beluga hunting is currently practised in the area, the people at Sisualik seem to have been fishing and birding rather than beluga hunting. Other Alaskan houses from the Western Thule period have been excavated in the interior, with significant differences in construction to those on the coast (Giddings 1952, Young 2002).

Moving east, houses of the Point Barrow type are found in early Thule sites across the Canadian Beaufort Sea and Amundsen Gulf coasts. In the Mackenzie Delta, House 8 at Cache Point has been described in detail by Friesen and Betts (2006) (Figure 9). Cache Point is the earliest Inuit site on the East Channel of the Mackenzie River, and its faunal sample indicates an early emphasis on beluga whale hunting, in addition to the acquisition of a wide range of fish, bird, and mammal species. This house contains a main room, a long entrance tunnel, and a kitchen entered from the house. This house was occupied between 1200 and 1400 CE and represents an early Thule Inuit occupation in the Mackenzie Delta.

In the Amundsen Gulf area, Tiktalik, Nelson River, and the Co-op site contain well-preserved semi-subterranean house structures. Tiktalik House 5 was composed of a main room, kitchen alcove, and tunnel (Morrison 2000: 225, Moody and Hodgetets 2013; 7-9) (Figure 10). Located on Banks Island, Nelson River is often considered one of the earliest Thule occupations east of Alaska, based on early radiocarbon dates as well as diagnostically early harpoon head types. The house was composed of two main rooms joined at a common tunnel entrance (Friesen and Arnold 2008: 529-530) (Figure 11). Adjoining one room was a separate external kitchen alcove (Arnold 1994: 273-274). At the Co-op site, three semi-subterranean dwellings that date to the early Thule period were excavated. Houses 1 and 2 were each composed of a main room, kitchen extension, and tunnel (Le Mouël and Le Mouël 2000: 169-171, 173). Each main room also had one or two small alcoves. House 5 consisted of two houses joined by two separate tunnels that met at a common entrance (Figure 12). Each house in the House 5 complex also had a kitchen extension and alcove off the main room.

Figure 9: Cache Point, House 8 (from Friesen and Betts 2006: 67).

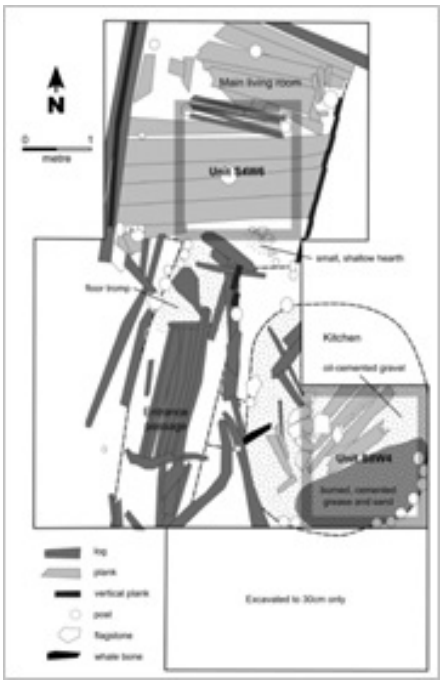

Figure 10: Tiktalik, House 5 (from Moody and Hodgetts 2013: 8).

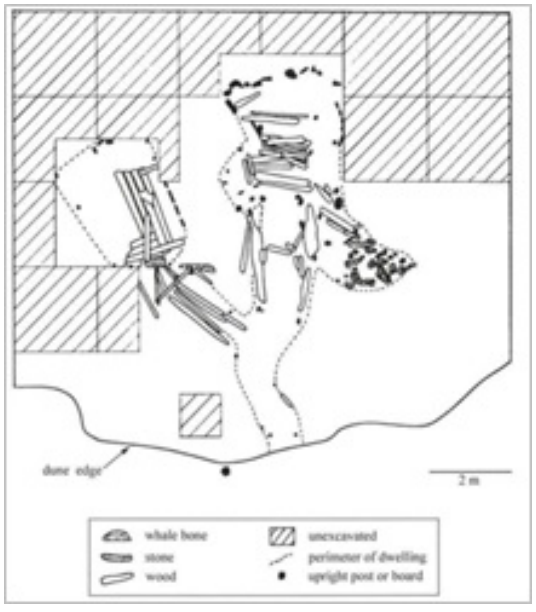

Figure 11: Nelson River (from Friesen and Arnold 2008: 530).

Figure 12: Co-op, House 5 (from Le Mouël and Le Mouël 2002: 184).

5.7 Similarity and Variability in Coastal Early Thule Houses

The descriptions of houses in Alaska and northwestern Canada indicate that early Thule houses, though variable, had a similar structure. Typically, Thule people in the early period built their houses with a large main room that contained a raised back platform. These main rooms usually had a large post in each corner, but walls were variably constructed, usually with some version of upright posts or planks, or horizontal logs. Main room floors were sometimes, but not always, paved with planks. Mainly due to poor

preservation, there is very little description of roof construction. Raised platforms were typically found at the back of the main room opposite the tunnel, although a few were located on the side. Platforms were relatively large, often taking up just under half of the main room's area. Although the planks of many house platforms had been removed by the original inhabitants or had disintegrated, upright posts likely indicate the front edge of such platforms. Kitchens were typically attached to the front wall of the main room, adjacent to the tunnel. Their wall and roof construction was highly variable, however they were usually much less robust than those of the main room or tunnel. Most kitchens had floors that were covered in midden material, specifically burnt bone and greasy matrices. Tunnels were usually long and deep, and were variably constructed with combinations of upright posts and horizontal logs. They were rarely paved with wood, and sometimes accommodated small alcoves or niches.

Beyond this basic main room-kitchen-tunnel floor plan, many houses also had additional rooms. These were variably constructed, but normally follow the four-corner post construction technique, with vertical or horizontal logs or planks between corner posts. Most often, there were no platforms or benches in these rooms. The floors were often planked. The smaller side rooms that are interpreted as storage rooms were often less robustly constructed. Some houses have more than one side room, while some side rooms have their own additional side rooms or extensions (e.g. Cape Krusenstern House 27 or Qimiarzuq House 2). These two complex houses are quite different from the smaller, less complex houses found almost everywhere else; they have more side rooms than any other house, and at least at Qimiarzuq, there is a second kitchen/hearth area.

Although not all archaeological excavations of houses included the immediate surrounding areas, those that did often revealed separate storage chambers not connected to the house by a tunnel. These storage areas are presumed to be related to the house occupation, and are either found beside or behind the houses. Beyond this limited excavation, very little research has been done archaeologically on areas external to dwelling features (but see Newell 1990; Polglase 1990).

6 Discussion

Overall, Feature 87 is relatively typical of early Thule houses. It incorporates a rectangular main room, a long sunken entrance tunnel, and a raised back platform. Furthermore, it has an external kitchen, though the precise nature of its articulation with the house remains unresolved.

The most unusual aspect of Feature 87 is the occurrence of two side benches. This may be a truly unique occurrence, however it is also possible that they have been encountered, but not recognized, in some other instances. This suggestion is based on the fact that the two benches in Feature 87 were encountered quite high up in the house stratigraphy, at the base of the roof fall layer. Due to their shallow burial, they had decomposed to a greater degree than most other structural wood from the feature. Thus, it would be quite easy to mistake them for roof fall. An alternative explanation is that in some instances side benches may have been removed by the original occupants when the dwellings were abandoned. However, it remains possible that the Feature 87 side benches are actually unique. This possibility is supported by the fact that the floor under the two side benches in Feature 87 was distinctively cemented with sea mammal fat as opposed to the wood planks that covered the rest of the floor. This stark delineation has not been recorded in other early Thule dwelling features.

The side benches are called 'benches' rather than 'platforms' because they more closely resemble the benches normally found in *qargich* (pl.; sing. *qargi*, also known as karigis or kashims; these communal structures were often used primarily for men's activities) than side platforms recorded in ethnographies and in prehistory. Benches are used for sitting, working, eating, and socializing; platforms are also used for all of these activities, in addition to sleeping. Side platforms have been recorded at sites across northwest Alaska and into the Canadian Arctic. However, these are similar or identical to the wide sleeping platforms normally found at the rear of a dwelling; they do not resemble the narrow side benches found at Feature 87. Among direct Thule ancestors, the earliest side platforms occur in the Birnirk period (Ford 1959: 51-52). At Cape Krusenstern, Birnirk houses and the early Thule House 7 had single side platforms; these were made of multiple planks or logs and took up about half of the room (Giddings and Anderson 1986: 78, 93).

Once house form diversifies in the late Thule period, side platforms are present in the archaeological and documentary record in different house types throughout the North American Arctic (Collins 1937, Young 2002). All of the published side platforms are thought to function like back platforms, as they are wide, made of multiple planks, and take up a significant amount of room space. They are not like the narrow, single plank side benches in Feature 87, which may have provided warm seating areas for working, but would not have been practical for sleeping (Patton and Savelle 2006: 141).

Narrow side benches like those excavated in Feature 87 are observed in the archaeological and documentary records from qargich. Qargich are often quite similar to cold-season domestic dwellings; both are semi-subterranean with the main room constructed of wood, whale bone, or stone, and accessed by an entrance passage (Murdoch 1892: 80, Rainey 1947: 244, Spencer 1959: 49, Patton and Savelle 2006: 141). They are identified archaeologically by their lack of sleeping platforms and the presence of seating benches along the inner wall (Irving 1962: 79-80, VanStone 1970: 35-36, Savelle 1997: 874, Patton and Savelle 2006: 141). Most of our knowledge of qargich comes from the documentary record as only a few excavated qargich have been published; of the excavated qargich, only a few are from the early Thule period. Excavations at the site of Utqiagvik uncovered a late prehistoric ceremonial house (Hall and Fullerton 1990b). VanStone (1970) also excavated a historic qargi at Akulivik, on the Nushagak River in southwestern Alaska. One early Thule qargi was excavated by Friesen at the Pembroke Site in the central Canadian Arctic (Norman and Friesen 2010, Friesen and Norman 2016); it conformed to ethnographic expectations as it was larger than the contemporary winter dwellings and had stones arranged as benches around the entire interior walls. One, and potentially two, Thule qargich were excavated at Hazard Inlet (Savelle 1987, Habu and Savelle 1994, Savelle 1997). The eastern Arctic has recorded a number of other Thule period qargich, such as those excavated at Cape Garry (McCartney 1980, McCartney 1988), Qariaraqyuk (Whitridge 1999a; Whitridge 1999b) and Skraeling Island (McCullough 1989). Others have been reported from Barter Island on the Alaska North Slope (Jenness 1990).

Narrow side benches have been used archaeologically to identify qargich and their appearance in Feature 87 may indicate that this structure functioned as both a domestic and ceremonial structure. Alternatively, this house may simply be a domestic dwelling with extra seating. Regardless of whether this house can be categorized as a domestic or hybrid domestic-ceremonial dwelling, the side benches mark the house as unique and might be tied to different activities than are normally found in Thule Inuit houses.

The house shows evidence for re-occupation in multiple seasons. The katak as described above is unresolved but may show evidence that the house floor was restructured to alternate from a cold-season entrance via the sunken entrance tunnel to a warm-season entrance via ground level. People may have replaced their floorboards in order to cover the entrance to the tunnel and allow themselves more floor space. Although there is no direct evidence for a ground-level entrance, the previous excavations to the southeast of the main room may have obscured evidence for a ground-level connection between the kitchen area and the main room. Evidence for a connection is found in the profile of the northeast wall from Harritt's excavation. Here, there is a thick layer of black matrix, filled with charcoal, burned bone, and burned sea mammal oil. This extends across the profile, towards the house and may indicate a walkway between the two. If this is the case, part of the occupation of the house may have been during a warmer season than is traditionally associated with semi-subterranean dwellings. Wood analysis and radiocarbon dates show later rebuilding episodes. This, along with the evidence for rebuilding of the katak and floor, indicates that the house was likely rebuilt multiple times over a longer period of time, and potentially rebuilt seasonally.

7 Conclusion

"The community thus begins with the house" (Spencer 1984: 327)

A detailed, holistic analysis of a house occupation can reveal interesting individual traits, such as construction details and rebuilding episodes, which can in turn be compared and contrasted to other house occupations geographically and temporally. This paper has presented an overview of occupation during the

early Thule period in the Kotzebue region that highlights both the variability and consistency in form and function of these domestic dwellings. Understanding these similarities and differences is important not only for understanding individual house occupations, but also for a broader examination of the early Thule period. The importance of the house to everyday life is supported ethnographically, where winter dwellings were the focus of domestic and social activities. A strong understanding of communities, interaction, subsistence pursuits, and social life is often built on knowledge of the house. This is especially true in the Arctic, where semi-subterranean dwellings are often the main source of artifacts, radiocarbon dates, and faunal material. In many respects, Feature 87 is a typical early house with a main room, long sunken entrance tunnel, and attached kitchen area. This similarity in form of the early Thule semi-subterranean dwelling masks the variability of individual house histories. The excellent preservation of the house has allowed a detailed understanding of the house occupation that will add significantly to our understanding of variability in Thule dwellings.

Acknowledgments: The Cape Espenberg Project was funded by an NSF (ARC-0755725) to John Hoffecker, Owen Mason, Nancy Bigelow, Claire Alix (University of Alaska Fairbanks), and Christyann Darwent. We would like to thank the National Parks Service for their assistance on many things, including the facilitation of a high-school student mentorship program. Tree-ring samples were measured by Ryan Jess at the UAF Tree Ring Lab of the School of Natural Resources and Extension (SNRE). Logistics were provided by Ch2MHill Polar Services. Thanks to all the archaeologists whose house excavations we relied on for comparative purposes in this paper. Special thanks to Ken Jessen and Rae Spain for field support and excellent cooking. Finally, many thanks go to the 2009 (M. Pendersen, J. Goodsell, V. Macri, A. Davis, and J. Hoffecker) and 2011 (A. Neffe, A. Fassoulas, K. Hill, P. Barr, G. Hernandez, K. Erickson, A. Tremayne, A. Jensen, K. Leeper, S. Anderson, J. Foin, J. Dougherty, L. Crawford, R. Méreuze, and D. Slaughter) field crews who excavated Feature 87.

References

Alix, C., and Juday, G. P. (2012). Date, transit time and origin of driftwood – a tool for tree-ring dating archaeological sites in northwestern Alaska, in: Using Tree Rings to Date and Locate: Dendrochronology and Dendroprovenance. Paper presented at the Canadian Archaeological Association Annual Meeting, Montreal.

Alix, C., Owen K. Mason, O. K., Bigelow, N. H., Anderson, S. L., Rasic, J. and Hoffecker, J. F. (2015). Archéologie du Cap Espenberg où la question du Birnirk et de l'origine du Thulé dans le nord-ouest de l'Alaska. Les Nouvelles de l'Archeologie, 141, 13–19.

Anderson, S. L., and Freeburg, A. K. (2013). A High-Resolution Chronology for the Cape Krusenstern Site Complex, Northwest Alaska. Arctic Anthropology 50(1), 49–71.

Anderson, S. L., and Freeburg, A. K. (2014). High Latitude Coastal Settlement Patterns: Cape Krusenstern, Alaska. The Journal of Island and Coastal Archaeology 9, 295–318.

Arnold, C. D. (1994). The Importance of Wood in the Early Thule Culture of the Western Canadian Arctic. In D. Morrison and J.-L. Pilon (Eds.), Threads of Arctic Prehistory: Papers in Honour of William E. Taylor Jr. (pp. 269–280). Mercury Series, Archaeological Survey of Canada Paper. Hull, Quebec: Canadian Museum of Civilization,.

Betts, M. W., and T. M. Friesen. (2013). Archaeofaunal signatures of specialized bowhead whaling in the Western Canadian Arctic: a regional study. Anthropozoologica 48(1), 53–73.

Bigelow, N. H., Mason, O. K., Alix, C. M. and Hoffecker, J. F. (2013). Dating wood and other plant bits at Cape Espenberg: Building a landscape chronology and avoiding pitfalls. Paper presented at the Alaska Anthropological Association 40th Annual Meeting, Anchorage.

Bowers, P. M. (2009). The Archaeology of Deering, Alaska: Final report on the Deering Village Safe Water Archaeological Program. Fairbanks: Northern Land Use Research, Inc.

Bowers, P. M., and Mason, O. K. (2009). Summary and Conclusions. In P. M. Bowers (Ed.), The Archaeology of Deering, Alaska: Final report on the Deering Village Safe Water Archaeological Program (pp. 285–288). Fairbanks: Northern Land Use Research, Inc.

Bronshtein, M. M., and Dneprovsky K. A. (2002). The northeastern Chukchi Peninsula during the Birnirk and Early Punuk periods. In D. E. Dumon and R. L. Bland (Eds.), Archaeology in the Bering Strait Region: Research on Two Continents (pp. 153–165). University of Oregon: University of Oregon Anthropological Papers.

Brown, S. K., Friesen, T. M., Mason, O. K., and Darwent, Ch. M. (2012). Ancient DNA Identification of a Polar Bear Bone Dagger from Cape Espenberg, Alaska. Alaska Journal of Anthropology 10(1&2), 173–175.
Collins, H. B. Jr. (1937). Archeology of St. Lawrence Island, Alaska. Smithsonian Miscellaneous Collections. Vol. 96, No. 1. Washington: Smithsonian Institution.
D'Arrigo, R., Mashig, E., Frank, D., Wilson, R. and Jacoby, G. (2005). Temperature variability over the past millennium inferred from Northwestern Alaska tree rings. Climate Dynamics 24(2-3), 227–236.
Darwent, J., Mason, O. K., Hoffecker, J. F., and Darwent, C. M. (2013). 1,000 Years of House Change at Cape Espenberg, Alaska: A Case Study in Horizontal Stratigraphy. American Antiquity 78(3), 433–455.
Dumond, D. E (1987). The Eskimos and Aleuts: Revised Edition. London: Thames and Hudson.
Ford, J. A. (1959). Eskimo prehistory in the vicinity of Point Barrow, Alaska. New York: Anthropological Papers of the American Museum of Natural History.
Friesen, T. M., and Arnold, C. D. (2008). The timing of the Thule migration: new dates from the Western Canadian Arctic. American Antiquity 73(3), 527–538.
Friesen, T. M., and Betts, M. W. (2006). Archaeofaunas and Architecture: Zooarchaeological Variability in an Inuit Semi-Subterranean House, Arctic Canada. In M. Maltby (Ed.), Integrating Zooarchaeology: Proceedings of the 9th Conference of the International Council of Archaeozoology, Durham, August 2002 (pp. 65–76). Oxford: Oxbow Books.
Friesen, T. M., and Norman, L. E. Y. (2016). The Pembroke Site: Thule Inuit Migrants on Southern Victoria Island. Arctic 69(1): 1-18.
Giddings, J. L. (1952). The Arctic Woodland Culture of the Kobuk River. University Museum Monographs. Philadelphia: University of Pennsylvania.
Giddings, J. L. (1967). Ancient Men of the Arctic. Seattle: University of Washington Press.
Giddings, J. L, and Anderson, D. D. (1986). Beach Ridge Archaeology of Cape Krusenstern: Eskimo and Pre-Eskimo Settlements around Kotzebue Sound, Alaska. Publications in Archeology. National Park Service, U.S. Department of the Interior, Washington, DC.
Graumlich, L., and King, J. (1997). Late Holocene Climatic Variation in Northwestern Alaska as Reconstructed from Tree Rings, Final Report to the Cooperative Research with the National Park Services. Tree-Ring Laboratory, University of Arizona.
Habu, J., and Savelle, J. M. (1994). Construction, Use, and Abandonment of a Thule Whale Bone House, Somerset Island, Arctic Canada. The Quaternary Research 33(1), 1–18.
Hall, E. S. Jr., and Fullerton, L. (Eds.) (1990). The Utqiagvik Excavations: Volume 1. The 1981 Excavations at the Utqiagivk Archaeological Site Barrow, Alaska. Barrow: The North Slope Borough Commission on Inupiat History, Language and Culture.
Harritt, R. K. (1994). Eskimo Prehistory on the Seward Peninsula, Alaska. Resources Report NPS/ARORCR/CRR-93/21. Anchorage: National Parks Service Alaska Region.
Harritt, R. K. (2010). Variations of Late Prehistoric Houses in Coastal Northwest Alaska: A View from Wales. Arctic Anthropology 47(1), 57–70.
Hoffecker, J. F., and Mason, O. K. (2010). Cape Espenberg Thule origins project. Alaska Journal of Anthropology 8(2), 141–146.
Holmes, R. L. (1983). Computer-assisted quality control in tree-ring dating and measurement. Tree-ring Bulletin 43, 69–78.
Irving, W. N. (1962). 1961 Field Work in the Western Brooks Range, Alaska: Preliminary Report. Arctic Anthropology 1(1), 76–83.
Jenness, S. E. (1990). Diamond Jenness's archaeological investigations on Barter Island, Alaska. Polar Record 26(157), 91–102.
Krupnik, I. (1993). Arctic adaptations: native whalers and reindeer herders of northern Eurasia. Hanover, NH: University Press of New England.
Larsen, H., and Rainey, F. G. (1948). Ipiutak and the Arctic Whale Hunting Culture. Anthropological Papers of the American Museum of Natural History. New York.
Lee, M., and Reinhardt, G. A. (2003). Eskimo Architecture: Dwelling and Structure in the Early Historic Period. Fairbanks: University of Alaska Press.
Mason, O. K. (1990). Beach Ridge Geomorphology of Kotzebue Sound: Implications for Paleoclimatology and Archaeology. University of Alaska Fairbanks. Unpublished PhD dissertation.
Mason, O. K. (1998). The Contest between the Ipiutak, Old Bering Sea, and Birnirk Polities and the Origin of Whaling during the First Millennium A. D. along Bering Strait. Journal of Anthropological Archaeology 17, 240–325.
Mason, O. K. (2009). Flight from the Bering Strait: Did Siberian Punuk/Thule Military Cadres Conquer Northwest Alaska? In H. D. Maschner, O. K. Mason, and R. McGhee (Eds.), The Northern World AD 900-1400, (pp. 76–128). Salt Lake City: The University of Utah Press.
Mason, O. K. (2012). Memories of Warfare: Archaeology and Oral History in Assessing the Conflict and Alliance Model of Ernest S. Burch. Arctic Anthropology 49(2), 72–93.
Mason, O.K. (2016) Thule origins in the Old Bering Sea culture: the inter-relationship of Punuk and Birnirk cultures. In T.M. Friesen and O.K. Mason (Eds.), Oxford Handbook of the Prehistoric Arctic (pp. 489-512). Oxford: Oxford University Press.
Mason, O. K., and Bowers, P. M. (2009a). The Origin of Thule is Always Elsewhere: Early Thule within Kotzebue Sound, "Cul-de-Sac" or Nursery? In B. Grønnow (Ed.), On the Track of the Thule Culture from Bering Strait to East Greenland: Proceedings of the SILA Conference "The Thule Culture-New Perspectives in Inuit Prehistory" Copenhagen, Oct.

26th-28th, 2006. Papers in Honour of Hans Chirstian Gullov, (pp. 25–44). Copenhagen: Studies in Archaeology & History. Publications from the National Museum.

Mason, O. K., and Bowers, P. M. (2009b). Early Thule within Kotzebue Sound. In P. M. Bowers (Ed.), The Archaeology of Deering, Alaska: Final report on the Deering Village Safe Water Archaeological Program (pp. 273–283). Fairbanks: Northern Land Use Research, Inc.

Mason, O. K., Gerlach, S. C., and Ludwig, S. L. (1991). Coastal erosion and salvage archaeology at Utqiagvik, Alaska: the 1990 excavation of the Mount 44 slump block. Occasional Papers of the Alaska Quaternary Center. Fairbanks: Alaska Quaternary Center.

Mason, O. K., and Jordan, J. W. (1993). Heightened North Pacific Storminess during Synchronous Late Holocene Erosion of Northwest Alaska Beach Ridges. Quaternary Research 40, 55–69.

Mathiassen, T.. (1927a). The Thule Culture and its Position within the Eskimo Culture: Archaeology of the Central Eskimos II. Report of the Fifth Thule Expedition 1921-42. Copenhagen: Gyldendal.

Mathiassen, T. (1927b). Archaeology of the Central Eskimos. I. Descriptive Part. Report of the Fifth Thule Expedition 1921-42. Copenhagen: Gyldendal.

McCartney, A. P. (1980). The Nature of Thule Eskimo Whale Use. Arctic 33(3), 517–541.

McCartney, A. P. (1988). Late prehistoric metal use in the New World Arctic. In R. D. Shaw, R. K. Harritt, and D. E. Dumond (Eds.), The Late Prehistoric Development of Alaska's Native People (pp. 35–79). Aurora. Fairbanks: Alaska Anthropology Association Monograph Series.

McCullough, K. M. (1989). The Ruin Islanders: Thule Culture Pioneers in the Eastern High Arctic. Archaeological Survey of Canada Mercury Paper. Ottawa: Canadian Museum of Civilization.

Méreuze, R. (2015). La construction de la maison 33 de cap Espenberg, nord-ouest de l'Alaska, au XVIIIe siecle. Les Nouvelles de l'Archeologie 141, 19–25.

Moody, J. F., and Hodgetts, L. M. (2013). Subsistence Practices of Pioneering Thule – Inuit : A Faunal Analysis of Tiktalik. Arctic Anthropology 50(2), 4–24.

Morrison, D. A. (2000). The Arrival of the Inuit: Amundsen Gulf and the Thule Migration. In M. Appelt, J. Berglund, and H. C. Gulløv (Eds.), Identities and Cultural Contacts in the Arctic: Proceedings from a Conference at the Danish National Museum, Copenhagen, November 30 to December 2, 1999 (pp. 221–228). Danish Polar Center Publication. Copenhagen: Danish National Museum & Danish Polar Center.

Moss, M. L., and Bowers, P. M. (2007). Migratory Bird Harvest in Northwestern Alaska: A Zooarchaeological Analysis of Ipiutak and Thule Occupations from the Deering Archaeological District The Regulation of Migratory. Arctic Anthropology 44(1), 37–50.

Le Mouel, J.-F., and Le Mouel, M. (2002). Aspects of Early Thule Culture as Seen in the Architecture of a Site on Victoria Island, Amundsen Gulf Area. Arctic 55(2), 167–189.

Murdoch, J. (1892). Ethnological Results of the Point Barrow Expedition. Ninth Annual Report of the Bureau of Ethnology to the Secretary of the Smithsonian Institution. Washington: Government Printing Office.

Nelson, E. W. (1899). The Eskimo about Bering Strait. Eighteenth Annual Report of the Bureau of American Ethnology. Washington: Goverment Printing Office.

Newell, R. R. (1984). The Archaeology, Human Biological, and Comparative Contexts of a Catastrophically-Terminated Kataligaaq, House at Utqiagvik, Alaska (BAR-2). Arctic Anthropology 21(1), 5–51.

Newell, R. R. (1990). The Intermound and Extramound Tests. In E. S. Hall and L. Fullerton (Eds.), The Utqiagvik Excavations, Volume 1: The 1981 Excavations at the Utqiagvik Archaeological Site Barrow, Alaska (pp. 174–209). Barrow: The North Slope Borough Commission on Inupiat History, Language and Culture.

Norman, L., and T. M. Friesen. (2010). Thule Fishing Revisited: The Economic Importance of Fish at the Pembroke and Bell Sites, Victoria Island, Nunavut. Geografisk Tiddsskrift-Danish Journal of Geography 110(2), 261–278.

Oswalt, W. (1955). Alaskan Pottery: A Classification and Historical Reconstruction. American Antiquity 21(1), 32–43.

Patton, A. K., and Savelle, J. M. (2006). The symbolic dimensions of whale bone use in Thule winter dwellings. Etudes/Inuit/Studies 30(2), 137–161.

Petitot, E. (1887). Les Grands Esquimaux. Paris: Librairie Plon.

Polglase, C. R. (1990). The 1982 Extramound Investigations Around Mounds 7 and 8. In E. S. Hall and L. Fullerton (Eds.), The Utqiagvik Excavations, Volume 2: Additional Reports of the 1982 Investigations by the Utqiagvik Archaeology Project Barrow, Alaska (pp. 105–166). Barrow: The North Slope Borough Commission on Inupiat History, Language and Culture.

Rainey, F. G. (1947). The Whale Hunters of Tigara. Anthropological Papers of the American Museum of Natural History 41(2), 231–283.

Rinn, F. (2003). TSAP-Win Time Series Analysis and Presentation for Dendrochronology and Related Applications - Version 0.53 for Microsoft Windows 98, 2000, XP. Rinntech, Heidelberg.

Saleeby, B. (1994). Appendix II: Results of faunal analysis. In R. K. Harritt (Ed.), Eskimo Prehistory on the Seward Peninsula, Alaska (pp. 317–382). Resource Report NPS/ARORCR/CRR-93/21. Anchorage, National Park Service, Alaska Region.

Saleeby, B., Moss, M. O., Hays, J. H., Strathe, C., and Laybolt, D. I. (2009). Faunal Analyses. In P. M. Bowers (Ed.), The Archaeology of Deering, Alaska: Final report on the Deering Village Safe Water Archaeological Program (pp. 175–200). Fairbanks: Northern Land Use Research, Inc.

Savelle, J. M. (1987). Collectors and foragers: Subsistence-settlement system change in the central Canadian Arctic, A.D. 1000-1960. Oxford: BAR.

Savelle, J. M. (1997). The role of architectural utility in the formation of zooarchaeological whale bone assemblages. Journal of Archaeological Science 24, 869–885.

Schaaf, J. M. (1988). Bering Land Bridge National Preserve: An Archaeological Survey Volume II: Site Descriptions. Anchorage: National Park Service, U.S. Department of the Interior.

Simpson, J. (1875). Observations on the Western Eskimo and the Country They Inhabit. Reprint of 1855 report. In A Selection of Papers on Arctic Geography and Ethnology, Reprinted and Presented to the Arctic Expedition of 1875, pp. 233–275. London: Royal Geographic Society.

Slaughter, D. C. (1980). The Point Barrow type house: An analysis of archaeological examples from Siraagruk and other sites in Northern Alaska. Anthropological Papers of the University of Alaska 20(1-2), 141–158.

Spencer, R. F. (1959). The North Alaskan Eskimo: A Study in Ecology and Society. Bureau of American Ethnology. Washington, DC: Smithsonian Institution.

Spencer, R. F. (1984). North Alaska Coast Eskimo. In D. Damas (Ed.), Handbook of North American Indians Vol. 5: Arctic (pp. 320–337). Washington, DC: Smithsonian Institution.

Stanford, D. J. (1976). The Walakpa Site, Alaska: Its Place in the Birnirk and Thule Cultures. Smithsonian Contributions to Anthropology. Washington, DC: Smithsonian Institution Press.

Storå, J. (2001). Skeletal development in the Grey seal *Halichoerus grypus*, the Ringed seal *Phoca hispida botnica*, the Harbour seal *Phoca vitulina vitulina* and the Harp seal *Phoca groenlandica*. Epiphyseal Fusion and Life History. In A. Pike-Tay (Ed.), Innovations in Assesing Season of Capture, Age, and Sex of Archaeofaunas (pp. 199–222). ArchaeZoologia. Grenoble: Pensee Sauvage.

Storå, J. (2002). Neolithic seal exploitation on the Aland Islands in the Baltic Sea on the basis of epiphyseal fusion data and metric studies. International Journal of Osteoarchaeology 12(1), 49–64.

VanStone, J. W. (1955). Archaeological Excavations at Kotzebue, Alaska. Anthropological Papers of the University of Alaska, 75–155.

VanStone, J. W. (1970). Akulivikchuk: A nineteenth century Eskimo village on the Nushagak River, Alaska. Fieldiana. Anthropology 60, 1–123.

Whitridge, P. (1999a). The Prehistory of Inuit and Yupik Whale Use. Revista de Arqueologia Americana 16, 99–154. Unpublished PhD dissertation.

Whitridge, P. (1999b). The Construction of Social Difference in a Prehistoric Inuit Whaling Community. Arizona State University.

Wiliams, C. M., Reuther, J. D., Newton, J. I. M. and Laybolt, D. L. (2009). Feature Descriptions. In P. M. Bowers (Ed.), The Archaeology of Deering, Alaska: Final report on the Deering Village Safe Water Archaeological Program (pp. 95–148). Fairbanks: Northern Land Use Research, Inc.

Young, C. E. (2002). Late Western Thule House construction in Northwest Alaska: The “Kobuk-Type” house. In D. E. Dumond and R. L. Bland (Eds.), Archaeology in the Bering Strait Region: Research on Two Continents (pp. 207-226). University of Oregon: University of Oregon Anthropological Papers.

Supplemental Material: The online version of this article
(DOI: 10.1515/opar-2017-0002) offers supplementary material.