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## **Ethnographic and Archaeological Perspectives on the Use Life of Northwest Alaskan Pottery**

**Abstract:** The role of pottery in Arctic hunter-gatherer lifeways is analyzed through this investigation of how pottery procurement, production, use, and discard was incorporated into past hunter-gatherer seasonal activities. This case study highlights the complexity of making pottery at northern latitudes and the time investment, technological skill, and resources required of northern potters to resolve these challenges; mobility and environmental constraints unique to northern Alaska shape the character, production, and use of ceramic vessels.

**Keywords:** hunter-gatherer pottery, pottery use life, ethnoarchaeology, Arctic,

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### **INTRODUCTION**

Ceramic vessel fragments are abundant in late Holocene coastal Alaskan archaeological sites. Until recently research on northern cooking vessels focused primarily on chronological questions (e.g. Oswalt 1955). A growing body of literature on hunter-gatherer ceramic technologies around the world (Barnett and Hoopes 1995; Eerkens 2002, 2003; Eerkens, Jordan & Zvelebil 2009; Eerkens, Neff, & Glascock 2002; Jordan and Zvelebil 2009) has contributed to renewed interest in the study of northern

ceramic technology to address questions of mobility, interaction, diet, food practices, technology, and the social role of ceramic vessels (Anderson, Boulanger & Glascock 2011; Anderson et al. 2016; Anderson, Tushingham & Buonasera 2017; Farrell et al. 2014; Frink and Harry 2008; Harry and Frink 2009; Ponkratova 2006). New research that draws data from both archaeological and ethnographic sources raises interesting questions about how pottery was made and used, and highlights the need for additional in-depth investigation of both the social and technological aspects of northern pottery.

This chapter presents a case study of northern Alaskan pottery traditions (**Error! Reference source not found.**). The aim is to understand the role of pottery in past northern hunter-gatherer lifeways. To achieve this, I adopt a use life perspective and investigate how pottery procurement, production, use, and discard was incorporated into past hunter-gatherer seasonal activities. I analyze ethnographic literature from across western and northern Alaska and use this to interpret the results of new archaeological research on northwest Alaskan pottery. I find that mobility and environmental constraints unique to northern Alaska shape the character, production, and use of ceramic vessels, which required a considerable input of valuable time and resources. This case study highlights both the complexity of making pottery at northern latitudes and the time investment and technological skill required of northern potters to resolve these challenges. The technological and social roles of pottery were important enough that people invested resources in pottery making and use despite the challenges. This research also identifies several links between pottery and the consumption of aquatic resources, suggesting a possible explanation for the development and persistence of such a difficult craft tradition.

< Fig 1 about here >

## **NORTHERN ALASKAN CERAMICS: OVERVIEW**

Ceramic technology was adopted in northern North America sometime between 2500 and 3000 years ago and subsequently spread north and south along the coasts of Alaska. The earliest sites are in the Bering Strait region (Ackerman 1982). By 1000 years ago, pottery was in use as far east as the Mackenzie River in the western Canadian Arctic and as far south as the Kodiak Archipelago. This ceramic technology likely has its origins in earlier Russian Far East traditions that spread to the Chukotka Peninsula and Magadan region by 5000 years ago (Ackerman 1982; Anderson, Tushingham, and Buonasera 2017; Dumond and Bland 199). Northern Alaskan ceramic technology can be classified broadly as falling into two traditions, Paleoeskimo (pre-1000 years ago) and Neoeskimo (post-1000 years ago) ceramics. While early Paleoeskimo ceramics are relatively rare, 105 known sites are dated to before 1500 years ago (Anderson, Tushingham & Buonasera 2017) later Neoeskimo ceramics are more common and are found at most residential sites in the western Arctic dated to after 1000 years ago. Note that while this paper is focused on the most common Alaskan ceramic material, ceramic cooking vessels, there are also ceramic bowls, cups, lamps, balls, and figurines reported in small numbers from sites across coastal Alaska.

There are regional differences within Paleo- and Neoeskimo traditions in terms of surface treatments, common temper types, and vessel shapes. Generally, Paleoeskimo pottery vessels are thinner and harder than Neoeskimo vessels, which tend to be thick and crumbly. Although sample sizes are small, the earliest Paleoeskimo pottery vessels appear to have had a rounded bottom and various types of cord marked, linear or check stamped surface treatments. Later Paleoeskimo vessels have more of a barrel shape with a flat bottom, although this sample is skewed towards southwest Alaska and may represent a regional variant rather than a broader evolution in Paleoeskimo ceramic form.

Neoeskimo vessels are also flat bottomed, and range in shape from cylindrical to an everted flowerpot shape. In northern and northwest Alaska, organic and mineral temper are common in both Paleoeskimo and Neoeskimo vessels, although Neoeskimo vessels have a much coarser paste texture and higher temper content. Surface treatments include various check, corrugated, and curvilinear stamped patterns, as well as line-dot designs and textile impressions (**Error! Reference source not found.**)(see Anderson, Boulanger & Glascock 2011; Dumond 1969; Griffin and Wilmeth Jr. 1964; Oswalt 1955 for more information). Changes in ceramic character over time from a higher investment to lower investment, or expedient, technology could be related to changing cooking practices. Alternatively, earlier Paleoeskimo ceramics may have had greater importance in a social context (e.g. as prestige items) than later Neoeskimo ceramics. I explore these issue in more depth in a subsequent section on pottery use.

<Fig 2 about here >

Paleoeskimo ceramic technology in Northern North America is reported at relatively few sites, particularly before 2300 years ago (Anderson, Tushingham & Buonasera 2017). The majority of pre-2300 year old materials are found between Kotzebue Sound and Nunivak Island on the Yukon-Kuskokwim Delta (Figure 1). These earliest ceramics were primarily recovered from coastal seasonal or logistical foraging sites (i.e. surface scatters), in part because few more permanent dwellings are known from this time period (but see Giddings 1957). Early ceramic recovery is restricted almost entirely to surface collection from disturbed contexts such as deflated dune environments (Schaaf 1988). As a result, we know very little about the context of early ceramic production, use, and discard. Between 2300 and 1000 years ago Paleoeskimo ceramics have a wider distribution, extending southwest to the Alaska Peninsula. Ceramics dating to this period were recovered from a variety of contexts, e.g. surface

scatters, houses, middens. Note, however, that there is a gap in the northwest and northern Alaskan ceramic record between about 2000 and 1000 years ago that may be due to abandonment of ceramic technology during this period by people associated with Ipiutak culture (Larsen and Rainey 1948). Ipiutak people may have abandoned pottery use due to increased mobility, or it could be related to an increased reliance on wood, rather than oil, for heating (Mason 1998, 2004).

After 1000 years ago Neoeskimo ceramics become abundant and have a much wider geographic distribution than Paleoeskimo ceramics, likely reflecting the spread and influence of Neoeskimo culture across the North. Ceramic materials are found at most sites during this period, and in much higher numbers than in Paleoeskimo contexts. Number of sherds is, of course, partially a product of ceramic durability and post-depositional processes that cause fragmentation; low fired and organic tempered Neoeskimo sherds common in northern Alaskan sites are particularly susceptible to freeze/thaw fracturing (Skibo, Schiffer & Reid 1989). At a coarse level, however, the increase in abundance and ubiquitous distribution of Neoeskimo ceramics suggests increased reliance on ceramic technology during this time period.

#### **THE USE LIFE OF NORTHERN ALASKAN COOKING VESSELS**

While archaeologists have established a general understanding of northern Alaskan ceramic types and their distribution, many questions remain about the social and technological role of pottery in hunter-gatherer lifeways. Ceramics are difficult to make and use in the cold, damp, northern climate, yet northern Alaskans persisted in ceramic making for the 2800 years. Why? How did people balance the costs of producing pottery with the possible social and/or technological benefits? In the following sections I consider these general questions more specifically through a northwest Alaskan case study. I integrate insights from new archaeological research in northwest Alaska with ethnographic data from

across northern and western Alaska and evaluate the many challenges involved in making and using ceramic technology in a northern setting. I consider the use life of pottery vessels from raw material procurement to vessel discard (Skibo 2013) to better understand how pottery making and use fit into the northern hunter gatherer lifestyle. Pottery making in a northern context cannot be understood in isolation from other activities; as such, it is helpful to consider how various stages of pottery use life are embedded in hunter-gatherer “taskscape” (Michelaki, Braun & Hancock 2015).

### *Raw Material Procurement*

Clay is, of course, the primary ingredient in northern cooking vessels. Until recently, only limited research was directed at clay procurement in northern Alaska context (e.g. Lutz 1970). An implicit assumption in northern ceramic studies has been that clay and temper material appropriate for making pottery was widely available. One would further assume, therefore, that people used clays located close to production sites to make the majority of their pottery. Review of northern and western Alaskan ethnographic literature and unpublished data indicates, however, that this may not always have been the case; clay appropriate or preferred for pottery making was not widely distributed (de Laguna 1947; Giddings 1961; Lucier and VanStone 1992; Spencer 1959).

Various interviewees from across northern and western Alaska indicate that people had preferred clay sources for pottery making in some cases (Noatak and Kolerak 1987; Smith 1986) and that they would trade for the clay they preferred if it was not available locally (Lee et al. 1990; Spencer 1959). Unfortunately, no details on the characteristics of preferred clays are reported. In addition to being a source of various pigments, clay from Nelson Island, located in western Alaska (Figure 1), was sent to neighboring villages on the coast where clay was not available or where Nelson Island clay was preferred over local sources (Fienup-Riordan 1975; Friday 1983; Oswald 1952). Procurement of clays

from more distant western Alaska locales even when easily accessible clays were present locally is reported on Nelson Island (Fienup-Riordan 1975) and in northwest Alaska (Spray 2002). People on St. Lawrence Island reportedly traveled 25 miles from what is now Savoonga to collect clay at the edge of a lagoon (Geist and Rainey 1937). Together these data indicate that people had specific requirements, some of which are unknown or cannot be quantified, for clay used in pottery making. Clays well-suited for pottery making located close to ceramic production sites may not have been used due to cultural preferences for more distant sources. In the 19<sup>th</sup> century, people traded for ceramics made in other regions even when local sources of clay and local pottery was available (e.g. Burch 1998, 2005; Ray 1975). It is highly likely that similar behaviors extend into the past, shaping the archaeological record of clay procurement, ceramic production, and distribution.

Ethnographic data from both northern and western Alaska indicate that clay was used for a variety of other purposes in addition to cooking vessel construction; these varied uses are likely one reason that knowledge of clay sources persisted in many regions several generations after pottery making ended (e.g. Ballot and Ballot 1987; Kugzruk 1987; Lee, et al. 1990; Noatak and Kolerak 1987). Examples of clay uses include in lamp making (Fienup-Riordan 2007, p. 272), fish storage (Amos and Amos 1986; P. Smith 1990; L. Smith 1986, 1989), and for medicinal purposes (Ballot and Ballott 1987). Nelson Island “clay” pigment sources were particularly valued for decorating a variety of objects (Angaiak 1984; Fienup-Riordan 2005, 2007; Kailukiak 1984; Kolerok 1986) and were traded across western Alaska (e.g. Hendrikson and Hendrickson 1991; see Anderson 2016 for more discussion). Kugzruk(1987) mentions clay used to make children’s toys; clay balls were used as part of a children’s game on the lower Yukon River and in the Norton Sound region (Fienup-Riordan 2005, p. 252).

These ethnographic data from across northern and western Alaska indicate that additional research was needed to better understand the ways in which clay availability, distribution, and character factored into a potter's raw material procurement activities. To assess this at the regional and local levels most likely to have been important to a potter, I undertook a clay survey in the Kotzebue Sound region of northwest Alaska (Anderson 2016) (Figure 1). Reconnaissance survey was directed at locating and sampling ethnographically known sources and areas at or near archaeological study sites (**Error! Reference source not found.**). Survey of the coast around Cape Krusenstern, Kotzebue, and Cape Espenberg, and interior areas along the Kobuk River and in the Imuruk Basin of the Seward Peninsula relocated all of the ethnographically reported sources. Several additional sources were identified in the field; some were reported by local residents and subsequently located by the survey. Multiple clay deposits were identified along the Kobuk River and along the north and central coasts of Kotzebue Sound. Clay suitable for making pottery, however, was not found on the southern coast or in the interior of the Seward Peninsula. Subsequent geochemical study of clay and ceramics showed that past people did not use all of the available clays even when they were located near presumed ceramic production sites. While much of this vast region remains unsurveyed for clays, this initial survey generated several key insights into the pottery production process. Specifically, survey revealed that pottery quality clay is not evenly distributed across northwest Alaska and that available clays were not always used by potters.

< Fig 3 about here >

A variety of temper materials are known from ethnographic and archaeological analysis across northern and western Alaska. Temper materials noted in archaeological assemblages include gravel or mineral temper, grass and other fibers, fur or hair, and feather (e.g. Dumond 1969, Griffin and Wilmeth

Jr. 1964; Oswalt 1955). In western Alaska during the ethnographic period, Annie Blue (1999, p. 28; Fienup-Riordan 2005) of Togiak (Figure 1) describes the use of various tempers in pottery production: “They didn’t use only the clay. They would mix the clay with other things such as ashes. Aged fish eggs were also used when assembling the clay. Anything can be added to make the clay thick when they make pots.” Annie also mentions use of fish livers, clay chips (possibly ceramic fragments), dog feces, and sand as temper (Blue 1999). Harry et al. (2009a, b) explore the addition of oil and blood to clays in their experimental production of Thule vessel replicas; they find that addition during production actually decreased clay workability and conclude that ethnographic accounts of blood and oil use may have been referring to application following firing. Use of clay with natural temper is mentioned on St. Lawrence Island and on the Yukon River (de Laguna 1947, p. 39; Geist and Rainey 1937) (Figure 1). Nelson Island people used crushed volcanic rock as a temper (Fienup-Riordan 1975, p.13), while people from Hooper Bay sometimes included dog hair or manure in addition to crushed rock (Oswalt 1952).

In the northwest Alaskan case study, low magnification analysis of 3772 ceramic sherds from 17 study sites (Figure 3) shows that both mineral and non-mineral tempers were frequently used in both Paleoeskimo and Neoeskimo ceramic materials (Anderson 2011). Non-organic temper was most common, although it is possible that at least some of the non-organic inclusions were part of the raw clay source rather than an addition during vessel production. Many possible clay sources identified by the northwest Alaska source provenance survey had mineral inclusions in the size ranges observed in ceramic thin-section. Feather was the most common identified organic temper, with shell and bone used only occasionally. An initial assessment of temper size and abundance was made during low magnification analysis, but later high magnification analysis of sherd thin-sections yielded different temper size and density information. This indicates that low magnification analysis of dark, highly

reduced, northwest Alaskan sherds is unreliable and temper estimates made using this method of analysis should be disregarded (Anderson 2011, p.125).

Overall, variability in temper type, size, and abundance in the northwest Alaska study area suggests people simply used materials that were available to them and that worked with their chosen clay. This is consistent with ethnographic descriptions of people in northern and western Alaska tempering clay with materials that were on hand and in contrast to the various ethnographic descriptions of selective clay use described above. This suggests that potters are making clay and temper choices based on factors outside of, or in addition to, the performance characteristics of different temper and clay combinations. For example, if finished vessel weight was a priority for northwest Alaskan potters, experimental studies (Reid 1989; Skibo, Schiffer & Reid 1989) indicate that one would expect higher rates of organic versus mineral temper than those observed in this study of northwest Alaskan ceramics. Or, if heat retention was a desired outcome, vessels would be tempered with predominantly mineral temper. Variability in temper use suggests that other unknown factors were important to potters.

### *Production*

In western Alaska, ethnographic accounts indicate that vessels were often formed from a lump of paste using a smooth rock on the interior of the vessel and a wooden or skin covered paddle on the exterior (Fienup-Riordan, p.133). Forming of vessels over baskets or in birch bark molds is also mentioned in a few western Alaskan ethnographic cases (de Laguna 1947, p. 141; Fienup Riordan 2007, p.48-49). Analysis of 77 northwest Alaskan thin sections provided new insights into previous ethnographic accounts of pottery production (Anderson 2011). For example, cracks in ceramic fabrics usually had an orientation parallel to the wall of the sherd, supporting the inference that ceramics were

made using a paddle and anvil technique (Rye 1981). High variability in inclusion density and character within a single thin-section suggests the addition of patches of clay during vessel production, or perhaps during later repairs. Thin black layers on the interior and exterior surfaces of several sherds may be from the application of oils or other organic material during production or use. Fiber impressions on the interior and exterior of a small percentage of ceramics from northwest Alaska suggests that the use of molds occurred prior to contact as well. The basketry impressions themselves are an interesting window into fiber technology of this region, little of which is preserved in the archaeological record. Various carved paddles, cord wrapped paddles, and other implements were used to stamp or incise finished vessels. Some surface treatment types have a broad geographic extent and are found across much of Alaska (e.g. variations on early and later check-stamping and curvilinear designs) but regionally specific designs are known as well (e.g. line and dot patterns from the Norton Sound and Yukon-Kuskokwim region, Seward striated design from the Kotzebue Sound region); there appears to be greater diversity in local designs during the late pre-contact period, at least in the Kotzebue Sound region (Anderson 2011). This could be due to shifts in mobility patterns due to the introduction of dog traction or a reorganization of regional exchange systems.

Ethnographic reports indicate that after sun drying, pottery was fired in open pits in uncontrolled conditions. On St. Michael Island, in western Alaska, a fire was built inside and outside of the vessel itself; the vessel was then heated to the highest temperature possible (Nelson 1983; Oswalt 1952). Vessels were often oiled with marine mammal fats before, during and after the firing process; burnt fish eggs or blood was sometimes used instead of, or in addition to, oil (Fienup-Riordan 1975; Reid 1989; Harry, Rink, O'Toole, et al. 2009; Harry, Frink, Swink, et al. 2009; VanStone 1989, p. 171). Spencer (1959, p.472) describes the firing process on the north slope. Vessels were dried first in the sun and placed in a fire and turned until fired. The fire itself was often built with driftwood soaked in oil. A

similar process is described on St. Lawrence Island (Geist & Rainey 1937) where seal oil saturated fuel was placed over the vessel to provide more even heat. On Nunivak Island, a dried vessel was placed bottom up on a bed of coals and then covered with willow and fired. Vessels were fired for the length of time it took for the tide to go out, in, and out again (Fienup-Riordan 1975, p. 15). Joe Friday (1983, p.5) described pottery making in the Chevak area of the lower Yukon-Kuskokwim delta:

“The people he saw making the pots did not put the finished product into the fire right away. It was wrapped inside woven grass for sometime until [sic] and was left hanging on the back end of the house until it hardened by itself. His parents use to be careful that the children don’t go near the hanging clay otherwise they were hollered at. It was later exposed to fire...the pot that he saw made long time ago was made after lighting a fire and the pot was turned occasionally on all sides by the fire. Each time they would get it closer to the heat and test its stability now and then. They would do this practically all summer and then towards the first snow fall in the fall time, the pot was placed upside down in the porch supported by something. They made a fire underneath and made the heat go inside the pot as a final preparation for the finished product. After this was done, they didn’t remove the pot right away but was probably left to cool off. Sometime later it was removed and placed in the hanging grass woven bag.”

Finished vessels were sometimes lined with caribou paunch, walrus gut, or some other membrane to make them water tight; oil application during firing and intermittently during use likely served a similar purpose (see also Arnold & Stimmell 1983; Reid 1989, p.171). This integration of animal oil, fats, blood, and other products at different stages of pottery manufacture could be a challenge in undertaking residue analysis of archaeological ceramic vessels. While some studies have identified marine mammal

residues on northern vessels (Farrell et al. 2014; Solazzo & Erhardt 2007, Solazzo et al. 2008), it is possible that the detected residues are from production rather than use. Experimental work could help in differentiating the residues that result from use of animal products during production versus cooking and processing of animal products in vessels.

A single pottery firing feature is reported from Nelson Island (BIA 1987) (Figure 1). Former site residents who visited the location with archaeologists described how the pottery was fired: “Yes, the fire pit was lined with rocks. Extra rocks were placed in the pit. The shaped object was placed there to dry....the fire was fueled by wood. Rocks were placed [on the fire], and rimmed with more rocks. That was how the object was heated. When it cooled off the cracks were coated with oil. More oil was used to coat it (White 1984, p.8)” (see also Sipary 1984). The firing feature itself was a small, 2 m diameter, circular pile of rocks; charcoal and pot sherds were found within the feature. Similar features are noted both in and near house structures at cold season settlement sites (e.g. Giddings and Anderson 1986).

An example of a firing feature was discovered at Cape Espenberg (Figure 3) in summer 2010. A shallow dish-like feature less than 1 m in diameter was identified outside of a late pre-contact semi-subterranean house in an activity area likely associated with house occupation. The possible pottery firing feature was composed of bright red oxidized sand, an abundance of broken pottery, as well as decomposing clay and ceramic sherds, charcoal fragments, and an abundance of burnt bone (Chris & John Darwent, personal communication, 2015). The current lack of known firing features at pre-contact archaeological sites in Alaska is likely influenced by archaeologists simply not looking for such features as well as difficulty in their identification. Ceramic firing features are likely embedded in other cooking and processing activities and therefore generalized into broader archaeological features such as “burnt areas” or “kitchens”. It is also possible that pottery firing took place away from cold season residential

camps, in short term logistical camps that are rarely identified or investigated in depth by northern archaeologists.

Perhaps the greatest cost in pottery production is the fuel used for firing ceramics (Rice 1987). While some think that low levels of ceramic production were linked to limited fuel availability in the Arctic (de Laguna 1947; Giddings 1952), others disagree (Oswalt 1955). Harry and Frink (2009; Frink & Harry 2008; Harry, Frink, O'Toole, et al. 2009, Harry, Frink, Swink, et al. 2009) experiment with ceramic production and use but do not explore the fuel requirements for ceramic firing in detail. It is possible that the addition of oil to the wood further increases fuel efficiency, as reported in the contact era in northwest Alaska (Saario & Kessel 1966; see also Crawford 2012). Even in treeless regions, driftwood is a seasonally abundant source of fuel available along the coasts and rivers of northern Alaska. But, driftwood may have varied in availability in the past (Alix 2005) and was required for many other tools and for house construction. Use of other materials (bone, dung) for ceramic firing and cooking is also a possibility. Seal oil as fuel for cooking is mentioned in the ethnographic literature (e.g. Burch 1998, p.102, 213), but oil is not mentioned as a source of fuel for ceramic firing except when used to soak wood. Analysis of northwest Alaskan ceramics indicates that these ceramics were fired at low temperatures in relatively uncontrolled conditions (likely open pits). However, scanning electron microscope analysis of a single sample from St. Lawrence island indicates that pottery was occasionally fired at high enough temperatures for sintering to begin (Anderson & Brown 2007). Additional research on fuel and fuel use in this region, including additional experimentation with the fuel requirements of ceramic firing are needed to answer this question, along with more archaeological research focused on other aspects of ceramic production. A next step in the study of production could involve using experimental and ethnographic data on firing to develop specific expectations for pottery production

features. Existing excavation data could then be revisited to see if any pottery firing features can be identified. Further investigation of “burnt areas” would also be informative.

## **USE**

Ethnographic data from across northern and western Alaska indicates that the primary use of ceramic vessels during the contact era was for cooking rather than food storage or transport. There are numerous ethnographic references to the importance of ceramic vessels in cooking and sustenance in general. For example, Annie Blue mentions that food cooked in clay pots tastes good and does not spoil right away (Blue 1999; see also Fienup-Riordan 2005, p.134; 2007, p.49). Blue also says: “I remember the pot was a very important necessity. That’s because we use the pot to feed ourselves therefore keeping us alive. Everyone has a pot. Everyone has a cooking pot. If a person lived without a cooking pot, how will he or she be? Perhaps his stomach will hurt because he will be very hungry. The pot feeds everyone who cooks with it (Blue 1999, p.5)”. Blue also recounts a story in which talking clay pots bring about abundant animals and successful hunting when requested to do so by people; abundant food keeps the pots full and (by inference) the people happy (Blue 1999).

Ethnographic information about cooking methods are somewhat limited (but see Frink & Harry 2008; Spray 2002) although indirect heating is reported. This includes the stone boiling method (e.g. Arnold & Stimmell 1983; Burch 2006, p.212, 1998, p.102; Fienup-Riordan 2007, p. 297; Ray 1975, p.117; Spencer 1959, p.472) or placement of the vessel next to the fire to heat (Fienup-Riordan 2007, p. 49, 297; Frink & Harry 2008, p. 111; Giddings 1961, p. 136; Lucier & VanStone 1992, p.5). Some late pre-contact and contact era vessels had lugs or holes for suspending the cooking vessel over a fire, or in the case of smaller lugged vessels over an oil lamp (Nelson 1983, p.202). Jessie Yiasrik Ralph describes using a tripod made out of willow branches to suspend a clay vessel over a fire (Lee et al. 1990, p.87). Spencer

(1959, p. 472) mentions that clay vessels were suspended in a net over the fire. According to Joe Friday (1983, p.5) "the clay pots were very good for cooking... the food was excellent that was cooked in these pots...wood was put underneath the pot to keep it straight and then wood was placed all around and lit. They kept adding wood around the pot until the food inside was cooked."

The change in pottery form from early round-bottomed and thin-walled vessels in the Paleoeskimo period to flat-bottomed and thick-walled vessels during the Neoeskimo period across Alaska suggests a general shift from direct to indirect heating, but other evidence (e.g. exterior sooting, thick interior and exterior residues, ethnographic data) points to continued use of Neoeskimo ceramic vessels as direct heating containers. However, Paleoeskimo ceramics from northwest Alaska are rare and it is not possible at this time to determine with confidence whether early ceramics were indeed round-bottomed. The analyzed northwest Alaskan assemblage included only 55 bases, all of which date to the Neoeskimo period; with the exception of one sherd from the Cape Espenberg site, all dated to the last 1000 years and the majority of these (42 bases, 76% of total) were flat bottomed. Thickness of Neoeskimo ceramics varied from site to site, but overall the Neoeskimo ceramics were much thicker than Paleoeskimo ceramics (Anderson 2011). In an experimental study, Harry and Frink (2009) find that direct heating is advantageous when fuel is limited or there is a need to keep cooking fires small. The persistence of ceramic forms that appear similar to vessels used for indirect heating may be due to local environmental constraints or a continuation of non-ceramic vessel forms. Potential advantages of ceramic vessels over other cooking vessels that could have been used for food processing include the ability to directly heat and boil foods for long periods of time and economy in production (although procurement costs may offset this). Fat rendering from bone and other meat byproducts through boiling or simmering is possible. The ethnographic record indicates that seal oil was typically rendered through other methods (Spray 2002, p.39); heat was used to render terrestrial mammal bone and this

process could have involved ceramic vessels. Culinary preferences for parboiled foods may also have been a factor in the adoption and persistence of Neoeskimo ceramic vessels (Frink & Harry 2008). Recent residue analyses (Anderson, Tushingham & Buonasera 2017; Farrell et al. 2014; Solazzo and Erhardt 2007, Solazzo et al. 2008) of Alaskan ceramic vessels provides a direct link between ceramics and aquatic resource use as far back as 2485-2341 cal BP. A study of 20 sherds from the Cape Krusenstern site (Anderson, Tushingham & Buonasera 2017) indicates that vessels may have been used for processing freshwater aquatic resources; mixtures of freshwater aquatic, marine aquatic, and terrestrial resources are also possible.

Differences in shape and wall thickness in these two time periods may simply reflect alternative cultural traditions and evolutionary trajectories, but could also be related to a shift from direct heating in the Paleoeskimo period to indirect heating during the Neoeskimo period. Study of vessel performance characteristics link thin walls and a rounded vessel base to direct heating, while thick walls and flat vases are associated with indirect heating practices (Linton 1944; Reid 1989; Sassaman 1995; Skibo, Schiffer & Reid 1989). Indirect heating is commonly associated with seed parching and roasting, and also with rendering of fats from meat and bone (Reid 1989). Both approaches to heating may have been used during the Neoeskimo period, however, particularly in tundra regions where the wood needed for sustained indirect heating was scarce (Harry & Frink 2009). The form of Neoeskimo vessels is particularly well suited for light cooking, or parboiling, of meat, a common cooking practices during the contact era in northern Alaska (Frink & Harry 2008).

Several ethnographic sources mention variation in cooking vessel size related to use. Large cooking vessels were about 7.6-11.4 litres (2-3 gallons), while smaller vessels and cups of unknown size were used for seal oil (Jacobsen, Woldt & Gunther 1977, p.107; Nelson 1983, p.201). It is not clear in

the original reference whether the smaller vessels were used for *storing* seal oil, or specifically for cooking with seal oil, and how this differed from cooking with the larger vessels. Analysis of 50 northwest Alaskan ceramic rim sherds identified a wide range of vessel sizes, with some variation in the shape of the vessel opening. The analyzed assemblage was dominated by direct rim sherds, although incurved or restricted rims are present as well and in larger numbers at interior sites. Rim opening diameters range in size between 25 and 50 cm, with a few outliers at each site measuring between 100 and 200 cm in diameter. Outliers may be the result of measurement error; irregular rim surfaces could introduce error in measurement. Alternatively, outliers may represent large vessels used for non-cooking purposes, for cooking different foods, or for use with a different cooking technique. The spatial distribution of restricted versus direct rim types could be related to different cooking techniques on the coast versus interior, increased wood availability in interior areas. Incurved rims are typically preferred when vessels are used for transporting goods or if heat retention is important (although not necessarily when boiling liquids) (e.g Rice 1987, p.238; see also Ali 2010; Arnold 2000; Hegmon 2000; Stark 2003). In the northwest Alaskan study, rim sherds from surface decorated vessels were, on average, greater in diameter and thicker than sherds without surface treatment. The sample size is small, but it is possible that surface treated vessels were designed for different uses than undecorated vessels.

While cooking seems to have been the most common use of ceramic vessels both before and after contact in the 18<sup>th</sup> Century, more pronounced ceremonial use of ceramic vessels is mentioned in the Barrow region. On the North Slope, three vessels types are known from the ethnographic period, larger (38-61 cm/15-24" tall) cooking vessels, small (15-20 cm/6-8" tall) cups, and flat-bottomed pan-like vessel (Spencer 1959, p.471). The ceremonial cups were kept in the ceremonial men's house, or *karigi*, in a special location and were used by women of the community to offer fresh water to sea mammal remains. Spencer also mentions ceremonial use of clay pots by interior people of the North

Slope. The first caribou meat each year had to be cooked in a clay vessel. These vessels were reportedly obtained through exchange with coastal potters (Spencer 1959, p.473). Little is known about non-cooking ceramic use from archaeological contexts. Several bowl-like ceramic vessels are known from Seward Peninsula archaeological sites (Schaaf 1988). Giddings (1952, plate XXV) recovered a cup-like ceramic vessel from the Ahteut site on the Kobuk River. In addition, a single ceramic cup was recovered during recent testing at the Cape Krusenstern Early Western Thule site (Anderson 2011). A large broken ceramic vessel was recovered from an interesting feature during recent excavations at Cape Espenberg. An adult fox and juvenile fox skull were found inside the broken vessel; a small bird skeleton was found inside the mouth of the adult fox skull. The faunal material and bowl was surrounded by groundstone arranged in a ring. Wolf canine pendants were also found in association with the ceramic vessel and faunal material (Personal communication, Chris Darwent, 2015).

#### **DISTRIBUTION**

In the 19<sup>th</sup> century, northwest Alaskan ceramic vessels were made for exchange. Pottery from Wales, Buckland, and the Selawik River regions were desirable exchange items amongst people from the region and with people from surrounding regions who gathered at several regional trade fairs for exchange (Ballot and Ballot 1987; Burch 1998, 2005; Kugzruk 1987; Lucier & VanStone 1992; Ray 1975). Spencer (1959, p.473) discusses production of pottery cooking vessels by people on the coast for trade with inland peoples for ceremonial use. In an unpublished account, Elsie Kugzruk (1987) comments on the exchange of ceramics from the coast for muskrat hides from the interior of the Seward Peninsula: "The pots were made down there on the coast [near Wales]. After they were made they were brought up here to trade usually with muskrat or some other things that the people needs". Noatak River people would use clay vessels from the Selawik River and Buckland regions (Giddings 1952; Hall 1970; Lucier & VanStone 1992; Stoney 1900, p.40). Before metal vessels were available, Nunamiut people of

the interior of northern Alaska reportedly made cooking vessels from clay or salty mud (Campbell et al. 2004, p.47; Campbell 1998). Spencer (1959, p.470) mentions that in the late 19<sup>th</sup> Century, when coastal residents used metal cooking pots for their own cooking needs, pottery was still made in coastal areas in the vicinity of Barrow specifically for inland trade. Wire repaired flat bottomed ceramics were found by Irving (Irving 1962, p.79) at the Kinyiksukvik site, located in the foothills of the Brooks Range; these ceramics were thought to have been imported from downriver (Lucier and Vanstone 1992, p.8). Lower Tena people of the Tanana River exchanged pottery upriver, at least as far as Big Delta (about 435 miles away) (de Laguna 1947, p.38; see also McKennan 1959, p.45), while people on Shagelak Slough of the Yukon River exchanged pottery downriver in return for beluga and seal oil (de Laguna 1947, p.140). Pottery production and use reportedly decreased as metal vessels became available across northern Alaska in the 18<sup>th</sup> Century (Campbell et al. 2004; Lucier and VanStone 1992; Ponkratova 2006; Ray 1975; Spencer 1959). Despite this, 19<sup>th</sup> Century pottery exchange is reported across northern and western Alaska (de Laguna 194; Fienup-Riodan 2007; Lucier and VanStone 1992; Nelson 1983; Osgood 1940; Spencer 1959; Stefansson 1914; Stoney 1900; VanStone 1954).

While ceramic exchange was fairly common during the contact era, the antiquity of this practice was unknown. I undertook a study of pre-contact ceramic distribution in northwest Alaska to address questions of social interaction during the late Holocene, focusing on the movement of ceramics as a proxy for social interaction across the region. Neutron activation analysis of 395 pottery cooking vessel fragments from 17 northwest Alaskan sites shows that over the last 2000 years, ceramics were incorporated into intraregional interaction networks. Subsequent expansion of the ceramic sourcing sample size, and analysis of additional clay materials has identified several outlying ceramic source groups that likely represent novel combinations of ceramic raw materials that may or may not have been imported or exchanged from outside northwest Alaska (Anderson et al. 2016).

Investigation of pottery distribution was limited prior to this most recent work, in part because ceramic use life was thought to be short due to vessel fragility. Results of technological analysis of northwest Alaskan ceramics indicate, however, that vessel fragility was highly variable and depended in part on the amount of organic temper and firing temperature, as well as depositional context and post-depositional processes. The circulation of vessels across northwest Alaska suggests that they were sturdier than typically conceptualized by archaeologists. Ethnographic data points to careful use of vessels to prolong vessel life. For example, vessels were transported in grass bags or wrapped in grass mats (de Laguna 1947, p.141; Fienup-Riordan 2005, p.134). While, in many cases, ceramics have an expedient appearance, vessels were clearly valued and handled carefully to prolong their use life. These practices further reflect the investment of time and resources made by potters, and the value of ceramic vessels to northern hunter-gatherers.

#### **REPAIR, REUSE, AND DEPOSITION**

While the sourcing study has shown that ceramic vessels were durable enough to circulate long distances, they likely broke frequently during use or transportation. There are a few references to repaired pottery, further indicating that ceramic vessels were a curated technology. Spencer (1959, 472) mentions that on the North Slope pottery was repaired with the addition of clay, feathers, and blood to the broken area; the vessel was then refired. Wire repaired pottery is reported from several contexts in the interior of northwest and northern Alaska (Irving 1962; Robin Mills, personal communication, 2008). Repaired ceramics were not observed in analysis of 3772 northwest Alaskan ceramics. During the contact era, ceramic use life was extended by lining or cushioning vessels with woven grass for protection, particularly during transportation (de Laguna 1947, p.141; Fienup-Riordan 2005, p.134).

There is surprisingly little information available on the specifics of archaeological ceramic depositional contexts. Ceramics are often recovered from house floor and fill contexts, but no study of within-house ceramic distribution patterns has been undertaken to date. Many pre-1970 excavations conducted in northwest Alaska retained only house level provenience information for ceramics and other materials so finer grained analysis of ceramics in museum collections is not possible. Ceramics are sometimes recovered from surface sites, and in these situations are usually interpreted as vessels abandoned or broken during seasonal or short term camping activities. The association of ceramics with burials is known from a few contact and pre-contact sites but it is not widely reported. Sinka Toopelook (1988) mentions an older grave marked with an old clay pot; Annie Blue (1999) discusses clay pots at the graves at the abandoned villages of Tangvaneq and Angvaneq. Clay lamps were sometimes used as grave goods or burial markers in the Yukon-Kuskokwim delta region (Broderick & Pratt 2009, p.134). A clay vessel was identified at a surface burial found on the northern Seward Peninsula in 2013 (Anderson & Junge 2017) and another burial associated vessel was found during recent work in Kotzebue (Ross Smith, personal communication, 2015). The practice of pottery as a burial good does suggest a greater significance for pottery beyond use as a cooking tool. An in depth review of archaeological literature on burials in northern and western Alaska is needed to further explore links between ceramics and burial practices and to provide evidence for study of how ceramics may have been incorporated into spiritual, social, and ceremonial aspects of past lifeways.

## **CONCLUSION**

This chapter integrates new archaeological information on northwestern Alaskan ceramic production and use with ethnographic data from northern and western Alaska. The goal is to better understand the role of pottery technology in past northern hunter-gatherer lifeways. The use life

perspective employed here is helpful in considering how pottery making and use could have been embedded within other important subsistence tasks and social activities during the pre-contact era. This synthesis provides new insights into the role of ceramics in northwest Alaskan social life and also highlights areas related to pottery production and use that need further investigation. Key findings include:

- Ethnographic data indicates that procurement and production were warm month activities. This is the same time that women, the presumed primary makers and users of pottery, were very busy with other food getting, processing, and storing tasks. That time was set aside during this peak season for pottery production is a further indication of the importance of ceramics both for cooking, and perhaps for exchange and other social interactions, during the pre-contact era.
- Ethnographic and archaeological data suggest that local and regional variability in clay, temper material, and fuels likely played a role in the development and spread of ceramic technology. Variable clay distribution and fuel meant that potters did not always have direct access to desirable clays or to the wood fuel needed for firing. People likely traded for clay or for completed vessels when necessary pottery making raw materials were not readily available.
- Ethnographic data indicates that people had specific clay requirements that were shaped by both environmental and social factors; temper use seems to have been more variable and perhaps more expedient. Temper choice may have been made in relationship to clay characteristics or other factors. The need to embed pottery making in other summer subsistence activities could be a clue as to why temper use and firing techniques were highly variable; women used what was on hand at their pottery production site, which was likely located to facilitate other subsistence activities rather than specifically for pottery production.
- Ethnographic data on the ceremonial use and discard of vessels provide evidence for the important social roles of ceramic vessels during the contact era. Archaeological data indicate

vessels were used predominantly for cooking, but variations in the size and shape of vessels suggest differences in cooking techniques and, perhaps, in vessel use.

Northwest Alaskan pottery vessels were a high investment and curated technology, the production of which took time away from other important subsistence and tool making tasks. Nevertheless, pottery making technology was maintained for thousands of years, up into the contact era when commercially made vessels became readily available. Ceramic vessels were important for food processing, but had significance beyond this in relationship to exchange networks and other aspects of social life. Frink and Harry (2008; Harry & Frink 2009; Harry, Frink, O'Toole, et al. 2009; Harry, Rink, Swink, et al. 2009) make a similar argument for the interplay of environmental and social factors in the adoption and development ceramic technology in western Alaska. There is a close link between ceramics and marine mammal oil at several stages in the production and use of pottery in northwest Alaska. Perhaps it is this link with marine mammal use that led people to maintain such a high investment technology despite the challenges of making and using pottery in northwest Alaska. In addition to continued study of ceramic technology itself, more research is needed on pre-contact cooking practices, the context of pottery deposition, and ceramic residue analysis to further investigate the potential association between marine and freshwater aquatic resources, ceramic use, and the social context of past pottery use in northwest Alaska.

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Figure 2. Northwest Alaskan sourcing study area.

**List of Captions for all Figures and Tables**

Figure 3. Alaska study area map with other key locations from ethnographic research mentioned in text indicated (Figure by Justin Junge).

Figure 2. Examples of northwest Alaskan ceramic surface decorations: A) Dentate stamp, B) Curvilinear stamp, C) Corrugated, D) Waffle stamp, E) Textile impression (there are many variations), F) Seward striated, or Striated (Photos by Alexandra Vincent, Figure by Justin Junge)(Images B, C, E, and F, Courtesy of the University of Alaska Museum of the North and Bureau of Land Management).

Figure 4. Northwest Alaskan sourcing study area. Archaeological sites, reported, clay sources, and locations where clays were sampled for INAA. Additional clay deposits were identified during survey but samples were not collected (Figure by Justin Junge).