UNIVERSITY OF SOUTHAMPTON

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OPEN PASSAGE: ETHNO-ARCHAEOLOGY OF SKIN BOATS AND INDIGENEOUS MARITIME MOBILITY OF NORTH-AMERICAN ARCTIC

by

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Thesis for the degree of Doctor of Philosophy

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ABSTRACT

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This thesis is an examination of prehistoric maritime mobility in the Arctic regions of North America through the ethno-archaeological analysis of skin boats. Covering over 100,000 km of coastline, the skin boat traditions of the Arctic and Subarctic zones are arguably among the most expansive watercraft technologies in the world, dating back at least 10,000 years. Despite the considerable material record generated by this geographically and chronologically extended use, and the potential this record contains for understanding Arctic maritime mobility, skin boat datasets are rarely considered in scholarly discussions on prehistoric exchanges and population movement. This study aims at closing this gap by focusing on the skin boat record as a key dataset for assessing the scale, nature and significance of maritime mobility in the North-American Arctic. The analysis of particular regional trends and cross-regional patterns is based on review of three case studies. Moving west to east this review starts in the Bering Strait region with a particular focus on the Kukulik site on St. Lawrence Island. Maritime mobility in the Chukchi Sea region is assessed through the archaeological assembly of the Birnirk site near Point Barrow, Alaska. The third case study is focused on the Qariaraqyuk site on Somerset Island, extending the geography of the research to the Central Canadian Arctic. Individual boat parts and the information they provide for reconstructing complete watercraft are analyzed along with the boat fragment frequency and spatial distribution. This provides understanding of the statistical and social makeup of seafaring in Arctic North America, of the logistics of maritime mobility, of the larger scale cross-regional and chronological patterns of skin boat design and use, and, ultimately, of the role of seafaring in constructing cultural landscapes of the prehistoric Arctic.

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DECLARATION OF AUTHORSHIP

I, Evguenia V. Anichtchenko, declare that this thesis and the work presented in it are my own and has been generated by me as the result of my own original research.

OPEN PASSAGE: ETHNO-ARCHAEOLOGY OF SKIN BOATS AND INDIGENEOUS MARITIME MOBILITY OF NORTH-AMERICAN ARCTIC

I confirm that:

1. This work was done wholly or mainly while in candidature for a research degree at this University;
2. Where any part of this thesis has previously been submitted for a degree or any other qualification at this University or any other institution, this has been clearly stated;
3. Where I have consulted the published work of others, this is always clearly attributed;
4. Where I have quoted from the work of others, the source is always given. With the exception of such quotations, this thesis is entirely my own work;
5. I have acknowledged all main sources of help;
6. Where the thesis is based on work done by myself jointly with others, I have made clear exactly what was done by others and what I have contributed myself;
7. None of this work has been published before submission

Signed:

Date: 12/07/2016

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Definitions and Abbreviations

AM	Alutiiq Museum and Archaeological Repository, Kodiak, Alaska
AMRC	Anchorage Museum at Rasmuson Centre, Anchorage, Alaska
ASM	Alaska State Museum, Juneau, Alaska
CMH	Canadian Museum of History, Ottawa, Canada
EMS	Ethnographic Museum of Sweden, Stockholm, Sweden
MAE	Museum of Anthropology and Ethnography, St. Petersburg, Russia
NMAI	National Museum of American Indian, Washington, DC
NMNH	National Museum of Natural History, Washington, DC
REM	Russian Ethnographic Museum, St. Petersburg, Russia
UA	University of Alaska, Museum of the North, Fairbanks, Alaska

Chapter 1: Introduction. Arctic maritime mobility and skin boats

1.1 Arctic mobility

This thesis is an examination of prehistoric maritime mobility in the Arctic regions of North America through the ethno-archaeological analysis of skin boats. Beginning with the initial crossing of Beringia between 20,000 and 13,000 years B.P., peoples' ability to negotiate sea- and landscapes was a major factor in the human history of Arctic zones of the American continent. Current understandings of prehistoric cultural sequences demonstrate that at different times this region was a stepping stone, as well as a stage, for geographically expansive trans-continental movements, such as the spread of the Arctic Small Tool tradition (ASTt), an extension of the Dorset culture and the Thule migration. On a smaller geographical scale, the extent and specific strategies of movement determined subsistence patterns and geo-politics, contributing to the development of cultural identity and regional territorialities. Whether a transmission of cultural or technological tradition, a migration, or an emergence of a socially-formative subsistence practice, such as ice-lead whaling, the events that wove the cultural history of the North American Arctic were directly related to people's movement through the environment.

Mobility has been recognized as a key strategy inherent to the social and economical practices of all societies. As such, it has been examined through a number of theoretical approaches and models, from optimal foraging theory to recent GIS analyses (Murrieta-Flores 2010:249), resulting in the emergence of progressively more complex and multi-dimensional interpretations of various aspects of movement. The initial "strongly logistical" economic paradigm (Binford 1990:138) expanded to embrace considerations of social and demographic needs, such as formation of mating networks (Wobst 1974; Ames 2002), and discourse in which both underlying motives and physical practices of movement are reviewed within ideological and cognitive frameworks (Politis 2006) and are linked to the "symbolic construction of geographical space" (Helms 1988:3).

Despite these developments, research on prehistoric mobility in the Arctic continues to be primarily focused on subsistence patterns and distribution of specific archaeological evidence, such as lithic and faunal assemblages, trade goods or raw material, analyzed primarily in the context of optimal procurement and necessitated exchanges (Clark and McFadyen Clark 1993;Cook 1995;Rasic 2016). This approach places emphasis on terminal points of departure (such as a settlement or hunting camp) and destination (source of lithic material, hunting grounds), leaving behind the very process of movement, and reducing a dynamic practice to a limited set of static, “materialistic” moments (Murieta-Flores 2010:249). Furthermore, the perception of resource-oriented movement directed towards the most efficient environment exploitation which emerges from this approach is very different from ethnographic observations of how travel was conceptualized and carried out in more recent cultural practices in the region.

Ethnographic data show that along with an applied knowledge of the environment and immediate subsistence needs, mobility was regulated by a system of cultural understandings, rituals and taboos, many of which were counter-intuitive to the immediate goals of the most efficient economic procurement. For instance, although women were expert sewers solely responsible for making skin covers for Arctic open skin boats, at the time of spring whaling, they were not allowed to walk on ice, as their presence was believed to avert whales from approaching hunters. In a practical sense it meant that if any damage was done to the watercraft while whalers camped on the ice in the proximity of open leads, the men had to call on their own expertise and knowledge to mend it, or, if the damage was more substantial, abandon the hunt and return to the village.

As with any interaction with the environment, travel had an element of contact with the spirit world, which also was in a perpetual state of movement and change. During field work in Wainwright, Alaska, for instance, the author heard many stories about “the little people” – human-like beings who can be both visible and invisible and dwell underground. In the old days, the elder Benjamin Amohagnak Sr. said,

> people in the village would hear approaching sled, dogs tied outside would yelp, and women in the house would put the kettle on to make tea for approaching guests. The sounds would draw closer, and closer, and then pass straight through the house, with no visitors to be seen. These were the little people travelling. This still happens today, only now the sounds are of snow machines and four-wheelers. Little people, they change too (Amohagnak 2007:n.p.n.).

Negotiating the spirit world was an important aspect of indigenous navigation (Birch 2015). Intended hunting and trading expeditions often began with a flight of the shaman, whose visions were important and affected every aspect of the journey, and were, in fact, seen as part of it. These perceptions may leave little or no archaeological trace, but had an immediate effect on why, how, and when people travelled.

To some degree the static, material culture-based approach to mobility is warranted by the nature of the data. Archaeological sites are, after all, static and localized assemblages of material culture. Furthermore, the archaeological data of the high Arctic often lack such tangible vectors of travel as roads, trails and docks. Every winter the sled routes and footpaths were charted anew over fresh snow and ice (Huntington et al. 2010; Druckenmiller et al. 2010). Every summer riverbanks and ocean shores offered easy and ubiquitous entrance for light skin-covered watercraft. And every transition between warm and cold seasons wiped this record clean. How can we understand the complexity of Arctic mobility through such an incomplete record?

The challenge of accessing multifaceted meanings through an incomplete material record is one of the fundamental issues of the archaeological discipline. As Michael Dietler and Ingrid Herbich pointed out: “archaeological inference about past societies (...) hinges critically upon an understanding of the relationship between material and non-material aspects of culture and society: left with only remnants of the former, we seek to use them to perceive and comprehend the latter” (Dietler and Herbich 1998:233). Our ability to understand the specific non-material aspect of culture depends, therefore, on two factors: the choice of the material culture proxy and the theoretical and methodological framework of the analysis. Until now, the study of prehistoric mobility in the Arctic has often bypassed one of the crucial aspects of material evidence – means of transportation. Yet, it can be argued that as objects designed to assist with movement, these artefacts are the best proxy for understanding mobility, embedding a number of meanings: from ritualistic perceptions to environmental knowledge and physical connection with visited places.

Prior to contact with industrial societies, Arctic mobility was afforded by three modes of travel: travel by foot, sledding/sledging and boating (Rousselot et al 1988; Morey and Sørensen 2002, Brown et al. 2013). Utilizing dog teams for pulling sleds was a later addition introduced in the beginning of second millennium AD (Hoffecker 2005:139; McGhee 1990:89-99). All three modes of Arctic mobility have received surprisingly scarce scholarly attention, although pertinent data are abundant. Archaeological examples of ice crampons, snowshoes and skies are found in many circumpolar sites. The oldest remains of Arctic sleds come from the 8,500 year old Zhokhov Island site in the East Siberian Sea (Pitulko and Kasparov 1996; Pitulko 2013:69). Sleds were used by Ipiutak (Larsen 2001:38-43), Dorset (Wells and Renouf 2014) and Thule peoples (Geist and Rainey 1936:109). The archaeological dataset pertaining to boat usage is equally rich and is discussed in detail in chapter 3. Despite its fragmented and scattered state, these data hold yet unrealized potential for understanding both physical and cognitive dimensions of Arctic mobility.

This thesis focuses on one part of this record – Arctic watercraft. To a large degree, the separation of overland transportation and watercraft in the Arctic cultural context is an arbitrary division. As discussed in chapter 4 of this thesis, cultural biographies of sleds and boats are closely connected in their manufacture, use, storage, and deposition. Archaeological remains of boats are frequently mislabelled as sleds and vice versa (see Chapter 4.5). The combined analysis of terrestrial and waterborne transportation would produce a richer and more comprehensive picture, but given the pre-natal state of research on these subjects, this would also make the task prohibitively overwhelming. Additionally, boats do play a unique role in the trinity of Arctic transport: unlike sleds and foot travel, they connect people with bodies of water. Boats provided access to the ocean, rivers and lakes, with all their resources and networking potential. By focusing on watercraft, the author hopes to inspire further research on other means of Arctic transportation and provide theoretical and methodological models for future research.

1.2. Skin boats: definition and terminology

For thousands of years, maritime transportation in the Arctic relied on a unique type of watercraft – skin boats. Comprised of frames made of driftwood and covered with marine mammal hides, these boats were a creative response to the demands, prospects and restrictions of high latitude coastal environments with characteristically rich marine biota and treeless landscapes. Two basic craft types can be indentified within the Arctic skin boat family: decked kayaks typically designed for a single individual (Alaska Native Heritage Center 2000), and large deckless - or “open” – boats, often referred to as umiaks (Ainana et al. 2003, Fig.1.1). Umiaks were typically propelled by a multi-person crew and could carry significant cargo and passenger loads, but small one-person umiaks are also known from ethnographic records (Nelson 1969:308-309, see Chapter 7). Likewise, both ethnographic and archaeological records contain examples of kayaks designed for several paddlers. The indigenous mariners of the Aleutian Islands, for instance, traditionally utilized the two-person kayak for training purposes along with the more typical one-man variety. Following the Russian colonization of Alaska, three-person kayaks developed in the Aleutians for transportation of colonial officials (Laughlin 1980:34, see chapter 3).

Fig.1.1. “Cape Prince of Wales Eskimos leaving for their home", Anchorage Museum, AMRC-b65-18-532. Note multi-person kayak and umiak under sail.

Similarly varied are the names used for these boats by different Arctic Native nations. Terms “umiak” and “kayak” are derived from Inuit names for these boat types. Both display a variety of spellings, such as *umiaq*, *oomiaq*, *kayaq*, *qayaq* etc. The etymology of the word “kayak” is unclear. The term “umiak” is likely derived from word *amiq* – “skin cover.” In the Unangan language of the Aleutian Islands, open skin boats are called *nixalax̂*, while decked craft are referred to as *ikiax.* In Siberian Yupik, Central Yup’ik and Sugpiaq languages, the term used for the open skin boats is *angyaq,* and word “kayak” is spelled *qayaq*.

Additional terminology developed as a result of the European colonization of the indigenous Arctic. Thus, Russian terms *baidara* (open skin boat) and *baidarka* (decked skin boat) are frequently applied to Native boats of the Russian Far East and Alaska, and Danish word *konebåd* – women's boat – to Greenlandic umiaks. Since the main focus of this thesis is on archaeological data, which does not always align with current ethnicities, the terms "umiak" and "kayak" are used as both more general and better academically established. Although these are Inuit words, in this thesis the plural and possessive forms of both are given according to the English grammatical rules instead of applying Inuit declension system, i.e. plural of "umiak" will appear as "umiaks", not *umiat*. The use of authentic terms and grammar is an increasingly popular and commendable trend in the scholarly literature, but since this work is not primarily concerned with language, and in fact works with boat traditions of people of several language groups, this approach seems justified. On the other hand, the names of ethnic groups are given in conjunction with the most recent standards based on names chosen by these groups. The ethno-adjective "Eskimo", for instance, appears only in reference to historiography of the subject, and is replaced with the more culturally accurate term "Inuit". On a smaller geographic scale, the indigenous nations are identified by their names, such as Iñupiaq, Siberian Yupik, Central Yup'ik etc. (Fig.1.2.).

Constructional discussions and descriptions of individual members of skin boat frames presented in this thesis utilize English terms without engaging traditional indigenous terminology. Although rich with meanings, indigenous boat vocabulary varies from nation to nation and region to region, which complicates cross-regional comparison. Details on kayak and umiak structural terminology are presented in Chapter 5 (See Fig. 5.6. and 5.7.)

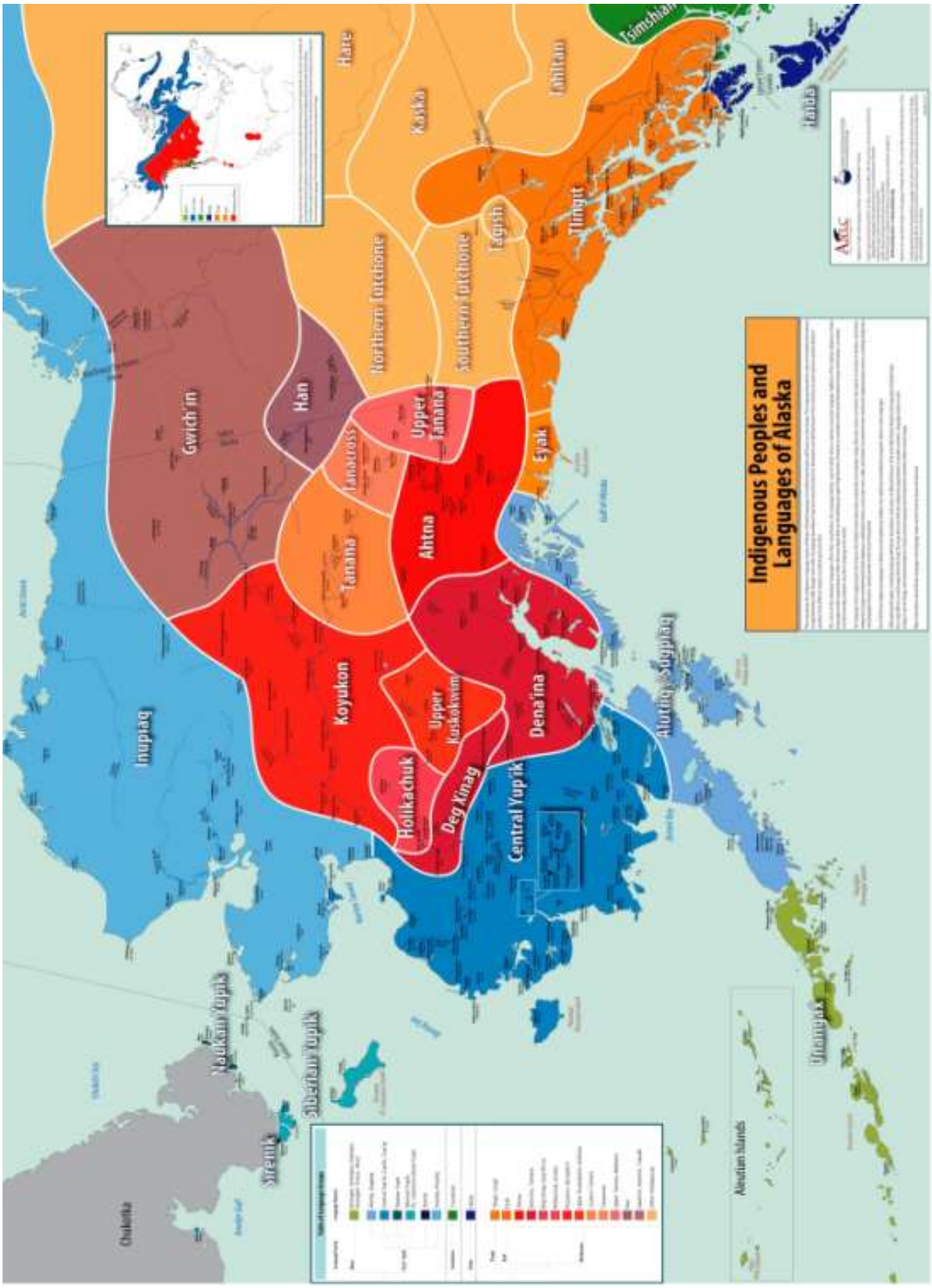

Fig.1.2. Map of Native peoples and languages of Alaska, Alaska Native Languages Centre, University of Alaska, Fairbanks

1.3. Boats as proxy for the study of Arctic mobility and central research questions

Covering over 100,000 km of coastline, the skin boat traditions of the Arctic and Subarctic zones are arguably among the most expansive watercraft technologies in the world, going back at least 10,000 years, and in some circumpolar regions, probably even older. In broad geographical terms it extends from 50° to 82° North latitude and from 70° East to 20° West longitude. Within this area skin boats were used by Nganasans, Nenets, Evenk, Even, Yukaghir, Chukchi, Koriak, Itelmen, Nivkh, Siberian Yupik, Central Yup'ik, Sugpiat, Unangan, Athabascan, Tlingit, Canadian and Greenlandic Inuit peoples. With roots in the deep prehistory of these nations, skin boats are still a living tradition in some places. Umiaks are watercraft of choice for indigenous whaling in the Alaskan communities of Barrow, Point Hope and Gambell, and are built for recreation and sport in several villages of Chukotka. Kayaks are actively built and used in Greenland.

The longevity and geographical spread of the skin boat tradition is both impressive and misleading. Its seeming vitality and ties with ethnic identity project a sense of unyielding time-resistant integrity. The notion of an "ideal" boat design that evolved a long time ago and was carefully copied by generations of boat users is equally widespread among Native communities and non-native researchers. The geographical spread is also often perceived as a continuum of evolutionary-related watercraft with individual environmentally-determined design elements. Combined, these two notions resulted in a scenario according to which circumpolar boat technology spread along with human expansion, "anchored" in specific locations, adapted to local environmental conditions, and then "frozen" in its development until contact with non-indigenous societies dealt a dramatic blow to the Native cultures of the North.

Although a legitimate hypothetical model, this vision lacks thorough evidence-based analysis, and largely depends on ethnographic data, whose chronological depth does not exceed two hundred years. Archaeological finds are often overlooked either because the researchers are unaware of their existence or, more often, because of challenging nature of these data. Finds of complete or nearly complete boats are very rare (See Chapter 3 for further discussion). Most boat-related artefacts are fragments, undated and often with inconclusive stratigraphic provenance. Because of this, the research potential of these data may appear limited. Yet, no conclusion regarding the large-scale history of Arctic skin boats and, consequently, maritime mobility they represent can be reached without analyzing these data. As the first study specifically focused on archaeology of circumpolar skin boats, this research began with several hypothetical assumptions regarding the potential of boat data for understanding of Arctic mobility and possible methodological approaches:

1) Analysis of individual boat-related artefacts can provide insight into specific details of boat engineering, boat builders' decision-making process, and particular aspects of a boat's biography, such as repair and recycling. The craftsmanship and artistic details offer further information about social and ritualistic value and meanings of boats, and consequently of maritime travel;
2) Reconstruction of watercraft based on artefacts can provide information about the hydro-dynamic characteristics of the boats, their cargo capacity, performance and propulsion, all of which are crucial for understanding of mobility as these express the ability and intent of a particular society or group to travel by water;
3) Frequency analysis of boat remains in specific archaeological sites may allow for an understanding of the number of boats per capita in a given site. This may elucidate the frequency and intensity of boat use, and, again, the extent of a population's ability to move through the aquatic environment.
4) Spatial analysis of boat artefacts positioning in a site can reveal processes of umiak and kayak use as well as functional, cultural and ritualistic meanings of boats in society. In other words, the deposition of boat-related artefacts is not coincidental and reflects both the "materialistic" aspects of a boat's biography, such as manufacturing, use, maintenance and final deposition/recycling, and the perceptual dimension, such as a boat's agency, related rituals and social meanings. Do boat remains exhibit a certain pattern of depositions? Are they associated with specific structures, areas or particular artefact assemblages and if so, what can be inferred from these patterns? In terms of mobility, the analysis of spatial and artefactual contexts of boat remains may shed light on the type of travel undertaken in the boats (hunting trips, long distance voyages, trading expeditions, kinship, exploration etc.) as well as the economic, social and ritualistic significance of these voyages.
5) Cross-regional and chronological analysis of boat data from different sites can elucidate persistence and change of practices and meanings pertaining to

circumpolar watercraft and their use through space and time. Are there differences in boat-related data from different chronological strata of the same site? Do geographically-separated sites occupied at the same period exhibit similarities in water technology? Understanding these aspects allows for reconstruction of the chronology of prehistoric travel and socio-technological networks of the Arctic.

As a dataset, therefore, archaeological remains of Arctic boats contain the potential to understand maritime mobility on both local and cross-regional scales. The goal of this thesis is to explore this potential through a comparative analysis of several archaeological sites. This analysis aims to produce three interconnected and progressively complex “reconstructions”: 1) reconstruction of specific prehistoric watercrafts, i.e. particular boats used in particular places at the particular times; 2) reconstruction of social processes and meanings involved in boat manufacturing and use; and 3) reconstruction of the Arctic prehistoric maritime network.

Conceived as a large-scale review of Arctic maritime mobility this research has, however, geographic and temporal limits. In choosing the focus area, attention was given to three key parameters. First, the region had to have geographical and cultural continuity, i.e. provide an opportunity to review connected cultural chronologies in the context of different, but connected, geographical settings. In other words, the ideal geographic area would be the one that served as a stage for several related population movements. Secondly, this region had to have several sites with substantial boat data. And last, but not least, these data had to be accessible to the author residing in Alaska. Put together, these considerations limited the research focus to the Arctic and subarctic zones of the North American continent. Three case studies selected within this region – Kukulik, Birnirk and Qariaraqyuk - are located in a considerable distance from each other, but are connected through the culture history of the region (See Chapters 1.4. and 4.4. for details).

Overall, therefore, this thesis is focused on assessing the scale, nature and significance of maritime mobility in the North-American Arctic. As put by Greg Woolf in his study of mobility in the ancient Mediterranean world, simple recognition that movement and exchange existed in the past does not allow for full understanding of mobility:

> It is not enough to declare ancient populations mobile: we need to consider in what ways people moved and how different kinds of mobility varied within our long historical period, and between antiquity and other ages, earlier and later. That inevitably entails some attempt at quantification, however approximate. And we need to ask who moved? how often? and how far? And finally it also means asking about stability, about stayers as well as movers (Woolf 2016:441).

Building upon this approach, the present study is guided by three key research questions:

a) What was the statistical and social make up of seafaring in Arctic North America? In other words, who were the ancient Arctic seafarers? How many people were engaged in maritime mobility and what was their social status?

b) What kind of mobility did these seafarers practice? This translates into questions about frequency, duration and direction of the movement and encompasses both seasonal and subsistence movements and long-term, long distance migrations.

c) How did the concept and execution of maritime mobility change through space and time? This large scale cross-regional and chronological inquiry is focused on the identification of patterns of continuity and change and as such, on the history of regional maritime networks in the North American Arctic.

The study is equally concerned with the physical aspects of circumpolar boat history (such as boat construction), its cultural ecology (subsistence use, implications of trade and long distance voyaging), and the perceptual dimensions, such as embedded cultural identity and hierarchy and associated rituals and beliefs. Ethnographic records are frequently called upon to provide additional guidance in interpreting archaeological data (See Chapter 4.4.-4.6. for the discussion on ethno-archaeological approach).

1.4. Thesis organization

Following this introduction into the research questions and strategies, the discussion is presented in three main blocks. The next four chapters establish general settings or backgrounds necessary for understanding of particular datasets and research aspects. Chapter 2 introduces the physical and cultural settings of the research area in general terms emphasizing shared natural characteristics and histories. A more detailed discussion on environmental and cultural contexts is provided within each case study. Chapter 3 provides an overview of previous studies on circumpolar skin boats in order to assess the present state of available data and the context in which they were acquired, interpreted and presented. Chapter 4 introduces the theoretical and methodological framework of this thesis, defining specific aspects of Arctic mobility explored in this research, explaining the rationale behind the choice of particular case studies, the pathways of the analysis and the larger theoretical context of the study. Chapter 5 focuses on cultural practices associated with skin boats of the North American Arctic as they are known from the ethnographic record and extant living tradition, building the most recent horizon for comparative chronological analysis of Arctic maritime boat tradition and mobility.

Chapters 6 through 8 take a closer look at specific regions and aspects of maritime mobility by examining archaeological data from particular case studies (Fig.1.3.). Moving west to east this review starts with the Bering Strait region with particular focus on St. Lawrence Island (Chapter 6), which contain some of the earliest boat data analyzed in this thesis (Old Bering Sea and Punuk Cultures). Chapter 7 discusses boat data and maritime mobility of the Chukchi Sea region by analysing the archaeological assembly of the Birnirk site near Point Barrow, Alaska. Chronologically this review is centred on Birnirk and early Thule cultures. Chapter 8 takes this study to the Qariaraqyuk site on Somerset Island in the Central Canadian Arctic Archipelago and extends the chronology of the research to Classic and Late Thule periods.

Chapter 9 brings both quantitative and qualitative data from all case studies together in a comparative analysis of trends and patterns of prehistoric maritime mobility of the North American Arctic. It summarizes the research finds and outlines directions for further research. Above all, it stresses the main theme which on different levels runs through this research: the connectedness of Arctic coastal cultures throughout most of the human history of the region, and the role of maritime mobility in creating the cultural landscape of the Arctic. The ultimate goal of this research is to show the value of archaeological skin boat research and to challenge scholars of the Arctic to stop seeing coastal cultures of the past as sedentary land dwellers with boats and maritime subsistence, and to start understanding them as highly mobile maritime nations of skilled seafarers, whose engagement with the ocean went above and beyond localized prey pursuits.

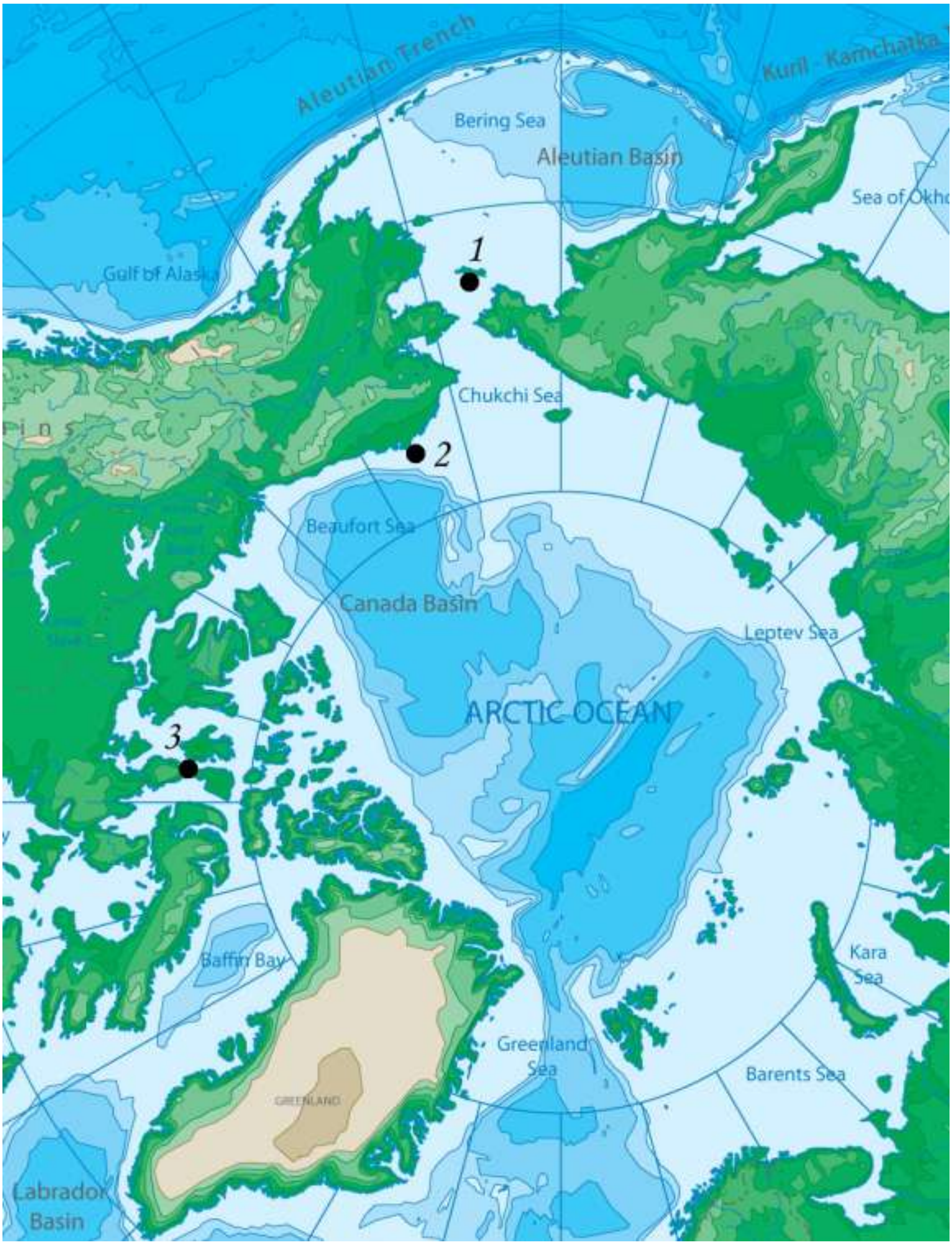

Fig.1.3. Location of the three case studies:
1. – Kukulik (St. Lawrence Island) 2. – Birnirk (Chukchi Sea), 3. – Qariaraqyuk (Central Canadian Arctic). See Chapter 4.4. for the case studies' selection strategy.

Chapter 2: Environmental and cultural settings

Human ability to move through the Arctic was both enhanced and limited by a number of different environmental factors: from oceanographic conditions and seasonal weather and subsistence patterns to the distribution of resources and materials necessary for construction of watercraft and other transportation devices. In testing these abilities people developed different adaptational strategies, which in turn defined the cultural settings of the Arctic. The discussion below provides a general overview of Arctic natural and cultural history with a specific focus on those factors with particular importance for understanding maritime mobility in the region. More detailed information pertaining to each case study is provided in chapters 6, 7 and 8.

2.1. Defining the North-American Arctic

Coined in Ancient Greece over 2000 years ago, the term “Arctic” commonly refers to the region north of latitude 66°30’, which according to Ptolemy corresponded with the constellation he called *Arktikos*, the Great Bear, or – as we know it today – Ursa Major (Sale 2008:15). Initially an astronomical concept, the Arctic Circle defined the zone within which the sun would be visible all day in mid-summer, and absent all day in mid-winter. As such, this designation is not very practical for inquiry into the history of human adaptation, particularly because of the great regional diversity in a number of environmental factors. More useful boundaries are derived from isothermic delineation of regions in the Northern Hemisphere where the mean summer temperature is equal or lower than 10°C, or from following mutually dependent lines of the southern-most extension of permafrost and the northern limit of tree growth (Maxwell 1985:5, Fig.2.1.). By this definition, the Arctic encompasses a much larger territory, extending as far south as 50° N and including the entire Bering Sea and most of Hudson Bay.
The North American Arctic is a geographically expansive and diverse environment. Extending from Bering Strait in the west to Davis Strait in the east, it includes the islands and coasts of northern Alaska and Canada. Virtually all types of land forms and topography are represented here: from coastal plains and cliffs to peninsulas and islands. The Canadian Arctic Archipelago is comprised of 94 major islands, including Somerset Island, where one of this thesis’case studies is located. The largest insular feature of

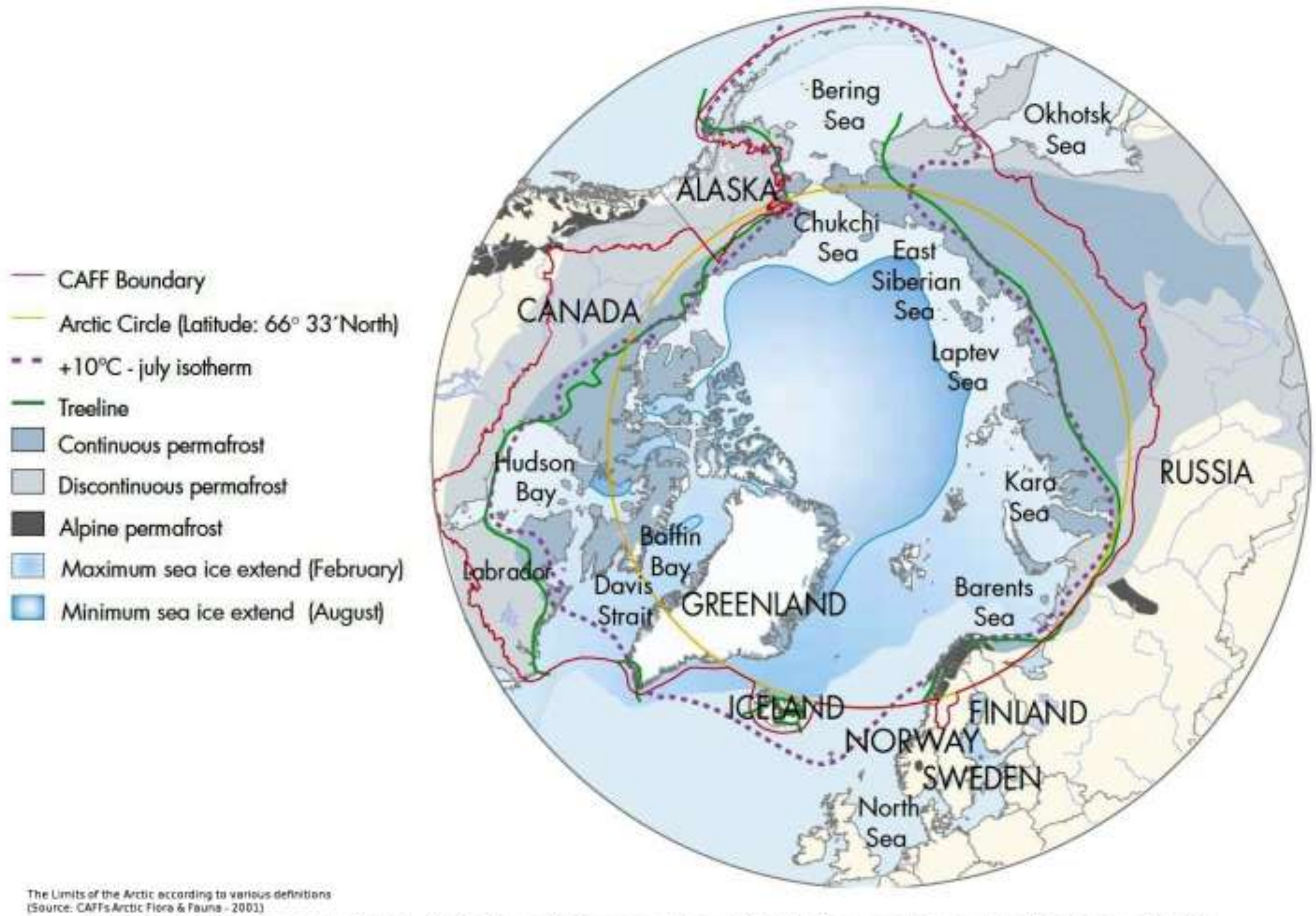

Fig.2.1. Definitions of the Arctic, Arctic Council, Conservation of Arctic Flora and Fauna Working Group (2011), CAFF Map # 46.
The red line corresponds with the definition developed by the Arctic Council for the purpose of cross-disciplinary international research

north-western Alaska is St. Lawrence Island. The Kukulik archaeological site discussed in Chapter 6 is situated on its northern shore.

The marine system of the North American Arctic is defined by three oceans. The continent's northernmost margin verges on the waters of the Arctic Ocean via the Chukchi and Beaufort Seas. The western shores of Alaska are influenced by the Pacific through the Bering Strait and Bering Sea. To the east, Baffin Bay and Davis Strait connect the Canadian Arctic Archipelago with the Atlantic Ocean (Coachman et al. 1975). (Fig.2.2).

Fig.2.2. Topographic map of the Arctic
(Nordpil, https://nordpil.com/portfolio/mapsgraphics/arctic-topography)

2.2. Arctic Ocean

The Arctic Ocean is a unique place, with no analogue elsewhere on the planet (Rogers and Anichtchenko 2014:495-496). Its oceanographic characteristics, such as low temperatures and sea-ice cover, create a difficult environment for human travel and occupation, but also provide a wealth of resources unmatched by the region's terrestrial potential. "The sea is our garden" is a sentiment shared by most North American Arctic peoples (Gearheard et al. 2013: xxxiii). Tending this garden has always required expert knowledge and understanding of marine conditions.

Oceanographers define the Arctic Ocean as the body of water surrounding the North Pole and extending to the northern shores of Europe, Siberia, Alaska, Canada, and Greenland, with a total area of approximately 14 million km^2. The Chukchi, Beaufort, and Greenland Seas are part of the same oceanographic system, but exhibit distinct regional differences. The ecology of the Chukchi Sea, for instance, is strongly influenced by its connection with the North Pacific Ocean. Flowing north via the Bering Strait, nutrient-rich Pacific waters provide a migratory pathway between the Pacific Ocean and Arctic Ocean for numerous species including marine mammals (Aagaard 1987:614-615; Rogers 2012:3). On the Atlantic side, the West Greenland current also facilitates marine migrations by carrying warm waters of Gulf Stream as far north as Baffin Bay, and keeping most of it ice free throughout the winter (Maxwell 1985:13-14)

The main Arctic Ocean surface current, known as the Transpolar Drift, flows clockwise from the Chukchi Sea, parallel to the northern shores of Eurasia towards Ellesmere Island and Greenland. The currents of the Canadian Arctic Archipelago are comparatively minor with a prevailing flow from north to south and from west to east (Ibid, Figure 2.3.). The northern coast of Alaska is dominated by the Alaskan Coastal Current, which originates south of the Bering Strait and flows west to east along the north-western margin on the continent. In the Beaufort Sea its margins collide with opposite currents of the Beaufort Gyre, the "most infamous of Arctic currents," which creates dangerous ice conditions. This massive clockwise circular current caused many problems for the 19th century commercial whaling fleet based at Herschel Island, and can be challenging to navigate even for powerful modern icebreakers (Sale 2008:52).

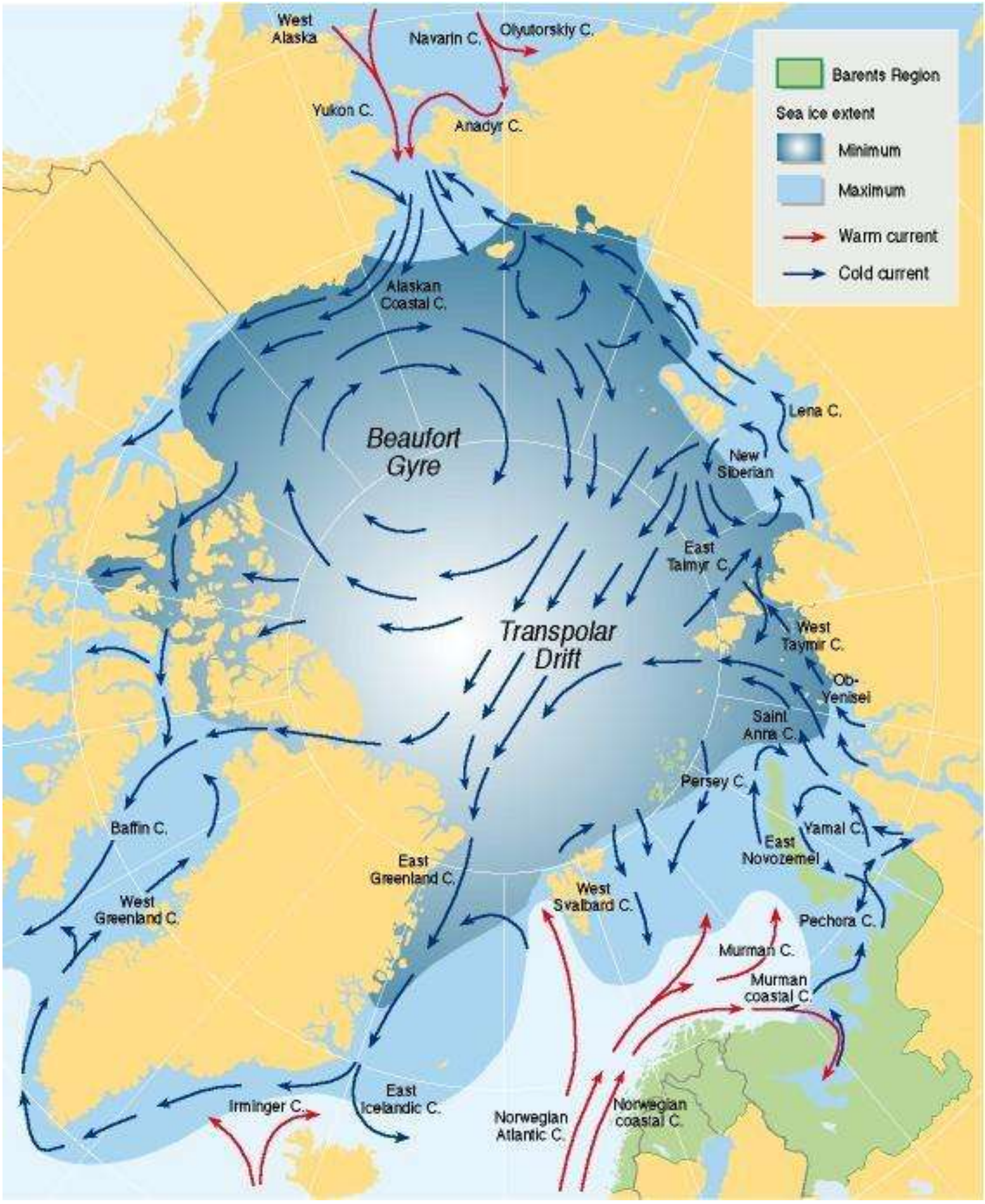

Figure 2.3. Arctic currents (Arctic Monitoring and Assessment Programme: http://www.amap.no)

Ocean currents have always played a key role in the human history of the Arctic. In addition to their effect on navigation in this region, rarely considered by archaeologists, there are three major reasons why currents were of major concern for both prehistoric and modern Arctic hunters:

> First, currents directly affect the availability of seal, walrus, and whale because their food content varies with source and temperature. Warmer waters entering the Arctic carry higher quantities of the phyto- and

> zooplankton, which are at the base of the food chain supporting the sea mammals. But the interface between warmer and colder waters also provides an ecotone, an overlapping of two ecological zones, where food resources are usually richer that within a single current. The north Alaskan Coast, where warm coastal waters mix with the polar waters of the Beaufort Sea, is such an ecotonal area. So also are the shores of Davis Strait and Baffin Bay between the Canadian Arctic Islands and Greenland. Second, currents and winds have a direct effect on the movement of floating ice. One of the greatest hazards of sea ice hunting is the danger of being far from land on a drifting ice field that the currents have broken from shore. A third factor is that water currents have a very direct bearing on the availability of driftwood. Supplies of driftwood are obviously less of a problem where currents flow to the shores from southerly forested regions, such as the coasts of Alaska, the eastern coast of Hudson Bay, and the northern shore of Quebec. Elsewhere, particularly in the centre of the Canadian Arctic Islands where most of the flow is out of the Arctic Ocean, driftwood is extremely rare (Maxwell 1985:15).

Driftwood availability was also directly linked with the location of rivers flowing into the Arctic Ocean from southern regions below the limit of tree growth (Eggertsson 1994:128-236; Alix 2009:181). Several rivers were particularly important both as transportation corridors and sources of driftwood: the Colville and the Mackenzie flowing into the Arctic Ocean; the Kobuk and Noatak discharging into the Chukchi Sea via Kotzebue Sound; and the Yukon, carrying its waters into the Bering Sea. Driftwood of Siberian origin was sometimes delivered to islands in the Bering Strait region by the Anadyr Current.

The Arctic Ocean is almost entirely ice-covered during the winter. The minimum ice extent (ca. 8 million km^2) is typically attained in the late summer (Barry and Maslanik 1989:35-44). Generally, ice begins to form in late September, and reaches an annual maximum in February or March; melting begins in May or June and pack ice retreats during July and August. Most of the Arctic continental shelf is therefore under ice cover for 7 to 10 months each year (Belchansky et al. 2004b:67-80).

The sea ice is a dynamic environment. It can reach a thickness of 3.5 m. in winter, but with the exception of several shallow bays, and some regions of the Canadian Arctic Archipelago, most of the North American Arctic has considerable ice movement throughout the winter. Under the influence of winds, temporary open water passages through ice (called “leads”), appear periodically and often close to the shore. Large chunks of ice can become separated from the ice pack and drift off. The sea ice near Point

Barrow is especially treacherous due to strong currents and deep water (Nelson 1969:4). Equally notorious for its sudden and dramatic ice movement are Bering Strait and St. Lawrence Island. On the other hand, the same ice conditions benefit hunting, particularly during the spring bowhead whale migration described below.

Another type of ice opening frequently occurring in the Arctic and subarctic waters is termed *polynya*. Defined as a “stable areas exceeding 5 x 5 km in size composed of open water and primary ice types” (Weeks 2010:281), *polynyas* typically reoccur in the same location and, unlike leads, remain open for extended periods of time. The main ingredient of *polynya* formation is a strong and persistent wind blowing in an offshore direction. Open ocean *polynyas* are known to occur, but coastal ones are more frequent and have stronger impacts on the human history of the Arctic. Since *polynya*s mean good winter hunting, many indigenous communities were deliberately positioned in close proximity (Ibid 286-287, Fig. 2.4.). By the extension, both leads and *polynyas* facilitated subsistence-oriented boat traffic even at the times when the sea was covered with ice.

In short, despite prolonged periods of coverage, sea ice does not automatically provide reliable and safe “winter ice ways” as is sometimes assumed. Knowledge and understanding of sea ice is one of the most crucial skills of Arctic coastal adaptation. The depth of this knowledge is evident from extensive vocabulary pertaining to different kinds of ice. The Yupik people of Chukotka, Siberia, for instance, distinguish 51 types of ice, each linked with specific recommendations regarding travelling in such conditions (Bogoslovskaya and Krupnik 2013:72-3).

2.3. Fauna and flora

Arctic species have had to develop adaptive strategies for dealing with cold environments and pronounced seasonality. Seasonal changes affect animal migrations and, consequently, traditional subsistence patterns. Some marine mammals, such as polar bear, and ringed and bearded seals move closer to the shore following the ice. Others, such as spotted seals, walrus and whales migrate south to retain open water access. Of land animals occupying this region only wolves and Arctic foxes roam the landscape year round. Other species either migrate into the region seasonally like caribou, or hibernate like ground squirrels. In spring and summer an abundance of birds make Arctic lakes and tundra their home (Nelson 1969:150-226).

Fig. 2.4. Map of circumpolar polynyas and shore fast ice (Arctic Council: http://www.arctic-council.org/index.php/en/our-work2/8-news-and-events/247-arctic-oases-the-role-of-polynyas)

Of three main Arctic mammals – seals, walrus, and whales, seals have the widest geographic range and are available in most of the Arctic throughout most of the year. The true backbone of Arctic subsistence, seal hunting ensured that people's basic needs were met. Seal flesh was eaten both cooked and raw; their skins were made into clothing, boat and tent covers; bones were fashioned into a variety of tools, and the blubber was used as fuel for cooking and heating.

Walrus and whales are more limited both seasonally and geographically. Walrus populations of the North American Arctic are restricted to its western (Chukchi and Bering Seas) and eastern (Davis Strait and the eastern Canadian Arctic Archipelago) margins and are lacking along the entire stretch of coast between Point Franklin (Alaska) and Barrow Strait (Canada) (Sheehan 1997:71-72, Fig.2.5.). Like seals, walrus provide a wealth of resources, and were particularly valued for the tusk ivory, prized for its durability and asthetic appeal. A favoured material for harpoon sockets, decorative and ritualistic objects, it was also used for manufacturing fastening pins for boat construction. In the Bering Sea region walrus skins were sewn into umiak covers and cut into long strips for lashing and rigging (Braund 1988:48).

Of whale species of the Arctic, bowhead whales (*Balaena mysticetus*), were particularly important for Arctic indigenous hunters. The adult of this marine mammal species reaches 18-20 m in length and can weigh over 50,000 kg, making them the largest animal ever hunted by any traditional prehistoric or historic hunter-gatherers (Nerini et al. 1984: 443-68; Reeves and Leatherwood 1985:305-44, Savelle and McCartney 1999:437, McCartney 1995). The successful harvest of a single animal provided enough meat and blubber to sustain a group of approximately 60 individuals for six months (Whitridge 1992). Whale bones were used in house construction and its baleen – long carotene plates in the animal’s mouth used to filter krill and other microorganisms – for lashing and toboggans manufacturing. Indigenous whaling had many functional and ritualistic ties with boat practices, particularly in case of open skin boats which served as the main vehicle of the hunt.

The ice-choked waters of the Canadian Archipelago divide bowhead whales into two distinct populations– Pacific and Atlantic. In terms of Arctic geography the range of the Pacific population can be defined as west of the Victoria Island, while the eastern-most extension of the Atlantic bowheads is marked by Somerset Island (Fig.2.6.). According to Arthur Dyke’s study of postglacial of bowhead whale remains, the Central Arctic ice barrier separated the Pacific and Atlantic populations since at least the early Holocene (Dyke et al. 1996: 235-255). This has important consequences for interpretation of the region’s past, as timing and routes of bowheads’ migrations have been among the most significant subsistence factors of the indigenous Arctic for over a thousand years (Morrison 1999: 139-140)

Figure 2.5. Map of walrus population distribution (http://www.carbonbrief.org/behind-the-pictures-what-does-climate-change-mean-for-the-walrus).

The Pacific bowhead whales spend winters in ice-free waters of the south Bering Sea and start moving north when spring breakup creates corridors of open water (leads) between shore-fast ice and pack ice. The first spring migrants reach St. Lawrence Island around the first week of April, and near Point Barrow towards the end of the month (Braham et al. 1980: 36-46; Allen and Angliss 2014:227). Comparatively narrow leads restrict the animals to a specific route, providing ideal hunting opportunity for Alaskan coastal communities. Spring whale hunting is practiced by nine Alaskan indigenous communities. By mid-May the first Pacific bowheads reach the Beaufort Sea (Ibid), where the majority stays throughout the summer, starting on their return journey in October (Shapiro and Burns 1975:379-386).

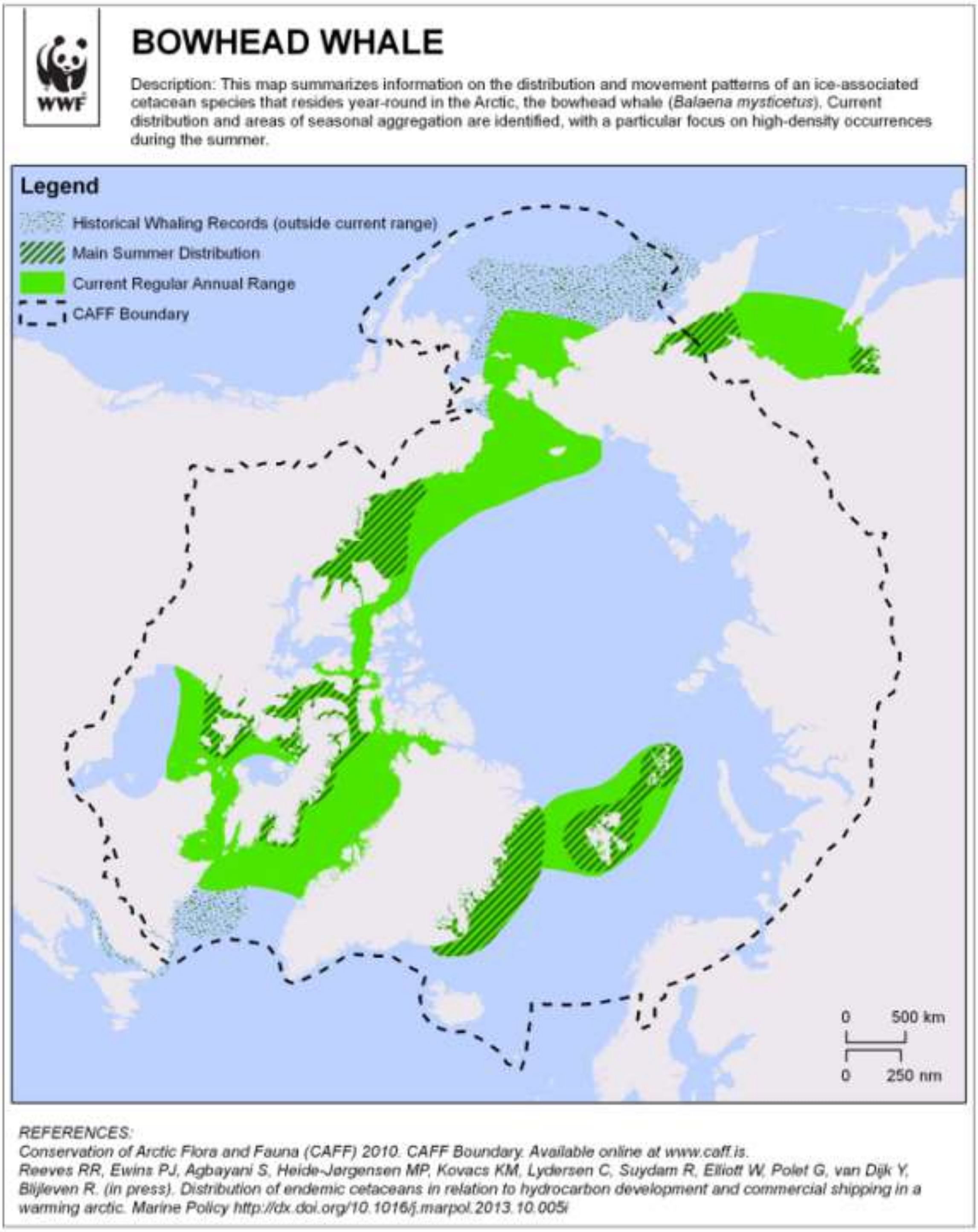

Figure 2.6. Map of bowhead whale distribution, World Wildlife Fund, 2010, http://www.wwf.ca/conservation/arctic/wildlife/bowhead_whale/

In the Eastern Arctic, bowhead whales winter in Hudson Strait and along the ice margin of Davis Strait (Dueck et al. 2006: 2-16; Allen 2006: 89-113). In the spring they start moving into their summer range, which includes Foxe Basin, Prince Regent Inlet and the Gulf of Boothia. Bowhead whales that move to northern Foxe Basin in the spring continue their migration and spend summers in the Gulf of Boothia and Prince Regent Inlet. Some of them move west of Somerset Island, arriving at Barrow Strait and adjacent fiords in summer (Ibid). Subsistence hunting is practiced by five Nunavut communities, with most whales harvested in July and August (Kuehl 2009:2). The strategies of indigenous open water whale hunting are markedly different from Alaskan-style lead whaling and are discussed in Chapter 8.

The divide between two whale and walrus populations of North American Arctic is an important consideration for this thesis and for the human history of the Arctic in general. Both walrus and whales were hunted in open water, and their presence in the people's diet and material culture indicate use of watercraft, as well as the connection between these animals' migratory movement and the movement of the people. Viewed through this lens, the whale- and walrus-free zones of North-American High Arctic between Amundsen Gulf and Western Parry Channel in the west and Barrow Strait and Prince of Whales Island in the east, appear to be a natural limit of subsistence-motivated open water exploits. This divide is also visible in all three ethnographic, historic and archaeological records of human habitation. This area was consistently more sparsely populated and often marked the break between eastern and western variants of the same cultural trends, indicating that although not an impassable barrier, it presented some challenges in terms of overall connectivity of the North-American Arctic.

The terrestrial resources of North American Arctic are considerably more limited than maritime biota. With permafrost underlying the topsoil at depths of 50-80 cm, only shallow-rooted plants can grow in Arctic tundra. Despite this Arctic flora is surprisingly diverse, with around a thousand species of vascular plants, including many lichens and mosses. Low bushes and plants thrive in this environment, providing food and shelter for land animals and birds (Jensen 2009:93-95). The treeline is generally south of the Brooks Range in Alaska, and only approaches the Canadian Arctic coast near the mouth of the Mackenzie River.

2.4. Climate history and paleogeography: last glacial maximum to present

The climate of the north polar regions is characterized by strong seasonality: long, cold and dark winters and short summers with long daylight hours (Weller 2000:143). The climate of the ocean and coastal zones is shaped by the prolonged presence of the Arctic pack ice, and by the physical processes of freezing and thawing of river, lake, and sea ice. Ice cover has a major influence on physical and biological processes within the ocean and atmosphere, as well as implications for human use and occupation (Rogers and Anichtchenko 2014:495-498). While milder than the Arctic, the Subarctic climate (also subpolar or boreal climate) is also characterized by long cold winters and short cool or mild summers. Interior subarctic climates, separated from moderating marine influences, can be quite severe.

Climate in the North American Arctic has varied greatly over the Late Quaternary. During cold periods (glacial stages) extremely cold climates meant that most available water was incorporated into polar and continental ice sheets, resulting in much lower relative sea-levels. The land area exposed during sea-level low stands is often referred to as Beringia (Hopkins et al. 1982). During warmer periods (interglacial stages), the ocean flooded much or all of the previously exposed plain. The peak of the last glacial stage (LGM or Last Glacial Maximum) occurred around 20-18,000 years ago. Generally warming climates since LGM were interrupted by several colder spikes, notably the Younger Dryas at around 12,000 years ago, the Neoglacial period at around 3,000 years ago, and the "Little Ice Age" from approximately 1300 to 1850 A.D. (Bradley 1999:263-277; Serreze and Barry 2005:267).

Sea-level history, tied to general climate developments, is important for understanding the timing and potential for human migration to the New World, and later history of coastal communities, including more recent erosion that removed a significant amount of the Arctic archaeological record. At the peak of LGM, sea levels on the Arctic coasts of North America were about 150 m below present. The majority of exposed land was in the Bering Strait region, as the Beaufort coastal shelf is somewhat deeper and narrower. As the glaciers and ice sheets melted during the late Pleistocene, sea levels rose fairly rapidly. The sill at the Bering Strait was breached around 11,500 years ago, and modern or near-modern levels were reached by around 3-4,000 years ago (Polyak et al. 2008:162-174; Hill and Driscoll 2008: 129-151).

Analysis of sea level fluctuation, pollen profiles, isotopic variations in deep ice cores, and the evidence of glacial advances and retreats combined with written sources, such as Norse observations of ice conditions in Greenland allow for a more detailed understanding of paleoclimatic conditions in North American Arctic during the last two millennia (Koch 1945:18-24, Barry et al. 1977:193-210, Maxwell 1985:31). A tentative climatic reconstruction identified six climatic episodes (Bryson and Wendland 1967: 271-298). The Sub-Atlantic (550 B.C. – A.D. 400) was on average colder than present conditions with the cold peak around 550 BC and a short warming trend between 100 B.C. - 100 A.D. followed by four centuries of gradually cooling climate (Maxwell 1985:34). The Scandic episode (A.D. 400-900) brought warmer temperatures and a climatic pattern similar to the twentieth century A.D. The most significant temperature rise took place during the Neo-Atlantic period (A.D. 900-1200), when open water appeared in the Canadian Arctic Archipelago and the tree-line advanced north into the tundra, changing the pattern of animal migration and human subsistence (Stanford 1976:8). The following Pacific episode between A.D. 1200 and 1500 was a period of gradual cooling, culminating with the onset of the cold Neo-Boreal period, also known as the Little Ice Age. The tree-line once again retreated southwards and glaciers formed as far south as New Mexico. The most recent climatic episode began around 1850 and exhibits a distinctly accelerating warming pattern, which in recent years evolved into a particularly alarming reduction of polar ice caps, and became identified with global warming. The year 2016 marks the lowest recorded polar ice coverage (NASA 2016: n.p.).

Climatic changes had an immediate effect on both biological and human histories of the North American Arctic. Most prehistoric population movements are linked either directly or through related subsistence changes. Spanning over 15,000 years, the human history of the North American Arctic is a complex and not completely understood subject. The brief outline provided below aims at providing a basic background for more focused discussion in following chapters.

2.5. Cultural chronology overview

Set in motion by the arrival of first pioneers across – or along the coast of - the Bering Land Bridge, the human colonization of the North American Arctic had a distinct eastward direction moving from Bering Strait along the Alaskan North Slope into the Canadian Arctic, and eventually Greenland (Hoffecker 2005:128-132). The earliest inhabitants of the region belonged to the Northern Paleoindian tradition (ca. 11,700 – 8,500 years ago), but evidence of their presence is sparse (Reanier 1995:31-50). More intense occupations began around 5,000 years ago by Paleo-Eskimo culture known as the Arctic Small Tool tradition (ASTt), characterized primarily by lithic assemblages of small, finely flaked sideblades and endblades, burins struck on bifaces, and flake knives.

The Arctic Small Tool tradition had an impressive geographic range and is consequently represented by a number of regional variants. Originating in the Eastern Siberia, it expanded both into Alaska, where it is known as Denbeigh Flint Complex, and eastward into Canada and Greenland, where it is recognized as Pre-Dorset, Saqqaq, Independence I and Independence II cultures (Grønnow 1994:197-238; McGhee 1996:71; Grønnow and Sørensen 2006:59-74). A Saqqaq site in Western Greenland yielded the oldest (to date) circumpolar kayak remains (see Chapter 3 for details). In general, archaeologists consider ASTt cultures to be the first Arctic maritime economies of the North American continent (Hoffecker 2005:128; Tremayne 2015:1).

A number of cultural changes occurred in both the eastern and western North American Arctic in the first millennium BC (Fig.2.7.). In the east, the Dorset culture makes its appearance between 800 and 500 BC. With roots in the Pre-Dorset tradition, it also differed from it in terms of dwelling architecture, tool manufacturing, as well as artistic styles and ritualistic behaviour (Maxwell 1985:127-167). The Dorset archaeological record contains evidence of kayaks, and lacks umiaks as well as – surprisingly - bow and arrow technology, which was used by Pre-Dorset predecessors. Dorset people occupied eastern American Arctic until circa 1200 A.D. when it vanished, possibly due to the eastern extension of Thule culture discussed below.

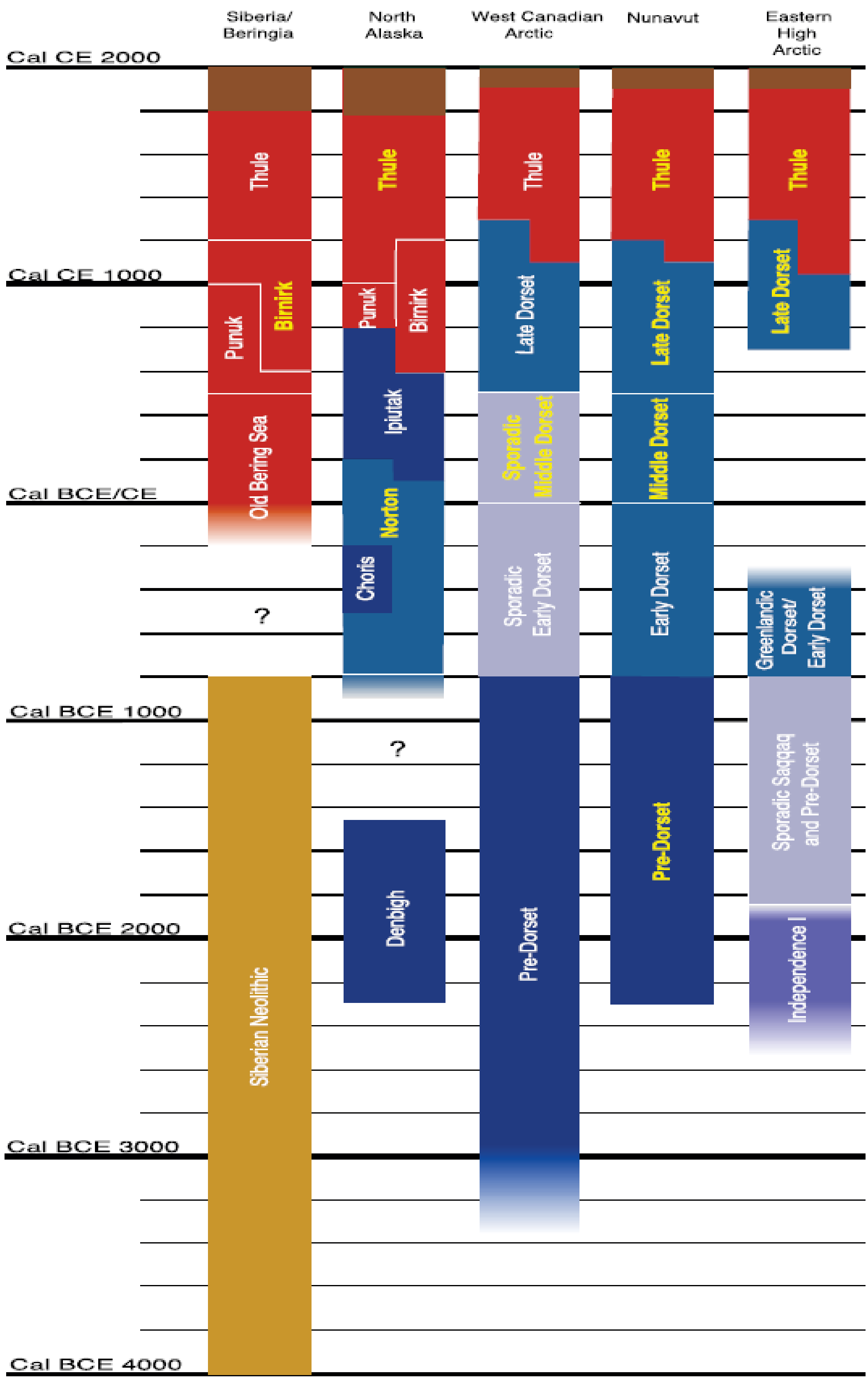

Fig.2.7. Chronology of prehistoric cultures in Arctic Siberia and North America (Raghavan et al.2014)

In Alaska, the beginning of the first millennium BC saw the development of the Choris phase of the Denbigh Flint Complex. Stylistically similar to earlier Denbigh styles, Choris tool kit, however, contained larger projectile points and knives. Choris sites are known from both coastal and interior locations. The faunal remains attest to the diversified subsistence: caribou and fish were taken in land, while fish, birds, seals, belugas, walrus, and baleen whales were hunted on the coast.

Around 500-400 BC Choris gives way to a related, but more distinctly maritime-oriented Norton culture. Notably larger than Choris, Norton settlements were located at the mouths of salmon-bearing streams mainly along the west coast of Alaska south of Berining Strait. Norton material culture was marked with characteristic boldly incised decorative motives, use of slate, presence of net sinkers, check-stamped pottery, and dedicated mortuary precincts (Giddings 1964; Dumond 1987; Mason 2015:923).

Farther north, two new related cultures made a strong mark on history of the region at the end of the first millennium BC: Ipiutak, rooted in the Alaskan shores of the Chukchi Sea, and the Old Bering Sea (OBS) anchored in the Bering Strait region. Both featured elaborately carved ivory artefacts and the earliest examples of iron use in the North American Arctic. Coastal Ipiutak sites lacked pottery, ground slate, lamps, houses with tunnels, and whale hunting equipment – all present in cultures before and after. Otherwise, artefacts are similar to those of the Denbigh Complex and Norton culture. In terms of watercraft, it is suggested that the Iputak people utilized kayaks, but did not know open skin boats (Larsen and Rainey 1948). The OBS shared some traits with Ipiutak, but likely had a different subsistence focus oriented on walrus and some whale hunting (Dumond 2009:75; Mason 2009; Jensen 2014:24). Geographically, this culture was strongly linked to Chukotka, St. Lawrence and Diomede Islands and had only limited presence in continental Alaska. The similarity of art styles of OBS and Iputak can, therefore, be interpreted as “delineation of allied socities that traded and engaged in warfare with each other of external enemy (Mason 1998; 2015:924). At some point around 600 AD, the OBS was followed by Punuk culture, distinguished from its predecessor on the basis of simpler and deeper engraved decorative motives and an increased number of toggling harpoon heads used for hunting whales (Dumond 2009:75).

At some point after Punuk got established on St. Lawrence Island and in the Bering Strait region, a new culture, named after the Birnirk archaeological site, made its appearance on Arctic coast of Siberia and Alaska (Mason 2000:245). Material traits of this culture include smooth ground slate tools and weapons, multiple-spurred harpoon heads with single barbs and opposing chert side-blade inserts, and use of ceramic for seal oil lamps and cooking pots (Ford 1959:41). Unusual for the earlier cultures of the mainland Alaska, most of these traits were, however, present in the Punuk culture, possibly indicating contacts between St. Lawrence Island and northern coast of mainland Alaska (Collins 1937; Ford 1959). Summarising a plethora of Birnirk traits Morrison characterised it as “the wholesale adaptation of Siberian Old Bering Sea and early Punuk technology by an Alaskan Ipiutak population” (1991:101).

Birnirk people were both maritime and land hunters. In contrast with the OBS culture, they made frequent use of inland resources, such as caribou, while maintaining permanent coastal settlements. Whalebone and baleen found in the Birnirk sites attest that these people exploited whales, but the question as to whether they hunted them or rather made use of beached animals remains debated (Mason and Bowers 2009, See Chapter 7 for details). Small settlements consisted of houses built on midden mounds, with entrance tunnels and sleeping platforms (Anderson 1984:90-91).

The place and timing of formation of Birnirk culture are also subjects of discussion. Birnirk-style artefacts have an extensive geographical distribution. Harpoon heads typical for this culture were discovered in north-western Siberia as far as the mouth of Kolyma River (Okladnivkov and Beregovaya 1971). The eastward extent is marked with a Birnirk site at Atkinson Point, east of Mackenzie River delta in Canada’s Northwest Territories (Anderson 1984:91). Following the first discoveries at the Birnirk-name site, it was suggested that the culture originated in northern Alaska, in the Point Barrow vicinity around 500 AD (Ford. 1959:244). More recent analysis based on refined radiomentic data suggests that the earliest known Birnirk sites occurred during AD 650-850 primarily on the northern Chukotka coast, but possibly at also in Point Barrow vicinity and at Cape Krusenstern, and that the extent of Birnirk penetration in Alaska was marginal before AD 900 (Mason 2000: 245-246).

Around 1,000-1,200 years ago, a dramatic shift occurred in nearly all Arctic societies, as the new whaling-based Thule culture came into existence (Dumond 1987; Mason 2015:924). Western Thule material culture appears to be an elaborate combination of Birnirk artefacts with specialized tools with whale, caribou, and seal hunting being the major subsistence activities. Houses were similar to Birnirk, with large settlements developed around the group sizes required for whale hunting (Anderson 1984: 91-92). However, the exact nature of the relationship between the Punuk, Birnirk and Thule cultures remains a question (Jensen 2009:75).

At some point between 1,000 and 1200 A.D., Thule people embarked on an epic eastward migration across the top of North America, colonizing the Canadian Arctic and reaching Greenland in a relatively short time. Analysis of ceramic shards found in Thule sites of Western Greenland revealed their Alaskan origin, suggesting that the movement across the vast Arctic expanses between Alaska and Greenland may have happened within the life span of a single generation. While the expansion itself is unquestionable, any consensus regarding its timing and motives remains to be reached. The initial theory that melting of the ice barrier in the Central Arctic Archipelago during the Neo-Atlantic warming episode facilitated meeting between the Pacific and Atlantic bowhead whale populations and prompted Thule hunters to move east following their prey (McGhee 1969/1970:173-184;) is unsubstantiated by recent DNA and paleo-climatic analysis (Dyke et al. 1996: 235-255). A new theory proposed that instead of whaling, Thule migrants sought iron from the Cape York meteorite field and Norse trade metal (McGhee 1984a: 1-7, 1984b:4-26; Cooper et al. 2016:6-7). Western Thule's need for iron may have been accentuated after political changes under Genghis Khan closed off Asian supply routes (Stern 2010:14). The modern Inuit population of Greenland and Canada are descendants of Thule immigrants.

The first contacts between the indigenous Arctic people of Western Hemisphere and the non-native newcomers occurred in Greenland and Newfoundland, when Vikings arrived here in their square-rigged ships around 1000 A.D. (Gad 1971:45-48, Fitzhugh 1985:23-31). By the late fifteenth century the search for the Northwest Passage and cod fishing brought progressively increased European traffic to the north Atlantic shores of Canada (Proulx 1993, Rankin & Crompton 2016:11). Notwithstanding episodic contacts, Alaskan Arctic and subarctic regions remained largely unaffected by the industrial societies until the second half of the 19th century, when commercial whalers discovered rich bowhead grounds north of the Bering Strait (Bockstoce 1986:21). While direct contact with Euroamericans may not have occurred until the mid-19th century, the Iñupiat Eskimo had established trade routes to exchange goods along the coast and into the Interior since at least the 16th century AD. Well-organized annual Native fairs were held in several coastal locations, including Kotzebue Sound, Colville River delta, and Barter Island (Hickey 1979: 411–434; Burch 2005:180-195). In addition to facilitating the exchange of locally produced goods, trading included glass beads, metal knife blades, and other products of distant industrial societies (Anderson 1984: 80-93).

Overall, this natural and cultural overview of the North-American Arctic demonstrates that despite the challenging natural environments, the region harboured a rich diversity of life. Far from been frozen in space or time, the Arctic was - and still is - a constantly evolving and changing system with complex interregional natural and cultural connections. As the most productive element of the Arctic ecosystem, the ocean played an important role in maintaining these connections and remained the main focus of many Arctic cultural groups.

Chapter 3: Consider the skin boat: review of literature and previous research

When, I wonder, having gone to the sea or into the wilderness, would anyone not have a story to tell? One must arrive with a story to tell. - “The Abandoned Boy”, story told by Mike Angaiak of Tununak, Alaska (Orr and Orr 1995:23)

The study of circumpolar skin boats consists of a number of records belonging to different fields of knowledge from the history of European exploration of the Arctic to the ethnographic and archaeological research. This chapter provides an overview of previous studies on skin boats of the North American Arctic and circumpolar north at large, in order to assess the present state of the available record and interpretation. This review identifies both patterns and gaps in previous research and guides the choice of theoretical and methodological frameworks for the present study.

3.1. Overview of ethnographic research

Owing to the geographic vastness of the circumpolar north and its ethnic and socio-political diversity, the timing of the origins of this region’s skin boats traditions differ from one region to another and is closely linked to the development of maritime adaptations. The first written references to indigenous boats of the circumpolar north come from “outsiders”: non-native explorers, invaders and settlers that encountered indigenous populations of the north and recorded these meetings (Magnus 1555:9, La Martinière 1674:397). Reflecting the history of European contact with circumpolar indigenous peoples, the earliest records of Arctic skin watercraft come from Greenland, where these interactions go back to the 10th century, pre-dating Thule migration to the island. According to the 12th century chronicle of the Icelandic priest Ari Frodi (Saemunds Frode Sigfusson), in the year 986 AD the Norsemen of Eric the Red, exploring the Greenlandic coast, “found many settlements, towards the east and towards the west, and remains of skin boats and stone implements, which showed that to that place journeyed the kind of people who inhabited Vinland and whom the Norse settlers call Skraelings” (Gad 1970: 144, Frodi 1838:168). In addition to being the earliest written reference to circumpolar skin boats, this is important evidence for use of skin boats by the pre-Thule population of

Greenland. A caption on Claudius Clavus Swart's 1424 map of Northern Europe referenced "tiny pigmies, who lived west of Lapps", and who were "captured at sea in a skin boat, now hanging in the Nidaros cathedral (in Trondheim, Norway); there was also a longboat of skin which had previously been captured with the same kind of pygmies in it" (Gad 1970:173-174).

Starting from the 16th century AD, the European search for the Northwestern Passages brought ever-increasing numbers of European explorers to the American Arctic. In the early stages of European colonial expansion into Arctic regions, Native people and their watercraft were often perceived as proof of discovery and tokens of possession. In 1576 the British captain Martin Frobisher, on his first voyage to Baffin Island, kidnapped a local Native by luring him with the offer of a trade bell and lifting him and his kayak aboard. The man died, but the boat and an unusual black rock found in it were presented to Queen Elizabeth (Fitzhugh and Laeyendecker 1993:11). A hundred years later Pierre La Martinier, a French surgeon aboard a ship of the Danish Company of Trades to the North described a similar acquisition of a two-hatch kayak on Novaya Zemlya in the Barents Sea. A Nenets man and a woman paddling this watercraft were taken prisoners, and brought back to Denmark along with their boat (La Martinière 1674:397, Fig. 3.1.).

Fig. 3.1. Native of Novaya Zemlya with his kayak (La Martinière 167: n.p.n.)

New materials and social patterns introduced by the contact with non-indigenous newcomers affected many aspects of Arctic Native cultures, including boat making. The extent of changes in indigenous watercraft manufacturing varied from region to region. While metal tools and fasteners were adopted virtually everywhere with little or no influence on the overall vessel appearance or performance, some traditions experienced more drastic changes. The demand for transportation of Russian colonial authorities, for instance, is credited for the development of a three-hatch Aleutian kayak, while only one or two-hatch boats were used in pre-contact times. Use of sail in indigenous seafaring is also frequently considered to be the European influence (Durham 1960:24; Adney and Chapelle 2007:65), although a strong case can be made for the independent development of this technology in indigenous North America (Holmberg 1856:380; Birket-Smith 1953:49; Knuth 1980:3-21; Anichtchenko 2016; see Chapters 6.9, 7.2, 7.7, 8.2, 9.5).

However brief and obscure, the early accounts provide a glimpse into the world of indigenous boat traditions before these changes took place. By the eighteenth century information about the Arctic and its peoples reached a volume that prompted both a deeper interest in their culture and posed questions about the relationship between different indigenous groups. Changes in political geography also played a role: by the end of the first quarter of the century Danes colonized Greenland, Russia extended its borders all the way to the terminus of north-eastern Asia, and the European race for the North Pacific began. Along with the usual colonial assortment of political ambitions, subjugation of Native entities and mercantilist frenzy, European colonization generated ever-increasing accounts of circumpolar Native peoples and their boats. The earliest written record of open skin boats or umiaks in Bering Strait, for instance, is a report by the Russian trader Kurbat Ivanov who met a party of nine umiaks, “each holding twenty to thirty Chukchi paddlers” in Anadyrsky Sound in 1659 (Vdovin 1965:108).

In 1725 the Russian Tsar Peter I, recognizing the need to map his growing empire, launched the First Kamchatka Expedition, which was followed by Great Northern (or Second Kamchatka) Expedition. Ethnographic research of native groups was one of the expeditions’ many objectives. Spanning from 1725 to 1743 these expeditions brought several dozen naturalists, geographers, historians, explorers and scientists to the extremes of North-Eastern Eurasia and beyond, and laid the foundation of ethnographic research in these regions (Bucher 2003:141). Georg Steller’s *History of Kamchatka*, completed in 1744 and Stepan Krashenninikov’s *Description of the Land of Kamchatka* first published in 1745 remain valuable sources for ethnography of Russian Far East. It was in the context of the Second Kamchatka expedition that the members of Vitus Bering's voyage across the Bering Strait (1741-1743) made the first European landing in Alaska and met their first indigenous "American," an Unangax kayaker, who approached Bering's ship in the vicinity of the Shumagin Islands (Steller 1988:95) (Fig. 3.2.).

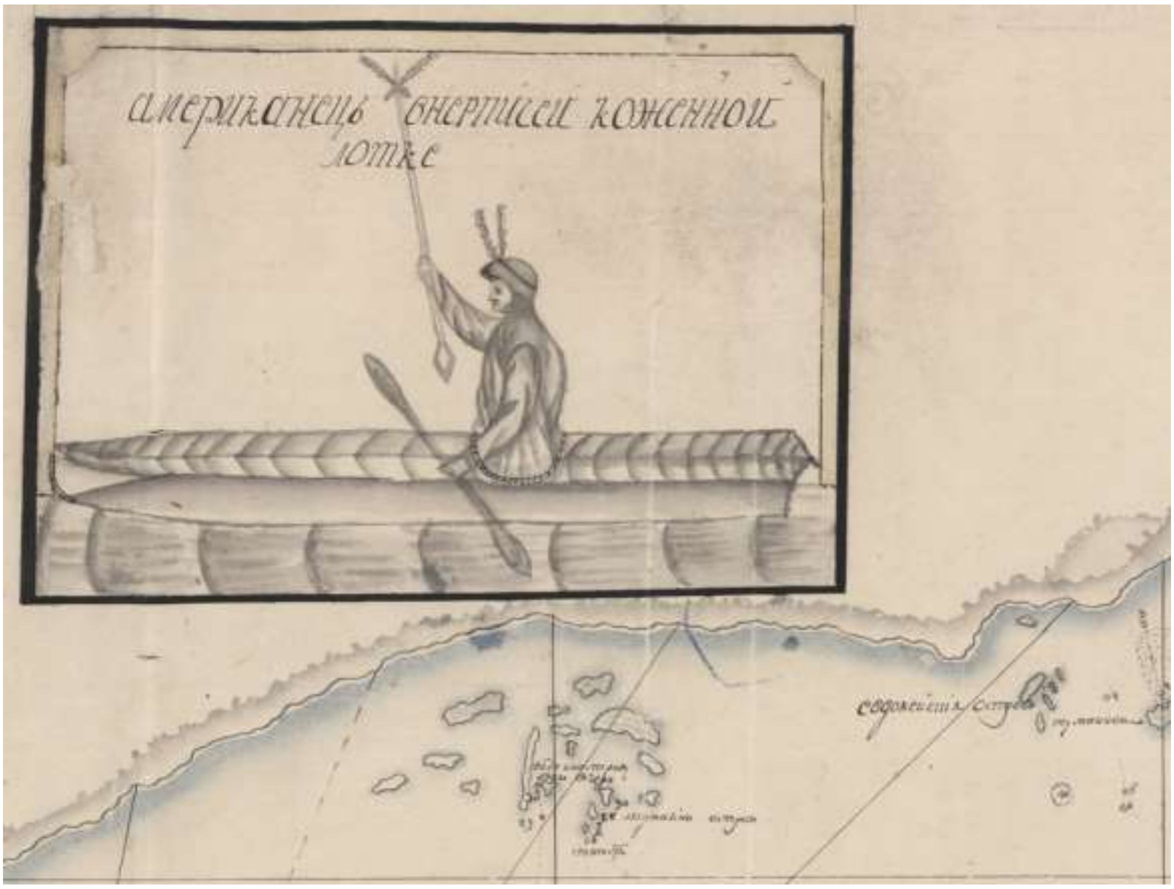

Fig.3.2. "American in his skin boat", detail of the Atlas of Captain Bering's voyages, 1775. Russian Naval Archives, St. Petersburg, Russia.

Comparative analysis of different Native cultures came into focus after the second Bering expedition, which placed Alaska on the map. Skin boat references from this time reflect these trends. Contributing to the fashionable debate on "where America got its inhabitants" Georg Steller was the first to point out the proximity of Asian and American shores in the Bering Strait region and the role of the indigenous watercraft: "One would long ago have learned this if the pluck and curiosity of the seafarers in their large vessels had been as great as the clamour and courage of the Chukchi, who row from one part to the other in their baidaras and skiffs (Steller 2003:191)." He then offers seven observations that in his mind confirm that "the Americans are descendants of Asia, and of the Koryak people in particular", the very first of which is that "Americans use the same kind of boats at sea as we found with the Koryaks (Ibid)."

In 1767 the Moravian priest David Crantz published his *History of Greenland: Containing a Description of the Country, and its Inhabitants*. Crantz lived in Greenland for several years and his detailed description of various aspects of indigenous life is a definite departure from the earlier voyagers' collection of cursory cultural vignettes as seen from the deck of a ship. In many ways his book is the first ethnographic study of a circumpolar culture. He was the first to suggest that the Greenland Inuits are related to the Mongols of Central Asia and arrived from Asia via Bering Strait (Gessain 1960:19).

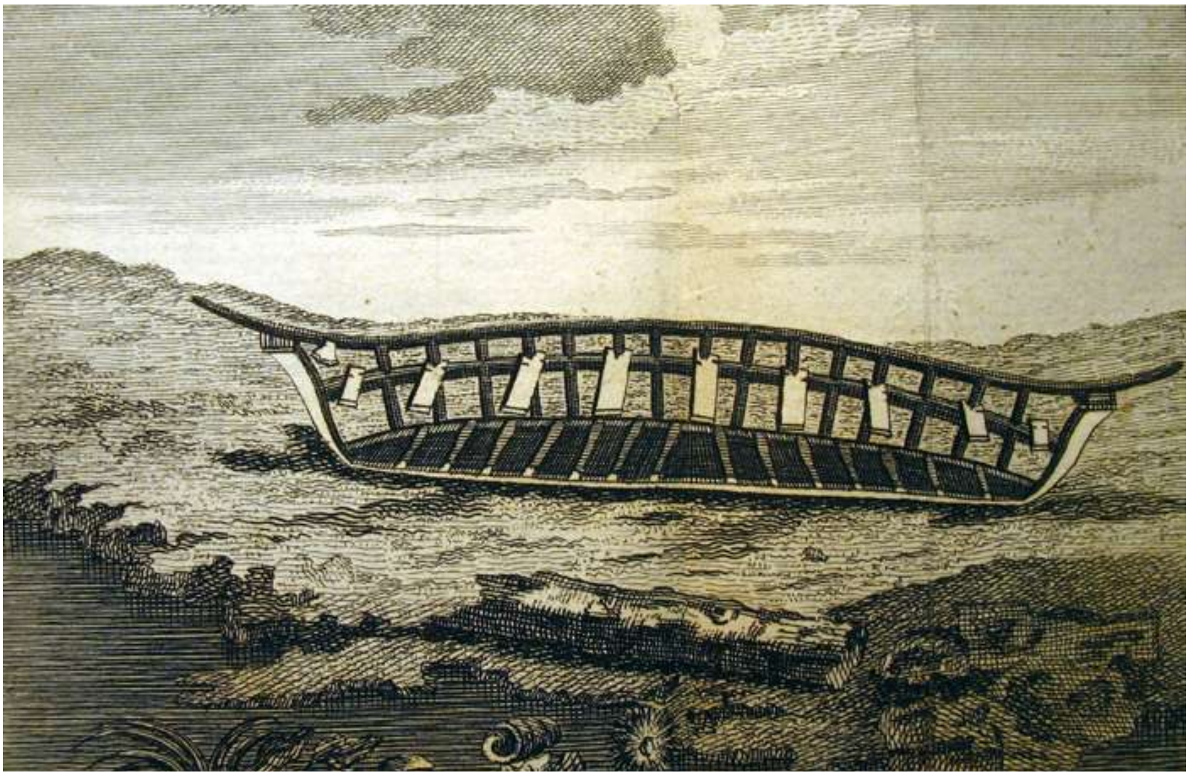

Fig. 3.3. Greenlandic umiak (Crantz 1820:VI b)

Crantz paid close attention to skin boats, providing both informative images of these watercraft and detailed description of their construction, use and role in different rituals (Crantz 1820:148-150, Fig. 3.3). His work proved to have a lasting influence on the development of perception and representation of circumpolar Native cultures in general and skin boats in particular. Twelve years after the first edition of Crantz's book was published, Captain Cook's ship *Resolution* anchored in Prince William Sound, off the Pacific coast of Alaska, the traditional land of Chugach Sugpiaq people. Captain Cook described the encounter in his journal:

> The first came in small Canoes other afterward in large boats, in one were twenty women and one man besides children. I attentively examined these

> boats with Crantz description of the Women's boat in Greenland before me and found these were built and constructed in the same manner, parts like parts with no other difference that the form of the head and stern; particularly in the first, which bears some resemblance to the head of a whale. The framing is of slender pieces of Wood and the outside is seal skin and perhaps the skin of some larger sea animal (Beaglehole 1967:348-349) (Fig. 3.4.)

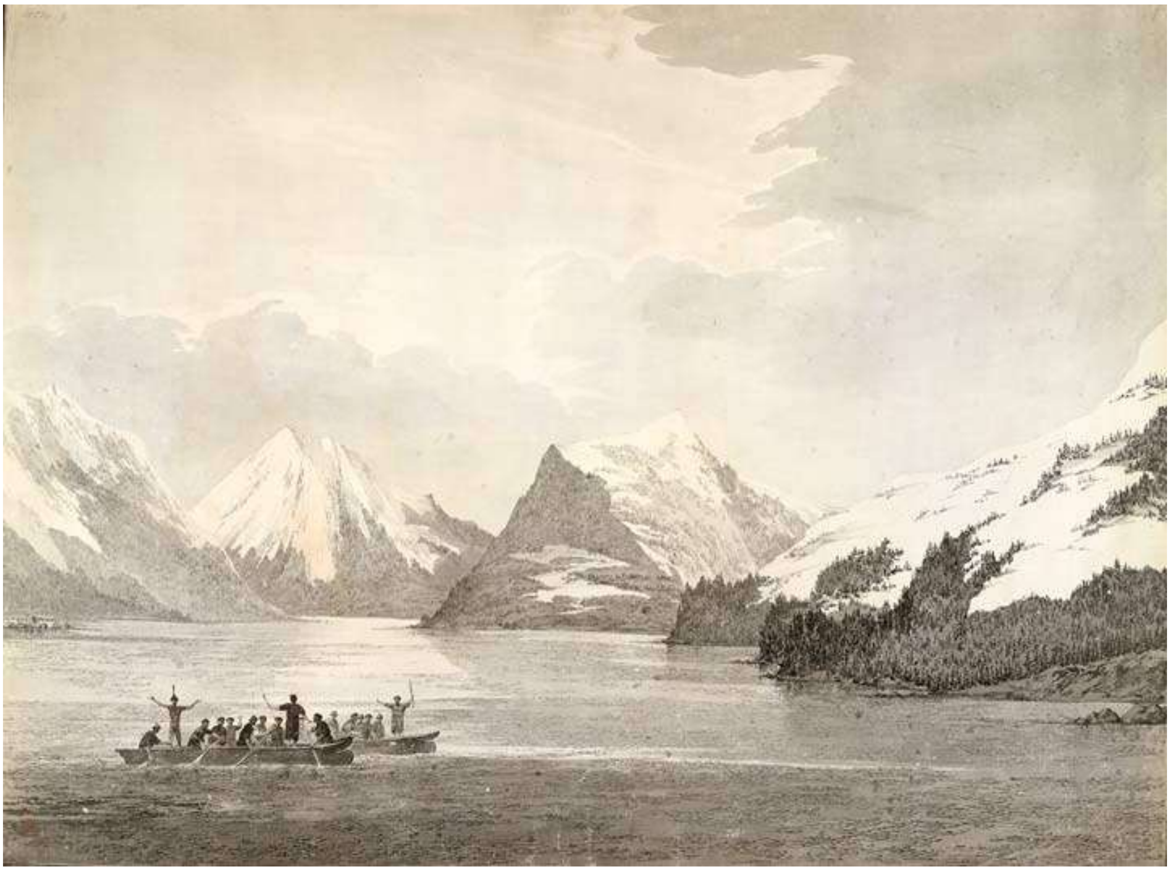

Fig.3.4. John Webber, *Baidars* of Prince William Sound (Cook & King 1784)

Cook's observation became the first published instance of comparative analysis of two geographically remote skin boat traditions, and owing to the popularity of the accounts of Cook's third voyage, this approach could have hardly had a more illustrious start. The perceived similarity was never specifically explained, and never went beyond the general physical appearance of the hull and basic observations of its constructional elements, such as light wooden fame and skin covers. Martin Sauer's account of Billings' expedition of 1785 contains one of the most extreme examples of such generalization: an image of a large open boat with a characteristic Kotzebue Sound shape, but seemingly made of planks, is entitled "Baidar used by Natives of Both Continents of Bering Strait" (Sauer 1972:247) (Fig. 3.5.). In reality, even today the Bering Strait region is home of several distinct umiak traditions. Such generalization, however, played an important and a positive role: once the idea of a perceived commonwealth of circumpolar peoples stopped being a novelty, scientists and the voyagers began to ponder the nature of this resemblance, which consequently fuelled more in-depth studies of northern indigenous cultures, and their boats.

Fig. 3.5. "Baidar used by Natives of Both Continents of Bering Strait," plate from Martin Sauer's 1785 publication (Sauer 1972:247)

Sauer's account of kayaks is much more accurate and detailed, displaying a fascination that was to be shared by many. Describing kayaks on Unalaska (Oonalaska), he wrote:

> The natives, observing our astonishment at their agility and skill, paddled in among the breakers, which reached their breasts, and carried the baidars quite under water; sporting about more like amphibious animals than human beings. It immediately brought to my recollection, in a very forcible light, Shakespeare's expression: "He trod the water, / Whose enmity he slung aside, and breasted/ The figure most swollen that met him" (Sauer 1972:158).

The attention to kayaks proved to be persistent: the reference to this decked skin boats frequent accounts of 19th century travellers visiting circumpolar regions, while umiaks are often left unnoticed and not described. Significantly larger and bulkier than kayaks, open skin boats were also rarely collected by explorers and collectors, who would often substitute a model for the full-scale boat. Outside of the archaeological record, these models, especially those collected in the early eighteenth century, are often the only source for understanding how the circumpolar open skin boats looked prior to contact with non-native newcomers.

By the end of the nineteenth century, European and American knowledge of circumpolar peoples reached a state at which the information was sufficient for posing more specific questions about the cultural connections across the Arctic, yet could not offer enough data to answer these questions. The 1867 purchase of Alaska from Russia gave the US both a new Arctic identity and a need to gain better understanding of its physical and cultural dimensions. Several geographic expeditions were launched in response to this need, culminating with the 1897 Jesup North Pacific Expedition, organized by the American Museum of Natural History. Pursuing the goal of "a systematic exploration of the culture and languages of the people inhabiting the coasts of the North Pacific between the Amoor River in Asia and Columbia River in America", the expedition assembled a collection of five thousand ethnographic objects, and produced several ethnographic monographs on most of the Native nations in North Pacific. Many of these monographs, such as Borogas' publication on the Chukchee (Bogoras 1975) and Jochelson's study of the Koryak (Jochelson 1908) "remained the most complete reference ethnographies and folklore collections on these peoples over the entire 20th century, despite generations of subsequent research" (Krupnik and Vakhtin 2003:16,18). In both publications boats are presented in the larger context of people's subsistence, social organizations and systems of belief. The latter aspect is of particular value since changes in Koryak and Chukchi society over the last century have eliminated many aspects of traditional spirituality, including such rituals as Koryak awakening of the boat in spring, or the Chukchi tradition of using pupils of caught whales as boat amulets (Bogoraz 1975:408).

Just when the Jesup expedition was drawing to its end, on the other fringe of the Arctic world, Danish-Greenlandic explorer and anthropologist Knud Rasmussen began his systematic exploration of Greenlandic cultures and their connections. In 1921 he commenced a massive Fifth Thule Expedition which was designed to "attack the great primary problem of the origin of the Eskimo race" (Rasmussen 1999: xxxiii). Seven expedition members began their journey in the eastern Arctic Canada, where they spent over a year collecting oral lore, ethnographic and archaeological data. The team then went on a 16-month dog-sled trip across Arctic North America to Nome, Alaska. The initial plan to continue this research in the polar regions of Russia had to be abandoned because the Russian authorities refused visas for Rasmussen and his companions, but even the four-year long expedition was a remarkable achievement. The ten volume account of the Fifth Thule Expedition contains rich, previously unpublished ethnographic, folklore and archaeological data. It was a major milestone for Arctic research and remains an important source for many aspects of Arctic material culture and social history, including boat building and use.

In summary, the Arctic skin boat ethnographic record consists of a variety of sources and data types: from written descriptions and images, to artefacts and oral lore collections, some of which goes back to Middle Ages. Varied in its nature, this ethnographic record has one common trend. Most of this information was collected in the context of relatively short, and not always friendly, encounters between the indigenous people and European or Russian visitors: sailors, missionaries, and later scientists. The subjects and methods of collecting as well as the manner of recording were chosen by the people positioned outside of the cultures they drew information from. Whether they were looking for curiosities or scientific samples, their approach and very nature of interest in materials they collected were often different from people who made and used the objects they sought.

3.2. Archaeological inquiry

The archaeological evidence pertaining to circumpolar skin boats may be classified in three categories: 1) artefacts and environmental factors indirectly implying watercraft, such as, for instance, wood working or caulking tools, insular location of archaeological sites with strong maritime adaptation markers or presence of significant amount of deep-water fish material in faunal assemblages; 2) representational evidence, such as boat miniatures and images of boats in pictograms and scenes etched on various tools and utensils, and 3) actual boat fragments (Arima 1975:227). Each of these categories possesses different inferential qualities and limitations.

Boat building tools and ecological features indicative of water transportation provide indirect evidence of occurrence, but little information about the construction and specific use of watercraft. Furthermore, most of Arctic tools were multi-functional and there are very few instruments that were used exclusively for boat making. Additionally, seasonally present sea ice provides a reliable substitute for a boat in terms of providing a platform for ocean fishing and hunting. With the exception of whales and walrus, all Arctic marine mammals could and were traditionally hunted from both boats and the ice.

Representational evidence demonstrates not only the presence of the boats, but also their contextual and perceptional dimensions in terms of subsistence and ceremonialism.

However, the value that these representations offer for understanding constructional details of watercraft has to be carefully weighed. Small and often approximately executed, these artefacts were typically intended to be a reference to watercraft and their role in society, rather than detailed realistic representation of boats, which is sometimes extrapolated from them. Because these are often the only archaeological data representing the entire, non-fragmented watercraft, there is a scholarly tendency to over-use it. A good example of over-interpretation of pictorial evidence is J. Louis Giddings' analysis of a hunting scene on a bodkin found in a Thule-period house at Cape Krusenstern. One of the surfaces of this 18 cm long ivory tool used for sewing depicts two hunters, a caribou and a boat with a person in it. The entire design area is 2 by 3.5 cm, and the boat image rendered in simple "stick" lines is less than 1 cm long, (Fig.3. 6.), yet Giddings' interpretation is imposingly conclusive:

> While at first the crosshatched boat appears to be an umiak like those in recent engravings, we see that the bow and stern pieces, which are always in line with the gunwale in umiaks, here continue upward at the same angles as the bow and stern. The man sits in the center, as he might do in a kayak or canoe, but not in a large skin boat that would be awkward to paddle from this position. The boat is clearly neither umiak nor kayak as we know them; rather, it resembles the birch-bark canoes described by the first western explorers on the Kobuk River (Giddings 1967:92)

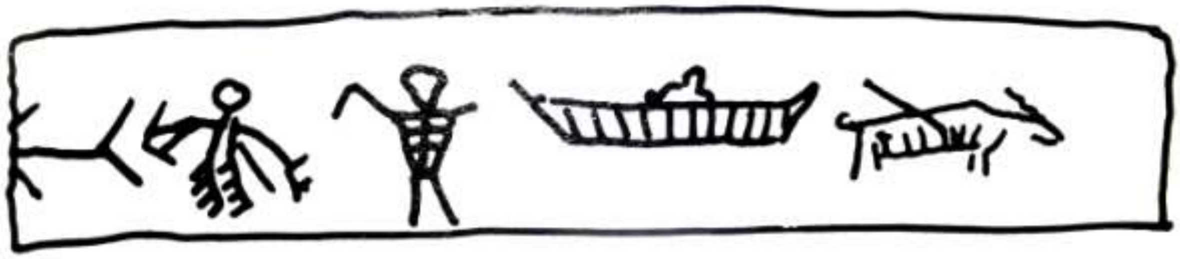

Fig.3.6. Hunting scene engraved on bodkin found at Cape Kruzenshtern (Giddings 1967:92)

A more balanced approach to this type of data can be achieved when it is considered in conjunction with other archaeological evidence, such as actual archaeological fragments of skin boats. Owing perhaps to the common belief that thin-framed skin-covered boats could not survive in the archaeological record (Zimmerly 2000a:3, Arima 1975:227) this is the least studied of all three groups of circumpolar skin boat evidence. In reality, archaeological data pertaining to skin watercraft are present in many Arctic and Subarctic sites. From the First Thule expedition to the most recent field seasons, boat parts have been steadily trickling into museum collections and archaeological depositories. The inventory of the Danish National Museum alone contains over 700 archaeological boat parts from archaeological excavations in Greenland and Eastern Canada (Danish National Museum 2012:n.p.n.). Archaeological data sample of boat remains at the University of Alaska Museum in Fairbanks, Alaska consists of over a thousand artefacts catalogued as umiak, kayak or skin boat parts from a dozen archaeological sites in western and northern Alaska (University of Alaska Museum of the North 2014: n.p.n.). Various museums in both Canada and Russia have similarly impressive collections.

Brief references to boat frame fragments are scattered throughout site reports, archaeological publications and conference proceedings, but are usually limited to basic artefact description with little effort to interpret the boats they represent. The reason for the lack of more comprehensive watercraft analysis lies in two mutually interdependent factors: the above mentioned disbelief that the archaeological record preserves enough material for such an analysis, and the lack of a research methodology for archaeological skin boat research. Additionally, the very research potential of boat studies for Arctic archaeology remains unexplored. A relatively young field, Arctic archaeology was and still is mostly concerned with sequence and chronology of cultures, focusing on such diagnostic elements as lithic technology, harpoon typology and house architecture. For most archaeologists the questions of when and where different cultures settled in the vast Arctic region appear to be more pressing than why and how people travelled.

Consequently, boats come into sharper focus when the sequence of Arctic cultures is considered, and the earliest occurrences of skin boats in circumpolar north are inferred by technological and ecological factors. Recent maritime migration theories, for instance, suggest that skin boats might have been a vehicle of human expansion across Beringia ca. 20,000 BP – 10,000 BP (Fladmark 1979; Dixon 1999, 2011). By circa 10,000 B.P., humans had settled in areas of Alaska that would have been inaccessible without watercraft, such as Anangula Island in the Aleutian chain (Aigner 1976a:51-62, 1976b:32-45), and Prince of Wales Island, where the second oldest human remains in Alaska were found (Kemp et al. 2007). At 3,000 B.P. the presence of maritime transportation is indirectly suggested by toggling harpoon points at the Cape Denbigh archaeological site in Norton Sound, a find which according to J. Louis Giddings carried “a strong implication of boating skill while hunting among masses of floating ice" (Giddings 1964:241). The use of umiaks circa 1800-1500 B.C. may be inferred at the Cape Krusenstern site, where large whaling harpoon and lance blades, and large quantities of whalebone combined with permanent settlement may indicate communal whaling (Giddings 1967: 242). A toggling harpoon found at the 3,500 years old Chertov Ovrag site on Wrangel Island, 140 kilometres north off the coast of Chukotka indicates sea mammal hunting (Dikov 1988:85), which along with the insular location may signal the presence of seaworthy boats.

The earliest direct archaeological evidence of skin boats is contemporaneous with the late Denbigh complex. The wooden rib of a flat-bottomed vessel was excavated at Qeqertasussuk, a Saqqaq culture site, located in Southeast Disko Bay, West Greenland (Grønnow 1994:19, 221, Fig.3.7.). Dated to circa 2200 B.C., this u-shaped rib is only 35 cm across and 22 cm high with a triangular cross section, which aided its identification as a kayak rib (Arima 2004:49).

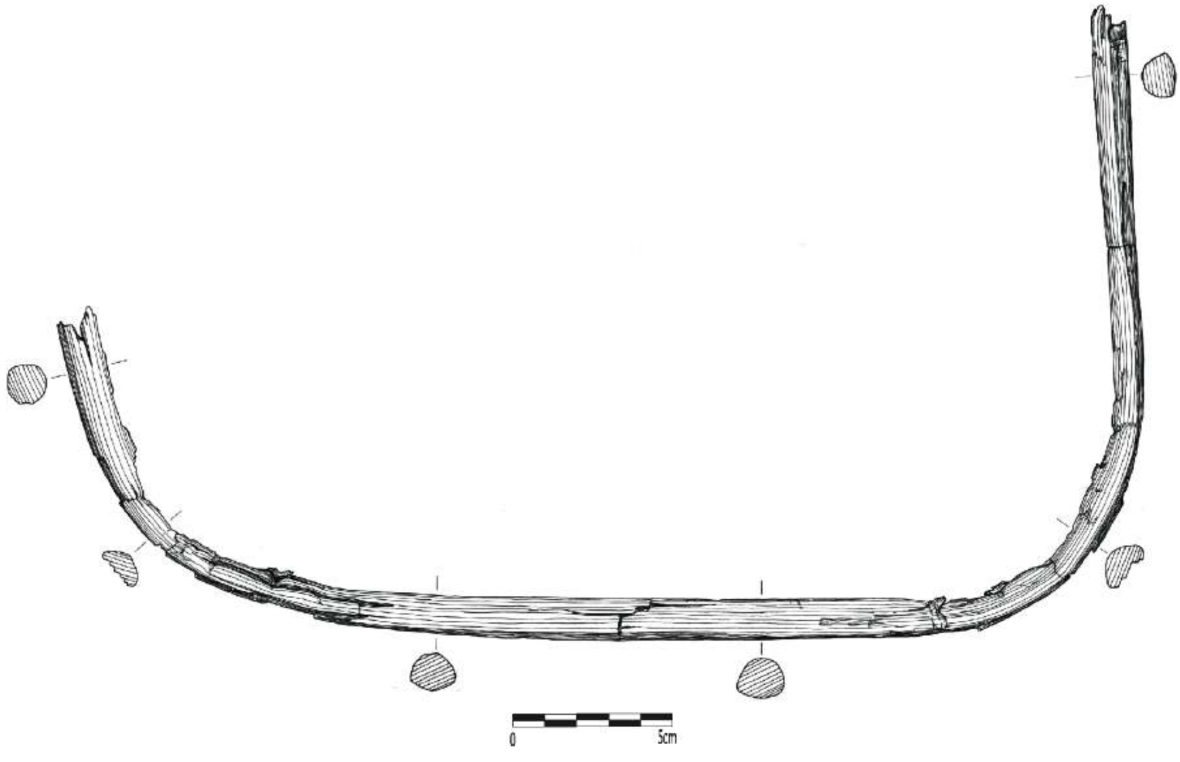

Fig. 3.7. Kayak rib from Qeqertasussuk, Southeast Disco Bay, West Greenland (Grønnow 1994:19, 221).

In North-Eastern Eurasia the earliest boat representation found to date comes from the Tokarev culture site on Spafar'ev Island, 2.7 km off the northern coast of the Sea of Okhotsk. The site, which dates to the second half of the first millennium BC, produced a 15 cm long bone boat miniature with protruding bow and incised marks in a dot and line pattern. Russian archaeologist Alexander Lebedintsev interpreted it as a kayak (Lebedintsev 1998:300,302) (Fig. 3.8).

Fig.3.8. Boat miniature from Spafar'ev Island, Sea of Okhotsk.
Image courtesy Alexander Lebedintsev.

Interesting pictographic evidence of boat use is presented by rock art. Rock paintings from Clam Cove and Tuxedni Bay in Cook Inlet, Alaska depict boats paddled both by a single person and multiple individuals. The images have been indirectly dated through archaeological finds in their vicinity to 2500 BC (Fagan 2008:75-77), but by the nature of such inference, the date remains speculative. Other samples from the same site yielded far more recent dates (Baird 2006 b).

Pictograms found on the cliffs along the Pegtymel River in Chukotka contain 76 images of single person boats and 32 watercrafts with multiple crew members, some of them pursuing whales (Figure 3.9). Both the date and ethnic authorship of these images remain speculative. Dikov (1999:86) suggested that they were created by the ancestors of the Chukchi between 1000 BC to 700 AD with some additions dating to 1400-s AD (Ibid:53), while Kiriyak believed that the images reflect three ethnic components: Yukagir, Chukchi-Koryak and Eskimo-Aleut, and could have been rendered as recently as circa 1600s AD (2007:256-263). The images represent scenes of deer, goose and sea mammal hunting. While no definite proof can be produced, given the treeless environment and maritime orientation, it is likely that the depicted boats are skin watercraft, although claims for plank boats and dugouts have also been made (Kiriak 2007: 257). The use of both umiaks and kayaks on the Chukotka Peninsula by the first centuries A.D. is attested by ivory and wooden boat miniatures found at the Ekven site (Bronshtein and Dneprovsky 2009:94) (Figure 3.10). 3000 year-old bone fragment with engraved image of whaling from umiaks excavated by Daniel Odess and Sergey Gusev at the Un'en'en site in Chukotka holds the earliest direct evidence of the practice of whaling (Witze 2008).

Ivory harpoon rests (v-shaped brackets used to support the blade-end of harpoons in order to protect boat's s cover from puncture) found in Choris sites show that both kayaks and umiaks might have been used by people living around Kotzebue Sound, Alaska, 1000 to 600 B.C (Giddings 1964). The presence of kayaks and umiaks is inferred from ivory deck fittings, harpoons and harpoon rests for Norton (Ibid 126) and Okvik (Bandi 1969:69-70) cultures, and established with even more certainty from models, and frame and paddle fragments for Old Bering Sea culture (Collins 1937:253). Archaeological data leave little doubt that by the 1st century AD skin-covered watercraft were actively employed on both sides of Bering Strait.

While skin boats are implied for circa 2,000 BC for both western Alaska and Eastern Greenland, the use of watercraft among the Dorset people of Central Canada between 1000 BC and 1300 AD remains a question. William Taylor and H.C. Bandi believed that bird darts and throwing boards from some Canadian sites might indicate the existence of kayaks (Taylor 1968:88; Bandi 1969:142), while Robert McGhee's proposed that "kayak building may have survived only tenuously throughout the Dorset world" (McGhee 1996:147). There is no archaeological evidence of umiak use by Dorset people, and in fact the very success of Thule expansion into the Dorset territories in the Central Arctic circa 1300 AD is credited in part to the advantages offered by Thule umiaks (Ibid:195).

Figure 3.9. Pictographic images of boats from Pegtymel River, Chukotka. Photo and tracings by I. Georgievsky, E. Giya, E. Devlet, E. Miklashevich, A. Mukhareva, A. Sirotkina (http://rockart.iaran.ru/index/sites/chuckotka/pegtymel/)

Fig. 3.10. Ivory and wooden boat miniatures found at the Ekven site, Chukotka (Bronshtein and Dneprovsky 2007:184)

Boat evidence becomes progressively richer towards the end of the first millennium AD and beyond. In Alaska skin boat parts were recorded at Birnirk and other sites in the vicinity of Point Barrow (500-1300 AD) (Ford 1959:156-160), at the Deering site in Kotzebue Sound (821- 1200 AD) (Bowers 2009), cave sites of Kagamil and Kanaga Islands in the Aleutian chain (890 – 1667 AD) (Nelson and Barnett 1955:387-392), and many other locations. Circa 1200s AD the Thule migration originating in Western Alaska swept across the Canadian Arctic to Greenland and set the stage for today's distribution of Inuit people. The remarkable speed, with which Thule culture covered nearly 4,000 km over a single generation, should be in part attributed to the watercraft of these people, and indeed skin boat fragments are not unusual for Thule sites of Canada (Canadian Museum of Civilization 1996) and Greenland (Mathiassen 1927:63-64; 1930:205, 329; 1934:86,100, 158).

Boat remains are also frequent in late pre-contact and early contact period Arctic sites. The 2008-2011 archaeological excavation of the Nunalleq site (AD c 1300–1650) in the Yukon-Kuskokwim Delta uncovered a number of wooden artefacts interpreted as boat remains and boat models (Britton et al. 2013). Fragments of kayak frames and paddles were discovered in late pre-historic- early contact period graves at the Nukasusutok, Kikkertavak-1 and Saglek Bay sites on Labrador (Hood 2008:240), in the Karluk sites on Kodiak Island (1300-1700 AD) (Knecht 1995), and in the Palutat cave in Prince William Sound (1700-1800 AD) (de Laguna 1956:65, 239, 245-249).

Although rich, these data comprise a puzzle of fragments in various stages of disarticulation. Pre-19th century archaeological frame assemblages are extremely rare. The oldest complete circumpolar skin boat from the archaeological record known today is the Peary Land umiak, discovered by the Danish expedition to Peary Land (northeast Greenland) in May of 1949 (Knuth 1952:6). Made of red *pingeq* driftwood, the frame was nearly complete, although flattened, with remnants of lashing material still in place. Dated to circa 1440 AD, Peary Land umiak is a remarkable example of late Thule boat technology and is discussed in more details in Chapter 8.3 of this thesis.

The abundance of archaeological skin boat data contrasts sharply with the small volume of scholarly research specifically focused on the pre-eighteenth century history of Arctic watercraft. Typically the discussion on archaeological finds pertaining to skin boats is limited to a brief description of these artefacts in the "means of transportation" section of archaeological reports or introductions to the ethnographic kayak studies. The following subchapter outlines major themes and trends of skin boat research and their development from the middle of twentieth century to present.

3.3. Skin boat research: themes and trends

One of the most important factors driving the overall interest in Arctic skin boats and consequently the research trends is the perseverance of this tradition. Skin boats are still present in some northern indigenous communities, providing a seemingly tangible and romantic link to the past:

> Rude, practical, covered in whale blood and walrus hide, sporting a combination of anything from baleen to car parts, enveloped in the blue stink of two-stroke exhaust, or gliding silently under paddles, the umiak is the one indigenous boat that never stopped working, never went "out of print". For all its apparent changes, umiak today is a vital descendant in an unbroken line from its working ancestors from five thousand years ago. (Snaith 1997:4)

Skin boats' role as a link to the past is even more articulated in the communities where this tradition has been lost within one or two generations. The sense of recent, still revocable loss generates both renewed interest, awareness of how fragile both actual boats and the very tradition are, and the urge to preserve what is left:

> Kayaks have not survived as a viable hunting craft through the end of the 20th century, and it is doubtful that they will survive even as museum specimens. There are only 200 to 300 kayaks still surviving in museums

> around the world. Because of their size, materials and weight, they are the most delicate artefact in many museum collections and consequently are deteriorating rapidly (…) But before kayaks are completely gone we do have a chance to gain an understanding of them from exhibits and publications (Zimmerly 2000a:4).

The focus on preservation and revival of Arctic skin boats has a tremendous impact on skin boat studies. Most publications on Arctic watercraft contain scale drawings and descriptions of the building process. Plans, measurements, and building instructions dominate skin boat literature. This course was set by some of the earliest works on the subject. Discussing his 1946 article on Arctic skin boats, Howard I. Chappelle, a co-author of the classic *Bark Canoes and Skin Boats of North America,* wrote that his main objective was to:

> …measure the skin boats and to make scale drawings that would permit the construction of a replica exact in details of appearance, form, construction, and also working behaviour. Special regard was given to the diversity of types with respect to hull form and construction methods … (Adney & Chappelle 2007:174).

This attention to constructional details, in turn, raised the question of reasons and mechanisms underlying both the differences and similarities between different designs. The quest for defined typological classifications and evolutionary sequences that emerged in response to these questions continues dominating the skin boat research.

3.3.1. Typology

Perhaps one of the most articulated developments in circumpolar skin boat research is an attempt to create typologies of both umiaks and kayaks (Fig.3.11). Since the criteria for designating “a type” vary and, in fact, are almost never articulated, the result of several decades of this effort is a plethora of overlapping groupings. Just to give a few examples of kayak typologies, James Hornell’s comprehensive 1946 study lists six main kayak groups (Hornell 1946:166-174), Eugene Arima distinguished nine variants (Arima 1975:67-86), David Zimmerly listed 11 different groups for Alaska and Siberia (Zimmerly 2000a), Jean-Loup Rousselot divided all kayaks of American Arctic coast into 28 “ethnographic” types (Rousselot 1994:252), and Harvey Golden identified 13 types in Greenland (Golden 2006) and 6 types in Alaska (Golden 2015).

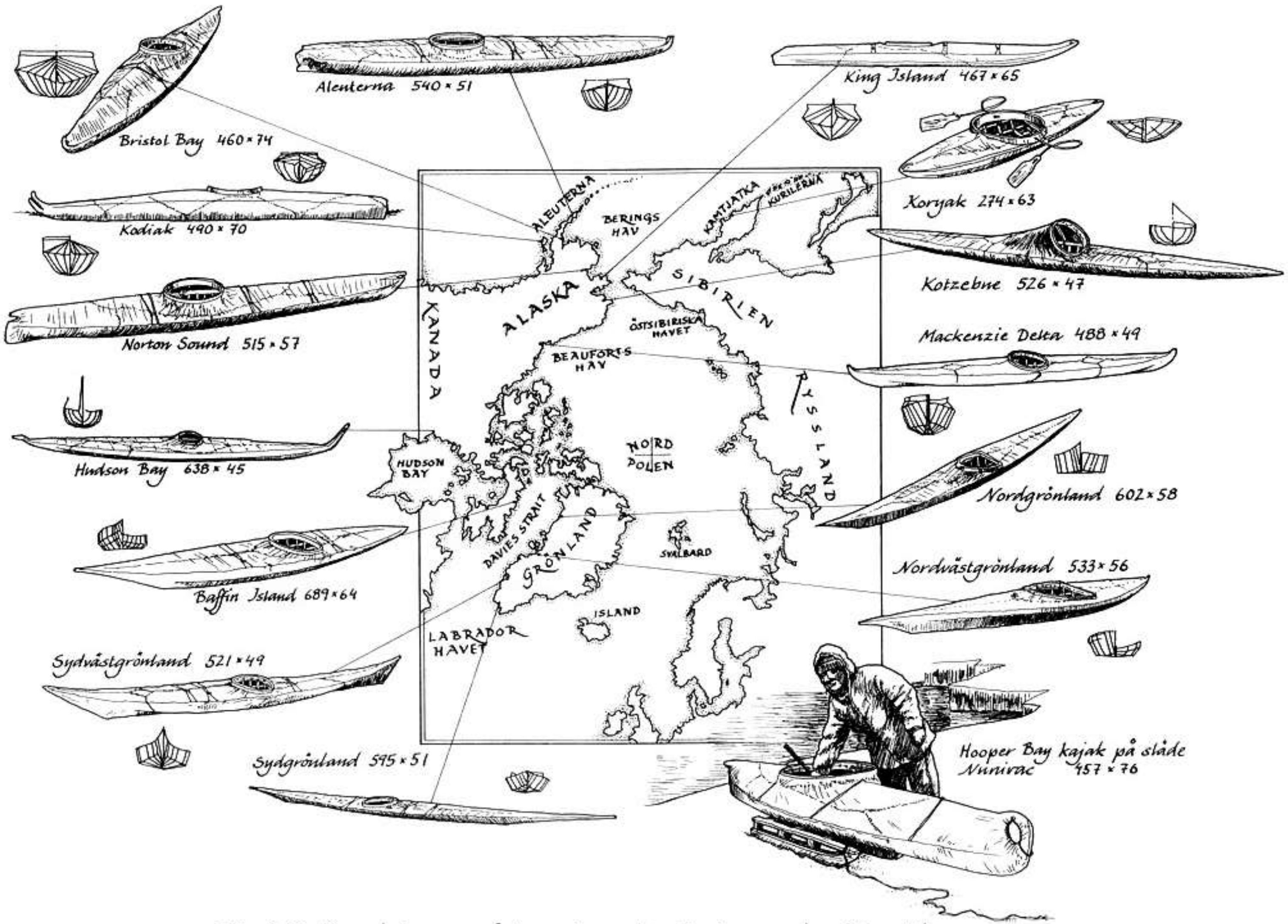

Fig.3.11. Kayak types of American Arctic, image by Børn Thomasson
http://www.thomassondesign.com/en/lasa-om/kajakhistoria/alaska

Comparing with kayaks, umiaks have attracted less attention, but have not entirely escaped the taxonomic zeal of skin boat enthusiasts. The first attempt to systematize circumpolar umiak heritage appeared in Bill Durham's *Canoes and Kayaks of Western America* (1960). Durham describes four different regional traditions corresponding to the specific Native groups: Siberian Yupik of St. Lawrence Island, Iñupiaq of Kotzebue Sound, Aleut of the Aleutian Islands and Sugpiaq of Kodiak Archipelago and Prince William Sound, leaving behind for unspecified reasons a number of Alaskan Native groups and regions. Boats' flare and sheer seem to play the major role in his classification:

> The umiak's design was admirable in every way for the employment for which it was intended. The strong flare was the chief contributor to its proverbial seaworthiness (…) Umiaks used in the neighbourhood of Bering Strait had an almost level sheer, while specimens along the arctic coast northward from the Strait were narrower than the norm. The umiaks of the Asiatic Eskimos and St. Lawrence Islanders were deficient in flare and sheer, besides being uncommonly narrow. Perhaps because of the shortcomings of this design, sealskin floats were often lashed to the hull to lessen the risks of the fifty-mile passage between Asia and the island (Durham 1960:20).

Durham saw the comparative study of indigenous Pacific watercraft as the chief tool for the "linking of medieval American and Asian civilizations" and boats themselves as "the prime vehicles of diffusion" (Durham 1960:9).

Broader geographical groupings were proposed by Howard I. Chappelle and Eugene Arima. Chappelle classified all circumpolar umiaks into two large groups: Western, which includes both shores of the Bering Strait and Alaska, and Eastern, encompassing Baffin Island, Labrador and Greenland. Western umiaks are further divided into two Alaskan and Asiatic sub groups, the latter is comprised of "Koryak" and "Chukchi" types, of which the Koryak boat is described as the most refined (Fig.3.12). Chappelle's classification also lacks articulate methodology and, just like Durham's, is based on hull characteristics such as rake, sheer, camber and flare. In a fascinating twist of misogynist theorizing Chapelle suggested that both boats' technological characteristics and the preservation of umiak tradition is a subject of gender of users:

> The Greenland umiak frame is much heavier and more rigid than the Alaskan. The eastern umiak is not intended for use in hunting but is primarily a cargo carrier; its use has been confined to women and its chief employment is moving the family and household effects from one hunting ground to another. While it is highly probable that this condition is the result of disappearance of whaling in this region, the use of the umiak as a

> hunting boat ceased so long ago that the eastern umiak model may have degenerated to a great degree. It has been otherwise in the western Arctic where the use of the umiak in hunting has continued and the boats have been managed, to a very great extent, by the men. As a result, the boats are held in greater respect by their builders and the better models have survived (Adney & Chappelle 2007:182).

Eugene Arima's classification also groups umiaks into western and eastern types. According to him the Western umiak group includes Mackenzie, Alaska and the Bering Strait, but excludes Koryak, Aleut, Koniag and Chugach boats as "somewhat distinctive shapes" (Arima 1963:7). Eastern umiaks include Greenland, south Baffin Land, and north Labrador (Ibid) (Fig.3.13.). Arima's classification resembles that of Chappelle, but his analysis is more fine-tuned to such details of boat construction as keel and floor-timbers assemblage, spacing of side ribs, positioning of stringers, method of fitting stem and stern posts to the keel, choice of animal skins for the boat cover, paddles, oars, skin floats and sail.

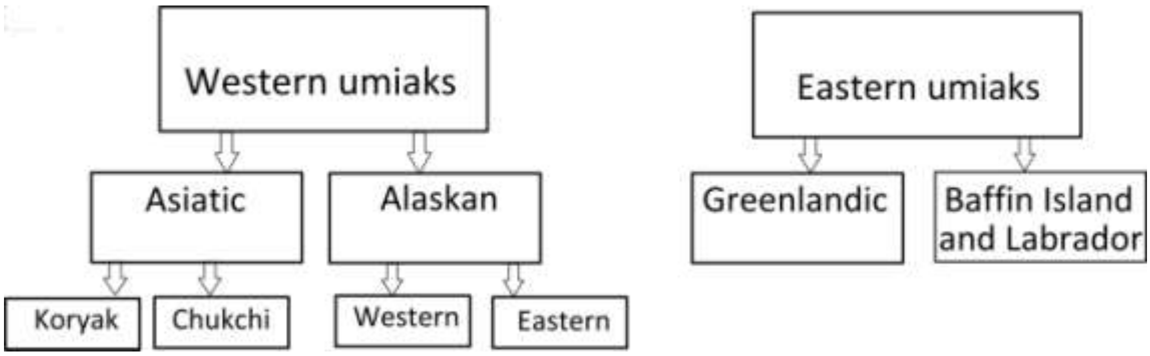

Fig.3.12. Chapelle's classification of North-American Arctic umiaks.
Diagram compiled by E. Anichtchenko based on Chapelle 2007.

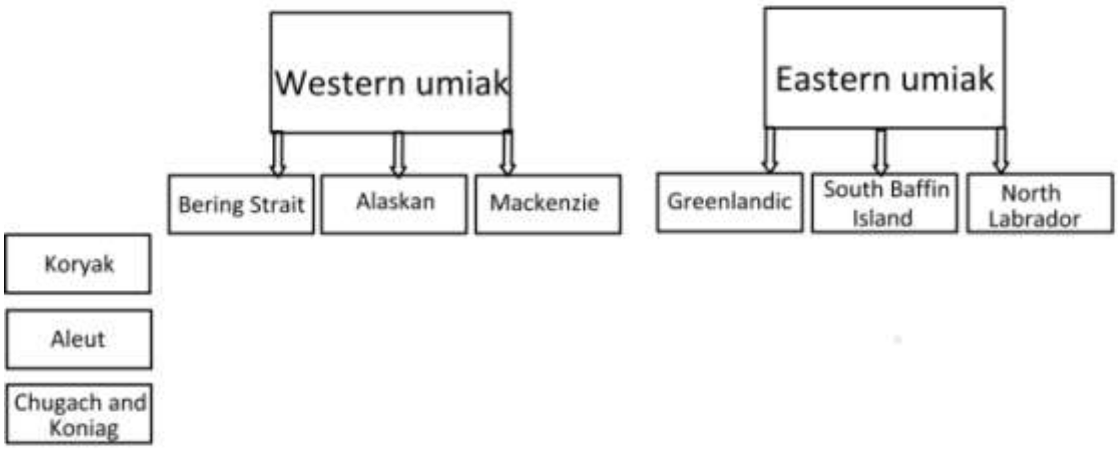

Fig. 3.13. Arima's classification of umiaks.
Diagram compiled by E. Anichtchenko based on Arima 1963

The majority of skin boat classifications share some common trends. Most notably, the typological arrangement is based on a geographical distribution along the East-West axis, ignoring the diversity of the boat types along such North-South oriented regions as coasts of Bering Strait, Greenland, and Davis Strait. The skin boats of Western and Central Eurasia are also excluded from all these classifications, largely due to the erroneous belief that, "the Arctic skin boat is almost entirely to be found in the North American Arctic from Bering Sea to the East Coast of Greenland. In Russian Siberia, only in a small area of the eastern Arctic lands, adjacent to the North American continent are any employed" (Adney & Chappelle 2007:174). Although beyond the scope of this research it is important to note that the Native peoples also built and used skin boats in both Western and Central Siberia (Antropova 1961).

H.C. Petersen's *Skinboats of Greenland* is a significant departure from the exclusively geographic approach that dominates skin boat research. Claiming that the extent Greenlandic umiaks sample is not sufficient enough to form a basis of typology of umiak tradition, he focused on kayaks (Petersen 1986:155). A Native Greenlander, immersed in the traditional subsistence and lifestyle from early childhood, Petersen noted that the shape of the kayak does not only reflect myriad of regional traditions, but also particular specialization (such as watercraft designed for stormy conditions) and specific circumstances of kayaker's life (Petersen 1986:42). A specific type of a kayak with very characteristic upturned tips, for instance, was traditionally built in some parts of Greenland for a boy whose older brother died in infancy. This kind of kayak, called *piaaqqisiaq,* was believed to protect the boy kayaker against witchcraft. "When a boy who had grown up with a *piaaqqisiaq* kayak became a young hunter he was given the regular local type" (Ibid 51).

Taking this diversity into considerations, Petersen classified Greenlandic kayaks according to such versatile criteria as hull sheer, purpose and function, region, age and "perceptional aspects". The resulting typology includes four different groups: present kayak types, specialized kayak types, local kayak types and old Greenland kayaks, and sub groups that range from "North Greenland type" to "cult kayak" (Ibid 1986:48-60) (Fig.3.14.). Perhaps more importantly than offering another typology, Petersen's classification invites consideration of skin watercraft as a phenomenon constantly evolving in several different non-linear dimensions, an approach eloquently summarized by Harvey Golden who defined Greenland kayaks as a "particular culture's answer to the question of survival – a compromise of thousands of possibilities, specific and random." (Golden 2006:26). Golden's typology of Greenland umiaks developed on the basis of 102 specimens of full scale kayaks consists of 13 types. Peculiarly, two of the boats in his data set transcend this typology and are presented as "melting-pot kayaks" (Ibid 117). According to Golden, kayak forms "evolved both subtly and gradually, and yet also suddenly on account of new tools and materials or even by emulating a design used by a particularly successful hunter" (Golden 2006:117).

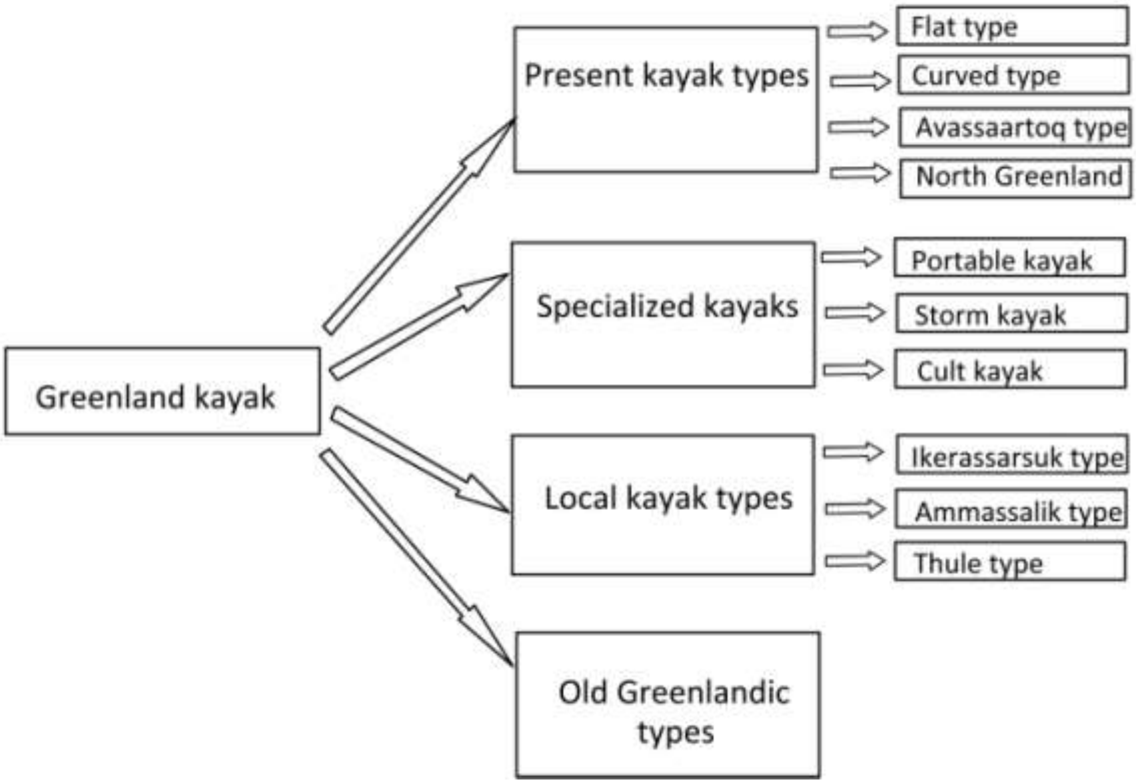

Fig. 3.14. Petersen's classification of Greenlandic kayak types. Diagram compiled by E. Anichtchenko based on Petersen 1986

It is noteworthy that although a number of skin boat topologies have evolved since 1964, not a single one of them combines umiaks and kayaks. This is surprising given how closely kayaks and umiaks are aligned in the context of the indigenous history of the circumpolar north. Most coastal Arctic peoples relied on both kayaks and umiaks, and if indeed some aspects of the history of these people can be asserted on the grounds of boat research, this evidence is likely to be present in both kayaks and umiaks. Similar if not identical processes drove the development of both kayaks and umiaks of the same

Arctic groups and cross-cultural influences that might have affected them, and the comprehensive picture of this development would only evolve when both kayaks and umiaks are considered on equal terms.

3.3.2. Origins and evolution

Given the fragmentary character and complexity of circumpolar boat data, it is not surprising that analysis has produced a wide range of hypothesis and theories, particularly in connection with the origins and evolution of circumpolar skin watercraft. Most researchers suggest an inland Eurasian origin for both kayaks and umiaks, however the issue of relationship and evolutionary connections between these vessel types and their sub-forms has generated a wide range of opinions.

George Dyson proposed that kayaks evolved from inflated animal-skin floats used for river crossing "through a long period of step-by-step development of sea-going skin vessels, which might have developed, perhaps repeatedly, as land-based hunters faced a rising sea-level and the growing temptation of sea-going prey" (Dyson 1991:262). In Dyson's interpretation the umiak is a product of the subsequent development of the kayak. The further development of kayak was fuelled by a self-amplifying circle encompassing the kayak, the hunter, and their prey:

> One kayak was required to obtain the game to sustain and clothe the hunter while building another kayak, in its turn required to hunt down the materials to build other kayaks: thus the ingredients of kayak evolution cycled forward from year to year. The kayak competed in speed, stealth, and stamina against a wide range of amphibious vertebrates – including fellow kayaks, both in peacetime and war (Ibid 263).

An alternative line of thinking suggests that umiaks preceded and influenced kayak development. Analyzing a 2,000 year-old kayak model from Ekven cemetery near East Cape, Chukotka, David W. Zimmerly pointed out that its "forked" gunwales at the bow and stern exhibit some umiak characteristics suggesting that "the kayak is a descendant of the umiak" (Zimmerly 2000a:3). Eugene Arima also believed that umiaks were influential in kayak design, specifically in the case of the Bering Sea kayaks and the characteristic bifid bow of Unangax/Aleut kayaks (Arima 1999:47), but did not exclude the possibility of the kayak's independent development (Arima 2004:137-138).

The Native lore of Unangax/Aleut people also supports the notion of the kayak's development from the open skin boat. According to a legend recorded by Lucien Turner in the Aleutian Islands, decked boats for a single hunter evolved from the larger open skin family boats at the time when increased warfare made seafaring unsafe (Turner 2008:2). Similar lore exists in Greenland, where "it is said that long ago the kayak was an open vessel, without deck, and the skin cover was hung on the frame with bone pegs stuck into the top of the sheer boards" (Petersen 1986:15). At the same time, an origin story of the Sugpiaq people states that their first boat was a two-hatch kayak (Doroshin 1866:369-370, See chapter 4 for the discussion on use of Native lore).

An interesting theory suggesting an Alaskan origin for kayaks was brought forward by archaeologist William Laughlin, who proposed that this watercraft originated in south-western Alaska, "where the greatest diversity in kayak construction is found" (Laughlin et al. 1991:184-186). According to Laughlin, early migrants who crossed the Bering Land Bridge from Eurasia to America used open skin boats, but "whether only coracles or open retrieval boats were in use for exploiting the rich marine resources at the edge or the umiak was used, cannot yet be essayed" (Ibid). Chronologically he places the invention of the kayak between the crossing of the Bering Land Bridge (16,000-12,000 before present) and 5,000 years ago, when according to Russian linguist G.A. Menovshchikov's study of the etymology of Eskimo-Aleut boat terms, both umiaks and kayaks existed as independent boat types (Menovshcikov 1959:112, 116; Laughlin 1991:184-186). Unfortunately, Laughlin provides no explanation of how and when kayaks made a reverse journey to Eurasia, and the general lack of supportive evidence does not allow for further development of this idea.

The umiak's evolution from Asian coracles was originally proposed by James Hornell in 1946. According to Hornell, the transformation occurred "when the bands of early men were driven northwards by the pressure of more powerful tribes in the south" (Hornell 1970:177). Once they emerged on the Arctic Sea coast, "the lack of timber and the unsuitable nature of the round river coracle for use on the wind-swept northern waters bred in certain tribes an inventive faculty that produced the umiak, suitable for the transport of the family and its few chattels, and later, when the art was acquired, for the pursuit of the whale" (Ibid). The rounded stem and stern of the Koryak umiak is seen by some scholars as supportive evidence for the umiak's evolution from coracles (Arima

2002). The construction of the kayak, in Hornell's opinion, had no relationship to the umiak or coracle, but instead grew out of the bark canoe (Hornell 1970:179).

An important step towards understanding the nature of relationship between different skin boat traditions of the circumpolar north was undertaken by John D. Heath. Heath was the first among the kayak researchers to trace the geographical distribution of particular constructional elements and to interpret this distribution in the context of history of circumpolar cultures. Observing two geographically removed skin boat traditions, Koryak kayaks from the Sea of Okhotsk and East Greenland kayaks from the Ammassalik District, he pointed out that although different in appearance, they had three features in common: "floating" (i.e. attached only to the kayak skin) cockpit rim, flat deck, and hull shaped by a keel and a single pair of bilge stringers. Looking at the geographical distribution of these features he suggested that it may reflect inter-regional connections established during the Thule migration (Heath 1978:21-22; 2004:7). Discussing the uniquely deep forefoot of kayaks of Greenland and eastern Canada he also traces the evolution of these features to migration routes of pre-historic north:

> The eastern part of the Thule range is the only place where both Thule and Dorset culture sites are found. That the deep forefoot is confined to that area may suggest that it might have been a feature of Dorset kayaks that was adopted by the Thule culture as they migrated eastward. Yet there is no hard evidence that the Dorset culture even had kayaks. From available archaeological data, there is only a suggestion that the Dorset culture had some type of watercraft (Heath 2004:7).

In addition to the methodological value of cross-cultural comparison based on analysis of specific elements of boat construction, Heath has also introduced the idea of Arctic peninsulas as "cultural dividers." According to him, they acted as forks in the road for nomadic maritime cultures, which "would tend to go up the coast or down the coast, (…) adjust to different subsistence patterns and remain separated" (Heath 1978:20). Heath's concept of the Arctic cultural chain, as illustrated by kayak evolution, emphasizes three particular locales: "The Seward Peninsula, which separates the Bering Sea Eskimos from those of Arctic Alaska; the Alaska Peninsula, which separates the Aleuts and Pacific Eskimos from the Bering Sea Eskimos and the Melville Peninsula, which separates the inland caribou hunting Eskimos from the Central and Greenland Eskimos" (Ibid).

Heath's observations were both refined and reassessed by Jarmo Kankaanpää, who pointed out that Heath's classification is based on two separate constructional features: 1) the deck assemblage and 2) longitudinal members that form the kayak hull. Kankaanpää considered both of them configurative components – "compound structural features, which due to their primary nature most easily become unconscious "idées fixes", established configurative assumptions which can only be changed through strong intrusive impulses" (Kankaanpää 1989:24). He further argued that because of their primary nature and resistance to change these features can provide a baseline for our understanding of watercraft development in larger geographic and temporal scopes. Based on this, all historical kayaks can be divided into three main type groups: 1) flat decked kayaks with hull shaped by two stringers and keel (the East Canadian and Greenlandic types and the Koryak type); 2) flat decked types with multiple hull stringers (the Copper and Caribou Eskimo, Chukchi Sea coast of Alaska Arctic types); and 3) ridged decked types with multiple hull stringers (the Bering Sea and South Alaskan types) (Fig. 3.15.). Two kayak types – the Mackenzie and Reindeer Chukchi- are excluded from this grouping as "not directly assignable to any group" (Ibid 36).

Based on the level of the constructional complexity and geographic distribution of these types, Kankaanpää further suggests that the first group is representative of the oldest and most original kayak type in East Canada. Archaeological finds, such as a kayak rib from house #76 of the Nunguvik site on Northern Baffin Island dated to the 4th to 6th century A.D. (uncalibrated) (Mary-Rousselière 1979:22-26) imply a connection with the Dorset culture. It may have been developed in Canada by the Dorset people or their predecessors, or it could have evolved in Siberia – hence the Koryak variant – and been carried to North America by the Arctic Small Tool tradition (ASTt) culture, which extended into Alaska circa 5,000 B.P. and reached north eastern Canada and Greenland around 4000-4500 B.P. with earliest Pre-Dorset in Canada and Greenland (Ibid 33-34). Kankaanpää suggested an early spread – perhaps even from Denbigh – of the flat-bottomed kayak to the inland tribes of the Chukchi Peninsula, where it may have been used as a reindeer hunting boat and was later adopted by the Koryak for maritime use. In this scenario, the inland kayak of the Reindeer Chukchi might actually be the most archaic form of ethnographically known kayaks (Kankaanpää 1989:37), instead of being a simplified form adopted from the coastal Siberian Eskimos.

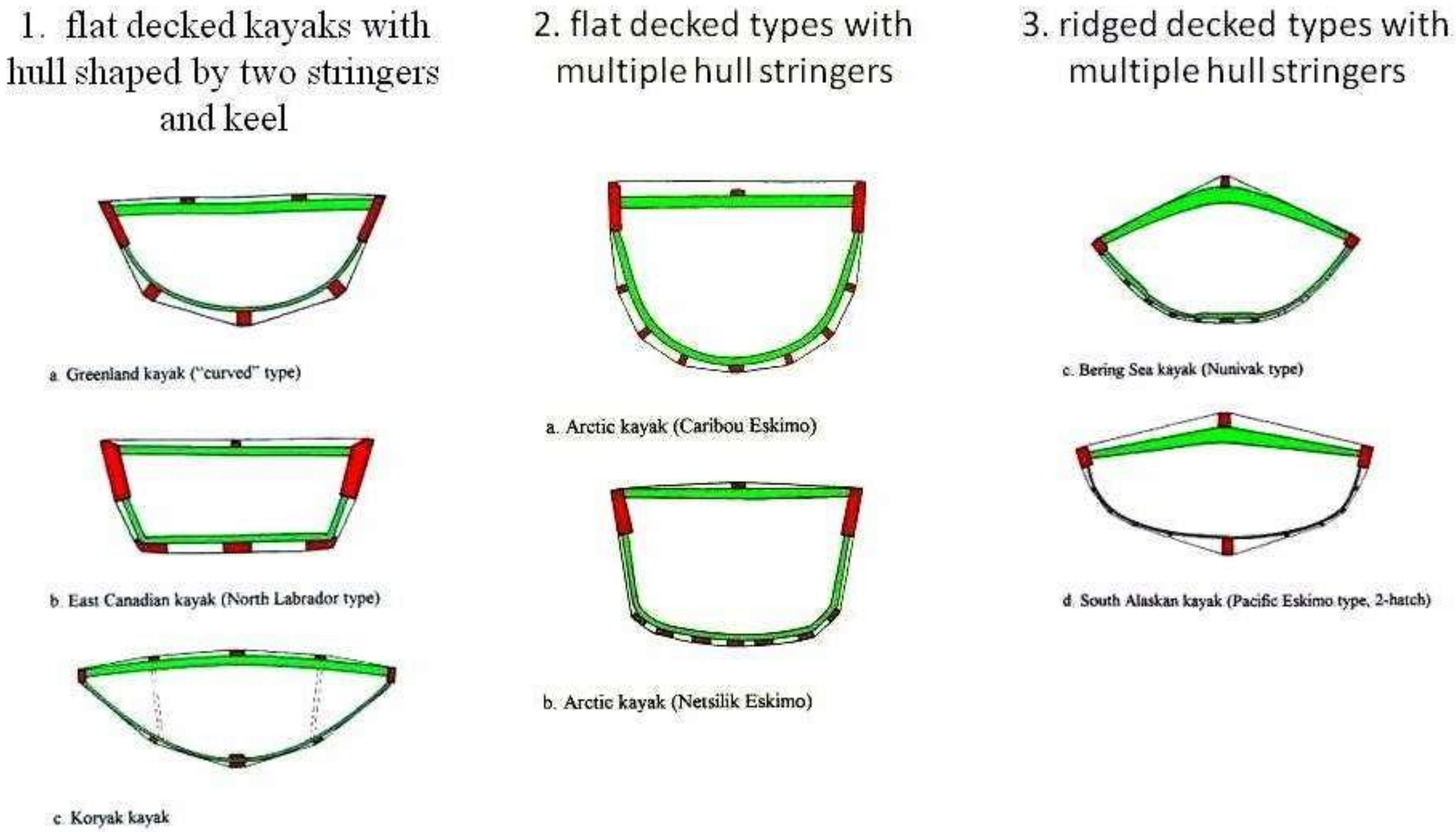

Fig.3.15. Kankaanpää's classification of three North-American Arctic kayak groups (1989:36).

The second group, consisting of flat-decked kayaks with multi-chined hulls, is connected, according to Kankaanpää, with the Thule culture and its spread into Canada and Greenland beginning in the 11th century. This conclusion is largely based on James Ford's analysis of kayak miniatures from the Birnirk site that according to him implied round bottoms (Ford 1956: 159). This and other boat-related artefacts from Birnirk site are discussed in more detail in Chapter 7.9. of this thesis.

The time and place of origin of the third group, round-hulled kayaks with ridged decks, remains an open question. The oldest ridged kayak deck beams discovered up to date are those found on Kagamil Island in the Aleutian chain, loosely dated to 890-1667 A.D. (Coltrain et al. 2006: 540; Dall 1878: Plate 8), and from the Nukleet site in Norton Bay, circa the 1400's (*cf.* Giddings 1964:83). The Kagamil Cave finds also contain thin rounded wooden fragments that may represent bent kayak ribs. Despite these comparatively recent dates, Kankaanpää proposes that both the ridged deck and multi-chined kayaks "originated in the Alaska Peninsula – Kodiak Island area or the Aleutian Islands" perhaps as early as 6700 BC in the process of adaptation to the open-ocean hunting in the high-energy environment, "since the structural function of the ridged deck is to prevent the frame from sagging in a swell (Ibid: 31)." He suggests that it spread to western Alaska fairly late, probably only toward the end of the first millennium A.D., and stopped at the southern margin of Seward Peninsula because the Punuk and Thule cultures' focus on whaling made ocean-going kayaks unnecessary. Consequently, the kayaks of the Seward Peninsula and North Alaska retained their flat decks (Ibid 38).

Kankaanpää's study in kayak topology and culture history is an important step towards systematic review of skin boat archaeological data because it points out that even isolated boat fragments can shed the light on patterns of large scale population movement in North-Eastern Siberia and North American Arctic. At the same time, the limited archaeological and ethnographic datasets leave many questions unanswered. In summary, despite a number of keen observations and bold ideas, most of the conclusions regarding the relationship between different indigenous boat forms of Eurasia and North America will remain speculative until more archaeological evidence is analyzed in a comprehensive manner, along with the living tradition and ethnographic, genetic, linguistic and environmental records.

3.4. Beyond the typology and diffusion

As evident from the review of the literature presented above, the existing scholarship on Arctic watercraft is primarily focused on boats' constructional details and performance characteristics. In those rare occasions when an attempt is made to provide a larger context or theoretical framework, the emphasis, as a rule, is on diffusion of technological trends and environmental adaptation. Boats are often presented as the most refined and complex technology produced by Arctic Native peoples with the goal of maximizing the efficiency of maritime hunting. Both kayaks and umiaks are, therefore, largely perceived as a part of hunting gear, used in a fairly limited geographical area between a permanent village and hunting grounds. Boat designs are typically described in terms of performance in hunting and adaptation to the local environmental conditions, although as evident from the previous discussion, some attempts to trace the evolutionary connections between different geographically removed types were also made. Peculiarly, despite the fact that some of these connections are linked to migratory events, the role of both umiaks and kayaks as means of convenience and potentially the very vehicles of this migration is largely ignored. Similarly unarticulated is the subject of skin boat long distance travel, although both Native oral lore and archaeological evidence suggest its existence. Bill Durham, writing in 1960, expressed the characteristic approach of his time, restricting the study of indigenous watercraft exclusively to the technological aspects of the boats:

> We are material-minded men, and if we attempt to understand our predecessors in this land in the light of their legends and superstitions they will remain forever remote and strange; as strange as would be Hollywood and Detroit interpreted for us in terms of Cinderella and the New Testament. Scrutiny of an exquisitely-finished canoe, the most demanding manufacture produced by primitive North Americans, may impart more of the dreams and talents; intelligence and passions of its builders than all native folk-lore yet compiled (Durham 1960:9).

The restrictive nature of this approach is due, perhaps, to the fact that this research is often focused on boats preserved in the museum collections, far away from the Native communities that built and used these boats. Different, more complex contexts and meanings emerged in studies not specifically focused on the boats but concerned with the anthropology and social relations of Arctic peoples (Fienup-Riordan

2007). Sergey Bogoyavlensky, for instance, who spent two years between 1967 and 1969 living with Inupiat people of King Island, positions umiak as a key element of social structure and political power of Inupiaq society. Like in many other traditional Inupiaq societies, the social and political structure of the community of King Island was centred on the powers of whaling captains, or *umialiit* (see Chapter 5 for details). Exploring the composition and mechanisms of their social position, Bogojavlensky emphasizes that the boat was both the foundation and symbol of *umialiq* power:

> Driftwood selected for a skin boat frame is unmistakable. When a man begins to haul such pieces into the men's house to dry them out for working on them, it is a public announcement that he intends to make a bid for a crew. Skin boats are constructed piece by piece, and the parts may be stored over a number of years before they are lashed together. While this work goes on, the aspiring captain will be engaged in the political struggle involved in establishing his headquarters for his clientele of younger men in the men's house. (Bogojavlensky 1969: 69).

A deeper interaction with the communities of practice both enriches and changes scholarly discourse. On one hand, observing a contemporary Native boat builder at work provides a wealth of information about the choice of materials, chain of operations and maker's decision process, feeding into the dominant skin boat research focus on constructional details (Braund 1988, Zimmerly 2000a). On another, the fluidity of living practice often resists rigid definition of tradition and established typology, as it is evident from Petersen's rendering of Greenlandic kayak typology. Observing kayaking communities of Ilulissat, Sisimiut and Nuuk, Greenland Mathew Walls noted that kayak construction is "inherently a creative process, where builders work towards goals related to the scenarios of use, invoking community experience rather than an underlying cultural schema of the 'right way' to build a kayak" (2014:7) and argued against the very existence of kayak "types" as rigid prototype. Instead, he sees similarities in design as a local convergence of form and technique resulting from "accumulative generations in the same environment, of many builders refining their kayaks according to their experience and teaching the next generation, who in turn build on their experiences" (Ibid 239). Applying this notion to the Thule migration, Walls proposes that instead of transferring a certain kayak design, the high-mobility nature of this event may have resulted in design that was continuously and rapidly adjusting to the changing conditions yet had some general characteristics suited to this dynamic setting:

> Like Greenlandic kayaks, Thule kayaks must have been highly personalized and carefully fitted to specific individuals to allow control in complex manoeuvres such as rolling or paddling in rough weather. However, Thule kayak designs may have been more generalized to compensate for the variety of conditions they were likely to be used in. Thule kayakers might have favoured efficiency in long distance paddling over manoeuvrability. Thule kayakers would not have benefited from the local navigational knowledge that Greenlandic kayakers eventually acquired, and they could not depend on their community to know where to find them if they ran into an emergency. Thule kayakers may have had to carry some supplies with them for such emergencies – and the designs might have been a bit larger than later Greenlandic kayaks to allow for storage within the kayak (Walls 2014:240).

Although thought-provoking, these suggestions remain hypothetical as Walls' review of Greenlandic archaeological data leads him to the conclusion that "fragments of Thule kayaks do not present enough inferable characteristics to permit comparison to particular Inuit designs" (Ibid: 239). Nevertheless, his emphasis on complex relationship between Arctic watercraft, mobility and place making is an important contribution to the field.

In sum, the study of Arctic indigenous watercraft in its present form encompasses a significant number of scholarly publications from early ethnographic research to recent studies of extant examples in the museum collections and collaborations with the communities of practice. Despite this seeming abundance, the themes and questions explored within this research field are few. Only a handful of scholars have viewed Arctic skin boats through prisms other than environmental determinism, typology and diffusion. In terms of choice of data sample, the overwhelming majority of literature on the subject is focused on ethnographic data with little or no mention of archaeological material. At the same time, the amount of accumulated data and perceptive observations both lay the foundations and invites further exploration of these data from different angles and with new research questions in mind.

Chapter 4: Theory and methodology

4.1. The scholarly record and indigenous narratives

The goal of this chapter is to introduce the theoretical and methodological framework of this research, defining the specific aspects of Arctic mobility that are explored in this thesis, explaining the rationale behind the choice of particular case studies, the pathways of the analysis and the study's larger theoretical context. As described in chapter 1 and chapter 3, this thesis is a response to two related challenges: a near absence of research on archaeological data pertaining to Arctic watercraft, and the need for a better understanding of Arctic mobility in general and maritime mobility in particular. Each of these challenges comes with its own set of theoretical and methodological questions. Working with archaeological material poses a number of "practical" questions from "how can a piece of worked wood be identified as a boat fragment?" and "what would a reconstructed boat look like?" to "what do artefact deposition and degree of fragmentation tell about boat practices?" A broader and more contextual investigation of Arctic mobility requires a look at the role of mobility in cultural development and identity formation. Both of these sets, however, share one fundamental concern or task of maintaining a balance, or at least a connection, between scientific inquiry and indigenous expressions and worldviews. The question "If we cannot begin to see the world through indigenous eyes, then what are we doing as archaeologists? (Whitridge 2004: 57)" can be effectively applied to many areas of anthropological discipline, but is particularly critical for research focused on a tradition which still exists in the context of living indigenous culture.

Of four Alaska Native communities that presently use skin boats for indigenous whaling (Point Hope, Barrow, Gambell and Savoonga), three are located in the immediate proximity of archaeological sites that were selected as case studies for this research. The author's visits to Barrow and Point Hope and interviews with boat builders, skin sewers and whaling captains conducted in 2012, 2013 and 2015, offered useful insight into contemporary boat practices. Although the value of the ethnographic record for interpreting archaeological data is never absolute (Wylie 1985, Blue 2003, Friesen 2012), it provides access to practices and meanings of the past, and a baseline for understanding how they change through time (McGrail 1984:149-150, Johnson 1999:48, Zborover 2009). The interviews with skin boat users and makers recorded during this research often revealed contexts and perceptions drastically different from those of existing skin boat scholarship based exclusively on study of ethnographic boats in the museum collections (see Chapter 5).

Along with rich data and food for thought this signalled the dangers of interpreting archaeological records and describing indigenous experiences of the past in terms and concepts alien to the cultures that created these records, and that lived and breathed these experiences (Schmidt and Patterson 1995). Staying in tune with authentic voices of the indigenous cultures and seeing the material record through the lenses of indigenous life is a daunting, and perhaps impossible task for a non-native researcher. In an attempt to achieve it, this research makes ample room for first-person indigenous narratives - interviews with elders and tradition bearers, stories, songs, oral tradition and ceremonies – allowing scholarly and indigenous storylines running their courses, contributing and occasionally contradicting each other.

4.2. Moving through space: mobility, environment and cognition

Mobility can be understood as a negotiation between the intent (motivation) to move and the ability to do so. This translates into two questions: “why do people move?” and “how do they move?” The seemingly hierarchical cause-and-effect relationship between these two questions defined the way archaeologists approached the subject in the past (Hawkes 1940; Childe 1969). Indeed, an inquiry into motives has an inherent promise of elucidating a broad spectrum of social mechanisms as well as chronological and spatial patterns of population movement, while the ability to move is often reviewed on a scale of technological adjustments that play a mere auxiliary role to the motives (McGhee 2009; Mason 2015), reducing it to an important, but rather mechanical accessory or side effect of the driving force of intent. Consequently, the issue of motives, most commonly discussed in terms of resource procurement and related demographics, remains at the core of archaeological examination of mobility. Historically this examination was predominantly focused on large scale population translocations that “changed prehistory with repercussions on humanity that still live with us today”

(Bellwood 2013: 3). Often indiscriminately termed "migration", "colonization," "settlement," "dispersal" and "invasion" these movements are impressive both from the point of view of their typically well-defined archaeological signature and grand-scale stories they tell, which deceivingly sets them off and above other mobility events and practices. Peter Bellwood's statement "Migration is more than mere mobility" (Ibid) is an extreme, but an accurate expression of the approach that until recently dominated studies on mobility.

Three models have been particularly influential on the development of current archaeological inquiry into the structure and mechanisms of movement. The "wave of advance model," first proposed by Luigi Cavalli-Sforza and Albert Ammerman, views population movement as a series of short-distance moves prompted by marked demographic increase in certain areas in response to improved subsistence efficiency, such as the adoption of farming (Ammerman and Cavalli-Sforza 1973). This increase generates slow and random radial movement from the place of origin, as people exhaust local resources or seek new home bases for the next generation. The mathematical estimate based on genetic statistics proposed that a population dispersed in such a manner would move in random directions at the rate of eighteen kilometres for each generation, or one kilometre per year (Ibid; Renfrew 1987:128; Figure 4.1). Ammerman and Cavli-Sforza characterized this mode of population movement as demic diffusion and emphasized that it should be distinguished from colonization or migration (1973, 1984).

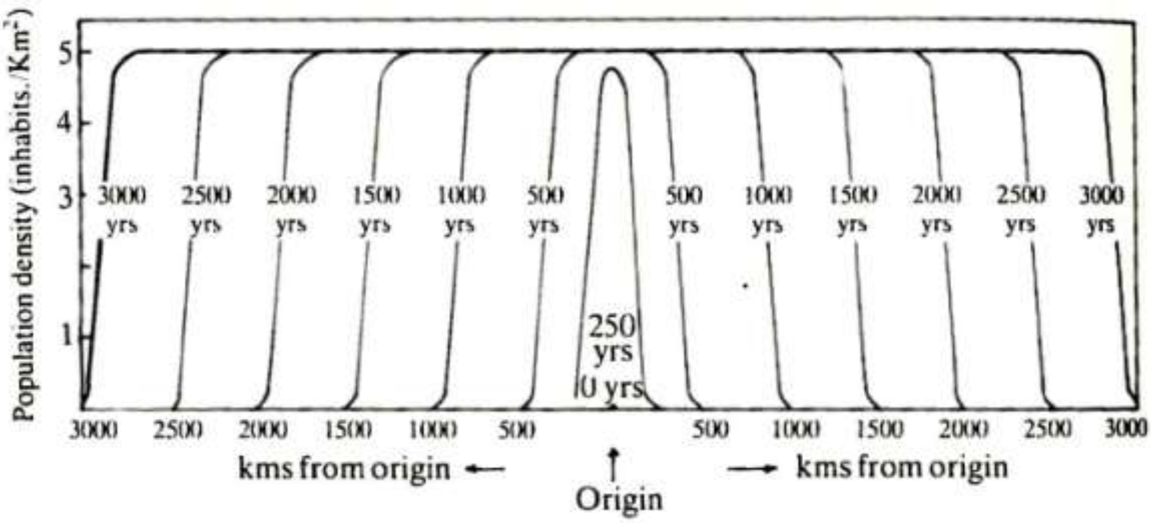

Figure 4.1. The wave of advance migration model (Renfrew 1987:128)

Another model was developed by David Anthony. Drawing from fields of demography and geography, Anthony suggested that the structure of migration can be best understood in the context of negative (push) stress in the home region and positive (pull) attractions in the destination region:

> Within this framework, migration processes become more likely as both the home negatives and destination positives increase, and as the transportation costs de-crease. Culture-specific value and belief systems also affect the decision to migrate, complicating any simple (or even sophisticated) attempt at objective cost-benefit analysis (Anthony 1990:989-900).

In contrast with the wave of advance theory, Anthony emphasizes the importance of information flow between the point of origin and destination, since “pull factors do not operate randomly, but rather apply only to specific destinations about which information is available (Brown et al.1977)” and the transportation cost, i.e. the intensity of effort required to move from one location to another (Ibid). Anthony further classified migrations into two groups: short-distance migrations that are more likely to occur in the societies with diffused subsistence focus, and long-distance migrations more typically linked to the societies pursuing highly productive but localized resources. Both are often accompanied with return migrations, but differ in terms of the level of organization. Long-distance movement in Anthony’s interpretation requires extensive planning and preparation, while shorter migrations are more likely to be impulsive. Anthony further elaborates that interregional, long-distance migration is likely to resemble the children's game of leap-frog more than it does a wave:

> Great distances may be jumped and large areas bypassed through the agency of advance "scouts" who collect information on social conditions and resource potentials and relay it back to the potential migrants. (…) Long-distance migration is dependent on the long-distance transmission of information concerning potential destinations, and on transportation routes or technologies that can counteract the frictional effects of distance. (…) The archaeological pattern produced by leapfrogging should resemble "islands" of settlement in desirable or attractive locations, separated by significant expanses of unsettled, less desirable territory (Ibid:902-903, Figure 4.2.).

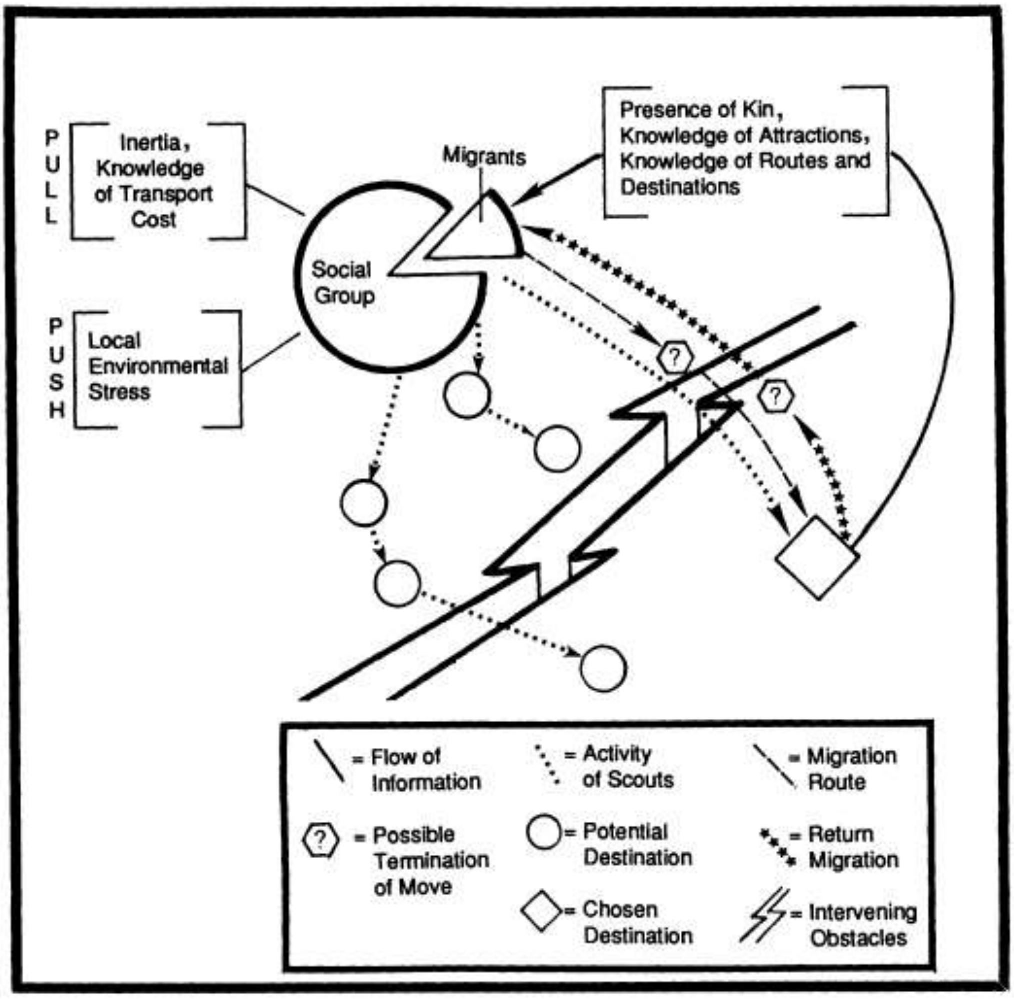

Figure 4.2. Diagram of push-pull migration process (Anthony 1990:900)

Anthony's observation that the structure of many migrations resembles a stream more than a wave, and that the migrants tend to proceed along well-defined routes was instrumental in re-defining models of short-distance movement, resulting in the third model known as "string of pearls" (Anderson and Gillam 2000:56-57). According to this paradigm, population movement occurs in the process of the fissioning of a group occupying "a circularly delimited territory" when it reaches a certain limit, and either a parent or daughter group moves into a new, adjacent territory situated along the least-cost pathway (Ibid, Figure 4.3.). The movement along a logistically determined pathway is, perhaps, the major difference between the string of pearls and wave of advance theories.

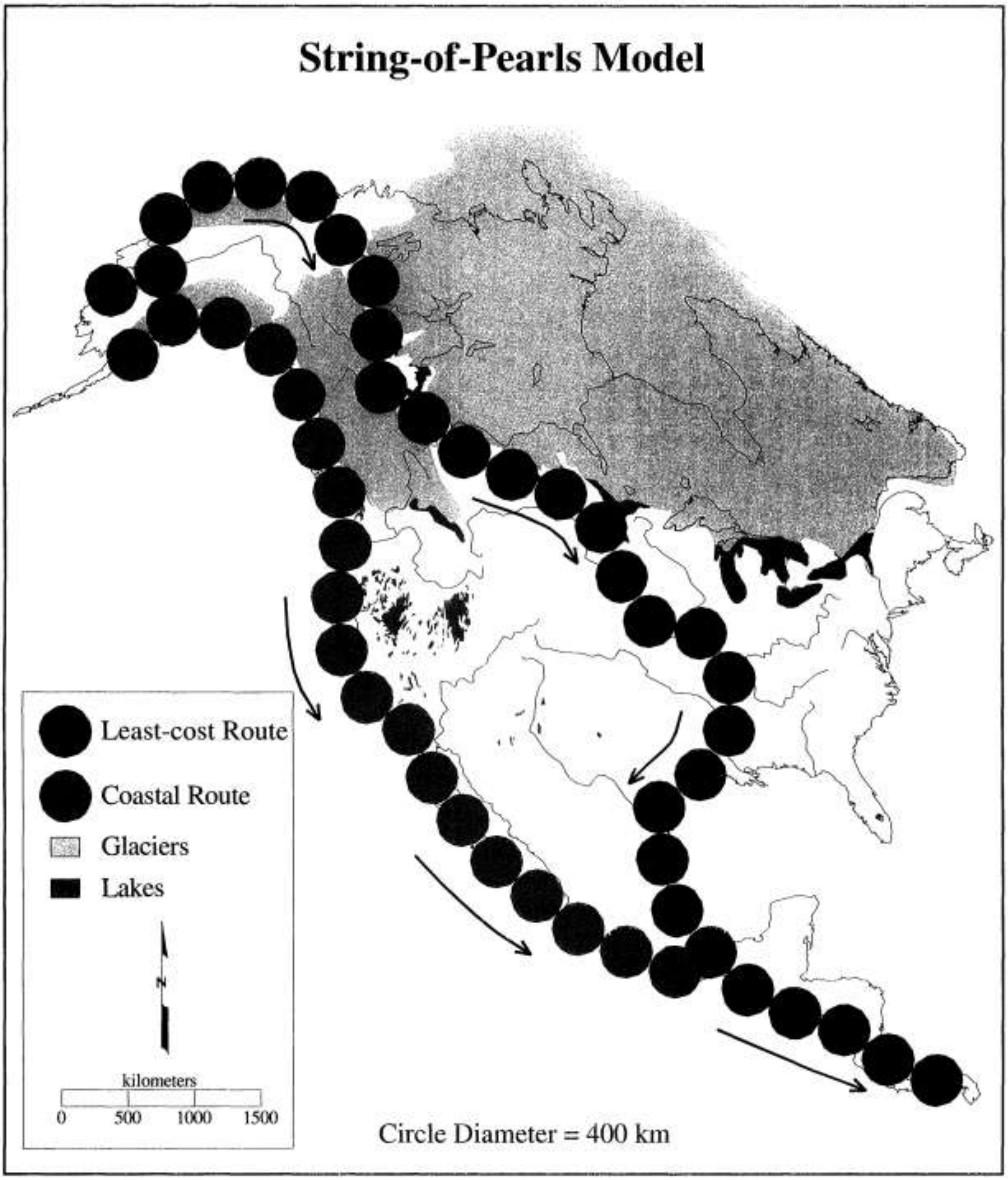

Fig.4.3. String-of-pearls model for Paleoindian colonization and movement through North America (Anderson and Gilliam 2000: 56)

All three of these models have been applied to prehistoric migrations in North America with the major focus on the initial colonization of the continent. The population and overkill model proposed by Paul Martin used the wave of advance paradigm to present human expansion in North America as a wave of expansions motivated by the pursuit of large mammals. According to his theory, the explosive overkill along the fronts of this movement lead to extermination of the prey and necessitated another move into new territory (Martin 1973: 970-972).

Both the leapfrog and string of pearl models were considered in Anderson and Gillam's least-cost analysis of the initial population dispersal in the North and South America and mapping of potential routes and movement corridors taken by early colonizers across the New World (Anderson and Gillam 2000). The leapfrog model was found more suitable for explaining the pattern of site-distribution and the rate of colonization for both ice-free land corridor and maritime routes scenarios. The use of watercraft is considered likely in both, since even in a land bridge and ice-free corridor scenario migrants would have crossed numerous bodies of water: "We can imagine thousands of square miles of the land bridge as being a morass of blind channels, sloughs, cutoff lakes, and river bars" (Engelbrecht and Seyfert 1994). Maritime migration appears particularly plausible when female, children and elderly are considered (Antoniou 2015:9), since boats would have significantly relieved the stress of extended journey and burden carrying, while travelling along the coast would have offered easy access to such resources as shellfish and seaweed, which can be gathered by individuals of all ages and level of physical abilities (Erlandson et al. 2007:169-171).

Following the initial settling the North American continent became the stage of innumerable migrations and population movements. Archaeologists working in the Arctic and Subarctic regions of the continent focused on both transcontinental and inter-regional movements. Much of this effort was centred on defining archaeological cultures and establishing culture chronologies. Heavily influenced by the early twentieth century quest for Eskimos origins, Arctic archaeology was and still is dominated by attempts to source particular cultures and map their geographical and chronological distribution.

When theoretical frameworks are evoked, a leap-frog model is often the favoured explanation for most of the currently identified long-distance population movements in the American Arctic. Applied to the Thule migration, which is one of the focuses of this study, this model suggests that the rapid movement of Arctic whalers from Western Alaska to Canada and Greenland was a journey, or a series of journeys, targeting a particular known and attractive destination or destinations, which were reached in a short time, possibly within 25 years, although further colonization and culture change spanned centuries (McGhee 1984a; Morrison 1999, see chapter 2 of this thesis). The migrants' ability to "jump" over unfavourable territories without leaving occupational signature implied efficient transportation, a fact which is well acknowledged and poorly researched at the current stage of scholarship. With much of the debate focused on chronology and motives of the Thule migration (See chapter 2), the question of how Thule pioneers moved through the environment remains marginal even in the discussion on the routes of the movement. Interestingly, although researchers overwhelmingly acknowledge that the Thule people hunted whales from umiaks, the role of water transportation in this mobility event is rarely considered. Instead, the emphasis is placed on dog traction, which is one of the archaeological signatures of the Eastern Thule culture (Morrison 1999; Freisen 2012). Pondering the logistics of Thule movement in attempt to explain the crossing of the Central Canadian Arctic, where the year-around sea ice may have present even during the Neo-Atlantic Warming Episode, David Morrison suggested that

> Thule migrants did their main <u>travelling during the long days of spring, by dog-sled, with their precious boats lashed on top</u> (emphasis is mine – Evguenia Anichtchenko). Autumn would be spent in intensive hunting, perhaps sometimes at inland locations where muskoxen and caribou may have been more reliable than coastal sea mammals. In winter they hunkered down in newly-built houses, and the next spring were off again (Morrison 1999:150).

According to Morrison's estimate, travelling in this fashion for only a few months of the year, the migrants would traverse about 100 kilometres a year, a speed that would allow covering the distance from Point Barrow to Northwest Greenland in roughly 30 years. His calculations are based on an analogy with the comparatively recent journey undertaken by a Baffin Island leader Qidtlarssuaq and a small community of followers from Devon Island to north-western Greenland in 1860 (Rousseliere 1991). It took four years to cross 450 kilometres. Qidtlarssuaq left with ten dog teams and fifty men, women and children. At some point of the journey half of the group decided to turn back, leaving about twenty-five people to continue on to Greenland. Under Qidtlarssuaq's leadership they reached their destination with just a few causalities in contrast with the members of the split group who starved to death during their attempt to return to Baffin Island. As did Qidtlarssuaq's group when they attempted to return home after Qidtlarssuaq himself died, which attests to the quality of his leadership (Morrison 1999: 150). While information provided by this journey regarding the speed of Arctic travel offers a valuable proxy for Thule migration, perhaps even more important are the insights it offers into such small scale particularities of the journey as the size of the group, the practical concerns of the journey as well as issues of day-to-day social interactions and role of leadership. Based on these insights Morrison postulates that the explosive movements of Thule migration may have been fuelled by the social ambition of whaling chiefs, who together with their kin and whaling crew were willing to risk a journey to a reputed whaling Eldorado in pursuit of social prestige.

Looking at the Thule migration through the lens of more recent history of human travel shifts the focus from a bird's-eye view of broad geographic movement to a more dynamic and also elusive narrative in which the central role belongs to the daily interaction between traveller and the environment (Whitridge 2012, 2013). For travellers making their way through tundra, sea and ice the question of how to traverse the next several kilometres on the way to their destination is at least the same, and likely more important than the overreaching goal of the entire journey. In fact, setting a particular destination is, in a practical sense, a manifestation and assessment of an ability to reach it. This ability is rehearsed in such daily routine movements as subsistence exploits, recreational trips, exercise etc. Thus, from the point of view of how the movement is carried out, migration is not "more than the mobility", but rather a more socially accentuated, spatially and temporally channelled, and destination focused manifestation of the skills, knowledge and technology regularly employed in other, more routine mobility scenarios.

Without understanding how people approached daily journeys any conclusions about migration will remain speculative. Just as the lack of a specific word for migration in the Inuit language would prompt a speaker to use a plethora of verbs and nouns to capture the meaning, the academic discourse on migration may need to shed its superiority complex and re-establish a connection with multiple aspects of transportation technology and practices that afforded it. This connection is particularly important, as these routine mobility practices not only affected the speed of travel or efficiency of subsistence exploits, but also the way people perceived, constructed and inhabited their environment. Arguing against what he called "the imagined separation between cognition and locomotion" Tim Ingold noted that:

> …we tend to imagine that things are perceived from a stationary platform,... but in real life, for the most part, we do not perceive things from a single vantage point, but rather by walking around them. As the founder of ecological psychology, James Gibson, argued in his classic work on visual perception, the forms of the objects we see are specified by transformations in the pattern of reflected light reaching our eyes as we move about in their vicinity. We perceive, in short, not from a fixed point but along what Gibson calls a 'path of observation', a continuous itinerary of movement (Gibson 1979: 195–197). But if perception is thus a function of movement, then what we perceive must, at least in part, depend on how we move. Locomotion, not cognition, must be the starting point for the study of perceptual activity (Ingold 2000a: 166). Or more strictly, cognition should not be *set off* from locomotion (Ingold 2011:45-46).

Linking cognition and locomotion effectively removes hierarchy and to some degree softens the dichotomy of mobility's "why?" and "how?" articulated in the beginning of this chapter. Viewed as a cognitive process, mobility assumes a holistic nature, which organically embraces motives, process and outcomes of the movement, an idea which fits well into the Native worldview. "Everything is connected" is one of the most important ontological beliefs in most, if not all, Arctic indigenous societies (Fienup-Riordan 2007).

Acknowledging formative power of movement as a process has important implications for the classic questions of origin, diffusion, and culture history. Because of its transformative nature, a journey may, in theory, not just transport, but also create cultures. Emphasizing Thule Inuit as a community of practice, Mathew Walls proposes:

> Rather than a single homogenous cultural group that developed somewhere in Alaska and then moved into the eastern Arctic, Thule culture may be something that developed through the process of migrations. The first groups of Thule migrants may have been a heterogeneous amalgamation of individuals with complex and mixed ancestry, who were united in a shared intention of never returning to the place they were born and raised, were not wedded to a particular heritage, and were ready to explore new opportunities and settle new places (2014:41).

The ability to move through the environment is thus an ontological process, which "often involves an imaginative engagement with profoundly new sorts of places, resulting in a creative reworking of the mental, social, and material frames through which people grasp the world" (Whitridge 2012:44). Taking the Thule colonization of Labrador as a case study, Whitridge states that cognitive resources and social needs of colonists appear as significant as the material environment itself for shaping the record they produced:

> In the course of rapidly settling the eastern Arctic, Classic Thule-phase Inuit encountered a succession of radically different land, sea- and icescapes, to which they had to adjust their habits of making living. Such an adjustment involved not merely learning the biotic schedules and spatial layouts of new territories, but also assimilating profoundly new sorts of organisms, people, and places of foreign worldview. The archaeological record of Inuit colonization of the south-eastern Canadian Arctic reflects this interplay between a resilient cognitive style and novel ecological situations. As Inuit expanded south from Baffin Island into northern Labrador and Quebec they encountered the transition from Arctic tundra to Subarctic forest for perhaps the first time since their ancestors had left Western Arctic. The novel patterns of residence and land use, and representation of the world that emerged here, represent an interesting instance of cultural accommodation to a novel environment – the forging of a distinctive "ecoreality" (2004).

Ethnographic inquiry into the Inuit/Eskimo worldviews indicate that this "ecoreality" encompassed both empirical and non-empirical environments, and that in fact, the distinction between two was virtually non-existent:

> To Eskimos, the universe possessed a fundamental unity in which several distinctions basic to the Western way of seeing things did not exist. Contrasts such as life and death, dreams and reality, and the beginning and end had no meaning. Extremes of time, space, and existence were all seen as different points of a continuum, or as different phases or aspects of a single, unified whole, which was reality. Eskimos did not even distinguish between possible and impossible, under the right conditions, anything was possible. The Eskimo believed that everything is imbued with a soul, or energy source, which conveys to its shape the potential for action, and a disposition, which determines its attitude toward other phenomena. A rock outcrop on a hillside, for example is not an inherently lifeless feature of the landscape, but a vital being (…) When Eskimo gazed out across the countryside, he did not see a static arrangement of land forms as we would. He perceived a complex, exciting, and often frightening world of natural and supernatural phenomena in which even inert topographic features contained within them the potential for dynamic action" (Burch 2013:17).

While it is difficult to establish with all certainly how far back in time these perceptional paradigms extend from "ethnographic times," the artistic legacy of Thule, Birnirk, Iputak, and Old Bering Sea cultures contains multiple depictions of transformations from persons to animals and birds, and from one animal to another, indicating that this notion of fluidity existed in Arctic North America at least for fifteen hundred years. The Native notion of active alive landscapes aligns with the phenomenological discourse of actor network, which affords agency to non-human phenomena, and maintains that landscapes are not just passive stages for human action, but "also do things and have experiential effects in relations to persons" (Tilley 2010:31). Addressing the question "how did people move through the environment?" with this worldview in mind requires an inquiry into the material proxies of movement, most obviously means of transportation, with an approach, which combines considering them both as material artefact and cognitive device.

4.3. Moving in a skin boat

Maritime transportation is slowly gaining recognition as a theoretically important subject. The approaches and perceptions that develop through this recognition are widely varied, ranging from viewing boats as environmentally determined tools of subsistence (Durham 1960) and instruments of production (Ames 2002:47), to more phenomenologically oriented discussions of boat practices as processes of enskillment (Walls 2014). As an inquiry into the connection between the static archaeological record and the process of people's movement through an aquatic environment, this research revolves around two connected sets of meanings: the meaning of boats and human perception of the ocean, because the story of people at sea is at the intersection of these two sets. Chapter 5 of this thesis takes a closer look at the meaning of boats in ethnographically recorded practices. The main focus here is on the human relationship with the ocean, articulated through the process of seafaring.

In the case of Arctic maritime cultures, this relationship includes not only open water, but also sea ice in all its various forms – from shore pack which provided a platform for winter hunting to ice floes that affected spring and summer voyages. To some degree, even sleds and sledges can be considered maritime transport, for most sled routes in the Arctic were over winter sea ice. Expertly adapted to the sea-ice environment, Arctic umiaks and kayaks are in essence "ice boats." With their hulls made of skins of pagophylic mammals, they are literally born on ice. Light and shallow-drafted they can be easily carried to the edge of ice pack, launched off it, or pulled back on for a quick stop, temporary camping and drying. Like many Arctic sea mammals, skin-covered watercraft are at home on sea ice.

Embracing sea ice as a part of the maritime environment and an element of people's relationship with the ocean is important for the very definition of Arctic maritime cultures and for establishing both physical and cognitive frameworks for people's interaction with their world. In the most immediate sense, it emphasizes that the extended period of ice coverage was not necessarily an interruption in ocean-focused activities. Sea ice hunting took men away from their villages in the heart of winter, and depending on type of hunting, they brought their kayaks with them to pursue the prey or retrieve the killed animal. In Eastern American Arctic, entire villages relocated to the ice pack edge to gain closer proximity to seals, living on sea ice for several months a year (Balikci 1970:56). The sea was never off limits or just a mere backdrop of life in the coastal Arctic, but a central, inhabited, not just visited, environment.

The close relationship with the ocean influenced both people's mobility pattern and the culture history of the region well beyond the presence of boats and high volume of sea traffic. For the people bound to the sea for their survival and cultural identity, being at the ocean was the central experience around which both their material culture and worldviews evolved. Consequently, the villages and camp sites on land, so important for archaeological inquiry, may, in fact, be of secondary, supportive importance as places in-between and activities in-preparation for seafaring or ice-hunting. This notion suggests that in order to understand the world of Arctic coastal people we might need to make a radical change of perspective, shifting away from perceiving seafaring in general and boats in particular as extensions of land settlement, and acknowledge it as a culturally and archaeologically formative agency, which structured life on land, as suggested by Hein Bjerck:

> What if we turn this around and see the boat as a core in these peoples' being in- the-world and the settlement as a supplement, a necessary land support for their being-in-the-boat? What if the boat was perceived as the center of their physical and mental world, a mobile site that was always there? In what manners may boats have influenced the role and function of the land settlements? What did the boat do to its human companions and their logistical strategies, activity patterns, settlements, and social structure? (2016:8)

Applying this perspective to the analysis of Mesolithic sites in Norway, Bjerck emphasizes that in nomadic forager societies boats, particularly those with large cargo capacity and multi-person crews, reduce mariners' dependence on established camps and consequently generate new sites:

> At the end of the day you do not have to reach a specific site to find the things you need, a dwelling and a place to sleep, food storages, instruments, and equipment. Your home is where you need it. You do not have to fight bad weather to reach the things that you depend on or persons that depend on you. This freedom may reduce both transport costs as well as the risk of losing life and material valuables in the struggle to reach "home." A consequence is that many settlements are produced, many more than in a stable settlement structure with permanent dwellings at optimal locations (e.g., Bjerck 1990). To conclude, the combined affordances and constraints of boats may very well have affected the size and composition of basic residential groups, set of activities, intervals and length of occupation at the settlements, and, subsequently, how settlements appear in the archaeological record (Ibid:16, Figure 4.4.).

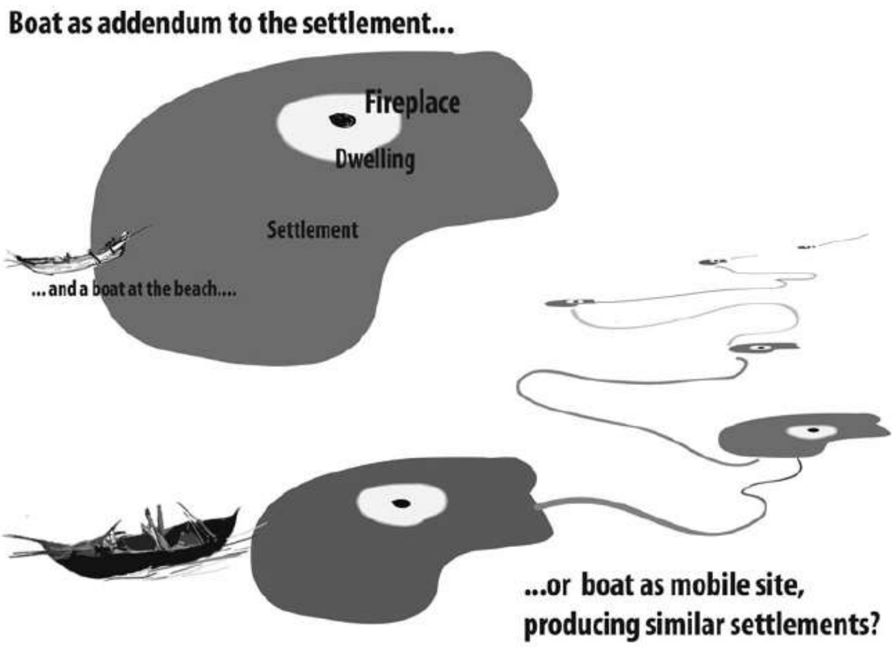

Figure 4.4. Boat as settlement's addendum versus boat as a mobile site diagram. Drawing by H. Bjerck (Bjerck 2016:16)

Similar dynamics existed in the Arctic North America, even in so called sedentary societies with large settlements. While winter journeys were typically anchored in the villages, summer voyages, particularly those employing umiaks, were unrestricted by the need to return. Pulled ashore and propped on one side, umiaks offered an immediate shelter well supplied with all necessary tools and implements (Fig.4.5, 4.6.). Kayaks were also used as windbreaks and parts of improvised shelters. In a practical sense, for the

Arctic maritime hunter, home was where his boat was. This conceptual connection may in part manifest itself in deposition and reuse of boat fragments in house construction, which is explored later in this thesis.

Fig. 4.5. "Eskimo camp, Nome beach, Alaska, 1905." ASL-P137-018.

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The seemingly expendable concept of home, however, had its politically imposed limitations, particularly in densely populated areas of Alaska where territorial boundaries between different nations were well established and zealously guarded. Oral histories from nineteenth and early twentieth century make it clear that if people of one nation found trespassers on their land, they would try to annihilate them unless they were partners or relatives (Burch 2005:28). At the same time, the Bering Straits region folklore contains stories of such accidental trespassing occasionally laying a foundation of new relations (Kaplan 1988:147-157). Interestingly, the territorial claims do not appear to extend towards the ocean. The concept of ownership of coastal waters is not recorded in Arctic ethnography or oral lore. Naval warfare was almost non-existent with the possible exception of several bow-and-arrow encounters in the Yukon-Kuskokwim Delta (Fienup-Riordan and Rearden 2016).

Fig. 4.6." At home under umiak." ASL-P137-025.

Outside of the considerations of territoriality, one of the most persistent issues of travelling in skin boats was the necessity to dry the boat every three to five days to prevent it from becoming waterlogged (see chapter 5 for details). This had an immediate effect on the route and dynamics of the voyage. Done in these intervals, long distance travelling in skin boats has a "stitching" pattern, with sea voyages running a fairly regular length between landings. Boat journeys, thus, stitched the environment as geographical reality and cognitive landscape, continuously connecting the ocean, sea ice, and the land. The resulting network had a much denser "mesh" and higher geographical resolution than, for instance, European maritime networks shaped by ship technology which allowed for weeks and even months of seafaring without landing. For Arctic seafarers, long-distance travelling meant regular (in a typical scenario - daily) encounters with coastal environments and people inhabiting these locations. Assuming ten hours of travel per day at 6-16 km per hour (Burch 2006:289), this would mean landing every 60-160 km. Given the risk of being found trespassing, described above, moving in this manner through the other nations' territory meant re-confirming and re-establishing extended personal and political relations. The skin boat voyaging, thus, entailed a high degree of connectivity between different social and geographical settings of the Arctic and required the knowledge and ability to negotiate these settings. As the key element of these journeys, skin-covered watercraft both afforded these connections and was influenced by them. Archaeological remains of these boats combined with more recent ethnographic record contain a challenging promise of a deeper understanding of mobility patterns and maritime networks of the North-American Arctic.

4.4. Research strategies and case studies definitions

A large-scale review of Arctic maritime mobility requires an effective way of connecting individual sites' data and analyzing them in the context of this connection. Methodological steps used in the process of this research were, thus, selected to provide an effective system for two stages of analysis: 1) analysis of boat data at a particular site, and 2) cross-regional comparison of locally observed trends with the goal of establishing patterns and chronology of persistence and change in construction, use and the meaning of boats; and through these proxies understanding how prehistoric people navigated empirical and non-empirical environments of the North-American Arctic. Three different types of datasets constitute the body of evidence upon which thesis observations and conclusions are based: archaeological, ethnographic, and living traditions. All three are of equal importance for understanding the complexity of boat use, but archaeological data takes the lead in anchoring this study in time and space through the analysis of selected case studies, with ethnographic and living tradition datasets providing additional information for its interpretation. Although slightly biased, this strategy allows to focus on material that previously has been largely ignored and to introduce boat archaeology into current anthropological discourse.

As it has been discussed in Chapter I, two considerations played crucial role in the selection of case studies analyzed in this thesis: the presence of sufficient boat data and the ability of the combined set of case studies to provide a geographically and chronologically continuous sweep across the North American Arctic. The search for richer boat dataset has an inherent bias towards a particular site type. As a rule, most abundant boat artefact samples are associated with comparatively large permanent settlements with an extended chronology of habitation. All three case studies analyzed in this thesis belong to this group. Smaller sites of a different nature contain their own unique and often better chronologically defined records. An inventory of Arctic archaeological sites with boat-related finds includes boat and paddle caches, burials, butchering grounds, seasonal hunting camps, temporary boat drying racks, and more. More transient by their nature these sites can perhaps be argued to be a better fit for understanding Arctic mobility, but are also more geographically and culturally dispersed and harder to bring together in cross-regional analysis. Some of the insights gained from interaction with these data are integrated in this research, but more thorough engagement is needed, and can perhaps happen beyond this study.

The case studies selection was also guided by an interest in examining different geographic settings (insular, mainland coastal and archipelago), and cultural affiliations (Siberian Yupik, Inupiaq, and Canadian Inuit). The resulting set includes three sites: Kukulik on St. Lawrence Island in Bering Strait, Birnirk on the Chukchi Sea coast and Qariaraqyuk in the Canadian Arctic Archipelago. Moving west to east, the case study review starts with St. Lawrence Island archaeological record, which contains some of the earliest boat remains analyzed in this thesis (Punuk culture). The Island is the home of the Siberian Yupik people, who continue building and using skin-covered umiaks, but lost their kayak tradition. The St. Lawrence has several important archaeological sites, of which the Kukulik was chosen on the grounds of especially rich boat data. Archaeological collections pertaining to this site contains over 300 boat artefacts and are curated in University of Alaska Museum of the North, Fairbanks, Alaska and the National Museum of Natural History, Washington DC.

The next case study, Birnirk archaeological site, is located on a sand spit in the north-eastern corner of the Chukchi Sea near Pont Barrow. As the type-site which gave its name to Birnirk culture, and as a possible origin of early Thule, the site played an important role in the development of culture history of North American Arctic. Thus, chronologically this review is centred on Birnirk and early Thule cultures. The site is located in the traditional lands of Chukchi Sea Inupiat, just a few kilometres from the city of Barrow, one of the most active centres of umiak building and use. Archaeological collections pertaining to this site are curated in University of Alaska Museum of the North, Fairbanks, Alaska, the National Museum of Natural History, Washington DC., the

American Museum of Natural History, New York, and the Canadian Museum of Civilization, Ottawa.

The third case study is positioned farther north and east from Birnirk, half way across the Central Canadian Arctic Archipelago on the southern shore of Somerset Island. The Qariaraqyuk is one of the largest sites dating to the classic and late Thule periods. The site was abandoned in late 1400 AD and lacks cultural connection with any contemporary community. The pertaining archaeological collections were examined at the Canadian Museum of Civilization, Ottawa.

To facilitate the research and stream-line the discussion, the boat data from each site was organized into three tables attached as Appendices (See Appendices I-III). The tables provide information about each artefact's functional meaning, dimensions and on-site provenience, organized by the object numbers. Images are available in most, but not all of the cases.

Each case is structured in the similar way to ease cross-regional comparison and introduced in the context of site-specific ethnographic and archaeological horizons, providing a localized framework for the analysis of archaeological data. Impressive in its geographical scale, the North-American Arctic has rich and complex histories, which often defy linear chronological comparison of different sites and mobility events. Thus, to allow for comparison and cross-regional conclusions, data from the case studies are presented in a bi-focal manner, consisting of quantitative and qualitative analyses.

The qualitative approach is exercised in addressing a different conceptual theme related to Arctic maritime mobility in each of the three case studies. The insular location of St. Lawrence Island case study, for instance, invites a discussion on the direction and range of indigenous sea voyaging as reflected in skin boat archaeological and ethnographic record. As such, it is focused on maritime mobility as the ability to negotiate the marine environment. The following Chukchi Sea inquiry is centred on the site, which is closely linked with the beginning of the Thule migration, and as such addresses the issues of development in watercraft technology as motivation for long-distance migrations or more localised subsistence movements. By extension, it is concerned with the consistency and change of associated practices and beliefs. The Canadian Arctic case study is focused on the social meanings of watercraft in the context of High Arctic environment with its short open water period and scarcity of wood which affected both the construction and recycling of watercraft. It assesses the changes in value of maritime mobility and associated social shifts.

Quantitative elements include such inquiries as the statistical and spatial analysis of boat artefacts. This examination aims at understanding of prehistoric skin boat practices, per-capita frequency of boat use and place of seafaring activities in the social structure (See Chapter 1.3.). Admittingly, “boat artefact” is a very arbitrary statistical unit. It may mean a crudely carved miniature, fragment of boat frame, or a complete watercraft (see Chapter 4.5). In the latter case, complete boats such as the Peary Land umiak, could technically count as a single object, which paradoxically would result in low ratio of boat parts in the overall artefact assemblage. On the other end of the spectrum, a broken kayak rib can be entered as several boat artefacts. To mediate the data biases that can result from a formal quantitative approach, each boat artefact was reviewed in terms of its vertical and horizontal in-situ positioning (if and when it was available) and analyzed in the context of site features and other boat-related objects. Resulting datasets allowed identifying boat frame clusters, which in turn was instrumental for boat reconstructions (see Chapters 6.10 and 7.8) and offered additional opportunities for cross-regional analysis. Methodological steps used to reconstruct Arctic skin boats from the fragmented archaeological data are described in Appendix V.

Overall, the cross-regional analysis brings together conclusions and observations pertaining to each of the case studies in order to elucidate persistence and change of practices and meanings pertaining to circumpolar watercraft and their use through space and time. Are there differences in boat-related data from different chronological strata of the same site? Do geographically-removed sites occupied during the same period exhibit similarities in water technology? Understanding these aspects allows for reconstruction of chronology of prehistoric travel and socio-technological networks of the Arctic.

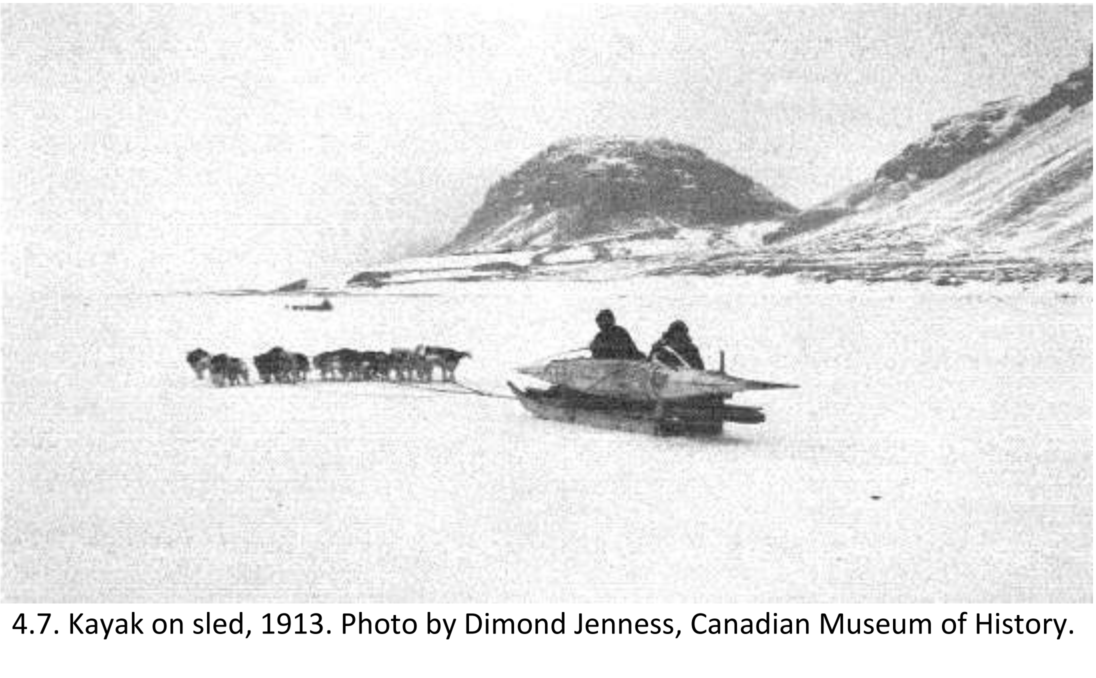
4.5. Working with archaeological dataset

The archaeological skin boat data considered in this thesis consists of three categories: 1) fragments of frames and skin covers of full-size kayaks and umiaks; 2) removable components exclusively associated with boats and maritime transportation, such as paddles, oars, masts, sails etc.; 3) representational artefacts: boat miniatures and artwork depicting boats. Recognizably, boat manufacturing and use were associated with a much wider inventory of tools and materials. Adzes, drills, burins and wedges were all employed in making circumpolar skin boat frames. Needles, scrapers and sinew twisters were necessary for crafting skin covers. Inflatable skin floats, often represented in the archaeological record by ivory valves (originally inserted into the float "neck" for inflation) were used for tiring harpooned marine mammals and in some regions for adding buoyancy to watercraft. Wooden and ivory water-bailing pails for open skin boats and tubes for kayaks helped to keep skin watercraft dry. Harpoons, spears and throwing boards were imperative for marine hunting and as such were an integral part of an artefact complex associated with kayaks and umiaks. However, most of these objects had functions outside of making and using boats and do not independently signify skin watercraft. For that reason they are not given much consideration and are employed only occasionally as supportive evidence.

As illustrated in the Chapter 3.2, although archaeological data pertaining to circumpolar skin boats has rarely been the subject of specifically focused research, boat artefacts are regularly present in circumpolar archaeological sites. Perpetually peripheral to archaeologists' interest, boat data are as a rule published in an incomplete and imprecise manner, often lacking dimensions, site provenance and photographs. In those cases when following the lead of a published report the author of this work undertook further research in the archaeological collections, it often revealed actual boat sample significantly larger and richer than the published descriptions, partly because of the selective nature of publication, and partly due to misidentification of many boat finds.

Identifying an archaeological artefact as a fragment of skin watercraft is not an easy task, and with the current lack of any field aids for such identification, it is largely subject to the archaeologists' interpretation, which is rarely explained. An average umiak frame consists of about sixty wooden, bone and ivory members, individually shaped and fastened together. In the archaeological record skin boats are usually disassembled, disarticulated and dispersed. Some of these fragments, such as umiak bottom crosspieces, side ribs, head boards, and cleats are easier to identify than less-specifically shaped and often fragmented stringers, gunwales and thwarts. Consequently, a significant amount of umiak and kayak parts ends up in "worked wood" and "unidentified artefacts" categories. Labelling of archaeological boat artefacts errs in both directions: 1) identifying an object unrelated to boat construction as a "boat part", and 2) identifying a boat part as an artefact of different function, typically a sled fragment.

This latter pattern goes beyond erroneous interpretation or mere resemblance, reflecting actual affinity between sleds and boats. Sleds and boats share a number of meanings and features. As the two main means of traditional Arctic transportation they are the largest mobile objects, often used in tandem (Fig. 4.7). The mobile nature typically allows for a distinction between boat stringers or sled parts and stationary wooden structures, such as houses and storage racks, although in some cases boat and sled parts were apparently reused in building both. Whereas racks and houses can be built using mortise and tenon technology secured by pegs or even lacking any fasteners, boat and sled frames have to be lashed together to maintain structural integrity during travel. It is theoretically possible and archaeologically suggested by the artefacts from the 8,500 year old Zhokhov site in the New Siberian Islands, that sleds can be constructed without lashing, using fish glue, and binding qualities of ice and rawhide (Pitulko pers.com.), but such methods would be laborious and more suitable to environments with year-around subzero temperatures. In more standard Arctic scenarios, both sleds and boats construction relies on lashing, which secures frame parts together while allowing some flexibility. Consequently, the presence of lashing holes or marks on large wooden timbers is usually helpful in establishing if these were used for stationary (houses, racks) or mobile (boat, sled) structures, but does not allow to distinguish boat parts from sled fragments.



4.7. Kayak on sled, 1913. Photo by Dimond Jenness, Canadian Museum of History.

In addition to similar constructional techniques, boats and sleds were often used together and stored in mutual proximity, entering the archaeological record as spatially compact collections of mixed sled and boat parts. Ethnographic umiak and sled use shows a high rate of recycling of wooden fragments from boat into sled complex and vice versa. Beverly Aveoganna's umiak rack in Wainwright, Alaska, for instance, is made from old sled runners (Fig. 4.8.), while the shape of cross bars of the sled illustrated in Birket-Smith's study on the Caribou Inuit (1929; Fig. 4.9) indicates that they were likely made from umiak cross pieces These observations not only highlight some difficulties of artefact attribution, but prompt the question of what practical considerations and cultural concepts underlay Arctic recycling practices. Re-making of one object into another was likely not a coincidental process, but a conscious choice guided by such practical aspects as shape and size of both "source" and "end product" objects, as well as by a broader relationship between their functions and cultural meanings.

Figure 4.8. Beverly Aveoganna's umiak, Wainwright, Alaska, 2012. Photo by E. Anicthchenko. Note the use of sled runners in construction of boat rack..

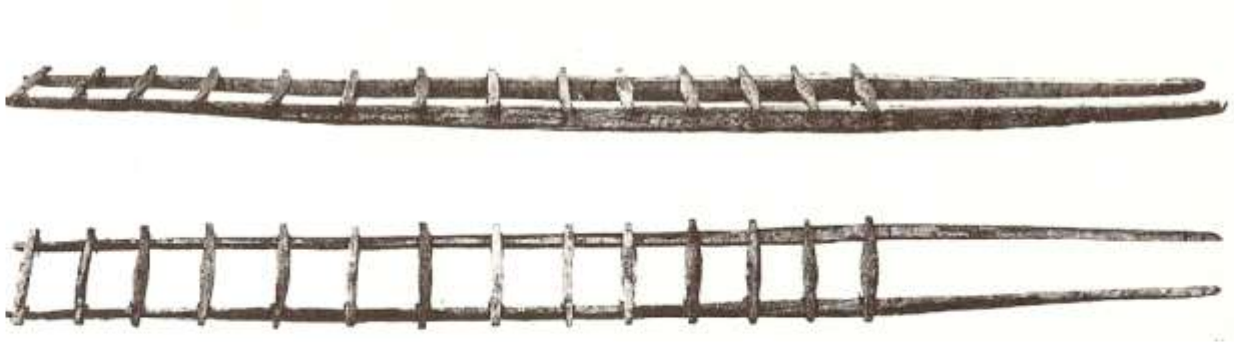


Figure 4.9. Caribou Inuit sled (Birket-Smith 1929)

In some ways this process may have paralleled the concept of soul recycling, present in all Inuit societies (Burch 2013). In traditional Inupiaq and Yup'ik worldview, when a community member passes away, one of his three souls moves into a new born child, whose identity is permanently marked by this act. Rather than re-incarnation, this is a merging of spirits that ensures continuous and active communion with ancestors. The soul does not, however, randomly inhabit the first child born after the death of the individual, but often "chooses" the child of a family member, thus maintaining kinship connections. Recycling of objects may have also been regulated by the considerations of artefact "families," with "source" and "end product" objects belonging to the same conceptual networks. Some of these networks are seemingly transparent. For instance, because of its function as the "floor" of a boat, it is somewhat logical to transform umiak cross-bottom pieces into sled cross-timbers, as in the above-cited example. Similar reasoning could have guided recycling umiak cross-bottom timbers as house floor planks, and boat's hide covers into floor rugs, particularly in light of boats serving as shelters during long-distance travels. Both the shape of the object and its contextual placement in the complete assemblage assist this transition. Although inserted into a new setting, the "source" artefact maintains its original identity, simultaneously forging – or confirming – connections between these assemblages. As a link between boat and sled or boat and house, it thus conceptually connects the ocean and the land, stationary and mobile, the home and the journey (Westerdahl 2005).

Other recycling networks are more obscure and uncertain. The standard shape of wooden adze handles from Birnirk and western Thule sites, for instance, is reminiscent of umiak side ribs with their slight elegant longitudinal curvature and lashing holes at the ends. I have excitedly pulled many such “umiak ribs” from the museum drawers only to find myself holding an adze with a nicely shaped lithic blade still in place. But perhaps there is a justifying excuse for my repeated mistake and these handles were reshaped from umiak ribs, making use of convenient lashing holes and sturdy polished wood that fits comfortably in human hand: in the traditional skin boat building the diameter of a hole in the centre of a loosely closed fist is one of the measures applied to establishing skin boat timbers’ circumference (Anichtchenko 2013). On the other hand, the adze is one of the primary tools for building umiaks, which symbolically, yet in a very tangible and practical way, connects the end of one boat’s life with the birth of another.

Even more abstract and tempting connections exist in the parallel between western Arctic kayak cockpits and drum loops. Both are constructed with a bent wooden loop about two fingers in width with a line often inscribed in the middle of it for securing a skin, which stretches over the side into the loop in case of the kayak or over the edge and the loop in case of the drum. With virtually no constructional differences, archaeologists can only securely distinguish these two artefacts if the drum’s diameter is significantly larger or smaller than that of a cockpit, or drum handle is still attached. Conceptually, this connection evokes the individual’s link to the community. “Stay within the drum” is a Yup’ik expression for staying in touch with one’s people and cultural identity (Fienup-Riordan 2007). Applied to kayak travelling this brings a wealth of meanings, from the kayaker’s ability to provide for the community, to the community’s continuous presence, which embraces him in his pursuits. The drum’s role in celebrating a successful hunt further reinforces these ties.

The morphological similarities, outlined above, do not necessarily or always reflect recycling process. Many may, in fact, be a feature of initial manufacturing. Intentional production of look-a-like objects for different purposes, however, also reflects the conceptual connection of these objects in maker’s mind. Intellectually stimulating as it is, it also complicates the process of artefact identification, often making the complete certainty impossible.

The striving for firm identification creates an archaeological bias towards more “specifically” shaped boat artefacts, such as paddles, stem and stern posts, headboards, thwarts, ribs, cleats, keel and bottom cross pieces and kayak deck timbers. Stringers and gunwales, which rarely survive in the original length and the fragments that might represent them in the archaeological record, can often be only tentatively identified as such through spatial affiliation with other boat elements. Even rarer are examples of boats' skin cover. The waterproof stitch used to sew it is unmistakable, and it would be relatively easy to identify a fragment of skin with stitching, but unfortunately many of fragments of the right thickness and size do not have seams. Ethnographic and living traditions document many uses for old skin boat covers – from birthing beds and shoe soles to tossing blankets and funerary wraps, explaining in part, the lack of recognizable boat covers in the archaeological record.

Some general remarks need to be made about the issue of dating archaeological boat parts, especially those excavated some decades ago. Dating archaeological remains of circumpolar skin boats presents a number of challenges. Made of driftwood, the frames of traditional circumpolar skin watercraft are subject to the "old wood effect," meaning that the radiometric date procured from these artefacts reflects not the time of manufacturing, but the time at which the tree ceased to absorb ambient atmospheric carbon. Consequently, the radiometric date of a wood sample from an umiak frame can significantly predate the construction of the boat.

Umiak and kayak skin covers present a different problem. Due to the intake of ambient carbon isotopes, which have already undergone radioactive decay in the oceans, marine mammals and other ocean organisms exhibit an older radiocarbon age than contemporary terrestrial samples, a phenomena known as the marine reservoir effect (Dumond and Griffin 2002). This age difference varies depending on regional and local factors and can only be calculated if the rate is established through cross-referencing marine organics with associated reliable terrestrial samples. All marine mammals and even terrestrial animals regularly consuming fish, marine mammals, invertebrate and shellfish are affected by this phenomenon, which makes dating skin covers of circumpolar boats challenging.

Given the limitations described above, the most reliable dates are produced by materials from terrestrial non-carnivorous animals, such as caribou, musk oxen and such. Caribou antlers were sometimes used for manufacturing skin boat frames, and both bone and antler are frequent finds in circumpolar archaeological sites. One of three samples analyzed in dating of the Peary Land umiak came from a musk ox skull found nearby. Dating by an associated object brings a different set of issues, particularly in case of surface finds lacking affiliated stratigraphic horizons, such as the Peary Land umiak in Greenland.

All eight samples submitted for the radiometric analysis in the process of this research were wooden boat frames, and thus are subjects to “old wood” effect. This choice was motivated by the fact that the excavations they originated from took place 60 to 80 years ago and lacked comprehensive record, making the selection of more reliable artefact from the same spatial and stratigraphic context impossible. The results of this radiometric analysis are presented in Appendix IV.

4.6. Working with ethnographic dataset

Ethnographic data pertaining to the circumpolar skin boat tradition contains tangible objects and related lore. Full scale boats are an ideal proxy for technological aspects of archaeological boats, providing information about constructional details and use (Heath 1987). There is a notable disproportion between the frequency of full scale ethnographic kayaks and umiaks in museum collections. The author’s research in ethnographic collections of the Canadian Museum of History in Ottawa, Canada, for instance, revealed that the museum holds nearly a hundred kayaks and only two full scale umiaks. As mentioned earlier in chapter 3, full scale open skin boats present transportation and storage difficulties and were often substituted by miniatures.

Despite their small size and the inevitable degree of approximation that comes with it, miniatures provide a wealth of information about traditional boat building (Anichtchenko 2012). Both early ethnographic observations and archaeological evidence show that indigenous peoples of the circumpolar north were making boat miniatures prior to contact with non-native newcomers. Gideon, a Russian Orthodox missionary travelling to Alaska in 1794, mentioned that young boys on Kodiak Island began training for building their kayaks by making miniature boats (Gideon 1989). Miniature umiak parts carved with utmost attention to details are known from many circumpolar sites including the Kukulik site on St. Lawrence Island, Alaska ((Fig.6.24 and 6.25), the Karluk site on Kodiak Island, Alaska (Fig. 4.10.) and the Inugsuk site in Greenland (Figure 4.11.). Additionally, boat miniatures were often used in rituals (Lantis 1947: 66; Davydov 1977: 107-111). Wooden carvings in shape of boats and paddles were found on St. Lawrence and Kodiak Islands (See Chapter 6.7), graced Yup’ik masks (Fienup-Riordan 1996: 131) and marked burials in Southcentral Alaska (Fig.5.3). Kayak –shaped toys with doll paddlers also figure in oral lore and often are associated with some magical abilities, like in the *Upumipaŋgunkiisiitah* story from Noatak, Alaska, in which such toy turns into a real person with a boat and kills other kayakers (Hall 1998:188-190).

Figure 4.10. Stem of the miniature Sugpiaq open skin boat from the Karluk site, Kodiak Island, Alaska Alutiiq Museum collection (AM 193.94:4321), Kodiak, Alaska. Photo by E. Anichtchenko.

After the contact with European newcomers, miniature-making evolved into a craft intended for the foreign market. By the second half of the twentieth century many boat model-makers based their miniatures not on actual watercraft, but on earlier models, and umiak and kayak model-making became essentially an art form with its own cultural and artistic meanings only formally linked to the actual watercraft.

The earliest examples, however, present details which are often lost or not immediately visible in the archaeological record. Some of them show how various parts of boat frames were brought and secured together, including methods of lashing, and even the pattern in which individual skins were sewn into a skin boat cover. Often equipped with a complete boat crew with all their regalia, gear and ammunition (Figure 4.12.), models illustrate not only boat construction, but also the social and cultural meanings of watercraft, supplementing oral lore and the written ethnographic record.

Figure 4.11. Miniatures from the Inugsuk site, Greenland: 1 and 2 - boat miniatures (L4.1516 and L.1515); 3 - female figurine, possibly a paddler for umiak model (L4.1514); 4 - miniature umiak thwart (L4.1517); 5 miniature umiak head board (L4.1518); 6 umiak pulley block (L4.1519). Danish National Museum. Photo by E. Anictchenko.

Figure 4.12. Open skin boat model from Kodiak Island, Alaska, ca 1804. Russian Naval Museum, St. Petersburg, Russia, Photo by E. Anichtchenko.

The ethnographic lore consists of ethnographic notes and observations, recorded oral traditions and folklore, as well as historical images, photographs and documentary films. Unlike the tangible ethnographic record, these data by nature carry a certain degree of the recorder's interpretation and editing. While the alignment between external observations and internal cultural meaning is rarely perfect (see Chapter 3.1), the works of early ethnographers are of immense importance for understanding the history of the circumpolar region. Given the ethnic diversity of the North American Arctic, this record is rich with regional variants. To maintain the value of ethnographic analogy this research strives to identify the ethnographic horizon specific to each of the case studies and to keep the comparative analysis of archaeological and ethnographic data anchored in place and consistent with the culture history of a particular location. A general introduction into boat practices which are shared across the region is provided in the following chapter.

Chapter 5: Skin boat practices of the North-American Arctic

The extended geography and varied physical and social environments of the North American Arctic produced a variety of cultural practices focused on seafaring, and boat manufacturing and use. In times when skin boats were a part of the daily life of coastal peoples, each region and each village had its own unique traditions and practices, and traces of this diversity are still visible in local lore and extant examples of watercraft today. Yet, some general patterns and concepts of boat use were shared throughout the coastal North-American Arctic, and beyond. This chapter explores this common ground in order to highlight the meaning of skin boats in Arctic societies and set the stage for more detailed and localized accounts presented in each case study.

5.1. Skin boat use and ownership

Perhaps the most notable feature of the Arctic skin boat tradition is the limited number of watercraft forms. The wide array of designs and sizes notwithstanding, the entire skin boat repertoire consists of only two forms: decked kayaks and undecked, or "open" umiaks. Between the two, these boat forms were capable of meeting all the complex demands of Arctic seafaring, conducting hunting exploits, long- and short distance voyages, trading trips and military missions. Apart from construction details, the main difference between the two is, as noted earlier, the number of crew members (see Chapter 1.2). Kayaks are usually manned by a single paddler, although in some regions two-man boats were used in prehistoric times, and three-person craft were introduced in Alaska allegedly during the Russian colonial period. Umiaks require a multi-person crew of six to nine individuals (Bogojavlensky 1969:108). Both kayaks and umiaks were owned by particular individuals or jointly, usually by the members of the same family (Freeman 1963:66).

Traditionally, seafaring was men's work. Women were not trained in kayaking and were only allowed on the umiak crew if male members could not be secured (Murdoch 1988:335), but a woman could own both umiaks and kayaks, for instance inheriting them from her husband. She might hold them in trust for children or use them for trade. In

Point Barrow an umiak was the customary shaman's fee for a successful cure (Spencer 1959:149). An umiak could also be inherited by sons of an umiak captain, either as joint or personal property. In the latter case, priority was given to the son who proved himself in his father's crew, and not necessarily to the oldest heir. These general principles of ownership still apply in contemporary Chukchi Sea whaling communities, but nowadays the boat can also be passed to the oldest daughter if she is found worthy (Anichtchenko 2012b).

Per-capita frequency of boat use in traditional Arctic societies is hard to estimate. Nineteenth century ethnographers often stated that nearly every male above the age of boyhood owned and managed kayaks (Murdoch 1988:328). Umiak ownership in general was considered a mark of wealth and a sign of social prestige accessible to fewer individuals than kayaks. Given the size of an umiak crew, the logical ratio of umiak ownership in traditional Arctic coastal societies would not exceed one umiak per 6-10 adult men. Statistical information pertaining to skin boat use was not collected regularly and the data are patchy at best. William Parry, who visited the Iglulik Inuit during the *Fury* and *Hecla* voyage to the North West Passage in 1821-1823, reported that only seven out of twenty hunters at the east Melville Peninsula camp had their own watercraft (Parry 1824, I: 507-510). Average per capita boat ownership in Greenland in 1855, for instance, was one kayak per 4.48 individuals of both genders and all ages and one umiak per 21 persons. In 1918 the same selection criteria shows a reduction of use at 4.87 individuals for each kayak and 44 community members per umiak (Petersen 1986:197). Milton Freeman reported that in 1959-1960, 17 of a total of 42 Belcher Island Inuit men aged 17 and older owned kayaks and six shared the use of kayak (1963:66). The ratio of umiaks per male hunters of 17 years and older on King Island, Alaska at about the same time was one boat per 15 men (Bogojavlensky 1969:32, 113). During research conducted in 2012 in Barrow, Alaska, it was noted that the community maintained 17 umiaks, meaning roughly one boat for 47 Inupiaq men between 18 and 64 years old (Anichtchenko 2012 b).

Skin boats were used for a variety of tasks, the strategies and seasonal cycle of which varied in different parts of the Arctic. In the Bering Strait and Chukchi Sea, preparation for skin boat hunting usually started in April, the lunar month of *iluvaittuvik*, "boat readying time,' in the traditional Inupiaq calendar (Bogojavlensky 1969:79). The period from late April through the end of June, when both whales and walrus migrate north through the Bering Strait, was the busiest umiak hunting time in this region:

> The boats are in keen competition, and if one crew ventures out, then all will follow, even when it is clearly fruitless. For the men of Bering Strait, spring boat hunting is the highest state of existence, brightening even the most lacklustre and inspiring the dullest. It is a value in itself (Ibid 81).

Up north, along the eastern coast of Chukchi Sea and further east, the main focus was on whaling. The whaling season here began and ended a little later than in the Bering Strait and target species included both bowhead and beluga whales. In the Mackenzie Delta the latter was performed from kayaks. A hundred or more of these boats were launched to cut out whales' access to the sea and force them to shallow waters, where they were harpooned in large masses (Nuligak 1966:14-15; Zimmerly 2000a:72-73). The Atlantic bowhead whaling season ran through most of the summer months, peaking in July and August (See Chapter 2.3.).

With bird migration and abundant sealing opportunities, kayaking was also in full swing in May and June. Later in the summer umiaks were outfitted for travelling and trading, taking hunters to their summer hunting camps and fairgrounds, and carrying spoils of the hunt, trade goods and driftwood back to the winter village. Fall migrations signalled another peak of boat hunting activities. Kayaks played an important role in caribou hunting, which in addition to securing important meat and skin supplies yielded stores of sinew. Split and twisted into durable threads, sinew was used for sewing both clothes and boat covers. In North-western Alaska umiak whaling crews took advantage of return whale migration.

Although all of these activities were important for local subsistence, umiak whaling had the most significant social impact. Harvesting the largest animal on the planet with stone tools and skin-covered watercraft was an impressive achievement of crucial economic importance (Savelle 1995, Sheehan 1995,Yesner 1995). The central role in organizing related activities and conducting the hunt belonged to whaling captains, called *umialiq* (singular) or *umialit* (plural), which translates as "boat owner." This was – and to some degree remains to be - a position of both social and ceremonial importance reserved for those who could secure loyalties of their crew members and support them throughout the year (Jolles 2003, Larson 2003). As individuals receiving the largest share of the harvested animal, whaling captains were as a rule the richest and most powerful members of the society. Becoming a "true *umealiq"* required both time and skill. In some Arctic communities, such as Point Hope and St. Lawrence Island, only a boat captain who harvested five whales was considered a real *umealiq* (Carius 1977:8-11; Anichtchenko 2013). Although not every boat owner was a whaling captain*,* owning an umiak was a necessary condition for claiming this social status (Spencer 1959:152). Traditionally the *umealiq* either built, or more frequently, sponsored the construction of his crew's umiak and was responsible for maintenance and equipment. Together with his wife he played a central role in ceremonies surrounding outfitting of the crew and conducting the hunt. If his crew was successful, he managed distribution of whale share and the following festivities.

5.2. Material procurement and construction

Building a skin boat had three important stages: assembling necessary materials; building the frame; and making the skin cover. In ethnographic times the first stage was a year-round process. In addition to finding suitable driftwood, it included harvesting materials from five different animal species: whale baleen for frame lashing; walrus ivory for fasteners and hides for lashing ropes and - in some locations – boat covers; caribou sinew for skin cover sewing; and seal skins for covers.

Driftwood was collected year-round whenever a "good" piece was found. Some of it was picked up during the extended voyages, quite a distance away from the village, and carved into boat frames during the shore breaks (Ford 1936:n.p.; Fig.5.1.). The boat's voyages thus began before its frame was fully assembled, and access to watercraft was often a key requirement for constructing one. Driftwood located far away from the home base was transported by both umiaks and kayaks (Fig.5.2.). Pieces too large for boat transportation were marked and brought in later by dog sled. These claims of ownership were highly respected and never interfered with (Ray 1966:77; Golden 2015:353). Some particularly valuable driftwood, such as root stumps used for stem and stern pieces, was sought after and traded for. In 2008, Jeffrey Leavitt of Barrow, Alaska, for instance, purchased such piece of driftwood for his umiak stem post for $100 (Anichtchenko 2012b). Different types of wood also held different values. According to whaling captain and artist Roger Silook Sr. from St. Lawrence Island, Alaska, birch was particularly sought after for umiak construction: "The people looked for these driftwoods for miles and sometime clear over to the other side of the island" (Silook 1976; n.p.).

Fig.5.1. "An old man from Point Lay working on umiak frame." Attanik village, Point Belcher Alaska, 1936, photo by James Ford, National Anthropological Archives, Smithsonian Institutions, Washington, DC.

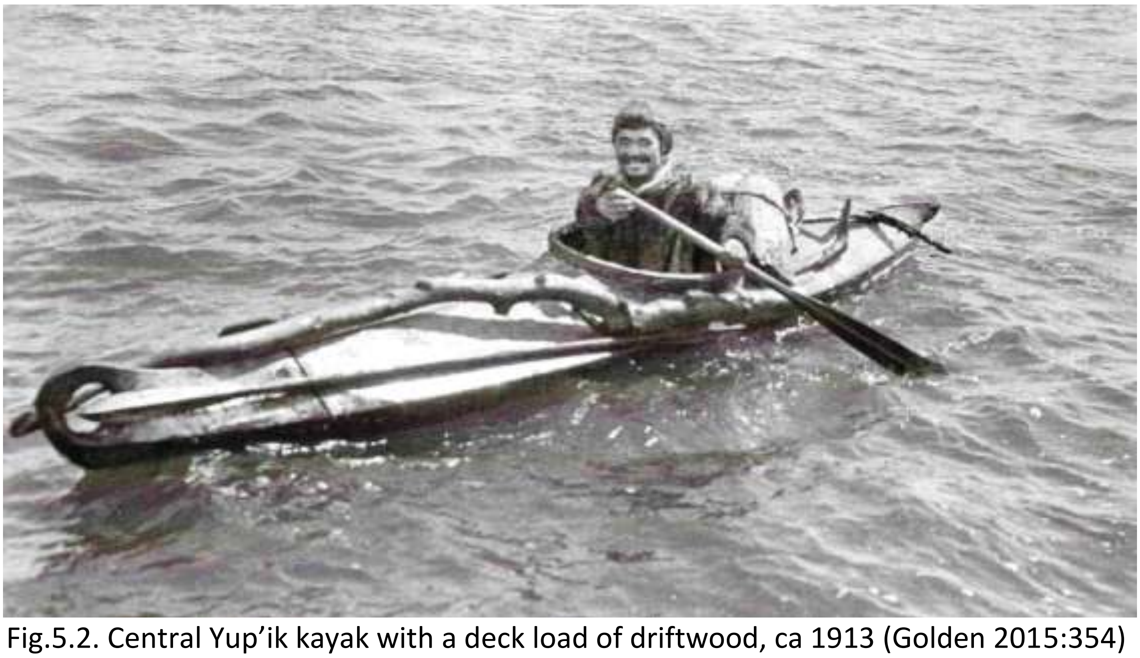


Fig.5.2. Central Yup'ik kayak with a deck load of driftwood, ca 1913 (Golden 2015:354)

Carving of individual boat fragments was not restricted to a particular place or schedule. Reporting on kayak construction on Nunivak Island, James Van Stone wrote:

> When a man was thinking about building a new kayak, he observed with care all the driftwood he gathered during the summer and set aside those pieces suitable for use in constructing the vessel. A kayak was never made all of one kind of wood, different parts requiring different wood with different qualities. Having laid suitable wood aside, various frame pieces were carved during the winter and put away until early spring… Often the hatch, ribs, and other pieces could be salvaged from an old kayak frame, thus reducing the amount of time necessary to construct a new vessel. (1989:15).

A large portion of wood-working activities in general and boat building and maintenance in particular took place in or nearby the men's house, or *qargi*. Individual parts of umiak and kayak frames were often carved here. Carving umiak frame pieces had meaning beyond practical carpentry. For a man who did not have *umialiq* status it was a declaration of his intent to become a whaling captain, and thus a beginning of his quest for power and prestige (Bogojavlensky 1969: 69).

Assembling the umiak frame and repairing boats took place outside (Figure 5.3). A *qargi* frequently maintained an *umiivik*, a shed where the whaling umiaks were stored and repaired, and where new skins were put on prior to the spring whaling. Anyone in the community could do his work there and use the shed-like structure if he wished. Technically, however, the *umiivik* was the property of the whaling captains of the *qarigi* which maintained it (Spencer 1959:148). Boat building usually took place after whaling, in spring and summer (Bodfish 1991:6). In cold months, temporary snow houses were built for working on the umiak and big gear on dance grounds next to *qargi* (Murdoch 1892:83). Rochfort Maguire describes such a snow structure that he observed in April of 1852 as:

> …a very ingeniously contrived workshop hollowed out in the snow with an entrance by a square trap door and passage similar to the usual snow houses." It was 32 feet in extreme length, and nearly six feet high, with a flat roof covered with seal skins and snow over all – the side toward the sun at the time of their working hours was effectively lighted by six ice windows which admitted a beautiful soft light (Maguire 1988: 358).

In summer months an umiak propped on one side could also serve as a temporary boat-building workshop (Bodfish 1991:6). Interestingly, in such occasions this umiak was also called *kargi* (Ibid).

Fig.5.3. Building umiak. Point Hope, circa 1930. AMRC B1998.027.029.

As a rule, both kayaks and umiaks were built by older men, whose experience and understanding of construction process would warrant safe watercraft. Younger men were considered too fast and too impatient (Bogojavlensky 1969:67). A kayak for a young hunter was often built by his fathers, his father-in-law, or commissioned boat-building expert (Orr and Orr 1995:17, 97, 110). Waldo Bodfish of Wainwright, Alaska, recalled kayak-building at the time of his youth, in early 1900:

> The one that knows how to build good *qayaq*, he teaches the others what to do and they do what he tells them, the way the older people know how. And that's now everybody learns how to do things. That's how I learned (1991:7).

Umiak building had a more communal nature, but was also guided by an experienced individual (Ibid). Similar practices exist in contemporary Alaskan skin-boat communities. A skin-boat building expert is either commissioned to build an umiak or asked to supervise the process, and is expected to receive compensation for his expertise.

For example, boat builder Henry Konook of Point Hope, Alaska, interviewed by the author in August of 2013 while finishing an umiak for a local whaling captain, received a Honda four-wheeler all-terrain vehicle in return for his work (Anichtchenko 2013).

Skin boats were built according to the anthropometric measurements of the future owner. The basic measuring units were different segments of hand and arm spread, although there were some variations in such units and their use in different nations and communities (Fienup-Riordan 2007:91-92). According to Van D. Edwardsen, a co-captain of a Barrow whaling crew, the height of an umiak equals the distance from armpit to the tip of the fingers of the boat owner, while the beam is determined by his height (Anichtchenko 2012b). The height of the St. Lawrence Island umiak was measured in the same manner (Moore 1928:349-350, Fig.5.4.), while boat's beam was calculated as the distance from captain's right and left elbows, his arms outstretched and slightly adducted at the shoulder joints. Similar calculations were appied in determining dimensions of other boat frames (Ibid, Fig. 5.5). Kayak measurements were even more closely linked to hunter's body, with every frame component corresponding to his measurements, sometimes in a very complex manner. The Hooper Bay kayak aft gunwale, for instance, was equal to the length of the owner's "outstretched arms from tip of one index to tip of the thumb plus width of one first from outside index knuckle to outside little finger knuckle" (Zimmerly 2000 b: xxi)

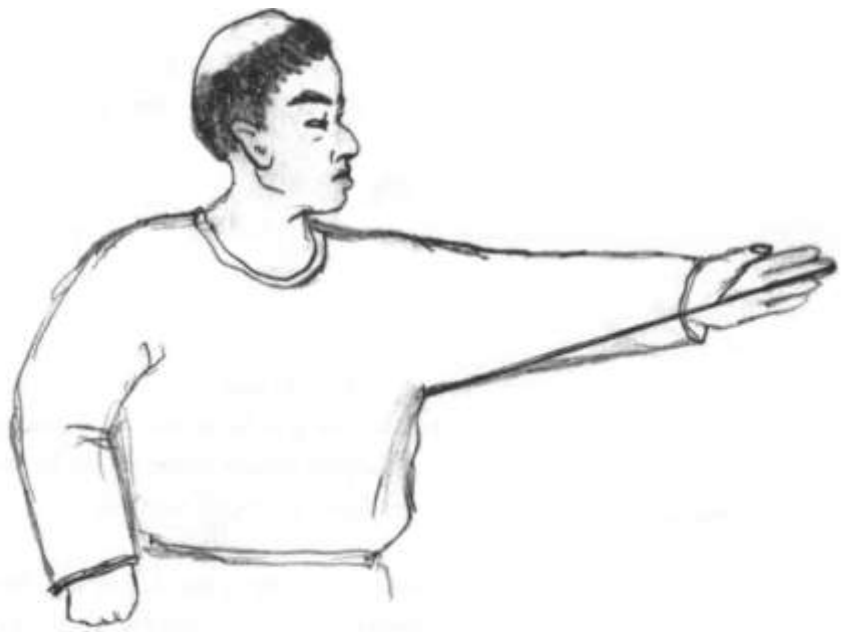


Figure 5.4. St. Lawrence umiak anthropometric measurements: depth of umiak. Pencil drawing by Nancy Walunga, Gambell 2000 (Krupnik & Krutak 2002:324)

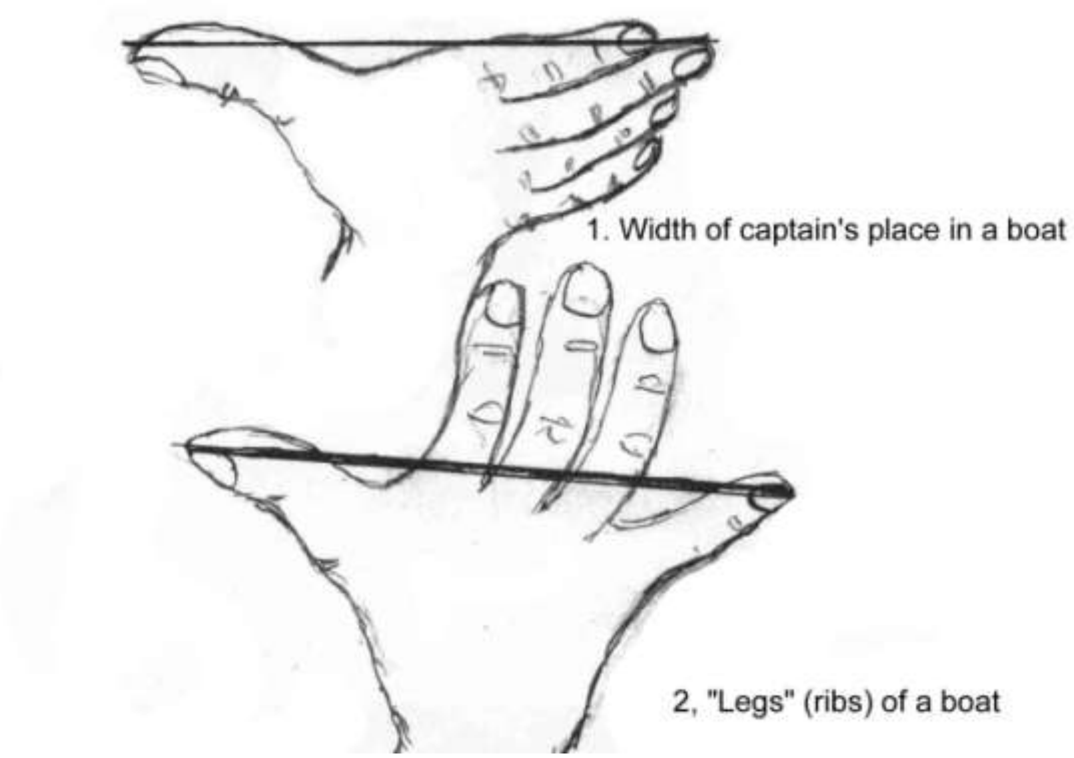


Figure 5.5. St. Lawrence umiak anthropometric measurements: 1) half the width of the captain's seat; 2) width of ribs Pencil drawing by Nancy Walunga, Gambell 2000 (Krupnik & Krutak 2002:324)

In contrast with carving of individual frame fragments, assembling the boat frame follows a well-established order with some small regional variations. Kayak construction begins with shaping the deck: gunwales are bent into a desirable shape and their ends are temporarily tied together. Deck cross beams – or in some regions temporary braces - are inserted into their places giving the assembly structural integrity, after which the frame is turned upside down and the stern, keel, ribs and hull stringers are secured in their places. The bow piece, deck rider and cockpit are usually attached last (Zimmerly 2000b; Arima 2004:128-136; 2014:111-113, Golden 2015:351:403, Fig.5.6).

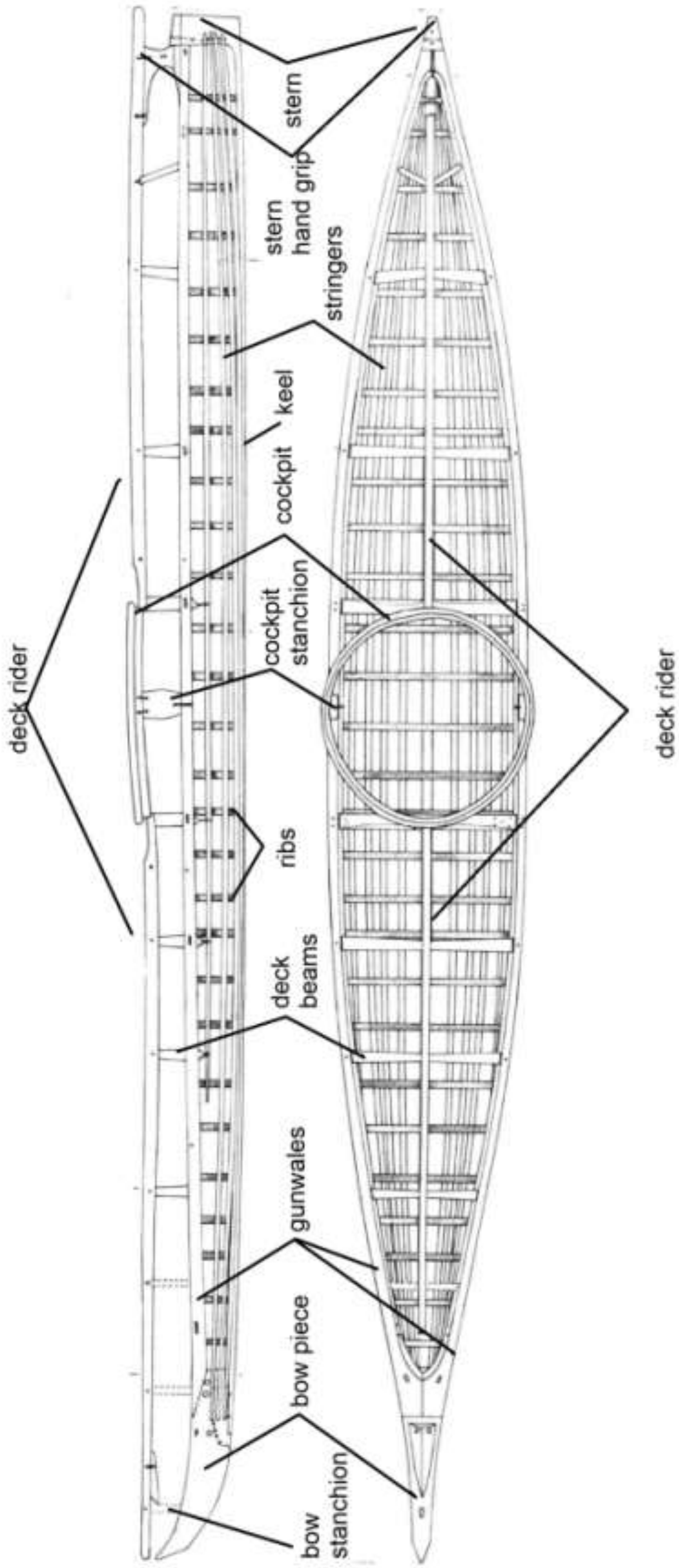


Fig.5.6. Kayak constructional terminology. After Golden 201:23

Umiak frames as a rule were assembled from the bottom to the top, although some exceptions existed. An umiak constructed at Ivuyivik, Labrador in 1960, for instance, was allegedly built in an upside-down position, starting with the gunwales and thwarts, generally paralleling the construction of a kayak (Arima 1963:29). First the boat builder attached stem and stern posts to the keel, and installed headboards to the top of the posts. In the flat-bottomed boat construction, the next step was focused on shaping the bottom by securing chines and bottom cross timbers/floors. After the ribs were inserted into the bottom chines, the gunwales were placed and lashed on top. Stringers – usually one or two on each side - were then lashed to the posts and inboard surface of ribs. Two trapezoid seats were laid on top of stringers at the stem and stern post. Another stringer was secured slightly below gunwale to the inboard surface of the ribs to accommodate thwarts and lashing rope which stretched the boat cover over the frame (Anichtchenko 2013, Fig.5.7. and 5.8.). In the round-bottom umiak construction the sequence was slightly different. After the posts were attached to the keel, temporary braces were installed to help attach gunwales to stem and stern headboards. Once gunwales took their final shape, braces were replaced with bent ribs and the rest of steps followed as described above with minor regional variations (Braund 1988:45).

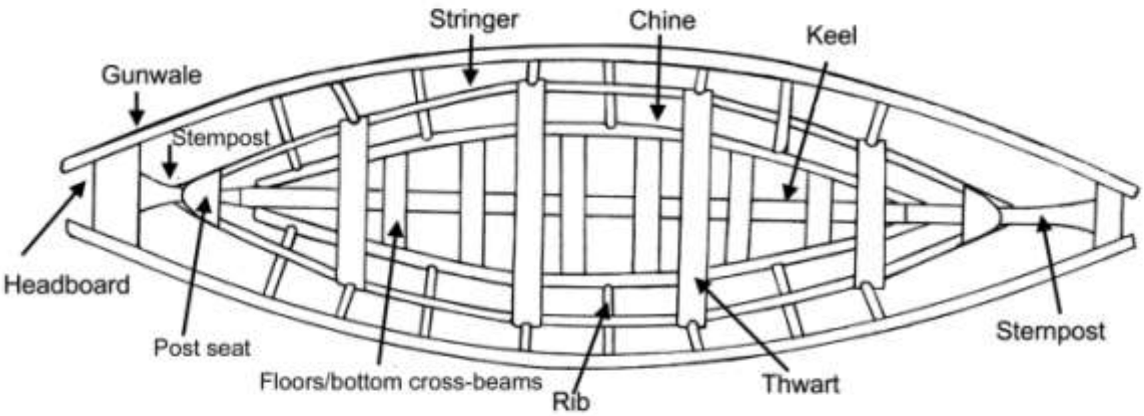


Fig. 5.7. Umiak constructional terminology. Graphics by E. Anichtchenko

Boat builders used adzes, axes, knives and drills to fashion the wooden frames, which were then fastened with a combination of baleen, walrus rawhide and wooden pegs. Baleen was chosen for lashing the ribs and bottom of the boat because of its water-repellent qualities. Most of the upper part was lashed with rawhide. The ready frame was smeared with seal or whale blubber to keep it from drying out.

Fig.5.8. Henry Koonook demonstrates anthropometric principle beghind umiak's beam dimensions. Point Hope, 2013, photo by Sarah Belcher.

The animal hides selected for boat covers varied in different parts of the circumpolar north. Most of the coastal communities preferred seal skins, but other sea and land mammals were also used. Walrus hides were the material of choice of Bering Strait islanders (Carius 1979:8-9), limited use of caribou occurred in some inland regions including the Ungava Peninsula (Arima 2004:134), polar bear skins were occasionally made into umiak covers near Point Barrow (Murdoch 1988:336), and beluga skins reportedly provided boat-cover materials for inland indigenous tribes of North Alaska (U.S. Census Office 1893:149).

Securing an adequate amount of skins was a continuous concern for all boat owners. While a well-built and maintained boat frame could last for several generations, skin covers had to be changed every few years, and accumulating enough skins of the right quality was not always easy, and often entailed some competition, as illustrated by the King Island ethnographic record:

> A man can, with sufficient patience and luck, accumulate enough of the right kinds of driftwood from the immediate vicinity of the islands to construct a boat frame (…). The real problem comes with finding the right number walrus hides…the availability of boat hides is carefully controlled by the skin boat captains. Boat hunting is the only efficient way of harvesting walrus. It is sometimes possible, though, to obtain such hides by individual effort in kayaks and very small boats. Even then a man who

> intends to skin a boat will have to rely on the help of others to obtain enough. Walrus hides prepared for covering boats deteriorate in two or three years and must be discarded. They cannot be stockpiled for longer than this period. Obviously, the introduction of manufactured boats would break the captain's hold on boat skins, and is probably another reason why skin boats are so unyieldingly upheld (Bogojavlensky 1969:70-71).

Preparing skins was women's work. The fresh skins were typically rolled up and left to ferment for several weeks to allow for hair to come off them naturally. The skins were then scraped, rinsed in sea-water and sewn together (Arima 2004:134-135). The positioning of individual hides differed depending on the region and animal species. While skin preparation took several weeks and sometimes months, the sewing of a skin boat cover had to be done in one stretch to prevent skins from drying.

Two different methods were used to make a kayak cover. Typically, several individual animal skins were sewn into one piece, which was then wrapped over the frame, stretched for a better fit, after which the edges were sewn together. This method was used in most of the North American regions north of the Bering Strait (Golden 2015:407). The second method consisted of first making a tailored skin "sock", which was pulled on the bow of the boat. The aft portion was covered in the same way as described in the first method, wrapped around the frame and stitched to the bow "sock" (Fig.5.9.). This method was used in the regions south of the Bering Strait. Umiak cover making essentially followed the first method, with the main difference being that the edges of the cover were stretched over the boat's gunwales and lashed to the inner stringer.

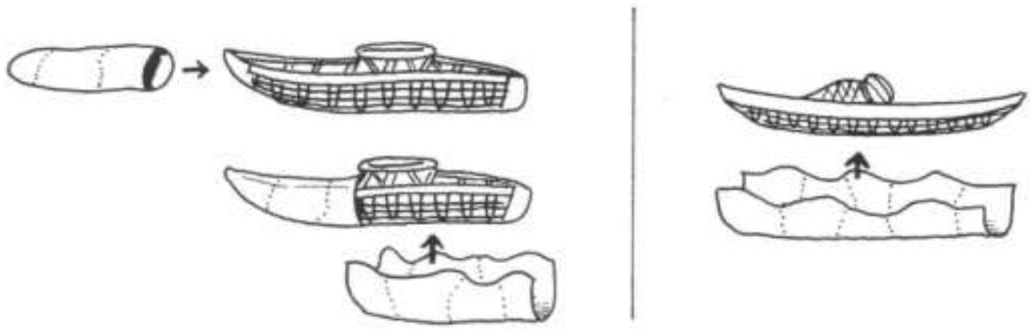


Fig. 5.9. Two different methods of covering the kayak frame with skins (Golden 2015:407)

Both umiak and kayak skins are stitched together with the same double blind stitch, which creates a watertight connection. Several coats of seal oil were applied to the outside once the cover was placed on the frame, and allowed to dry thoroughly, after which the cover became “impervious to water for a week or ten days” (Nelson 1889:217). To prevent water-logging, boats were usually hauled up on the shore and dried every night and re-oiled periodically.

A well-made cover is one of the most essential requirements of skin-boat technology. The Inupiaq saying “the man’s life is on the tip of the woman’s needle” captures the connection between skin-sewers’ skill and safety of the hunters. Traditionally, women began learning skin sewing in early age and were assigned to different sections of the boat depending on their level of expertise, with bow and stern requiring most attention. In contemporary skin-boat communities the communal effort is guided by a “head skin sewer.” In the past this role often belonged to the whaling captain’s wife. It is considered essential that the women working on the skins maintain positive attitudes as their words and even thoughts are believed to affect the boat’s performance and seafarers’ experience (Anichtchenko 2012b).

5.3. Performance, maintenance, storage, recycling

Speed, maneuverability, cargo capacity and other boat performance characteristics depend on number of factors and vary from one region and design to another. Some general information can, however, be useful for a baseline understanding of skin boat seafaring. Ethnographic accounts provide that indigenous kayakers were capable of maintaining speeds between 11 and 16 km/h or more (Robert-Lamblin 1980:n.p.). In 1791, Captain Gavriil Sarychev witnessed Unangan/Aleut kayakers keeping up with their sailing ship when it was moving at a rate of four leagues (22.2 km) per hour (Sarychev 1969:73). Although not normally used for cargo transportation, they could reportedly manage loads of about 500 kg (Silook 1976:34)

Umiaks could cover between 6-16 km per hour when paddled and maintain greater velocity under sail (Burch 2005:289). Estimates of umiak cargo capacity vary throughout the ethnographic record. Stefansson reported it at 900-1300 kilograms (1944:37, 1951:106). Doris Saario estimated carrying capacity of Kivalina and Wuluk Rivers umiaks at 2,270-2,720 kilograms (1966). Large boats of Cape Prince of Wales, Alaska, were capable of moving 4,500 kilograms of freight (Thorton 1931:125), and records on Kobuk and Noatak Rivers umiaks attest that they could transport up to 6,350 kilograms (Stoney n.d.:162). Cargo, ballast, or passenger/crewmen weight was, in fact, essential for umiaks' performance, as they were difficult to manage when too light, as evident from James Ford's description of his "wild" crossing in an empty umiak:

> Bow and stern would kick up six or eight feet in the air and hit the waves with a big smack. Every time she came down you could see a foot or more of green water over the gunwales, but the boat would always rise before the water would break. Darn good boat (Ford 1936: n.p.).

A fully loaded umiak could contain virtually everything necessary for comfortable camping, as attested by Frederick Beechy's description of umiak landing on Chamisso Island on September 6, 1826:

> We were astonished at the rapidity with which they pitched their tents, settled themselves, and transferred to their new habitation the content of their baidaras (*umiat*), which they drew out of the sea and turned bottom upwards. On visiting their abode an hour after they landed, everything was in as complete order as if they had been established there a month, and scarcely anything was wanting to render their situation comfortable. No better idea could have been conveyed to us of the truly independent manner in which this tribe wander about from place to place, transporting their houses, and everything necessary to their comfort, than that which was afforded on this occasion. Nor were we less struck with the number of articles which their ingenuity finds the means of disposing in their boats, and which, had we not seen them disembarked, we should have doubted the possibility of their having been crammed into them. From two of these they landed fourteen persons, eight tent poles, forty deer skins, two kayacks (sic), many hundred weight of fish, numerous skins of oil, earthen jars for cooking, two living foxes, ten large dogs, bundles of lances, harpoons, bows and arrows, a quantity of whalebone, skins full of clothing, some immense nets made of hide for taking small whales and porpoises, eight broad planks, masts, sails, paddles etc., besides seahorse (walrus) hides and teeth, and a variety of nameless articles always to be found among Esquimaux (1831, vol.1:404-405).

Frequent landings, like the one described above, were a characteristic feature of skin boat travel. Covered with non-tanned hides, Arctic skin boats were prone to becoming waterlogged, which many researchers hold as a main argument against the possibility of extended indigenous open ocean voyages (Rainey 1941:463; Giddings 1960; Kankaanpää 1989:31; Mason 1998:299; Crockford 2008:126). Typically, skin boats were pulled out of the water and dried daily. Historical records, however, attest that when needed, skin-covered watercraft were capable of staying in the water for several days, and even weeks. In 1902, Bill Tcheripanoff, an Unangan tradition bearer born on Akutan

Island in the eastern Aleutians, told his father's story about a storm which destroyed a large party of kayak hunters. Bill's father managed to attach his partner's kayak to his boat, and together they rode the waves for five days without food or water (Robert-Lamblin 1980:n.p.). Five-day long kayak journeys without land sighting are also recorded in Yup'ik oral traditions (Fienup-Riordan 2000:67). A King Island story "Two King Islanders adrift" tells of the adventures of Avauraq and his companion who were forced away from home shores after the southeast wind broke shore ice, and reached Northwest Cape of St. Lawrence Island, 200 km away, after five days at sea (Kaplan 1988: 147-157).

An even longer voyage is implied by the enigmatic appearance of a Greenlandic kayaker at the mouth of the Don River in Aberdeen, Scotland in the early 1700s. The man died within 3 days, and his watercraft was moved to the University Chapel (Macritchie 1912:221-225). The shortest distance between Aberdeen and Greenland is over 2700 km, which makes this one of the most impressive recorded kayak journeys of all time, even if the kayaker made landfalls in Iceland, the Faroe Islands, and Orkney. Similar encounters presumably occurred near Orkney in the 1680s (Wallace 1883:33-34). At the same time, these instances may result from kidnapped Native kayakers' escapes from European ships when in proximity of land (Whitaker 1977).

In addition to regular drying, more in-depth boat maintenance took place every year before whaling, as part of a ritual renewal of the whaling gear. Sloppy gear was believed to insult whales, who then would not "give themselves" to the negligent whalers. The old cover was stripped from the boat frame, which was scraped clean and washed with the urine of the whaling crew (Spencer 1959:333). Wives of the crew members sewed a new umiak cover in the *umiivik.* White was believed to attract whales and the skins were often bleached to achieve this colour.

When not in use, both umiaks and kayaks were stored elevated from the ground to protect them from being gnawed by dogs and wild life. In those places in the Arctic where driftwood was readily available, they were placed on specially constructed wooden racks usually near the owner's home or *qargi*. Piled rocks and house roofs often served the same purpose. In some regions kayaks were hung inside *qargi* in the winter months. In the Central Canadian Arctic during the winter, paddles were used as insulating material for sleeping platforms in snow houses:

> The surfaces of the snow banks which forms the foundation for the bed is covered with pieces of wood, oars, paddles, tent poles, etc. These are covered with a thick layer of shrubs. Over these numerous heavy deerskins are spread, and thus a very comfortable bed is made (Boas 1964:136).

In addition to be stored in permanent settlements, kayaks, umiaks and paddles were cached near summer camps or en route to hunting grounds (Ibid).

With proper maintenance, a well-made skin boat frame could last over fifty years and both umiaks and kayaks were often passed from one generation to another, or re-furbished into a new watercraft. Once they reached the end of their career at sea, frames were recycled both into new boats and other objects. The umiak's curved stem post, or *kusiq*, was particularly valuable and often moved from an old boat to a new one because driftwood of right curvature and quality was not easy to come by (Anichtchenko 2012 b). This recycling may have also had a ritualistic meaning, transferring the expertise of previous marine ventures to a new watercraft. Boat amulets, discussed later in this chapter, were also as a rule maintained and moved to a new watercraft.

The old boat skin covers also found new use. In Chukchi Sea Inupiaq communities there is a tradition of stripping the cover from the umiak belonging to the captain who caught his very first whale and turning it into a tossing blanket for trampoline-like jumping game usually held at the celebration at the end of spring whaling season (Okakok and Kean 1981:342). Old, salt-water and seal-oil impregnated boat skins were also valued as house floor covers and as material for shoe sole manufacturing. Kayak skins may have played a special role during childbirth. Yup'ik lore of central Alaska mentions women giving birth over used kayak skins (Blue 2007:33-35). On Nunivak Island the body of a dead man was wrapped in his clothes and covered with a kayak cover, which was said to prevent the dead from visiting the living. The kayak frame was then placed over the coffin and left in the burial ground (Fienup-Riordan 2000: 139), and wooden carvings of kayaks on long poles served as grave markers (Fig.5.10). The boats, thus, accompanied people though most of their lives – from birth to death.

Fig.5.10. Kayak carvings used as grave markers, Kuskokwim delta, circa 1910.
CMH V-X-342 and V-X-343. Photo by E. Anichtchenko.

5.4. Journeys

For most of the North American Arctic the open water season lasted from May until the end of October. Hunting was one of the main activities, but other journeys also took place. Umiak travel took place from May to early October in the interior, from June to late October in Bering Strait and from July to mid-October in southern Chukchi Sea (Burch 2005:168). There were many reasons to undertake a boat journey – from travelling to summer camp to visiting relatives and trading partners, and the routes were equally diverse, taking the voyagers along the coast, across the straits and through the inland river and lake networks. The best documented of these journeys in terms of routes and timing were related to regular trading fairs. The largest of such venues, the Sisualik Fair, was located on a long spit in the north-eastern corner of Kotzebue Sound nearby the place where three major rivers - the Noatak, Kobuk and Selawik - enter the sound, providing an ideal meeting place for inland and coastal people (Ibid 180). Nearly two thousand individuals of different nations, including Siberian Natives traveled here in their boats in mid-summer, some over the distance of 500 kilometers, for trading and celebration, a tradition that goes back to at least the15th century, and likely even earlier (Hickey 1979; Burch 2005:180-186; Mason and Bowers 2009). Similar, but smaller venues were held at Nigliq, in the Colville River Delta (Burch 2005:193), on Icy Cape (Ibid 197), on Barter Island near the Mackenzie River Delta (Ibid: 199-200), and in other locations during summer months.

In addition to peaceful voyages, boats also carried military units en route to ambushing their foes' settlements. Such troops usually travelled either on foot or in umiaks. The boats, however, were used exclusively for transportation: the battles, as a rule, took place on land (Ibid 87-88).

5.5. Ceremonialism

Given how firmly skin watercraft was embedded in the social, spiritual and economic fabric of all circumpolar cultures, it is not surprising that boat manufacturing and use were associated with many rituals and ceremonies. In general, almost all of them could be divided into two related groups: 1) ceremonies directed towards enhancing boat performance, and 2) rituals held in order to secure success of maritime hunting.

An indispensible partner in sea ventures, skin boats shared some of the Arctic mariners most profound and dangerous experiences. As Robet-Lamblin (1980:12) put it, the fates of boats and hunters "are bound up together, and their lives end at the same time; they disappear at sea together or, on land, share the same grave." In most of circumpolar Arctic cultures, the boats are recognized as animated and willful agencies, whose actions can be regulated through amulets, proper treatment and ceremonies (Crowell 2009). This concept is manifested, for instance, through incising thin longitudinal lines in the middle of umiak and kayak frame timbers. According to the Inupiaq lore, these are blood vessels that bring boat to life (Anichtchenko 2013). On Nunivak Island, when the man finishes the frame of his kayak, his wife brings "akutak", a mixture of tallow, seal oil, and snow. The man puts a little of it on all connecting parts of the ribs and side-bars to feed, not to lubricate, these places (Fienup-Riordan 2000:145). When the cover is finished and the last flap on the after-deck is sewn, the owner accompanied by all men present, sings his childbirth song to his new kayak (Curtis 1930:13).

Painted and carved images placed on kayaks and umiaks, particularly in the Yup'ik regions of Alaska, were believed to transfer desirable characteristics to the boats. Fast-moving animals like seals or minks were depicted on the body of the boat to enhance its speed, while a human figure with arms and legs spread out extending from the bow to the stern was supposed to promote stability. Two faces **–** male and female - or representation of two female breasts were carved on cockpit stanchions of Yup'ik kayaks "to prevent the kayak from overturning because they keep mutual balance" (Fienup-Riordan 2000:136).

In indigenous narratives skin boats are embedded with distinct identity and people have certain obligations towards them, such as allocating a share of whale and walrus meet for the umiak after successful hunt (Spencer 1959:335). On St. Lawrence Island, a specially prepared food was fed to the boat and sacrificed to the ocean during the *Autughuk,* "moon worshipping" ceremony (Moore 1912:1-2). Proper treatment was believed to result in boat's willing cooperation with their owners. Native stories tell of kayaks responding to their master's commands "like an obedient dog" (Fienup-Riordan 2000:103), and umiaks that moved themselves magically without any means of propulsion according to the owners' wish (Hall 1998:112).

Hunting rituals are different from the performance-enhancing complex in a sense that instead of being directed to the boat, they are focused on establishing relationship with the hunted animals through the amulets and rituals, which often engage watercraft. The classic example of such rituals is whaling ceremonial complex. All the preparations for waling were ceremonially regulated to ensure a successful hunt. As a mediator between people and whale, the boat had a special role in these ceremonies. When the umiak cover was finished, for instance, the wife of the whaling captain walked around it singing her whaling song, after which she poured fresh water on the umiak from a specially made wooden vessel. This was the same vessel she would use to bring fresh water to the killed whale to "greet" the animal as a guest who travelled from afar and was thirsty from long journey (Spencer 1959:334, 345). After this, whalers were not allowed sexual relations and remained in the *kargi* until it was time to go whaling (Ibid).

Each umiak had whaling charms, which were the property of the whaling captain. Whaling charms were often kept in a wooden box shaped as a whale, which had marks for each whale taken by the owner (Ibid 339). There were no regulations regarding what constitutes a whaling charms, and the contents of the box were individually determined. They could contain carved ivory figurines, pieces of baleen cut into the forms of whales, walrus and seals, stuffed raven skins, dried beetles, seal vertebrae, hair of prominent whalers of the past, or green and white trade beads (Ibid 339).

Large whaling lances kept in umiaks also had a ritualistic meaning and were likewise cased in special wooden containers depicting marine mammals, or, occasionally, the mistress of the sea known as Sedna in Alaska, Nuliajuk in Canadian Arctic and Sila in Greenland (Fig.5.11). With the face of the woman and body of the seal, she was believed to inhabit the depth of the ocean and control the sea and all its animals – either releasing them to the hunters, or withdrawing the pray if a taboo was broken (Balikci 1970:206). Pushed into the ocean by her father (in Alaskan version of the legend) of her fellow villagers (in Netsilik oral lore), the mistress of the sea has no particular liking of the human kind and her benevolence has to be secured through offerings and rigorous taboo observations.

Fig. 5.11. Harpoon box in the shape of Sedna from the Utkiavik archaeological site. NMNH A39912, photo by E. Anichtchenko.

A property of the captain, the boat charms were usually removed after whaling and kept in his house, not in a *qargi*. The exception was a whale figurine carved underneath of a stem seat, which was an integral part of the boat frame. This was where the captain sat in the umiak. Whale figurine thus represented the connection between him and the boat on one hand, and whales on another (Figure 5.12). In extant ethnographic examples such figurines feature exclusively in the Inupiaq umiaks. The bows and sterns of umiaks from different Alaskan nations, however, were also marked with special designs, such as spirit animals and *oculai* motives (Anichtchenko 2012a). In Point Hope, and some other Inupiaq communities of Chukchi Sea, a small ivory whale figurine was attached to the rope that lashed the umiak skin to the frame on the post side of the bow. This carving had both functional and ritualistic purpose, helping to secure lashing as a “cord stopper”, and serving as boat amulet (Ford 1936, Anichtchenko 2013, Fig.5.13.).

Figure 5.12. Umiak captain’s seat with whale figurine.
NMAI 226908.000

Fig.5.13. Ivory whale "cord stopper"/charm. Point Hope, Alaska, 2013.
Photo by E. Anichtchenko

Launching of an umiak during the spring ice-edge whale hunting was also ceremonially embedded. The crew carried the boat towards the ice lead, as dogs were not allowed on ice out of respect for the whale. At the point where the sea ice began, the umiak was placed on ice and the entire crew entered it and imitated paddling the boat and harpooning the whale. Then the crew picked the umiak up again and brought it to the edge of the ice lead. All the gear was arranged inside, the box of charms was placed under the gunwale at the bow (Spencer 1959:339), and the boat was launched. Everybody in the crew had their specific roles. In addition to the captain, the umiak compliment included a harpooner, steersman, paddlers and a *kaakliq*, an older, experienced whaler who knew and could sing whaling songs – incantations that were believed to affect the whale's behavior. Sometimes one crew member could combine several roles. The captains, for instance, often served as steersmen or harpooner.

Successful hunting was followed by a celebration. In spring, the ceremonial greeting of the whale, butchering and meat sharing took place on sea ice. During this time and for the short period afterwards the umiaks also remained on the ice. It was an important part of their transition from ocean and ice back to land and rushed return of the boats was believed to repel the whales (Anichtchenko 2013). Bringing boats to land signified the end of the whaling season and the beginning of the feast. According to Laurie Kingik, umiaks would then be brought to the “boats’ stopping place” marked by whale’s head near *qargi* (Okakok and Kean 1981:338). For several days after the last crew returned the entire community engaged in feasting and dancing, followed by outdoor festival called *nalukataq.* All captains brought out their umiaks and propped them on one side using paddles to form windbreaks (Fig.5.14.). Raven skins were attached to the boats as banners. The festivities included races, games, tag-of-war and blanket tosses mentioned earlier in this chapter. After the festivals were over, the boats were placed bottoms up next to *qargi* on elevated boat racks. If the skin cover was in good shape, it was removed for winter months and stored in ice cellars or caches until it was time to go whaling again (Murdoch 1988: 338).

5.14. *Nalukataq* spring whaling celebration, Point Hope, circa 1936. AMRC B1980.027.160

5.6. Meaning of the boats

Even a cursory overview of cultural practices associated with skin watercraft brings up a number of meanings that boats held for indigenous peoples of Arctic coasts. An essential tool of maritime adaptation, they served as the basis for both economic and social structure, manifestation of cultural identity, and a vehicle of inter-communal and international interactions. Perceived as animated beings, kayaks and umiaks accompanied individuals throughout their entire lives, connecting different seasonal cycles and geographical locations, the world of people with the world of animals and spirits. An Inupiaq whaler and artist from Point Hope, Steve Oommittok emphasized this in his explanation of the importance of umiaks:

> When I make a drawing, I always put umiak in it, because it's the connection. Connection between the whales and us, the ice and the ocean, and the land, between the women who make skin covers and men who paddle in the boat. We come together around the umiak (Anichtchenko 2013).

These multiple meanings accompanied and often guided all aspects of boat manufacturing, use and recycling, positioning skin boats as a physical focus of the social life in the coastal Arctic. Although not always articulated in an immediately obvious manner, they are nevertheless reflected in the material record, signalling the need of multi-dimensional interpretation of these data.

Chapter 6. Bering Strait case study, St. Lawrence Island: range of seafaring

Our review of prehistoric maritime mobility in North American Arctic begins at the western margin on the region, in the Bering Strait. Lying between North American and Eurasian continent, this body of water played a key role in transcontinental movements throughout the history of American Arctic. Many of these movements had to rely on maritime transport. Yet, the position of seafaring in these processes is often underplayed due to the general scepticism regarding skin-covered watercraft ability to engage in prolonged open sea voyages (see Chapter 5.3). At the core of this inquiry, therefore, is the question of the range of indigenous maritime mobility and the factors that afforded or constrained it. This includes the technological ability of skin watercraft to engage in long-distance voyages, and the social meaning and context of seafaring. Could skin-covered watercraft cover the extended open sea distances without becoming waterlogged and incapacitated? How did maritime mobility affect interregional networks? And how did these networks influence seafaring practices in general and watercraft development in particular? In case of Bering Strait, these questions touch upon both the regional history and transcontinental connectivity of Arctic maritime cultures in general.

6.1. Bering Strait region and inter-continental maritime mobility

Situated between 64. 3° and 65.7° north latitude, with its northern border skirting the Arctic Circle, Bering Strait is one of the most dynamic zones in the circumpolar north. As a passage between the Bering and Chukchi Seas and a bio-environmental bottle neck, it funnels marine currents and movement of biota, and brings together colliding Arctic and Pacific weather patterns. Equally important are east-to west connections afforded by the Bering Strait's position between two continents. Only 85 kilometres separate Eastern Asia and North America at the narrowest point of Bering Strait. In geographic terms this distance can be crossed in a relatively short time by any form of transportation, including trekking by foot over sea ice. Modern ocean-going ships cover it in less than three hours. An experienced kayaker can reach the other shore in a matter of a day or two, and it has been proven possible to cross the frozen strait by foot in two weeks time (BBC News 2006). Historically, however, this geographic proximity did not result in any lasting cultural unity between the two continents. Instead, the Bering Strait was and continues to be a transitional and a transformative zone, which both connects and divides the cultural and political entities on both of its shores. On one hand, it fostered a number of important inter-continental population movements and migrations, including the initial peopling of the Americas, as well as regular trade networks. On another, with the exception of the Siberian Yupik nation of St. Lawrence Island and the South Chukotka Peninsula, the Native peoples inhabiting its Asian and American shores belong to different culture groups and speak different languages, although some cultural trends are shared.

The impact of the dynamically linked social and physical environments of the Bering Sea region on local culture history is particularly complex in the case of insular societies, with their inherent and contrasting tendencies towards both absorbing and connecting external influences and shaping unique isolated cultural trends (Spriggs 2008:211-213, Fitzpatrick et al. 2007, Fitzhugh and Hunt 1997, MacArthur and Wilson 1967; Vayda and Rappaport 1963). Maritime mobility plays an important role in these processes. The islands of the Bering Strait, therefore, provide an insight at as to how indigenous seafaring affected and reflected both cross-regional and local culture histories.

Four islands are located in the Bering Strait region (Fig. 6.1.). Two of them, Big and Little Diomede, are in what may be considered Bering Strait proper, lying approximately mid-way between Cape Dezhnev in Russia and Cape Prince of Wales in Alaska. Two others are at the southern outskirts of the Bering Strait region at large: King Island off the west coast of the Seward Peninsula and St. Lawrence Island due south of Cape Dezhnev. The largest island in this group, St. Lawrence is located at the south-western extreme of the Strait. By geographical position alone, it may even be argued that its regional identity belongs to the northern Bering Sea rather than Bering Strait. However, in terms of cultural ecology, the island is strongly affected by the proximity of the strait. Located perpendicular to the narrow passage between two continents, it offers access to the same animal and bird migrations and transcontinental trading routes that affected subsistence and cultures of Bering Strait cultures further north.

Figure 6.1. Map of the Bering Sea and Bering Strait.

One of the last exposed portions of the land bridge that connected Asia and North America ten thousand years ago, St. Lawrence Island played a significant role in the history of cultural connections between the two continents. In terms of cultural orientation, the island has stronger ties with Siberia than with Alaska, largely due to its geographical proximity to the Asian continent. The western end of the island is only about 65 km from the Siberian coast, while its eastern proximity lies 160 km from the Alaskan coast, a distance which some researchers consider beyond the range of traditional skin boats (Rainey 1941:463; Giddings 1960; Kankaanpää 1989:31; Crockford 2008:126). Although the modern indigenous population of the island indeed belongs to the Siberian Yupik nation, the same people that inhabit the Chukotka Peninsula on the Russian coast of Bering Strait, St. Lawrence Island also has many ties with Alaska. Archaeological finds testify to fairly active traffic between coastal Alaska and St. Lawrence Island (Ackerman 1961:1), and traditional stories specifically reference skin boat voyages to both the Alaskan and Siberian coasts. According to the National Museum of Natural History Naturalist Edward Nelson, who worked in western Alaska and Siberia between 1877 and 1881, King Island kayakers voyaged both to St. Lawrence Island and Siberian coast of the strait (1889:220). The indigenous name of the island is Sivuqaq, which means “to be wrung out," and the Yupik story about its creation emphasizes the island's connection to both Alaska and Siberia:

> When the Creator finished the mainland of Alaska and Siberia, he felt that a part in the middle was still missing. He took a great handful of earth from the bottom of the ocean, squeezed it dry, and placed it between the two continents. Then he said, "There, it is complete." (Koonooka 2010:73)

This unique role of St. Lawrence Island as a link between two continents and a gateway to Bering Strait and the Arctic makes it an ideal case study for inquiry into transcontinental and trans-regional indigenous Arctic maritime mobility. Its archaeological record has great potential – from elucidating the boat technology of the first settlers of North America and later migrants, to tracing the vectors of cultural, technological and social exchange between different continents (Asia and North America) and oceans (the Pacific and Arctic, via the Bering and Chukchi Seas).

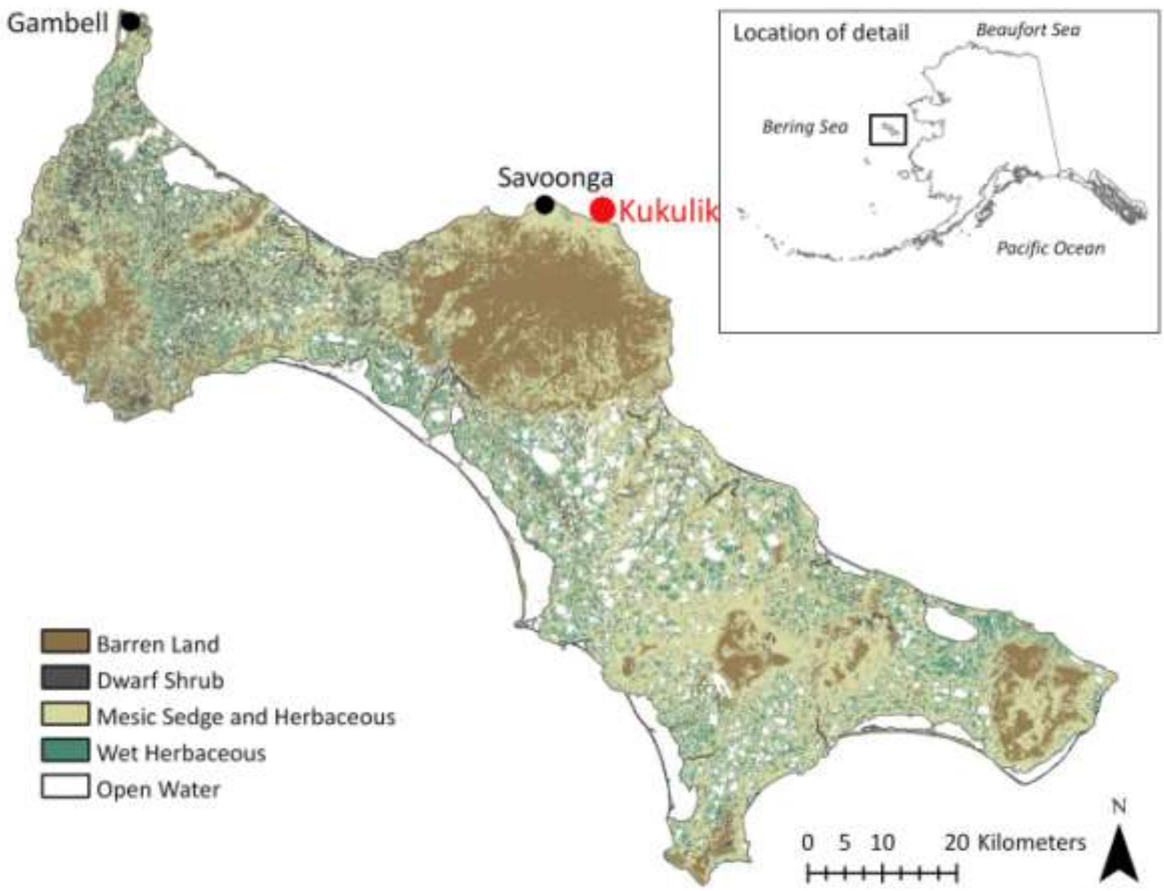


Figure 6.2. St. Lawrence Island with Kukulik location, map after the National Land Cover Database (NLCD).

With over a century of history of archaeological research, St. Lawrence Island has a number of well-known and excavated sites. The site chosen for this research is located on Cape Kukulik (63 42'N, 170 23'W), situated at the approximate midpoint of the island's northern shore, near the village of Savoonga (Fig. 6.2). Kukulik is one of the largest archaeological sites on St. Lawrence Island, referred to as "the former center of population on St. Lawrence Island, where prehistoric Eskimo culture was marked by extreme complexity and mutability" (Collins 1939:479). Both the site's central location, which seemingly balances eastern and western influences, and the richness of artefactual data in general and the boat record in particular were significant factors in identifying it as the case study for this research. The presence of the indigenous community of Savoonga still practicing skin boat building is also an important consideration.

6.2. Ethnographic horizon

The earliest recorded information about St. Lawrence Island comes from the oral lore of Chukchi peoples collected during the Russian expansion into Chukotka in the late 1600s. According to this information, contacts between Siberian Natives and the inhabitants of St. Lawrence Island were fairly frequent and included both peaceful interactions, such as trading and intermarriage, and military expeditions. The first non-native sighting of the island took place on August 18, 1728 when the Russian ship *Sv. Gavriil* under the command of Vitus Bering sailed nearby on its search for the North American coast. Sometime before 1799, the Russian serviceman Kobelev drew the first map of St. Lawrence Island. Despite these and other voyages up until the second half of 19th century, St. Lawrence remained at the periphery of Russian and European interests (Burgess 1974; Crowell and Oozevaseuk 2006:5).

Western contacts with the island intensified following Captain Thomas Roys' 1848 discovery of rich bowhead whale stocks in Bering Strait. News travelled fast and in 1849, 50 whaling ships ventured into the region. Between 1848 and 1899, approximately 2500 annual whaling cruises took place in the Bering Sea and beyond (Bockstoce 1986). Many made a stopover on St. Lawrence Island, trading western goods for ivory and baleen, and occasionally hiring locals (Silook 1976:16-17). In addition to the new trading opportunities, whalers depleted walrus and whale stocks and brought disease and significant quantities of alcohol. Both played a role in one of the most dramatic events of the island's history - the famine and epidemic of 1878-1880. A combination of poor weather conditions, depleted animal stocks, disease (identified as "measles or black tongue") (Rosse 1883:21) and possibly alcohol consumption resulted in catastrophic life loss of more than 1,000 people (2/3 of the island's population) (Ackerman 1976:38-39, Bockstoce 1986:136-41, Burgess 1974:28-32; Crowell and Oozevaseuk 2006:3). Recent analysis of archaeological and historical data suggests even higher numbers: 1900 people out of a pre-1878 population of around 2200 (Mudar and Speaker 2003).

The disaster took a particularly heavy toll on Kukulik: only one man of an estimated 300 inhabitants survived the epidemic, and the settlement ceased to exist. The surviving population of St. Lawrence gravitated to more fortunate locations, particularly Sivuqaq (modern Gambell). In 1911-1912, people from Sivuqaq/Gambell established a new permanent camp near the extinct village of Kukulik, which eventually became the new community of Savoonga (Krupnik and Chlenov 2013:112). Today all inhabitants of St. Lawrence live in either Gambell or Savoonga.

Both depopulation and changes in settlement patterns had a tremendous impact on the traditional life and population dynamics of the island. Demographically, it created a void which motivated a migration of Siberian Yupik people from the Asian mainland to St. Lawrence Island (Ibid 108-113). The impact on traditional life is harder to gauge, but in general the loss of entire communities likely eliminated some regional traditions and dealt a blow to the inter-generational knowledge transmission, removing an important part of the cultural record before more systematic inquiries into the ethnography and archaeology began at the end of 19th century.

Early ethnographic accounts mention skin-covered watercraft frequently, although the information is usually brief and focused exclusively on umiaks (*angyaqs* in Siberian Yupik) (Sarychev 1969:43, Merck 1980:185). On July 21, 1791 Captain Joseph Billings made a short landing at the Koozata lagoon on the south shore, west of Siknik Cape. He reported seeing a distant habitation and a large skin boat with about 30 men aboard which retreated when warning shots were fired (Sauer 1972). A quarter of a century later, in July of 1817, Otto von Kotzebue, the captain of the Russian brig *Rurik*, stopped at Kialegeak at the south-east point of the island. While he was conversing with local inhabitants an umiak "was drawn along the strand by dogs, which just came from the Tschukutskoi" (Chukchi Peninsula) (Kotzebue 1967:175). In the course of the same conversation Kotzebue learned that the ice had left the shore of the island only three days prior to his landing. Evidently, skin boat navigation was possible immediately after or likely simultaneously with the retreat of the ice. Kotzebue also stated that the Natives of St. Lawrence Island “call the inhabitants of the continent of America their brethren, as they have constant intercourse with them, and their language is also the same” (Ibid).

More detailed information became available when the US government began exploring its new acquisition following the purchase of Alaska from Russia in 1867. Visiting Kialegeak at the southeast end of St. Lawrence Island in 1874, naturalist Henry Wood Elliott recorded his observations in both textual descriptions and sketches. Regarding the boats used by St. Lawrence inhabitants he noted that the crew of the boat that approached their ship consisted of both men and women and provided following description:

> The boats, about 14 feet (4.3 m.) long with 4 feet (1.3 m) beam, consisted of a frame, very neatly lashed together, of pine, with whalebone fastening, over which walrus-hide was stretched; they propelled it with paddles and oars, which were also well made (Elliott 1875:220-224).

Riley D. Moore, a medical professional contracted by the Smithsonian Institution to conduct body and facial measurements of St. Lawrence Island indigenous people, recorded larger and narrower umiaks during his stay in Gambell, at the north-western end of the island, in 1919. According to him, Gambell umiaks at the beginning of the 20th century had flat bottom and measured up to 7.3 m in length, 1.8 m in width, and 0.6-0.75 m. in depth, with a maximum bottom breadth of about 0.8 m. (Moore 1928:349-350). These boats could carry 25 to 30 people and about five tons of cargo. Significant disparity in size between umiaks described above reflects the difference between larger boats intended for long-distance travel and smaller hunting watercraft. Early 20th century photographs and oral traditions also indicate that the Siberian Yupik people of Asia had one-person open skin boats, which could be carried by a single individual and were used for sealing and fishing (Krupnik & Krutak 2002).

The cover of a St. Lawrence umiak was typically made of walrus hides, although in one instance bull reindeer was reported to be used for a boat cover in Gambell (Carius 1979:10; Chapter 5.2.). Female walrus skins were preferred because they were softer and less damaged by fighting than males’. Typically, walrus cover could last about three years. If it was made of male walrus skins, however, it would start leaking and had to be replaced in a year (Oozeva 1985:169).

Umiak paddles had two different designs: narrower ones (7 inches/17.8 cm wide) used by the crew and wider (1 ft/30.5 cm wide) for the captain of the boat and for the striker or bowman. The legendary "strong men" were reportedly using a big whale's scapula bone for a paddle, which would be about 122 cm wide (Silook 1976:2). According to Siberian Yupik tradition, if an umiak was successful in taking a whale, special designs were painted on its paddles with a mixture of the viscous fluid from whale's eyeballs and soot (Fig.6.3.). The eyeball tissues were wrapped in leather and then joined together in pairs and added to the string of amulets belonging to the boat (Bogoras 1909:408).

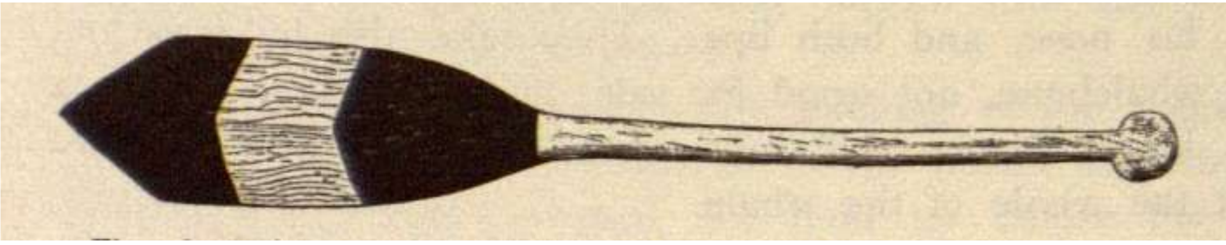


Figure 6.3. Chukchi/Siberian Yupik paddle painted in celebration of successful whale hunt (Bogoras 1909:408).

In addition to paddles, umiaks were propelled by sails made of walrus stomachs. The stomachs were cleaned, and hung outside for several weeks to allow for "the wind to work them out and make them soft and the weather bleach them. When they are almost white and dry, women cut them open and stretch tissue into 4 ft (122 cm) long strips, which are then sewn together. A hole a size of a pencil is punctuated into every membrane to release the pressure of the wind" (Ibid: 2-4).

St. Lawrence Island umiaks were used for hunting, travelling along the coast of the island (such as going between the villages, going to summer camp or to the various locations of subsistence activities), and long distance voyages. Trading parties from Oongazik (Chaplino in Siberia) and Gambell exchanged visits early every summer. The distance between Chaplino and Gambell is 50 miles, which took about 20 hours of paddling and less by sailing (Silook 1976:1). Along with other articles, such as hides, clothing, ammunition and clothes, Siberian traders sought out St. Lawrence Island umiak frames (Krupnik & Krutak 2003: 125).

St. Lawrence islanders also visited the Asian coast, often venturing farther north from Indian Point, all the way to Lavrentiya Bay in the northern part of the Chukchi Peninsula. Trade with inland Chukchi reindeer herders supplied St. Lawrence Islanders with reindeer meet and skins (Ibid:168). Oral lore and historical accounts attest that some traffic existed between St. Lawrence Island and other islands in the Bering Strait region, although these voyages were likely less regular than those to Siberia (Chlenov 1988, Krupnik and Chlenov 2013:34).

The visits from Siberia were not always peaceful. Conflicts often occurred and the retaliation was swift: "an arrow is returned with an arrow, and a spear with a spear and knife is returned with a knife and so on" (Silook 1976:11). Warring parties also arrived in umiaks, and usually included several boats. These were likely the same vessels as those used for trading. Because of this, all watercraft approaching the island were met with initial suspicion if not aggression, and the ultimate reception depended on many factors, including adherence to social protocols and display of established gestures and objects signalling peaceful intentions. Parties suspected in hostile intentions were met with a rain of arrows and often prevented from landing. Siberians were rumoured to have prayers that could slow down their opponents' boats. Their umiaks, it was said, had special helping spirits, which sometimes made themselves visible as killer whales following the boats (Ibid:13).

Umiaks are featured prominently in St. Lawrence Island tales, often as a vehicle of transportation between different worlds. In the tale "When the Pale Moon Went Fainting" a woman fleeing her abusive husband is aided first by a skin boat paddled by a crew wearing the same dull white colour, who turned out to be gulls, and then by another umiak with black-tipped paddles, manned by Arctic terns. In this manner the woman arrives to her new husband, the Creator, who also goes around in an umiak (Slwooko 1979:74-79).

In another tale, *The Lost Sister of Ivongo* (Silook n.d.), also known as *Clashing Rocks* (Slwooko 1979), three brothers are in need of a very special watercraft to find their sister taken away by a supernatural whale/walrus skull. They are instructed to build an umiak that can outrun flying ducks. After several unsuccessful attempts, the brothers finally build such an umiak with a birch wood frame covered with beluga whale skins. Their boat's speed is tested when they reach clashing cliffs, which closed behind them as soon and they passed, snapping the end of their boat, but leaving them unharmed and able to continue the journey (Slwooko 1979:55, Silook 1929:n.p.n.).

Contacts with commercial whalers introduced the indigenous people of the Bering Strait to a new form of watercraft – wooden whale boats. Yankee whalers heading south at the end of the whaling cruise were eager to get rid of used whaleboats and traded them for 20 to 30 baleen pieces, a price that many Native families could afford if at least one whale was taken (Bogoras 1909:629, Braund 1988:100). Although significantly heavier and harder to maintain than umiaks, whaleboats were popular because of their manoeuvrability under sail, and because they did not become waterlogged. By the end of the 19th century whaleboats were widely used by the St. Lawrence Islanders, along with traditional skin watercraft (Braund 1988:104-107). This situation changed again in the 1930s following the collapse of commercial whaling, when wooden boats became both more scarce and harder to barter for. Interestingly, instead of returning to the traditional flat-bottomed design, the islanders began building round-bottomed skin boats, which incorporated elements of both. This innovation originated from the Bering Strait community of King Island, where a local man Jimmy Atłuk devised skin boat with an inboard motor well and steam-bent ribs, which made the boat more seaworthy under increased power (Bogojavlensky 1969:215). By 1930s, the bent-rib umiaks spread into St. Lawrence and Little Diomede Islands, completely replacing traditional flat-bottom boats (Ibid 115). All umiaks currently built and used on St. Lawrence belong to this type (Fig.6.4).

The history of St. Lawrence umiak highlights several aspects important for the overall understanding of dynamics and patterns of technological innovations in the Bering Strait region. It defeats the notion of conservatism of traditional designs, points the role of external influences, and the capacity of Native boat builder for the inventive ingenuity rooted in, but not restricted by their traditional knowledge and understanding of environment. Along with information about the umiak voyages, it demonstrates that the social and technological network encompassing St. Lawrence Island extended in some directions over 270 miles from the island and included different Native nationalities.

Figure 6.4. Round-bottom umiak, Savoonga, 2014, photo by Craig Childs.

By the comparison with umiak data, the ethnographic record on kayaks is both poor and under-researched. Kayaks are absent in all written sources on St. Lawrence Island, which prompted the academic community to believe that this type of watercraft was abandoned in the distant past (Nelson 1899:218; Geist and Rainey 1936:121; Kankaanpää 1989:17). When and why kayaks disappeared from St. Lawrence Island remains a question. Finnish archaeologist Jarmo Kankaanpää suggested that St. Lawrence kayaks ceased on the island during the late Punuk phase following the establishment of organized crew whaling that removed the need for small one-person watercraft (1989: 34). However, other Arctic and subarctic societies practicing organized crew whaling retained their kayaks up until the twentieth century. The Siberian Yupik people of Asia, for instance, reportedly had kayaks in the early 1900s. Waldemar Bogoras photographed a 15-foot long kayak in the Siberian Yupik village of Wute'en, and also collected a model of a kayak made at Indian Point (Bogoras 1909:135, Zimmerly 2000a:14, Fig. 6.5.). The boat was reportedly similar to kayaks of the maritime Chukchi, with a rounded bottom and flat deck (Fig. 6.6.).

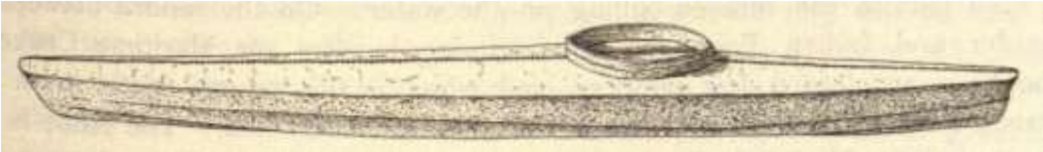


Figure 6.5. Drawing of Siberian Yupik kayak (Bogoras 1909:135)

Fig. 6.6. Maritime Chukchi kayak collected by A.E. Nordenskiold on the North cost of Chukotka in 1879-1880. EMS 1880.4.1255. Photo by David Zimmerly.

Despite the lack of written evidence or full scale kayak examples, these boats feature in oral lore in connection with both mundane activities and heroic deeds. In the story *Tutakemsegaq* (Wood Carver) a skilled and good-humored St. Lawrence wood carver travels in his kayak to an island where good wood could be found. One day he carves himself a beautiful woman, who becomes alive and travels with him in his kayak back to the village, where she is promptly snatched away by one of the younger hunters. Discouraged, but determined, Tutakemsegaq returns to the island to carve himself a new woman, this time giving her an ugly face. Once again she travels with him to the village in the hold of this kayak, but this time when she peeks from the kayak hatch the villagers run away and the witty carver finally gets a wife (Carius 1979:37-38). Besides an obvious connection to the myth of Pygmalion, the *Tutakemsegaq* story shows that kayaks played a role in daily travel, passenger transportation, and possibly marriage networking.

In another tale, *Ivongo Om Ee Luk*, three younger brothers of the St. Lawrence "strong man" Ivongo drift away to mainland Alaska while hunting, and Ivongo goes looking for them in his kayak. After he finds his brothers and punishes everybody who did them wrong, they all return to St. Lawrence Island (Silook 1929: n.p.). A reference to kayak voyages between St. Lawrence Island and Alaskan mainland, this tale also points out tension in the relationship between the islanders and people of mainland Alaska.

While traditional tales are hard to date, some comparatively recent ethnographic records also attest to the presence of kayaks on St. Lawrence Island as late as the early 20th century. An ivory smoking pipe from the National Museum of Natural History collected in Gambell in 1912, for instance, depicts walrus and seal hunting from kayaks (E280599, Fig. 6.7.). The ethnographic collection assembled by Moreau Chambers and Henry Collins during their work on St. Lawrence Island in 1933 contains four assemblages of wooden artefacts labeled "kayak measuring sticks" (NMNH E280248, Figure 6.8.) and purchased in Gambell. The "sticks" are narrow triangular pieces of wood about 1.5 cm thick, 2-3 cm wide and ranging in length between 12 and 39 cm. Rectangular cuts at one or both ends of these artefacts are reminiscent of mortise joints of kayak deck crosspieces, ribs and flat bottom cross pieces, but the precise method of use is obscure. A single hole drilled into each of these timbers likely served to accommodate a cord that held several sticks together. The very existence of this method of measuring is in seeming contradiction with the notion of kayaks being tailored to their owners' individual body measurements, but may perhaps indicate methods used by a master kayak builder in the process of building a commissioned kayak. Instead of summoning the future owner every time a new measurement was needed, the builder may have had a "fitting session" by recording his client's anthropometric data with wooden sticks. The specific purpose of these objects is captured in their indigenous name recorded by Collins in the collection catalogue – *uuqyah'juqum* – "to make kayak."

Figure 6.7. Ivory smoking pipe collected by R.D. Moore in Gambell in 1912.
NMNH E280599. Photo by E. Anichtchenko

Figure 6.8. Kayak measuring sticks collected by M. Chambers in Gambell in 1933. NMNH E280248. Photo by E. Anichtchenko.

The use of kayaks for subsistence activities was apparently remembered in the second half of twentieth century. Gambell elders interviewed sometime before 1976 recalled kayak hunting for young bearded seals. Killed seals were put inside the kayak, which could reportedly hold about 10 young seals (Silook 1976:34). Estelle Oozevaseuk, a St. Lawrence elder, recalled that kayaks were used on the island “long time ago” and were even paddled to Siberia (Estelle Oozevaseuk 2004). Even more informative are two photographs taken by Henry Collins in 1929 at Point Kialegak. Two small black and white images show kayakers paddling single-hatch boats (Fig. 6.9 and 6.10.). An ivory kayak model purchased by Edward Nelson at an unknown St. Lawrence Island location in 1881 depicts similar watercraft (Fig.6.11).

In terms of design, St. Lawrence Island kayak of late 19th –early 20th century appear to resemble Norton Sound watercraft with a characteristic hand-grip protrusion at the stern and a cleft bow (Fig.6.12). A very different kayak is represented by the Henry Elliott’s 1874 sketch of St. Lawrence island walrus hunting, which shows a boat with split-bow resembling the stems of the Aleutian Island and Kodiak Archipelago kayaks (Fig. 6.13). It is noteworthy that both Collins and Elliott’s references indicate watercraft similar to Alaskan types, with little resemblance to kayaks of Yupik people of Chukotka, with who, as it was discussed earlier, St. Lawrence Islanders have many strong cultural and social connections.

Figure 6.9. Two men and a kayak, Point Kialegak, St. Lawrence Island, 1929.
Photo by Henry Collins. National Anthropological Archives, Smithsonian Institution, Washington DC.

Figure 6.10. Man paddling kayak at Point Kialegak, St. Lawrence Island, 1929.
Photo by Henry Collins. National Anthropological Archives, Smithsonian Institution, Washington DC.

Figure 6.11. Ivory kayak model with a seal float behind cockpit collected by Edward Nelson on St. Lawrence Island in 1881. E63450, National Museum of Natural History, Washington DC.

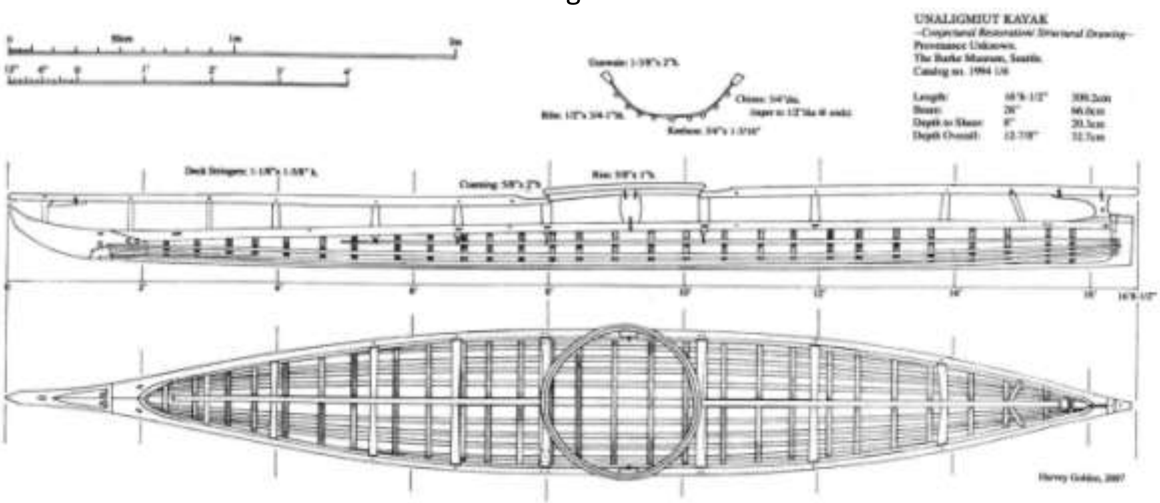


Figure 6.12. Norton Sound kayak lines (Golden 2015:220)

Figure 6.13. “A hunter in a kayak ready to strike a walrus with a harpoon.”
(Elliott 1881:98)

While Collins’ photographs may have theoretically captured visitors from the main land, the presence of measuring sticks implies that kayaks were built on St. Lawrence Island as late as the beginning of 20th century. In light of this evidence, it is likely that the disappearance of kayak (and possibly flat bottom umiak) traditions was a comparatively recent development, which can be correlated with the famine of 1878-1880. A handful of thirty-plus-year-old survivors of the epidemic versed in traditional knowledge could have kept it alive for several decades, but were not numerous enough and may have not had enough community network to pass the skill on to the next generation. Traditionally, a young man began learning how to build kayaks in his early twenties under the guidance of more experienced builders and elders. By 1930s the generation brought up in “pre-famine” times was mostly gone, and the manufacturing of traditional watercraft ceased. With time the very memory of this tradition faded and without ethnographic objects or records to re-kindle it, the millennia-old tradition was forgotten, leaving behind only fragmented archaeological data.

6.3. Archaeological horizon

Considering the role of the Bering Land Bridge in the colonization of North America, the range of human history in the Bering Strait region extends over the past 20,000 years.

Post-glacial sea level rise and the inundation of Beringia made earlier sites inaccessible, restricting direct evidence of human presence to the last 4-5,000 years (Ackerman 1961:1). A prominent volcanic feature during the glacial maximum, St. Lawrence maintained land connections with Eurasia and North America until around 11,000 B.P. (Hopkins 1959, Smith et al. 1978:2). Much of the early archaeological research of St. Lawrence Island has been inspired by the island's potential to elucidate the culture-historical connections between Asia and Alaska. Starting from Otto Geist's 1926 archaeological survey, the island was subject to fairly regular investigations, resulting in recording of 59 archaeological sites (Fig. 6.14).

Archaeological research revealed that St. Lawrence was populated by circa 50 BC, by people with close cultural affiliations with contemporaneous inhabitants of the Chukotka Peninsula (Dumond 2009:72, Blumer 2002). Settlements of this culture, which became known as Old Bering Sea (OBS, See Chater 2.5.), were positioned along the island's north shore in locations that allowed easy access to maritime resources. Walrus and seals were particularly important for these people's subsistence, and the lack of OBS sites along the southern shore is attributed to the scarcity of walrus in that area (Ackerman 1961, 1962). Zooarchaeological analysis demonstrates that animals were taken year round, which implies hunting both on sea ice and open water (Crowell 1985:10).

The OBS hunters appear to have arrived on St. Lawrence Island with a fully developed Arctic adaptation specifically and expertly geared to sea ice-edge habitat. While it has been largely accepted that the initial colonizers came to St. Lawrence from Chukotka (Crowell 1985:11), Susan Crockford's recent research on mid-Holocene climate change makes a persuasive argument for tracing their origin to the southern margins of Bering Sea. Crockford proposed that the sea ice-edge hunting technology of early St. Lawrence settlers, including boats, has its ancient roots in the eastern Aleutians and is represented archaeologically by c. 4700 BP (Crockford 2008). According to this theory, the initial wave of population came to St. Lawrence from the south, along the retreating spring ice at the end of the Neoglacial period. Regardless of the initial point of origin, the distribution of OBS sites and material culture traits on St. Lawrence Island and Eurasian and Alaskan coasts attests to high level of these people's mobility and supports the notion of trans-continental exchanges (Dumond 2009:75).

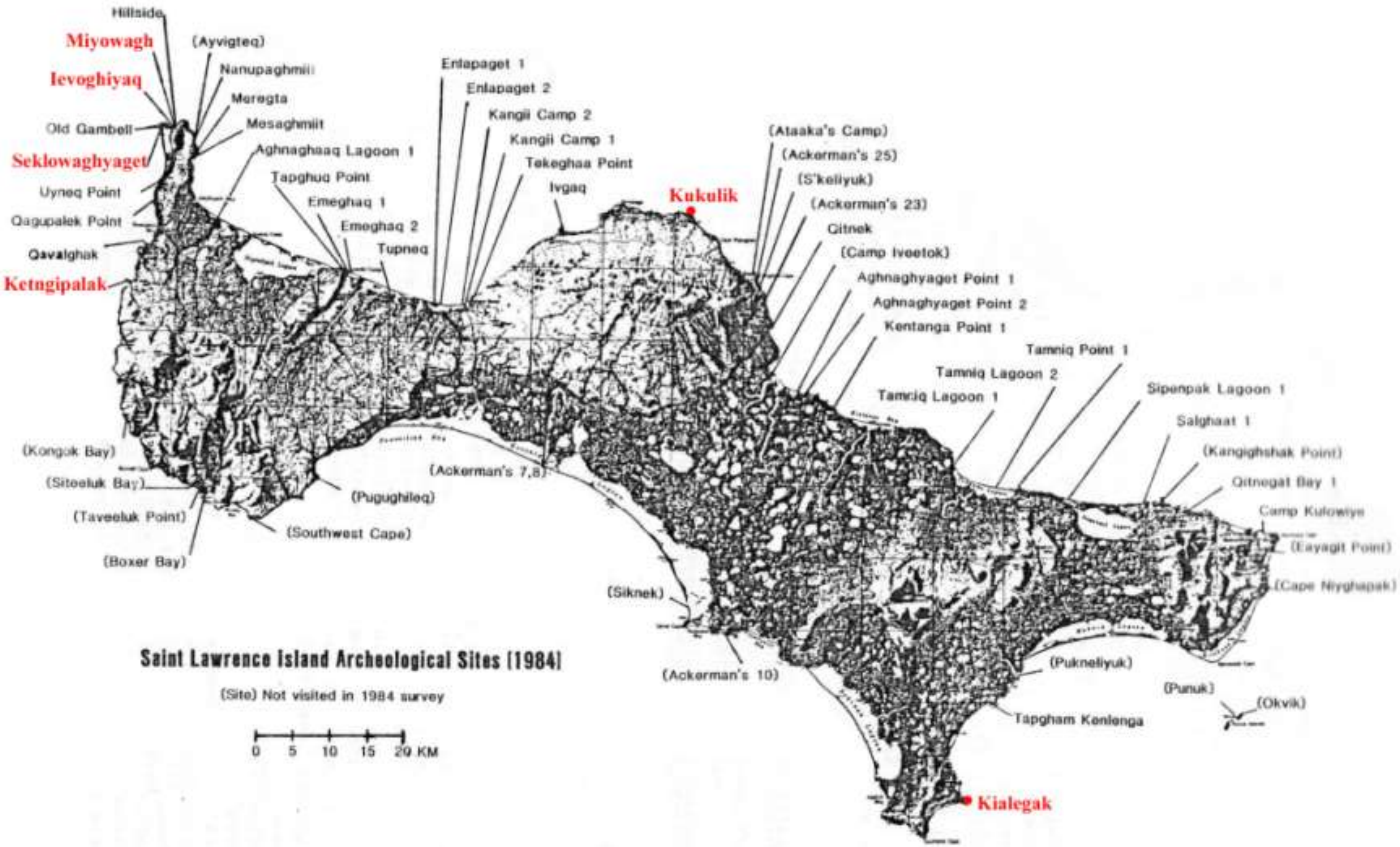


Fig.6.14. St. lawrence Island Archaeological Sites. Red font indicates sites mentioned in this chapter (after Crowell 1984: Figure 1)

Miniature ivory and wooden boats from the OBS sites, such as Ekven cemetery on the Chukotka Peninsula (Bronshtein 2007, Bronshtein and Dneprovsky 2009:94), Miyowagh on St. Lawrence Island (Collins 1937:413-414, plate 59, figures 1-7) and Point Hope in north-western Alaska imply OBS use of both kayaks and umiaks. Two of these models are particularly informative. Originating at opposite sides of Bering Strait – Chukotka Penninsula and Point Hope – they are practically identical, depicting a kayak with gunwales divided at both stem and stern and a human face peeking through a cockpit. Two whales or seals carved between the cockpit and the bow may represent boat charms or buoys made of inflated seal skins and used to aid boat's buoyancy (Fig. 6.15, Fig. 6.16). A smiling human head facing the cockpit of the Point Hope kayak is interpreted as a spirit guiding the watercraft, suggesting a shamanistic spirit voyage (Fitzhugh 2009:164). The miniature, thus, is both a visual reference, however schematic, to how the OBS kayaks looked and one of the earliest representations of Arctic kayak's agency and its connection with the spirit world. The resemblance between these ivory kayak models collected at two geographically removed Bering Strait locations is hardly coincidental and can be seen as evidence of the consistency of both ritualistic meaning and design of OBS kayaks on a trans-continental scale.

Figure 6.15. Ivory kayak model from Ekven archaeological site, Chukotka, Russia, circa 50 B.C.-A.D. 500. Museum of Anthropology and Ethnography (Kunstkamera), St. Petersburg, Russia. Photo by E. Anichtchenko

Fig. 6.16. Ivory boat miniature collected by G. B. Gordon in Point Hope in 1907. NA1619, Penn Museum (Fitzhugh 2009:165)

At some point between AD 600 (Giddings 1960; Bandi 1969) and AD 1000 (Rainey and Ralph 1959) the Old Bering Sea culture transitioned to the Punuk phase. Punuk is characterized by a simpler decorative style, ground slate knives and blades, which replaced OBS chipped stone implements, and larger houses constructed with stones, walrus skulls and whalebone (Collins 1937). An increase of whale bone in faunal assemblages and the appearance of large toggling harpoons implies a subsistence shift towards whaling, which some scholars equate with “greater maritime proficiency” (Dumond 2009:75). A number of St. Lawrence archaeological sites, such as Miyowagh, Ievoghiyaq, Seklowaghyaget etc., combined OBS and Punuk layers, suggesting a transition between these two cultures, possibly under the influence of Siberian trade networks that connected the Bering Strait region with Korea and China (Mason 1998). At the same time, Punuk material culture traits are present at the archaeological sites of mainland Alaska (Ackerman 1962), including the Birnirk archaeological site discussed in the next chapter.

From the point of view of prehistoric mobility, the presence of OBS and Punuk sites in

Alaska attest that the region was a scene of active long distance seafaring throughout the first millennium A.D. This movement traversed the Bering Strait in all directions and reached as far north as Point Barrow, Alaska, seemingly unhindered by any technological limitations of watercraft. Ocean-going skinboats connected the American continent with the Asia, establishing and maintaining inter-continental exchange of materials, technologies, ideas and populations.

Because of the Punuk focus on whaling, the St. Lawrence transition to Thule culture is a subject of chronological and terminological debate. Some scholars place the merge around 1000 A.D. (Dumond 2009:75) or 1100 A.D. (Crowell 1985:13), others consider the Punuk phase of St. Lawrence material culture to last from 700 A.D to circa 1600 A.D. (Collins 1937, Bandi 1969, Anderson 1978). The dates of occupation of different sites are also subject to considerable differences in opinion, especially because the initial excavations took place before the development of reliable radiometric dating techniques. An abbreviated compilation of dates for sites mentioned in this article is presented in (Table 5.1.). Despite these differences, it is generally accepted that along with Birnirk, Punuk was integral to the development of the Thule culture and that “the earlier maritime cultures around Bering Strait, on both American and Asian shores, built upon steady interchanges between Asia and America” (Dumond 2009:75).

Site	Collins (1930, 1937)	Smith (1978)	Blumer (2002)
Miyowagh	OBS-Punuk	No data	ADcal 60 - 1445 (peaks 400-1297)
Ievoghiyaq	Punuk	No data	ADcal 885-1400 (peaks 1000-1162)
Seklowaghyaget	Punuk-AD 1700	No data	ADcal 1350-1650 (peaks ADcal 1470)
Ketngipalak		No data	ADcal 465-1635 (peaks AD 635-1493)
Kialegak	OBS-Modern	AD 300-460	ADcal 730-1160 (peaks 970-1040)

Table 6.1. Comparative chronology of five St. Lawrence Island archaeological sites compiled from various published sources.

During the Thule/late Punuk period, organized crew whaling became a focal point of both subsistence and social organization. This shift had a tremendous and lasting effect on every area of people's life. Much of the St. Lawrence island technologies and social and ceremonial practices recorded ethnographically originated at that time. By comparison with the OBS period, boat remains are more frequent in the Punuk and Thule layers of all St. Lawrence Island sites. Ivory miniatures from these periods exhibit both similarities and differences with the OBS models. A kayak carving from the Punuk layers of the St. Lawrence Ievoghiyaq site, for instance, has the same semi-oval cockpit, flat deck and set of two floats as the Ekven and Point Hope miniatures, but also features a ridged deck and connected gunwales (Arima 1999; Fig. 6.17). The gunwales of the model from the Seklowaghyaget site (A356213-0 NMNH), also presumably dating to the Punuk period, are joined at the stem, but divided at the stern, which has a distinctly transom shape. This miniature is particularly remarkable as it appears to be the earliest representation of a double-hatch kayak from the Bering Sea region (Fig. 6.18).

Fig. 6.17. Ivory carving of a kayak with hunter from Ievoghiyaq archaeological site, Cut 5, I, section 5, National Museum of Natural History A355338-0, photo by E. Anichtchenko

Fig. 6.18. Ivory kayak miniature from Seklowaghyaget archaeological site, Cut 1, G, Section 2, A356213-0 NMNH. Two circular hollows carved out on deck may represent two hatches

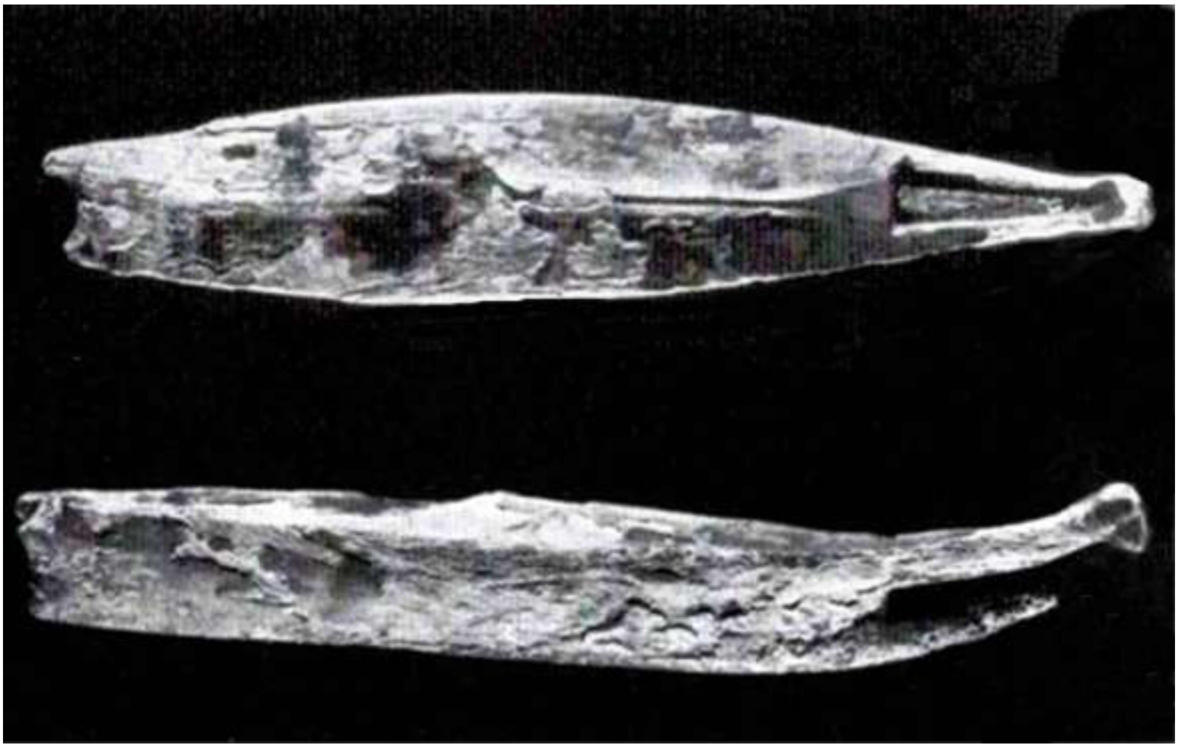


Figure 6.19. Kayak miniature from Seklowaghyaget site, St. Lawrence Island, NMNH A264174, photo by Vernon Doucette (Arima 2004:139-140).

This Seklowaghyaget miniature is not the only evidence of transom-stern kayaks. A similar design is implied by another miniature from the same site (NMNH A264174, Fig. 6.19.) and wooden and ivory miniatures from the Edmund Carpenter collection (Fig.6.20 and 6.21), all presumably dated to Punuk/early Thule. Divided gunwales protruding behind the stern appear to be a feature related to OBS boat technology, yet the bow is seemingly different, suggesting both a connection of Punuk/Thule kayaks of St. Lawrence Island with their OBS ancestors, and changes in boat technology. In addition to miniatures, Punuk and Thule period boat data contain a number of full-scale boat fragments and paddles. Particular artefacts and trends exhibited by these data are discussed below in the context of overall St. Lawrence Island skin boat history (see Chapters 6.7.-6.10 below).

Figure 6.20. Ivory kayak miniature from the Edmund Carpenter collection, Menil Museum, Houston. Photo courtesy Alamy Stcok Photos.

Figure 6.21. Wooden kayak miniature from the Edmund Carpenter collection, Menil Museum, Houston. Photo courtesy Alamy Stcok Photos.

The subject of this case study, Kukulik archaeological site, contains stratigraphic layers pertaining to all periods of the island's human history from late OBS/early Punuk to the 1878-1880 epidemic discussed earlier. The site's chronological depth is both promising and challenging. On one hand, it presents a unique opportunity to study nearly two millennia of human habitation at the same location. On another, the presence of multiple temporal layers often disturbed by the elements and people, make chronological placement of particular artefacts and structures difficult. Carried out almost a century ago in challenging subarctic conditions, the site's recording left many questions unanswered. This is particularly regrettable because over the decades following the archaeological survey the site was virtually destroyed by local Inupiaq residents who dug into its middens and houses in search for carved ivory pieces, which were subsequently sold to unknown collectors around the world (Crowell 1985:83, Smith et al. 1978). Understanding the Kukulik archaeological data, therefore, requires a review of the site's excavation history.

6.4. Kukulik excavation history

The archaeological potential of Kukulik was first reported by Dr. Otto Geist during his 1926 reconnaissance trip to the Bering Sea region carried out under the auspices of the Alaska Agricultural College and School of Mines (now the University of Alaska) (Geist 1936:23). The first test cut was excavated in summer of 1929, but more systematic investigation did not start until June of 1931 (Ibid 29-39). Excavation started on the west end of the East Mound, which was most affected by ocean tides. The cut exposed a "recent" house measuring to 7.9 by 7.9 m. and containing thirty-four human skeletons, likely victims of the 1879-1880 famine.

In 1932 and 1933 field seasons the test cut was extended across the entire mound and excavated to sterile sediments, revealing six houses and one meat cache (University of Alaska Museum of the North Kukulik artefact provenience excel data sheets). During the field seasons of 1934 and 1935, the excavation concentrated on the East Mound, with particular focus on the area northeast of the Test Cut. A second vertical cut was excavated along the northeast beach slope to verify site stratigraphy and several units were opened in the West Mound (Kukkola 1935, (Fig. 6.22 and 6.23).

Overall, archaeological work conducted from 1932-1935 revealed 34 meat cellars, 13 houses and seven “storm sheds”. The cumulative artefact collection includes approximately 51,100 objects, most of which are curated at the University of Alaska Museum of the North, in Fairbanks. A relatively small number of Kukulik artefacts can be found in the Henry Collins collection at the National Museum of Natural History, in Washington DC. The results of Geist’s excavation at Kukulik were published in 1936 under the title *Archaeological Excavations at Kukulik* (Geist and Rainey 1936). Additional information about the fieldwork can be gained from the *Otto Geist Papers,* a collection of original field notes and documents available at the University of Alaska’s Elmer E. Rasmuson Library in Fairbanks.

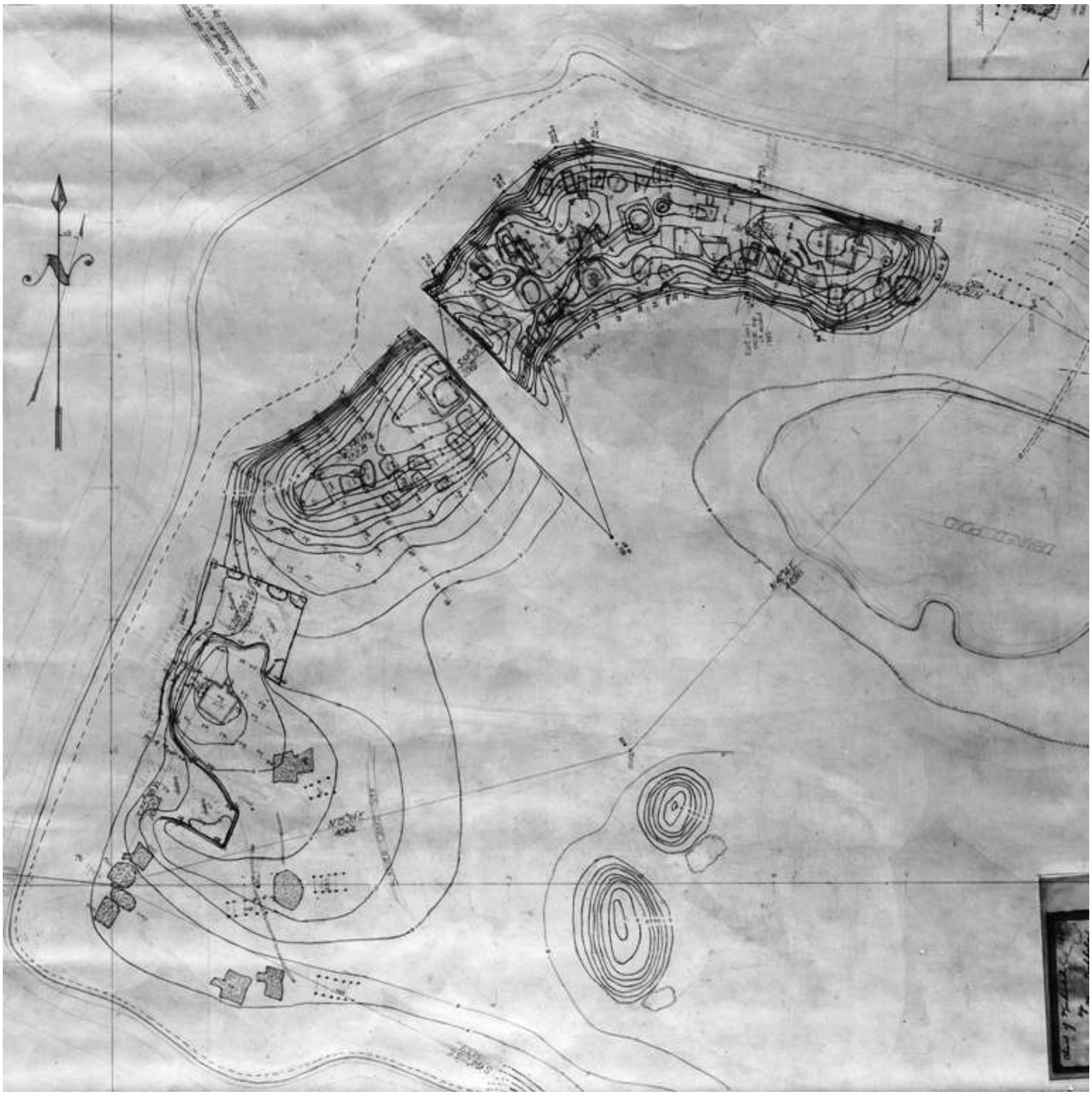


Figure 6.22. Original Kukulik survey chart (Kukkola 1935 a). Image courtesy Chris Houlette.

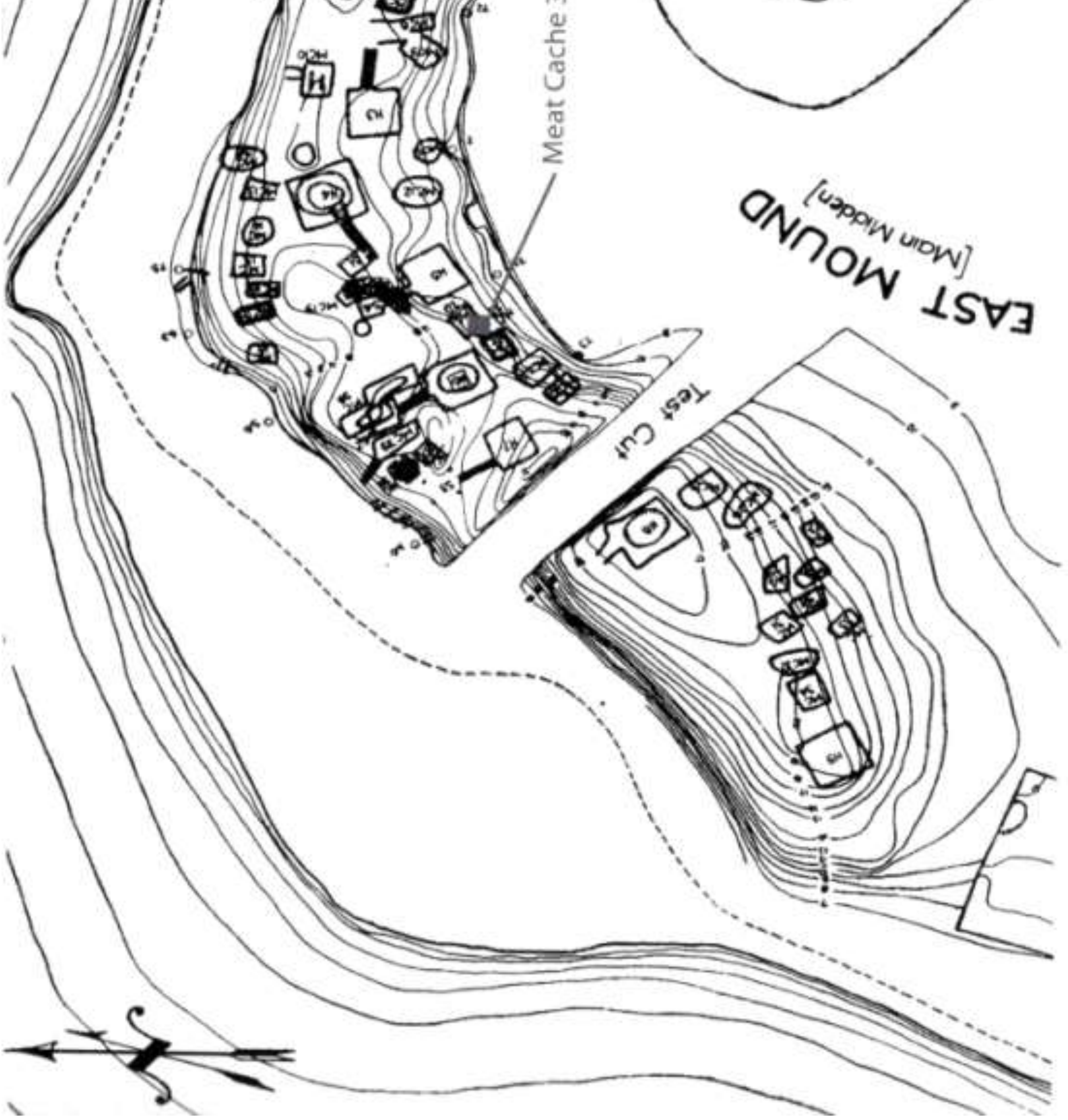


Fig.6.23. Site map of Kukulik showing features of East Mound (Geist and Rainey 1936:54)

6.5. Site description and dating

The Kukulik archaeological site consists of two mounds, located on the beach along the shoreline and exposed to the action of the waves. The largest mound, often referred to as the East Mound or Main Midden, is 193.5 meters long and 41 meters wide with height ranging from 2 to 7 meters. The smaller West Mound measures 55 meters in length, 41 meters in width and 4 meters in height. The mounds are anthropogenic in character and are comprised of midden deposits and structures which Geist identified as houses, meat cellars and "storm sheds." The latter were represented by the base of a post surrounded by stones (Ibid 65). Geist proposed that their main purpose was to protect the entrance to the house tunnel and storage of hunting gear, but admitted that these may have also served as boat racks or elevated caches.

Of ten house structures excavated in Kukulik, three (House I, House II and House III) were positioned directly under each other, providing stratigraphic context for artefacts discovered inside them. All houses excavated at the Kukulik site are rectangular or square semi-subterranean dwellings constructed of driftwood frames covered with sod. Entrance to the houses was gained through tunnels, the orientation of which varied from house to house. Some dwelling featured sleeping platforms which with the exception of House V were positioned along the walls. In House V the square platform was placed in the centre. The house was excavated in a deeper part of the mound, which according to Geist and Rainey made it one of the oldest structures at Kukulik (64). Meat cellars did not exhibit any uniform plan, but were generally built in a deep square or round pit with stone walls supported by beams of whale maxilla and driftwood logs. Whale scapulae often served as their roofs placed either at the ground level or raised one or two feet above it. The floor was sometimes covered with planks or animal hides (Ibid 191-192).

In addition to the habitation-related structures, the site yielded a significant amount of human remains. Bodies were found inside some houses, both on sleeping platforms and buried underneath the floor, in meat cellars and outside of the structures. "True" burials excavated in the midden were typically single individual graves containing few objects and covered with logs and rocks. The burial practices of the inhabitants of Kukulik may have varied through time and depended on individual's status, the circumstances and perhaps season of death. A small rocky hill about two miles southeast of Kukulik was evidently used as a cemetery. The graves at the top of the hill were outlined by rocks "in the shape of a boat, with a post on end at the head, evidently representing the prow of a boat. A few of these graves had some polar bear skulls over them" (Ibid 81). The same hill featured a different type of burials with bodies laid down of on the surface on top of sleds or carrying poles. Geist interpreted rock-lined boat-shaped graves as older burials "since they resemble those near Ievoghiyogameet, one of the older mounds on St. Lawrence Island" (Ibid).

Despite five seasons of field work, Kukulik was only partly excavated and much of the earlier layers remained untouched by archaeologists. With the exception of two test cuts discussed above and several features, the majority of artefacts were collected from the upper four feet (about 120 cm), a strata that Geist himself identified as "surface level" (1936:224) of the midden deposit. The overall site chronology was based on artefacts' stylistic typology and stratigraphic information revealed by test cuts. Geist suggested that layers of sod clearly visible between different archaeological strata represent six periods of occupation or cultural phases and proposed a correlation between the depth of artefacts' deposition and their cultural affiliation. According to this correlation, the first 4 ft (120 cm) of deposit represent modern period (1879-1880 AD). The next 5 ft (120-274 cm below the surface of the mound) contain recent-prehistoric material (1649-1879 AD). The layer below the 3rd house (274 cm+ below the surface, including the somewhat shallower Meat Cache 35) correspond to Thule occupation. Punuk artefacts were observed below the Thule horizon in the East Slope test cut. The Birnirk phase was identified on the basis of several artefacts found in the central layer of East Mound test Cut. Finally, the Old Bering Sea period of Kukulik occupation was determined on the basis of several objects excavated from the base of the East and West Mounds along the beach slope (Ibid 231).

More recent attempts to assess the chronology of the Kukulik site utilized radiocarbon dating. Four ivory and bone harpoon heads from Kukulik were submitted for AMS analysis and yielded four sets of different dates ranging from cal BC 55 to AD 1468 (Mason 2000, Houlette 2009:113, Table 6.2). Additional chronological data was supplied by Christopher Houlette's analysis of four antler and wood samples from Meat Cache 35, which Geist defined as an "early Thule assemblage." Three of the four of these samples indicated that the feature was in use in the late thirteenth to fourteenth century (Ibid).

UAMN Catalog Number	Beta Analytic Sample #	Artifact Description	Material	Depth Below Surface	Provenience	Measured ^{14}C Age BP	$^{13}C/^{12}C$ Ratio	Converted Age	Calibration Used	Calibrated Calendar Yr BC/AD (2 sigma)
1-1933-8692	196352	Harpoon Head	Bone	11 ft. 7 in. 3.53 m	Test cut	1920±40	−21.1	1980±40	IntCal 04	87–78 BC, 55 BC–AD 91, AD 99–124
1-1935-0115	144990	Harpoon Head	Ivory	72 in 1.83 m	Beach slope	1500±40	−13.6	1680±40	Marine 04 ΔR737±20	1323–1468
1-1935-8676	144991	Harpoon Head	Ivory	23 in. 58.4 cm	East end	1050±40	−20.8	1110±40	IntCal 04	783–787, 817–843, 860–1018
1-1935-8992	144992	Harpoon Head	Ivory	?	Test cut?	1850±40	−9.5	2110±40	Marine 04 ΔR737±20	919–1152
3-1935-0003	248282	Harpoon Head	Antler	60 in 1.52 m	MC 35	470±40	−18.2	580±40	IntCal 04	1297–1373, 1377–1422
3-1935-0005	248283	Harpoon Head	Antler	60 in 1.52 m	MC 35	550±40	−18.2	660±40	IntCal 04	1274–1330, 1339–1397
3-1935-0040	248284	Bow Fragment	Wood	60 in 1.52 m	MC 35	250±40	−22.8	290±40	IntCal 04	1483–1665, 1784–1795
3-1935-0043	248285	Drying rack piece?	Wood	60 in 1.52 m	MC 35	560±40	−24.8	560±40	IntCal 04	1301–1367, 1382–1434

Table 6.2. Radiocarbon dates from Kukulik (Houlette 2009:111)

Combined with Geist's observations about the stratigraphy and chronology of Kukulik mound, these radiocarbon dates show that the site was inhabited from the 1st century BC to ca. 1880 AD. Assessment of the site's cultural affiliation and sequence is more challenging. Geist's claim that the Thule culture was present on St. Lawrence Island fostered a debate about the delineation of Thule, Punuk and Birnirk cultures in this particular locale (Collins 1939:480). Although dating of Meat Cache 35 effectively removed the possibility of these materials representing early Thule, placing it instead into the context of later stages of this culture, it does nevertheless represent westbound movement of this culture and poses questions about mobility patterns and events that afforded this presence. It is of particular interest for this research since the feature contained a number of boat artefacts.

6.6. Boat data spatial distribution

The assembly of boat artefacts from Kukulik site contains 375 specimen: 368 objects from the University of Alaska Museum of the North collection and seven from the National Museum of Natural History (See Appendix 1). This constitutes approximately 0.66% of the entire corpus of excavated artefacts. Assessment of artefacts' spatial distribution is complicated by partial data about objects' provenience and the repetitive system of site feature names. The house features 1, 2, 3 and 4 excavated in the test cut are, for instance, not the same features as House 1, 2, 3 and 4 of the Main Midden. Thirteen artefacts are marked as "random diggings" or "uncatalogued objects", and the information about the provenience of another 37 is limited to "miscellaneous objects from Main Midden."

Even when seemingly more precise provenience is provided, it is not always possible to establish from which feature was the artefact excavated. For instance, 28 artefacts excavated in 1934 are identified as originating from sections 375-625, and the provenance of 110 objects uncovered in 1935 is marked as sections 3-6. Both, actually, refer to the same location. Geist divided the entire length of the mound into five 125 ft.-wide sections, numbered from west to east, and used both feet count and section numbers to refer to the specific locations on site. Thus, section 3-6 is the same location as section 375-625 – an area measuring to 76 by 41 meters and containing four houses and fifteen meat cellars. Consequently, it is virtually impossible to reconstruct the in-situ context for the 138 boat artefacts excavated from this area. To make it worse, the same area of the site was evidently referred to as the "east end", which is given as provenance information for another 52 boat artefacts. In summary, data provided by the collection catalogue and Geist's publication lack precise provenance for about 60% of the Kukulik boat artefacts.

Feature	Number of boat artefacts	Miniatures	Umiak fragments	Kayak fragments	Paddles
Main Midden, House 3	2	1		1	
Main Midden, House 6	3	3			
Test Cut, House 1 ("modern house")	3		1		2
Test Cut, House 2	25	12	8	2	3
Test Cut, House 3	5	4			1
Test Cut, House 4	4	3	1		
Main Midden, Meat Cache 1	1	1			
Main Midden, Meat Cache 3	4		3		1
Main Midden, Meat Cache 7	1		1		
Main Midden, Meat Cache 8	1			1	
Main Midden, Meat Cache 10	1		1		
Main Midden, Meat Cache 17	1			1	
Main Midden, Meat Cache 20	1		1		
Main Midden, Meat Cache 35	3		2	1	
Main Midden Caches 36 and 38, House 7	4	1	2		1
Main Midden, Modern meat Cache	2	1	1		
Test Cut, East Slope, Recent Meat Cache	3		3		
Test cut, Meat Cache	2		2		
West Mound, Meat Cache	3		1	2	
Meat Cache (?) next to house 3	1	1			
Total	70	27	27	8	8

Table 6.3. Kukulik boat data distribution for artefacts with known provenance.

Despite this deficiency, the dataset allows for some observations about the distribution of boat artefacts. Boat-related objects were found in at least six of 14 excavated houses and in 14 out of 34 meat cellars. The largest frequency of boat material per structure (25 objects) was found in Test Cut House 2, which Geist dated as “recent prehistoric”, i.e. dating to 1649-1879 AD according to his chronological system. A more typical concentration is between one and five boat artefacts in a structure (Table 6.3

Umiak fragments appear to be more widely distributed among different features than other types of artefacts, and amount to 25% of all boat-related artefacts. Both kayak and paddle remains are less numerous and constitute 7 % (kayaks) and 4% (paddles) of the entire boat data set. The largest group is miniatures, containing 239 objects or 64% of all Kukulik boat-related artefacts (See Fig. 6.24.). Although the collection contains some fragments of skin, none of them can be with full certainty identified as boat covers.

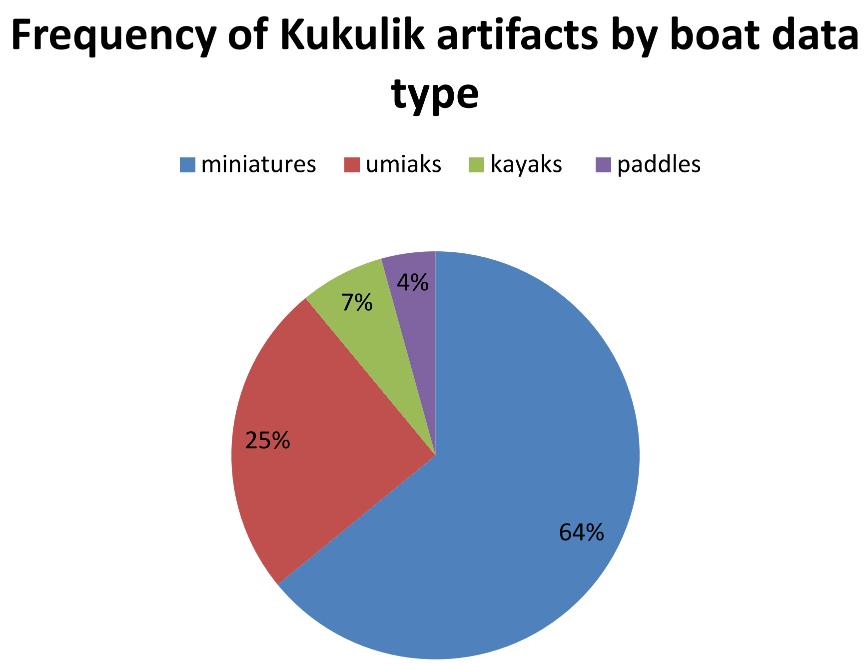


Figure 6.24. Frequency of Kukulik artefacts by boat data type

6.7. Kukulik miniatures

Kukulik miatures include three different types of artefacts: 1) paddles (159 objects), 2) miniatures representing kayaks (50), and 3) miniatures representing umiaks (25). All miniatures are made of wood. The level of craftsmanship varies from object to object, but in general umiak models are more detailed. Umiak miniatures are also represented by frame fragments, such as downscaled keels and head boards, implying that manufacturing of some of these models followed in general terms the sequence of manufacturing of the full scale boats (Fig. 6.25. and 6.26.). Similar artefacts are found in different St. Lawrence sites (see Appendix 1, #336). Miniature kayak keels from the Kukulik House 6 and Miyowagh site (see Appendix 1, #163 and 377) attest that some of kayak models were also put together from individually carved frame fragments.

Figure 6.25. Miniature umiak headboards from the Kukulik archaeological site.
UA, 5-1934-1692, 1693, 1694. Photos by E. Anichtchenko.

Figure 6.26. Miniature umiak keel from the Kukulik archaeological site.
UA 5-1934-1690.

One of the umiak representations differs significantly from other miniatures in its appearance and functional and ritualistic meanings. Found in a structure near the entrance of House 3, the artefact is a boat-shaped box with fins carved into one end of it and a six-legged creature painted in black over red-stained sides (Fig. 6.27.a-b.). The image is unusual for the St. Lawrence Island material culture, but well-rooted in the mythology of Central Yup'ik people of mainland Alaska, where this creature is known as *pol-rai-yuk,* an alligator-like monster dwelling in lakes, creeks and marshes. In Central Yup'ik creation legend the Raven cautions the First Man not to drink from the lakes because *pol-rai-yuk* would seize and destroy any one who ventured near. Edward Nelson reported that "nearly all of the umiaks in the country of lower Yukon and to the southward have a picture of this animal drawn along the entire length on each side of the boat, with the head near the bow"(Nelson 1889:445).

a)

b)

Fig. 6.27. a-b. "Idol boat" from the Kukulik archaeological site. UA 01999-200.
Photo by E. Anichtchenko.

The box contained two drinking tubes, five sinkers and an incomplete whale harpoon head (Ibid 66). Geist and Rainey called this artefact an “idol boat” indicating a presumed ritualistic meaning. While this artefact is unprecedented for St. Lawrence Island, similar boxes often carved in shape of marine mammals are known from different Chukchi Sea sites. According to ethnographic accounts, such boxes containing whaling harpoons and various charms were kept on board umiaks while hunting whales (see chapter 5.3). The Kuklik idol boat, thus, combines elements of two Alaskan indigenous cultures: Yup’ik people living south of Bering Strait, and Inupiaq nation of Chukchi Sea littoral.

Most of the kayaks miniatures have a carved out opening indicating a hatch into which a kayaker figure may have been inserted at some point. However, no such figures were found at Kukulik, although they are known from the island’s other archaeological sites. A figurine from Miyowagh attests that St. Lawrence Island kayakers wore wooden visors similar to those used by Unangan and Central Yup’ik hunters in ethnographic times with hoods of their parka pulled over it for added protection from the elements (See Appendix 1, #360).

The ratio between the frequency of representation of kayaks, umiaks and paddles within the miniature group is noticeably different and in fact reversed from the full scale objects. Some of the crudely made miniatures make it difficult to distinguish between kayak and umiak representations, but miniature paddles are unquestionably the most frequent artefacts in this group. In fact, they are the largest group of boat-related objects across the entire data set, which contrasts sharply with the frequency of full scale paddles and poses the question of purpose and significance of these miniatures.

According to the ethnographic information, paddles, both full scale and miniature, played a prominent role in the Kozeevuh/Kaziva (going around) ceremony, held over five days in the beginning of January. The festivities took place in a tent-like structure made of wooden poles, paddles, seal skins and snow to house. William Furman Doty, a school teacher who attended the Kaziva ceremony hosted by the whaling captain Assoone in 1899 in Gambell, described the construction:

> A long steering oar was firmly tied in a horizontal position aloft, supporting the frame work of paddles and ropes, while a paddle which had been successfully used by Assoone [Asunaghaq] in steering his canoe in several prosperous whale-hunting trips, was secured to a pole. The blade of this paddle had been painted black, except a strip a couple inches wide, painted

> from water taken from the eye of a whale and boiled for quite a long time. This paddle was highly prized for by its aid Assoone claimed to have taken four whales" (Krupnik & Krutak 2002:288).

A stone lamp was placed in the centre of the room and wooden idols representing men and women in equal numbers were placed in two rows on each side of the lamp, men facing women. A hundred or more miniature paddles decorated with figures painted in seal's blood were suspended from the rope in pairs. On the first day of celebration, the host invited boys and girls of the village to join in singing and dancing. At the end of the day the boys were seated on the floor under the canoe paddles. When the last of the girls have finished dancing all of the boys jumped up and get as many of the canoe paddles as possible, which they keep for souvenir (Moore 1912:3-4).

Next day the man of the household took the paddle and ran to the homes of his friends tapping with it on the door to invite them to the ceremony. That evening invited men and their wives arrived to the host with presents of food.

> When all the guests have arrived the lamp is extinguished and while the host and his wife sing for them, each man of that household catches one of the visiting women about the waist and marches around the lamp with her in the direction which sun travels around the heavens. The woman each man chooses on this occasion is always one with whom he has cohabited at some previous time when the men traded wives. After these have marched around the lamp the husbands of these women each selects a woman of the household and catching her about the waist marches around the lamp as the others had done, after which the guests all go to their homes (Ibid:2)

On the third day, the host once again goes around with his paddle, calling at the same homes. The ceremony repeats the previous night with the difference that this time the couples walk around the lamp in opposite direction, or "unwind" as they call it. On the following day, the festivities continue with drumming, singing, gifts, and later in the night, exchange of wives. The celebration completes next day when the entire community is welcome and the men entertain guests with a wrestling competition.

Although paddles may appear a mere accessory in this celebration of family alliances re-confirmed with rituals, sharing of food and sexual exchanges, they carry an important meaning. Congregating in the structure constructed of paddles and summoning guests with their aid evokes the partnership of men in maritime pursuits in general and in umiak crew in particular along with social context and impact of this partnership. Each crew member uses one paddle, thus in a practical sense the number of paddles is equated with the size of the crew. In a broader metaphorical context paddles represent an individual's effort in a collective undertaking. Thus, seizing of miniature paddles during the children's ceremony may refer to future alliances that young men need to make to assure their social and economic success. It is possible that such "souvenirs" were kept as charms as the young boys grew to be expert mariners, or, perhaps, were stored in bulk for future ceremonies.

The Kozeevuh ceremony provides a plausible explanation for the abundance of paddle miniatures in Kukulik and other St. Lawrence sites, such as Kialegak and Mesaghmiit. In terms of general site stratigraphy, Kukulik miniature paddles come from comparatively recent layers, corresponding to Gesist's "recent prehistoric" period, i.e. AD 1649-1879, which makes this ethnographic analogy particularly relevant. In the older and more chronologically constrained sites miniature paddles are either much less frequent or absent all together. The artefact assemblage excavated by Collins from the Miyowagh site, dated to 125 -1400 cal AD (Blumer 2002:74) contains only one miniature paddle. The Ievoghiyoq site, occupied between 880 and 1300 cal AD with a peak of probability around 1085 cal AD, lacks this type of artefact alltogether.

The ceremony is also evidence of the consistence of paddles' ritualistic meaning between peoples from St. Lawrence Island and the Siberian coast. While miniature paddles from the St. Lawrence archaeological context lack pigmentation, ethnographic samples collected by Henry Collins in 1930s are decorated with simple geometrical designs (Fig.6.28). It is noteworthy that these designs are identical to those the Siberian Yupik rendered with liquid from a whale's eye on full-scale paddles during the celebration of a successful whale hunt (see subchapter 6.2., Fig.6.3.)

From the point of view of understanding the meaning of miniatures both in the cultural and archaeological context it is interesting that although paddles are part of a boat's gear, the miniatures used in the Kozeevuh ceremony were not associated with kayak or umiak models and did not directly represent watercraft. Instead, they referred to social alliances constructed around maritime activities. This is an important distinction: if the connection with the boat's physicality was not at the centre of attention, the accuracy of physical representation may also be of minor importance. This ultimately raises the question of the accuracy of miniatures' depiction of actual watercraft, and of the value they provide for reconstructing full scale boats.

Fig. 6.28. Ethnographic miniature paddles collected by H. Collins on St. Lawrence Island circa 1930, E260268, National Museum of Natural History, Washington, DC., Photo by E. Anichtchenko

The St. Lawrence miniature dataset is varied in terms of materials, styles and level of craftsmanship, which arguably reflects objects' purpose and function. Ivory kayaks carved of a single piece of walrus tusk, for instance, likely have different meaning than miniature wooden umiak frames that had to be lashed together much in the same manner as full-scale boats. While the latter carried information about how the boat was actually made, the former may have portrayed the voyages and experiences of Native mariners at sea with only superficial reference to the boat's constructional details. The wooden boat-shaped box from Kukulik described above had yet another purpose. Functionally it provided a container for sharp whaling lances that could otherwise damage a boat's skin cover. Conceptually, the flippers carved into one of its ends and the mythological sea-creature design on its sides linked the umiak and whaling equipment with a fierce and successful marine predator. This box likely played an important role in hunting rituals, which may explain its rather unique in-situ placement in a special structure, but does not help with visualizing actual watercraft. This is not to say that boat miniatures have nothing to offer for understanding the design of watercraft they represent, but rather that such information can only be sufficiently validated if certain features are referenced repeatedly in different miniatures and preferably correlated with full-scale boat fragments. The information miniatures carry for reconstruction of full scale boats and paddles is discussed in more details below in conjunction with full-scale boats finds.

6.8. Kukulik paddles

All paddles from the Kukulik archaeological site, both miniature and full-size, are single bladed. Four different variants can be distinguished on the basis of miniature paddle blade shape and proportions (Figure 6.29.). Only Variant I and III are represented by extant full-scale examples of St. Lawrence Island paddles (See Appendix 1: # 78 for Variant I, and # 17, 80, 241 for Variant III). All of full-scale paddles located during this research were incomplete, although Geist reported excavating a complete paddle in the House 1 Test Cut, measuring to 110 cm in total length with 37 cm long blade (Geist 1936:121-122).

Fig. 6.29. Kukulik paddle variants based on miniature paddles. Photo by E. Anichtchenko

All extent examples of St. Lawrence Island paddles appear to be composite, meaning that were constructed with individually fashioned blade and handle, scarfed and lashed together (Appendix 1, #19). Artefacts NMNH A355720 and NMNH A355721 from the Ievoghiyoq archaeological site at the western tip of St. Lawrence Island illustrate how the blade was attached to the shaft. The blade's neck is scarphed for attachment to the shaft and has two peg holes with remains of a bluish-greenish residue, possibly clay adhesive applied to secure the joint (Fig. 6.30). The paddle shaft has similar diagonal scarf and peg holes that line up with those at the neck of the blade and are smeared with the same clay substance. In addition to pegs and adhesive, the pieces were secured with two rows of lashing as evident from the discoloration on the "neck" of the blade above the scarf.

Fig. 6.30. Paddle blade and shaft from the Ievoghiyoq archaeological site. NMNH A355720, A355721. Photo by E. Anichtchenko.

The shape of the Ievoghiyoq paddle shaft and rectangular mortise carved into it suggest that it was made out of a recycled kayak gunwale. The object was sampled for AMS ^{14}C analysis and yielded an age of Cal BP 735 to 670/Cal AD 1215 to 1280 (Beta-409145) (See Appendix IV), attesting to the longevity of composite paddle technology, the more recent examples of which are provided by miniature paddles from the Kukulik and Kialegeak sites.

Since St. Lawrence kayaks and consequently associated paddles are not known ethnographically, it is hard to tell with all certainty whether these paddles were used for kayak or umiak propulsion. The above discussed late 18th century drawing by Elliott shows double-bladed kayak paddle and single-bladed umiak paddle (Fig.6.13). In the sample of artefacts with identifiable in-situ provenience, paddles appear more frequently in the same location with umiak remains than with kayak frames (see Table 6.3.). The umiak head board NMNH A355722, found in spatial association with composite paddle NMNH A355720/NMNH A355721 (See Appendix 1, #407-409), implies that the latter was used for umiak propulsion. At the same time, the variability of designs demonstrated by miniature samples may reflect differences between umiak and kayak paddles, as well as technological responses to different navigational conditions.

6.9. St. Lawrence Island umiak according to archaeological data

St. Lawrence Island umiaks are represented by a wide variety of artefacts – from boat miniatures to fragments of full-scale frames and rigging. Miniatures depict several stylistically different open boats. The majority of them attest to flat bottomed double-ended watercraft, although two artefacts show boats with sterns visibly wider than the bows: UA 1-1932-1755 (Appendix I, #21), UA 1-1933-3351-G (Ibid, #48, Fig. 6.31). Both of these models originate from layers pre-dating the dominant “recent prehistoric”, potentially implying the existence of this design at some point prior to the 1600s AD. The expertly fashioned model UA 1-1935-8996 (Appendix I, # 310) also shows a boat with a stem end slightly sharper than the stern. This asymmetry is emphasized by gunwales which are joined forward of stem post, but remain separated at the stern (Fig. 6.32.).

Fig.6.31. Kukulik wooden umiak miniature UA 1-1933-3351-G. Photo by E. Anichtchenko

Fig.6.32. Wooden umiak miniature UA 1-1935-8996. Photo by E. Anichtchenko

With the exception of a single umiak model (UA 3-1934-3741, Fig.6.33, Appendix I, #87), umiak miniatures lack thwarts, making it difficult to assess the size of the crew. An ivory bag handle (NMNH A344600), excavated by local Native people from an unknown location in the Kukulik midden and purchased by Henry Collins, shows five individuals in a boat pursuing a diving whale (Fig. 6.34.). This may be interpreted either as a crew of ten, or, more likely, as six paddlers plus a harpooner at the stem and steersman/captain at the stern.

Fig. 6.33. Kukulik wooden umiak miniature UA 3-1934-3741. Photo by E. Anichtchenko

Fig. 6.34. Ivory handle depicting umiak hunting scene. NMNH A344600.
Photo by E. Anichtchenko

Although the available archaeological data do not provide complete information regarding the size and proportions of umiaks used by the people of Kukulik, individual boat frames offer insight into constructional details. Two full scale posts excavated in the main midden section 3-4-5 (UA 1-1935-3923, Appendix 1 # 239, Fig.6.35) and section 500-625 (UA 3-1934-4291, Appendix 1 # 102) measure to approximately the same height (45 and 46 cm respectively) and about the same width. The upper end of the post has two lashing holes for attaching headboards. Post UAA 3-1934-4291 is broken at the lower end, while UAA 1-1935-3923 is a complete boat frame, which provides useful insight regarding how the boat's keel was connected to the posts and bottom chines.

Fig.6.35. Umiak post from Kukulik archaeological site. UA1-1935-3923. Main midden, sections 3-4-5, 75:45:6.5cm. Photo by E. Anichtchenko.

Headboards were mortised into the post's tenon and further secured with leather thong lashing (Fig.6.36). All four headboards excavated at Kukulik are of the same type: T-shaped frames with a triangular back panel and rectangular top carved out of single piece of wood, and ranging in height between 16 and 23 cm. The cumulative height of the umiak at the posts would then be between 61 and 69 cm. The length of the upper horizontal part of headboards allows for an estimate of the distance between gunwales at the post and ranges between 24 and 44 cm. Object UA1-1927-582, collected in Gambell by Geist, has a single red bead inserted underneath the horizontal part of the T-shaped headboard. Beads often carried a special sacral meaning and this placement is hardly coincidental, however no information regarding the meaning of this treatment is currently available (Fig.6.37). A flat board was placed over the T-shaped frame. In the Kukulik data sample these boards had a semi-circular shape lacking the sharply defined corners of trapezoid-shaped boards of more recent umiaks (Appendix 1 # 322, 323, 374, Figure 6.25). A board purchased by Geist in Gambell in 1927 has the same shape and traces of red ochre (UA 1-1927-573, Appendix 1 #1).

Two T-shaped headboard frames from the floor of House 2 in the Test Cut may have belonged to the same boat, in which case the difference in width between gunwales at the stem and stern of this particular watercraft was only 6 cm (Appendix 1 #14, 16). This contrasts noticeably with the asymmetric end design suggested by a miniature originating from the same stratigraphic context (Appendix 1 # 21). The same house feature also contained two more umiak frames: a 71 cm long bottom cross piece (Appendix 1 #15) and 57.5 cm timber that may have served as a thwart (Appendix 1 #18).

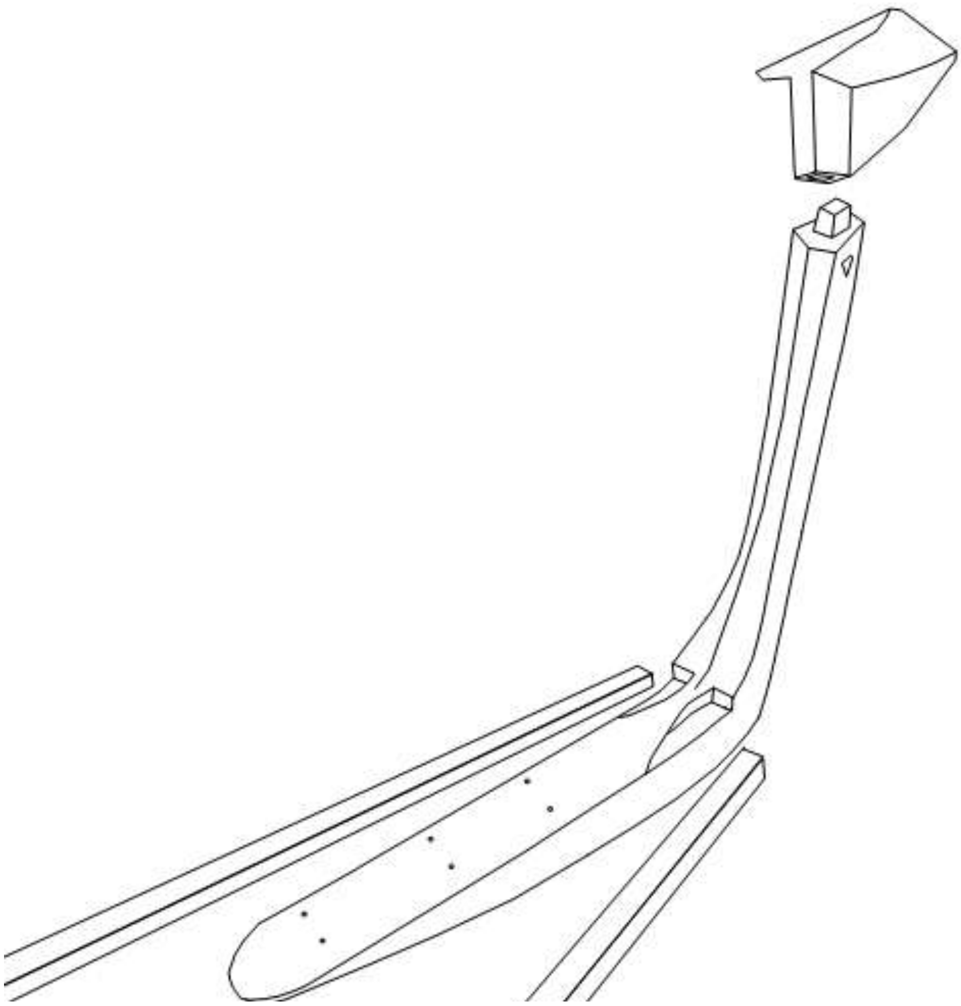


Fig.6.36. Constructional drawing of St. Lawrence Island umiak stem with headboard. Drawing by E. Anichtchenko

Fig.6.37. Umiak headboard from Gambel. UA 1-1927-582. Photo by E. Anichtchenko.

The cross piece is a slender elongated frame with a width of 5.5 cm at the widest point in the middle and 2 cm at its narrow ends. The ends were carved at 4 cm from the tip to fit over the bottom chines. Two sets of holes piercing the timber diagonally from its underside to the side indicate that the frame was lashed to the 10 cm wide keel. With minor variations, most of the bottom cross timbers from Kukulik follow the same design and vary in size between 27 and 71 cm in length and 3.5 and 8 cm in width (Fig. 6.38., Appendix 1 #148,149, 152, 153, 240, 312, 314,333). Identical shape of umiak cross-bottom timbers can also be found in early 20th century umiak models from Chukotka, Russia (6.41).

Figure 6.38. Umiak bottom cross piece from Kukulik, UA 5-1934-2167.
Photo by E. Anichtchenko.

Fig. 6.39. Kukulik umiak side ribs UANMN 5-1934-2169, 2170, 2171, 2172.
Photo by E. Anichtchenko.

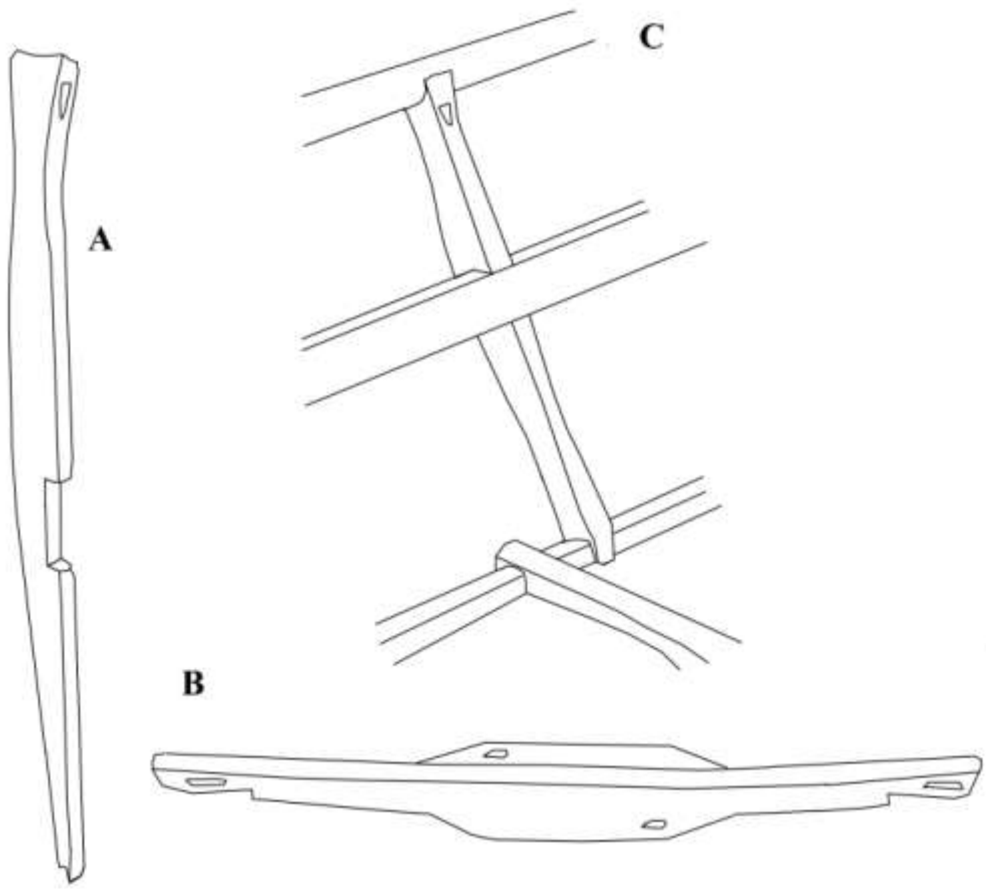


Fig. 6.40. Constructional drawing on St. Lawrence umiak frame members: A. side rib; B floor timber; C. Method of attachment of ribs and floor timbers.
Drawing by E. Anichtchenko.

Kukulik umiak side ribs are represented by 14 artefacts. Judging by the spatial distribution, six of them belonged to the same umiak dating from the early to mid-19th century (UA 5-1934-2169, 2170,2171,2172,2174/57 and 2176/77, Fig. 6.38, 6.39, 6.40 A). The ribs are 60 cm long and 6-7 cm wide, rectangular in profile with a slight curve carved on top and the bottom to fit over the gunwale and lashing holes at each end to secure the joint. A single rectangular opening, 8 cm long and 1 cm deep is carved on the inward facing surface of the rib for side chine (Fig.6.40 C). This design was apparently used in different island locations from at least the 15th century AD, since a single rib fragment of the same appearance was excavated by Moreau Chambers in 1933 at the Miyowagh site (NMNH A371150). In the larger geographical context, a stringer notch carved into ribs is a rather unusual feature. Outside of St. Lawrence Island this element is known from only two other locations: Siberia's Chukotka Peninsula (Fig.6.43) and Greenland.

In addition to paddles, Kukulik umiaks were propelled by oars. Oar use is evident from miniature UA1-1935-3680 (See Appendix 1, # 233) and a number of both full-scale and miniature examples of oar locks (Ibid, #23, 45, 51, 83, 298, 327). Oar lock technology is represented by two types of artefacts: wooden blocks with pegs which received oars (Appendix 1 #83, 85,100, 327) and braces with sockets which were lashed to umiak gunwales and into which oarlock pegs were inserted (Appendix 1 # 157, 219, Fig. 6.41). Geist writes:

> Oar locks and sockets of this kind were used on St. Lawrence Island until recently. The tendency now is to use metal oar locks. Old Eskimo say that these were not known before the advent of the white men, as previous to that time all boats were paddled and not rowed. The majority of the specimen in the collection are made from oak and, as Nelson points out, were probably copied from those seen on whaling vessels (1936:121).

The stratigraphic positioning of all Kukulik oarlock artefacts is consistent with this assessment. None of these artefacts can be reliably placed into a temporal context predating contact with non-native newcomers.

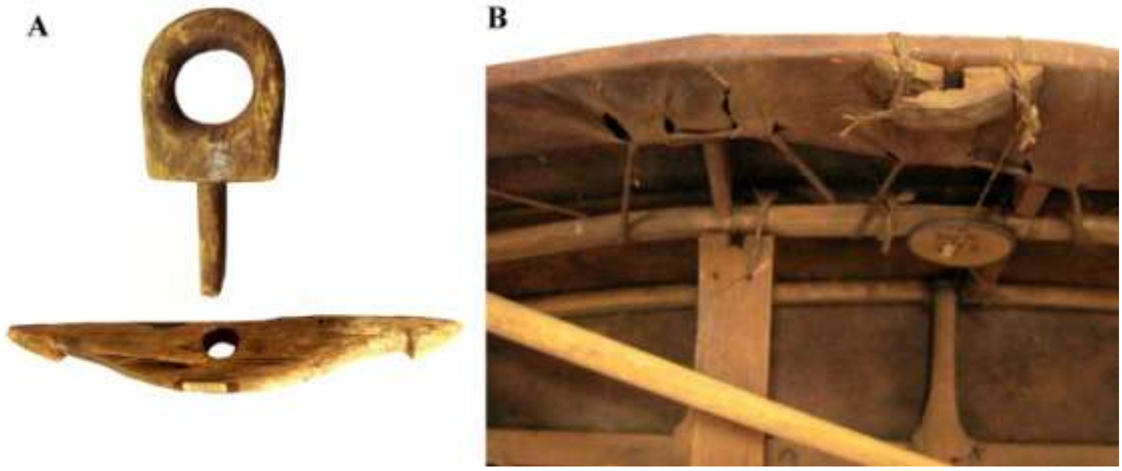


Fig.6.41. St. Lawrence umiak oar attachment system: A. Oar socket UA 3-1934-2562 with brace UA1-1933-6647G, Kukulik, University of Alaska Museum of the North; B. detail of Siberian Yupik umiak model 2083-64 showing gunwales with lashed brace for oar socket, Russian Ethnographic Museum, St. Petersburg. Photos by E. Anichtchenko.

Use of sail technology is attested by ivory and bone rigging hooks (UA1-1934-3631, UA2-1934-2463, Appendix 1 #53, 52, 115, 116) and two mast steps (UA 1-1933-0632 and UA 5-1934-2162, Appendix 1 #44, 144, Fig. 6.42). The shape of mast step UA 1-1933-0632 resembles the above-mentioned gunwale cleats, but the round opening is slightly larger and is not through. Mast steps of this design are known from Kamchatka ethnographic models in which they were lashed to the boat’s bottom cross piece (Fig. 6.43). St. Lawrence Island mast steps may have had several different designs. A mast step collected by Riley Moore in 1912, for instance, is square and made out of whale bone (Fig.6.44.). All mast steps and rigging hooks in Kukulik artefact assemblage were found in “recent” stratigraphic layers.

Fig. 6.42 Umiak mast step. UA 1-1933-0632, Kukulik East slope, recent meat cache. Photo by E. Anichtchenko

Fig.6.43. Chukchi umiak model with mast step, Anadyr region, 1904-1907.
REM 2083-66. Photo by E. Anichtchenko

Fig.6.44. Whale bone mast step purchased by Riley Moore
on St. Lawrence Island, Alaska in 1912. NMNH E280347. Photo by E. Anichtchenko

In sum, Kukulik archaeological data provides insight into 600 years of umiak use and technological development, from approximately the 1200s AD to 1880 AD. Umiak miniatures suggest that boat designs may have undergone various changes, and that older St. Lawrence umiaks had transom sterns, but this observation has no reliable confirmation from full-scale boat remains. Excavated boat frames reveal that the prehistoric St. Lawrence umiak was a large boat, measuring to 60 -70 cm in height and up to at least 71 cm at the maximum bottom width. The length of the boat is harder to estimate. Kukulik umiaks, and those from St. Lawrence in general, were propelled by all three methods: paddles, oars and sail. The exact timing of the introduction of oars and sail cannot be precisely established at this time, but a ^{14}C analysis of oar locks and mast steps from the Kukulik site may shed light on this question in the future.

The “boat idol” from the entrance of House 3 and bead decoration in the headboard from Gambell indicate that umiaks were ritualistically embedded and that skin covers of St. Lawrence umiaks in the past may have been decorated with animal designs, similar to ethnographically known boats of the Central Yupik people. The combination of ethnographic and archaeological data demonstrates that in terms of constructional details (stringer notches in side ribs, shape and lashing pattern of bottom cross-timber, mast step configuration) and ritualistic treatment (paddle designs rendered with whale eye liquid, moon worshipping ceremony) St. Lawrence umiaks were aligned with open skin boats of Chukotka. At the same time, the designs of particular frame members, such as ribs and floors have parallels in the eastern American Arctic, suggesting possible connections. This topic is further explored in chapter 7.

6.10. St. Lawrence Island kayak according to archaeological data

Despite Otto Geist’s dismissive remark that at the time of his excavations, kayaks were not “used or remembered on St. Lawrence Island” (Geist and Rainey 1936:121), both kayak miniatures and fragments of full-scale frames have been discovered at Kialegak, Miyowaghameet, Ieavogh, Seklowaghyget and other St. Lawrence sites (see Appendix 1). Kukulik alone yielded 25 fragments of full scale kayak frames and 50 miniatures, many of which were found in the upper stratigraphic levels –suggesting that kayaks may have been present on St. Lawrence until late 19th-early 20th century.

With a few exceptions, Kukulik kayak miniatures are crudely fashioned wooden boat representations with a single hole, referencing the cockpit. One of the models (UAA 5-1934-1674, Appendix 1 #122) has two holes and may be interpreted as a double-hatch kayak, similarly to an ivory miniature from the Seklowaghyaget site (Fig. 6.18.). A ridged deck is suggested by four miniatures from Kukulik (UA5-1934-1687, UAA 5-1934-1688, UAA 5-1934-1689 and UA1-1935-2189, Appendix 1 #135, 136, 137, 186, Fig.6.45) and one from Seklowaghyaget (NMNH A371633, Appendix 1 #414). All of these models depict boats with pointed ends, sharply raised bows and 1:5-6 beam to length ratio, resembling in basic outline the ethnographic King Island and Cape Espenberg kayaks (Heath 1991; Zimmerly 2000a:54,56).

Fig. 6.45. Kukulik kayak miniature UA 1-1935-2189. Photo by E. Anichtchenko.

A different design is represented by the miniature UA 1-1939-1469 from the 9th level of House 4 in the Kukulik Test Cut, which according to Geist contained Punuk materials. The miniature shows a kayak with a ridged deck, sharp raised bow (possibly bifid - the tip is broken) and a transom stern with gunwales protruding past the stern post. A short rectangular wooden peg is positioned slightly aft of midpoint, presumably for attachment of a kayaker figurine or simply for referencing it (Fig. 6.46). A similar combination of ridged deck, transom stern and split bow is demonstrated by the Seklowaghyaget miniature NMNH A264174 (see Chapter 6.3, figure 6.19) excavated by locals and purchased by Henry Collins. The lack of in-situ provenance makes chronological placement of this model challenging. According to Collins, Seklowaghyaget was occupied from late Punuk times up to the early eighteenth century (1937:187). A sample of whale bone from a house ruin collected by Bandi furnished a calibrated interval of 1350-1650 AD cal with a peak of probability around 1470 cal AD (Blumer 2002:75). The gunwales protruding behind kayak's stern are also featured in a St. Lawrence kayak model from

Carpenter collection (Fig. 6.20) and resemble the forked ends of Old Bering Sea ivory models (see Chapter 6.3, Fig. 6.15, 6.16), potentially implying ancestral lineage between OBS and Punuk boat technology.

Fig. 6.46. Two views of Kukulik kayak miniature UA 1-1939-1469. Photo by E. Anichtchenko.

Even more interesting is the fact that along with divided gunwales these miniatures depict a kayak with a transom stern. The benefits of a transom stern in skin boat construction were perhaps similar to those in plank boat manufacturing: sharp boat ends require boat builders to bend longitudinal frames, such as gunwales, stringers, or planks. A transom end is, therefore, less labour intensive. At the same time, the transom-sterned kayaks are extremely rare in the circumpolar record. The ethnographic Chukchi kayak features rectangular gunwale boards at the stern, which in some ways are reminiscent of umiak headboards and reference transom ends, but connected gunwales give this boat a double-ended hull shape (Zimmerly 2000a:12-13). The only known example of fully transom-stern kayaks come from the Aleutian Islands. This is particularly interesting because the bifurcated bows of the miniatures NMNH A264174 (Fig.6.18), and UA 1-1939-1469 (Fig.6.46) also have only two ethnographic parallels: kayaks of Kodiak archipelago and baidaras of the Aleutian Islands (Fig. 6.47). Cleft bow design of St.

Lawrence kayak is additionally indicated by the Elliott's St. Lawrence Island drawings (Figure 6.13).

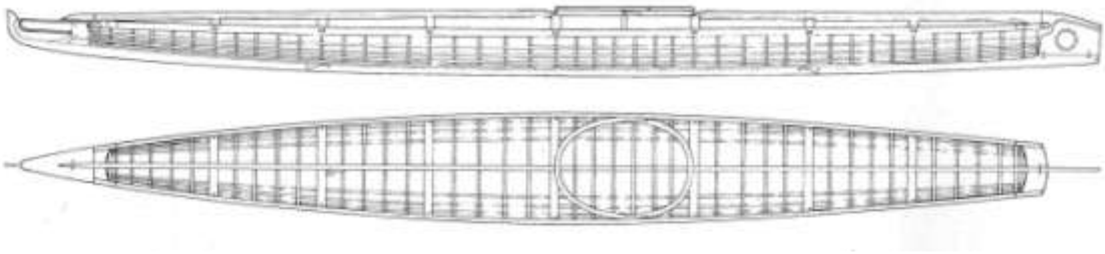


Fig. 6.47. Lines of Aleutian kayak (Zimmerly 200a:17)

Fig.6.48. Bifurcated kayak miniature prow of from the Nunalleq site in the Yukon-Kuskokwim Delta. Photo courtesy Richard Knecht.

The resemblance between St. Lawrence and Aleutian kayak technology is particularly intriguing in the context of Susan Crockford's theory of the island's initial colonization by migrants from the Aleutians who brought with them a fully developed maritime Arctic adaptation tool kit, which included boats (Crockford 2008: 123, see chapter 6.3.). The connections between the kayak technology of St. Lawrence and the Aleutian Islands may present evidence in support of ancient maritime routes between these landmarks situated 1,000 km apart. The miniature carvings of bifurcated kayak bows discovered recently at the Nunalleq site in the Yukon-Kuskokwim Delta and dated to circa AD 1640 is another evidence of extended geographic distribution of the Aleutian kayak design (Knecht pers.com., Fig.6.48.)

Although the Kukulik dataset lacks examples of bow frames, additional information about the shape of the St. Lawrence Island kayak prow can be inferred from artefact NMNH A347028 excavated at Kialegeak (Appendix 1 #357, Fig. 6.49 A). The object was unearthed by Henry Collins in 1929 from the south midden of this site at a depth between 2 and 4 feet (0.6 – 1.2. meters) and labeled "section of sled." The artefact measures 25 cm in length, 19 cm in height and 1 cm in width, and features a sharply upturned tip at one end with a lashing hole and two joint scarphs at another. Object's shape, dimensions and joint pattern leave little doubt that this is a kayak bow piece.

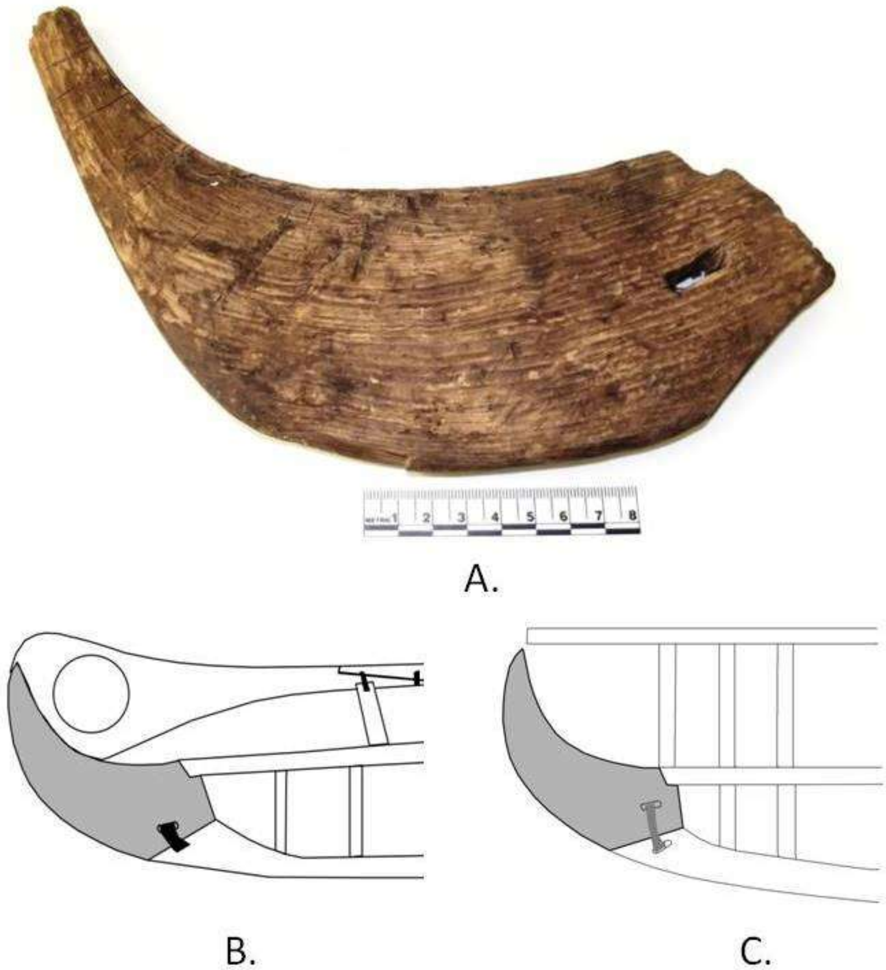


Fig.6.49. Kialegak bow fragment. A. Artefact NMNH A347028, Kialegak, south midden; B. Reconstruction of the Kialegak bow in Hooper Bay style; C. Reconstruction of Kialegak bow in Norton Bay style. Photo and graphics by E. Anichtchenko.

The ethnographic record provides two possible references for understanding how this frame fit into the stem assembly. It can represent either a bow of Hooper Bay kayak style with its characteristic large circular opening (Zimmerly 2000a:48, 2000 b:xvii, Fig. 6.49 B), or the Norton Sound variant with a smaller tear-drop shaped hand-grip (Fig. 6.49 C). None of the archaeological sites on St. Lawrence island contain examples of a Hooper Bay style top bow piece, making a Norton Sound style bow variant more plausible, particularly in light of the above mentioned kayak photographs taken by Henry Collins at Cape Kialegak in 1929 (Fig.6.9). It is noteworthy that the Norton Sound kayak bow is technically bifurcated, although in a different manner than Aleutian skin boats. Norton Sound and – evidently - St. Lawrence Island are the northern-most extent of this constructional technique. The traces of such bifurcation can be seen in bow grip holes of Bering Strait and King Island kayaks, and are lacking north of Bering Strait.

A 15 cm tall cockpit stanchion (NMNH A34689, Appendix 1 #355) from the lower half of Cut 2 in the south midden of the same site may shed additional light on some dimensions of the boat. Inserted between the gunwales and cockpit coaming, stanchions are indicative of the distance between the gunwales and deck rider. Combined with the height of lower stem piece, this provides information on the approximate height of the kayak, which in this case will equal 35-40 cm.

The Kialegeak bow was sampled for ^{14}C AMS dating. Two resulting date ranges: Cal AD 1310 to 1360 (Cal BP 640 to 590) and Cal AD 1385 to 1425 (Cal BP 565 to 525) (Beta 409143, Appendix 2) demonstrate that kayaks with bow similar to the ethnographic Norton style boats were built on St. Lawrence Island for at least half a millennium. In sum, the evidence provided by this artefact in conjunction with other archaeological and ethnographic data attest to the connection between St. Lawrence Island and Norton Sound, rooted in over 500 years of history and perhaps reflecting even older ties with the Aleutian Islands.

In contrast with archaeological data pertaining to the kayak bow, miniatures' references to a transom stern remain unsubstantiated by full-scale kayak artefacts. The only artefact that can be identified as a kayak stern fragment is object NMNH A369827 from the Miyowagh site. Measuring 19 cm in length and 7.5 cm in height, it is a fragment of slightly curved timber with a pronounced angular shape, a mortise joint at its upper end, and 2 lashing holes – one at each end of its longer side (Fig. 6.50 B.). The artefact's triangular cross-section and perpendicular turn suggest that this is a bottom stern piece. The narrow broken end may have at some point been attached to the kayak's keel, while the wider mortised end received the upper part of the stern.

Two more kayak frame members were discovered at Miyowagh in proximity to the stern piece: a complete keel middle piece (NMNH A 370242-b,c, Fig. 6.50 D) and a deck stringer fragment (NMNH A370242-a, Fig. 6.50 A). All three stern, keel and deck stringer fragments came from cut 19, section 18, 6 ft 1 inch below the surface, and likely belonged to the same kayak. The keel was later cut in two by Collins to obtain a sample for dendro-chronological analysis, the results of which have not been published or otherwise recorded. The total length of the artefact in its unaltered state was 88.3 cm. It has a triangular cross section with a 2 cm wide upper surface and 4.5 cm tall sides (Appendix 1#387,388). Both ends are fashioned into diagonal hooked scarphs. Judging from this artefact's design, the complete keel assemblage consisted of at least three pieces. The middle piece was locked in place by its hooks which were facing downward. The joint was further secured by lashing as evident from lashing line discolorations. Radiocarbon analysis of this keel piece yielded three ranges of dates Cal AD 990 to 1045 (Cal BP 960 to 905) and Cal AD 1095 to 1120 (Cal BP 855 to 830) and Cal AD 1140 to 1145 (Cal BP 810 to 805) (Beta – 409146) (Appendix 2). By stratigraphic affinity, the same dates would apply to the deck stringer fragment discussed below.

The Miyowagh deck stringer fragment is a carefully crafted wooden timber. Judging from a 3 cm tall stanchion with two lashing holes, which extends from its underside, the fragment represents a portion of stringer at the stern post. The stringer proper is 5 cm wide and 45 cm long, broken at both ends. In the complete kayak frame the stanchion rested on the stern bottom piece and was lashed to it. Although both Miyowagh deck rider and stern piece seemingly pertain to stern assemblages, they do not fit together or provide an immediate answer to how the complete assemblage was constructed. The artefacts' combined height of 10.5 cm appears to be too short for a kayak stern, suggesting that the assemblage included other structural components. Unfortunately, the available data do not allow for the reconstruction of these elements.

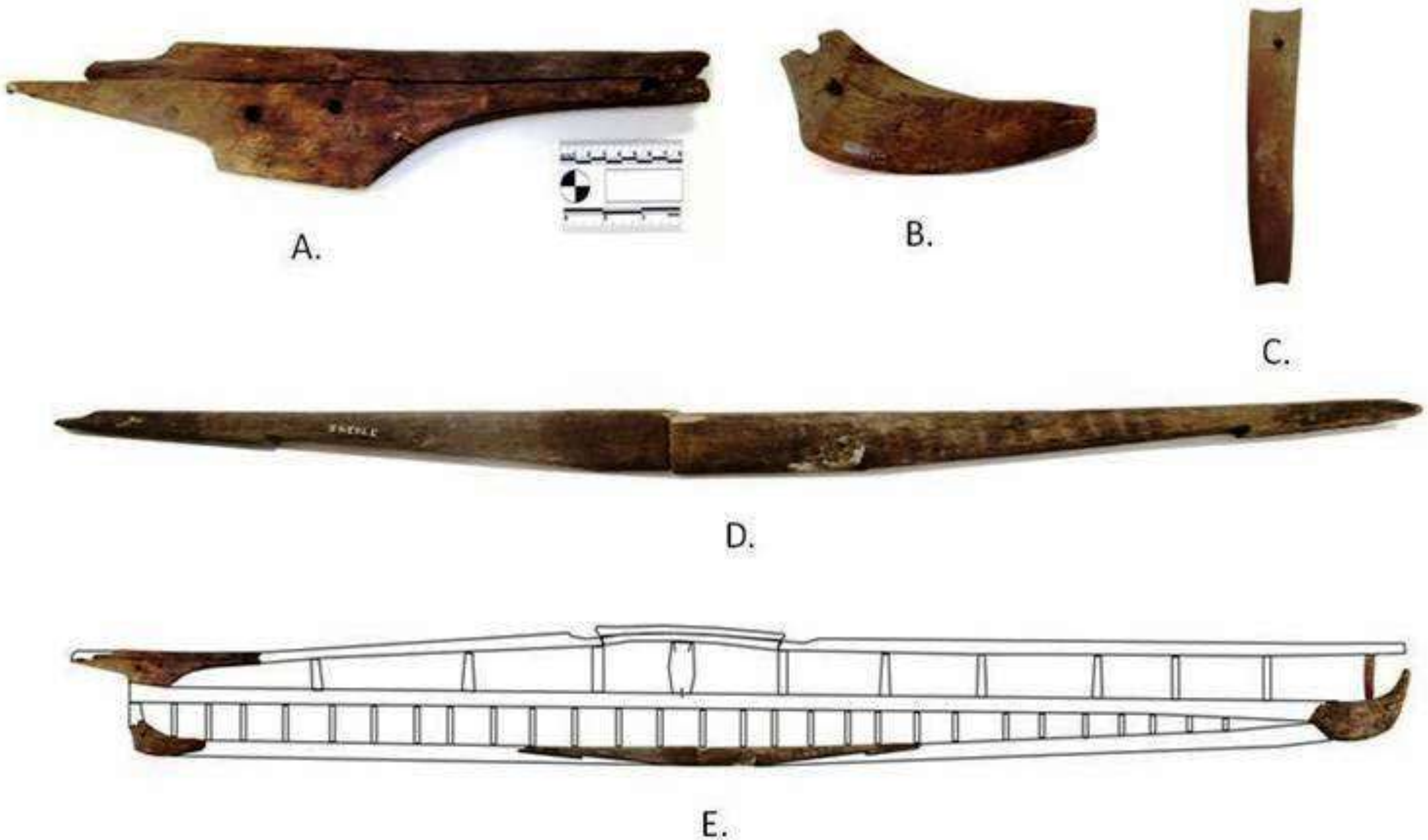


Fig. 6.50. St. Lawrence Island kayak fragments from Miyowagh archeological site: A) deck stringer (NMNH A370242-a); B) stern fragment (NMNH A369827); C) deck stanchion (NMNH A370193); D) keel middle piece (NMNH A 370242-b); E) reconstruction of placement of Miyowagh artefacts in combination with the Kialegak bow. It is important to note that Kialegeak bow and Miyowagh fragments are separated both geographically (circa 180 km as crow flies) and temporally (200-300 years), thus bringing these two sets of evidence together is hypothetical. Photos and graphics by E. Anichtchenko.

However incomplete, the Miyowagh deck rider offers two observations. First is that a section of deck stringer evidently protruded behind the stern in a manner similar to the ethnographically known stern hand holes of Bering Sea, Hooper Bay and Norton Sound vessels, and referenced by kayak miniatures discussed above. The second is that the kayaks used in Miyowagh in the 11^{th}-12^{th} century AD had ridged decks, as evident from the stanchion that elevated the rider 3 cm above the gunwale. Artefact A370193 from the same site and cut, but different section and depth may represent either a deck bow stanchion (Fig.6.50. C) or perhaps a deck cross beam. In the latter case, each deck ridge consisted of two (starboard and port) parts, lashed or otherwise attached to gunwales and deck rider. Ridged deck is also suggested indirectly by the shape and low height of Kialegeak bow, which refers to the kayak with only 6 cm spacing between keel and gunwales at the bow. Even with the extremly rockered bottom, this would not provide enough height for kayaker, unless ridged deck added some elevation. The notion of ridged deck is also supported by examples of deck cross pieces from Kukulik and Ievoghiyoq archaeological sites.

All artefacts identified as deck cross pieces are flat-bottomed and comparatively short ridges. The most typical design is presented by artefact UA 1-1935-3626 (Fig.6.51). This 27 cm long, 3 cm tall deck cross piece has a slightly arched profile and a 2.5 cm long groove. Given its length, it was likely positioned near the stern of the boat. Two holes in the horizontal surface of the groove indicate that it was lashed to the deck rider. The deck beam was evidently placed over the gunwales and lashed to them with a lashing line running through two holes fashioned into each of its ends. Another possible modification of deck crosspieces is presented by artefacts 3-1935-0046 from Kukulik (Appendix 1 #313) and A355641 (Appendix 1 #406) from the Ieavogah site. Both are small woodn arches with triangular notch on the top, presumably for deck stringer. The artefacts lack lashing holes, and their method of attachment to gunwales is unclear.

The extant dataset of Kukulik gunwales contains four fragments: UA1-1932-2159 (Appendix 1 #24), UA1-1935-7885 (Appendix 1 #301), UA2-1934-097 (Appendix 1 #72), UA2-1934-107/108 (Appendix 1 #73). Two of them appear to be in association with kayak ribs from the same stratigrafic context. The tenoned end of the Kukulik kayak rib UA 2-1934-100, excavated in close proximity to gunwale fragment UA2-1934-107-108, fits in this gunwale's mortise hole. Similarly matched are kayak rib UA 1939-2955 and gunwale

UA1939-2951 from the Ketngipalak archaeological site on the western shore of St. Lawrence Island (Fig.6.52). In both cases, mortise holes are spaced at 3 cm apart, which is unusually close for North American kayaks, but is similar to the rib spacing pattern of kayaks of Chukotka Peninsula (Zimmerly 2000 a: 12-13). The Ievoghioq gunwale discussed above (Chapter 6.8, Fig.6.30) features a slightly less dense rib spacing of about 7cm. Judging from this artefact, mortise-and tenon joinery was used in St. Lawrence kayak building since at least the 13th century AD, which is noteworthy as the pre-contact existence of this technique remains a highly debatable subject among kayak researchers, many of whom believe that it was not practiced prior to the appearance of metal tools (Brinck pers.com.).

Fig.6.51. Two views of Kukulik deck cross beam UA 1-1935-3626.
Photo by E. Anichtchenko

Fig.6.52. Ketngipalak kayak rib and gunwale fragment, UA1939-2951 and 1939-2955.
Note lashing line discoloration on the gunwale. Photo by E. Anichtchenko.

Only three artefacts in the Kukulik data set can be reliably identified as rib fragments (2-1934-100, 2-1934-111, 3-1934-4956). All three measure between 3 and 3.5 cm in width and 23 to 28 cm in length. The extent examples show no traces of chew marks or bending, which may indicate that the craft they represent had flared sides and was at least 15-17 cm deep from keel to gunwales.

In sum, the archaeological sites of St. Lawrence Island present a wealth of information pertaining to the use of kayaks. It appears that despite the scarcity of ethnographic records, kayaks were present on St. Lawrence Island through the 19th century and even the beginning of the 20th, vanishing, as they did in other places in Alaska around the second quarter of the 20th century. Kayaks used on St. Lawrence Island at that time closely resembled the Norton Sound type with a characteristic tear-drop shaped gap at the bow and a stern hand grip. Both elements had long roots in the history of St. Lawrence kayaks. The earliest evidence for a stern hand-grip and ridged deck is provided by the Miyowagh gunwale dated to cal AD 990-1145. The Kialegeak bow attests that kayaks with cleft-prows similar to the Norton Sound type were constructed on the island by cal AD 1310-1425. Together with photographs taken by Henry Collins in 1929, this appears to be strong evidence in support of consistence of this design for over half a millennium.

At earlier stages of its development, however, the St. Lawrence kayak underwent a number of changes. The Punuk version may have had a transom stern and slightly differently shaped bow, more closely resembling the decked watercraft of the Aleutian Islands, and the preceding OBS form likely had affinities with boats of northern Bering Strait and the Chukchi Sea. This combination of geographic references is not coincidental. It points at mutual influences between different regional technologies, which could only happen through direct contact and interaction – whether friendly or hostile. In other words, it is evidence of multiple long distance sea voyages ranging in length between 65 and over 500 km and at different times directed to different destinations.

6.11. Conclusion

This review of ethnographic and archaeological data demonstrates that seafaring was at the core of St. Lawrence islanders' economic, social and ritualistic activities. The range of these activities was varied and seemingly unrestricted: from short distance coastal cruising to long distance voyages to Chukotka, Bering Strait, coastal Alaska, and perhaps the Aleutian Islands. Material culture allows tracing these long–distance connections over at least a millennium.

Skin boats – both kayaks and umiaks – played a central role in establishing the inter-continental network, and their constructional details and ritualistic meanings may reflect particular aspects of these connections. In terms of constructional trends umiaks and kayaks may have had differing geographic orientations. Umiaks are aligned with Siberian open skin boats, while also exhibiting constructional affinities with Greenlandic watercraft. Kayaks demonstrate closer connections to Alaska, east and south of St. Lawrence Island.

The analysis of St. Lawrence skin boat data extends our understanding of this technology by about a millennium, taking it from ethnographic time to circa the 11th century AD. It appears that over time both umiaks and kayaks underwent some changes, but that the basic construction may have not changed significantly between circa the 1400s AD and the second half of the 19th century when intensified contacts with commercial whalers fostered a switch to round-bottomed umiaks and the kayaks disappeared possibly as an aftermath of the 1879 epidemic. Both umiaks and kayaks were ritualistically embedded and figured prominently in ceremonies focused on ensuring peoples' connection with the spirits of ocean and marine animals. This meaning persisted for over two millennia and is recorded in number of ways – from the OBS ivory models to rituals practiced until the middle of the 20th century. St. Lawrence Island's place in the intercontinental maritime network demonstrated a similar consistency. Skin boats plied the waters east and west of the island until the construction of the first air strip offered a much faster alternative, and the umiak tradition has persevered to modern times.

Overall, the ethno-archaeological review of St. Lawrence Island skin boats suggests that their functions were not constrained by localized subsistence use, but included an extensive range of movements that comprised a complex and dynamic interregional network. This recognition, in turn, invites a greater awareness of skin-covered watercraft and practice of indigenous seafaring in the Bering Sea region and the Arctic and subarctic zones in general. As agents and artefacts of interregional mobility, Native skin boats are not static reflections of people's adaptations to particular environmental conditions and subsistence requirements, as many kayak researchers would have us believe, but a dynamic record of socio-political exchanges and logistics of mobile maritime societies. Understanding this record is essential for comprehension of prehistoric coastal cultures and maritime networks of Alaska and the circumpolar north in general.

Chapter 7. Chukchi Sea case study: Birnirk. Skin boat technology and territorial expansion

7.1. The Chukchi Sea in the context of the North American Arctic

Named after one of the ethnic groups settled on its western shores, the Chukchi Sea even today supports some of the most active traditional indigenous communities of the circumpolar north. Two out of six modern population centres where skin boats are still regularly manufactured and used are located on its coast: Point Hope at the north-western extreme of the Alaskan coast and Barrow on the sea's eastern margin. Today, the resilience of this tradition is directly linked with subsistence whaling, which constitutes the focal point of indigenous identity of the Inupiaq people of the region (Jensen 2012). Other functions traditionally performed by skin boats, however, are transferred to modern means of transportation, and the role these watercraft have played in people's mobility is almost forgotten. "Umiak means whaling, this is how it's always been" – stated Barrow whaling Captain David Leavitt, reflecting both the contemporary meaning of the boat and the perception of its history (Anichtchenko 2012b). Yet ethnographic and archaeological records portray more diverse and dynamic use of skin boats in the past.

Situated between North America and Asia, with Bering Strait to the south and the Arctic Ocean to the north, the Chukchi Sea not only affords inter-continental connections similar to those of the Bering Strait region, but also extends these connections along the northern coasts of two continents, providing opportunities for maritime travel along and across both south-north and east-west axes. Together with the Beaufort Sea, it links Bering Strait with High Arctic regions of Siberia, Alaska and Canada (Fig.7.1). The archaeological research demonstrates that throughout time, this connection facilitated numerous exchanges that shaped the cultural history of the region and beyond, including the Thule migration, which sprang from the Chukchi Sea littoral to Greenland, encompassing approximately one third of the Arctic circumpolar coastline (See Chapter 2).

Fig.7.1. Chukchi Sea map with contemporary communities
(US National Research Council 2014:16)

Both the region’s maritime orientation and its role as a catalyst of many important large-geographic scale developments and exchanges is well recognized and addressed in scholarly literature (Mathiassen 1927, Jenness 1928, Collins 1933, Larsen 1948, Mason 1998 and 2000), but the place of water transportation in this process has never been specifically acknowledged. However, territorial expansion of maritime nations is often directly linked with developments in their ship and boat building and seafaring strategies. The adaptation of sail by Scandinavian seafarers, for instance, is one of the reasons behind geo-political changes of Viking Age (Christensen 2000). What maritime technology and practices afforded Thule expansion? Can a review of boat artefacts elucidate the social dynamics and logistics of this movement? How does subsistence mobility interact with long-distance seafaring? This chapter explores these questions while aiming to address the issue of watercraft technology and seafaring practices as a reflection of and motivation for long-distance travel and territorial expansion. This focus is particularly appropriate in the context of the case study focused on the Birnirk type-site, located at the eastern extreme of Chukchi Sea, the starting point of Thule migration.

7.2. Ethnographic horizon

The Birnirk (Pigniq) archaeological site is located at 71°18′ north latitude, at the far-eastern margin of the Chukchi Sea, 500 km above the Arctic Circle (Fig. 7. 2). The nearest settlement to the site is Barrow – the northern-most town in the United States. Today, the Alaskan coast of the Chukchi Sea is home for the Inupiaq people. Although speaking the same language and sharing many traits, this is not a completely culturally homogenous group. In the nineteenth century, it was comprised of over fifteen nations (Burch 2005:37-39) engaged in complex and not always peaceful relationships with each other. The land where the Birnirk archaeological site is located belonged to Kakligmiut nation, whose territory stretched along the Chukchi Sea coast from Point Belcher to the western shore of Dease Inlet (Fig.7.2).

The earliest information about the Inupiaq people reached Europeans in the late 1700s as a result of Russian and British voyages of exploration. This does not, however, mean that the Chukchi Sea Inupiat did not have exposure to industrial societies prior to this time. Some “non-native” goods and influences reached Arctic Alaska through trade with indigenous populations of the Chukotka Peninsula. By the time the first European explorers reached the Arctic coast of Alaska, local Inupiat already knew and valued beads, tobacco and metals, all of which had to be transported across the sea to the Alaskan coast. Ancient roots of the region’s trans-continental exchanges are evident from a fragment of a 600 A.D. Chinese bronze buckle and needles fashioned locally out of reused bronze found at the Cape Espenberg site near Kotzebue Sound (Hoffecker et al. 2012; Cooper et al. 2016). Knives and engraving tools with metal blades of presumably Asiatic origin were also present in the Birnirk site’s stratigraphic layers dating prior to 1000 A.D. (Carter 1958:2).

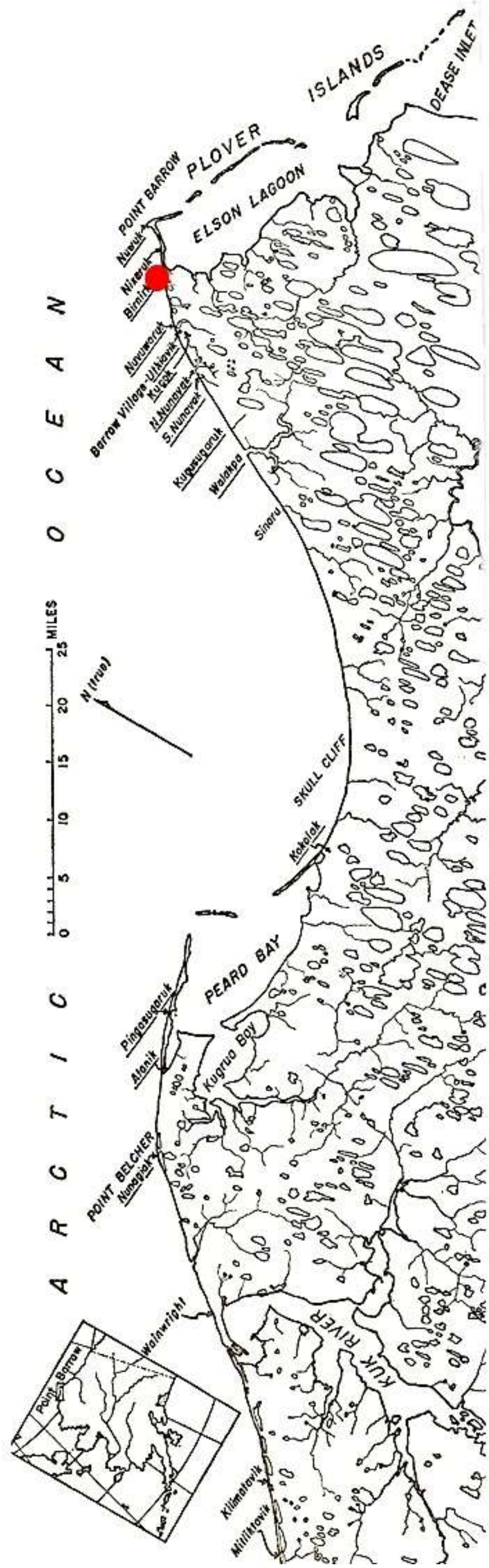


Fig.7.2. Archaeological sites along the north-eastern margin of the Chukchi Sea. The location of the Birnirk archaeological site is marked in red (after Ford 1959:14)

The short and relatively low-impact initial encounters of the 18th century charted the way for the next stage of the region's exploration and exploitation. In 1848 Yankee commercial whaling ships began hunting north of the Bering Strait, bringing up to 70 ships per year to the Alaskan coast of the Chukchi Sea. In addition to new materials, diseases, and cultural influences, this increased traffic in the Chukchi Sea resulted in growing written and pictorial accounts of local Native people, their culture, and their boats.

The earliest ethnographic information about the skin boats of the eastern Chukchi Sea comes from the early nineteenth century explorers who ventured into the region looking for the Northwest Passage. In 1816 Captain Otto Von Kotzebue sailed the Russian brig *Rurik* into the sound that later received his name, and was greeted by a party of "Natives", who approached the ship on their "baidaras," waving a fox skin to indicate their peaceful intentions (Kotzebue 1821:199). The meeting was sketched by the ship's artist and later appeared in the first Russian publication of Kotzebue's voyages (Fig.7.3.).

Fig.7.3. "Boat of Kotzebue Sound" (Kotzebue 1821-23). Note the red and black decorations on paddle blades.

Ten years later, Frederick Beechey, the captain of the fifteen-gun sloop HMS *Blossom* described the boats of Kotzebue Sound:

> They consist of the frame of driftwood, covered with the skin of walruses, which are strained over it and are capable of being tightened at any time by a lacing inside of the gunwale; the frames and benches for rowers are fastened with thongs, by which the boat is rendered both light and pliable; the skin when soaked with water is translucent; and a stranger placing his foot upon the flat yielding surface at the bottom of the boat fancies it a

> frail security, but it is very safe and durable especially when kept well greased" (Beechey 1831:346, Fig. 7.4.)

Fig.7.4. "Natives of the coast near Cape Thompson" (Beechey 1831:360)

According to Beechey, the boat frames were coloured with "iron pyrites" (ochre) (Ibid: 345). The umiak crew consisted of ten to thirteen men: an elderly steersmen who appeared to be the leader, and paddlers who propelled the watercraft with a velocity that European mariners "were not prepared to witness" (Beechey 1831:346). Paddles were decorated with stripes of different colour: "those for use on starboard with black stripes, and the larboard ones with red" (Ibid: 346), which corresponds with the image in Otto Kotzebue's publication (Fig.7.3). At Point Barrow paddles were "about 4 to 5 feet long, made of one piece of driftwood, with slender round shafts, and lancelet blades about 6 inches broad, and a short rounded cross handle at the upper end" (Murdoch 1988:340).

Both the Kotzebue and Beechy accounts portray watercraft with characteristic gunwales protruding well beyond stem and stern and joining their front tips (Fig. 7.5). This feature persisted with minor alterations until the twentieth century. According to current local informants, protruding and connected gunwales allowed for extra space for storing whaling harpoons, which were tied to these gunwales with blades lying over the connected ends. However, not all Chukchi Sea umiaks followed the same design. A number of models, including the one collected by John Barrow in Kotzebue Sound in 1855, lack this feature. This model is particularly interesting because of the lighter-coloured skin decorated with images of marine mammals which covers the bow of the boat (Fig.7.6.). This is unusual since Inupiaq umiaks are rarely painted with figurative designs, which are more typical for their southern Yup'ik neighbours.

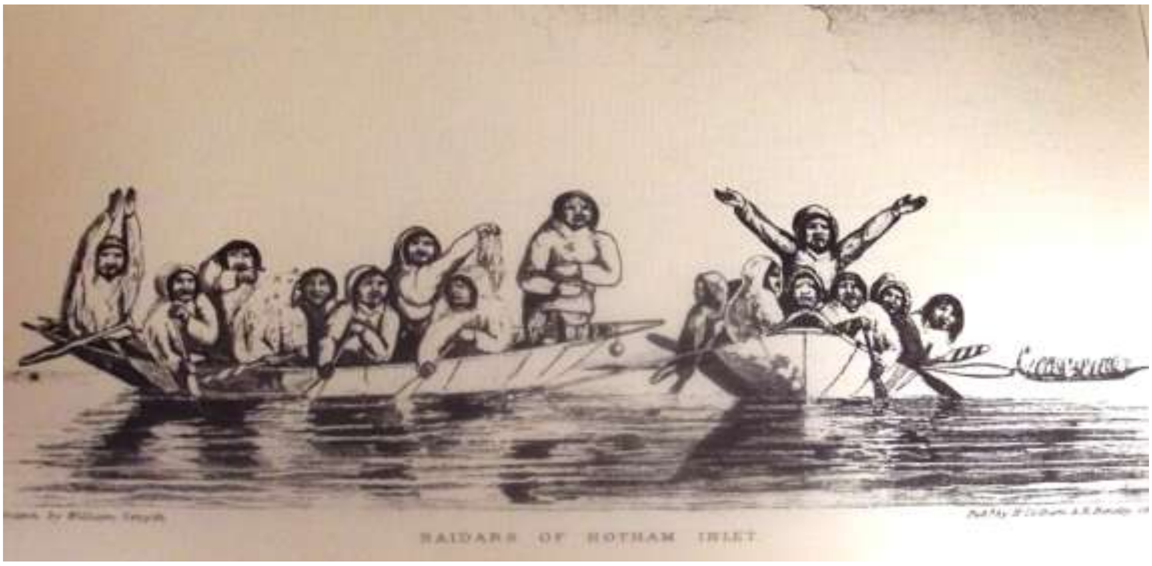


Fig.7.5. "Baidaras of Hotham Inlet" (Beechey 1831)

Fig.7.6. Umiak model collected by John Barrow, Kotzebue Sound, 1855
British Museum Am1855.1126.101.a, 62.5 : 19.5: cm.

Our knowledge of the regional diversity of Chukchi Sea skin boats at the time of first contact with Europeans is limited to the cursory observations of early explorers who, as mentioned earlier, were more intrigued by the overall similarity of Arctic skin boats than by their unique characteristics in specific locations. Only occasionally did they point to regional differences. Captain Beechey, for instance, noted that the umiaks of the people at Cape Kruzenstern were "better made than any we had seen excepting those of the St. Lawrence Islander, which they resemble in having a flap made of walrus skin attached to the gunwale for the purpose of keeping their bows and arrows dry" (Ibid:389). Beechey's crew was the first Europeans to leave an account about encounters with the Native people of Point Barrow in 1826. Evidently they were not well received: a fleet of over 30 umiaks and multiple kayaks met them on their approach to the village and prevented a landing. Although no detailed boat descriptions resulted from this encounter, apparently both kayaks and umiaks were engaged in patrolling and military actions. Additionally, the ship's artist rendering of this episode provides an image of both umiaks and kayaks (Fig. 7.7.). The former is more visible and seems to be very similar to the image of Kotzebue umiak.

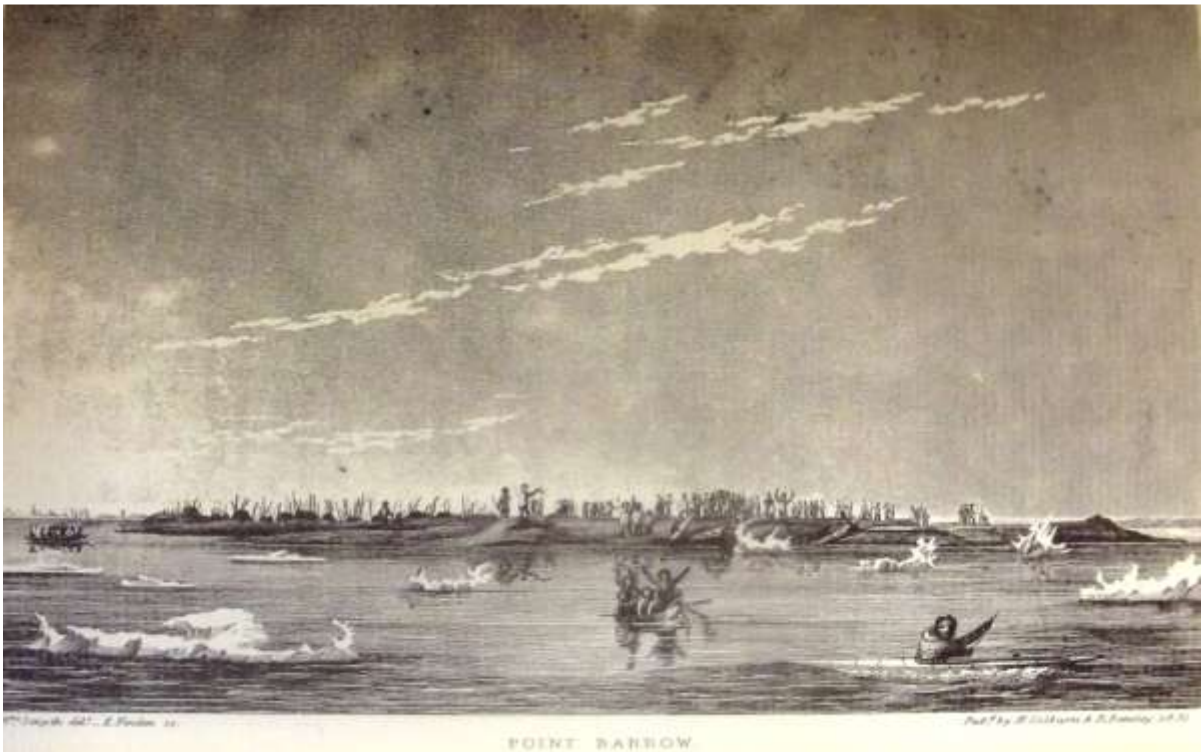


Fig.7.7. Point Barrow (Beechey 1968:425)

Although the basic construction type appears to be the same, boat dimensions varied. The captain of HMS *Plover,* Rochfort Maguire, who spent two years in Point Barrow (1852-1854) described local boats as 18 feet (549 cm) long (Maguire 1988:11), 7 feet (213 cm) in beam and 3-3 ½ feet (91 to 107 cm) high (Maguire 1988:358). The umiaks observed at Point Barrow by John Murdock in 1882 had depth of 2 ½ feet / 76 cm, beam of 152-183 cm (5 or 6 feet/), and length of 914 cm /30 feet (Murdoch 1988:335). Robert Spencer, who did ethnographic work in Barrow in 1952, reported 30 foot-long (914 cm) umiaks that were used by inland Inupiat for river transportation and trading voyages (Spencer 1959:136). According to him, these boats were covered with 5 to 6 walrus skins (Ibid). Contemporary Barrow whaling umiaks recorded during the author's fieldwork in

2012 measured 570 to 710 cm in length, 140 to 170 cm in beam and 50 to 72cm in height (Fig.7.8).

Fig. 7.8. Contemporary whaling umiaks in Point Barrow, August 2012,
Photo by E. Anichtchenko.

On the coast, umiaks were usually covered with skins of bearded seals or “ugruks” as they are called by Inupiat (Murdoch 1988:337). Umiak length is traditionally expressed in the amount of bearded seal skins necessary for making a cover for the boat. Point Barrow elder Roxy Ekowana, interviewed in 1981, related: “the small umiak is five ugruk skins, then the next larger size is 6 ugruk skins, then 7, some would be bigger that that with 8 or 9 skins to cover the framework. It depends on how big the person wants to make his boat” (Libby 1984: 5). Most of the skin boats in Barrow today are “six-skinners.”

The number of crew members depended on the size of the boat and purpose of the voyage. Whaling crews as a rule consisted of six paddlers. According to an 1838 report, large “cargo” umiaks of Point Barrow could hold up to 12 people (Van Stone 1977:89; Burch 2005:170).

In addition to paddles, Chukchi Sea umiaks made use of both sail and oars, which predated the first contact of Chukchi Sea Inupiat with non-native explorers and sailors in the early 1800s. Both Otto von Kotzebue and Beechey observed umiaks under sail, and

Kotzebue mentioned two different sail modifications (Kotzebue 1821:199, 202; Beechey 1831: 404). Unfortunately these accounts lack detailed descriptions or pictorial evidence, and it is hard to tell to what degree the early 19th century umiak sail resembled its late 1800s variant, of which we have a much fuller record. The umiak sail collected by Beechey in Kotzebue Sound in 1828 (British Museum Am.1828, 1213.13) is a rectangular sheet made out of four strips of walrus gut (Fig.7.9.). In 1881-1882 Murdoch described sails used at Point Barrow as a square piece of dark blue drilling laced to a light yard, which was attached to a 10 foot long mast:

> The mast is a stout square pole 10 or 12 feet long and is set up well forward of amidships, without a step, the square butt resting against a bottom board, and held up by two forestays and two backstays, running from the masthead to the inside streak. All the rigging, stays, halyards, towing line, etc., are made of stout thong (Murdoch 1988:338, Fig.7.10).

Fig.7.9. Walrus intestine sail, Kotzebue Sound, Alaska, collected by Captain F. W. Beechey in 1828, British Museum Am1828.1213.13

Fig.7.10. Umiak with mast near Barrow, circa 1910, Anglo-American Polar Expedition, photo by E.K. Leffingwell, USGS Photographic Library

The earliest reference to the native use of oars in the eastern Chukchi Sea region dates to 1837. The umiak Thomas Simpson purchased from some Point Barrow Natives at Dease Inlet was supplied with “four of their slender oars, which they used as tent poles, besides a couple of paddles” (Simpson 1843: 148). The Inupiat who sold the boat stated that this was a genuine native design, not an adaptation of “white man” technology (Ibid). The oars were about 7 feet long with 3 inch wide blades and were fitted to the gunwale with two overlapping loops of hide thong (Fig.7.11). The question of whether the oars and sails were independently invented by Arctic Native mariners or adopted from the European tradition was first brought up by Murdoch, who believed that oars predated the European contact, but also pointed out that only paddles were used in whaling umiaks, which he explained as “merely another case of adhering to an obsolete custom on semi-religious grounds” (Murdoch 1988:339-340).

Both oars and sails persisted with some changes into at least the beginning of twentieth century as demonstrated by historic photographs, museum examples, oral lore and old umiak examples still present in the local communities, and fell out of use circa 1940s, perhaps in response to increased availability of outboard motors. Contemporary whaling umiaks are used only for whaling and are propelled exclusively by paddles during the whale chase, and by oars when the dead whale is towed to the ice edge (Anichtchenko 2012b).

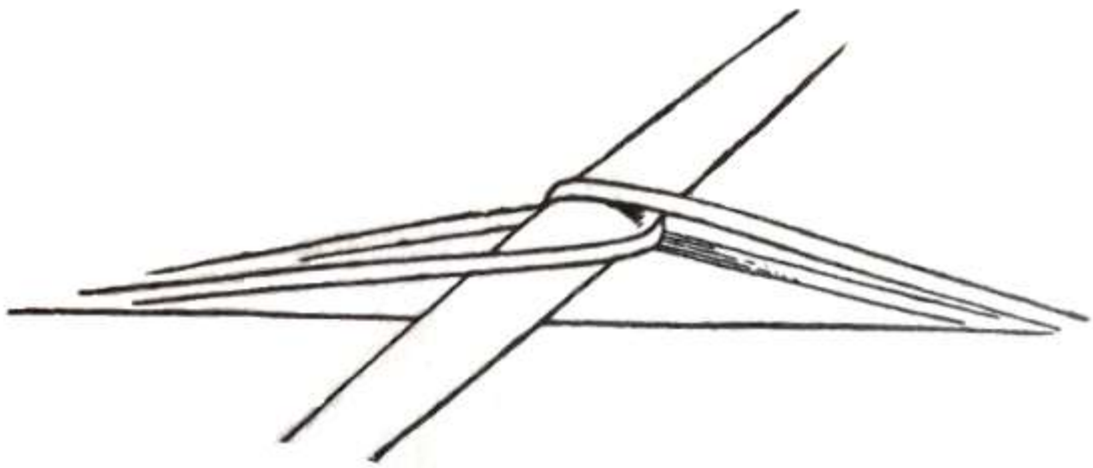


Fig.7.11. An umiak oar held in place by two overlapping hide loops (Murdock 1988:339)

In addition to whaling, umiaks played an important role in long-distance trading and warring. In ethnographic times, one of the main trading locations for the Point Barrow Inupiat was Nigliq Fair at the mouth of the Colville River, approximately 350 coastal kilometres southeast of their home community. The travelling parties of several umiaks left Barrow in late June, when the ocean was still frozen, dragging their boats on sleds:

> After five days or so they reached an area where a lead of open water had formed between the land and the sea ice. They left their sleds and continued by boat. The total trip took about eight or ten days (Van Stone 1977:34). About half a day's journey from their destination the leading boats halted to wait for the laggards. When the last boat arrived the entire party moved en masse to Nigliq, arriving in mid-July (Burch 2005:194).

After two weeks of festivities and trading, the Barrow Inupiat moved to Cape Oliktok to prepare for the Barter Island Fair, yet another 300 km to the east. The Barter Island Fair was held in early August and had an entirely different tone than the Nigliq. Trading with Mackenzie Delta Eskimos and Gwich'in Athabascans provided access to some exotic inland goods, but the mutual fear and distrust were so great that no one slept during the proceedings, and the parties departed immediately after their business concluded (Ibid 200). Such 1200 km-long round trip journeys took place annually, but were likely restricted to relatively well-to-do members of society who could afford time away from summer hunting and possessed resources necessary for travel and trade.

Similarly lengthy trips were undertaken for raiding purposes. Oral accounts contain stories of Barrow Inupiat attacking nations inhabiting northern shores of Kotzebue Sound – a distance of over 500 coastal km each way (Ibid 138). Although such raids were not always amphibious and some lengthy overland foot crossings are recorded, warriors typically travelled by umiaks (Ibid 87). Considered together, these raiding and trading journeys outline a coastal travel range of over 1000 km.

Inland waterways also provided ample and often safer routes for skin boat traffic. Ethno-historian of Inupiaq nation Ernst Burch mapped 68 routes traditionally used by the Inupiat of Northern Alaska. Without a single exception all of them utilised rivers (Ibid 274-296). Water flow did most of the work when boats travelled downstream, and sail could be used when travelling downwind. Going upstream without favourable winds often required the boat to be towed by dogs and people (Ibid 168).

Lengthy inland journeys were typically carried on with umiaks, but kayaks often accompanied these parties and also ventured on shorter hunting and camping trips. Inland kayaks used along the Noatak River had frames similar to ocean kayaks, but were often covered with caribou skin. This craft was used for hunting caribou as they swam across inland lakes and rivers (Nelson 1969:306) and for muskrat hunting (Zimmerly 2000:64). On the coast, kayaks were used in seal hunting from the edge of the ice and in whaling, particularly for beluga whales. Edward Curtis left the following description of the hunting method:

> Then the boats and kaiaks put out, each hunter armed with two spears and two flint knives. They form a long line to seaward of the belugas and drive them in-shore. The older hunters, in kaiaks, cast the first spears and drive the animals into shallow water, where they become stranded and helpless. The men stab them in the blow-holes until they are dead. Kaiaks are used in the surrounding and killing, because they are much more mobile than the larger skin boats. The crews of these, too, hunt and kill, but their chief usefulness is in towing the catch to the village (Curtis 1930:163).

Chukchi Sea kayaks, as known from nineteenth century literature and museum examples, were long and slender watercraft of about 500 cm in length and 46 cm in beam (Nelson 1969:306) although a variety of dimensions are recorded both in historical literature and extant watercraft examples (Golden 2015:312, 318-331). The most notable feature of this kayak is the deck which is flat aft of the coaming, but is raised in front of it (Fig.7.12). The raised section of the deck rests on 4-7 arched deck beams, providing the kayaker with protection from ocean spray. Deck beams are mortised into tall gunwales, and the hull is multi-chined with a nearly flat bottom (Zimmerly 2000a:63, Golden 2015: 318-331). The boat was propelled by double-sided paddle (Ibid).

Both Chukchi Sea umiaks and kayaks carried special amulets that were valued and often kept out of sight. Elaborate whale images often adorned the downward facing surface of a bench at the bow or stern of an umiak, the so-called "captain's seat" (See Chapter 5.5, Fig. 5.11) Simpler versions of the same image are still etched into the benches and headboards of umiaks in Point Hope, along with a Christian cross (Fig.7.13). When asked the meaning of these whale images, two different Point Hope boat owners stated that they etched them as decorations in their spare time. However, the iconography and placement of the image leaves little doubt about its connection with earlier three dimensional whale carvings and their ritualistic significance.

Another form of boat amulet is the ivory whale figurine still used in Point Hope as a "cord stopper" (See chapter 5.5., Fig.5.12.). Evidently, similar carvings were used in Barrow as late as the 1930s. When Henry Ford rented an umiak in Point Barrow for archaeological reconnaissance at Birnirk, the boat owner specifically instructed him not to lose this ivory whale. Similar charms were used in kayaks. In 1881 Edward Nelson tried to purchase a wooden beluga-like image hanging from the frame of a kayak at Kotzebue Sound, "but its owner said that he would die if he parted with it" (Ray 1981:23).

Designed for speed, kayaks provided a good platform for pre-contact hunting methods by allowing a hunter to approach the animals within the distance of a harpoon throw. The head of the harpoon was attached to a line, which helped with retrieving the prey. After the introduction of firearms, traditional kayaks lost their primary purpose: the animals could now be shot at much longer distances, and there was no need for a speedy approach. Consequently, by the 1920s, the traditional "old-timer" long and slender kayaks were replaced with a new variant, a retrieving kayak, the main purpose of which was to provide an effective means of retrieving seals shot in open water (Nelson 1969:307). This short (270 to 370 cm in length) and stout (60 cm in beam) watercraft retained the basic design of its predecessor with an upturned foredeck, slanted cockpit rim, and rounded u-shaped cross section, but could fit on a sled and was much easier to transport on ice.

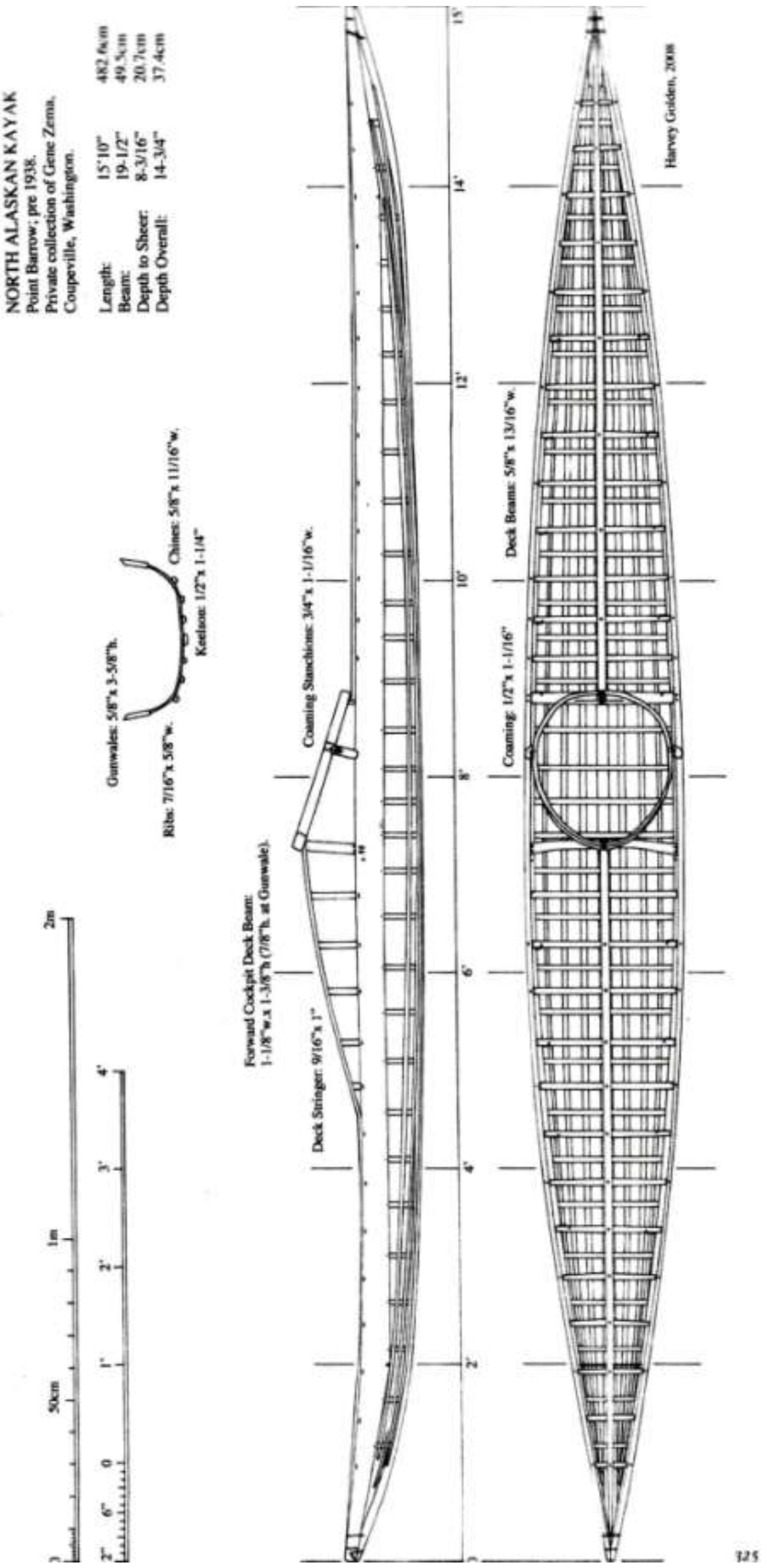


Fig.7.12. Point Barrow kayak from private collection of Gene Zema (Golden 2015:325)

A.

B.

Fig.7.13. Stem views of an umiak, Point Hope, Alaska, 2013. A. etched image of spouting whale on headboard; B. Christian cross on the stem post directly underneath the whale image and above the "captain's seat," the underside of which was traditionally embellished with 3 dimensional whale carving. Photos by Evguenia Anitchenko.

For about forty years the retrieval kayak, called *qayapauraq* (little kayak), or *qayapak* (fat kayak) was very popular in Barrow and other Chukchi Sea communities. In addition to retrieving prey, it was used for river journeys and various subsistence activities. Wainwright elder Oliver James Nullautaq remembered his mother tending to the fishnet using a kayak (North Slope Borough Commission on History, language and Culture 1982:22). By 1960s, however, the retrieval kayak had also gone out of use. According to Richard Nelson, there were only three functional kayaks and one uncovered kayak frame in Wainwright during 1964-65 (Nelson 1969:308). In 2012 there were only three uncovered *qayapak* frames in Wainwright, and the only kayaks in Barrow were those exhibited in the Inupiaq Heritage Center museum (Anichtchenko 2012 b).

Like small kayaks, the *umiahalurak,* or small umiak, was also introduced in the twentieth century. It also primarily served as a retrieval boat, although Beverly Aveoganna, the widow of a whaling captain from Wainwright, Alaska, born in 1930, recalled people using *umiahalurak* for river trips (Aveoganna 2012b). According to local lore, small umiaks arrived at Wainwright and Barrow from lower latitudes at about the same time as retrieval kayaks, but outlasted the latter because they were easier to build and enter and had larger cargo capacity (Nelson 1969:308-309). Very popular in 1970s, they were virtually obsolete by the end of the century. Only one such boat was observed during 2012 field work in Wainwright and Barrow (Anichtchenko 2012b:97-99). Built sometime in the 1930s, Beverly Ageoganna's *umiahalurak,* has a round bottom and measures 340 cm long in length, 102 cm in beam and 50 cm in height.

In contrast with kayaks, umiak construction and use are still practiced in Barrow and Point Hope, but exclusively in the context of whaling. Seventeen of Barrow's thirty-two whaling crews use skin-covered umiaks. It is widely believed that whales are more inclined to approach the traditional boat than contemporary watercraft. When asked about their reasons for using skin covered boats, many captains mentioned quiet approach, safety and the connection to ancestral ways of living (Anichtchenko 2012 a;2013).

To summarize this overview, the changes in the Chukchi Sea skin boats in "ethnographic time" demonstrate a comparatively high degree of adaptability to new technology and changing conditions. Less than a hundred years saw the disappearance of large cargo umiaks and traditional kayaks, and development and then, again, abandonment of small retrieval kayaks and umiaks. Although the twentieth century was, perhaps, among the most intense periods of the millennia in terms of Inupiaq culture's exposure to new tools, materials and influences, these changes suggest that boat technology was not on principle constrained by existing forms and variants, and was likely constantly evolving and changing even prior to contact with industrial societies. At the same time, a certain degree of conservatism is apparent from the consistency of design and ritualistic treatment (such as persistence of whale-shaped charms). Additionally, the ethnographic record of boat use points out the extensive range of travel and the importance of water transportation for regional and interregional networking.

7.3. Archaeological horizon

Our understanding of the history of North Alaskan prehistory in general and maritime adaptation in the region in particular is compromised by two factors: relatively few archaeological investigations conducted to date; and the changes in coastline due to both sea level change and coastal erosion, which removed important coastal elements of the region's archaeology (Bowers et al. 2001). Although more than 1,200 prehistoric sites are known for the entire North Slope (Hall 1981:50), only a handful of them are on the coast.

The oldest archaeological sites of the Chukchi Sea littoral found to date belong to the ASTt culture (see Chapter 2.5). Poor organic preservation at ASTt sites makes it difficult to understand subsistence patterns, but some maritime adaptation is inferred by sites' coastal locations (Dumond 1987: 112). Coastal ASTt sites likely represent only seasonal occupations. Initially, the local subsistence cycle included seasonal migrations to the coast with its access to ocean resources, and inland, where caribou herds were abundant. By 200 AD there are clear signs of permanent coastal villages, with faunal assemblages indicating that their occupants hunted marine mammals, but archaeological remains of boats are missing. Although some indirect material evidence of watercraft use is known from Denbigh, Norton and Choris cultures (see Chapter 3.2), the earliest archaeological boat fragments of Chukchi Sea littoral come from Ipiutak sites of Point Hope (AD 100-900) (Larsen 1948). Interestingly, all boat-related artefacts from these sites pertain to kayak technology, suggesting that the extensive trading and warring relationship between the people of Point Hope and inhabitants of Chukotka, implied by a number of archaeological finds (Mason 1998, 2000) were carried out by kayak.

Similarly to other parts of Alaska the archaeological boat dataset of the Chukchi Sea littoral becomes noticeably richer at the turn of the second millennium AD (see Chapter 3.2. and 6.3). In addition to the Birnirk site dataset discussed below, archaeological finds pertaining to the boat technology of the eastern Chukchi Sea region come from six known sites (Fig.7.14). Four of these sites (Utqiavik, Nuvuk, Walakpa and Pinagsugruq) are located between Point Hope and Point Franklin, in geographic proximity to Birnirk. The Deering and Cape Espenberg sites are on Kotzebue Sound, just north of Bering Strait. Although geographically removed, these two sites offer boat data contemporaneous and similar to the Birnirk finds.

Fig.7.14. Chukchi Sea archaeological sites with boat data

In terms of culture sequence, the end of the first – beginning of the second millennium AD is the time when, using Mason's analogy, the region "may have resembled a patchwork of ethnic enclaves, each with its own history of material and martial interchanges, sibling rivalries and long standing feuds, as well as trade relationships" (2000:228). The confluent and conflicting influences of the Siberian Old Bering Sea, Punuk, Ipiutak, and possibly Norton cultures resulted in development of the Birnirk complex. Named after the site which is the main subject of this chapter, Birnirk culture may have originated on the Siberian coast, spreading into Alaska circa AD 850 (Mason 2000, 2007, Raghavan et al. 2014) and reaching as far east as Atkinson Point in the Canadian Northwest Territories, over 3000 km away from the Siberian sites of the same culture (Anderson 1984:91, Chapter 2.5). Given the geography of the region, this geographical spread would not be possible without active seafaring.

All known Birnirk sites are located on the coast, but the population harvested both marine and land resources. Seal and caribou bones dominate faunal assemblages of sites prior to about 800 AD, and the extent of whaling prior to the second millennium AD remains an open question. Whaling harpoons and related material culture are rare at the Birnirk-period sites, leading some archaeologists to the conclusion that Birnirk hunters did not regularly hunt whales (Stanford 1976:97,Giddings 1986:110; Dumond 1987:132). At the same time, whale bone and baleen ranked high in the Birnirk type-site faunal assemblage, although seal bones were considerably predominant (Carter 1953:4, 1954:4). Walrus hunting also played an important role in local subsistence, as evident from the site's walrus ivory artefacts, faunal material and imagery. Interestingly, the only hunting image from the Birnirk-Thule period found in the vicinity of Point Barrow depicts walrus being hunted from umiaks (Fig.7.15.).

Fig.7.15. "Bone wedge" with umiak hunting scene. The artefact was excavated by local Inupiat in the vicinity of Point Barrow and purchased by James Ford in the vicinity of Point Barrow in 1931. A399977, National Museum of Natural History, Washington DC. Photo by E. Anichtchenko.

The transition from Birnirk to fully-maritime adapted Thule culture remains a subject of discussion. Two periods are recognized within Thule culture: the Early Thule, closely linked with late Birnirk, circa 900-1100 A. D. and Late Thule, starting from 1400 A.D. A majority of researchers see the transition from Birnirk to Thule as a local *in situ* development at Point Barrow with subsequent “evolution” into the Late Thule culture and finally historic Inupiat. James Ford, one of the first archaeologists to excavate sites at Point Barrow, including Birnirk, stated that “from the study of the Point Barrow collections it seems obvious that there was no substantial break in occupation from Birnirk to historic times (1959:243).”

An alternative vision emerged from the investigation of skeletal remains from the area. Comparing archaeological data from the Birnirk-period Kugusugaruk site with cranial measurements from living individuals, Ales Hrdlicka observed that the archaeological examples are more similar to those of Labrador and southern Greenland than they are to the historic population of Point Barrow. He suggested that the Birnirk population of Point Barrow might have become extinct (Hrdlička 1930:329). Continuing Hrdlicka’s research Eric Hollinger, Stephen Ousley and Charles Untermohle sampled DNA from several sets of human remains excavated at Birnirk and concluded that: there were significant differences between the Birnirk/Early Thule and Late Thule/historic populations of the Barrow area (Hollinger at al. 2009:135).

For the Point Barrow area the question of the relationship between the early and late Thule is a key issue of cultural and biological history of the local Inupiat people. In a more particular sense the nature of the relationship between the recent Inupiat population and the people occupying the Birnirk site determines the value of ethnographic analogy in the analysis of Birnirk archaeological data. If the Point Barrow region did indeed undergo population replacement, the ethnographic information and oral lore of modern Inupiaq people of Point Barrow is more applicable to the archaeological materials after circa 1300 AD, than to the Birnirk and Early Thule cultures. By the same logic, the oral lore and ethnographic data of the Inuits of Arctic Canada and Greenland might provide a more relevant ethnographic analogy for the Birnirk archaeological finds.

In contrast with Birnirk and early Thule cultures, Late Thule was distinctively focused on whaling. Villages were located to provide easy access to winter leads, the narrow openings in sea ice serving as migration paths for bowhead whales. Some whaling took place in the fall, but the main whale hunting season began in March or early April and lasted from two weeks to two months, depending on the migration dynamics. In summer people left the villages for trading voyages and inland resources until September, when it was time to return home. The villages contained up to 50 active houses with 6 to 13 inhabitants each (Sheehan 1997:75). Permanent semi-subterranean structures were excavated into and incorporated within the permafrost. The house frames were made from a durable framework of driftwood logs and whalebone and covered with layers of sod. The dwelling was entered through a long tunnel, often 10 m. in length, which acted as a cold trap. The interior typically featured planked floor and a sleeping platform and was lit by oil lamps. A removable gut skylight provided light and ventilation (Lee and Reinhardt 2003). Meat caches excavated into permafrost were placed near the house entrances.

In addition to the residential structures Thule villages had ceremonial houses or *qargi* (See Chapter 5.3). Many activities associated with whaling took place in *qargi*, and archaeological evidence attests that the concept of the communal men's house was well established in Thule culture starting from the 12th century (Larsen 2001:80; Sheehan 1997:109). Whaling umiaks were often stored in proximity to these communal structures.

Evidence of kayak and umiak use is abundant for both Birnirk and Thule cultures, and some speculation has been made regarding constructional details of these watercraft. Using boat models as primary evidence, Arima (1975:53, 87-90;1999:53) and Kankaanpää (1988:29) suggested that kayaks used by these cultures were flat-decked with bow and stern "horns" characteristic of ethnographic kayaks of the Eastern (Canadian) Arctic (see Chapter 8.2, Fig.8.5). Their opinions about lower hull shape, however, differed. According to Arima (1999), the flat bottom and hard chines suggested by the model from the Clachan site in West Coronation Gulf (Canadian Museum of history NaPi-2-29.15) represent the "original" Thule design. Kankaanpää (1975) maintains that Thule and Birnirk kayaks had multi-chined rounded bottom and equates flat-bottomed kayaks with earlier archaeological cultures, such as Dorset and ASTt/Denbigh. The boat data of the Birnirk site provides an opportunity to compare these observations with fragments of full-scale boats.

7.4. Birnirk site excavation history and dating

The Birnirk archaeological site was first mentioned by Lieutenant Patrick Henry Ray and Sergeant John Murdoch in 1881-1883. “Birnirk” is a mispronunciation of the site’s Inupiaq name “Pigniq,” which means “place to hunt ducks”. The first artefact collections occurred in 1912 when Vilhjalmur Stefansson arranged to have local Inupiat dig at the site and purchased the recovered artefacts for the American Museum of Natural History, New York (Ford 1959:33). A portion of Stefansson’s collection was later purchased by the Canadian Museum of Civilization in Ottawa, Canada (Morrison 2001:79).

Systematic investigations began in 1931, when James A. Ford of the National Museum of Natural History in Washington D.C. established that the site consisted of 16 well-defined mounds and excavated seven of them during field work in 1931, 1932 and 1936. The total time spent working at Birnirk was relatively brief: only four days in 1931, six weeks in 1932 and two weeks in 1936 (Ford 1959:36). The artefacts collected by Ford are currently curated at the National Museum of Natural History in Washington, DC. The description of Ford’s work in Birnirk was first published in 1959 his *Eskimo Prehistory in the vicinity of Point Barrow, Alaska.*

In 1951, 1952 and 1953 the site was further excavated by a Harvard University expedition, directed by Wilbert Carter, who collected over 16,000 objects which are presently curated at the University of Alaska Museum of the North, in Fairbanks, Alaska. The final report of Carter’s excavations has never been published, and his intermediate reports to the Naval Office provided only brief overviews of successive season’s work. Specific excavation details and artefact provenience cited in this work were established on the basis of the expedition field notes and artefact field catalogues. In sum, the archaeological collections excavated at Birnirk are presently located in four cities and two countries.

Carter’s excavations at Birnirk led him to believe that the Thule culture had originated in the vicinity of Barrow. Thus, Birnirk became a seminal site, initially placed between 200 and 1300 A.D (Carter 1966: 2-3; Ford 1959: 156-160). These dates, based primarily on harpoon typology and dendrochronology, contrast with more recent radiochronological data. An outer ring of structural timber from mound A collected by Owen Rye in 1948 dates to 996-1162 A.D (Beta 133361) (Mason 2000, Morrison 2001) (Mason and Bowers 2009:27). Four antler harpoon heads from the collection of the Canadian Museum of History yielded a range of dates from 880 A.D. to 990 A.D.

(Morrison 2001:80). Three AMS dates obtained during this research fluctuate between the last decade of the 10th century AD and the first half of 11th century AD (See Appendix IV). Consequently, all Birnirk site dates available at the moment fall between the ninth and twelfth centuries A.D.

7.5. Site description

The Birnirk site is situated on the southern end of the 365 meters wide sand spit that lays between the Arctic Ocean on one side and Elson Lagoon on the other. Ford reported 16 well-defined dome-like mounds arranged in three rows parallel to the beach of the Arctic Ocean (Fig.7.16). Carter's analysis of the same site stated that there were 20 mounds ranging between 0.5 and 3 meters in height and 15 and 36 meters in diameter (Carter 1966:9). Today the ground around the mounds is marshy tundra that lies from 0.3 to 1.8 meters above sea level. At the time of habitation, however, the ground was at least 1.5 meters higher and consisted of coarse clean sand mixed with small gravels. Mounds resulted from repeated construction of sod-covered houses and ice cellars on the remains of older structures (Ford 1959:33), and from piling the debris of human activities outside of habitations (Carter 1966:11).

Ford excavated seven mounds (A, C, D, G, H, J and R), uncovering the remains of seven houses, two caches or meat cellars, and four unidentified structures. Carter focused on Mounds H, Q and L. The excavation at Mound Q yielded a large multi-room house (Carter 1954a:3), Mound L contained the remains of a smaller house (Carter 1966:19), and the test trench in Mound H revealed two middens (Carter 1966:16). According to Carter, the midden material from Mound H indicated that Birnirk "was in use for an extended period of time"(Ibid). With his characteristic vagueness he identified four phases of occupation: "modern, or early contact; late prehistoric (perhaps a form of Western Thule); Thule and Birnirk" (Ibid). Throughout the most of its history Birnirk was a permanent, year-round village with excellent access to a variety of seasonal resources: from whales and seals to waterfowl and caribou. The site abandonment may have been caused by land subsidence and the consequent invasion of wet tundra (Ford 1959:35).

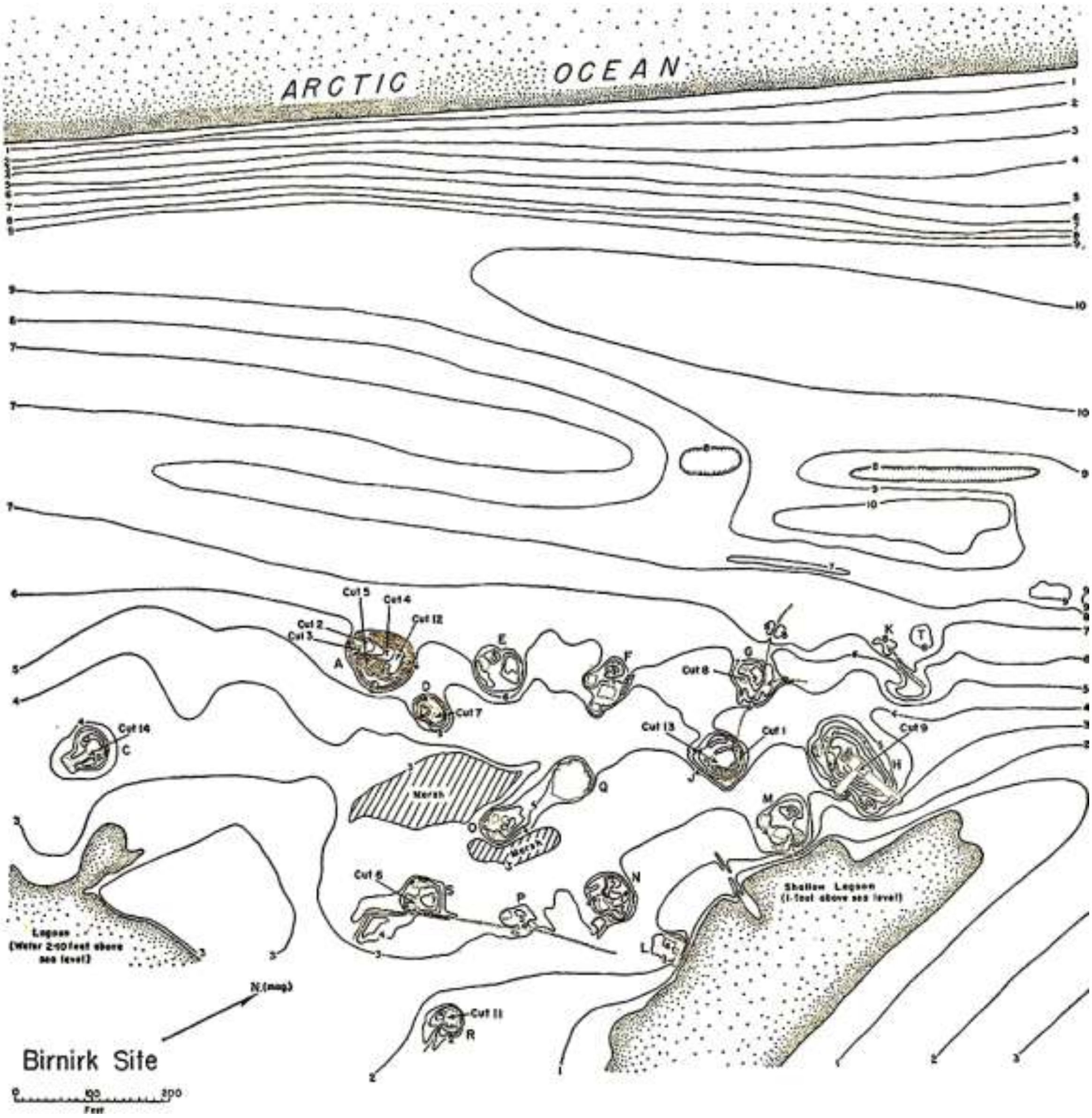


Figure 7.16. Map of the Birnirk site (Ford 1959:34)

7.6. Boat spatial distribution

Much in the spirit of the time, both Ford and Carter focused their analysis predominantly on harpoon typology (Carter 1965:4-6, Ford 1959: 231-236) and house architecture (Carter 1960:4). Other artefacts were collected, but received less attention. Analyzing boat fragments in the site report, Carter wrote:

> the information is complete enough to conclude that the Birnirk Eskimos had both the small skin boat (kayak) and the large skin boat (umiak) but fitting the parts together is a difficult task. In no case does the collection offer enough boat parts to reconstruct much of a complete boat (Carter 1953b:9).

The catalogue of Carter's collection identifies 76 artefacts as boat, umiak or kayak parts, paddles, and miniature or toy boats. Ford's collection at the National Museum of Natural History contains 37 boat fragments. The total sample size is thus 113 artefacts, which constitutes 0.80% of the entire Birnirk collection.

Boat-related data was uncovered in eight out of ten excavated mounds. Although nearly ubiquitous, boat artefacts were not evenly distributed in terms of their quantity in different site features. 42 % of all boat data, for instance, originated from Mound H. Mounds A and Q also contained high number of boat artefacts (Fig.7.17.) By contrast, mounds D, J, L, and R had the smallest amount of boat-related objects – between one and two artefacts each. This pattern reflects, in part, the size of mounds. Mound H and A were the largest mounds of the site, containing multiple structures, while mounds J, L, R and D were significantly smaller and had a single structure each. Given the lack of systematic radiochronological sampling it is hard to tell whether the difference between mound sizes or single and multi-room house architecture reflect different chronological positioning, social structure or other processes.

A better understanding of the artefact distribution pattern can be gained from the analysis of individual features (houses, meat cellars and middens) in each mound (Table 7.1.). To further this analysis the boat dataset is divided into four categories: miniatures, full scale umiaks, full scale kayaks and paddles. The distinction between these groups is explained in the theory and methodology chapter.

Boat artefacts appear in houses, meat cellars and middens, with houses displaying a slightly higher boat artefact concentration than other types of locations. As a family abode and shelter during long winter months, houses contained a range of activities. Here the men carved new boat frames and reworked fragments of old boats into knife and adze handles, children played with miniature boats and women tended oil lamps with splinters of broken stringers. Boat fragments were also used in house construction for both practical and ritualistic reasons (see Chapter 5.3).

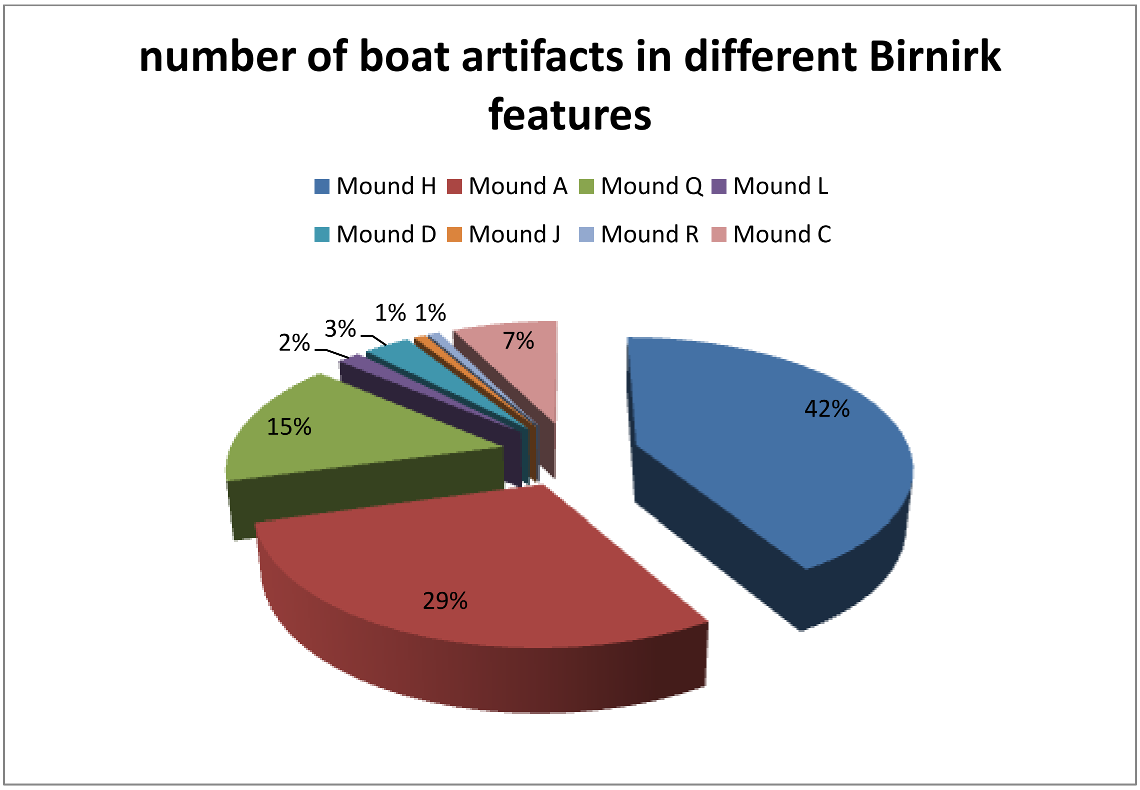


Fig.7.17. Frequency of boat artefacts per Birnirk site feature. Graphics by E. Anichtchenko.

The presence of boat frames and miniatures in meat cellars is more intriguing. In later ethnographic times great care was taken in cleaning and maintaining meat cellars, particularly in preparation for the new hunting season. It was believed that dirty cellars would offend animal spirits and cause them to avoid the hunter. For that reason, cellars were perhaps the most rigidly organized and maintained of all living spaces of an Inupiaq settlement, with virtually no unintended elements. Since cellars were not used for refuse, boat building, or children's games, the presence of boat data in these spaces is likely a ritualistic highlight of the connection between boats, animals and the sustenance they provide to the people.

In terms of the distribution pattern of each of boat category, kayak fragments are both the most frequent and widely distributed (Fig.7.18). They are found in 13 site locations of different functions, both as single elements and clusters of artefacts. This may indicate that kayaks were more numerous than umiaks and more closely linked to individual households. Miniatures are present in ten different Birnirk structures/features. Although this category of boat data has a particularly close affiliation with houses (which may reflect their function as both toys and ritualistic artefacts), boat models are also found in meat cellars and middens.

Feature	Function	Total number of boat artefacts	Miniatures	Umiak fragments	Kayak fragments	Paddles
Mound J	House, single room	2	1		1	
Mound L	House, Single room	1	1			
Mound R	House, Single room	1	1			
Mound C, Structure A	House, Single room	9	1		8	
Mound A, Structure A	House, Single room	4	4			
Mound A, Structure E	House, Single room (?)	1			1	
Mound A, Structure F	House, Single room	1		1		
Mound Q	House, Multi room	17	5		11	2
Mound A, Structure C	House, single room or meat cellar	10		2	5	3
Mound A, Structure B	Meat cellar	3	1		1	1
Mound A, Structure H	Meat cellar	5	1		4	
Mound A, Structure D	Unidentified, possibly midden	1			1	
Mound D	Midden (?)	2			2	
Mound A, Structure G	Midden	3	1	1	1	
Mound A, Cut 12	Midden	1			1	
Mound A, Cut 12	Test trench	1			1	
Mound H	Unidentified, possibly complex of structures and middens	51	4	22	24	1
Total		113	20	26	61	7

Table 7.1. Birnirk boat data distribution.

Full scale umiak fragments are both less frequent and much more localized than both miniatures and kayaks. Artefacts of this group were found in four locations of two of Birnirk mounds (A and H), and with the exception of Mound H, each of these locations yielded just one or two finds. Only one umiak-related artefact came from a context that can be reliably identified as the interior of a dwelling. The highest concentration of umiak fragments originated from the mound H, the functional meaning of which unfortunately remains undetermined.

Paddles are the least frequent category and are found in four different locations: one house structure, two cellars and one exterior area/midden. From available data it appears that at least statistically they have a stronger association with kayak fragments than with umiak finds. All but one recovered paddles were broken. The sole complete example was a single-bladed paddle excavated from the proximity of burial containing kayak fragments (See Appendix II, #88), which may suggest that unlike their descendants, Birnirk kayakers used single-bladed paddles.

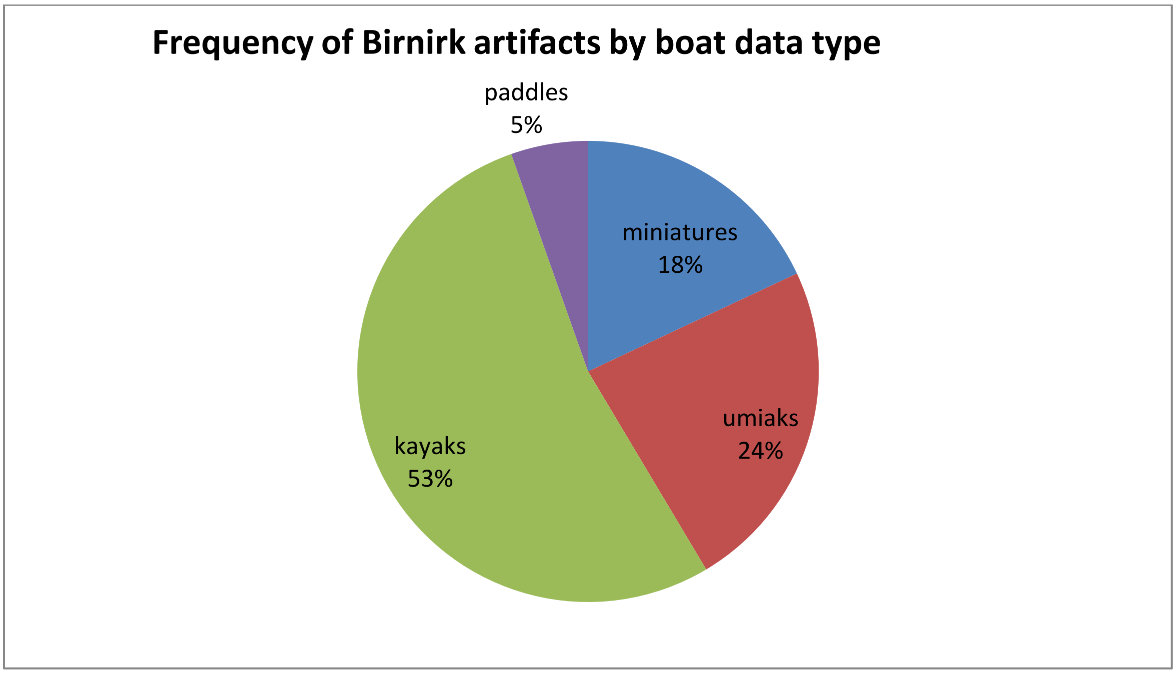


Fig. 7.18. Frequency of Birnirk artefacts by boat data type. Graphics by E. Anichtchenko.

Three skin fragments excavated by Carter may represent boat coverings. All three are relatively small sewn pieces of seal skin. This identification is also inconclusive and is based largely on the fact that all the hair is removed from the skin and that they are sewn with the same waterproof stitch that is still used today for making umiak covers. In one of these skin fragments (BK-H-2399) the seam appears to be smeared with a greasey substance to make it even more watertight. While all of this is consistent with the manufacturing of skin boat covers, the same techniques would have also be appropriate for skin bags, shoe soles and tent covers.

Four site features exhibit particularly high concentration of boat remains: 1) Mound C; 2) structure C in Mound A: 3) Mound Q; and 4) Mound H. With the exception of Mound H, all these structures are identified as houses, although some doubts exist in case of House C from Mound A. Ford described this feature as “a rather hopeless tangle of logs lying to the east of the entrance to House A […] It is somewhat uncertain whether this structure represents the remains of a building, a house, or meat cellar” (1959:43-44). All boat artefacts from this structure relate to full-scale boats, including kayak and umiak frame remains and paddle blade fragments (Table 2), and were positioned, likely intentionally, below the floor of the structure, together with a layer of seal bones.

Mound C contained remains of a house, measuring roughly 11 by 11 feet (3.3 by 3.3 m.). Similar in size and plan to other Birnirk single room houses, such as those in Mounds J, L and R, it had some notable differences (Ford 1959: 48). A small whale skull and an articulated portion of whale vertebrae were incorporated into the wall of the entrance tunnel. A well preserved sleeping area along the northern wall of the house was covered with two polar bear skins. In ethnographic record of Alaska’s Inupiaq people both polar bear and whale were symbolic of wealth and power, which may be referenced in these elements of Birnirk house treatment, perhaps indicating the occupants’ high status. Two Birnirk Open socket type harpoons were found in this feature, which according to Ford, “appear to date the structure fairly early in the Birnirk period” (Ibid). Nine boat-related artefacts – one boat miniature (398865) and eight “kayak frame fragments” - were excavated from the floor deposit and the level below the floor of this house. Both the miniature and frame fragments are rather unusual. The miniature seemingly represents an un-decked single-man boat and will be discussed later. The “kayak frame fragments” include 19-25 cm long slightly curved wooden cylinders and two curved antler strips. Evidently, Ford was not certain about these artefacts’ affiliation with kayak. While field records identify these artefacts as kayak frames, the final publication lists them as “Birnirk type of wood float bars” (Ford 1959:101). Indeed, unless these fragments represent a vessel drastically different from ethnographically known kayaks, it is hard to reconstruct their functional meaning and placement in a kayak frame. The use of antler for kayak construction is, however, ethnographically recorded in Barrow region and for this reason these artefacts were included in the analysed boat dataset.

Mound Q contained a structure, that Carter interpreted as a house with "one large rectangular room plus four or five smaller ones" (Carter 1954 a: 3). The rooms were joined by passageways floored with logs (Ibid). The boat data from this feature consists of five models (three kayaks and two umiaks), an ivory paddle tip, paddles, and 11 kayak frame fragments. All of the kayak fragments from this mound came from spatially compact location which consisted of sections 20, 21, and the intersection of 11, 19 and 18. Five kayak frame fragments excavated from section 19 originated from the same strata and likely represent the same boat. Paddle, deck beam and skin fragments excavated from the same depth of adjacent sections 18, 20 and 21 may also be related to this watercraft (See Appendix II, #88,89, 92-97, Fig.7.19). The site's artefact catalogue identifies unit 11 as "Burial cache" (38-41). Human remains found in this site's location included a skull and a bundle of hair, and were accompanied with a rich collection of objects, such as darts, harpoon points, ivory pins, ulu knives etc. (Ibid). Although the exact details of the burial are not recorded, the spatial positioning of kayak fragments provided in the field catalogue reveals that the kayak cluster was located in the immediate vicinity and slightly below this burial feature, and was likely associated with it (Ibid, Carter 1951:159-176). Judging from his schematic field drawing, the burial was positioned outside of the house's main living area, possibly in one of the side rooms adjacent to the entrance tunnel. Along with paddle and frame remains, the burial cache contained several examples of mouth pieces for seal floats, which were often used in hunting mammals from both kayaks and umiaks. Evidently for the people of Birnirk the afterlife journey was a maritime venture.

Mound H, the largest of all mounds, was documented with even less precision than Mound Q. Carter focused on this feature for two subsequent seasons, laying his L-shaped trench south and west of Ford's unit. The expedition field notes and photographs reveal that the mound contained plentiful timber that once constituted a number of structures, but no analysis or comprehensive mapping of these structures was undertaken during or after the field work. Artefacts' spatial positioning recorded in the expedition's field catalogue, however, allows for reconstruction of connections between individual artefacts.

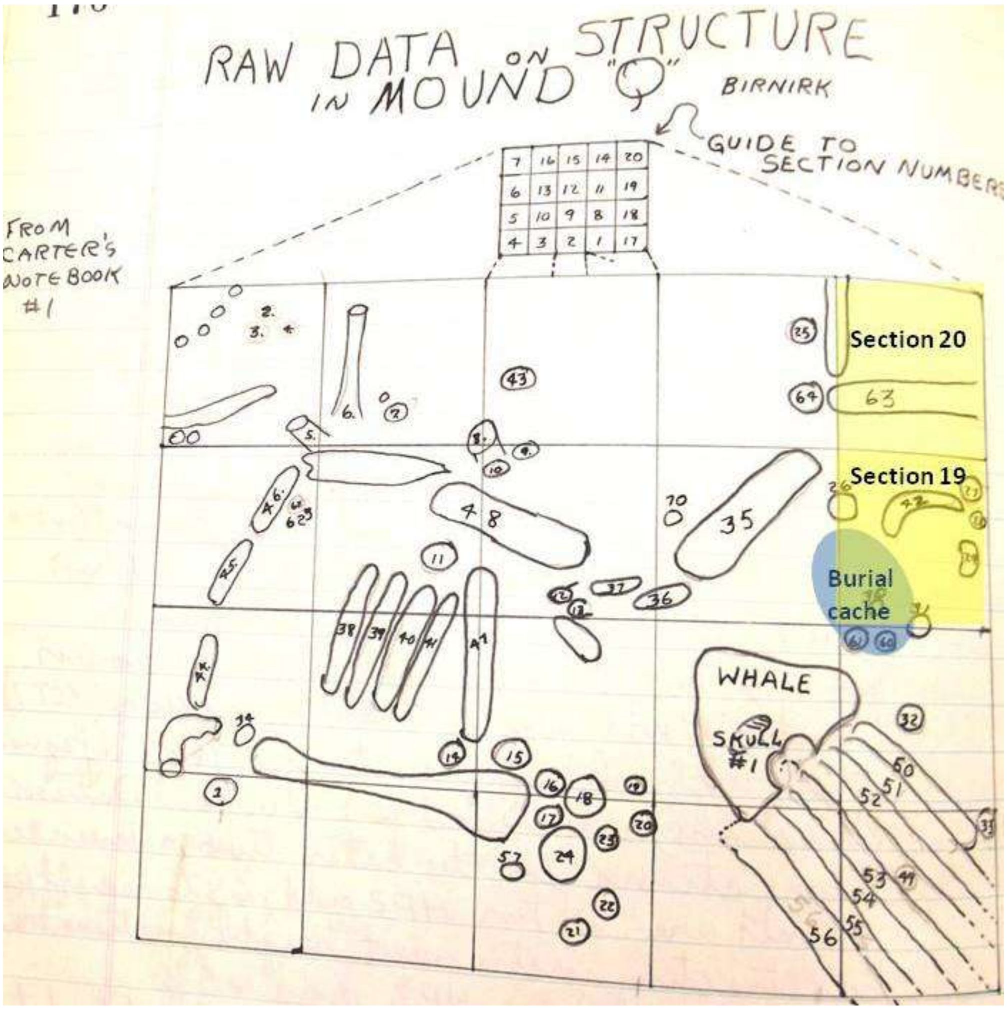


Fig.7.19. Sketch of Birnirk Mound Q from field catalogue. Not to scale. Sections 19, 20 and intersection of 11, 18 and 19 yielded cluster of kayak remains which may be associated with the burial cache (Birnirk field catalogue n.d.:176)

Carter divided excavation area into 44 square units, 182 by 182 cm each. Twelve of these units yielded total of 51 boat-related finds: 10 miniatures, one paddle fragment and 40 boat frame pieces (Fig.7.20). Most of the frame fragments were found in eight squares at the north-western portion of the trench at depths between 76.2 and 91.4 cm. from the surface. Fifteen of these artefacts located in two adjacent units are umiak frame fragments, including six bottom cross pieces, two side ribs and a thwart. All the cross pieces had a keel groove of the same dimensions carved into their underside, indicating that these frames were once a part of a single watercraft. Several other objects from these and adjacent units appear to also be associated with the same umiak frame. The Mound H dataset pertaining to the kayaks is equally informative and is discussed later in this chapter.

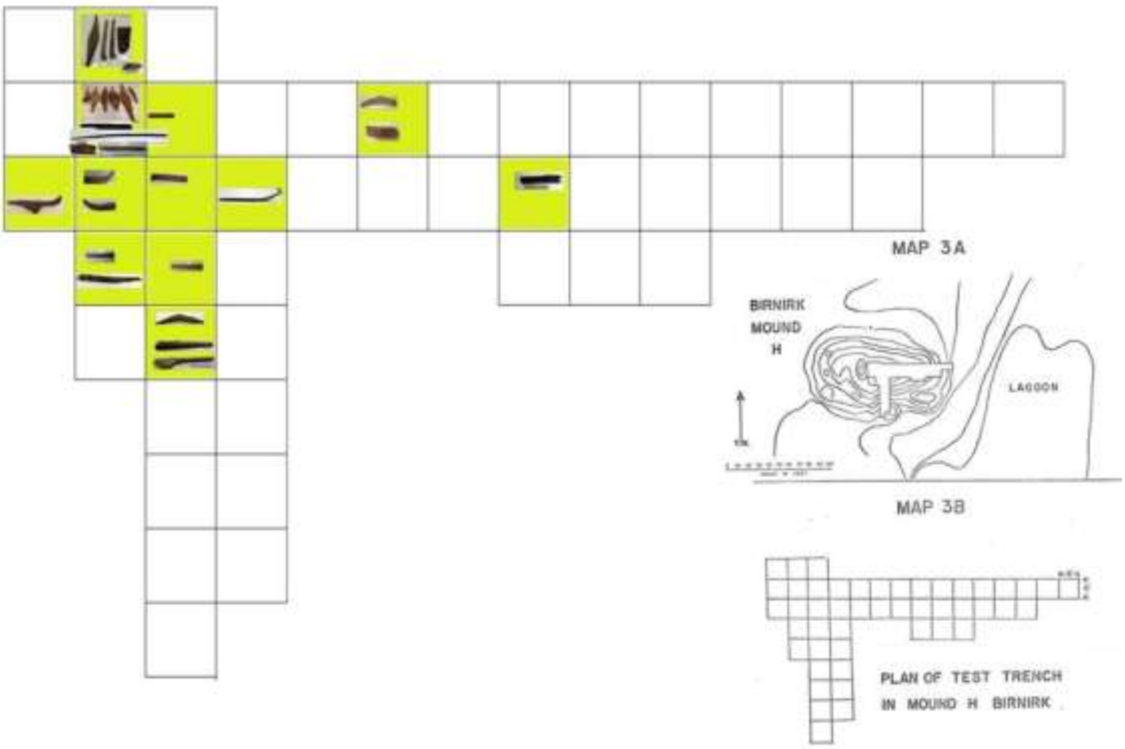


Fig.7.20. Mound H test trench excavated by W. Carter with boat artefact locations. Graphics by E. Anichtchenko.

Such accumulation of boat parts in comparatively contained area suggests that it was dedicated to boat manufacturing or storage. Given that frame fragments show the sign of use, the latter is more likely. The cluster may consequently represent the remains of boat rack initially positioned outside of the Mound H structure.

Overall, the review of boat artefacts spatial distribution implies that in terms of water transportation, people of Birnirk used both kayaks and umiaks, but kayaks were more numerous. Full scale kayak frame fragments were found in six out of 10 excavated mounds and if their presence is demonstrative of kayak ownership, about half of Birnirk households owned this type of watercraft. By contrast, umiak remains are found in only two mounds (A and H) and are associated with only three of the site's structures. Notably, these are the largest mounds with the most complex assemblage of structures, perhaps reflecting groups bound by close kin and social relations, which may in turn be exemplified by access to or joint ownership of an umiak. In nineteenth century Inupiaq societies such grouping was often centred on membership in a whaling crew. If this ethnographic analogy is applicable to the 10-12th century society, and if Mounds A and H are contemporaneous, we may assume that there were two umiak crews at Birnirk. Whaling may have been the focal point of these crews' organization as a social group, but given that umiaks had multiple functions besides whaling, it is possible that their main focus was on seafaring at large, i.e. maritime ventures that included not only seasonal subsistence, but long-distance trading voyages and war raids. Metal artefacts of presumed Asian origin found at the site suggest long distance exchange, possibly assisted by water transport (Carter 1958:2). In-situ positioning of umiak frames in only two confined locations may imply that participation in these ventures and membership in these groups was reserved for a selected few and may have been a marker of elite status. A more in-depth understanding of the social meanings of both umiaks and kayaks can be gained through examination of constructional details provided below.

7.7. Birnirk miniatures

Birnirk boat miniatures represent both decked (15 examples) and open boats (10 examples). This nearly equal representation contrasts with the ratio between full-scale kayaks and umiaks, in which kayaks are significantly more numerous. Miniature paddles are lacking, which is notably different from the St. Lawrence Island dataset discussed in Chapter 6.

With a few exceptions, such as A398865 and A399679 from the NMNH collection, Birnirk models are fashioned in a crude manner and rather indicate boats than depict their constructional details (Fig. 7.21.). Yet, reviewing these data, Ford inferred some design elements, such as that "in contrast to the recent Barrow kayaks, those made at Birnirk had flat decks and upturned bows" (1957:157). All of the miniatures examined by the author indeed had no sign of the raised cockpit characteristic of the ethnographic Point Barrow kayak, however, the bows' upturn appears insignificant. General observations that can be made on the basis of these data are limited to two notions: 1) that Birnirk kayaks were single-person craft (judging from carved cockpit openings); and 2) that with the exception of the model A399679, all miniatures represent sharp-ended boats. By contrast, A399679, one of the most expertly made of all Birnirk boat miniatures, resembles in its general outline transom-sterned kayak models of St. Lawrence Island (Fig.

7.22, see Fig.6.20 for comparison). As in the case of St. Lawrence Island kayaks, this difference in designs may, perhaps, reflect changes through time.

Fig.7.21. Kayak miniature from Birnirk Mound Q, UA BK-Q-2641.

Fig.7.22. Kayak miniature A399679 from Birnirk Mound J, NMNH. Photo by E. Anichtchenko.

Birnirk miniature kayaks range from 5 to 12 cm in length and are made of wood, bark and baleen, characteristically lacking ivory boat miniatures that are known from contemporaneous sites at St. Lawrence Island, Point Hope and the Chukotka Peninsula. None of the models is perforated, and thus was not likely worn or attached to full scale boat as an amulet. Ritualistic use cannot, however, be excluded, particularly in view of the above discussed placement in meat cellars, which are the unlikely place for child play. No kayaker figurines were found at Birnirk.

Miniature umiaks vary in length from 16.5 to 20 cm. Several examples indicate thwarts: two in the model NMNH A-399452 and three in the NMNH A-399184 (Fig. 7. 23). Since each thwart accommodates two paddlers, the models represent four- and six men umiaks respectively. Miniature UA BK-Q-2597 does not have thwarts, but features five parallel rows of paired holes indicating a 10-person crew. Most of the examples show a slender boat with a length to width ratio of 4:1, and sharp ends perhaps referencing joining gunwales, but two of the objects depict shorter and wider watercraft with a length to width ratio of 3:1 and rounded ends (BK-H-2548 and BK-L-287).

Fig.7.23. Umiak miniatures NMNH A-399184 and NMNH A-399452 from Birnirk site showing thwarts. Photo by E. Anichtchenko

Two Birnirk umiak models – NMNH A- 398865 and UA BK-H-566 have a small round opening in the centre reminiscent of the hole for a paddler figurine and thus potentially indicating small one person umiaks (Fig.7.24). The same feature, however, can be interpreted as a mast step, particularly in view of the lack of miniature kayaker figurines in the Birnirk dataset. Object NMNH A-399364 may also be evidence of the use of sail. The artefact is shaped like an umiak bottom cross timber with a circular opening in the middle (Fig.7.25). An identical design was used for stepping the mast of the Peary Land umiak – the oldest surviving example of complete circumpolar umiak, discovered in northern Greenland (See Chapter 8.3, Figure 8.18) .

Fig. 7.24. Umiak model NMNH A-398865, Birnirk, Mound C, Structure A (Appendix II, #1). Photo by E. Anichtchenko. Note an opening representing either a single paddler or mast step.

Fig.7.25. Artifact NMNH A-399364-0, possibly a miniature mast step. Birnirk, Mound A, Structure G (Appendix II, #124). Photo by E. Anichtchenko

As a group, miniatures show that boats played an important role in Birnirk society, affording both solo and group seafaring. The latter was carried on by crews of four to ten individuals. In terms of size and design, more than one variant of both kayaks and umiaks is implied, but whether this represents coexisting variety or chronological development is impossible to infer. The similarity between Birnirk and St. Lawrence transom-sterned kayak models suggest contact between the people of these places, which has also been archaeologically indicated by other material culture traits (See Chapters 2.5 and 7.3). This and other Birnirk long distance connections may have been afforded by the use of sail technology, but like other constructional elements suggested by miniatures, this observation requires further material evidence, some of which is available in full-scale boat dataset.

7.8. Birnirk umiak based on archaeological data

As it has been mentioned earlier, Birnirk umiak data is much more spatially compact than the kayak-related elements. Umiak fragments are found in only two mounds and 84% of this dataset umiak originated from mound H. Twenty-two of these artefacts were excavated from this mound's eight adjacent units that form a rectangular area of 9 by 3.6 m, with two thirds of the data sample coming from two neighbouring units (Fig.7.20).

Umiak frames were found at depths of 0.76 m to 0.9 m, and included six bottom cross pieces, two side ribs, two headboards, five thwart fragments, a "brace", and six longitudinal fragments, likely representing stringers. The artefacts' high concentration in a fairly compact area suggested that these are remains of a single boat. This observation is further confirmed by the analysis of six cross pieces, which Carter misidentified as "wood bow piece of umiak." Varying in length from 30.5 to 85.09 cm, all these fragments have a 9 cm wide groove in the middle of their underside running perpendicular to their length of the piece, which suggests that they were grooved to receive the same keel (Fig.7.26, Appendix II, #61, 65-68).

Three samples (two from the crosspieces BK-H-2862 and BK-H-3551, and one from a side rib BK-H-2589) were submitted for AMS radiometric dating analyses to assess if the frames belong to the same time period (Appendix IV). The dates produced by the analysis range between calibrated A.D 920 and 1020 with strong overlap circa 1010 AD, making the Birnirk watercraft the oldest umiak frame found to date in the entire circumpolar north. Given the old wood effect, the actual date of manufacturing of the boat would be later than wood's C14 age, but still likely within the 11^{th} century A.D. or early in the next century. The chronological placement on the verge of Thule eastbound migration provides a unique opportunity to understand the technology that afforded this mobility event, and to assess its connection with both contemporaneous and more recent examples of umiak technology in Arctic Alaska and Canada.

Although not a complete watercraft, the Birnirk umiak frame fragments contain a wealth of information about the boat's constructional details, including an opportunity to reconstruct some of its dimensions (Fig.7.27). The details of analytical process behind this reconstruction are presented in Appendix V. In a nut shell, Birnirk umiak was a flat-bottomed watercraft with total length of circa 800 cm and the height of circa 60-65 cm. The boat's maximum bottom breadth was at least 85.9 cm, and its maximum breadth at the gunwale was equal or exceeding 116 cm (Fig.7.27, Appendix V). For the comparison, contemporary umiaks of the region recorded by the author measured to 560-610 cm in length, 140-170 cm in beam and 50-55 cm in height (Anichtchenko 2012).

Fig.7.26. Umiak cross-pieces from Birnirk mount H: underside (left) and top (right) views. Photo by E. Anichtchenko.

Umiak's means of propulsion are represented by two artefacts: a paddle or oar blade fragment (BK-H-386) and wooden brace BK-H-1981 with a 2 cm opening in the middle (Fig.7.28). The latter resembles oarlock braces known from both ethnographic and archaeological records (compare with artefact UA1-1933-6647G from the Kukulik archaeological site on St. Lawrence Island, Fig.6.40). If indeed an element of oar attachment, this artefact would be the earliest evidence of oar usage in indigenous circumpolar technology and proof of its existence prior to contact with European cultures. However, the ethnographic record shows that similar braces were used for attaching floats and the objects that would be too bulky or messy for keeping inside of the boat, including killed prey. Yet another functional parallel is the mast-holding brace attached to the stem headboards of Greenlandic umiaks (Fig.7.29.), although the diameter of the opening in the Birnirk artefact seems to be too small for a mast.

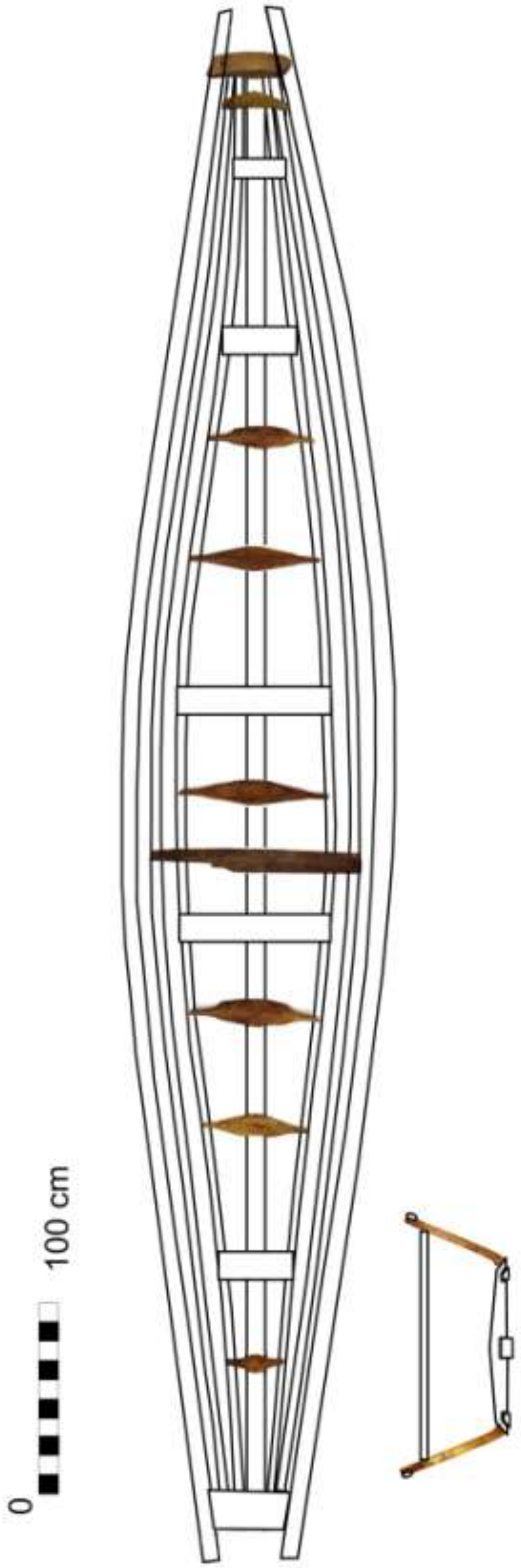


Fig. 7.27. Reconstruction of the Birnirk umiak. Graphics by E. Anichtchenko

Fig.7.28. Wooden brace from the Birnirk archaeological site. University of Alaska Museum of the North BK-H-1981. Photo by E. Anichtchenko

Fig.7.29. Mast brace, umiak model CMH IV-A-424, west coast of Greenland, circa 1961. Photo by E. Anichtchenko

In general, the Birnirk umiak appears to be longer and more slender than contemporary whaling boats of the Chukchi Sea region, resembling proportions of the Peary Land umiak found in Northern Greenland (See Chapter 8.3, Fig.8.15.). The Birnirk umiak crosspieces grooved to fit over the keel are also notably different from Chukchi Sea ethnographic boats, in which these frame members lay flat on top of the keel. Umiak floors from Cape Espenberg, another Chukchi Sea site contemporaneous with Birnirk, are also stepped for the keel (Alix 2013:n.p.), but otherwise this contractual feature is unusual for Alaskan ethnographic and archaeological records. Interestingly, stepped bottom crosspieces are a trademark of East Canadian and Greenlandic umiaks (Petersen1986: 126, Fig. 7.30.), a connection which may reflect transfer of boat technology in the process of the Thule migration.

Fig.7.30. Detail of the bottom of umiak model CMH IV-X-836,
Labrador, circa 1900. Note how cross-pieces are groved to fit over the keel.
Photo by E. Anichtchenko.

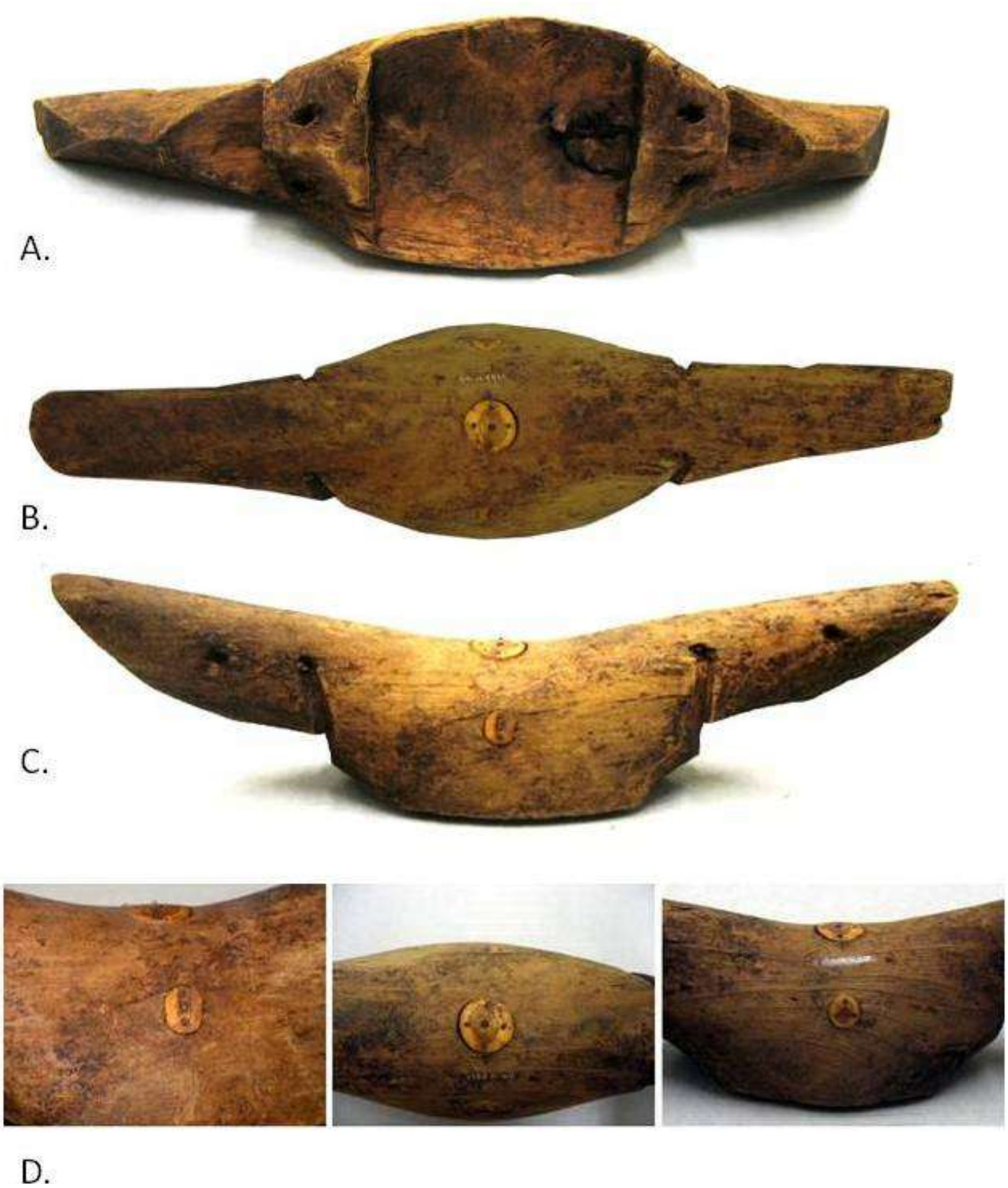


Fig.7.31. Birnirk umiak bottom crosspiece UA BK-H-2862. Photo by E. Anichtchenko.

Some features of Birnirk umiak frame fragments lack immediate functional meaning, implying a decorative or evNoteen ritualistic significance. The shortest of the bottom cross pieces, BK-H-2862, for instance, features three ivory inlays inserted into the centre of its top and side surfaces (Fig.7.31). The inlays are small ivory plates held in place by ivory pins, which are arranged in three simple but distinctly different geometric designs. The inlay in the top has five pins placed in a diamond design with one pin in the centre. One of the side inlays is decorated with four pins arranged as a triangle, the other features three pins inserted in a vertical line (Fig.7.31 D).

Fig.7.32. Ivory inlays in a Yup'ik umiak model. Private collection, photos courtesy of Walter Van Horn. Note how the combination of inlays and painted design on the stern headboard resemble faces of Grenlandic visors in Fig. 7.33 below.

Fig.7.33. Greenlandic kayak visors with ivory inlays on display at the Danish National Museum. Photo by E. Anichtchenko

Ivory inlays are rare at Birnirk, and no comparative samples were identified in the site's dataset. In terms of broader analogies, the pin patterns are reminiscent of dot motif, which is one of the most widely used and chronologically resilient designs in Arctic

North America and Greenland. Dots arranged in different configurations graced Arctic tools and jewellery from at least the beginning of the current era to ethnographic times. Use of ivory fasteners and inlays in boat construction and embellishment is attested by the walrus task pins of the Peary Land umiak, and by some ethnographic models, such as Yup'ik umiak model from a private collection (Fig.7. 32). Elaborate ivory and bone decorations were attached to wooden visors worn by Greenlandic indigenous kayakers to protect their eyes from glare and sea spray (Fig. 7. 33).

While the particular form of decorative treatment featured by the Birnirk umiak cross piece has not been previously recorded on boat frames, the placement is consistent with the practice of embellishing both the stem and the stern of umiaks with special symbols and charms (See Chapter 5.5 and Fig. 7.6.). Examples of ritualistic embellishment of umiak bottom cross pieces are rare, but known from two other Alaskan sites - Tigara in Point Hope and Little Diomede Island in Bering Strait - and from the collection assembled by Daniel Newman at Cape Prince Wales circa 1910-1921 (Alaska State Museum II-A297). In all three cases it takes the shape of a whale figurine remarkably similar to the carvings on Inupiaq ethnographic umiaks' captain's seats (Fig.7.34, compare with Fig.5.11.). The Little Diomede artefact was sampled for C14 dating and yielded two ranges: Cal AD 1440 to 1520 (Cal BP 510 to 430) and Cal AD 1595 to 1620 (Cal BP 355 to 330) (Beta 409144, Appendix IV). The Tigara archaeological site dates to approximately the same period (Larsen and Rainey 1948).

Fig.7.34. Embelished umiak cross timbers. A: from Tigara archaeological site, Point Hope, H-36-97, University of Alaska Museum of the North; B: Little Diomede, excavated by locals from an unknown site and purchased by Collins, H-36-97, National Museum of Natural History. Photo by E. Anichtchenko.

The whale's eyes and spout on the Little Diomede cross-beam are rendered in small pieces of obsidian, which was sourced to Batza Tena ridge on the Koyukuk River, located over 800 km southeast from Little Diomede Island. The actual route traveled by the obsidian to become a part of this Bering Strait island umiak frame was both less direct and longer, down or along river corridors and across the sea, traversing indigenous national boundaries and changing hands (Houlette 2009). This long-distance journey likely added to the value of the exotic material, and perhaps influenced its incorporation into the one of the most spiritually embedded part of the umiak. Along with evoking powers and attributes of the whale at sea, the cross-piece connected the boat with distant and exotic locations on land, binding both within the body of the boat.

The oval opening on the underside of both Tigara and Little Diomede cross-pieces may have also contained special stone amulets (Fig.7.34). Similar shallow notches are carved into the centre of the keel groove of the Birnirk cross pieces BK-H-3057, 3058 and 3059 (Fig.7.26., 7.35.), and into the surfaces of some ethnographic captain's seats (7.36). Several of these artefacts retain their original inserts - a tear-drop shaped beach pebble (Fig.7.34 B). A short description accompanying captain's seat from the Anchorage Museum Arthur Eide collection states that when the captain or pilot sat upon this seat "the whale spirit was supposed to direct him thru the rocks and help him steer thru the water in order to capture a whale" (Arthur Eide Collection 55.3.42). Some stones were also believed to possess special powers and attributes and may have been selected by shamans and captains as charms. In any case, this ethnographic parallel strongly suggests that the openings in other captain's seats and cross pieces may have also contained a rock or pebble of some special significance.

Reviewed together with ethnographic examples, Birnirk, Tigara and Little Diomede cross-pieces suggest a continuum of boat ritualistic practices on a broad geographic and chronological scale. Evidently, the tradition of embellishing umiak bottom crosspieces was maintained for over 800 years in the region that included the entire Alaskan coast of Chukchi Sea and northern Bering Strait. Perhaps in response to the growing importance of subsistence whaling at some point prior to AD 1600 the non-figurative imagery of earlier examples (Birnirk) evolved into whale representation, which later was transferred to the captain's seat, confirming the *umialiq*'s special relationship with this animal and highlighting his role as a leader in maritime pursuits. Birnirk's cross-piece's lack of immediately recognizable references to whaling may indicate that the main purpose of the boat was not yet closely focused on this subsistence practice. Whale imagery is in general infrequent in the Birnirk site's figurative art assembly, which is dominated by seal representations.

Fig.7.35.Birnirk cross piece UA BK-H-3057. Photo by E. Anichtchenko.
Note the opening in the centre of the keel groove. Two pairs of holes on each side of the groove are lashing holes.

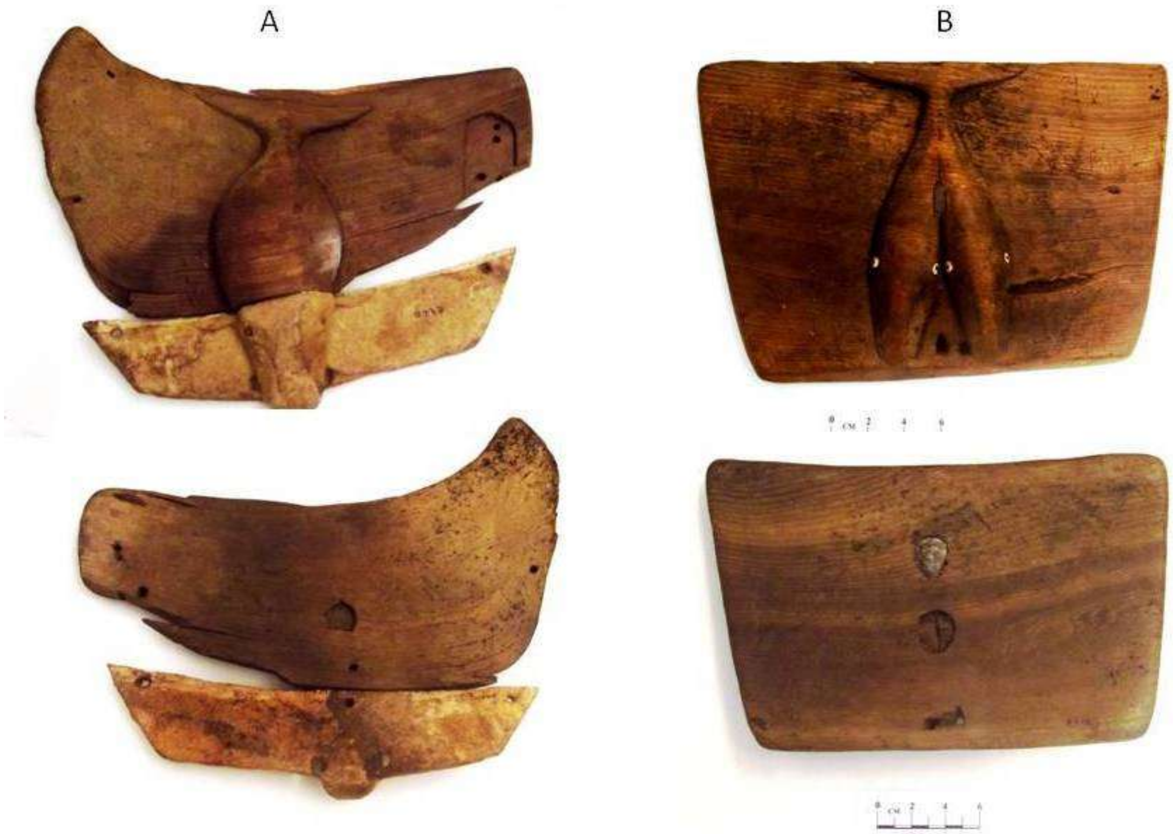


Fig. 7.36. Umiak captain's seats from the Alaska State Museum collection with underside whale carvings and pebbles inserted into the top surface: A. II-A374, King Island, 1910-1921; B. II-A373**,** Cape Prince of Wales, circa 1910-1921. Photo by E. Anichtchenko.

Mound A, the second location at the Birnirk where umiak fragments were found, contained only four artefacts. Notably, one of them is a crosspiece of the same design as Mound H frames, but unfinished. Two areas may thus correspond with different aspects of umiak use: manufacturing (in Mound A) and storage (in Mound H).

In summary, some constructional details of umiaks used at the Birnirk circa one thousand years ago demonstrate affinity with both contemporaneous boat technology of Chukchi Sea (as evident from the comparison with the Cape Espenberg dataset) and ethnographic umiaks of Canada. At the same time, the joinery and some other elements of frame design of Birnirk umiak are notably different from ethnographic Chukchi Sea boats, indicating that boat construction has changed through time, although perhaps not as drastically as in the late 19^{th} – early 20^{th} century.

The Birnirk umiak was ritualistically embedded in the very process of the vessel's manufacturing, which signals the belief that the spiritual essence of the boat was intricately linked with its functions and performance. Like many constructional features of watercraft, this concept was both resilient and changeable. The material record of the Chukchi Sea littoral illustrates nearly a millennium of evolution reflected in umiaks' cross pieces and captain's seats. Interestingly, despite its impressive time span, this tradition was evidently restricted to the Chukchi Sea region. Neither whale carvings on captain's seats nor embellished cross pieces are currently known from the Canadian Arctic or regions south of Bering Strait, although boat agency was also recognized and ritualistically acknowledged in these regions in a number of different ways.

Evidence of sail and oar use may be inferred, although is not conclusive. The presence of either sail or oar technology, if confirmed, could be considered a technological trait that assisted the remarkable speed with which Thule people moved across the Arctic margin of North America.

7.9. Birnirk kayaks based on archaeological data

Compared to full scale umiak fragments, remains of Birnirk kayak frames are both more frequent and have wider on-site distribution. Two locations exhibited particularly high and meaningful kayak frames concentrations: the north-west corner of mound H and the house excavated in mound Q. As mentioned earlier, the Mound H cluster likely represents a collapsed boat rack. Similarly to the umiak frames fragments found here, kayak remains likely refer to a single watercraft, represented by several gunwale fragments.

The Mound Q kayak frame was likely deposited as a part of burial (see Chapter 7.6) and is represented by fragments of ribs, deck beams, a gunwale, a paddle and ivory paddle tip. In addition to presenting one of the earliest examples of skin boat incorporation into the burial practices, the Mound Q cluster elucidates some constructional details of this watercraft. Two fragments of the same kayak rib (BK-Q-838, BK-Q-845) allow for reconstruction of the boat's lower hull (fig.7.37). The complete rib had a trapezoid shape with flared but nearly straight sides and a slightly rounded bottom. The hull cross section represented by this rib is 12.5 cm deep and 37 cm wide. Given that this depth is not adequate for accommodating a kayaker, these proportions allow for two observations: 1) that this rib was positioned not at the boat's widest point, but towards one of its ends; and 2) that the kayak it belonged to had a rocker bottom. Tooth marks at the turn of the bilge attest that bending was achieved by chewing on the wood to partially break and soften the fibres, the practice that in some Arctic regions persisted until the mid 20th century (Fienup-Riordan 2007). Bevelled ends and presence of lashing holes show that the rib was mortised into the gunwales and further secured by lashing. Rib fragment BK-Q-837, found in the proximity of BK-Q-838, BK-Q-845 was fashioned in the same manner.

Fig. 7.37. Kayak rib from Birnirk Mound Q reconstructed from two fragments: UA BK-Q-8383 and BK-Q-845. Photo by E. Anichtchenko

An example of a complete deck cross beam is provided by artefact BK-Q-740 (Fig.7.38). Measuring to 45 cm in length and 4 cm in width, it is a slightly arched piece carved to fit into kayak gunwale mortises. The arch is only 2 cm high, suggesting a nearly flat deck with a maximum breadth of 45 cm or greater. Flat or nearly flat deck construction is also suggested by similar artefacts from mounds A (NMNH A399504, A399365, A399365, A398930), C (NMNH A398886), and Q (BK-Q-851). These artefacts range between 10 to 22 cm in length and 1.6-3 cm in width, and have bevelled ends shaped to fit into the gunwales' mortises.

Fig.7.38. Birnirk kayak deck cross piece UA BK-Q-740 from Mound Q. Photo by E. Anichtchenko.

Artefact BK-Q-846 from Mound Q further aids our understanding of Birnirk kayak construction (Fig.7.39). This 58 cm long frame member with an upturned pointed end is a kayak gunwale fragment. The artefact shows an asymmetric treatment of vertical surfaces: one side has an angled ridge and slightly rounded surface, while the other is cut flat, as if intended to be joined to another element. Although the overall shape is reminiscent of the Miyowagh deck rider discussed in chapter 6, the flush cut supports the notion that this was a gunwale. Traditionally, a pair of gunwales was made by longitudinally splitting a single driftwood timber in order to produce two frames of equal weight, length and density. This would insure that the kayak was well balanced and equally flexible on both sides (Wells 2012). The inward facing flat surface provides a good surface for bringing the ends together at the boat's stem and stern.

The 3.5 cm long, 0.5 cm wide mortise hole on the underside of the BK-Q-846 "foot" illustrates how it was attached to the bottom portion of the hull. Fragments of similar design were found in other Birnirk locations, such as Mound D, House C in Mound A and Mound H. The end of gunwale BK-H-3765 features a much sharper upturn and may represent a stern grip. This and other gunwale fragments from Mound H were also apparently attached to the lower hull members via mortise and tennon joints, but unlike the above discussed frame piece, they were tennoned, not mortised (Fig.7.40). In either case, this construction method is different from ethnographic Chukchi Sea kayaks in which ends are simply lashed to each other and to lower frame members.

Fig.7.39. Kayak gunwale UA BK-Q-846 from Birnirk Mound Q. Photo by E. Anichtchenko

Fig.7.40. Examples of Birnirk gunwale fragments. A. UA BK-H-1985; B. UA BK-H-3765; C. NMNH A-399081; D. NMNH A-399001. Photos by E. Anichtchenko.

Several Birnirk artefacts, including NMNH A399675-0, NMNH A399090-0, BK-H-2740, BK-H-1189, and BK-Q-1061, appear to represent the same boat frame element (Fig.7.41). These are straight wooden frame members with circular or oval profiles of about 2 cm in diameter, and an arching cut at both ends seemingly designed to fit over rounded scantlings. This cut and lashing hole suggest placement between two frame elements. Ranging in length between 15 and 27 cm, these artefacts may have one of three possible functional applications: 1) cockpit stanchions; 2) deck crosspieces arranged in pairs to support raised deck; and 3) deck stanchions similar to those found in

Chukchi kayaks (Zimmerly 2000 a:10). Notably, the first two options suggest raised cockpits or/and at least partially ridged decks, both of which are consistent with ethnographic Chukchi Sea kayaks.

Fig.7.41. Kayak frame stanchion UA BK-H-1189.
Photo by E. Anichtchenko.

Cumulatively, archaeological finds pertaining to the Birnirk kayak reveal a watercraft with bent ribs, flared sides, rocker bottom, upturned ends and deck that combined flat and ridged elements. The ribs were inserted into gunwales at a distance of 7 to 11 cm and the joint was further secured with lashing. Although the incomplete nature of the data does not allow for the definite reconstruction of vessel dimensions, it appears that the Birnirk kayak was a comparatively shallow and narrow watercraft with projected depth to sheer of 18-20 cm and beam of at least 45 cm. No data is available for the reconstruction of cockpit size, dimensions and positioning. The bottom elements of stem and stern are also lacking, leaving some room for interpreting how the front and the back of the kayak looked.

In sum, the Birnirk kayak is both similar and different to ethnographic kayaks from the eastern Chukchi Sea. The similarities include overall proportions (shallow draft and comparatively narrow beam), flat deck with possible ridged section in front of the cockpit and pointed upturned ends. At the same time, the Birnirk kayaks had differently shaped gunwales, and possibly more vertical sterns with sharply upturned ends, which may have born some resemblance with stem and stern horns of kayaks of the Eastern American Arctic. In contrast with Birnirk umiak, kayak frames in its extant state lack any visible markers of ritualistic treatment. However, the association with funerary practices is an important indicator of boat's significance both during the owners' lifetime and his afterlife journey.

Figure 7.42. Reconstruction of Birnirk kayak. Graphics by E. Anichtchenko.

7.10. Chukchi Sea skin boat tradition: between Atlantic and Pacific coasts

The fairly wide distribution of boat artefacts (eight of 10 excavated features) attests that boats played an important role in Birnirk society. Both kayaks and umiaks were utilized, but kayaks were more numerous and widespread. 70% of all investigated features contained kayak remains. In terms of more direct association with households, five out of nine excavated houses yielded kayak frames, suggesting that over half of Birnirk households owned or used these boats. Abundance of seal and waterfowl remains at the site attest to active kayak subsistence hunting, which included both summer open water forays and hunting off pack ice and in leads during the winter. Less lucrative in terms of return volume of meat and raw material than umiak whaling or walrus hunting, it nevertheless was a reliable year-round strategy for obtaining food, fuel and hides for clothing and shelter.

Nineteenth and twentieth century sources report that the range of kayaking trips could be quite expansive. The watercraft could carry tools, weapons and implements necessary for camping and provide a wind break for improvised shelter. Although not used in amphibious warfare, kayaks were scouting watercraft dispatched to boats and ships approaching their home shores to investigate the intentions of newcomers. More numerous than umiaks, kayaks were more actively engaged in seafaring, and it is possible and even likely that new maritime routes along the coasts of Chukchi Sea and beyond, including the Thule expansion, were first explored by indigenous mariners paddling these vessels. The information flow established in this manner could then inspire larger expeditions and expansion. The importance of these boats for the inhabitants of the Birnirk settlement, and their connection with life and death on this Arctic coast is evident from the burial in Mound Q, which included a kayak frame.

Both ethnographic and archaeological examples of Chukchi Sea kayaks demonstrate that they resembled ethnographically known Canadian and Greenlandic kayaks, while displaying noticeable differences from kayaks of other Alaskan regions. Given the geographic span and the variety of environmental zones along these coasts, this consistency cannot be explained by adaptation to similar conditions, signalling instead direct transfer of knowledge between the Chukchi Sea and Atlantic Arctic, which likely occurred during the Thule expansion. Despite their focus on whaling, Thule pioneers would heavily depend on sealing for meeting their subsistence needs, particularly while exploring new shores along the gap between Pacific and Atlantic bowhead ranges (See Chapter 2.3). Kayaks thus constituted one of the essential tools of the migration in both charting its course and supporting daily logistics.

By contrast with kayaks, umiak parts were found only in two of the site's largest mounds. The umiaks' exclusive association with these structurally – and likely socially – complex units suggests a special relationship between these boats and heightened social complexity, which was perhaps connected with the organization of boat's crew. This complexity may have been directly linked to whaling or not, but it indicates the presence of social hierarchy and leadership, specifically in the context of maritime ventures. The low frequency of this boat type may, in fact, mean that only a few individuals could achieve this social level. This again is reminiscent of the status of the *umialiq*, but could also be related to different maritime ventures, such as long distance exchange evident from the cross-continental distribution of Birnirk culture. Participation in these exchanges was likely a prestigious and specialised activity reserved for a few particularly skilled or/and privileged members of the society. Long-distance umiak travel may have been aided by use of sails and oars, although neither is definitively proven. Similarly to the Vikings' adaptation of sail cited earlier in this chapter, this technological change may have played a key role in Thule migration.

Constructional features of Birnirk umiaks also have parallels with boats of the Canadian Arctic and Greenland, hinting once again at the possibility of technological transmission via the Thule migration. At the same time, the ritualistic embellishment of the Birnirk umiak frame is consistent with the uninterrupted tradition unique to the Chukchi Sea region. As a body of evidence the Birnirk umiak tradition, thus, contains technological and social scripts linking it with both the Atlantic and Pacific coasts of North America and attesting to the role seafaring played in the region's culture history and connectivity.

Chapter 8. Central Canadian Arctic case study: Qariaraqyuk

8.1. Eastern extension: Central Canadian Arctic

This dissertation's third and final case study is Qariaraqyuk archaeological site located on Somerset Island in the Central Canadian Arctic Archipelago (Fig. 8.1). Over 2,000 kilometer lies between Qariaraqyuk and Birnirk, yet the sites are connected through one of the major mobility events of human history in the Arctic, the Thule migration. Like Birnirk, Qariaraqyuk was a permanent, "winter" village with a sizable population. Approximately 350 individuals lived here at the peak of occupation between AD 1200 and 1400, which makes it the largest Classic Thule winter village in the Eastern Arctic (Whitridge 1999:v). Large quantities of baleen and whaling gear along with remains of butchered whales, indicate that Qariaraqyuk's subsistence was focused on communal whaling with umiak crews. At its demographic peak the settlement may have had between nine and 14 whaling crews (Ibid). Despite this, the boat remains comprise a very small part of recovered material culture. Only 31 boat artefacts were excavated from the site, and most of them are recycled and reduced to small fragments of their initial shape and size.

One of the major reasons for such small a sample size is the local scarcity of driftwood (McCLintock 1860:212; Dyke et al. 1997). Located in treeless tundra in a narrow inlet far north of the tree line, the region has always lacked easily accessible sources of wood. In ethnographic times, Netsilik Inuits occupying the southern tip of Somerset Island and the Boothia Peninsula, believed that driftwood only grew on the bottom of the open ocean like seaweed and was uprooted and carried to the surface during storms (Rasmussen 1931:145). The Netsilik made trips as far as to Melbourne Island (a straight-line distance of approximately 500 kilometers) to barter for driftwood with Copper Inuits (Jenness 1922:49, 150; Rasmussen 1931:27,481). Such journeys came at the price of summer hunting with no guaranteed results (Ibid).

Fig.8.1. Location of the Qariaraqyuk site.

The scarcity of wood had a significant effect on boat construction: a single kayak gunwale strake was, in some cases, made of up to half a dozen short pieces of driftwood scarphed together (Arima 1987:42). Additionally, it increased both the value of wood and the rate at which it was recycled into progressively smaller artefacts. Old kayak and umiak frames unsuitable for their initial purpose were a valuable source of material for handles, shafts, wick trimmers and other tools, significantly reducing the dataset of recognizable boat parts (Fig.8.2.).

As a result, the information presented by the Qariaraqyuk assemblage is limited, particularly in comparison with the Alaskan cases discussed above. It does not, for example, offer the possibility to review constructional details of watercraft. Yet, in the context of Canadian High Arctic boat artefacts, this sample size is not unusual and any attempt to understand maritime mobility in this region is challenged by similarly limited data. At the same time, the condensed chronology of the site’s occupation accentuated by the recent excavation specifically focused on study of contemporaneous features, allows a focus on a chronologically controlled horizon, which is often challenging in sites with longer occupational histories excavated at the dawn of Arctic archaeology.

Fig.8.2. Wooden artifacts from the Qariaraqyuk site. Museum of Canadian History, Ottawa, Canada, photo by E. Anichtchenko

With minimal constructional information about boats proper, understanding patterns and meanings of maritime mobility depends on the analysis of spatial and inferred social contexts of extant boat artefacts. This approach is particularly appropriate for this case study since the 1991 excavation of Qariaraqyuk by Peter Whitridge was guided by research questions directed towards understanding the construction of social differences of Arctic Thule societies. Thus, this chapter is focused on the social meaning of the boats and the relationship between maritime mobility and the construction of social differences in Canadian/Eastern Thule society.

Due to the limited access to wood, boat ownership likely had an additional value as a marker of high social status. Correlating frequency and composition of boat dataset with the analysis of social standing of particular households would help to understand which segment of society was engaged in seafaring. Umiak ownership, for instance, would appear to be restricted to few powerful individuals, most likely whaling captains. Whaling, however, was not the only source of power and prestige in Thule society. Thule people were avid traders operating in a geographically expansive network. The Qariaraqyuk archaeological assembly contains an impressive array of exotic materials ranging from Norse goods and meteoritic iron from Greenland to amber from the Mackenzie River delta and Asian iron (Fig.8.3.). Given the region's geography, much of this trade was carried by boats, most likely umiaks during the open water period, which in this part of the Arctic coincides with whaling season. Were such expeditions also lead by whaling captains, or were they carried on by different individuals who may have gained high social status through such voyages?

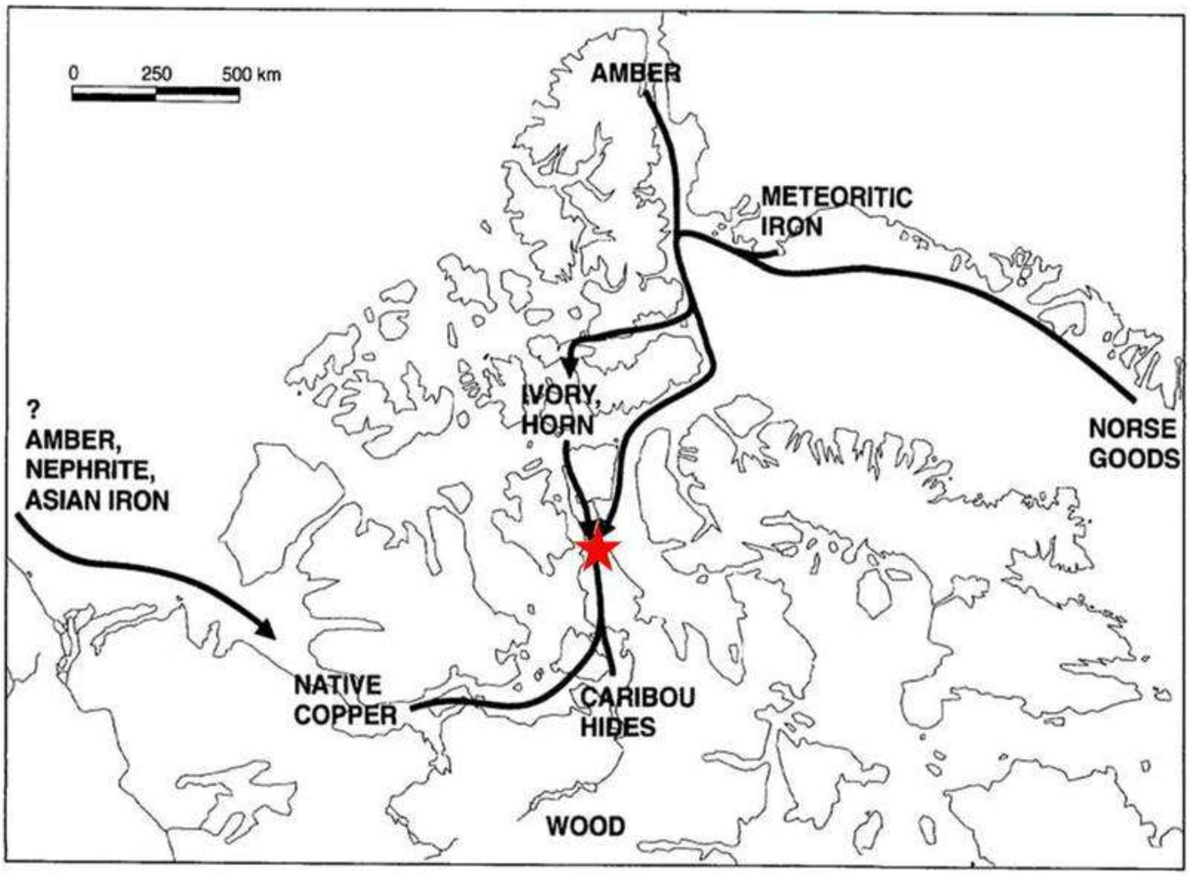


Fig.8.3. Probable sources of Qariaraqyuk trade goods. (Whitridge 1999:256)

The small boat data sample size raises an additional question of the extent to which maritime mobility was important for the Thule population of the Canadian Arctic Archipelago in general, and the people of Qariaraqyuk in particular. Both pre-Thule cultures and more recent ethnographic groups of the region were notably more focused on land and ice travel than contemporaneous groups of coastal Alaska. Remains of kayaks, for instance, are rare in pre-Thule Dorset sites and umiaks are absent altogether, while sled fragments and miniatures are fairly typical and some evidence of the use of skies has been located in a Dorset house at the Nunguvik site, North Baffin Island (Mary-Rousseliere 1979).

In contrast with the episodic appearance of kayaks, sleds and land/ice voyages are prominently featured in the tales of Central Canadian Inuits. Sleds bring migrants to the new homeland (Boas 1901: 192-193; 1964:212), carry the Man of the Moon to earth when he descends to protect abused orphans (Boas 1964:191), and can even be seen in one of the constellations (Boas 1901:174). All of this is in marked contrast with tales of coastal Alaska, in which the leading role in both earthly and celestial mobility belongs to boats (see chapter 6.2). Was, then, the environment of the High Canadian Arctic inherently limiting for maritime mobility? This is, after all, the region that for half a millennium choked European attempts to locate the Northwest Passage. Does the smaller data sample size indicate not only the scarcity of wood, but the decline of seafaring? A juxtaposition of the in-depth analysis of Qariaraqyuk's social make-up and spatial patterns undertaken by Whitridge with a specific focus on boat data may help to answer these questions.

8.2. Ethnographic horizon

Unlike Kukulik and Birnirk, Qariaraqyuk is not directly tied to a modern or ethnographic indigenous community, which poses the question of the most relevant ethnographic proxy for the site's material culture. The two nearest contemporary villages- Resolute (290 km to the north) and Taloyoak (or Spence Bay, 275 km to the south) are recent settlements, founded in the late 1940s. Thule groups abandoned most of the Canadian Arctic archipelago between 1400 and 1500 AD (Jordan 1984), and for nearly 300 years Somerset Island was visited only episodically (Ross 1850; Kennedy 1853).

Indigenous interest in the area was activated during the second half of the century largely because of European exploration and ensuing shipwrecks. In 1825 William E. Parry lost his ship HMS *Fury* at what is today know as Fury Point on the east coast of Somerset Island. Seven years later John Ross had to abandon his side-wheel steamer *Victory* near Victoria Harbor at the east coast of Boothia Peninsula, and in 1845 John Franklin's ships found their final resting place near King William Island west of Boothia Peninsula. For Inuits, European ships were a valuable source of wood and iron (Van Stone 1962: 5-7). The Hudson Bay Company trading post Fort Ross, established later at Spence Bay, provided an additional attraction.

In terms of historically recorded ethnographic make-up, Qariaraqyuk falls between two neighboring Inuit groups – the southern tip of Somerset Island is the traditional land of the Netsilik people, while the island's western shore is within range of the Iglulik nation's homeland (Fig. 8.4.). Netsilik and Iglulik nations belong to the Central Inuit group, which also includes Caribou, Baffinland, and Copper Inuit. For both Netsilik and Iglulik, Somerset Island was at the margin of the exploited territory.

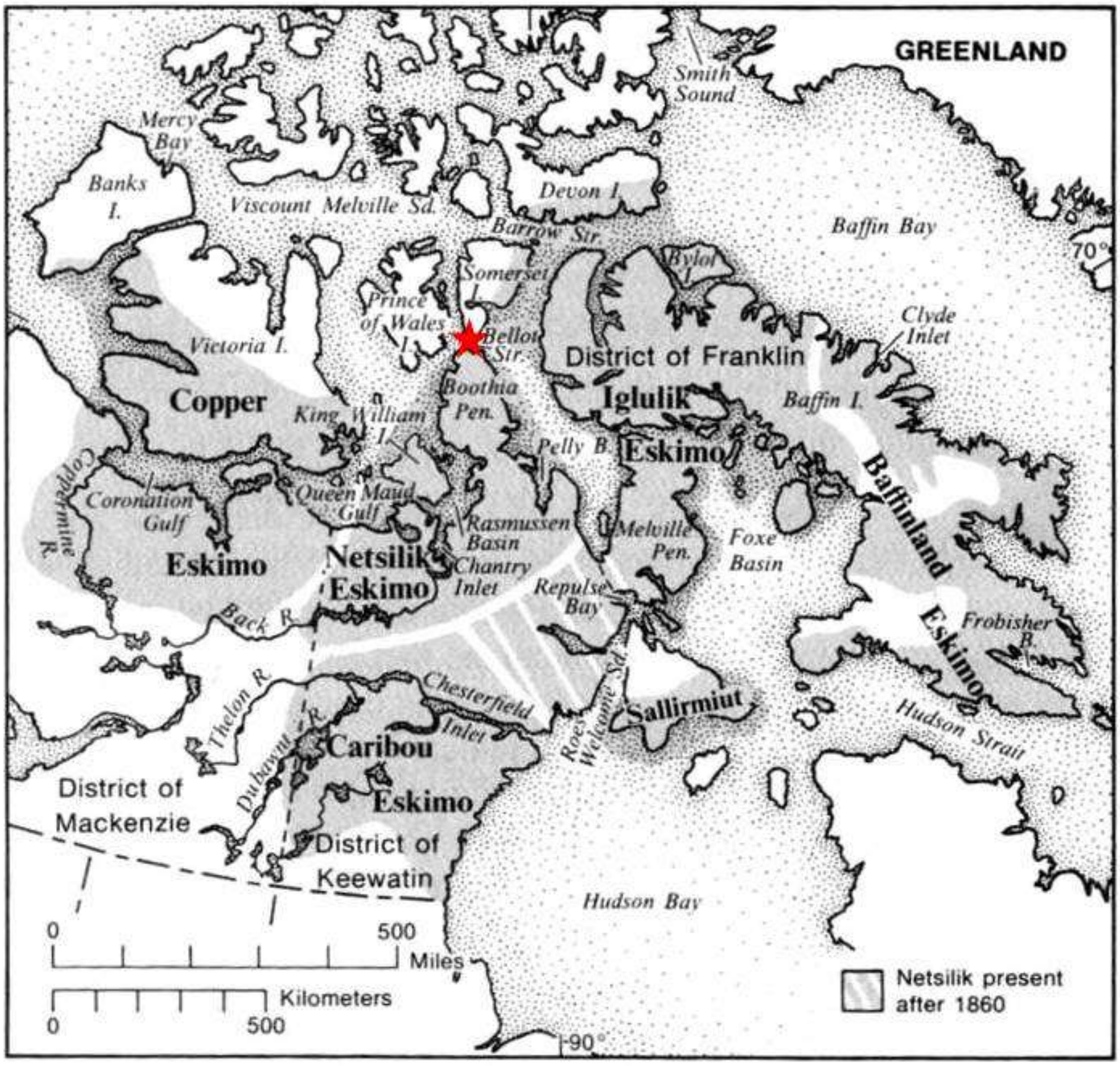


Fig.8.4. Ethnographic map of Eastern Canadian Arctic with Qariaraqyuk site's location (Sturtevant 1984:391)

Unlike their Thule ancestors, neither Iglulik nor Netsilik Inuit had permanent winter villages on shore. Most of the winter months were spent on sea ice where people engaged in breathing-hole sealing and floe edge hunting. Hunting bands – usually a group of people bound by extended family ties – lived in houses constructed of snow blocks.

Both groups spent summers in temporary camps either in-land, hunting caribous and fishing. During this period, small highly mobile groups of hunters lived in caribou hide tents, and, in the case of the Iglulik people, in temporary semi-subterranean houses roofed with hides. Netsilik people did not pursue marine mammals on the open water (Balikci 1970:43), while the Iglulik harvested walrus and even Greenland whales, which they hunted with seal skin-covered kayaks. In contrast with Thule culture, whaling did not constitute the main subsistence or cultural focus for the Iglulik, but rather provided a segment of highly diversified group of food staples.

The shift in subsistence and consequently social patterns in the Canadian Arctic is attributed mainly to climate change. At the beginning of the 15th century AD a new, colder climatic episode replaced the warmer period that afforded Thule migration (See chapter 2.4). Increased sea ice affected marine mammal migration, reducing the frequency of whales in the Central Canadian Archipelago and setting in motion many changes for groups settled in this region. Diminished access to maritime resources and shortened periods of ice-free water affected the social ecology of the Eastern Arctic to such a degree, that some researchers question whether Neo-Inuit ethnographic data is a useful proxy for understanding Eastern Thule societies (Friesen 2012). Instead, the material culture of Canadian Thule sites is often interpreted in comparison with North Alaskan ethnographic societies, and Peter Whitridge's analysis of Qariaraqyuk is an example of this approach. Yet, the watercraft of ethnographic groups of Central Canadian Arctic have ancestral roots in the seafaring technology of Eastern Thule and can inform archaeological inquiry.

Ethnographically known Iglulik and Netsilik kayaks are sleek shallow-draft boats with flat decks, asymmetrically raised cockpits, and long thin horn-like extensions projecting from the boat's stern and stem, which served as handholds during vessel launching and retrieval (Arima 1987:53 and 1994, Fig.8.5, 8.6.). Iglulik kayak's horns are more pronounced than those of Netsilik watercraft. While most of Iglulik and Netsilik kayaks constructional characteristics (such as flat deck, shallow draft and flat bottom) are common for all Arctic coast kayaks from Chukchi Sea to the Canadian Arctic and Greenland, the only other examples of stem and stern horns in the Canadian Arctic are the Mackenzie and Caribou Inuit kayaks. By comparison, the stern hand grip extension is comparatively common feature of Alaskan kayaks, including Bering Sea, Hooper Bay, and Norton Sound variants. Upturned gunwale and deck rider fragments from Birnirk and St.

Lawrence Island archaeological sites (See Fig. 6.49 and 7.38) attest to the long history of this design element. Comparing Birnirk finds with the Caribou-Iglulik kayak design, Arima suggested that "since the Birnirk culture developed into the widespread Thule culture, which is immediately ancestral to historical Inuit, the Caribou-Iglulik kayak design might be seen as quintessentially Inuit" (1994:193).

Iglulik and Netsilik kayaks were covered with ringed seal or caribou skin, and weighed only about 15-20 kg (33-44 lbs.) The Iglulik used the same boats in both land and ocean hunting. The transition between coastal and inland seasons was articulated ritualistically: after a successful whaling season all clothing was discarded near the shore, "so that in the deer-hunting season the deer may not be offended" (Boas 1901:499-500). Netsilik used kayaks only in fresh water, although their folk tales talk about the times when the salt sea was open in winter and people hunted seals with kayaks. The Netsilik story of Kivioq, an immortal hero who had many adventures while voyaging in his kayak, is known in different versions to nearly all indigenous coastal groups of Greenland and Arctic North America, reflecting the extensive network that connected these geographically removed places during Thule times and/or common cultural origin (Rasmussen 1931:365). Both Iglulik and Netsilik boats were propelled by double-bladed paddles (Arima 1994).

Iglulik whaling took place in summer and was a collective undertaking of several kayakers. Parties of up to 14 kayakers cautiously approached surfaced whales and delivered multiple blows with heavy harpoons equipped with inflated seal skin. More blows followed every time the wounded animal surfaced for air until it was killed (Boas 1901:509). Although very different in terms of strategies from lead umiak whaling of western American Arctic, kayak whaling was accompanied by a number of rituals strongly resembling those of northern Alaska. Only old people were allowed to watch the pursuit of the whale. Young women were required to lie down in their tents, which was believed to make the whale quiet and prevent it from striking the boats (Boas 1901:499-500). In whaling communities of northern Alaska similar behaviour was prescribed to the whaling captain's wife.

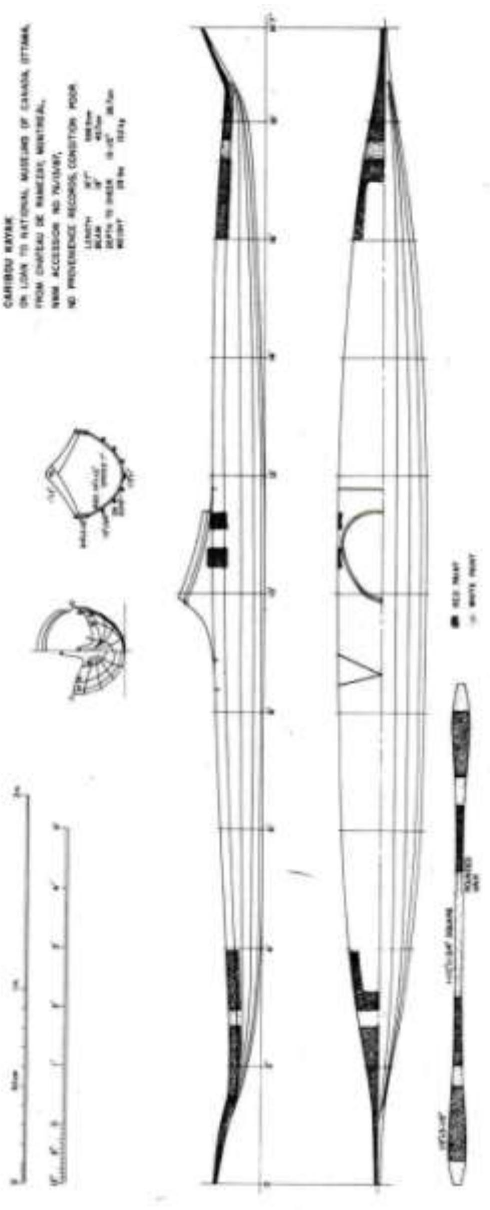


Fig.8.5. Caribou/Iglulik kayak (Arima 1987:210)

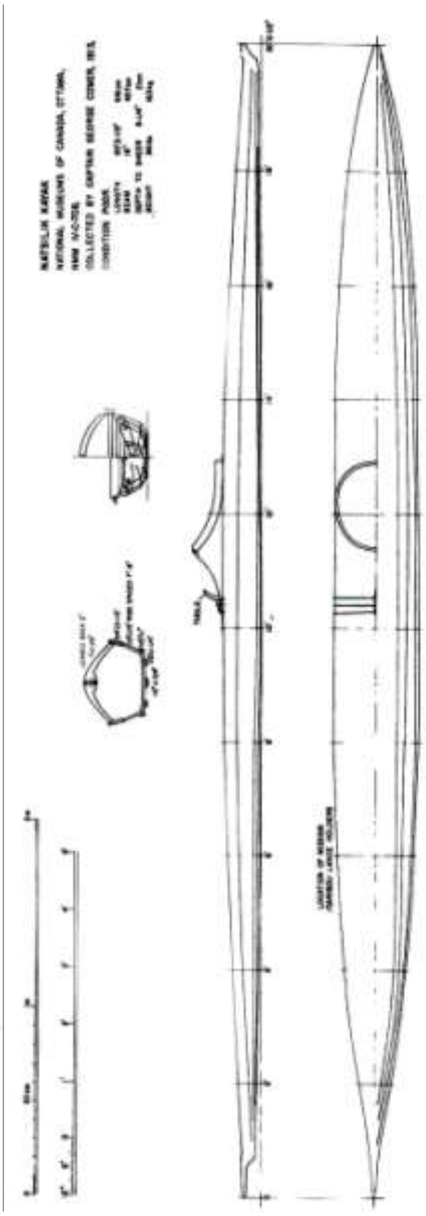


Fig. 8.6. Netsilik Inuit kayak (Arima 1987:201)

When the kayak of an Iglulik hunter who first struck the whale approached the shore, the boys rushed down with dippers filled with fresh water and poured it over the bow of the kayak to make them successful hunters (Ibid). This ritual parallels the Alaskan custom of the *umialik*'s wife offering a drink of fresh water to the dead whale, which was also believed to increase success in future whaling (See Chapter 5.5). Pleased with its reception and the people's gratitude, the spirit of the harvested whale would be more inclined to return to them. Offering a drink to the kayak instead of the whale carcass indicates that the boat was perceived as active and animated participant of the hunt, the success of which depended on its aptitude and willing cooperation.

Manufacturing and use of Netsilik kayaks was also accompanied by a number of ceremonially embedded practices and beliefs. It was, for instance, preferred that all the women of the camp participated in sewing of the boat cover, which would bring the hunter great luck (Rasmussen 1931:172). Both kayak and kayakers had special amulets. Bird feet, miniature kayaks, fish bones and dried gadflies were sewn into men's garments to make them fast paddlers. Bird, lemming, ermine, fox and hare skins were placed inside a kayak to ensure great speed. A piece of skin with which a baby boy is wiped immediately after he was born enclosed in seal skin pouch with seaweed inside guaranteed safety at sea. Kayak frame fragments and tools also possessed special powers. Deck attachments were worn on amulet belts as longevity charms, and a piece of boat equipment belonging to a prominent deceased kayaker transmitted his skills to a new owner (Ibid: 268-277).

Kayaks were also represented in Netsilik funerary practices. A crudely shaped image of a narrow sharp-ended boat was found in one of the Netsilik River Graves (Van Stone 1962: Plate VI, 8) dated to circa 1910. A similar artefact came from a Thom Bay grave belonging to a man who died around 1840-1850 (Ibid: Plate VIII, 25). According to Rasmussen, such miniature kayaks were brought to the grave after the funeral as offerings for the soul of the deceased, which now and then comes to the place where the body was laid (1931:264).

Umiaks seem to begin disappearing from the Central Canadian Archipelago by 1820, although knowledge of their construction was retained and expressed in boat model building, as reported by Parry (Parry 1824, I: 507-510). On Baffin Island, open skin boats were in use until the beginning of the twentieth century (Mary-Rousseliere 1954).

Boas, who conducted his field work on Central Eskimo in 1883, encountered and recorded umiaks on South-Eastern Baffin Island and remarked that "In Iglulik, and probably in Pond Bay, umiaqs (sic) are rarely used and never made, as wood is wanting" (1964:119). By 1920s umiaks were considered gone from the living tradition of Central Inuits (Mathiassen 1927, II:64). At the same time, as evident from the photograph by Richard Harrington (1952-1953, Mary-Rousseliere 1984:432), the Iglulik Inuits utilized small umiaks for retrieving seals as late as 1950s (Fig.8.7.). The shape of this one-person open skin boat is similar to the large umiaks of Central and Labrador Island Inuits, suggesting a certain degree of regional consistency.

Fig.8.7. Hunter pulling captured spotted seal from the water. Photograph by Richard Harrington, 1952-1953, Public Archive of Ottawa, PA 129874 (Mary-Rousseliere 1984:432)

According to ethnographic data, the most characteristic feature of Central Canadian umiaks was the wide headboards which almost equalled the watercraft's width at midsection and gave it a rectangular appearance. The watercraft had flat bottoms and stem posts were set nearly perpendicular to the keel (Fig.8.8.). Four miniatures depicting umiaks of a similar type were discovered at the Spence Bay site attributed to ethnographic Netsilik (Van Stone 1962: Plate IX). Central Inuit umiaks typically required three bearded or 12 harp seal skins to cover the vessel (Boas 1964:119-120).

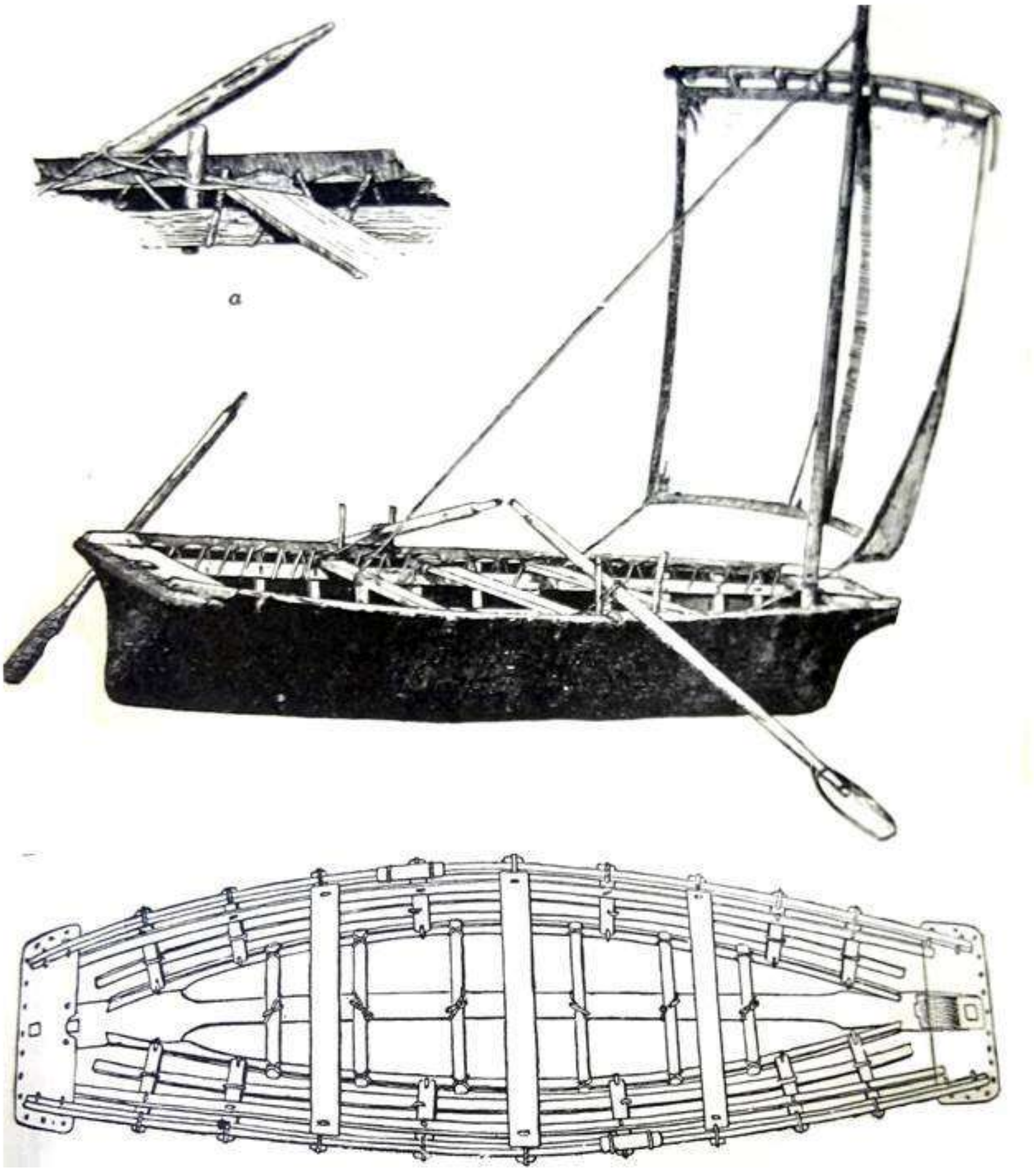


Fig.8.8. Central Eskimo (Baffinland) umiak (Boas 1964:119-120)

The absence of full scale examples tempers any attempt at an in-depth understanding of boat construction. Some evidence, however, is provided by late 19th – early 20th century Caribou Inuit models from the collection of the Canadian Museum of History (Fig. 8.9.). Models represent stout watercraft with wide headboards and peculiar treatment of posts wedged to the keel by large wooden chocks, perhaps intended to balance the weight of the headboards. Along with bulky headboards, this type of post to keel attachment indicates ample availability of wood and a peculiar lack of interest in the boat's weight and performance. The Caribou Inuits indeed had better access to wood than their Netsilik and Iglulik neighbours, as the southern extent of their traditional land almost reached to the tree line. However, the hydrological characteristics of this watercraft remain puzzling. With its marked resemblance to a bathtub, the boat projects similar expectations in terms of its seaworthiness and the labour required to paddle it.

Eugene Arima, recording the construction of a Labrador umiak of similar type in Ivuyivik in 1960, suggested – somewhat counter intuitively- that the wooden blocks connecting the keel to the posts were a "sound local solution to the scarcity of suitably large driftwood for stem and stern posts" (Arima 1963:59). The Ivuyivik umiak's performance was tested when the boat was paddled from the beach in front of the village to the icebreaker, which was delivering it to the Museum of Man (now Canadian Museum of History) in Ottawa. Observing five men paddling the 6 ft long boat across the glassy calm bay, Arima remarked "In the calm water the umiak was quite stable. If anyone leaned over the side, it tilted; but never was it danger of tipping over. Without a heavy load the boat skimmed along the surface" (Ibid:57).

In terms of larger geographical connections, the Central Inuit umiak stands apart from umiaks of Alaska, comparing to which it appears to be less fit for both open ocean seafaring and in-land portaging. The bulky shape and heavy frame would also make it a poor choice for the pursuit of marine mammals, reducing its function to cargo transportation and short distance trips in comparatively sheltered waters. Such limited application signals reduced interest in maritime mobility which, given Thule ancestry discussed in details in the next section, may be a comparatively recent development initiated during the transition from the Thule to Inuit phase. At the same time, several constructional features, such as vertical posts and – in the case of the Baffin Island umiaks – placement of the mast at the stem, resemble ethnographic Greenlandic umiaks and may be a sign of direct influence, or, perhaps, of a shared lineage. Environmental determinism, often credited for independent development of similar technological solutions in geographically removed locations, does not have a strong standing in this case because of the consistency of this umiak form throughout the entire Atlantic side of Canada, from High Arctic to Labrador Peninsula, a territory which includes a wide range of varied environments.

Fig.8.9. Two views of umiak model from Chesterfield Inlet, Caribou or Iglulik Inuit, 1914, Canadian Museum of History, IV-C-761. Photo by E. Anichtchenko

8.3. Archaeological horizon

The eastern Canadian Arctic was first colonized circa 4000-4500 BP, by a group of the Arctic Small Tool tradition (ASTt) culture (See Chapter 2.5). This rapid and possibly large scale movement may have been prompted by the retreat of Pleistocene ice, which opened Hudson Bay and Hudson Strait to Atlantic waters (Blake 1966; Maxwell 1984:359). At that time climate was warmer than currently with a larger extent of seasonally ice-free coastal water, and at least part of the immigration must have been by boat (Maxwell 1960). The initial colonization was not culturally homogenous. Archaeologists distinguish two different groups: Independence I and Pre-Dorset. Both cultures were strongly focused on maritime resources and had an impressive geographical range that extended from Coronation Gulf to Greenland. The oldest skin boat remain of the circumpolar north – a kayak rib from the Saqqaq site in Western Greenland – is culturally affiliated with the Independence I culture and dates circa 2200 BC. (See Chapter 3.2). Between 800 and 500 BC, the pre-Dorset culture underwent some changes and entered a new stage, known as Dorset. Along with new harpoon forms, these changes included the appearance of bone sled shoes, snow knives for snow house building and ice creepers made of antler and ivory. Dog traction, bows and arrows, and drills disappeared from the general cultural inventory (Maxwell 1985). Full scale and miniature kayak parts recovered from the Button Point (Mary-Rousselliere 1979) and Nanook sites (Maxwell 1973; Arundale 1976) imply shallow, flat-bottomed boats with hard chines and slightly flared sides (Fig.8.10). There is currently no material evidence for the existence of Dorset umiaks.

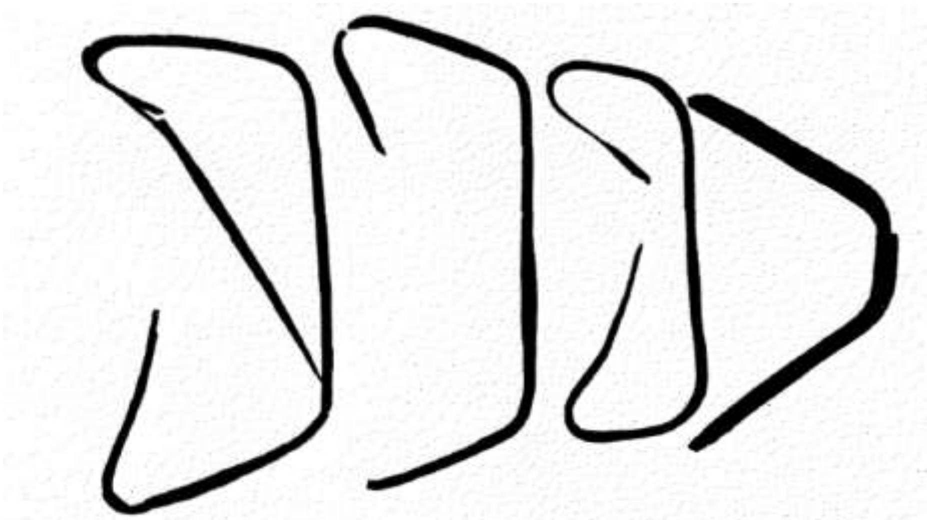


Fig.8.10. Ribs of kayak model, from house 71, Nunguvik site, Button Point. (Mary-Rousselliere 1979:25)

Dorset culture occupied the Canadian Arctic until circa the 12th century AD, and overlapped chronologically with the incoming Thule culture which began settling in the region around AD 1000 (Helmer et al. 1993, LeMoin and Darwent 1998). Based on the analysis of harpoon types, particularly the Sicco, the Thule settlement of Eastern Arctic had two waves: the initial, or Natchuk phase dated to about AD 1000, and the northern-bound Ruin Island migration that reached Ellesmere Island and Northern Greenland circa AD 1200 (McCullough 1989, Morrison 1989, Arnold and McCullough 1990, Fig. 8.11.). Both of these migratory events originated from Alaska. Natchuk bears resemblance with early Thule materials from Point Barrow and Point Hope (Larsen and Rainey 1948; Ford 1959, Morrison 1999:143), while the toolkit of the Ruin Island people has marked Punuk influences characteristic of western Alaska (Collins 1937; Yamamura 1984; Morrison 1991)

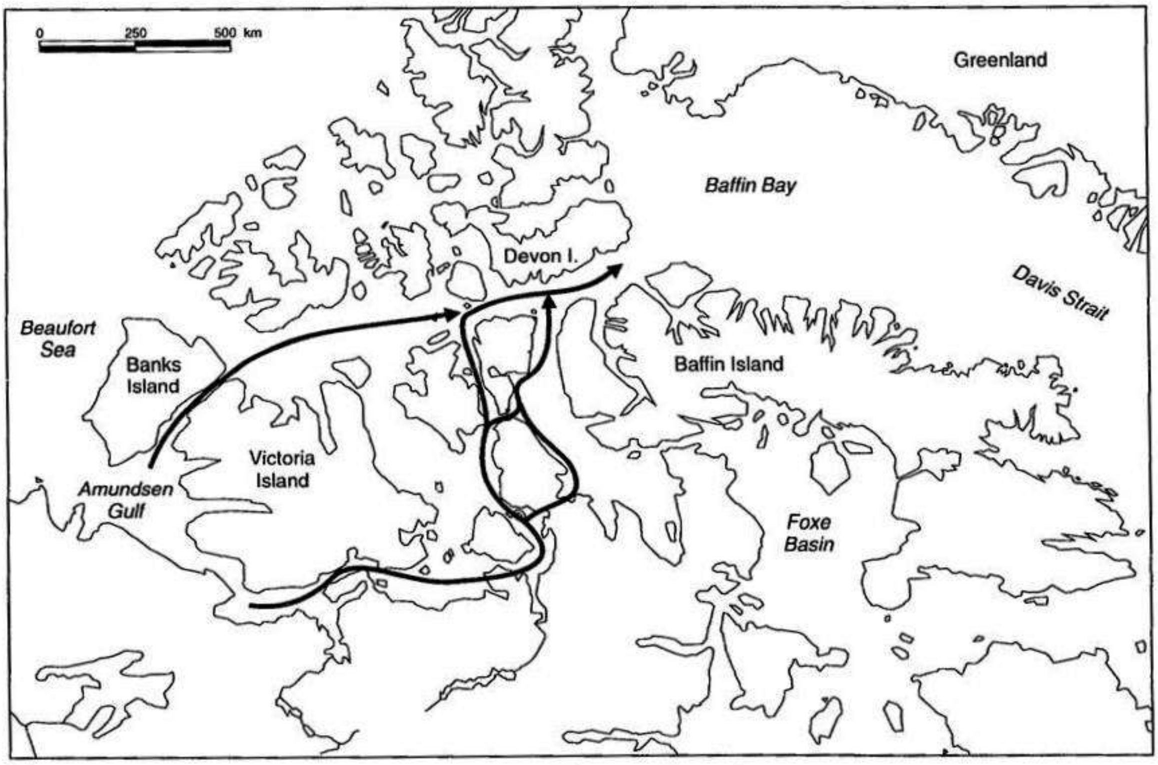


Fig. 8.11. Thule migration routes in Eastern American Arctic (Whitridge 1999: 142)

The Natchuk migration route took Thule colonizers from Birnirk to Lancaster Sound via Amundsen Gulf, Melville Sound and Barrow Strait, skirting the northern coast of Somerset Island. Both Dorset and Thule sites are found here, often in close geographic and chronological proximity. The extent of interaction between Thule and Dorset cultures, however, remains a subject of discussion and direct evidence of contact is lacking despite the chronological overlap (Park 1993). Changes in Dorset material culture and the historically documented Dorset abandonment of southern Greenland before Norse arrival in the late 10th century AD suggest that the population was stressed and likely declining (Whitridge 1999: 66). Whether Thule colonizers arrived in a recently abandoned land or had to contest an existing population, the success of their settlement of new territories is often credited to their skin boat technology (Maxwell 1985): unlike Dorset they possessed large open skin boats that allowed for more efficient whaling strategies and perhaps enhanced Thule military capabilities. In addition to umiaks, the Thule arrived equipped with useful (and unknown to the Dorset) technologies such as the sinew-backed composite bow, throwing boards and skin floats (Ibid).

Canadian, or Eastern Thule, differed from its original Alaskan form in a number of ways. The scarcity of wood in most of the Canadian Arctic enforced changes in house architecture. Instead of Alaskan log-lined rectangular semi-subterranean houses, Eastern Thule built round or oval houses lined with boulders, stone slabs or whale bones. Dome-shaped snow-houses constructed by eastern Thule for winter shelters were another innovation, possibly adopted from their Dorset predecessors (McGhee 1984c:372). Perhaps one of the most important changes concerned the organization of whale hunting. In northern Alaska bowhead whaling was an intensive, seasonally confined activity. Migrating whales, channelled by leads in the spring ice, were harvested by whaling crews in umiaks launched from the pack ice. This technique capitalized on the combination of a high concentration of migrating animals and the fairly narrow path they had to follow (Friesen 2012). In the Canadian Arctic, hunters had to chase whales in open water, using both umiaks and kayaks. McGhee suggests that this would significantly reduce both the hunters' success rate and limit the size of eastern Thule social groups to 10 to 50 individuals (McGhee 1984c: 371).

After the initial occupation, during the 12th to 14th centuries AD, the range of Thule settlements extended south, reaching the northern part of Hudson Bay and the Ungava Peninsula. The sites of this period, often called "Classic Thule", display the notable homogeneity of material culture which implies active interregional interactions. The world of Classic Thule was geographically expansive, environmentally diverse and culturally connected (McCartney 1991; Whiteridge 1999,2002, 2016). The mobility impulse of the initial migration from Alaska did not expire upon reaching the Atlantic side of the continent, but instead developed into an extensive network of short- and long-distance connections. Transportation in general and maritime transportation in particular played an important part in this.

Boat images engraved on drill bows, snow knifes and other ivory and bone objects provide some information about how these boats looked and were used. Open skin boats are typically depicted with long gunwales extending past the boat's stem and stern posts and often sharply upturned at the bow. A wooden umiak model from Peale Point site in Frobisher Bay, Baffin Island, is a three-dimensional representation of the same type (Maxwell 1985, Fig.8.12). Notably, the model's overall appearance and especially long joined gunwales are very different from ethnographic umiaks of Baffin Island, but similar to ethnographic boats of northern Alaska.

Fig.8.12. Peale Point umiak model, Frobisher Bay, Baffin Island (Maxwell1985:Fig.8.11)

The most common context for umiak depiction is the whale hunt, particularly the moment when the animal is harpooned (see, for instance the whalebone snow knife from the Resolute site, Cornwallis Island, the ivory drill bow from Arctic Bay and ivory drill bow from Cumberland Sound). An ivory pendant from Cape Dorset shows a killed whale towed by an umiak by its tail (Ibid:268). Four to six figures depicted in the boat represent the crew of six to ten individuals: harpooner at the bow, steersman at the stern and paired paddlers in the middle. Kayak representations are typically one-person watercraft with sharply upturned ends resembling Caribou Inuit and Mackenzie watercraft. Propelled by double-sided paddles with diamond-shaped blades they are depicted pursuing caribous and assisting with umiak whaling (Habu and Savelle 1994:3, Maxwell 1973).

In the early 15th century AD the lifestyle and adaptation of Eastern Thule was tested by another episode of climate change, termed the Little Ice Age. For nearly two hundred years the temperatures in High Arctic dropped lower than they are now significantly increasing sea ice coverage. In the High Arctic the ice cover may have been nearly total even during the warmer seasons, making boat use dangerous and even impossible. Ocean hunting was likely affected even in more southerly locations because the increased size of ice fields changed the migration patterns of whales (Maxwell 1985:305). A gradual decline in bowhead whaling after 1400 AD is deduced, in part, from the decreasing amount of baleen in archaeological sites (Schledermann 1979). By the 16th century open water hunting and transportation seemed to cease in the High Arctic.

Remarkably, the most complete example of Thule watercraft belongs to this period and comes from Peary Land, northern Greenland (Fig.8.13). Even today navigation in these ice-choked waters is challenging, yet the site discovered by Egil Knuth in 1949 attests that a small group of hunters lived and hunted here in the past (Knuth 1952). The site featured multiple tent rings, open-air hearths, various scattered artefacts, sled remains and the complete frame of an umiak (Jensen 2003:211-214). Radiocarbon samples were collected from boat's baleen lashing, a fragment of oak wood located inside the umiak, and musk ox bones found in the boat's proximity. The resulting dates place the Peary Land umiak between cal.AD 1420 and 1480, which is consistent with Thule dates from the area (Ibid).

The 10.7 m long umiak is a slender boat with almost symmetrically angled stem and stern posts, 12 bottom cross timbers and 14 pairs of side ribs (Knuth 1952) A number of constructional features set it apart from more recent Greenlandic umiaks. Notably, it lacks bow and stern hand grips or "horns", which were characteristic for both more recent examples and, according to the representational evidence, Thule umiaks. The ribs of Peary Land umiak are straight, lacking a stringer notch, which is another trademark of ethnographic open skin boats from Greenlandic umiaks, although un-notched design was also known in the region (Petersen 1986:127). The frames were joined together utilizing ivory pegs, lashing and metal nails, which Knuth suggested came from a European shipwreck (Ibid).

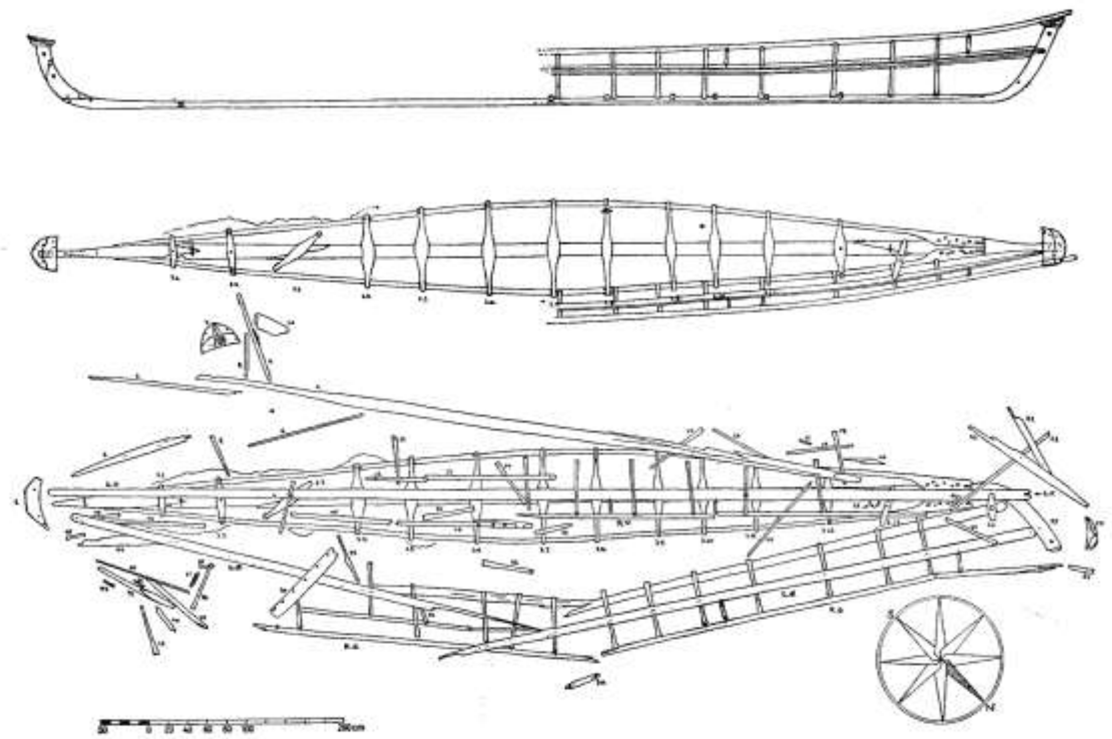


Fig.8.13. Reconstruction of Peary Land umiak (above) and in-situ drawing (below) (Knuth 1952:21)

One of the most important features of the Peary Land umiak is evidence of both sail and oar propulsion. A mast was set into a simple depression carved into one of the forward floors (Fig.8.14). Similar system of mast setting is known from ethnographic umiaks, in which it is typically secured by thwarts (see Fig.8.9). Currently, this is the earliest positive proof that indigenous people of the Arctic used sails prior to the more intensified contacts with Europeans that started in the 16th century. As discussed in chapters 6 and 7, a number of archaeological finds in Alaskan sites may be interpreted as mast steps, but lack of defined contextual or chronological context does not allow for complete certainty. Although a European origin of sailing technology cannot be ruled out (the borrowing may have occurred, for instance, in Eastern Arctic through contacts with the Norse), the very fact that Thule umiaks were utilizing wind for propulsion is important for understanding maritime mobility of that time. The remarkable speed with which Thule culture spread from northern Alaska to Greenland should perhaps be credited to the development of sail propulsion, which in this case becomes one of the key factors that allowed for and motivated Thule migration (Anichtchenko 2016).

In addition to a sail, the Peary Land umiak was also propelled by oars. Several large oars were found in the vicinity of the boat, although the frame itself lacked any signs of oar grommets (Petersen 1986:160). Like sails, Inuit oar use may have been inspired by familiarity with European technology. Contact with Norse is implied by the presence of iron nails and oak wood, which is exotic to the Arctic, but whether this was direct or indirect interaction remains unknown (Knuth 1952). Thule Inuits clearly had access to European materials originating from the Greenlandic Eastern and Western settlements (McGovern 1979, 1980), but Norse sagas do not specifically mention interaction with the Natives. Yet the wide distribution of Norse metal in Thule sites and Europeans' desire for walrus ivory and polar bear skins, both of which could be obtained through barter with Inuits, strongly suggest encounters between the two groups. The most convincing archaeological evidence of direct contact is the small wooden figurine of a Norseman executed in typical Inuit style and discovered in House 8 of the Okiavilialuk site on the southeast end of Baffin Island (Sabo and Sabo 1978; Maxwell 1981).

Fig.8.14. Peary Land umiak mast step. Photo courtesy Matt Wells.

With continuous cold spells of the Little Ice Age, life in High Arctic became difficult even for the expertly adopted Thule people. By around 1600 many earlier settlement patterns and subsistence practices were disrupted. Much of the High Arctic was abandoned, whaling decreased, which ultimately changed the structure of the entire society, and interregional interactions were reduced to near isolation of some Eastern Inuit groups. With many waterways covered or choked by ice nearly year-around, the significance of maritime mobility declined. Archaeological evidence, however, demonstrates that skin-covered watercraft persevered for some time even in the areas where the affects of colder climate were most severe. Kayak remains discovered during the 1921 Danish Bicentenary Jubilee Expedition in Morris Bay on the North-eastern coast of Greenland, recently dated by Mathew Walls, demonstrate that kayak hunting was practiced here circa AD 1660–1950 (Walls et al. 2015).

The gradual decline of indigenous maritime mobility in the Canadian Arctic coincided with the beginning of fairly regular European exploits (Dawson 2016). The earliest contacts were centred on South Baffin Island, Hudson Strait and Foxe Basin. Starting from Martin Frobisher's voyages of 1576-1578, this area was frequented by European ships, particularly in the late seventeenth to early nineteenth centuries. Baffin Island Inuit gathered at Saddleback and Big Island in anticipation of ship arrivals and hope for profitable trade (Maxwell 1985:309). High Arctic Inuits were in the periphery of these interactions until the second decade of the 19th century when Lancaster Sound became the gateway to western Arctic exploration (VanStone 1962). The interactions intensified in the second half of the nineteenth century, when activities of commercial whalers, the spread of the Hudson Bay Company trading posts, arrival of missionaries and other changes altered both the material and nonmaterial culture of the Eastern Inuit (Ibid). Introduction of wooden boats and guns contributed to the decline of skin boat traditions, although knowledge and memories of traditional watercraft manufacturing and use is still present in Eastern Arctic, and several eastern Greenlandic communities maintain an uninterrupted history of kayaking. Umiaks are no longer working boats in the Eastern Arctic, although some are made in Greenland for racing.

8.4. Qariaraqyuk setting and excavation history

Qariarayuk is located at the far south-eastern corner of Somerset Island at 72°03’32”N 94°05’52”W, on the shore of the Hazard Inlet, a small arm of Prince Regent Inlet, which separates the island from the Boothia Peninsula. The site is stretched along a beach with low tundra hills behind it (Whitridge 1999:128-131). Outcrops of limestone, dolostone and sandstone provided the inhabitants of Qariarayuk with materials for house construction and oil lamp manufacturing. As in many Canadian High Arctic sites, driftwood is sparse.

The inhabitants of Qariaraqyuk hunted a variety of marine mammals. Ringed and bearded seals are frequent in the faunal assembly. Walrus was rare: and the site’s record contains only one, possibly traded, walrus tooth (Ibid:135). Of several whale species present in the local water, only bowhead appear to be exploited by Qariaraqyuk hunters. Presently, Somerset Island is at the southern limit of the summer migration of the Davis Strait stock into the Central and High Arctic, and the visiting population is quite small, owing to the near extermination of Eastern Arctic stock by commercial whalers in the 19th century (Reeves et al. 1983; Ross 1993; Woodby and Botkin 1993). However, during Thule times, the island was a part of the major summering range with an estimated population of 11,000 individuals. With a single adult whale providing enough nourishment for approximately 60 people for 6 months (Whitridge 1992:137), whaling was by far the most effective and secure food procurement strategy. Presently, ice starts forming on Prince Regent Inlet in October and breaks in July, restricting the open water period to two months. However, this period was likely longer during the medieval warm period (Mayewski et al. 1993; McKay 1990:286; Tynan and De Master 1997). The Bellot Strait *polynya* along the south coast of Sommerset Island remains ice-free year around.

The abandoned Thule sites of Somerset Island first came to archaeologists’ attention through the references of the 19th century explorers (Mathiassen 1927; VanStone 1962; Savelle 1981). The first survey and artefact collection from Somerset Island and the Boothia Peninsula was undertaken between 1939-1949 by L.A. Learmonth, manager of the Hudson’s Bay Company post at Fort Ross. (VanStone 1962:2). More in-depth investigations of Somerset Island, which took place in the 1960s and 70s revealed a long history of human occupation, which included ASTt and Paeloeskimo components (Taylor and McGhee 1979; McCartney 1979b; Yorga 1979; Rick 1980; Bielawski 1988; Whitridge 1999:140). Late Dorset material culture was reported in several Thule sites, including Qariaraqyuk, but whether this was a result of direct interaction remains an open question. Thule is by far the best represented archaeological culture in the study area, both in terms of number and size of settlements.

Qariaraqyuk was first reported in 1958 (Savile 1959:968). In 1975 the site was inspected from the air as part of the whale bone survey program of the Thule Archaeology Conservation Project (McCartney 1979a; Clarke 1979), and fifteen years later Savelle undertook the site's first archaeological survey, recording 51 houses and associated whale bones (McCartney and Savelle 1993).

Savelle's investigation in the Hazard Inlet region resulted in identifying several classic Thule sites contemporaneous with Qariaraqyuk (Habu and Savelle 1994). Clusters of coastal Thule sites extend from Creswell Bay to Bellot Strait. Permanent villages, camping sites and caches are arranged systematically, suggesting dense populations, and established zones of economic interest and logistical territories (MCartney and Savelle 1993, Whitridge 1999, Fig.8.15.). Based on their survey of the area, Savelle and McCartney identified two radiuses of economic activities: a foraging radius within 10 km of the permanent village, which contained temporary residential sites, caches and scatters of whale bone, and a logistical radius at 20 km represented by smaller camping sites (Savelle and McCartney 1988). The C14 dates obtained from the region attest that most of these sites were abandoned circa 1400 AD and received were visited only episodically until the beginning of the 20th century (Whitridge 1999:145).

In 1991 Peter Whitridge conducted a systematic unobtrusive survey of the site, mapping 455 features and developing methodology and excavation strategies for his dissertation project. According to the survey, the site contained 57 winter houses, four ceremonial or communal houses (*kargi* or *kariyit*), and a number of caches, tent rings and burials (Fig.8.16). Caches and tent rings were positioned close to the beach, while houses were arranged in single and double rows running parallel to the shore between the beach and the bluff. Burials were concentrated north of the site on the slope and the top of the bluff behind the settlement. Whitridge interpreted the site's spatial organization as a material representation of corporeal, social, and cosmological order on the model of the Inuit house:

> The house consists of three main levels: a sunken entrance tunnel in which equipment and animal products were stored (and which often

housed the dogs), a general activity area (the house floor) in the middle, and a raised sleeping platform to the rear. Qariaraqyuk, like some other Thule winter villages, is itself structured along similar lines, with an area of tent rings and caches close to the beach, the main house row along a raised beach in the middle, and a cemetery on the talus slopes and bluffs above the village. Within Thule conceptual space an elevated area at the rear is reserved for bodies at rest, whether sleeping or dead, high status or sacred, and is paralleled in the use of heather both to line graves (Hanset et al. 1991:156) and as a sleeping platform cover. (...) In the middle, at an intermediate elevation, is a place for living people, for daily human activity. At the front, and lower down, is a place for animals and animal products (Whitridge 1999:206).

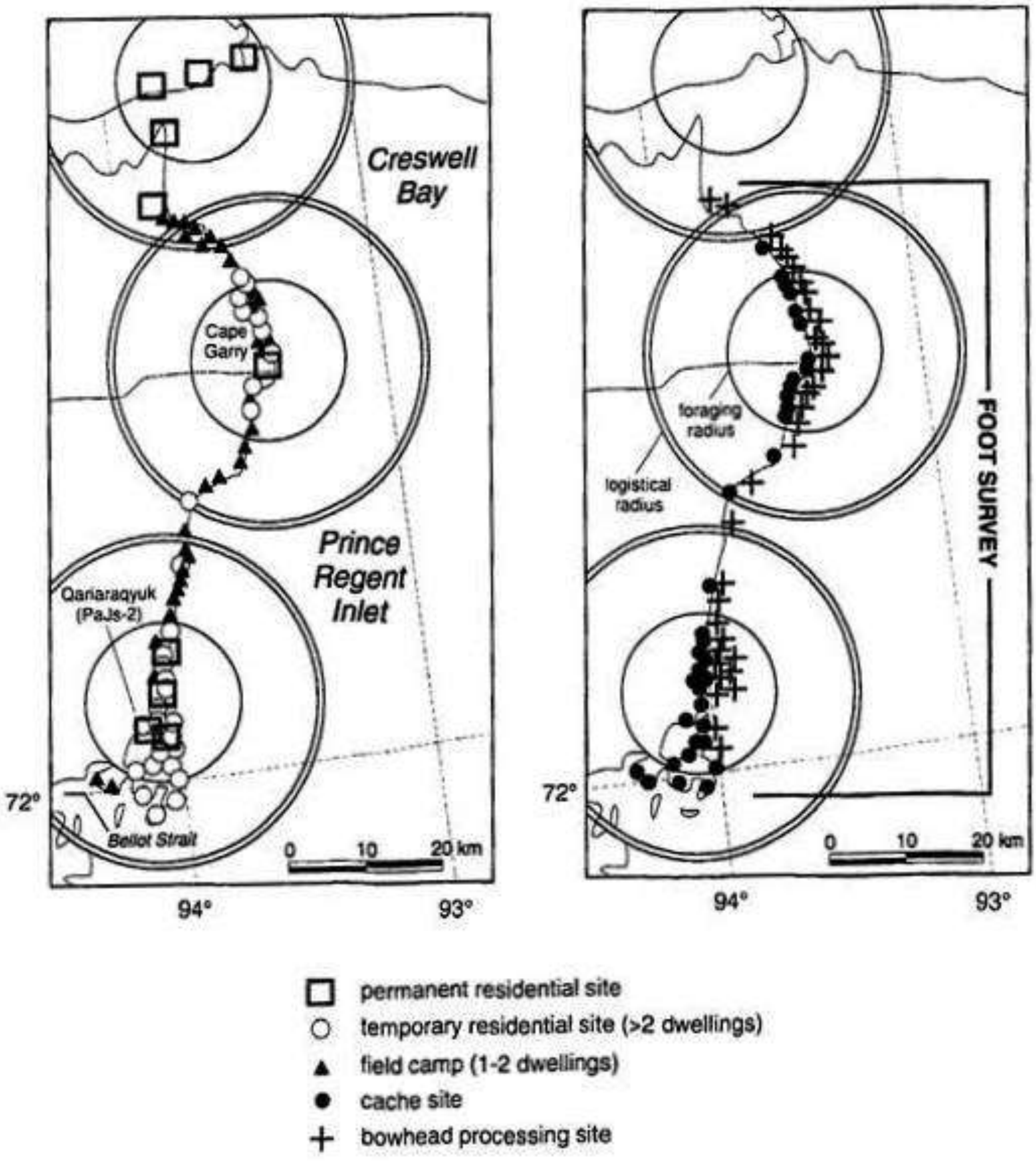


Fig.8.15. Thule settlement systems on southeast Somerset Island (Whitridge 1999:144)

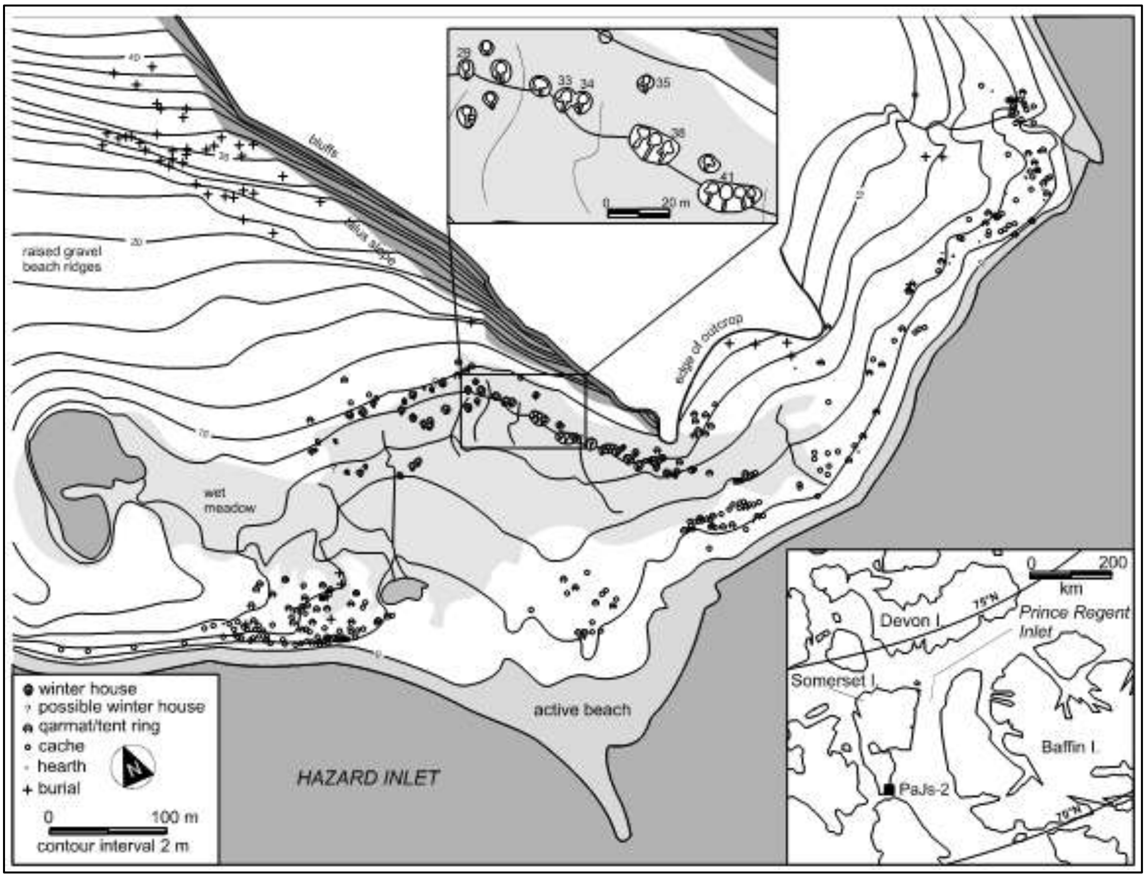


Fig.8.16. Plan of Qariaraqyuk archaeological site (Whitridge 1999)

The survey revealed that the site's earliest houses are those at the eastern end and that throughout its history the settlement expended from east to west. Further analysis of spatial distribution identified eight house clusters containing between 3 and 12 houses each. Some houses within these clusters stood very close to each other and were connected by passages. Approaching spatial proximity as a measure of social connection, Whitridge (1999: correlated these clusters with *upsiksui* – house groups occupied by the members of extended family. This social kinship, in turn, was one of the central principles behind the whaling crew's organization.

Upiksui clusters often contained a *kargi* where most of the whaling rituals and preparations, including boat building, took place. Based on the estimate of about eight individuals per house, one hunter per every four individuals, and eight hunters per whaling crew, Whitridge proposed that Qariaraqyuk could potentially have mustered 9-10 crews, a number that with some approximation matches the amount of Qariaraqyuk's *upiksui* (1999:195).

All of the recorded residential houses were further analyzed in terms of their architectural and constructional features, such as number of sleeping platforms, presence of extra rooms and niches, use of whalebone in construction, depth of the floor and length of the entrance tunnel. The assumption was made that these differences reflected varied functions and social status of house inhabitants and six different types were distinguished on the basis of this analysis. Excavation efforts were then focused on a spatially restricted area on the central portion of the site (clusters 5 and 6), which contained a variety of house types including *kariyuit*. Within this area six features representing six different house types were judgmentally selected for excavation (Whieridge 1999:157). Houses 35, 38 and 41 were partially excavated in summer of 1993, and houses 29, 33 and 34 were investigated in 1994. A 1:2 test pit was also excavated into the front area of House 6. Of these structures, only two (House 33 and 34) belong to the same *upsiksui.*

Three antler and five botanical samples were submitted for C14 analysis. Samples were chosen from each of the excavated features. The resulting dates fall into two periods: AD 1160-1510 (68% range) and AD 1000-1650 (95% range), with peak probability circa AD 1200-1405 (Ibid:166). Although overlapping in chronology of their use, houses were constructed and abandoned at different times. Houses 34, 38 and 41, for instance, were earliest of sampled structures built circa 1200 AD and abandoned by 1400. House 29 was constructed half a century later and abandoned circa 1450, while Houses 6 and 33 contain evidence of occupation until 1500 AD (Ibid 168-170).

8.5. Qariaraqyuk boat data

Boat-related artifacts from Qariaraqyuk comprise 31 objects originating from 5 houses (Fig.8.17). The cumulative data sample constitutes 0.66 % of the entire artefact collection (4671 objects), and represents 5 out of 6 fully excavated houses (Table 8.1). In terms of break down by boat data type, Qariaraqyuk's lack of paddle fragments sets it apart from both Kukulik and Birnirk datasets. Miniatures are the smallest category (10%), followed by kayak parts (39%). Umiak fragments constitute more than a half of the entire dataset (Fig.8.18).

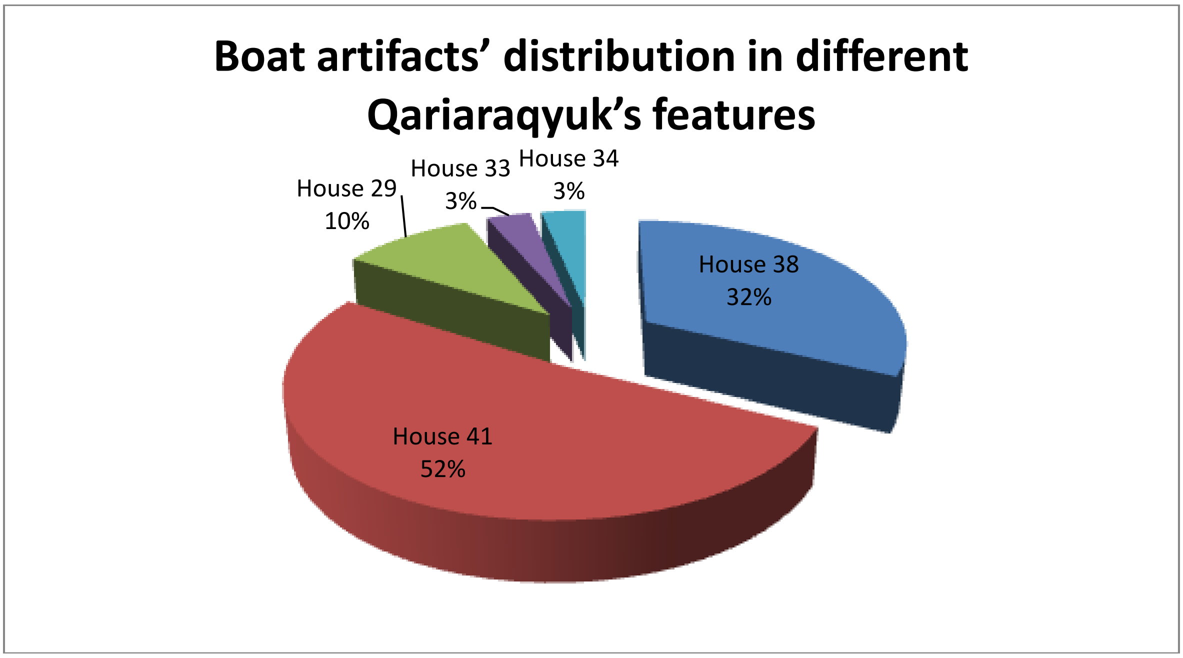


Figure 8.17. Boat artifacts' distribution in different Qariaraqyuk's features

Feature	Number of boat artefacts	Miniatures	Umiak fragments	Kayak fragments	Paddles
House 38 (AD 1200-1400)	10	1	5	4	
House 41 (AD 1200-1400)	16	2	9	5	
House 29 (AD 1250-1450)	3		1	2	
House 33 (AD 1250-1500)	1			1	
House 34 (AD 1200-1400)	1		1		
Total	31	3	16	12	

Table 8.1. Qariaraqyuk boat data distribution for artifacts with known provenance.

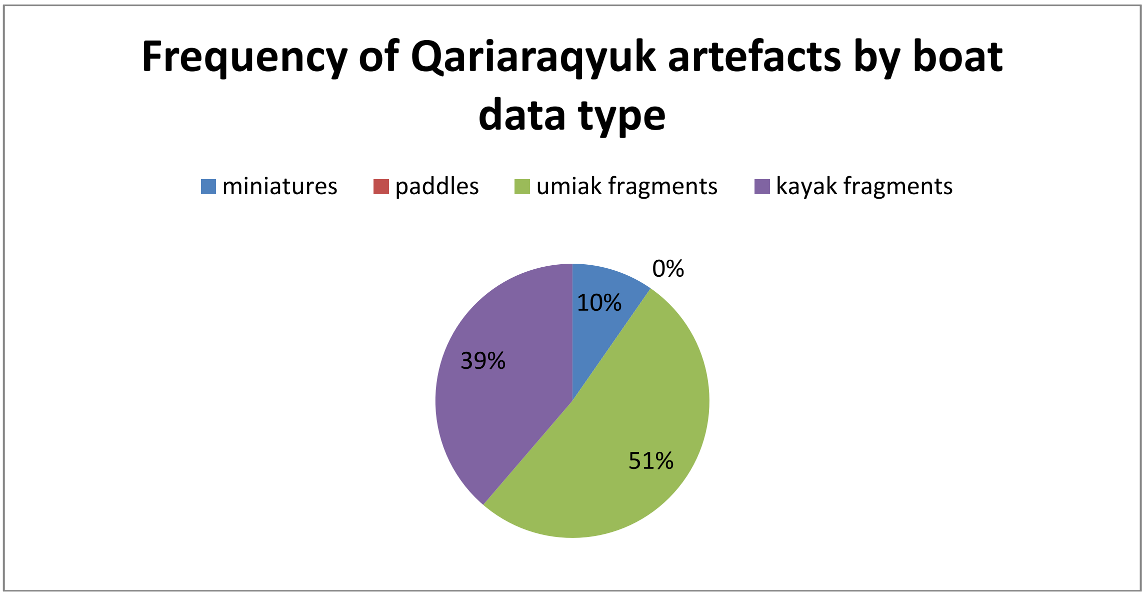


Fig.8.18. Qariaraqyuk artefacts by boat data type.

Most boat data originated from two structures - House 38 and 41, the latter yielding a particularly rich sample of more than half of all boat artefacts. These houses also occupy leading positions in overall artefact count and are among the earliest site's structures (Table 8.1, Whitridge 1999:185)). The abundance of boat data is not the only characteristic that sets out House 41. The structure lacks sleeping platforms and detached kitchen, but features a circular floor, central pit and walls constructed with bowhead whale crania – all indicative of a *kargi*, a communal house built for celebrations and men's activities. The artefactual assemblage of this house contained a high percentage of manufacturing refuse and male tools. A female figurine and a small carving of an ermine discovered on the midden next to the House 41 mound may be evidence of ritualistic activities that took place in this structure (Whitridge 1999:196-201). In the northern Alaskan context, ermine is often associated with shamanistic powers. Ermine tails were used as umiak charms and pelts of this animal were worn by *umialit* during the celebration of a successful whale hunt (Spencer 1959:339).

The abundance of whaling gear, such as lance heads, and float mouthpieces further confirm that House 41 played a central role in whaling preparation and rituals (Whitridge 1999). In addition to ceremonial activities, the *kargi* was a communal workshop where men manufactured most of their tools and hunting gear, learning from elders and teaching the younger generation. Both kayak and umiak frames were carved here, and according to ethnographic data from Arctic and subarctic Alaska, kayaks were often assembled and stored inside *kargi* (See Chapter 5.2). Wooden boat fragments in

House 41 may, thus, imply that similar practice existed among Canadian Thule groups. The Qariaraqyuk *kargi* boat sample includes remains of both kayaks and umiaks, as well as two miniature paddle fragments (See Appendix III). Since paddle miniatures were not found in the site's residential structures, it is possible that their presence in the *kargi* had ritual meaning, perhaps similar to the St. Lawrence Kozeevuh/Kaziva ceremony described in chapter 5.

House 38, the second most boat-artefact-rich structure at the Qariaraqyuk, is also the largest and most architecturally complex of all the excavated structures. The house had a heart shape created by two oval chambers joined together at the entrance to the house tunnel. Each of these chambers featured sleeping platforms. The western wall of a narrow tunnel opened into the kitchen with a substantial stone platform covered with bones and animal fat residue. The walls of the tunnel had several alcoves with remains of shelves or benches, which Whitridge interpreted as storage areas (1999:425).
The structure is positioned within a shared mound *upiksui* group, which also includes Houses 36 and 37. Some features of House 37 are consistent with the layout of *kargi,* but positive identification is challenging since this house remained unexcavated. Whitridge hypothesizes that if House 37 is in fact a kargi, it was presumably owned by the residents of House 36 or 38." (1999:211,213). Alternatively, this *upiksui* may have been associated with the House 41 *kargi*.

House 38 appears to be most prosperous household of all the excavated structures. An abundance of whale bone and by-products, as well as whaling gear attest to the inhabitants' successful participation in whaling activities. This was the only location on site where whale tail-shaped pendants were found (Ibid). In the ethnographic record of the western North American Arctic such pendants were attached to vessels used in whaling rituals or worn by whaling captains or harpooners (Spencer 1959:339). A high frequency of boat remains in this house may, therefore, reflect the prominent position that the occupants of this house had in the whaling crew. The boat dataset from this house includes fragments of full scale boats, one crudely made umiak miniature, a boat hook and a scraper for clearing ice off the boat. Umiak boat frame fragments are significantly more numerous than kayak remains, but neither is sufficient for understanding the boats' structural details.

If the first two most boat-data-rich houses support the notion that the frequency of boat artefacts is proportional to the household's engagement in whaling, the remaining part of the dataset rejects such a straight-forward association. Of the remaining three structures with boat finds, House 29, which Whitridge labeled as a "non-whaling" household, features more watercraft-related artifacts than "whaling" Houses 33 and 34 put together. According to Whitridge, the degree of a household's participation in whaling could be inferred from the frequency of whaling gear, such as "large harpoon foreshafts, large lance heads, various working parts of sealskin floats, and boat parts and paraphernalia" (1999:239) in house artifact assemblages. Frequent consumption of whale products, reflected in the faunal assemblage, is considered an additional indicator of participation in whaling activities.

House 29 had a comparatively small sample of whaling gear (4% versus the site average of 18.5%), but yielded a high volume of fishing and bird/small game hunting gear, suggesting that the economic strategies of its occupants "were fundamentally different from those of large whaling households" (Whitridge 1999:241). In addition to the relative frequency of boat parts, House 29 contained an abundance of both ritualistic and "exotic" or traded artefacts, suggesting that the social standing of people living here may have been based on considerations and activities other than participation in whaling. This notion is supported by the fact that one of two ivory labrets found at Qariaraqyuk came from this house. In indigenous societies of North American Arctic labrets were typically a marker of high social status. The second Qariaraqyuk labret originated from the "captain/harpooner" House 38 described above (Ibid).

Reflecting the high amount of ritualistic paraphernalia in House 29, Whitridge proposed that this status may have been related to shamanistic powers and services (1999:278). Two ivory chains discovered at this location provide strong evidence in support of this suggestion. In the ethnographic record of Arctic Alaska such chains were attached to wooden vessels used by the whaling captain's wife to give the harvested whale a drink of fresh water. Both vessels and chains were typically made by a shaman in strict observation of taboos and rituals (Rainey 1947:245).

Several constructional features also set House 29 aside from the other excavated structures. Most notably, it lacks a detached kitchen and sod roof; the latter may be seen as a sign that the house was occupied only during the warmer season when the structure could have been covered with hides. At the same time, a high percentage of sled-related gear, which would have been used in winter, challenges this notion. The boat dataset of this structure consists of two wooden artifacts interpreted as kayak frame fragments and a whalebone *yaavutak* – a tool used to tighten a skin cover over the umiak frame. Placing the cover on the boat was often accompanied by ritualistic activities, and may have been performed by shamans. The high percentage of transportation-related artifacts in House 29 suggests residents' heightened mobility, which, it can be argued, is central to shaman's occupation. The shaman's ability to depart from his/her body during a self-induced trance and to travel in spirit to other worlds was seen as the crucial element of cure or divination sessions. In the physical world, shamans travelled to collect medicinal plants and materials for amulets, to communicate with spirits and to seek knowledge (Asatchaq 1992). The presence of transportation artefacts in this dwelling may, therefore, reflect both the physical and spiritual mobility of its inhabitants.

House 33 and 34 each yielded one boat fragment – a possible wooden kayak rib fragment from the former and a whale bone umiak cross piece from the latter. These structures form a shared mound house group or *upiksui* and likely belonged to members of an extended family. The abundance of whaling gear indicates that both households participated in whaling. From this point of view it is interesting that their combined boat dataset represents both types of watercraft, however, the small sample size makes any conclusions and observations tentative.

In terms of constructional information, the extant artefact sample allows for only limited observations. Most notably, the inhabitant of the Qariaraqyuk made use of whalebone in the construction of watercraft. Wooden frame fragments constitute only 45% of boat data, which is both consistent with the local scarcity of wood and markedly different from known boat-building practices of Arctic North America, and the example of the late Thule boat construction provided by the Peary Land umiak. Typically, whalebone is reserved for manufacturing accessory elements such as oar locks and mast steps. The occasional use of antler in kayak construction in northern Alaska was both reported ethnographically (Nelson 1969) and inferred archaeologically (Ford 1959). At Qariaraqyuk, whalebone was allegedly used as material for umiak bottom cross-pieces and other frames. Heavier and more fragile than wood, whalebone is not an ideal material for boat building, yet, given the Thule focus on umiak whaling, it may have an added symbolical dimension.

The concept of boats' affinity with various animals has a number of manifestations in the ethnographic record of the North American Arctic. Images of birds, sea mammals and fantastic creatures (such as the *polraiyuk* water dragon discussed in chapter 6.7) were placed on watercraft to empower it with qualities of these animals, which would penetrate and even transform the body of the boat into a living being. Such transformation is illustrated in a story collected by Knud Rasmussen in the 1920s, in which a father sets himself a task to build a boat for his daughter:

> So he built an umiaq for her and drew amulets on it: along the sides a bird, and under the bottom a salmon, saying to her: 'When you go travelling in this boat and wish for speed, the umiaq will become a bird by the force of its amulets and raise itself over the water'. On the back of the bird she would be taken forward at high speed. But if she became anxious about the speed, if she merely wished for slower speed, the umiaq would turn into a salmon and swim with her on the surface of the water. … The girl rowed away to look for a husband, sometimes flying like a bird, sometimes swimming like a salmon (Ostermann 1952:262, cited in Hill 2011:408).

In northern Alaska, such amulet imagery was predominantly focused on whales and was strongly connected with umiaks. Both iconography and placement of whale representations within the body of boat, have long traditions going back to the classic Thule period (see Chapter 7. 8. for discussion), reflecting this culture's subsistence focus as well as recognition of whales as sentient beings. Incorporating whalebone into the umiak frames makes the connection between boat and animal even more immediate and tangible. An umiak with whalebone floors was not just evoking certain qualities of the whale, it was a marine animal itself, with bones and skin and living spirit. The hull of the boat, thus, becomes a body with all the potentialities of this concept. In traditional cosmology of the indigenous people of Arctic North America, the body was a liminal and negotiable space, where "the lines between species and classes, even between man and animal, are lines of fusion, not fission, and nothing has a single, invariable space" (Carpenter 1973:283-4). The materiality of the body, as Erica Hill explains, "was inherently unstable, containing a range of possibilities that could be expressed under certain conditions or when proper procedures were followed" (Hill 2011:408).

8.6. Conclusion

An examination of the Qariaraqyuk archaeological record demonstrates that although the boat artefacts are notably less numerous than in the previously discussed Alaskan cases, they are present in all but one fully excavated houses, suggesting the important role watercraft and maritime mobility played in Qariaraqyuk's society. The dwellers and owners of two of the house structures with the highest concentration of boat remains, were actively engaged in whaling and likely occupied a high social standing because of their role in whaling crews. However, the third most boat-rich household appears to be on the margin of whaling subsistence activities, while displaying signs of social distinction and active maritime and terrestrial mobility. This permits speculation that Canadian Thule societies engaged in seafaring which was not immediately connected to pursuit of the whale, and possibly had seafarers specializing on trading and other types of non-hunting voyages. Given that these voyages had to take place at the time of the whaling, this invites a consideration of existence of a class of maritime specialists other than *umialiit.* These may have been people with the acknowledged shamanistic powers, as it appears to the case at the Qariaraqyuk, or perhaps hunters with extended kin relationship in the distant lands. In either case, these individuals choose, and had an ability to use their prized watercraft and preciously short open water season, in such a non-whaling way that brought them archaeologically recognizable economic and social status. Unlike Thule societies in Alaska, where the seasonal and whale migration patterns allowed for combining spring and fall whaling with summer trading voyages (Burch 2005), the Canadian High Arctic Thule groups had to diversify to accommodate both tasks. This diversification could have been a result of adaptation to the climatic and seasonal conditions of Eastern Arctic, or perhaps had roots in the very process of Thule migration.

While Qariaraqyuk archaeological record provides no information for reconstructing watercraft, the ethnographic dataset and archaeological finds from other locations allow for some comparison between boat technology of eastern and western American Arctic. As it has been discussed in part in the previous chapter, ethnographically known kayaks of Central Inuits display a number of similarities with kayaks of northern Alaska. All kayaks of the North American coasts from Point Hope to Baffin Island are flat bottomed boats with sharp ends and flat or partially raised decks. Judging from the comparison of Birnirk kayak archaeological fragments and ethnographic data, main elements of this design persisted from the 11th century AD to early 20th century (See Chapter 7.9).

Ethnographically recorded umiaks of eastern American Arctic, on the other hand, differ from contemporaneous boats of north-western coasts. At the same time, the evidence provided by Peary Land umiak, suggests that boats of Thule settlers may have been closer in design to the umiaks of northern Alaska than more recent Central Inuit examples of this technology (See chapters 7.8 and 8.3), implying that some constructional changes may have occurred between 1400s and 1800s AD, possibly in response to climatic change. Why the umiak design of Central Canadian Arctic changed, while kayak construction remained comparatively consistent through time remains a question. Evidently, the development of these two forms of skin watercraft was not synchronized and responded differently to presumably the same environmental and social changes. To some degree this observation parallels the review of skin boat technology of St. Lawrence Island, which pointed out that local kayaks and umiaks may have been affected by different geographic traditions (see Chapter 6.11).

Chapter 9. Open passage: cross-regional analysis of prehistoric maritime mobility in the North-American Arctic

9.1. Cross-regional analysis: strategies and limitations

As a large-scale exploration of the maritime mobility of the North-American Arctic through ethno-archaeological analysis of indigenous skin-covered watercraft, this research engages with both quantitative and qualitative analyses of boat datasets from three different locales: Bering Strait (represented by St. Lawrence Island, and more specifically the Kukulik archaeological site), the Chukchi Sea (reviewed through the material culture of the Birnirk site near Point Barrow, Alaska) and the Central Canadian Arctic (assessed through the archaeological record of the Qariaraqyuk site on Somerset Island, Nunavut territory). This bi-focal approach allows for assessment along two related lines: the chronological and spatial comparison of boat data across the circumpolar regions of North America; and a review of larger themes, which could be summarized as the role of seafaring in constructing cultural landscape of the prehistoric Arctic (see Chapters 1.3. and 1.4. of this study). Together these inquiries elucidate the scale, nature and significance of maritime mobility in the North American Arctic.

Derived from three specific case studies, the cumulative dataset allows broad geographical comparisons, but also has its limitations and analytical challenges. The choice of case studies discussed in this thesis was based on two main considerations: geographical position in different regions of the North-American Arctic; and the presence of sufficient boat data (see chapter 4.6.). While allowing for broad scale geographical comparison and offering rich datasets, this selection resulted in sites that vary significantly in terms of their excavation histories, duration of occupation and the size of the recovered artefact collection. Chronologically, the oldest dataset reviewed in this study comes from the Kukulik archaeological site on St. Lawrence Island. The occupational history of this site extends from 87 BC to 1880 AD. However, a very small portion of St. Lawrence Island boat data can be reliably traced to the time prior to circa 500 AD, and the oldest dated fragment of a full scale boat yielded a date of Cal AD 990 to 1145 (see Chapter 6.10, Appendix IV).

Similar differences between the overall site chronology and boat artefacts' dates exist for Birnirk. Reportedly occupied from 200 AD to 1300 AD, the site contains little information about boat technology prior to circa 800 AD. The Central Canadian Qariaraqyuk archaeological site is the only case study in this thesis where the boat chronology parallels that of the site. In sum, the bulk of archaeological data reviewed in this thesis is chronologically centred on the period between circa 900 AD and 1450 AD, although wherever possible, an attempt was made to expand this range. In terms of the region's cultural and natural history, this is a period of several major transformations, which include dramatic climatic change and a long distance migration movement known as Thule migration.

Prolonged occupational history, particularly in the case of Kukulik, combined with poorly identified chronological and spatial provenience of many artefacts from both Kukulik and Birnirk make analyzing these data a challenging task. Funding obtained through the US National Science Foundation and a Smithsonian Fellowship program allowed for AMS C14 sampling of six key boat artefacts. The chronological placement of the remainder of boat data was drawn from project investigators' published research and unpublished field notes. More thorough radiocarbon sampling would enhance our understanding of site's history and the chronological context of particular artefacts, but was not possible due to financial limitations.

Ethnographic inquiry is also not chronologically homogenous. Both Birnirk and Kukulik are located in the regions where umiak use is still a living tradition today, but whereas Chukchi Sea kayaks are well represented in the ethnographic record, the St. Lawrence Island kayak is considered a forgotten watercraft. Qariaraqyuk lacks immediately geographically adjacent ethnographic proxy all together. Ethnographic analogies for this site's data are drawn from the larger region and include three different indigenous nations.

The size of datasets also varied from site to site. The largest collection of 55,375 artefacts is from the Kukulik site on St. Lawrence Island (see Chapter 7.6.). Birnirk on the Alaskan coast of the Chukchi Sea Island yielded 12900 items (see Chapter 8.5.) and Qariaraqyuk on Somerset Island in the Canadian Arctic Archipelago produced circa 4670 objects (See Chapter 6.6.). The difference in sample size reflects in part the extent of each site's excavation. Although the information about the percentage of excavated portion against the total site area was not always provided, the basic count of investigated structures – 20 at the Kukulik, 17 at the Birnirk, and 6 at the Qariaraqyuk – points out that Alaskan sites were more extensively excavated.

Despite these differences, the sites reviewed in this thesis have an important common factor: each of them is the most prominent site in the respective region in terms of square footage, population size and the richness of material culture. This prominent position permits quantitative comparison of these sites' boat data (Table 8.1.), but also poses the question of how demonstrative these data are in terms of understanding maritime mobility of smaller settlements and less permanent settings. Additionally, although over 75,000 artefacts were reviewed in the process of this research (with over 500 boat fragments individually measured and catalogued), the analyzed sample size is a small portion of the overall Arctic skin boat record. There is, therefore, an unavoidable degree of approximation in projecting the numerical values resulting from this analysis into the larger geographical and temporal scopes of the North-American Arctic. Yet, understanding mobility requires quantitative claims, however approximate, "for all the same reasons that it is not sufficient to write about trade and production simply as "active", "important" or "significant" (Woolf 2016:444).

9.2. Who were Arctic seafarers?

One of the most tangible sets of information presented in this thesis is the boat artefact count and spatial deposition of the dataset. As proposed in the beginning of this study, statistical and spatial analysis of boat fragments can elucidate the frequency and intensity of boat use, as well as social aspects of seafaring (see Chapter 1.3.). The quantitative analysis of boat data in this thesis is based on the analytical assumption that spatial deposition and frequency of boat artefacts are not coincidental and reflect associated practices (see Chapter 4.4.).

The extent to which an object's archaeological context retains traces of its "upstream" activities is one of the most enduring questions of the discipline (Schiffer 1972; Hodder 1987). Typically, spatial positioning and the state of archaeological sampling correlate more directly with depositional and post-depositional processes, i.e. processes that caused this object to enter the archaeological record (LaMotta 2012). These processes, in turn, may include not only the immediate context of objects' manufacture and use, but also such behavioural activities as scavenging, curation and recycling, all of which are relevant to the frequency and deposition patterns of objects in the archaeological record (Schiffer 1976). The analysis of boat data in this thesis is centred on the understanding that all these variables are linked within a larger behavioural context, which is identified through relevant environmental settings, resource procurement and material engagement patterns, and ethnographic analogies (LaMotta and Schiffer 2001).

In a practical sense immediately related to the boat data, it means that while high-frequency boat artefact locations on a given site may not always be directly correlated with a specific boat practice, they do indicate engagement in such practices. For instance, kayak fragments recovered from the floor of a particular household, may have entered this context in the process of boat manufacturing or recycling, ceremonial or scavenging behaviour, but in either case, the presence of these materials indicates that household was involved in seafaring, and the degree of this engagement is reflected in the frequency of boat data. Presuming that different features of the same site were affected by similar site formation processes, comparison of these features' boat datasets would thus allow for inferring social dynamics of seafaring in a particular settlement.

Given significant collection size differences between case studies, the most reliable way of comparing datasets in terms of frequency of boat artefacts is to establish what percentage they constitute in the cumulative artefact collection. The results of this comparison are presented in Table 8.1. Notably, the percentage of boat-related artefacts is both small and relatively consistent across all three case studies, fluctuating between 0.66% and 0.75%, with the most data-rich site (Kukulik) exhibiting the same ratio as the smallest dataset in the wood-deprived Central Canadian Arctic (Qariaraqyuk).

The value of this observation is ambiguous. On one hand, it can be interpreted as a sign of consistent interest towards watercraft and maritime mobility in different parts of the North American Arctic during the first half of the second millennium AD, and perhaps similar dynamics of boat parts recycling. On another, sites of a different nature, such as smaller communities or temporary camps may exhibit a different proportion of boat artefacts. For instance, at the Kialegak and Punuk sites on St. Lawrence Island, the overall boat-related artefacts ratio is notably higher, constituting 5.5% of all excavated artefacts, but the largest portion of these data is miniatures and models. When miniatures are excluded from the statistical analysis (See Table 8.1), the ratio of full scale boat fragments to the overall number of artefacts in the case studies fluctuates between 0.28% and 0.62%.

Site name	Occupational period	Total artefact count	Number of boat-related artefacts	Percentage of boat-related artefacts in cumulative artefact assembly	Number of full-scale boat fragments	Percentage of full scale boat frames in cumulative artefact assembly
Kukulik, St. Lawrence Island	87 BC - 1880 AD	55735	375	0.67%	158	0.28%
Birnirk, Chukchi Sea	200 AD - 1300 AD	14122	113	0.80%	70	0.50%
Qariaraqyuk, Somerset Island	1200 AD - 1405 AD	4670	31	0.66%	30	0.62%
Kialegak, St. Lawrence Island	465 AD – 1650 AD, with some 19th century use	1318	73	5.5%	21	1.6%
Punuk, St. Lawrence Island	70 BC-330 AD with 19th century re-use	165	9	5.4%	5	3.03%

Table 9.1. Quantitive comparison of case studies' boat datasets (highlighted rows) with additional data from St. Lawrence Island sites.

At the same time, certain types of Arctic archaeological sites, such as boat caches may be represented exclusively or almost exclusively by boat artefacts. It is also important to remember that "boat fragment" is a very arbitrary statistical unit (See chapter 4.4). With these considerations in mind, the conclusions derived from the data discussed in this thesis apply predominantly to a particular type of archaeological site - a permanent coastal Arctic settlement, or so called "winter villages." More sedentary in nature than temporary camps, they may not reflect the full dynamics of people's movements, but offer a larger dataset and an opportunity to review boat practices in a more defined social context (see Chapter 4.4).

More informative than analysis of artefact frequency is an inquiry into the spatial positioning of boat fragments. A breakdown of boat data by site features shows that boat-related artefacts were comparatively widespread. At Kukulik, watercraft-related objects were found in eight of 14 excavated houses and in 14 out of 34 meat cellars, i.e. in

46% of all investigated site features. This percentage would likely be higher if the investigators maintained more comprehensive provenience records – 60% of all Kukulik boat artefacts lack precise provenience. At Birnirk, boat artefacts were found in 14 of 19 excavated features, which equals 74% of the site's structures. Research at the Qariaraqyuk archaeological site revealed boat data in five out of six fully excavated and one tested structures, i.e. in 71% of all investigated features.

Although nearly ubiquitous, boat data were not equally distributed throughout the sites. Each of the case studies had areas where concentrations of boat artefacts were notably higher than the overall site average. Kukulik Test Cut House 2, for instance, contained 8% of the entire Kukulik boat dataset. Birnirk featured four such concentration areas: Mound H (43% of the of the entire Birnirk boat dataset), the multi-room house in Mound Q (17%), House C in Mound A (12%), and Structure A in Mound C (7.6 %). While the typical boat dataset per structure is one to five fragments, these locales contained between nine and 51 boat artefacts each. A similar pattern is apparent in the Qariaraqyuk dataset, where three out of five excavated features contained between one and five boat fragments, while Houses 41 and 38 yielded 10 and 16 objects respectively. Together, these locales contain 84% of all excavated boat data from this site (Table 8.2.).

Site	Ratio of features with boat data to the overall number of excavated features	Features with highest boat artefact concentration with percentage to overall dataset
Kukulik	46%	Test Cut House 2 – 8%
Birnirk	74%	Mound H House– 43% Mound Q burial and structure– 17% Mound A House C– 12% Mound C, Structure A – 7.6%
Qariaraqyuk	71%	House 41 *kargi* (1200 AD - 1400 AD) - 52% House 38 (1200 AD - 1400 AD) – 32%

Table 9.2. Spatial distribution of boat artefacts in case studies' datasets.

While the high percentage of features containing boat artefacts suggests that watercraft played an important role in these coastal Arctic societies, the spatially disparate concentration indicates that the level of engagement in maritime mobility may not have been equal throughout the population. Some locales exhibited stronger relationships with ocean-going activities as manifested by increased number of boat artefacts, particularly full-scale frame fragments. In terms of functional meaning, with the exception of burial in the Birnirk Mound Q and the Qariaraqyuk *kargi*, all of these locales are associated with residential structures, thus potentially implying that members of these particular households developed and maintained a higher than average degree of maritime expertise and mobility. Notably, site locations exhibiting high rates of boat artefacts demonstrate it across all boat types (see Tables 6.3, 7.2, and 8.1.). Similarly, the lack of boat materials in some houses may suggest that their occupants were not directly involved in seafaring. Although it could perhaps be argued that the appearance of uneven participation may be due to random deposition and sampling biases, the presence of this pattern in all three sites is thought-provoking, particularly in view of the lack of comprehensive ethnographic information on the frequency of kayak and umiak use (see Chapter 5.1)

The notion of uneven participation in seafaring and boat activities may appear trivial for modern western cultures. It is, however rarely explored in the context of prehistoric indigenous maritime Arctic societies, in which supposedly every male received in-depth training in kayaking from an early age on a nearly equal level and with nearly identical results (Nelson 1983; Zimmerly 2000 a; Adney and Chapelle 2007; Golden 2015). Archaeological boat data from these case studies provides an interesting point of departure from this view by showing that although boats played an important role for most members of these society, some households/individuals may have possessed higher expertise in watercraft use and/or manufacturing. What is the social background of this inequality? And how does the presence of this group affect our understanding of Arctic indigenous maritime mobility?

First of all, this group appears to represent a relatively small portion of the population: one third of excavated houses at Qariaraqyuk, one sixth at Birnirk and one fourteenth at Kukulik. Because of the paramount role of whaling captains in Arctic whaling societies, there is a strong temptation to equate this expert group with *umialiit*, and in some of the locations with high boat concentration, such as the Qariaraqyuk *kargi*, this was almost certainly the case. Ethnographic data show that certain boat artefacts, and occasionally umiaks, were stored in the proximity of whaling captain's houses, and kayaks were often a prerequisite to ascending to whaling captain status (see Chapter 5.2).

However, it can be argued that although they definitely held a lot of seafaring expertises, whaling captains were not the only maritime mobility specialists in Arctic indigenous societies. The most boat data rich house at the Qariaraqyuk, for instance, appeared to be the residence of a non-whaling individual whose social standing was linked with his or her shamanistic abilities (see Chapter 8.5.). One of Birnirk's most boat data-rich households, Structure C in Mound A, is also the site's smallest residential structure with no evident association with whaling. It may, therefore, be suggested, that some "seafaring experts" drew their prominence from sources other than whale hunting. These may have been expert boat builders, particularly proficient kayakers, or, as suggested by the Qariaraqyuk data, shamans. In any case, these members of Arctic maritime societies had access to maritime technology and mobility outside (or on the margin) of the predominant whaling subsistence paradigm and may have used them in a different manner.

This understated dualism invites consideration of maritime skills as an area of professional specialization, which supported the social hierarchy and possessed social status, but did not have to be limited to a particular subsistence paradigm or exercised exclusively by the wealthiest and most powerful members of society. In terms of understanding how and by whom the decision about boat building and maritime mobility were made, the data combined from all three case studies show that starting from at least the 11th century AD and throughout the Classic Thule period, indigenous Arctic coastal societies may have contained individuals with particular seafaring proficiencies and expertise. This recognition is important for its paradigm-shifting potential. Instead of understanding Arctic indigenous seafaring as an equally-practiced communally-developed skill, it positions it as a practice guided by groups of maritime experts who may have had both authority and creative freedom over both boat construction and the course and strategies of maritime mobility. The emergence of specialization focused on seafaring, in turn, signals its social complexity and importance.

9.3. Arctic maritime mobility: range, direction, networks

One of the central questions regarding pre-contact Arctic maritime mobility is the relationship between short- and long-distance movements. Both are well-documented in the ethnographic and archaeological record, although with different resolution. Short-distance movements are generally associated with subsistence activities, and as such are perceived as frequent seasonal movements of the majority of the population, directed towards various locations in the vicinity of the main settlement or satellite hunting camps. The role of watercraft in these movements is well-established, and in fact, indigenous boats are predominately perceived as ideal tools of such localized subsistence mobility (Durham 1960; Dyson 1986; Zimmerly 2000a; Golden 2015). Review of these movements for three case studies showed that although all three settlements were located in ecological "hot spots," the radius of regular seasonal subsistence in ethnographic times was 150-200 km from the settlement, which included both coastal voyages and in-land trips via rivers and lakes (see Chapters 6.2, 7.2, 8.4). In all three case studies, voyages associated with whale hunting were among the shortest moves. Settlements were deliberately positioned to facilitate access to whales' migration routes. Subsistence mobility was carried out by both kayak and umiak, although kayaks may have been used more frequently. In ethnographic times, this range of subsistence movements effectively outlined the territorial holdings of particular groups, and their national borders, within which they could safely hunt and travel (see Sections 5.4. and 7.2).

Long-distance maritime mobility is notably less-explored than subsistence-related movements. In the existing research literature, native watercraft are predominantly discussed as tools of local subsistence, essentially a part of hunting gear, used in fairly limited geographical areas anchored by permanent villages and seasonal hunting camps (Durham 1960; Zimmerly 2000 a; Heath and Arima 2004:ix; Adney and Chapelle 2007:176). This approach is to some degree a legacy of the earlier European colonial exploration of the Arctic. Long distance sea- voyaging with all the associated romanticism of plunging into unknown, expanding cognitive boundaries and exploration was reserved for European mariners in the Arctic, while the Native relationship with the ocean was framed in terms of subsistence and survival (Lisianski 1814; Beaglehole 1967). In other words, European ships sailed into the horizon chasing knowledge and profit, while Native kayaks and umiaks paddled near familiar shores in search of food. However, long-distance movement is clearly evident from both the archaeological record and indigenous lore. Indigenous narratives of extended sea voyaging in search of adventure portray the sense of wanderlust and exploration, while the circulation of cultures and trade goods along the Arctic shores attests to long-range mobility of the population (see Chapters 5, 6, 8).

In the ethnographic record, long-distance maritime mobility usually comes into focus in connection with trading journeys and war raids. Both are in essence forms of international relations. Less frequent than subsistence moves, trading was a regular annual activity in most of North American Arctic. The frequency, directions and timing of trading voyages is particularly well documented for ethnographic north-western Alaska, where they were often linked to the indigenous trading fairs. Although the earliest written evidence about these fairs dates to the beginning of the 19th century, the system of interregional relations was significantly older, going back 500-1,000 years (Burch 2005:232; Schweitzer and Golovko 1995:135; Chapter 5). Both St. Lawrence Islanders and the people of Point Barrow made annual visits to such fairs, covering distances of 200-600 km each way in large cargo umiaks (see Chapters 6.2. and 7.2). Such trips often included women and children and were highlights of people's social lives. "Exotic goods" found at Qariaraqyuk, and the extreme scarcity of local driftwood, attest that inhabitants of this settlement also participated in long distance trading voyages. A journey of over 500 km, for instance, was necessary for replenishing this settlement's driftwood supplies (see chapter 8.1).

In Alaska, military raids were frequent, particularly during the first millennium AD (Mason 1998:240). Attacking troops arrived either by foot or in umiaks and consisted exclusively of men (usually belonging to the same kinship group). The range of these exploits is comparable to trading voyages, but the direction varied. Although cases when certain nations both traded and warred with each other are known, typically hostile interactions did not target trading partners. For the Point Barrow Inupiat, for instance, the main trading location was Nigliq, 350 km southeast of their home, while the main rivals lived at Point Hope, more than 500 coastal kilometres to the southwest. Together, these two geographic points outlined the extended range of these people's regularly practiced maritime mobility, which stretched over 800 coastal kilometres (see chapter 7.2).

Analysis of boat data from St. Lawrence Island and Birnirk shows that a similar, and perhaps even more impressive mobility range was practiced in the past. The St. Lawrence Island kayak constructional development discussed in Chapter 6.10 for instance, points to this island's connections with various Bering Strait and Bering Sea locations, such as Point Hope and the Chukotka Peninsula, as well as possible contacts with the Aleutian Islands, and the northeastern shore of Chukchi Sea. Likewise, the symbolic treatment of umiak floor frames from Birnirk shows affinities with similar frame fragments from Point Hope and Little Diomede Island, located 500 and 900 km southwest from Point Barrow respectively (see Chapter 7.9).

Such an expansive range of maritime mobility suggests a high level of connectivity of northern and north-western Alaska. Indeed, if every coastal settlement exercised a similar geographic range of movement, it would only require four or five such network links to encompass the region from the Mackenzie Delta to Bering Strait, i.e. the entire Arctic coast of Alaska. Both maritime technology and expertise necessary for maintaining such extensive networks were in place by the second half of the first millennium AD, and probably earlier, and archaeological evidence of cultural exchanges facilitated by this network are ample, including traces of the St. Lawrence Island Punuk culture at the Birnirk site near Point Barrow (a distance of over 1100 km) and the discovery of Birnirk culture sites on the north-eastern shores of Siberia at the mouth of the Kolyma River (circa 900 km from Point Barrow) (Okladnikov and Beregovaya 1971, for details see Chapter 2.6).

Prior to the Thule period, these networks appeared to have a limited extent east of Point Barrow; the Atkinson Point site on the north-eastern side of the Mackenzie River delta being the easternmost example of Birnirk culture (Anderson 1984:91). With climatic amelioration at the beginning of the second millennium AD, the open water season in the eastern North American Arctic lengthened, offering better navigational conditions, and the long-distance east-bound cultural extension known as the Thule migration followed.

Introducing navigability as an important factor of Thule migration may seem a minor addition, but it contains potential for an important paradigm switch. Much of the effort in explaining this large-scale culturally formative movement has been placed in finding economic motives (whaling, pursuit of meteoritic iron or Viking goods, etc.) (McGhee 1969, 1984; Arnold and McCullough 1990) or social forces (demographic pressure, military conflicts, invasions (Mason 2009) that provided extraordinary circumstances to necessitate it when the climatic change offered the possibility. This, by extension, presented the Thule migration as an extra-ordinary, almost sudden development of revolutionary character. Approaching the same movement as merely taking advantage of the newly increased navigability in the bordering regions positions it as a natural extension of existing norms and practices of a highly mobile maritime people, whose sea-voyaging experience included regular journeys of 500-1000 km.

The switch is, therefore, rather a perceptual adjustment challenging scholars of Arctic prehistory to reconsider the position of mobility in the context of maritime adaptation. The prevailing notion that "maritime collecting is best undertaken from a single location," and that maritime hunters can best be understood as central-place foragers (Yesner 1980:730) places sedentism at the core of Arctic maritime cultures, presenting them as cultures of land dwellers with boats and maritime subsistence. Accepting maritime mobility as central element of these cultures, on the other hand, provides a different perception, positioning them as highly mobile maritime nations of skilled seafarers, whose engagement with the ocean went above and beyond localized prey pursuits. The range of their movement is important testimony to their extended geographic and cognitive networks, which not only facilitated diffusion of materials and cultural influences, but actually shaped people's identities through the very process of the movement, friendly and hostile interactions with other coastal nations, and kinetic and emotional engagements with various land- and seascapes.

Based on our current understanding of the archaeological record, these observations are particularly applicable to the western regions of the coastal North American Arctic over the last two millennia. However, mobility played an important role throughout the human history of the region at large. More sparsely populated areas may yield less evidence of movement, but whatever the date, character or location of the archaeological site, people travelled to arrive there, and ventured away either on a temporary or permanent basis. And in this process, both people and landscapes changed.

Replacing the focus on static moments of occupation with inquiry into movement and connectivity effectively removes the interpretation of Arctic people as primitive societies barely surviving in frozen isolation. Instead, we face robust cultures incorporated in complex international relations on a transcontinental scale. Indeed, the European dream of establishing a connection between Asia and Europe via the Northwest Passage was a reality for indigenous people of the Arctic by the 12th century AD, when both Asian metalwork and Viking products were moved along the northern shores of the American continent in skin-covered watercraft (see Chapters 2.6, 6.3., 8.4.).

9.4. Change and continuity: moving through time

Re-establishing, or perhaps merely re-articulating the role of maritime mobility in the culture history of the North American Arctic brings into focus the question of the meaning of boats. The complexity involved in every aspect of boat manufacturing and use requires a critical revision to the approach of Arctic indigenous skin-covered watercraft as mere technological devices, and poses the question of the very nature of indigenous technology. In societies where every object and element of the environment were believed to be animated agencies inherently connected to each other, both the making and using of things were more complexly linked with their purpose, than in the contemporary western understanding of technology (see Chapter 4.2, Walls 2015). Instead of performing the same function, a nominally technological object was often enlisted in all sorts of social roles and settings (Whiteridge 2004:457). An umiak, for instance, represented not just a floating craft suitable for water transport, but a spiritual connection to whales, and the social hierarchy of the whaling society (see Chapter 5.5). In long-distance travel, it became shelter, a home away from home (see Chapter 4.3). Propped on one side, the boat arched over travelers much in the same way as their semi-subterranean village abodes, providing a physical reminder of home and a less tangible connection to the very concept of people's identity, which is both anchored in a particular place and inherently mobile.

The acquisition and processing of materials necessary for boat construction bound together wood from a faraway forest, land animals, marine mammals, and birds, making the boat a thing of land and air (as much as of water), and a narrative of both human and animal journeys (see Chapter 5.2). The driftwood of which the frame was made, the whales that provided baleen for lashing, seals and walruses whose skin made up the body of the boat, caribous whose sinew stitched these skins together – were all the watercraft's ancestors, active and live forces continuing their journeys along with the people in the boat. All these elements were entangled in watercraft functionality, constituted its technological profile, and determined its performance.

This approach is markedly different from the estimates of velocity, maneuverability and cargo capacity so often used by twentieth century western researchers in characterizing watercraft performance (Dyson 1991). A boat's sturdiness, balance, weight and speed were important considerations for indigenous people of the Arctic, but in traditional practice they were equally linked both with tangible constructional solutions and social contexts and understandings. Sound wood and tight but flexible lashing were essential elements of a sturdy boat frame, but as many Native stories remind us, what really held the boat together was the relationship with the owner. Without proper treatment, the boat could turn against its master, collapse and drawn together with him (see Chapter 5.5).

Careful execution of the gunwales was practiced to ensure good balance, but emotional and social stability was also an important consideration. Two faces carved on the hatch stanchions –a smiling man and frowning woman - placed the Yup'ik kayaker in the middle ground of these emotional and gender dualities (Ibid). The hunting success of a well-balanced boat and its owner would, in turn, ensure the stability of a hunter's family and extended kin. The importance of speed in watercraft performance is evident both from constructional elements, such as boats' sharp entries and hull curvatures, and boat amulets evoking the speed of birds and sea creatures (See Chapter 8.2, Thalbitzer 1914; Rasmussen 1931).

These multiple dimensions in perception of performance and functionality are particularly important for understanding technological changes through time and space. Rather than mere adjustment, adaptive response, or cultural borrowing, such changes signal renegotiation of social scripts (Whiteridge 2004:445). Seemingly small shifts - or long-term consistency – in technological designs and solutions are meaningful evidence of extended and complex social processes.

Within the scope of this study, charting the connections between boat practices and indigenous histories of the Arctic was largely dependent on interpretation of highly fragmented archaeological data. In the St. Lawrence Island and Chukchi Sea case studies these data proved informative for understanding boat construction in the past and gaining insights into the chronological development of watercraft, elucidating both the consistency and changes in watercraft design. Some of the changes were afforded by the mobile nature of watercraft. Inquiry into the development history of the St. Lawrence kayak, for instance, shows that at different times this boat may have been influenced by a variety of regional kayak technologies ranging from Chukotka to the Aleutian Islands (see Chapter 6.10), perhaps reflecting shifts in the direction of islanders' trade and war relationships.

In the early twentieth century, contact with commercial whalers and the introduction of wooden longboats influenced a significant change in St. Lawrence Island umiaks, replacing flat-bottom construction with a bent-ribs variant (see Chapter 6.2). A comparatively recent development, this change in St. Lawrence Island umiak construction also provides insight into the role of individual creativity in the process of indigenous boat engineering. The Native peoples of Bering Strait were in contact with Europeans for over 50 years before a particular St. Lawrence Island boat builder thought to apply elements of their boat technology to Native watercraft, an invention, which was almost instantly accepted as a new constructional mainstream (see Chapter 6.2). Similarly, the introduction of the small retriever kayak in the Chukchi Sea is credited to a particular individual from Point Hope (See Chapter 7.2). These recent examples suggest that although cherished as an ancient tradition and a link to the ancestors, indigenous Arctic boat building had an inherent ability to respond to external influences and individual experimentation and creativity. This creativity may have been particularly influenced by contact with new elements – be it previously unknown or unavailable materials, or observations of other peoples' boat technology. Commercial wood and metal tools and fasteners introduced in late 19th century, and fibreglass construction techniques, which became widespread a century later, are among the most powerful agents of change in the Arctic skin boat tradition.

Not all changes in boat elements had structural meaning. Review of ritualistic treatment of the umiak bow from Chukchi Sea region shows a progression from non-figurative decoration on forward-most bottom cross-timbers to depictions of whales, which initially was carved on the same boat frame, and then later moved on the underside of the captain's seat (see Chapter 7.9). Although the image itself and its placement changed, it remained a presence enabling a boat's connection with its ultimate destination and purpose, a symbolic or spiritual compass, physically embedded into the boat frame and pointed towards the ocean, while maintaining the connection with land. At the same time, changes in the iconography and placement are not coincidental and have their own significance. The shift from non-figurative treatment to the whale figurine may refer to the growing importance of whaling as the key subsistence strategy. Likewise, the move of the whale carving from the floor timber to the underside of the captain's seat can perhaps be interpreted as strengthening of *umialiit* authority. Analysis of these seemingly small changes in design of two umiak frames, therefore, provides understanding of the chronological development of some of the most important social practices of the prehistoric North-American Arctic.

9.5. Cross-regional connections: moving through space

Tracing the changes exhibited in skin-covered watercraft at a large-scale regional level is a daunting task, particularly because of challenges associated with establishing continuous chronological horizons at such a geographic scale. The fragmentary character of archaeological record placed some additional limitations on the extent of possible comparison. In some cases, such as St. Lawrence kayak and Birnirk kayak and umiak, the data allowed for some insights into how the complete watercraft looked. In others, the comparative sample was limited to observations over particular frame members' design or artefacts' spatial positioning.

The chronologically overlapping datasets from St. Lawrence Island and Birnirk case studies show that umiaks used in these locations at the beginning of the second millennium AD had the same basic characteristics, but varied in constructional details. Both were flat-bottomed boats with trapezoid headboards, but whereas Birnirk umiak bottom cross-timbers were grooved to fit over the keel (see Fig.7.25), the St. Lawrence Island umiak floors laid flat over it (Fig.6.37, 6.39). Additionally, St. Lawrence Island umiak ribs were notched for stringers (Fig. 6.38, 6.39), while Birnirk side ribs were straight, without any particular accommodations for stringer attachment (Fig.7.26). As it has been discussed earlier, the grooved floors are a trademark of the Eastern American Arctic umiak, perhaps suggesting the transfer of this constructional detail from Alaska to Canada and Greenland during the Thule migration (see Chapter 7.8). Interestingly, St. Lawrence umiak notched ribs are also present at the eastern extend of Thule culture: some Greenlandic umiaks have similar design (see Chapter 8.3). Notched ribs of Chukotka umiaks extend geographic distribution of this design element to the Asiatic shores of Bering Strait.

The review of archaeological data pertaining to umiak propulsion suggests that both oars and sails, which are often considered to be introduced by European contact, existed in the American Arctic prior to 1440 AD (See Chapters 6.9, 7.8 and 8.3). Narrowing the timing of introduction of sail in the indigenous Arctic would require more data, but the presence of this technology during the late Thule period is informative in terms of logistics of maritime mobility.

Ethnographic kayaks from Point Barrow and the Alaskan Chukchi Sea coast exhibit a strong affinity with Canadian and Greenlandic watercraft. Unlike watercraft of Bering Strait and the Bering Sea, these boats had flat decks with a slight ridge positioned in front of the coaming. The deck beams rest on tall gunwales of a design not found in other regions of Alaska, but characteristic to the eastern American Arctic and Greenland. Archaeological evidence from the Birnirk site dated to circa 1020 AD, suggests that at that time the Chukchi Sea kayak was similar in overall design to ethnographic boats from both the Chukchi Sea and Eastern American Arctic regions in terms of flat deck, trapezoid bottom profile and stem and stern treatment. Upturned stern hand grips of Birnirk archaeological site kayak is unusual for Inupiaq kayaks, but has parallels in Mackenzie Delta and Caribou Inuit watercrafts (See Fig.7.38. and 8.5.). Notably, the reconstruction of the contemporaneous St. Lawrence Island kayak presents a different design, demonstrating that regional differences in kayak construction did exist at that time and suggesting that the affinity of watercraft design is not a coincidental or ubiquitous feature. The Birnirk kayak, thus, provides a link between ethnographically known decked boats of Chukchi Sea and watercraft of Canadian and Greenlandic Inuits, highlighting the connection of these two regions and the role boats played in development of this connection.

9.6. Conclusion: open passage

The Arctic plays an increasingly larger role in today’s world with its growing awareness of global warming. The reduction of Arctic polar sea ice brings many changes. Cruise ships and commercial vessels can now sail along the Arctic coast of North America, and the Northwest Passage has been declared “open”. In reality, the Northwest Passage has been open for navigation for several millennia. Native boats charted these waters for at least 4,000 years, connecting places and cultures in geographically and chronologically uneven, but persistent networks. The relationship with the ocean shaped the human experience in Arctic North America since the first people arrived on the continent. Reaching deep into many practices of coastal cultures, this relationship was particularly dynamically manifested in boat manufacturing and use, which left rich although fragmentary material evidence.

The goal of this study is twofold: it aspires to advance the understanding of North-American Arctic coastal cultures as dynamically linked maritime societies, and strives to demonstrate how their complex interactions could be accessed through the rarely considered archaeological skin boat record. As one of the pioneering studies on this subject it claims neither comprehensiveness nor irrevocability of conclusions, but lays out some methodological guidelines in analyzing Arctic maritime mobility through ethno-archaeological assessment of boat data, and traces the perceptual and paradigm changes emerging from this analysis. The methodological implications of this research include 1) guidelines for reconstructing skin boats' constructional details from fragmented archaeological finds (See Appendix V); and 2) a set of following observations regarding the value and potential of archaeological skin boat research:

- Arctic coastal archaeological sites of permanent or semi-permanent character, such as villages and subsistence camps, with good organic preservation are expected to yield boat data, the construction details and spatial positioning of which can allow for reconstruction of watercraft and associated practices. This, in turn, elucidates social and cultural history of the people who inhabited this location and provides an insight into larger territorial network they maintained;
- Boat data include different types of material culture – from miniature representations to full scale fragments of both umiaks and kayaks, paddles, skin fragments and tools used in seafaring and maritime hunting. The research potential of these data is greatly increased when information presented by these different boat data types is analyzed together. The practice of drawing conclusions on the basis of a single miniature, ignoring the information presented by other miniatures or full scale boat fragments tends to generate flawed conclusions. Similarly, kayak and umiak records of the same site – or nation - should be reviewed in connection with each other as material manifestation of related processes and movements;
- Identification and interpretation of archaeological boat dataset benefits from deeper engagement with ethnographic record of both local and neighboring groups. Boat technology of the past was highly dynamic in its ability to borrow constructional and ritualistic elements of other regions, and may not resemble the

most recent ethnographically known watercraft, but instead have an affinity with kayaks and umiaks of neighboring or distant nations. Indigenous stories, rituals and subsistence strategies provide important dimensions of boat construction and maritime practices, contribute greatly to understanding of archaeological record, and are parts of the same narrative.

In terms of more conceptual paradigm shifts, one of the major directions emerging from this research is the need to re-connect the prehistoric coastal Arctic with the ocean beyond its obligatory and superficial recognition as a source of subsistence. Covered with ice for three quarters of the year, Arctic waters are recognizably different from most maritime environments of our planet, but much like in lower latitudes, for people living on these coasts the ocean meant connections – to animals beyond its waves, peoples and places over the horizon, and the ever changing seascape beyond the bow of their boats. Understanding the nature and logistics of these connections is crucial for reconstructing both local and interregional histories of the Arctic, and challenging, if not impossible, without engaging data pertaining to watercraft that afforded it.

Appendix I.   Boat data from St. Lawrence Island

#	Photo Image	Object ID	Index term	function	Count	Length cm	Width cm	Height cm	Feature/ source	Unit	Depth, ft
	UNIDENTIFIED SITES, UA MUSEUM OF THE NORTH										
1		1-1927-573	umiak	Head board	1	35.5	24		Gambell		
2		1-1927-582	umiak	Head board	1	30		20	Gambell		

#	Photo	Object ID	Term	Function	Count	Length	Width	Height	Feature	Unit	Depth
3		1-1927-0872	kayak	Rib or deck piece	1	21	4		St. Lawrence Island		
4		1-1927-1723	umiak	headboard	1	22	4	18	St. Lawrence Island		
5		1-1927-1727	umiak	Bottom cross piece	1	40	8		St. Lawrence Island		

#	Photo	Object ID	Term	Function	Count	Length	Width	Height	Feature	Unit	Depth
6		1-1927-2991	umiak	headboard	1				St. Lawrence island		
7		1927 uncatalogued	miniature	umiak					St. Lawrence island		
8		uncatalogued	umiak	Rigging hooks	2	3.5-5	3	1.5	St. Lawrence island		

#	Photo	Object ID	Term	Function	Count	Length	Width	Height	Feature	Unit	Depth
9		1931 uncatalogued	miniatures	Paddle, umiak, oar lock	5				St. Lawrence island		
	KUKULIK, UA MUSEUM OF THE NORTH										
10		1-1932-303-G	umiak	Fragment of cross-bottom piece, “handle” over the chine, perforated fo the ine	1	19	6	3.5	House 2	Test Cut	
11		1-1932-358G	miniature	Paddle with v-shaped end	1	24.5	3.5		House 2	Test cut	

#	Photo	Object ID	Term	Function	Count	Length	Width	Height	Feature	Unit	Depth
12		1-1932-817-G	miniature	Paddle with "petal" shaped end	1	14	3		House 2	Test cut	
13		1-1932-818-G	miniature	Paddle with "petal" shaped end	1	18	3		House 2	Test cut	
14		1-1932-892	umiak	Head board	1	42 cm	11	16	House 2	Test cut	

#	Photo	Object ID	Term	Function	Count	Length	Width	Height	Feature	Unit	Depth
15		1-1932-1367	umiak	Bottom cross-piece	1	71	5 .5	4.5	House 2, floor	Test cut	
16		1-1932-1371	umiak	Head board	1				House 2, floor	Test cut	
17		1-1932-1483	paddle		1	61	10	3.5	House 2, floor	Test cut	
18		1-1932-1560-G	umiak	Thwart?	1	57.5	6.5	4	House 2, floor	Test cut	

#	Photo	Object ID	Term	Function	Count	Length	Width	Height	Feature	Unit	Depth
19		1-1932-1575 G	paddle	handle	1	44	4	2	House 2, floor	Test cut	
20		1-1932-1688	umiak	Fragment of gunwale (?) broken on one side, cut on another		73	3.5	4	House 2, floor	Test cut	
21		1-1932-1755	umiak	miniature	1				House 2, floor	Test cut	

#	Photo	Object ID	Term	Function	Count	Length	Width	Height	Feature	Unit	Depth
22		1-1932-2024-G	umiak	Head board	1	21	8.5	18	Recent house	Test cut	
23		1-1932-2151 1-1932-2152 1-1932-3623	umiak	Oar locks	3	39-50	5	9	Recent House	Test cut	
24		1-1932-2159	kayak	Gunwale?	1	31	1.5	3	Recent House	Test cut	

#	Photo	Object ID	Term	Function	Count	Length	Width	Height	Feature	Unit	Depth
25		1-1932-3608-G	umiak	headboard	1	1	21	8.5	Recent House	Test cut	
26		1-1932-6271	miniature	Paddle with broken end		18	2.5		House 2	Test cut	
27		1-1932-6315	miniature	Paddle with v-shaped end		21	6		House 2	Test cut	

#	Photo	Object ID	Term	Function	Count	Length	Width	Height	Feature	Unit	Depth
28		1-1932-6320-G	miniature	Paddle with v-shaped end		19	2		House 2	Test cut	
29		1-1932-7024-G	miniature	Paddle with v-shaped end		22	5		House 2 floor, north half of cut	Test cut	
30		1-1932-7028	kayak	Keel?, rectangular in cross-section		38.5	5.5	1.5	House 2 floor, north half of cut	Test cut	
31		1-1932-7046 G	boat	Paddle handle with shaft, fragment		45	3	3.75	House 2 floor, north half of cut	Test cut	
32		1-1932-7072	miniature	Paddle with “petal” shaped end		19	4		House 2 floor, north half of cut	Test cut	

#	Photo	Object ID	Term	Function	Count	Length	Width	Height	Feature	Unit	Depth
33		1-1932-7326	Umiak?	Oar shaft - ?		50	4		House 2, near bottom of cut	Test cut	
34		1-1932-7334	Umiak?	Oar shaft - ?		33	4.5		House 2, near bottom of cut	Test cut	
35		1-1932-7350	Umiak ? Kayak?	Side rib?		20	3	32	House 2, near bottom of cut	Test cut	
36		1-1932-7358	umiak	miniature		30	4	3	House 2, near bottom of cut	Test cut	

#	Photo	Object ID	Term	Function	Count	Length	Width	Height	Feature	Unit	Depth
37		1-1932-7370	miniature	Paddle with v-shaped end		16	4		House 2, near bottom of cut	Test cut	
38		1-1932-7371	miniature	Paddle with broken end		18	4.5		House 2, near bottom of cut	Test cut	
39		1-1932-8266	miniature						House 3	Test Cut	
40		1-1932-8353	miniature	Paddle with v-shaped end		19	5		"random diggings" from beach		

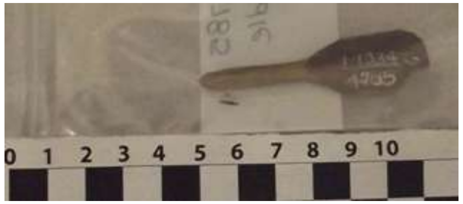
#	Photo	Object ID	Term	Function	Count	Length	Width	Height	Feature	Unit	Depth
41		1-1933-357	Paddle blade, fragment			38	10		East Slope	Test Cut	
42		1-1933-0628	umiak	Stern/stem post, top		24	10	16.5	East Slope, Recent Meat cache	Test cut	
43		1-1933-630- G	boat	Frame fragment	1	14.5	5	2	East slope	Test cut	

#	Photo	Object ID	Term	Function	Count	Length	Width	Height	Feature	Unit	Depth
44		1-1933-0632	umiak	Mast step, "nest" is 5.2 in diameter, 2.5 deep	1	28	7	4	East Slope, Recent Meat cache	Test cut	
45		1-1933-0633	umiak	oar lock or mast brace	1	36	4.5	5.5	East Slope, Recent Meat cache	Test cut	
46		1-1933-1220	Miniature fragment	umiak	1	7	3.5	1	Second and Third House debris	Test cut	
47		1-1933-1232	Miniature	paddle	1	14	1.5	0.5	Third House	Test Cut	

#	Photo	Object ID	Term	Function	Count	Length	Width	Height	Feature	Unit	Depth
48		1-1933-3351-G	miniature	Umiak	1	31.5	7	8	Fourth House	Test Cut	
49		1-1933-3437	Kayak?	Hutch or drum hoop, fragment, perforated, 12 holes	1	49 cm max diameter	3 cm	0.3	Lot # 1	Test Cut	
50		1-1933-5395-G	umiak	Head board, crude, unfinished -?	1	44	14	7	Lot # 17	Test Cut	

#	Photo	Object ID	Term	Function	Count	Length	Width	Height	Feature	Unit	Depth
51		1-1933-6647-G	umiak	Oar lock with 3 cm hole	1	37.5	3.5	5.5	Random Diggings, Lot #5	Test Cut	
52		1-1933-6649-G	Umiak	Stern/stem post with head board	1	24.5	7.5	11	Random Diggings, Lot #5	Test Cut	
53		1-1934-3631	rigging	Ivory hook	1	9.5	3	1.75	Misc.	Main midden	

#	Photo	Object ID	Term	Function	Count	Length	Width	Height	Feature	Unit	Depth
54		1-1934-4770	miniature	paddle	1	16	2		Misc.	Main midden	
55		1-1934-4776	miniature	paddle	1	18	4		Misc.	Main midden	
56		1-1934-4780	miniature	paddle	2	17			Misc.	Main midden	

#	Photo	Object ID	Term	Function	Count	Length	Width	Height	Feature	Unit	Depth
57		1-1934-4782	miniature	kayak	1	10	3		Misc.	Main midden	
58		1-1934-4784	miniature	paddle	1	15	1.5		Misc.	Main midden	
59		1-1934-4785	miniature	paddle	1	5	2		Misc.	Main midden	
60		1-1934-4788	miniature	kayak	1	11	2.5		Misc.	Main midden	

#	Photo	Object ID	Term	Function	Count	Length	Width	Height	Feature	Unit	Depth
61		1-1934-4789	miniature	paddle	1	13	2		Misc.	Main midden	
62		1-1934-4794	miniature	umiak	1	10	4		Misc.	Main midden	
63		1-1934-4796	miniature	paddle	1	16	3		Misc.	Main midden	
64		1-1934-4797	miniature	paddle	1	18	3.5		Misc.	Main midden	

#	Photo	Object ID	Term	Function	Count	Length	Width	Height	Feature	Unit	Depth
65		1-1934-4800	miniature	kayak	1	11	2.5		Misc.	Main midden	
66		1-1934-4802	miniature	kayak	1	12	2		Misc.	Main midden	
67		1-1934-4805	miniature	paddle	1	14	3		Misc.	Main midden	

#	Photo	Object ID	Term	Function	Count	Length	Width	Height	Feature	Unit	Depth
68		1-1934-4806	miniature	paddle	1	12.5	3		Sect. 500-625	Main midden	
69		1-1934-4807	miniature	kayak	1	8	3.5		Misc.	Main midden	

#	Photo	Object ID	Term	Function	Count	Length	Width	Height	Feature	Unit	Depth
70		1-1934-4811	miniature	kayak	1	10	3		Misc.	Main midden	
71		1-1934-4865	miniature	paddle	1	16	1		Misc.	Main midden	
72		2-1934-097	kayak	Gunwale frgm	1	26	2.5	3.5	Misc.	Main midden	
73		2-1934-107, 108	kayak	Gunwale frgm	2	46	3.5	2	Main midden	misc	
74		2-1934-100	kayak	Rib	1	23	3	1.5	Main midden	misc	

#	Photo	Object ID	Term	Function	Count	Length	Width	Height	Feature	Unit	Depth
75		2-1934-111	kayak	Rib or deck cross piece frgm	1	27	3.5	1.5	Main midden	misc	
76		2-1934-286	umiak	Bottom cross piece	1	33.5	5.5	4.5	Main midden	Misc.	
77	IMAGE NOT AVAILABLE	2-1934-284	Kayak?	Deck cross beam flat	1	48	3.5	1.5	Main midden	Misc	
78		2-1934-285	paddle	Blade, hole, Sharp triangular tip	1	54	11.5	1.4	Main midden	Misc	
79		2-1934-291	paddle	handle	1	55	3.5		Main midden	Misc	

#	Photo	Object ID	Term	Function	Count	Length	Width	Height	Feature	Unit	Depth
80		2-1934-357	paddle	Blade fragment	1	20	8.5	0.2	Main midden	Misc	
81		2-1934-0443	umiak	Oar lock fragment	1	11.5	11.5	1	Main midden	Misc.	
82		2-1934-2463	umiak	Rigging, whale bone hook	1	13	3	1	Main midden	Misc.	

#	Photo	Object ID	Term	Function	Count	Length	Width	Height	Feature	Unit	Depth
83		3-1934-2562	umiak	Oar lock	1	26	10.5	3	Main midden	Meat Cache 7	
84		3-1934-2965	Kayak	rib or stanchion fragment	1	14	4	1.85	Main midden	Meat cache # 17	
85		3-1934-3291	umiak	Oar lock	1	24.5	10	6.5	Main midden	Cache 10	

#	Photo	Object ID	Term	Function	Count	Length	Width	Height	Feature	Unit	Depth
86		3-1934-3357	kayak	Stanchion	1	19	2.6	0.3	Main midden	Cache 8	
87		3-1934-3741	miniature	Umiak with 1 thwart	1	15	2.5	1	Main midden	Cache 1	
88		3-1934-3874	umiak	Rib unfinished	1	70	5	1.4	Main midden	Sec. 375-625	general surface level
89		3-1934-3877	umiak	Rib	1	62	4.5	1.1	Main midden	Sec. 375-625	general surface level
90		3-1934-3888	miniature	paddle	1	21	3.5			Sect. 500-625	
91		3-1934-3894	miniature	paddle	1	20	5			Sect. 500-625	

#	Photo	Object ID	Term	Function	Count	Length	Width	Height	Feature	Unit	Depth
92		3-1934-3897	miniature	paddle	1	15	3			Sect. 500-625	
93		3-1934-3898	miniature	paddle	1	23	4			Sect. 500-625	general surface level
94		3-1934-3899	miniature	paddle	1	7	2			Sect. 500-625	
95		3-1934-3904	miniature	kayak	1	10	2.5	0.80		Sect. 500-625	general surface level

#	Photo	Object ID	Term	Function	Count	Length	Width	Height	Feature	Unit	Depth
96		3-1934-4051	miniature	paddle	1	31.5	4	0.3		Sect. 500-625	general surface level
97	IMAGE NOT AVAILABLE	3-1934-4208G	umiak	Bottom cross piece	1	51.5	4.5	3.5		Sect. 500-625	general surface level
98		3-1934-4210G	umiak	Gunwale frgm	1	42	2.6			Sect. 500-625	general surface level
99		3-1934-4227 G	miniature	kayak	1	15.5	3.5	0.4		Sect. 500-625	general surface level
100		3-1934-4249	umiak	Oar lock, wooden	1	22	8	2		Sect. 500-625	general surface level

#	Photo	Object ID	Term	Function	Count	Length	Width	Height	Feature	Unit	Depth
101		3-1934-4268	umiak	Bottom cross piece	1	53	4.5	5		Sect. 500-625	
102		3-1934-4291	umiak	Post	1	46	7	5.5		section 500 to 625	General surface level,
103		3-1934-4485	umiak	Gunwale?	1	61	5		Main midden	section 375 to 625	General surface level

#	Photo	Object ID	Term	Function	Count	Length	Width	Height	Feature	Unit	Depth
104		3-1934-4714	miniature	paddle	1	14	2			Sect. 500-625	
105		3-1934-4716	miniature	paddle	1	14	1			Sect. 500-625	
106		3-1934-4717	miniature	paddle	1	14	3			Sect. 500-625	
107		3-1934-4721	miniature	paddle	1	13	2			Sect. 500-625	
108		3-1934-4722	miniature	paddle	1	13.5	3			Sect. 500-625	

#	Photo	Object ID	Term	Function	Count	Length	Width	Height	Feature	Unit	Depth
109		3-1934-4725	miniature	paddle	1	10	2.5			Sect. 500-625	
110		3-1934-4742	miniature	kayak	1	12.8	3.6	0.80		Sect. 500-625	General surface level
111		3-1934-4956	kayak	Rib?	1	28	3.5			Sect. 500-625	General surface level
112		3-1934-4995	umiak	Post board	1	44	9.5	19		Sect. 500-625	General surface level

#	Photo	Object ID	Term	Function	Count	Length	Width	Height	Feature	Unit	Depth
113		3-1934-5000	umiak	Thwart, fragment, recycled as fire board	1	34	11	4		Sect. 500-625	
114		4-1934-5824	kayak	Deck fitting ?		12 cm	2.5 cm		West mound, east end,	under interme diate meat house	
115		5-1934-0131	umiak	Ivory hook for rigging	1				Main midden	East end	Surface to -18”

#	Photo	Object ID	Term	Function	Count	Length	Width	Height	Feature	Unit	Depth
116		5-1934-0132	umiak	bone hook for rigging					Main midden	East end	Surface to -18”
117		5-1934-1668	miniature	umiak	1	25	6	2	Main midden	East end	Surface to -18”
118		5-1934-1669	miniature	umiak	1	25	6	2	Main midden	East end	Surface to -18”

#	Photo	Object ID	Term	Function	Count	Length	Width	Height	Feature	Unit	Depth
119		5-1934-1671	miniature	kayak	1	16	4		Main midden	East end	Surface to -18”
120		5-1934-1672	miniature	kayak	1				Main midden	East end	Surface to -18”
121		5-1934-1673	miniature	kayak	1	8	2		Main midden	East end	Surface to -18”
122		5-1934-1674	miniature	kayak	1	14.5	4		Main midden	East end	Surface to -18”

#	Photo	Object ID	Term	Function	Count	Length	Width	Height	Feature	Unit	Depth
123		5-1934-1675	miniature	kayak	1	8	3		Main midden	East end	Surface to -18”
124		5-1934-1676	miniature	kayak	1	14	4		Main midden	East end	Surface to -18”
125		5-1934-1677	miniature	umiak	1	9	3		Main midden	East end	Surface to -18”
126		5-1934-1678	miniature	kayak	1	14	3		Main midden	East end	Surface to -18”
127		5-1934-1679	miniature	kayak	1	12	3		Main midden	East end	Surface to -18”

#	Photo	Object ID	Term	Function	Count	Length	Width	Height	Feature	Unit	Depth
128		5-1934-1680	miniature	kayak	1	8	3		Main midden	East end	Surface to -18”
129		5-1934-1681	miniature	kayak	1	7	2.5		Main midden	East end	Surface to -18”
130		5-1934-1682	miniature	kayak	1	11	3		Main midden	East end	Surface to -18”

#	Photo	Object ID	Term	Function	Count	Length	Width	Height	Feature	Unit	Depth
131		5-1934-1683	miniature	umiak	1	7	3	1.5	Main midden	East end	Surface to -18”
132		5-1934-1684	miniature	umiak	1	8	3		Main midden	East end	Surface to -18”
133		5-1934-1685	miniature	kayak	1	8	2.5		Main midden	East end	Surface to -18”

#	Photo	Object ID	Term	Function	Count	Length	Width	Height	Feature	Unit	Depth
134		5-1934-1686	miniature	kayak	1	12	2		Main midden	East end	Surface to -18”
135		5-1934-1687	miniature	kayak	1	15	3.5		Main midden	East end	Surface to -18”
136		5-1934-1688	miniature	kayak	1	10	2		Main midden	East end	Surface to -18”
137		5-1934-1689	miniature	kayak	1	13	2		Main midden	East end	Surface to -18”

#	Photo	Object ID	Term	Function	Count	Length	Width	Height	Feature	Unit	Depth
138		5-1934-1690	miniature	umiak keel fragment	1	22	2	6	Main midden	East end	Surface to -18”
139		5-1934-1692	miniature	umiak head board		4	3		Main midden	East end	Surface to -18”
140		5-1934-1693	miniature,	umiak head board	1	6 cm	5.5 cm		Main midden	East end	Surface to -18”

#	Photo	Object ID	Term	Function	Count	Length	Width	Height	Feature	Unit	Depth
141		5-1934-1694	miniature umiak	umiak head board	1	3.5 cm	2.5 cm		Main midden	East end	Surface to -18”
142		5-1934-2159	umiak	oarlock, 3.5 cm diametr	1	40	4.5	7	East end		0-18”
143		5-1934-2160, 5-1934-2161	umiak	oarlock	2				East end		0-18”

#	Photo	Object ID	Term	Function	Count	Length	Width	Height	Feature	Unit	Depth
144		5-1934-2162	umiak	mast step, 4.47 cm nest diameter	1	25.6	25.5	6	East end		0-18”
145		5-1934-2163	umiak	oarlock, 3 cm hole diameter	1	55	4.5	7	East end		0-18”
146		5-1934-2164	kayak	Deck ridge	1	35	8		East end		0-18”
147		5-1934-2166	umiak	Bottom cross piece	1	37.5	4	4.2	East end		0-18”

#	Photo	Object ID	Term	Function	Count	Length	Width	Height	Feature	Unit	Depth
148		5-1934-2167	umiak	Bottom cross piece	1	35.5	3.5	3.5	East end		0-18”
149		5-1934-2168	umiak	Bottom cross piece	1	32	5	3.5	East end		0-18”
150		5-1934-2169-G, 2170, 2171-G, 2172	umiak	rib	4	60-61 cm	7	5	East end		0-18”
151		5-1934-2174,2175,2176,2177	umiak	ribs	2	68	7	2.5	East end		0-18”
152		5-1934-2180	umiak	bottom cross piece fragment	1	27	8	2.5	East end		0-18”

#	Photo	Object ID	Term	Function	Count	Length	Width	Height	Feature	Unit	Depth
153		5-1934-2185	umiak	cross-bottom piece	1	67	4	3.5	East end		0-18"
154		5-1934-2186	umiak	paddle/ oar blade	1	67	11	0.2	East end		0-18"
155		5-1934-5861	umiak	Oarlock, Hole diameter 2.5 cm	1	52	9	6	West mound, east end	under intermediate meat house	
156		MC 1934-3 G	umiak	miniature	1	35	9	6	Main midden	Modern meat cache	
157		MC 1934-11	umiak	oar lock, hole 3 cm	1	43.5	4.25	5	Main midden	Modern meat cache	

#	Photo	Object ID	Term	Function	Count	Length	Width	Height	Feature	Unit	Depth
158		1-1935-012	umiak	miniature	1	41	7.5	5.5	Northeast beach slope		
159		1-1935-013	boat	Paddle, fragment	43.5	10.5	0.7		Northeast Beach Slope		
160		1-1935-0303	miniature	Paddle blade		7	3		House 6, Recent		
161		1-1935-321 1-1935-323	miniature	paddles	2	18 15	5.5 4		House 6, Recent		

#	Photo	Object ID	Term	Function	Count	Length	Width	Height	Feature	Unit	Depth
162		1-1935-326 1-1935-327 1-1935-328 1-1935-331	miniature	paddles	4	16 17 14 12			House 6, Recent		
163		1-1935-0409	miniature	keel with the post, likely kayak	26	2	15		House 6, Recent		

#	Photo	Object ID	Term	Function	Count	Length	Width	Height	Feature	Unit	Depth
164		1-1935-1756	Umiak?	Thwart?	1	23	16		East end		
165		1-1935-1847	miniature	paddle	1	16.5	2		East end		
166		1-1935-1848	miniature	paddle	1	13	2.5		East end		
167		1-1935-1849	miniature	paddle	1	13	2.5		East end		
168		1-1935-1850	miniature	paddle	1	13	2		East end		

#	Photo	Object ID	Term	Function	Count	Length	Width	Height	Feature	Unit	Depth
169		1-1935-1851	miniature	paddle	1	13	3		East end		
170		1-1935-1852	miniature	paddle	1	16	2		East end		
171		1-1935-1853	miniature	paddle	1	11	1.5		East end		
172		1-1935-1854	miniature	paddle	1	14.5	2		East end		

#	Photo	Object ID	Term	Function	Count	Length	Width	Height	Feature	Unit	Depth
173		1-1935-1855	miniature	paddle	1	13	3		East end		
174		1-1935-1856	miniature	paddle	1	18	2		East end		
175		1-1935-1857	miniature	paddle	1	17	5		East end		
176		1-1935-1858	miniature	paddle	1	16	2.5		East end		
177		1-1935-1859	miniature	paddle	1	22	4		East end		

#	Photo	Object ID	Term	Function	Count	Length	Width	Height	Feature	Unit	Depth
178		1935-1860	miniature	paddle	1	20	2		East end		
179		1935-1861	miniature	paddle	1	26	4		East end		
180		1-1935-1862	miniature	paddle	1	24	2		East end		
181		1-1935-2157	miniature	paddle	1	16	3		Main midden	Section 3 and 4	
182		1-1935-2158	miniature	paddle	1	13	5		Main midden	Section 3 and 4	

#	Photo	Object ID	Term	Function	Count	Length	Width	Height	Feature	Unit	Depth
183		1-1935-2159	miniature	paddle	1	16	3		Main midden	Section 3 and 4	
184		1-1935-2160	miniature	paddle	1	18	3		Main midden	Section 3 and 4	
185		1-1935-2176	miniature	paddle	1	24	2		Main midden	Section 3 and 4	
186		1-1935-2189	miniature	Kayak, wooden	1	18.5	4	2	Main midden	Section 3 and 4	
187		1-1935-3249	miniature	paddle	1	8	5		Main midden	Sect. 3 & 4-5-6	

#	Photo	Object ID	Term	Function	Count	Length	Width	Height	Feature	Unit	Depth
188		1-1935-3250	miniature	paddle	1	22	4		Main midden	Sect. 3 & 4-5-6	
189		1-1935-3252	miniature	paddle	1	14	4		Main midden	Sect. 3 & 4-5-6	
190		1-1935-3253	miniature	paddle	1	14	2		Main midden	-Sect. 3 & 4-5-6	
191		1-1935-3254	miniature	paddle	1	9.5	2.5		Main midden	-Sect. 3 & 4-5-6	
192		1-1935-3255	miniature	paddle	1	15	3		Main midden	-Sect. 3 & 4-5-6	

#	Photo	Object ID	Term	Function	Count	Length	Width	Height	Feature	Unit	Depth
193		1-1935-3256	miniature	paddle	1	20	3		Main midden	-Sect. 3 & 4-5-6	
194		1-1935-3257	miniature	paddle	1	11	4.5		Main midden	-Sect. 3 & 4-5-6	
195		1-1935-3258	miniature	paddle	1	10.5	3.5		Main midden	-Sect. 3 & 4-5-6	
196		1-1935-3259	miniature	paddle	1	14	2.5		Main midden	-Sect. 3 & 4-5-6	
197		1-1935-3261	miniature	paddle	1	9	2		Main midden	-Sect. 3 & 4-5-6	

#	Photo	Object ID	Term	Function	Count	Length	Width	Height	Feature	Unit	Depth
198		1-1935-3262	miniature	paddle	1	11	3		Main midden	-Sect. 3 & 4-5-6	
199		1-1935-3260	miniature	paddle	1	22	3		Main midden	-Sect. 3 & 4-5-6	
200		1-1935-3263	miniature	paddle	1	20	4		Main midden	-Sect. 3 & 4-5-6	
201		1-1935-3264	miniature	paddle	1	16	2		Main midden	-Sect. 3 & 4-5-6	

#	Photo	Object ID	Term	Function	Count	Length	Width	Height	Feature	Unit	Depth
202		1-1935-3265	miniature	paddle	1	13.5	2		Main midden	-Sect. 3 & 4-5-6	
203		1-1935-3266	miniature	paddle	1	13.5	4		Main midden	-Sect. 3 & 4-5-6	
204		1-1935-3267	miniature	paddle	1	15	4		Main midden	-Sect. 3 & 4-5-6	
205		1-1935-3268	miniature	paddle	1	20	3		Main midden	-Sect. 3 & 4-5-6	
206		1-1935-3269	miniature	paddle	1	10	3		Main midden	-Sect. 3 & 4-5-6	
207		1-1935-3270	miniature	paddle	1				Main midden	-Sect. 3 & 4-5-6	

#	Photo	Object ID	Term	Function	Count	Length	Width	Height	Feature	Unit	Depth
208		1-1935-3271	miniature	paddle	1	16.5	2		Main midden	-Sect. 3 & 4-5-6	
209		1-1935-3272	miniature	paddle	1	13	3		Main midden	-Sect. 3 & 4-5-6	
210		1-1935-3273	miniature	paddle	1	16.5	4		Main midden	-Sect. 3 & 4-5-6	
211		1-1935-3274	miniature	paddle	1	15	5		Main midden	-Sect. 3 & 4-5-6	
212		1-1935-3275	miniature	paddle	1	16	3.5		Main midden	-Sect. 3 & 4-5-6	

#	Photo	Object ID	Term	Function	Count	Length	Width	Height	Feature	Unit	Depth
213		1-1935-3276	miniature	paddle	1	16	5		Main midden	-Sect. 3 & 4-5-6	
214		1-1935-3277	miniature	paddle	1	11.5	4.5		Main midden	-Sect. 3 & 4-5-6	
215		1-1935-3278	miniature	paddle	1	14	4		Main midden	-Sect. 3 & 4-5-6	
216		1-1935-3626	Kayak	deck cross piece	1	27	3.5	3	Main midden	-Sect. 3 & 4-5-6	
217		1-1935-3627	Kayak-?	deck cross piece	1	20	2.4	0.8	Main midden	-Sect. 3 & 4-5-6	
218		1-1935-3628	umiak	side rib?	1	35	3.5	0.75	Main midden	-Sect. 3 & 4-5-6	

#	Photo	Object ID	Term	Function	Count	Length	Width	Height	Feature	Unit	Depth
219		1-1935-3629	umiak	oar lock	1	16.5	2	6	Main midden	-Sect. 3 & 4-5-6	
220	IMAGE NOT AVAILABLE	1-1935-3639	umiak	mast brace or gunwale cleat	1	21	2	4.5	Main midden	-Sect. 3 & 4-5-6	
221	IMAGE NOT AVAILABLE	1-1935-3657	miniature	umiak	1	28	7	3.5	Main midden	-Sect. 3 & 4-5-6	
222		1-1935-3658	miniature	kayak?	1	11	4		Main midden	-Sect. 3 & 4-5-6	
223		1-1935-3660	miniature	kayak?	1	10	3		Main midden	-Sect. 3 & 4-5-6	

#	Photo	Object ID	Term	Function	Count	Length	Width	Height	Feature	Unit	Depth
224		1-1935-3661	miniature	kayak?	1	10	2		Main midden	-Sect. 3 & 4-5-6	
225		1-1935-3662	miniature	kayak?	1	10	4		Main midden	-Sect. 3 & 4-5-6	
226		1-1935-3657	miniature	umiak	1	24	7	5	Main midden	-Sect. 3 & 4-5-6	
227		1-1935-3658	miniature	kayak	1	11	4		Main midden	-Sect. 3 & 4-5-6	

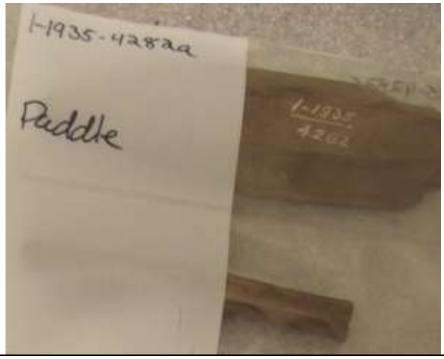
#	Photo	Object ID	Term	Function	Count	Length	Width	Height	Feature	Unit	Depth
228		1-1935-3660	miniature	kayak	1	12	2.5		Main midden	-Sect. 3 & 4-5-6	
229		1-1935-3661	miniature	umiak	1	10	2.5		Main midden	-Sect. 3 & 4-5-6	
230		1-1935-3662	miniature	kayak	1	10	4		Main midden	-Sect. 3 & 4-5-6	
231		1-1935-3677	miniature	umiak keel frgm	1	14	7	1	Main midden	Sect. 3 & 4-5-6	

#	Photo	Object ID	Term	Function	Count	Length	Width	Height	Feature	Unit	Depth
232		1-1935-3679	miniature	paddle	1	7	1.5		Main midden	-Sect. 3 & 4-5-6	
233		1-1935-3680	miniature	paddle	1	10	1		Main midden	-Sect. 3 & 4-5-6	
234		1-1935-3681	miniature	paddle	1	9	2		Main midden	Sect. 3 & 4-5-6	
235	IMAGE NOT AVAILABLE	1-1935-3730	umiak	Side rib frgm	1	27	5	0.5	Main midden	-Sect. 3 & 4-5-6	
236		1-1935-3829	paddle	Handle fragment	1	13	7		Main midden	Sect. 3 & 4-5-6	
237		1-1935-3830	paddle	Handle fragment	1	15	4.5		Main midden	Sect. 3 & 4-5-6	

#	Photo	Object ID	Term	Function	Count	Length	Width	Height	Feature	Unit	Depth
238		1-1935-3831	paddle	Handle fragment	1	10	4		Main midden	Sect. 3 & 4-5-6	
239		1-1935-3923	umiak	Stern piece	1	75	6.5	45	Main midden	Sect. 3-4-5	
240		1-1935-3973	Umiak	Bottom cross piece, frgm.	1	31	4	4	Main midden	Sect. 3-4-5	
241		1-1935-4105	paddle	Blade of a composite paddle?	1	46	4.5	2	Main midden	Sect. 3-4	

#	Photo	Object ID	Term	Function	Count	Length	Width	Height	Feature	Unit	Depth
242		1-1935-4237	miniature	umiak	1	14.5	4		Main midden	Sect. 3-4-5	
243		1-1935-4238	miniature	kayak	1	20	3		Main midden	Sect. 3-4-5	
244		1-1935-4239	miniature	kayak	1	15	3		Main midden	Sect. 3-4-5	
245		1-1935-4240	miniature	kayak	1	12	4		Main midden	Sect. 3-4-5	
246		1-1935-4241	miniature	kayak	1	13	4.5		Main midden	Sect. 3-4-5	
247		1-1935-4243	miniature	kayak	1	11.5	3		Main midden	Sect. 3-4-5	
248		1-1935-4244	miniature	kayak	1	11.5	2.75		Main midden	Sect. 3-4-5	

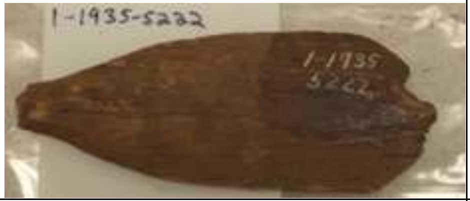
#	Photo	Object ID	Term	Function	Count	Length	Width	Height	Feature	Unit	Depth
249		1-1935-4236	miniature	umiak	1	21	5		Main midden	Sect. 3-4-5	
250		1-1935-4289	miniature	paddle	1				Main midden	Sect. 3-4-5	
251		1-1935-4290	miniature	paddle	1				Main midden	Sect. 3-4-5	
252		1-1935-4291	miniature	paddle	1				Main midden	Sect. 3-4-5	

#	Photo	Object ID	Term	Function	Count	Length	Width	Height	Feature	Unit	Depth
253		1-1935-4282	miniature	paddle	1	10	3		Main midden	Sect. 3-4-5	
254		1-1935-4283	miniature	paddle	1	20	5		Main midden	Sect. 3-4-5	
255		1-1935-4284	miniature	paddle	1	20	3		Main midden	Sect. 3-4-5	
256		1-1935-4285	miniature	paddle	1	16	3		Main midden	Sect. 3-4-5	

#	Photo	Object ID	Term	Function	Count	Length	Width	Height	Feature	Unit	Depth
257		1-1935-4286	miniature	paddle	1	12	5		Main midden	Sect. 3-4-5	
258		1-1935-4288	miniature	paddle	1	20	3		Main midden	Sect. 3-4-5	
259		1-1935-4289	miniature	paddle	2	10	3		Main midden	Sect. 3-4-5	

#	Photo	Object ID	Term	Function	Count	Length	Width	Height	Feature	Unit	Depth
260		1-1935-4290	miniature	Paddle frgm.	1				Main midden	Sect. 3-4-5	
261		1-1935-4291	miniature	Paddle frgm.	1				Main midden	Sect. 3-4-5	
262		1-1935-4292	miniature	Paddle frgm.	1	5	2		Main midden	Sect. 3-4-5	
263		1-1935-4293	miniature	Paddle frgm.	1	12	4		Main midden	Sect. 3-4-5	

#	Photo	Object ID	Term	Function	Count	Length	Width	Height	Feature	Unit	Depth
264		1-1935-4294	miniature	Paddle frgm.	1	11	4		Main midden	Sect. 3-4-5	
265		1-1935-4295	miniature	paddle	1	15	2		Main midden	Sect. 3-4-5	
266		1-1935-4307	miniature	paddle	1	25	1		Main midden	Sect. 3-4-5	
267		1-1935-4308	miniature	paddle	1	18	2		Main midden	Sect. 3-4-5	

#	Photo	Object ID	Term	Function	Count	Length	Width	Height	Feature	Unit	Depth
268		1-1935-4309	miniature	paddle	1	16	2		Main midden	Sect. 3-4-5	
269		1-1935-4310	miniature	paddle	1	20	2.5		Main midden	Sect. 3-4-5	
270		1-1935-4311	miniature	paddle	1	21	2.5		Main midden	Sect. 3-4-5	
271		1-1935-5221	miniature	paddle	1	9	3			Sect. 5 & 6	
272		1-1935-5222	miniature	paddle	1	13	4.5			Sect. 5 & 6	
273		1-1935-5223	miniature	paddle	1	12	3			Sect. 5 & 6	

#	Photo	Object ID	Term	Function	Count	Length	Width	Height	Feature	Unit	Depth
274		1-1935-5224	miniature	paddle	1	18	4			Sect. 5 & 6	
275		1-1935-5225	miniature	paddle	1	16	4			Sect. 5 & 6	
276		1-1935-5226	miniature	paddle	1	13	4			Sect. 5 & 6	
277		1-1935-5227	miniature	paddle	1	19	4			Sect. 5 & 6	
278		1-1935-5228	miniature	paddle	1	20	4			Sect. 5 & 6	

#	Photo	Object ID	Term	Function	Count	Length	Width	Height	Feature	Unit	Depth
279		1-1935-5229	miniature	paddle	1	18	4			Sect. 5 & 6	
280		1-1935-5230	miniature	paddle	1	17	2.5			Sect. 5 & 6	
281		1-1935-5231	miniature	paddle	1	19	2			Sect. 5 & 6	
282		1-1935-5232	miniature	paddle	1	15	6			Sect. 5 & 6	
283		1-1935-5233	miniature	paddle	1	14	2.5			Sect. 5 & 6	

#	Photo	Object ID	Term	Function	Count	Length	Width	Height	Feature	Unit	Depth
284		1-1935-5234	miniature	paddle	1	8	3.5			Sect. 5 & 6	
285		1-1935-5235	miniature	paddle	1	13	6			Sect. 5 & 6	
286		1-1935-5236	miniature	paddle	1	9	2			Sect. 5 & 6	

#	Photo	Object ID	Term	Function	Count	Length	Width	Height	Feature	Unit	Depth
287		1-1935-5237	miniature	paddle	1	12	2			Sect. 5 & 6	
288		1-1935-5239	miniature	paddle	1	19	4			Sect. 5 & 6	
289		1-1939-5240	miniature	paddle	1	19	2			Sect. 5 & 6	
290		1-1935-6156	miniature	paddle	1	24	3			East end	random
291		1-1935-6157	miniature	paddle	1	25	2			East end	random
292		1-1935-6158	miniature	paddle	1	21	3			East end	random

#	Photo	Object ID	Term	Function	Count	Length	Width	Height	Feature	Unit	Depth
293		1-1935-6159	miniature	paddle	1	15	4			East end	random
294		1-1935-6160	miniature	paddle	1	14	1.5			East end	random
295		1-1935-6213	miniature	paddle	1	29	3	0.6		East end	Misc
296		1-1935-6244	boat	Paddle, fragment		35	5.5			Section 1 & 2	beach slope

#	Photo	Object ID	Term	Function	Count	Length	Width	Height	Feature	Unit	Depth
297		1-1935-6245	paddle	fragment, worn out, but the central ridge is still visible on the blade	1	40	8			Section 1 & 2	beach slope
298	IMAGE NOT AVAILABLE	1-1935-6922	umiak	Oar lock	1	34	4.5	3		Meat Cache 20 recent	
299		1-1935-7370	Umiak	Side rib frgm	1	27	7.5			Meat Cache 35	
300		1-1935-7714	miniature	paddle	1	19	2			House 6 Shed	

#	Photo	Object ID	Term	Function	Count	Length	Width	Height	Feature	Unit	Depth
301	IMAGE NOT AVAILABLE	1-1935-7885	Kayak?	gunwale		39	1.5	2.5		House 3	
302		1-1935-8468	miniature	paddle	1	25	4.5	0.2	House 7	Meat cashes 36 and 38	
303		1-1935-8473	paddle	Bade frgm reworked	1	25	9.5		House 7	Meat cashes 36 and 38	
304		1-1935-8478	Umiak?	thwart fragment used as fireboard	1	29.5	10	2.2	House 7	Meat cashes 36 and 38	

#	Photo	Object ID	Term	Function	Count	Length	Width	Height	Feature	Unit	Depth
305		1-1935-8501	umiak	Side rib	1	60	6.5		House 7	Meat cashes 36 and 38	
306		1-1935-8510	Umiak?	Stern seat?	1	38.5	17	2.5	House 7	Meat cashes 36 and 38	
307	IMAGE NOT AVAILABLE	1-1935-8594	Paddle?	Shaft?	1	44.5	3		House 4		
308		1-1935-8743	miniature	kayak	1	16.5	2		East end	Misc.	
309		1-1935-8744	miniature	kayak	1	15	3		East end	Misc.	

#	Photo	Object ID	Term	Function	Count	Length	Width	Height	Feature	Unit	Depth
310		1-1935-8996	Miniature, umiak	Model, wooden, flat bottom	1	32	9	4.5	Random collections		
311		01999-200	Miniature boat	Bowl or bot effigy, wood, red with carved out “tails” and black image of P gragon on both sides, opening on the bottom, pegs	1	53	15	8-9	Structure near entrance to house 3		

#	Photo	Object ID	Term	Function	Count	Length	Width	Height	Feature	Unit	Depth
312		3-1935-0044	umiak	Cross-bottom piece, “standard” Kukulik design without keel groove, but with diagonal lashing holes	1	34	6	4	Main midden	“Thule” Cache 35	
313		3-1935- 0046	kayak	Ridged deck piece with a notch for longitudinal deck piece	1	15.5	2	4.5 (from end to top of arch)	Main midden	“Thule” Cache 35	
314		1-1939-1238	umiak	Bottom cross piece	1	37	8	6	Test Cut	walls of House 4	6'-9'

#	Photo	Object ID	Term	Function	Count	Length	Width	Height	Feature	Unit	Depth
315		1-1939-1245	umiak	Thwart fragment	1	31	9.5		Test Cut	walls of House 4	6'-9'
316	IMAGE NOT AVAILABLE	1-1939-1248	umiak	Thwart ? complete	1	29	12		Test Cut	walls of House 4	6'-9'
317		1-1939-1469	miniature	Kayak?	1	23.5	5		4th house, 9th level	Test cut	9-10’

#	Photo	Object ID	Term	Function	Count	Length	Width	Height	Feature	Unit	Depth
318		1-1939-1633	umiak	Side rib frgm	1	6	5	1	Meat Cache	Test Cut	7'-9'
319	IMAGE NOT AVAILABLE	1-1939-1639	Umiak?	Side rib frgm	1	45	8	0.5	Test Cut	Meat Cache	7’-9’
320		1-1939-2951	kayak	gunwale	1	18			Ketngipalak		
321		1-1939-2955	kayak	Side rib	1				Ketngipalak		

#	Photo	Object ID	Term	Function	Count	Length	Width	Height	Feature	Unit	Depth
322		1968-70-1343	umiak	Headboard fragment	1	31.5	13.5	2	1934 excavations no insitu provenience		
323		1968-70-1344	umiak	Headboard	1	34.5	13.5	1.6	1934 excavations no insitu provenience		
324		1968-70-1345	miniature	Paddle blade	1	21	4.5	0.1	1934 excavations no insitu provenience		

#	Photo	Object ID	Term	Function	Count	Length	Width	Height	Feature	Unit	Depth
325		1968-70-1407	Kayak?	Rib?	1	25	3.5	0.5	1934 excavations no insitu provenience		
326		1968-70-1413	Kayak?	Deck cross piece	1	23.5	1.5	0.5	1934 excavations no insitu provenience		
327		1968-70-1320	Umiak?	Oar lock?	1	29	18	1.5	1934 excavations no insitu provenience		
	KUKULIK, NMNH										
328		A344600	umiak	Ivory handle with carving of umiak and whale tail on upper	1	11.7	1.9				

#	Photo	Object ID	Term	Function	Count	Length	Width	Height	Feature	Unit	Depth
				end							
329	IMAGE NOT AVAILABLE	A344601-0	kayak	Ivory Boat Attachme nt	2	7					
330		A347612	miniature	paddle	2	27 16	4.5 3				
331		A356532	miniature	miniature paddle	1	13	2				

#	Photo	Object ID	Term	Function	Count	Length	Width	Height	Feature	Unit	Depth
332		A356547-0	miniature	umiak?	1						
333		A356558-0	umiak	bottom cross piece	1	1	31				
334	IMAGE NOT AVAILABLE	A356572-0	miniature	kayak	1						
	OLD VILLAGE SITE, NMNH										
335		A333165	Miniature	Umiak	1	6 cm	1.5 cm			8	

#	Photo	Object ID	Term	Function	Count	Length	Width	Height	Feature	Unit	Depth
PUNUK, NMNH											
336		A342773	miniature	umiak post	3				House 2		
337		A343408	Skin cover with needle		1	24	10		House 5	“Below floor”	Last layer
338	IMAGE NOT AVAILABLE	A343645-0	miniature	ivory boat-shaped Object	1						

#	Photo	Object ID	Term	Function	Count	Length	Width	Height	Feature	Unit	Depth
339		A343844	miniature	paddle, fragment	1						
340		A344204	umiak	bottom cross piece	1						
341	IMAGE NOT AVAILABLE	A356695-0	boat	ivory boat hook	1						
KIALEGAK, NMNH											
342		A342829	miniature	Miniature paddle	1	12.7	18.1				

#	Photo	Object ID	Term	Function	Count	Length	Width	Height	Feature	Unit	Depth
343		A342882	miniature	paddle	3	17 -9					
344		A342891	miniature	paddle	3						

#	Photo	Object ID	Term	Function	Count	Length	Width	Height	Feature	Unit	Depth
345		A342906	miniature	paddle	10						
346		A342938	miniature	paddle	1						
347		A342954	miniature	paddle	3						

#	Photo	Object ID	Term	Function	Count	Length	Width	Height	Feature	Unit	Depth
348		A346417	umiak	ivory rigging hook	2	9	2.5	1.4	north village	Cut B	"upper half"
349		A346428	miniature	paddle	16	Max 18 Min 8					

#	Photo	Object ID	Term	Function	Count	Length	Width	Height	Feature	Unit	Depth
350		A346436	miniature	paddle	24	Max 20.5 Min. 8.5					
351	IMAGE NOT AVAILABLE	A346462-0	umiak	ivory rigging hook	1						
352		A346498-0	umiak	ivory rigging hook	4	7.5	2.2				
353		A346499	umiak	ivory rigging hook	1	3.5					

#	Photo	Object ID	Term	Function	Count	Length	Width	Height	Feature	Unit	Depth
354		A346891	miniature	umiak	1	20	8		south midden	Cut 2	lower half
355		A346893 a	kayak	hutch stanchion	1	15	3.3		south midden	Cut 2	lower half
356		A346893b	kayak	rib fragment	1	17.5	2.7		south midden	Cut 2	lower half

#	Photo	Object ID	Term	Function	Count	Length	Width	Height	Feature	Unit	Depth
357		A347028	kayak	prow fragment	1	25	2	19	Cut 4	Sec. 2	2-4 ft
	MIYOWAGH, NMNH										
358		A353042	kayak	gunwale fragment	1	15	3.5		Cut 1	Sec. B	
359	IMAGE NOT AVAILABLE	A353134-0	Canoe Model	Piece Of Toy Bark Canoe	1						

#	Photo	Object ID	Term	Function	Count	Length	Width	Height	Feature	Unit	Depth
360		A353596	miniature	kayaker figurine	1	5.5 cm					
361	IMAGE NOT AVAILABLE	A353667-0	umiak	ivory rigging hook	1						
362	IMAGE NOT AVAILABLE	A353684-0	umiak	ivory rigging hook	1						
363	IMAGE NOT AVAILABLE	A353925-0	umiak	ivory rigging hook	1						
364	IMAGE NOT AVAILABLE	A354011-0	miniature	umiak	1						

#	Photo	Object ID	Term	Function	Count	Length	Width	Height	Feature	Unit	Depth
365	IMAGE NOT AVAILABLE	A354101-0	Boat Hook	Ivory Meat Or Boat Hook	1						
366	IMAGE NOT AVAILABLE	A354173-0	Boat Hook	Ivory Boat Hook*	1						
367		A354224	Kayak?	kayak hutch or drum hoop	1	38	3				
368		A354275	"wooden shaft painted red"	Kayak stringer?	1	20	1.5				
369	IMAGE NOT AVAILABLE	A354288-0	boat	Ivory Meat Hook Or Boat Hook	1						

#	Photo	Object ID	Term	Function	Count	Length	Width	Height	Feature	Unit	Depth
370		A354295-0	miniature	umiak	1	11	3.5		Cut 17 M	Sec. 2	
371	IMAGE NOT AVAILABLE	A354365-0	miniature	kayak	1						
372	IMAGE NOT AVAILABLE	A354398-0	umiak	ivory rigging hook	2						
373	IMAGE NOT AVAILABLE	A354504-0	umiak	ivory rigging hook	1						
374		A369741	miniature	umiak headboard	1	8.5	4	0.5	Cut 18	Sec. 6	2’8”

#	Photo	Object ID	Term	Function	Count	Length	Width	Height	Feature	Unit	Depth
375		A369644	paddle	blade tip	1						
376		A369745	kayak	frame fragment (?)	1	14.5	9.5				

#	Photo	Object ID	Term	Function	Count	Length	Width	Height	Feature	Unit	Depth
377		A369745 b	miniature	stern or stem	1	10	0.4	3.5	Cut 18	Sec. 6	2’8”
378	IMAGE NOT AVAILABLE	A369759	miniature	umiak	2				Cut 18	Sec. 7	3’
379		A369827	kayak	stern fragment ?	1	19 cm	7.5 cm		Cut 18	Sec. 10	3’

#	Photo	Object ID	Term	Function	Count	Length	Width	Height	Feature	Unit	Depth
380		A369828	miniature	kayak?	1				Cut 18	Sec. 10	3’
381	IMAGE NOT AVAILABLE	A369829	miniature	kayaker figurine	1				Cut 18	Sec. 10	3’
382		A369880	miniature	kayak	1	24.7	3.5				
383		A370097	kayak	cockpit stanchion	1	14.5	4.5				
384		A370149	miniature	umiak	1	7.5	2	1	Cut 19	Sec.13	4’6”

#	Photo	Object ID	Term	Function	Count	Length	Width	Height	Feature	Unit	Depth
385		A370193	kayak	cockpit stanchion? Deck beam?	1	15	2.4		Cut 19	Sec. 15	4’11”
386		A 370242-a	kayak	gunwale fragment	2	45	8		Cut 19	Sec. 18	6’ 1”
387		A 370242-b	kayak	keel fragment	1	41	4.5		Cut 19	Sec. 18	6’ 1”
388		A 370242-c	kayak	keel fragment	1	47.5	4.5		Cut 19	Sec. 18	6’ 1”
389	IMAGE NOT AVAILABLE	A370363	miniature	umiak bottom cross piece	1				Cut 19	Section 20	6’7”

#	Photo	Object ID	Term	Function	Count	Length	Width	Height	Feature	Unit	Depth
390		A 370384	umaik	rib fragment	1	14	3.5				
391		A370626	miniature	kayak?	1	17	3		Cut 23	Sec. 10	4’10”
392		A 370627	kayak	deck beam?	1	15.5	3		Cut 23	Sec. 10	4’10”
393		A370628	paddle	blade fragment	1	22	7.5	1.5	Cut 23	Sec. 10	4’10”

#	Photo	Object ID	Term	Function	Count	Length	Width	Height	Feature	Unit	Depth
394		A370699	paddle	blade fragment	1	33	8	3	Cut 23	Sec. 16	6’9”
395		A370702	paddle	Shaft fragment	1	28.5	3.5		Cut 23	Sec. 16	6’9”
396		A370825	miniature	kayak?	1	11	2	0.5	Cut 24	Sec. 1	6’
397		A370911	miniature	paddle	1	25	3.5				

#	Photo	Object ID	Term	Function	Count	Length	Width	Height	Feature	Unit	Depth
398		A370941	miniature	kayak?	1	18	2.5		Cut 25	Sec. 12	7’
399		A371050	miniature	umiak cross piece	1	6	1.8				
400		A371150	umiak	rib	1	28	3.5	2.5	Cut 27	Sec. 10	3’10”
	IEVOGHYAGET, NMNH										
401	IMAGE NOR AVAILABLE	A354718-0	miniature	kayak	1						

#	Photo	Object ID	Term	Function	Count	Length	Width	Height	Feature	Unit	Depth
402		A355338-0	miniature	kayak	1				Cut 5, I	Sec.5	
403		A355460	miniature	umiak	1						
404		A355635	paddle	blade tip					Cut 6.I	Sec. 5	

#	Photo	Object ID	Term	Function	Count	Length	Width	Height	Feature	Unit	Depth
405		A355637	kayak	rib fragment					Cut 6.I	Sec. 5	
406		A355641	kayak	deck cross piece		19	2.5		Cut 6.I. (base)	Sec.6	
407		A355720	paddle	blade		59	9.5		House #7		
408		A355721	paddle	shaft		35	3		House #7		
409		A355722	umiak	headboard recycled as fireboard	1	37	14		House 7		

#	Photo	Object ID	Term	Function	Count	Length	Width	Height	Feature	Unit	Depth
410		A371283	miniature	umiak	1	18.5	4.5	3			
411		A371284	kayak	Kayak deck piece (?)	1	34.5	7				
	SEKLOWAGHYaGET, NMNH										
412	IMAGE NOT AVAILABLE	A355832-0	Boat	Draging hook	1						

#	Photo	Object ID	Term	Function	Count	Length	Width	Height	Feature	Unit	Depth
413		A355972-0	umiak	whale bone harpoon rest	2	15 14	4 3				
414		A371633	miniature	kayak	1	24	5.5	2			
415		A356213-0	miniature	kayak, ivory	1	9	1				
	MESAGHMIIT, NMNH										
416	IMAGE NOT AVAILABLE	A356440-0	umiak	Rigging hook	1						

#	Photo	Object ID	Term	Function	Count	Length	Width	Height	Feature	Unit	Depth
417		A364204	miniature	paddle	1	24	5				
	MEREGTA, NMNH										
418		A356519	miniature	paddle	1	13	2				

#	Photo	Object ID	Term	Function	Count	Length	Width	Height	Feature	Unit	Depth
419		A356520	miniature	Miniature umiak or sled part							

Appendix II Boat data from Birnirk archaeological site

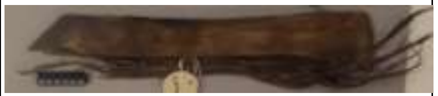
#	Photo Image	Object ID	Index Term	Function	Count	Length, cm	Width, cm	Height, cm	Feature	Unit	Depth
	National Museum of Natural History, Washington DC										
1		A398865-0	miniature	kayak	1	7.6	1.27		Mound C	House A	floor deposit
2		A398886-0	kayak	kayak frame parts, wood and bone	8	17.8-37	2.3 -3.8		Mound C	House A	floor deposit

#	Photo Image	Object ID	Index Term	Function	Count	Length	Width	Height	Feature	Unit	Depth
3		A398912-0	miniature	kayak	1	12.7	2.5		Mound A,	House B, Cut 5	floor deposit
4		A 398930-A	paddle	blade fragment	1	31	6.3		Mound A	House B	20 cm below floor
5		A398930-0	kayak	Wooden Kayak Part (?)	1	14	1.5		Mound A	House B	20 cm below floor

Appendix II

#	Photo Image	Object ID	Index Term	Function	Count	Length	Width	Height	Feature	Unit	Depth
6		A399001-0	kayak	Bow fragment (?)	1	30.5	4.6		Mound D	no information	surface, "from Eskimo's excavations"
7		A399003-0	kayak	Kayak Rib (?)	1	21	2.6		Mound D	no information	surface, "from Eskimo's excavations"
8		A399032	paddle	Shaft?	1				Mound A	Structure C	floor
9		A399043A-0	kayak	deck beam ?	1	36	2.5		Mound A	Structure C	below floor

Appendix II

#	Photo Image	Object ID	Index Term	Function	Count	Length	Width	Height	Feature	Unit	Depth
10		A399044B	kayak	deck beam?	1	10.2	1.8		Mound A	Structure C	below floor
11		A399049	kayak	kayak rib?	1				Mound A	Structure C	below floor
12		A399065	umiak	thwart	1				Mound A	Structure C, Area 6-1936	below floor
13		A399081-0	kayak	Kayak Bow-Piece /1	1	25.4	5		Mound A	Structure C, Area 6-1936	below floor

Appendix II

#	Photo Image	Object ID	Index Term	Function	Count	Length	Width	Height	Feature	Unit	Depth
14		A399088-0	paddle	Blade fragment	2	12, 29.2	1.27, 5.7		Mound A	Structure C, Area 6-1936	below floor
15		A399090-0	Kayak	Rib fragment	1	9.5	2.5		Mound A	Structure C, Area 6-1936	below floor
16		A399100	umiak	thwart	1	30	8		Mound A	Structure C, Area 6-1936	below floor

Appendix II

#	Photo Image	Object ID	Index Term	Function	Count	Length	Width	Height	Feature	Unit	Depth
17		A399112-0	kayak	Gunwale and deck beam?	2	17.1, 33.6	2, 3.5		Mound A	Structure D	floor deposit
18		A399151B-0	miniature	kayak	1	16.5	3.5		Mound A	Structure A	floor
19		A399184-0	miniature	umiak	1	20.3	4		Mound A	Structure A	floor #2 (45.7 cm below floor)

Appendix II

#	Photo Image	Object ID	Index Term	Function	Count	Length	Width	Height	Feature	Unit	Depth
20		A399190-0	miniature	kayak	1	11.4	2.5		Mound A	Structure A	floor #2 (45.7 cm below floor)
21		A399201B-0	miniature	kayak	1	15.2	4.4		Mound A	Structure A	no information
22		A399303-0	kayak	gunwale fragment	1	35.5	5		Mound A	Cut 12	no information

#	Photo Image	Object ID	Index Term	Function	Count	Length	Width	Height	Feature	Unit	Depth
23		A399327	umiak	bottom cross piece fragment	1				Mound A,	Structure G, section 1	10 cm
24		A399364-0	miniature	kayak? mast step?	1	7	1.5		Mound A	Structure G Section 4	45.7 cm

#	Photo Image	Object ID	Index Term	Function	Count	Length	Width	Height	Feature	Unit	Depth
25		A399365-0	Kayak	rib fragment?	1	19	1.9		Mound A	Structure G Section 4	45.7 cm
26		A399420A-0	kayak	gunwale fragments (?)	3	26.7, 28.5	3, 5		Mound A	Structure H	no information
27	Image not available	A399439-0	kayak	gunwale	1	32	5		Mound A	Structure H	no information

#	Photo Image	Object ID	Index Term	Function	Count	Length	Width	Height	Feature	Unit	Depth
28		A399452-0	miniature	umiak	1	16.5	2		Mound A	Structure H	no information
29		A399504-0	kayak	Kayak deck beam (?), antler	1	30.5	3		Mound A	Structure E	no information
30		A399533-0	umiak	bottom crosspiece , unfinished	1				Mound A,	Structure F	38 cm below the floor

Appendix II

#	Photo Image	Object ID	Index Term	Function	Count	Length	Width	Height	Feature	Unit	Depth
31		A399541-0	miniature	kayak	1	17.3	3		Mound R	Structure A	no information
32		A399675-0	kayak	rib fragment	1	18.4	1.5		Mound J	Cut 13, section 2,	63.5 cm
33		A399679-0	miniture	kayak	1	11.43	2.3		Mound J	Cut 13, section 2	48.28 cm

#	Photo Image	Object ID	Index Term	Function	Count	Length	Width	Height	Feature	Unit	Depth
	University of Alaska Museum of the North										
34	Image not available	BK-H-214	miniature	toy boat					Mound H	no information	no information
35		BK-H-566	miniature	toy umiak		10	1		Mound H	no information	no information
36	Image not available	BK-H-835	miniature	toy boat					Mound H	no information	no information
37	Image not available	BK-H-1034	kayak	fitting					Mound H	no information	no information

Appendix II

#	Photo Image	Object ID	Index Term	Function	Count	Length	Width	Height	Feature	Unit	Depth
38		BK-H-1130	miniature	toy boat		13	4		Mound H	no information	no information
39		BK-H-1189	kayak	Stanchion		15	3		no information	no information	no information
40	Image not available	BK-H-1543	miniature	toy kayak					Mound H	S0E5	137-152 cm
41	Image not available	BK-H-1628	kayak	TBD					Mound H	S2E0	152-168 cm
42	Image not available	BK-H-1656	miniature	toy kayak					Mound H	S1E7	30-45 cm

#	Photo Image	Object ID	Index Term	Function	Count	Length	Width	Height	Feature	Unit	Depth
43		BK-H-1981	umiak	brace		50.5	3.5	6	Mound H	S3E0	207 cm
44		BK-H-1985	umiak	gunwale		57	3.5	8	Mound H	S3E0	76 - 91 cm
45		BK-H-12540	umiak	thwart		116			Mound H	S0W1	90 -107 cm
46	Image not available	BK-H-2101	miniature	toy kayak					Mound H	no information	no information
47	Image not available	BK-H-2151	kayak	TBD					Mound H	N1W1	45-61 cm

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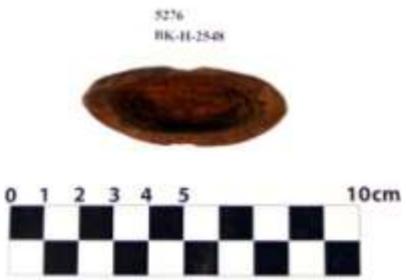
#	Photo Image	Object ID	Index Term	Function	Count	Length	Width	Height	Feature	Unit	Depth
48		BK-H-2239	umiak	gunwale			?	?	Mound H	S3E0	168-183 cm
49		BK-H-2295	umiak	thwart			?	?	Mound H	N0E0	no information
50		BK-H-2330	miniature	toy kayak		11.43	2.54		Mound H	S1E6	76 -91 cm
51		BK-H-2373	umiak	TBD		32	5		Mound H	S1E0	2.0-2.5

Appendix II

#	Photo Image	Object ID	Index Term	Function	Count	Length	Width	Height	Feature	Unit	Depth
32		BK-H-2399	umiak	skin boat cover		20.32	14		Mound H	S4E1	2.5-3.0
53		BK-H-2425	umiak	thwart		36	6.5		Mound H	N0W1	2.5-3
54	Image not available	BK-H-2441	boat	TBD					Mound H	no informati on	no information

Appendix II

#	Photo Image	Object ID	Index Term	Function	Count	Length	Width	Height	Feature	Unit	Depth
55		BK-H-2512	kayak	kayak stanchion or fragment of deck piece		30	6.35		Mound H	S1E5	76-91 cm
56		BK-H-2548	miniature	toy umiak		6	2		Mound H	S0E1	107-122cm
57		BK-H-2589	umiak	straight rib		48.26	6.35		Mound H	N1W1	61-76 cm
58		BK-H-2590	umiak	straight rib		48.26	6.35		Mound H	N1W1	61-76 cm

Appendix II

#	Photo Image	Object ID	Index Term	Function	Count	Length	Width	Height	Feature	Unit	Depth
59		BK-H-2740	boat	straight rib		19.5	3.5		Mound H	S2W1	15cm
60		BK-H-2744	umiak	gunwale		37	3		Mound H	S2W2	15cm
61		BK-H-2862	umiak	cross piece		31.75	11.5	9	Mound H	N0W1	91 cm
62		BK-H-3008	umiak	gunwale		32	5		Mound H	S0W1	76-91 cm

Appendix II

#	Photo Image	Object ID	Index Term	Function	Count	Length	Width	Height	Feature	Unit	Depth
63		BK-H-3016	boat	TBD		25.5	2	2	Mound H	S2E0	137-152 cm
64		BK-H-3052	umiak	fragment of bench or paddle tip, recicled as fire drill wood		25	12		Mound H	N1W1	76-91 cm
65		BK-H-3057	umiak	cross piece		57.2	15.24	2.54	Mound H	N0W1	107-122 cm

Appendix II

#	Photo Image	Object ID	Index Term	Function	Count	Length	Width	Height	Feature	Unit	Depth
66		BK-H-3058	umiak	umiak bottom cross piece		61	15.24	2.54	Mound H	N0W1	91-107 cm
67		BK-H-3059	umiak	umiak bottom cross piece		61	15.2	7.62	Mound H	N1W1	76-91 cm
68		BK-H-3060	umiak	cross piece		85.09	17.78	7.62	Mound H	N0W1	91-107 cm

Appendix II

#	Photo Image	Object ID	Index Term	Function	Count	Length	Width	Height	Feature	Unit	Depth
69		BK-H-3092	umiak	Cross piece fragment		30	6.5		Mound H	no information	no information
70		BK-H-3382	umiak	TBD		19.05	10.16		Mound H	no information	no information

#	Photo Image	Object ID	Index Term	Function	Count	Length	Width	Height	Feature	Unit	Depth
71		BK-H-3540	umiak						Mound H	N0W1	91-107 cm
72		BK-H-3551	umiak	cross piece		57.15	15.24		Mound H	N0W1	91-107 cm

Appendix II

#	Photo Image	Object ID	Index Term	Function	Count	Length	Width	Height	Feature	Unit	Depth
73		BK-H-3765	umiak	gunwale		38	2	15.24	Mound H	S1W3	61-76 cm
74		BK-H-3775	umiak	kayak rib - ?		25.4	1.3		Mound H	S0W3	30-46 cm
75		BK-H-3839	umiak	TBD		27.94	10.16		Mound H	N1W1	107-122

#	Photo Image	Object ID	Index Term	Function	Count	Length	Width	Height	Feature	Unit	Depth
76		BK-H-3896	umiak	gunwale		25.4	5.08		Mound H	S1W1	91-107 cm
77		BK-H-3917	umiak						Mound H	no information	no information
78		BK-H-3865	paddle	paddle or snow shovel		24.13	18		Mound H	N1W1	107-122 cm

Appendix II

#	Photo Image	Object ID	Index Term	Function	Count	Length	Width	Height	Feature	Unit	Depth
79		BK-H-12066	umiak	head board		34	8.5		Mound H	S0E3	170-180 cm
80		BK-H-12070	umiak	umiak seat		27.5	6	5	Mound H	no information, possibly S0E3	no information
81		BK-H-12100	umiak	TBD		89	10.16		Mound H	no information, possibly S0E3	no information
82		BK-H-12104	umiak	thwart		103	12		Mound H	no information	no information

#	Photo Image	Object ID	Index Term	Function	Count	Length	Width	Height	Feature	Unit	Depth
83	Image not available	BK-H-12106	umiak	keel		101			Mound H	SOE3	90 -107 cm
84		BK-H-12539	boat/sled	keel/sled runner		138			Mound H	no information	no information
85		BK-H-12541	umiak	gunwale or harpoon shaft		137		1,5	Mound H	no information	no information
86		BK-L-287	miniature	umiak		7	1.5		Mound L	N0W2	61-76 cm
87	Image not available	BK-L-600	miniature	toy kayak					Mound L		no information

Appendix II

#	Photo Image	Object ID	Index Term	Function	Count	Length	Width	Height	Feature	Unit	Depth
88	Image not available	BK-Q-400	paddle	Paddle blade & distal shaft		Not avialable	Not avialable	Not avialable	Mound Q	Burial cache, intersection of section 8,11 and 18	78-98
89	Image not available	BK-Q-414	paddle	ivory kayak paddle tip		Not avialable	Not avialable	Not avialable	Mound Q	Burial Cache, Section 11	60-91
90		BK-Q-719	umiak	Thwart?		35	7.5		Mound Q	Section 9	186 cm
92		BK-Q-740	kayak	kayak deck piece		45	4	2	Mound Q	Section 20	91- 121 cm below datum

Appendix II

#	Photo Image	Object ID	Index Term	Function	Count	Length	Width	Height	Feature	Unit	Depth
93		BK-Q-837	boat	rib		18	2		Mound Q	Section 19	91- 121 cm below datum
94		BK-Q-838	boat	Deck cross-piece		14.75	2		Mound Q	Section 19	91- 121 cm below datum
95		BK-Q-839	boat	Boat hook?		18	3	18	Mound Q	Section 19	91- 121 cm below datum

Appendix II

#	Photo Image	Object ID	Index Term	Function	Count	Length	Width	Height	Feature	Unit	Depth
96		BK-Q-845	kayak	kayak rib, bent		30	2		Mound Q	Section 19	91- 121 cm below datum
97		BK-Q-846	kayak	gunwale	1	58	1	11	Mound Q	Section 19, N0W1	111 cm below datum
98		BK-Q-1061	kayak	deck crosspiece		26.7	3.3		Mound Q	Northeast face, sections 21 & 22	61-122 cm
		BK-Q-1064	kayak	Gunwale fragment		25.5	3		Mound Q	Northeast face, sections 21 & 22	61-122 cm

#	Photo Image	Object ID	Index Term	Function	Count	Length	Width	Height	Feature	Unit	Depth
99		BK-Q-1129	miniature	toy umiak		6.35	2.54		Mound Q	S1E1	131 cm below transit
100	Image not available	BK-Q-1130	miniature	toy umiak					Mound Q	S1E1	131 cm below transit
101		BK-Q-2597	miniature	toy boat		10	1		Mound Q	S2E1	131 cm below REF B

Appendix II

#	Photo Image	Object ID	Index Term	Function	Count	Length	Width	Height	Feature	Unit	Depth
102		BK-Q-2641	miniature	toy kayak		9	2		Mound Q	S1E3	Against E.Wall at about level of floor boards, 3-3.5 below REF B
103	Image not available	BK-Q-2902	miniature	kayak					Mound Q	N2E1	110-128 cm
104	Image not available	BK-Q-3030	boat	boat cover					Mound Q	N2E1	110-128 cm
105		BK-Q-3052	miniature	toy kayak					Mound Q	N2E1	110-128 cm

Appendix II

#	Photo Image	Object ID	Index Term	Function	Count	Length	Width	Height	Feature	Unit	Depth

Appendix III. Boat data from Qariaraqyuk

#	Photo Image	Object ID	Index term	function	Count	Length cm	Width cm	Height cm	Feature	Unit	Depth
		PaJs-2-90	umiak	Rib fragment?	1	16	2.5	1	House 38	36	Level 1
		PaJs-2-106	kayak	Rib fragment?	1	12	2.3	1.6	House 38	14	Level 1

Appendix III

#	Photo Image	Object ID	Index Term	Function	Count	Length	Width	Height	Feature	Unit	Depth
		PaJs-2-125	Umiak ?	Rib fragment?	1	19.7	3.73		House 38	41	Level 1
	Image not available	PaJs-2-313	umiak?	Wb crosspiece	1				House 41	81	Level 1
	Image not available	PaJs-2-649	umiak?	Wb boat hook	1				House 38	52	Level 1
	Image not available	PaJs-2-927	kayak?	Wb boat part ?	1				House 41	75	Level 1

Appendix III

#	Photo Image	Object ID	Index Term	Function	Count	Length	Width	Height	Feature	Unit	Depth
	Image not available	PaJs-2-1004	umiak	WB boat cross-piece ?	1				House 41	90	Level SS
	Image not available	PaJs-2-1767	umiak	WB yaavutak ?	1				House 29	18	Level 2F
		PaJs-2-1875	kayak	Rib fragment	1	12.5	2	1	House 29	28	Level 3T
		PaJs-2-1877	kayak	Gunwale?	1	45.7	27.7		House 29	28	Level 3T

Appendix III

#	Photo Image	Object ID	Index Term	Function	Count	Length	Width	Height	Feature	Unit	Depth
		PaJs-2-2166	kayak		1	21.5	32.2	1.43	House 33	35	2
	Image not available	2625	Umiak ?	Wb boat cross-piece/umiak slat	1				House 34	26	3F
	Image not available	3289	Kayak?	Antler ice scraper off boat?	1				House 38	28	2F
		PaJs-2-3515 F	Kayak?	Deck cross piece?	1	25.2	2.6	1	House 38	35	Level 2SP/F

Appendix III

#	Photo Image	Object ID	Index Term	Function	Count	Length	Width	Height	Feature	Unit	Depth
		PaJs-2-3687	Umiak ?		1	13.5	4	0.6	House 38	49	Level 2K
		3751	umiak	Whale bone sled cross-piece/boat part	1				House 38	53	
		PaJs-2-3793	Miniat ure?	umiak	1	9.4	2	2	House 38	58	Level 2T/T W

Appendix III

#	Photo Image	Object ID	Index Term	Function	Count	Length	Width	Height	Feature	Unit	Depth
	Image not available	4440	Kayak?	Antler splice - high finish					41	46	2F
	Image not available	4607	Umiak?	Antler boat cross-piece ?					41	67	2T
	Image not available	4662	Umiak?	Wb shaft - v heavy, deeply scored					41	74	2
		4711	Kayak?	ice scraper ? antler					41	81	2

Appendix III

#	Photo Image	Object ID	Index Term	Function	Count	Length	Width	Height	Feature	Unit	Depth
		PaJs-2-4836	miniature	paddle	1	10	1.5		House 41	89	2T
		PaJs-2:4839	Kayak?	Rib ?	1	6	2	1.2	House 41	90	Level 2T

Appendix III

#	Photo Image	Object ID	Index Term	Function	Count	Length	Width	Height	Feature	Unit	Depth
		PaJs-2-4978	Kayak ?	Rib?	1	8	1.5		House 41	94	Level 1
		PaJs-2-5044	miniature	paddle	1	9.89	1.54		House 41	96	Level B
	Image not available	5753	Umiak?	Wedge, probably recycled boat part					41	46	3TM

Appendix III

#	Photo Image	Object ID	Index Term	Function	Count	Length	Width	Height	Feature	Unit	Depth
	Image not available	5754	Umiak?	boat part - umiak slat ?					41	80	1
	Image not available	5855	Umiak?	Whale bone shaft - v heavy, square					41	88	1
	Image not available	5891	Kayak?	Wb boat part ?					38	47	1
	Image not available	5948	Umiak?	boat part ?					41	83	2T
	Image not available	5951	Umiak?						41	11	2

Appendix III

#	Photo Image	Object ID	Index Term	Function	Count	Length	Width	Height	Feature	Unit	Depth

Appendix IV Radiocarbon dates for case studies, INTCAL13 calibration curve.

Artifact catalogue #	Beta Analytic Sample #	Description	Site	Provenience	Measured ^{14}C Age BP	Calibrated calendar years BC/AD (2 sigma
NMNH A347028	409143	Kayak bow, wood	Kialegak, St. Lawrence Island	South midden, between 2 and 4 ft below the surface	530 +/- 30	AD 1310 -1360, AD 1385- 1425
NMNH A370242-b,c	409146	Kayak keel frame, wood	Miyowagh St. Lawrence Island	cut 19, section 18, 6 ft 1 inch below the surface	970 +/- 30	AD 990 -1045, AD 1095 - 1120, AD 1140 -1145
NMNH A355720	409145	Kayak gunwales re-used as paddle shaft, wood	Ievoghiyoq, St. Lawrence Island	House 7	760 +/- 30	AD 1215 to 1280
NMNH-A347918	409144	Umiak cross-piece, wood	Little Diomede Island	Excavated by Inuits from an unknown archaeological site and purchased by Henry Collins	350 +/- 30 BP	AD 1440 to 1520 AD 1595 to 1620
BK-H-3551	331679	Umiak cross-piece, wood	Birnirk, Chukchi Sea coast	Mound H, N0W1	990 +/- 30 BP	AD 990 to 1050 AD 1090 to 1120 AD1140 to 1150
BK-H-2589	331678	Umiak rib, wood	Birnirk, Chukchi Sea coast	Mound H, N1W1	1040±30	Cal AD 900 to 910 AD 970 to 1030
BK-H-2862	321203	Umiak cross-piece, wood	Birnirk, Chukchi Sea coast	Mound H, N0W1	1070 +/- 30 BP	AD 900 - 920 AD 970 -1020

Appendix V Methodology of skin boat reconstruction and Birnirk umiak find

Reconstruction of skin-covered watercraft configurations from fragmentary archaeological data draws from constructional observations of ethnographic and contemporary boats:

- Umiaks and kayaks are symmetrical about the longitudinal axis, meaning that the starboard side of the frame is symmetrical to port. The treatment of the stem is, however, almost always different from the stern, even in umiaks, which sometimes look like double-enders;
- Umiak bottom cross timbers/floors are spaced at equal distances with the exception of the last floors to the boat's ends, which can be further away from the previous floor. Cross pieces of contemporary and ethnographic umiaks are usually spaced at intervals of about 35 to 50 cm. In the Point Hope umiak building tradition, floors are spaced at a distance equal to that from the knee to the heel of this umiak's captain;
- Umiak bottom cross timbers/floors vary in length to accommodate the bottom flare. Floors of equal or nearly equal length can be expected either close to the widest part of the bottom, or on different sides of this widest portion. Combined with the notion that the bottom chines' curve is a continuous smooth arch, this may allow estimation of cross timber positioning in partially preserved umiaks like the Birnirk find.
- Umiak ribs are usually the same length throughout the hull length. An exception to this rule is presented by so called "half ribs" - shorter ribs sometimes inserted between stringer and gunwale at the bow or stern section. A single umiak rib, thus has a potential to elucidate the overall depth of the hull;
- Kayak ribs typically vary in shape and height throughout the hull, which often makes it impossible to establish the shape of the boat's cross section based on a single rib, which may, for instance, have v-bottom shape, but represent a stem section of a kayak with flat bottomed midsection. However, even a single flat-bottomed rib is evidence for a flat bottomed craft;
- Similar observations apply to kayak deck cross pieces. Because the curve of the deck often changes, a single fragment of this type presents only partial information. Chukchi Sea ethnographic kayaks, for instance, combine both arched and flat deck cross pieces.

- Both kayak and umiak ribs are evenly spaced throughout the hull;
- When several frame elements are attached to the same member (for instance ribs and deck cross-pieces to the gunwale), the points of attachment are offset, meaning that the mortise for deck cross-piece is some distance away from the place where the rib is lashed to the same gunwale. The same rule applies to umiak gunwales and bottom chines, which accommodate floors and ribs;
- The length of umiak thwarts positioned near the midsection's widest point are indicative of, but slightly shorter than the boat's maximum beam.

Analyzed within the context of these guiding principles, even partially preserved archaeological data allow for insight into boat's constructional details. Applied to the Birnirk umiak finds, for instance (see Chapter 7.8), it provides for reconstruction of some of the boat's dimensions.

The straight ribs BK-H-2589 and BK-H-2590 attest that the Birnirk umiak was a flat-bottomed boat and allow estimation of the depth of the hull. Measuring to 48.26 cm in length and 11.4 cm in width, they are carved to fit over the gunwale at one end and notched to accommodate a 3.8 cm-wide bottom chine at another. Together with an estimated 12-15 cm for gunwales and keel, the depth of the umiak's hull would come to 60-65 cm.

The maximum bottom breadth would be at least 85.9 cm - the length of the longest cross piece (BK-H-3060). The umiak's beam at the gunwale level can be inferred from the length of the thwarts. Two of five of Birnirk umiak's thwarts are complete, with worked ends and square lashing holes on each end and baleen lashing still in place. The longest one (BK-H-12540) measures 116 cm and was likely positioned close to mid section, although not necessarily at the boat's widest gunwale-to gunwale section. The distance between the gunwales at the stem or stern post is provided by the width of the headboard (BK-H-12070). Although incomplete, it allows for reconstruction of its initial width at 43-46 cm. The same artefact indicates that the boat's post was 13 cm wide. The boat's cross section is defined by the maximum known breadth at the bottom chines and gunwales combined with the height indicated by the ribs.

The length of the boat is harder to estimate. The analysis of lengths of six crosspieces and experimental attempt to position them in a manner that creates a continuous arch indicates that the boat likely had at least five more floors. Assuming the above discussed spacing at 35-50 cm, and taking into consideration widths of cross pieces and about a meter distance between the last cross piece at the boat's ends and stem or stern post, these measurements translate into a total speculated boat length of circa 800 cm (Fig.7.27).

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