

# RECONSTRUCTING THE ST. LAWRENCE ISLAND KAYAK: FROM FORGOTTEN WATERCRAFT TO A BERING SEA MARITIME NETWORK

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## ABSTRACT

St. Lawrence Island kayaks are absent in both museum collections and written historical sources. At the same time, the pictorial record, indigenous oral lore, and archaeological data point to uninterrupted use of kayaks well into the beginning of the twentieth century. Drawing on the analysis of kayak data from four archaeological sites, this article reconstructs structural details and discusses the history of the St. Lawrence kayak over the last millennium; it also analyzes the values of these data for understanding prehistoric maritime networks of the Bering Sea.

The Bering Sea has one of the richest and most varied traditions of indigenous kayaks in the entire circumpolar north. Together with the Aleutian chain, the region features eight ethnographic kayak variants, representing all indigenous coastal and insular nations with two noticeable exceptions: the St. Lawrence and Diomedé islanders (Adney and Chapelle 2007:190–202; Zimmerly 2000a:39–62). This absence is particularly intriguing in the case of St. Lawrence Island—the largest of all Bering Sea islands, with over two millennia of human occupation history and a reputation as a “bi-continental throughway” (Ackerman 1961:1). Lying at the southern margin of Bering Strait, the island is a natural stepping-stone between the Asian and American coasts with only 65 km to Chukotka and about 160 km to Norton Sound. The distance to Chukotka is well within the range of traditional skin boats, and St. Lawrence umiak subsistence use and voyages to Siberia are both historically documented and recently practiced (Braund 1988:17, 104–107; Carius 1979:10; Elliott 1886:220–224; Kotzebue 1967:175; Moore 1928:349–350; Nelson 1899:217; Oozeva 1985:169; Silook 1976).

The gradual disappearance of kayaks from living tradition is an unfortunate reality almost everywhere in the circumpolar north, set in motion centuries ago by changes in Native social and material culture associated with contact with nonindigenous societies. In most of coast-

al Alaska, kayaks were still in use in 1910–1920s, when their significance for subsistence hunting was challenged by easy access to different technologies (Golden 2015:11; Nelson 1969:308). By that time, however, examples of ethnographic kayaks had been acquired by museums around the world, and the interest generated sent researchers to distant communities to record the extant knowledge of boat builders and surviving boat frames. What makes St. Lawrence and Diomedé Islands kayaks exceptional is that they were not preserved in either museum collections or the source communities.

The significance of this gap in our understanding of the history of St. Lawrence Island and the Bering Sea region in general goes far beyond a single missing subsistence tool or technology. Kayaks were firmly embedded in the social, spiritual, and economic fabric of all circumpolar cultures. An indispensable partner in sea ventures, the kayak shared some of the hunter’s most profound experiences. As Joelle Robert-Lamblin (1980:12) eloquently put it: “their fates, indeed are bound up together, and their lives end at the same time; they disappear at sea together or, on land, share the same grave.”

Kayak ownership was often synonymous with being a real man, a provider, and an active member of society (Arima 1975:186). It can be argued that kayaks were extensions of their owners’ masculinity, the connection often

articulated and reinforced in local boat practices and rituals (Anichtchenko 2017:112–113).

Kayaks were also sometimes perceived as living beings, capable of making a conscious decision to aid or destroy their master. In one Yup'ik story, for instance, a hunter calls upon his kayak when an ice floe breaks off and he starts drifting away. The kayak comes to him and brings him safely home (Fienup-Riordan 2000:103). A tale from King Island describes how a man blown out to sea while kayaking destroys his watercraft as soon as he reaches the land, which happens to be St. Lawrence (Kaplan 1988:155). Even though he is far away from home, he has no trust in his kayak and does not wish to be put out at sea in it in case he encounters unfriendly people. In many Arctic indigenous societies, making and mastering a kayak was the first step toward higher social status, since it allowed for acquisition of marine mammal skins for clothing and tent skins as well as other material wealth (Arima 1975:48; Turner 1894:240). Kayaks welcomed newborn children as old kayak skins used for mats during childbirth (Blue 2007:33–35), and accompanied people on their final journeys as grave markers and funerary covers (Fienup-Riordan 2000:139; Murdoch 1892:424; Ray 1885:xcvi; Stefánsson 1914:152). In a more tangible sense, kayak frames embodied the environmental knowledge necessary for acquiring driftwood, skins and lashing material, woodworking skills, and an understanding of the hydrodynamic principles of boat building. Finally, as a crucial element of maritime mobility, kayaks are an indispensable source for understanding the extent, directions, and dynamics of people's movement in aquatic environments and, as such, of interregional networks.

This wealth of meanings and practices mandates a more detailed look at the history of the St. Lawrence Island kayak in order to reconstruct its development and review the information it presents regarding the indigenous maritime network of the Bering Sea region. The progress of the study of skin boat seafaring and intercontinental and long-distance maritime networks of the Bering Sea and the Arctic in general has been delayed by three preconceived notions.

First, there is general skepticism regarding the ability of skin watercraft to handle a prolonged journey without becoming waterlogged and incapacitated (Crockford 2008:126; Giddings 1960; Kankaanpää 1989:31; Mason 1998:299; Rainey 1941:463). The covers of indigenous boats were made of untanned marine mammal hides sewn together with a waterproof stitch and oiled with blubber

to make them even more watertight. Both prolonged use in water and overdrying compromised structural stability. In a regular scenario, during the navigational season boats would be pulled out on shore after each use to allow the skins to dry. This need for regular landfall is thus often seen as an obstacle to extended voyages.

Second, archaeological boat remains are rarely considered in studies of prehistoric networks, which favor such methodologically established avenues as lithic and trade goods distribution analysis or raw material provenience sourcing. This lack of awareness of boats' potential as archaeological source material is not limited to skin watercraft or the Arctic. As Robert Van de Noort (2006:269) pointed out in his study of the social dimensions of Bronze Age sewn plank boats, "most prehistoric boats have been considered in the literature predominantly in a decontextualized manner." The study of watercraft remains the domain of specialist maritime or nautical archaeologists, whose focus predominantly lies with technological aspects of the ships and boats, rather than their economic, social, or ideological role in past societies (Adams 2001:292–310; Van de Noort 2006:269). As a result, boat archaeology is often positioned as an isolated and somewhat esoteric field, not immediately relevant to larger themes of archaeological inquiry, the value of which is further diminished by a comparatively small average percentage of boat data in sites' overall artifactual assemblages.

The third hurdle comes from the bias in existing skin boat scholarship, which for a long time positioned them as tools of local subsistence, components of the hunt, used in limited geographical areas anchored by permanent villages and seasonal hunting camps (Adney and Chapelle 2007:190–195; Arima 1975). Recent research on skin boats brings new approaches, emphasizing the connection between cognition and locomotion **while** engaging more thoroughly with archaeological data (Walls 2014, 2016; Walls et al. 2016). Yet long-distance indigenous Arctic sea voyaging remains surprisingly understudied.

At the same time, both ethnographic and archaeological evidence for long-distance maritime seafaring in the indigenous Arctic is ample. The oral lore of circumpolar people contains many stories about extended kayak voyages, the most notable of which are stories about the cultural hero *Qayaqtuagagniqtuq*, whose name translates as "forever riding a kayak" (Oman 1995; Sheppard 1998:150, 154; Van Deusen 2009). Known in many regions of the Arctic—from Siberia to Greenland—this narrative follows the adventures of a man who, after having been expelled

from his home at a young age, sets out on an epic kayak journey “across the sea,” visiting strange lands and encountering new peoples (Walls 2014:57–58). Long-distance kayak and umiak voyages—whether following the shore or crossing large bodies of water—are also recorded ethnographically (e.g., Anichtchenko 2017:109–110; Burch 2005:199–200; Ganley and Wheeler 2012:118–119).

In the Western scientific paradigm, current understandings of prehistoric culture sequences demonstrate that at different times the Arctic was the stage of several geographically expansive transcontinental movements, such as the spread of the Arctic Small Tool tradition (ASTt), expansion of the Dorset culture, and the Thule migration, all of which depended—at least in part—on people’s ability to negotiate seascapes. Archaeological remains of the watercraft that afforded this ability, combined with more recent ethnographic boat records, contain a challenging promise of a deeper understanding of prehistoric network and mobility patterns in Alaska and beyond. This article aims to respond to the challenge and assess the promise while focusing on one of the least-known kayak technologies of the circumpolar north.

As a study concerned with boat construction, it engages structural terminology pertaining to the kayak frame (see visual guide provided in Fig. 1). Much of the data discussed below result from collections research conducted at the University of Alaska Museum of the North (UAMN) and the National Museum of Natural History (NMNH). Both access to the collections and radiometric dating were

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## LOST AND FOUND: THE ST. LAWRENCE KAYAK IN THE RECENT PAST

Even today, nearly a century after the first archaeological investigation on St. Lawrence Island, much of our knowledge of its history and culture comes from the pioneering research of Otto Geist. In 1926, Geist undertook a 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) “with moderate private funds” (Geist and Rainey 1936:23). While on St. Lawrence Island, he became intrigued with midden deposits at Cape Chibukak and Kukulik. Over the following two decades, Geist spent eight seasons excavating Kukulik and other sites, assembling an impressive collection of over 80,000 artifacts and becoming an expert on many aspects of indigenous life of the island. In recognition of his connection to the local community, he was even accepted into a local clan and received the Yupik name *Aghvook*, “whale” (Keim 1969: xvii–xix). Although his own excavations yielded a number of kayak frame fragments and miniatures, Geist paid little attention to this dataset, briefly remarking on the presence of both umiaks and kayaks in the past and stating that at the time of his research kayaks were “not used or remembered on St. Lawrence Island” (Geist and Rainey 1936:121). Given his reputation as one of the

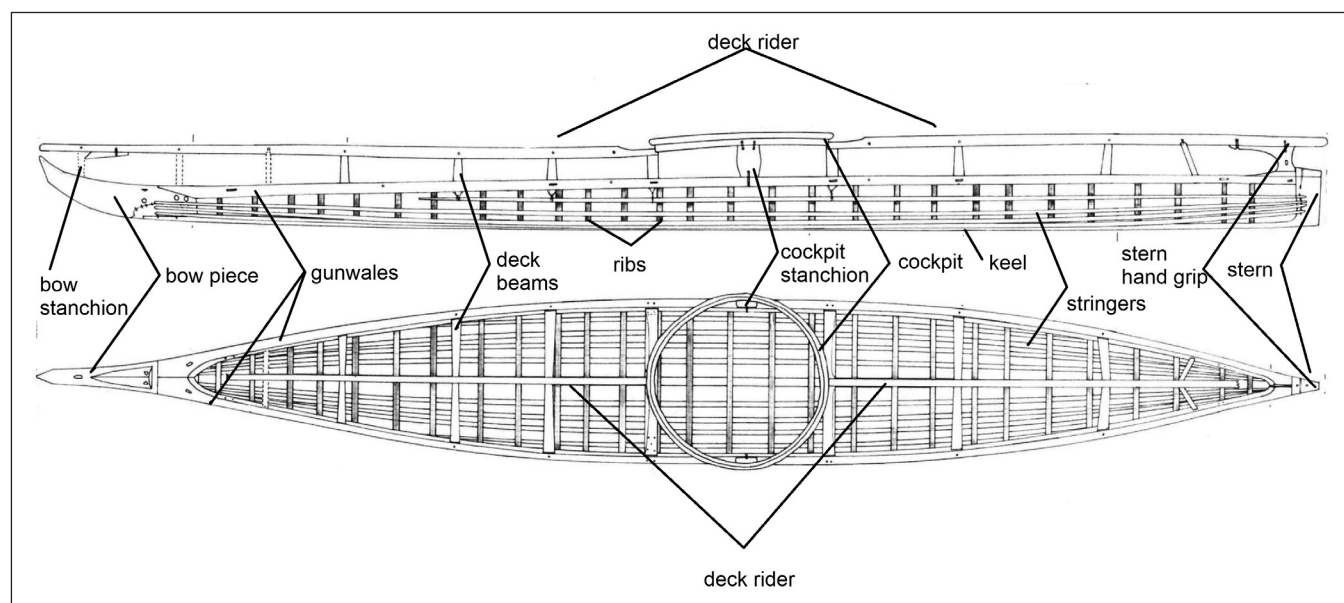


Figure 1. Kayak terminology. Background image Golden (2015:220).

“fathers” of St. Lawrence Island studies, it is not surprising that his statement was taken seriously. Convinced by the lack of St. Lawrence ethnographic kayaks and perhaps a little too trusting in Geist’s observation, kayak researchers accepted as fact that St. Lawrence kayaks must have gone out of use in the distant past. Finnish archaeologist Jarmo Kankaanpää, for instance, suggested that St. Lawrence kayaks disappeared as a result of the establishment of organized crew whaling, which removed the need for small one-person watercraft. In his opinion, at that point (circa AD 800–1000), only the communities engaged in caribou hunting maintained use of kayaks.

When umiak whaling became common in the Bering Strait area during the Punuk phase, the kayak completely disappeared from the Diomedes and St. Lawrence Island which did not have indigenous populations of caribou. We may presume that Alaskan proto-Thule, upon developing a whaling-based economy with the help of Punuk-derived technology, probably also gave up kayak sealing although retaining the craft for caribou hunting. (Kankaanpää 1989:34)

Although interesting and thought-provoking, Kankaanpää’s hypothesis remains unconvincing. Faunal analysis of St. Lawrence Island and Bering Strait archaeological sites does not show a decline in seal consumption throughout the Thule period (Savinetsky 2002:277). Furthermore, the use of kayaks was not limited to caribou and seal hunting. Most other Arctic and subarctic societies practicing organized crew whaling retained their kayaks up until the twentieth cen-

tury. The Siberian Yupik people of Asia, closely related to the present population of St. Lawrence Island, used kayaks in the early 1900s. Waldemar Bogoras photographed a 4.5-m-long kayak in the Siberian Yupik village of Wute’en, and collected a model of a kayak made at Indian Point (Bogoras [1909] 1975:135; Zimmerly 2000a:14). The boat was reportedly similar to kayaks of the maritime Chukchi, with a rounded bottom and flat deck.

A closer look at the ethnographic record of the island reveals that despite the lack of written evidence or full-scale examples, kayaks feature in St. Lawrence Island oral lore in connection with both subsistence activities and heroic deeds. In the story “*Tutakemsegaq* (Wood Carver),” a skilled and good-humored St. Lawrence wood carver paddles his kayak to an island to collect driftwood. 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. Disappointed but not discouraged, *Tutakemsegaq* returns to the island to carve himself a new woman, this time giving her an ugly face. Once again he takes his creation to the village, but this time when she peeks from the kayak hatch the villagers run away and the witty carver finally gets a wife (Slwooko 1979:37–38). Besides an obvious parallel with the myth of Pygmalion, the *Tutakemsegaq* story hints at the kayak’s 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

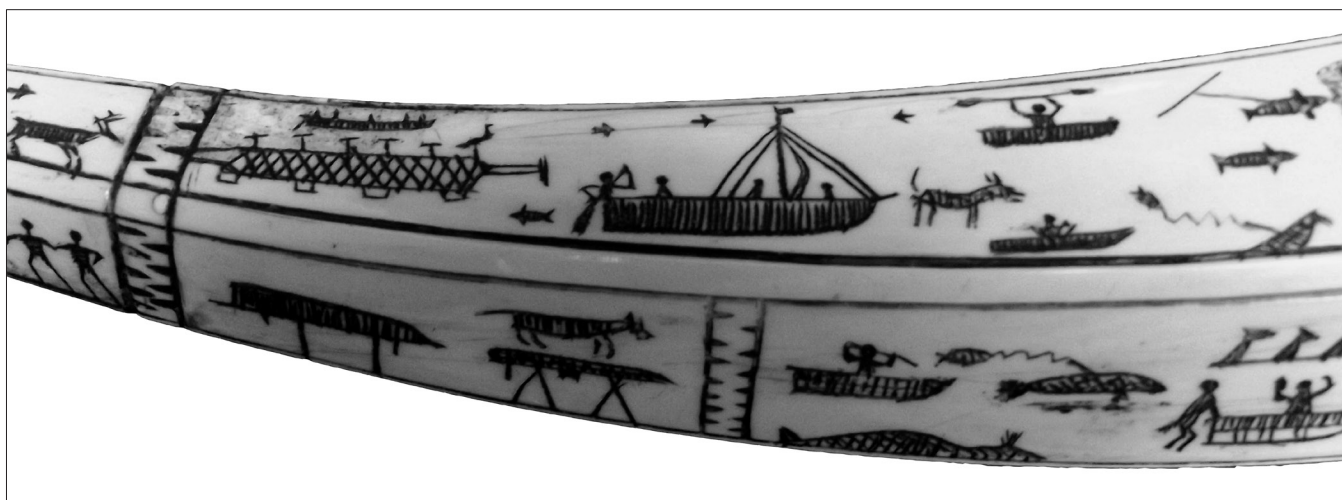


Figure 2. Ivory smoking pipe collected by Riley D. Moore in Gambell in 1912. National Museum of Natural History, E280599,. Photo by E. Anichtchenko.



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). A reference to kayak voyages between St. Lawrence Island and the Alaskan mainland, this tale also hints at tension in the relationship between islanders and inhabitants of mainland Alaska.

While traditional tales are hard to date (e.g., see Sheppard 1998), some comparatively recent ethnographic records also attest to the presence of kayaks on St. Lawrence Island as late as the early twentieth 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. 2). Another St. Lawrence smoking pipe features a hunting scene with both single- and double-hatch kayaks engaged in whale hunting (NMNH E316794). Estelle Oozevaseuk, a St. Lawrence elder, recalled that kayaks were used on the island a “long time ago” and were even paddled to Siberia (Oozevaseuk 2004).

An ethnographic collection labeled “kayak measuring sticks” purchased by Moreau Chambers and Henry

Collins in 1933 in Gambell is further evidence that kayaks may have been manufactured on the island as late as the beginning of the twentieth century (NMNH E280248, Fig. 3) 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 artifacts are reminiscent of mortise joints of kayak deck crosspieces, ribs, and flat-bottom crosspieces, 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 apparent contradiction with the notion of kayaks being tailored to their owners’ individual body measurements, but perhaps indicates methods used by a master 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 catalog: *uuqyah’juqum* (“to make kayak”).



Figure 3. Kayak measuring sticks collected by Moreau Chambers in Gambell in 1933. National Museum of Natural History, E280248. Photo by E. Anichtchenko.

The use of kayaks for subsistence activities was apparently remembered in the second half of the twentieth century. Gambell elders interviewed sometime before 1976 recalled kayak hunting for young bearded seals. Killed seals were put inside kayaks, which could reportedly hold about ten young seals (Silook 1976:34).

Even more informative are two photographs taken by Henry Collins at Point Kialegak in 1929, when Collins was conducting archaeological reconnaissance at St. Lawrence Island on behalf of the Smithsonian Institution. Two small black-and-white images show kayakers paddling single-hatch boats (Figs. 4 and 5). The date and place where the photographs were taken are marked in Collins's hand on the back of the prints (Collins 1929:CK29-26, CK29-1). In terms of design, these kayaks resemble Norton Sound watercraft with a characteristic hand-grip protrusion at the stern and a cleft bow. Henry Elliott's 1874 sketch of walrus hunting also shows a kayak with a cleft bow, which resembles the boats of the Aleutian Island and Kodiak Archipelago rather than the Norton Sound type (Elliott 1886:313; Fig. 6).

Overall, this ethnographic record indicates that the disappearance of the St. Lawrence kayak tradition was a comparatively recent development. It appears that kayaks were still used and perhaps built in the 1920s, but van-

ished rapidly shortly after, leaving little or no memory of specific construction details. The timing of this disappearance coincides with the abovementioned decline of kayak traditions around the Bering Sea and Alaska in general, which in turn is linked with the accessibility of firearms and alternative methods of transportation (Nelson 1969:307). Outside of St. Lawrence Island, this decline was gradual. VanStone (1989:15) notes that thirty-four kayaks were in use on Nunivak Island in 1946, and in some areas kayaks were functional watercrafts as late as ca. 1975 (Pratt 2009:185). The absence of full-scale St. Lawrence kayak boat frames from the early twentieth century and the lack of kayak construction knowledge in the source communities is enigmatic. Such rapid and marked change indicates that although still practiced, the tradition was already in severe decline when Collins chanced upon recording its last days.

In a larger anthropological context, sudden changes in cultural practices usually indicate dramatic events and are often accompanied by significant population loss. One such event in St. Lawrence Island history took place in 1878–1880, when a combination of poor weather conditions, depleted animal stocks, and disease resulted in a famine, which claimed between 75% and 86% of the island's population (Bockstoe 1986:136–141; Burgess



*Figure 4. Photo taken by Henry Collins in 1929 at Point Kialegak, St. Lawrence Island. Henry Bascomb Collins Collection, National Anthropological Archives, Smithsonian Institution, Washington, DC.*





Figure 5. Photo taken by Henry Collins in 1929 at Point Kialegak, St. Lawrence Island. Henry Bascomb Collins Collection, National Anthropological Archives, Smithsonian Institution, Washington, DC.

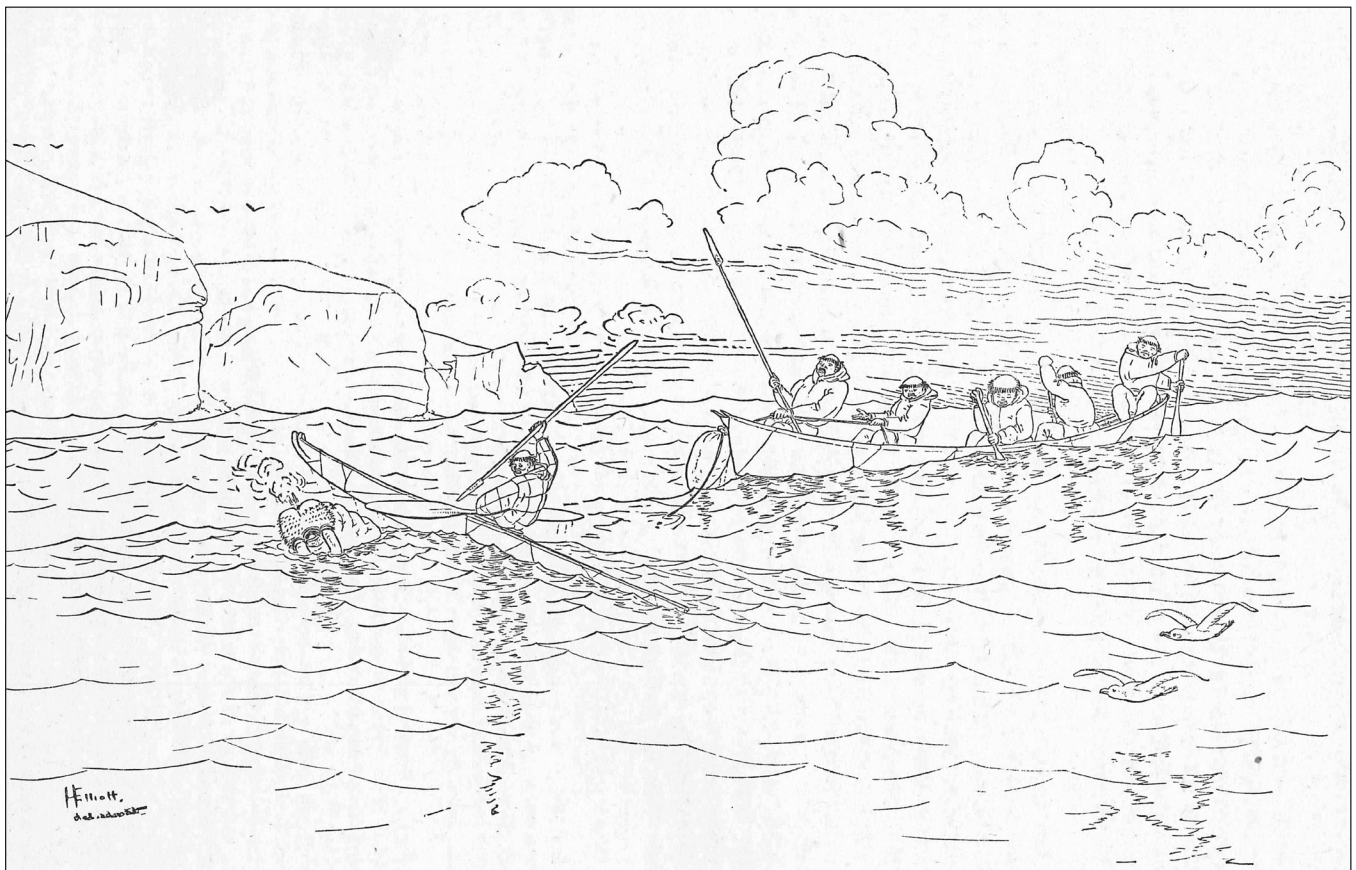


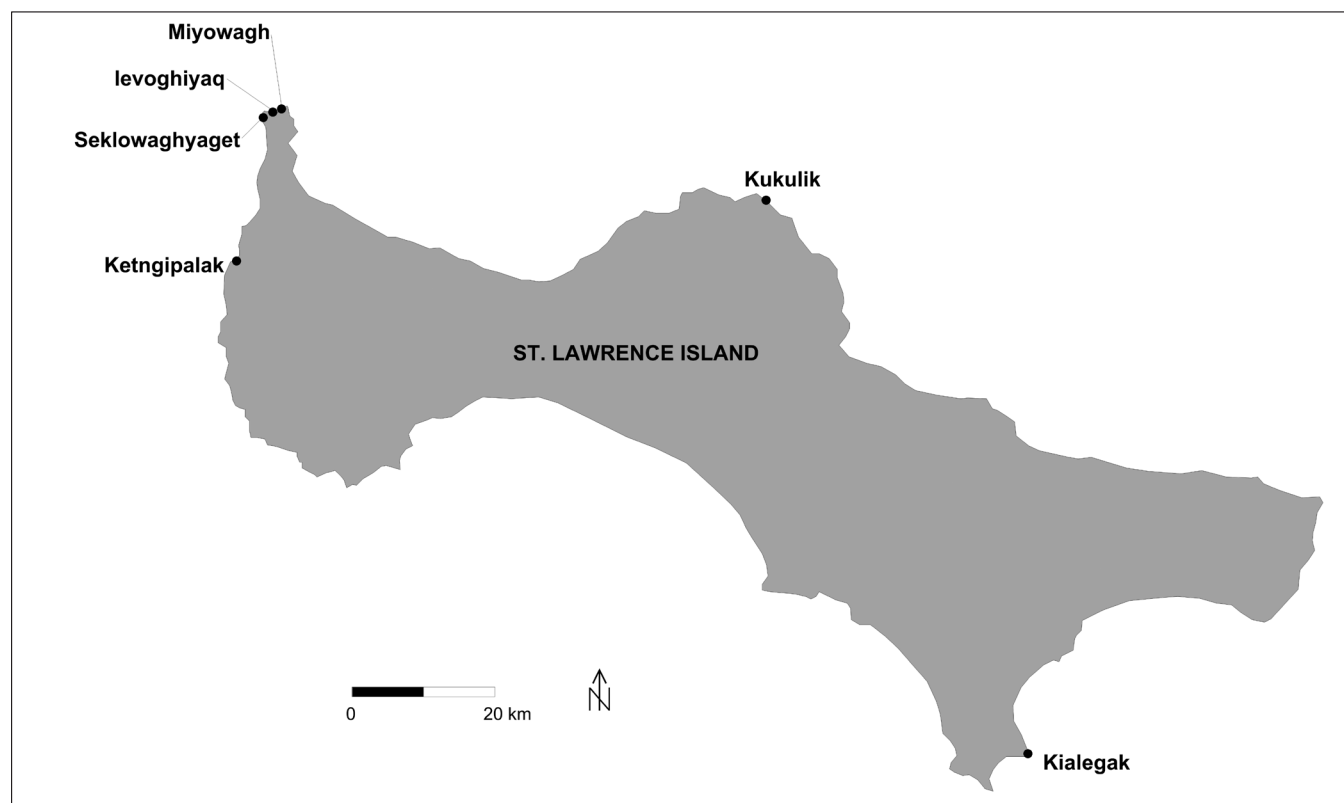
Figure 6. Walrus hunting on St. Lawrence Island. Henry Elliott (1884; plate XXIII).

1974:28–32; Crowell and Oozevaseuk 2006:3; Mudar and Speaker 2003). Depopulation and consequent changes in settlement patterns had a tremendous impact on the island’s traditional culture. The loss of entire communities eliminated some regional traditions and dealt a blow to intergenerational knowledge transmission, removing some parts of the cultural record before more systematic inquiries into the ethnography and archaeology of the island began at the end of the nineteenth century. The decline of the kayak tradition was also likely related to the 1878–1880 famine. A handful of thirty-plus-year-old male survivors of the epidemic versed in traditional knowledge could potentially have kept it alive for several decades, but they may not have had enough apprentices to ensure the survival of the tradition. Traditionally, kayaks were built by older men (Bogojavlensky 1969:67). By the 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. Without ethnographic objects or records to rekindle it, the millennia-old tradition was forgotten, leaving behind many unanswered questions—including some very basic ones, such as the essential morphology of the St. Lawrence kayak. Did it resemble the Aleutian type, as suggested by

Elliott, or the Norton variant, as implied by Collins’s photographs? To seek the answers to these questions, we now turn to the archaeological record of St. Lawrence Island.

### ARCHAEOLOGY OF THE ST. LAWRENCE KAYAK: RECONSTRUCTING FORGOTTEN WATERCRAFT

Considering the role of the Bering Land Bridge in the colonization of North America, the range of human history in the Bering Sea and Bering Strait region extends over the past 20,000 years. A prominent volcanic feature during the glacial maximum, St. Lawrence maintained land connections with Eurasia and North America until around 11,000 BP (Hopkins 1967; Smith et al. 1978:2). The island’s potential to elucidate the cultural and historical connections between Asia and Alaska inspired many archaeological investigations, resulting in the recording of fifty-nine archaeological sites, many of which contain boat data (Crowell 1985; Fig. 7). 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 (Blumer 2002:93–94; Dumond 2009:72). Settlements



*Figure 7. St. Lawrence Island map with archaeological sites mentioned in this article.*



of this culture, which became known as Old Bering Sea (OBS), were positioned along the island's north shore in locations that allowed easy access to maritime resources, particularly walrus and seals (Ackerman 1961, 1962). Zooarchaeological analyses demonstrate that animals were taken year-round, which implies watercraft use during the summer season (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, Susan Crockford's recent research on mid-Holocene climate change makes a persuasive argument for tracing their origin to the southern margins of the Bering Sea. Crockford proposes that the sea ice-edge hunting technology of early St. Lawrence settlers, including boats, had its ancient roots in the eastern Aleutians and is represented archaeologically by ca. 4700 BP (Crockford 2008). According to this theory, the initial wave of population came to St. Lawrence from the south, along 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 the Asian and Alaskan coasts attests to the high level of these people's mobility and supports the notion of transcontinental exchanges (Dumond 2009:75).

Miniature ivory and wooden boats from OBS sites, such as the Ekven cemetery on the Chukotka Peninsula (Bronshstein and Dneprovsky 2009:94), Miyowagh on St. Lawrence Island (Collins 1937: 413–414, plate 59), and Point Hope in northwestern Alaska, imply OBS use of both kayaks and umiaks (Fitzhugh 2009:164). The overall OBS model sample size is both small and heterogeneous. Wooden models are noticeably less detailed than ivory miniatures and, if taken as an accurate depiction of watercraft, represent sharp-ended boats with ridged decks and round cockpits. All wooden kayak models from Ekven, for instance, belong to this type (Bronshstein 2007:184). By contrast, an ivory kayak from the same site depicts a flat-decked boat with an oval cockpit and gunwale ends flaring out in opposite directions at stem and stern (Fig. 8). A human face peeks through the cockpit and a pair of whales, or perhaps seal floats, are positioned behind it. A miniature almost identical to this Ekven example was collected in 1907 by George Byron Gordon on the opposite shore of Bering Sea, in Point Hope, Alaska (Penn Museum NA1619, Fitzhugh 2009:165). The model



*Figure 8. Old Bering Sea (circa 50 BC–AD 500) ivory kayak model from Ekven archaeological site. Museum of Anthropology and Ethnography (Kunstkamera). Photo by E. Anichtchenko.*

was presumably excavated by local residents from a nearby archaeological site, but its exact provenience and age are unknown. 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). Assuming that the resemblance between two miniatures is not coincidental, the Point Hope ivory kayak is both a visual reference, however schematic, to how OBS kayaks looked, and one of the earliest representations of the 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 may be seen as evidence of the consistency of both ritualistic meaning and design of OBS kayaks on an intercontinental scale. A "2,000-year-old Siberian kayak model" of uncertain provenance published by David Zimmerly (2000a:3) is of similar design but has more sharply angled gunwales. The difference between wooden and ivory miniatures still requires some explanation. Were cruder wooden models just generic toys, and not representative of boats' actual features? Or perhaps vice versa—more elaborate ivory miniatures were amulets depicting spirit boats, not actual watercraft? Answering these questions with any degree of certainty requires an examination of actual remains of a full-scale OBS kayak, which are yet to be discovered.

At some point between AD 600 (Bandi 1969; Giddings 1960) 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 whale bone (Collins 1937). An increase

of whale bone in faunal assemblages and the appearance of large toggling harpoons imply a subsistence shift toward whaling, which some scholars equate with "greater maritime proficiency" (Dumond 2009:75). A number of St. Lawrence archaeological sites, such as Miyowagh, Ievoghiyaq, and Seklowaghyaget, combined OBS and Punuk layers, suggesting a transition between these two cultures, possibly under the influence of a Siberian trade network connecting the Bering Strait region with Korea and China (Mason 1998). Because of the Punuk focus on whaling, the St. Lawrence transition to Thule culture is subject to chronological and terminological debate. Some scholars place the convergence around 1000 AD (Dumond 2009:75) or 1100 AD (Crowell 1985:13); others consider the Punuk phase of St. Lawrence material culture to last from 700 AD to circa 1600 AD (Anderson 1978; Bandi 1969; Collins 1937). 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 1.

In comparison with the OBS period, boat remains are more frequent in the Punuk and Thule levels of all St. Lawrence Island sites. Ivory miniatures from these periods exhibit both similarities to and differences from the OBS models. A kayak carving from Punuk layers of the Ievoghiyaq site, for instance, has the same semi-oval cockpit and set of two floats as the Ekven and Point Hope miniatures, but also features a ridged deck and connected gunwales (Arima 1999; Fig. 9). The gunwales of the model from the Seklowaghyaget site (A356213-0 NMNH), also presumably dating to the Punuk period, are joined at

*Table 1. Comparative chronology of six St. Lawrence Island archaeological sites compiled from various published sources*

Site	Collins (1930, 1937)	Geist & Rainey (1936)	Smith et al. (1978)	Blumer (2002)	Houlette (2009)
Miyowagh	OBS–Punuk			AD 60–1445 (peaks 400–1297)	
Ievoghiyaq	Punuk			AD 885–1400 (peaks 1000–1162)	
Seklowaghyaget	Punuk–AD 1700			no radiometric date	
Ketngipalak				AD 465–1635 (peaks AD 635–1493)	
Kialegak	OBS–Modern		AD 300–460	AD 730–1160 (peaks 970–1040)	
Kukulik		OBS–AD 1880		AD 430–1155 (peaks 575–1005)	BC 55–AD 1795



Figure 9. Ivory carving of a kayak with hunter from Ievoghiyoq. National Museum of Natural History (NMNH), A355338-0. Photo by E. Anichtchenko.

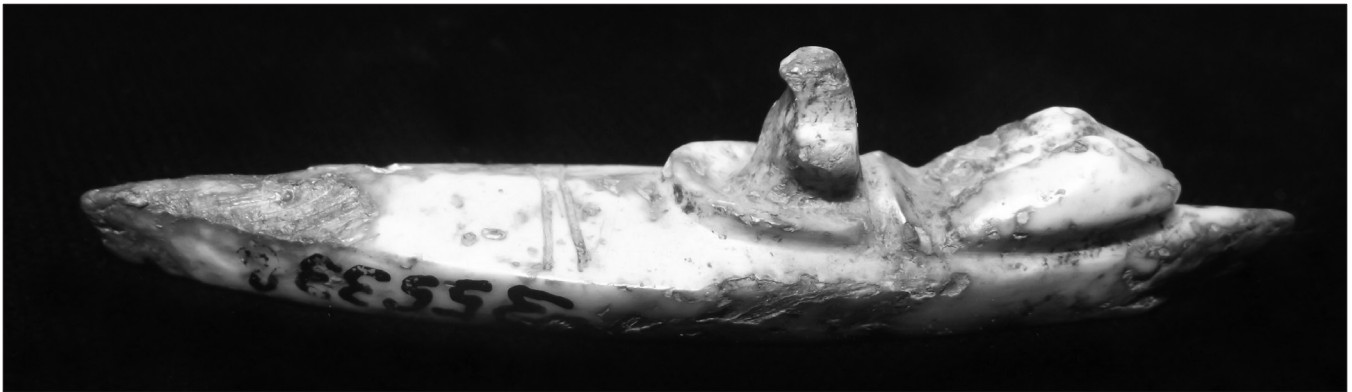


Figure 10. Ivory kayak miniature from Seklowaghyaget archaeological site. NMNH A356213-0. Photo by E. Anichtchenko.

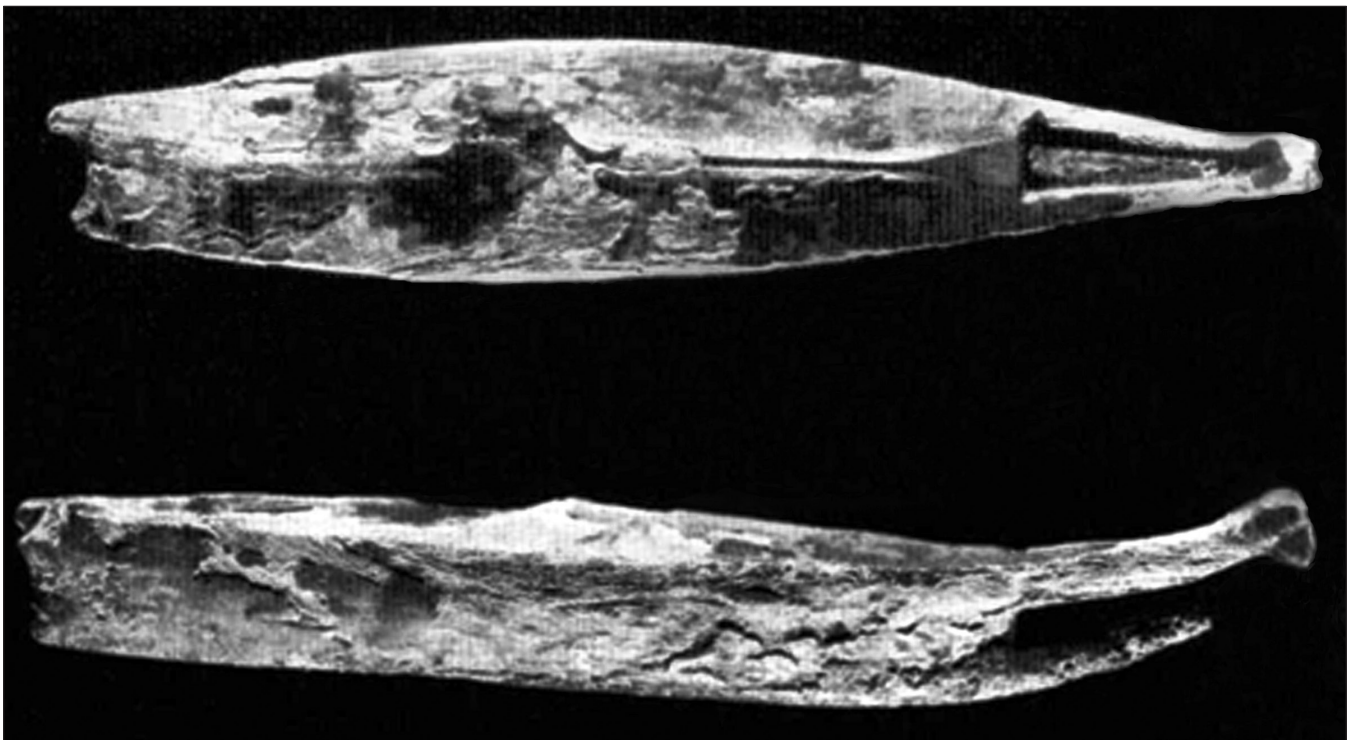


Figure 11. Kayak miniature from Seklowaghyaget site. NMNH A264174. Photo by Vernon Doucette (*Arima* 2004:139–140).





*Figure 12. Kayak miniature from Kukulik site. University of Alaska Museum of the North (UAMN), 1-1939-1469. Photo by E. Anichtchenko.*



*Figure 13. Ivory kayak miniature from the Edmund Carpenter collection, Menil Museum, Houston. Photo courtesy Alamy stock photo.*

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 known representation of a double-hatch kayak from the Bering Sea region (Fig. 10).

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. 11), a wooden boat model from Kukulik (UAMN 1-1939-1469; Fig. 12), and wooden and ivory miniatures from the Edmund Carpenter collection (Fig. 13), 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.



*Figure 14. Wooden kayak paddler figurine from the Miyowagahameet site. NMNH A353596. Photo by E. Anichtchenko.*

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 labor intensive. At the same time, transom-stern 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 transom-stern kayaks, thus, comes from the Aleutian Islands, which is particularly interesting because the bifurcated bows of the miniatures NMNH A264174 and UAMN 1-1939-1469 also resemble the cleft prow of Aleutian baidarkas.

A wooden figurine from Miyowagh attests that St. Lawrence Island kayakers wore wooden visors with their parka hoods pulled over them (Fig. 14). Visors of this type are not ethnographically known on St. Lawrence but are fairly typical for coastal Alaska, the Aleutian Chain, and the Kodiak Archipelago. The long, protruding shape of this visor again brings to mind Aleutian bentwood hats.

The resemblance between St. Lawrence and Aleutian kayak technology is particularly interesting in the context of Crockford's abovementioned theory of the island's initial colonization by migrants from the Aleutian Islands who brought with them a fully developed maritime Arctic adaptation tool kit, including boats (Crockford 2008:123). The apparent 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 1000 km apart. The miniature carvings of bifurcated kayak bows discovered recently at

the Nunalleq site in the Yukon-Kuskokwim Delta dated to circa AD 1640 is another evidence of extended geographic distribution of the Aleutian kayak design (Knecht 2014:n.p.).

In addition to miniatures, Punuk- and Thule-period boat data include a number of full-scale boat fragments and paddles. A kayak prow piece from the Kialegak site (NMNH A347028) provides additional insights into the design and evolution of the St. Lawrence kayak. The object was unearthed by Henry Collins in 1929 from the south midden of this site at a depth between 0.6 and 1.2 m (2 and 4 feet) and was labeled in the NMNH collection's card catalog as "section of sled." The artifact 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 (Fig. 15a). The object's shape, dimensions, and joint pattern, however, leave little doubt that this is a kayak bow piece. The ethnographic record provides two possible references for understanding how this frame fit into the stem assembly. It can represent either the bow of a Hooper Bay-style kayak with its characteristic large circular opening (Zimmerly 2000a:48, 2000b:xvii; Fig. 15b) or the Norton Sound variant with a smaller tear-drop-shaped handgrip (Golden 2015:220; Fig. 15c). None of the archaeological sites on St. Lawrence have yielded examples of a Hooper Bay-style top bow piece, making a Norton Sound-style bow variant more plausible, particularly in light of the abovementioned kayak photographs taken by Collins at Cape Kialegak in 1929. 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 northernmost extent of this constructional technique. The traces of such

*Table 2. Radiocarbon analysis of St. Lawrence Island kayak fragments, INTCAL13 calibration curve*

Artifact catalog #	Lab Identification	Description	Material	Provenience	Uncalibrated RCYBP (1 $\sigma$ )	Calibrated Date (2 $\sigma$ )	$\delta^{13}\text{C}$ Value (‰)
NMNH A347028	Beta-409143	Kayak bow	Wood	Kialegak, South midden, between 0.61 and 1.21 m below the surface	560 $\pm$ 30	AD 1310–1360, AD 1385–1425	–23.4
NMNH A370242-b,c	Beta-409146	Kayak keel frame	Wood	Miyowagh, cut 19, section 18, 1.85 m below the surface	1000 $\pm$ 30 BP	AD 990–1045, AD 1095–1120, AD 1140–1145	–23.4
NMNH A355720	Beta-409145	Kayak gunwales reused as paddle shaft	Wood	Ievoghiyaq, House 7	780 $\pm$ 30 BP	AD 1215–1280	–23.8

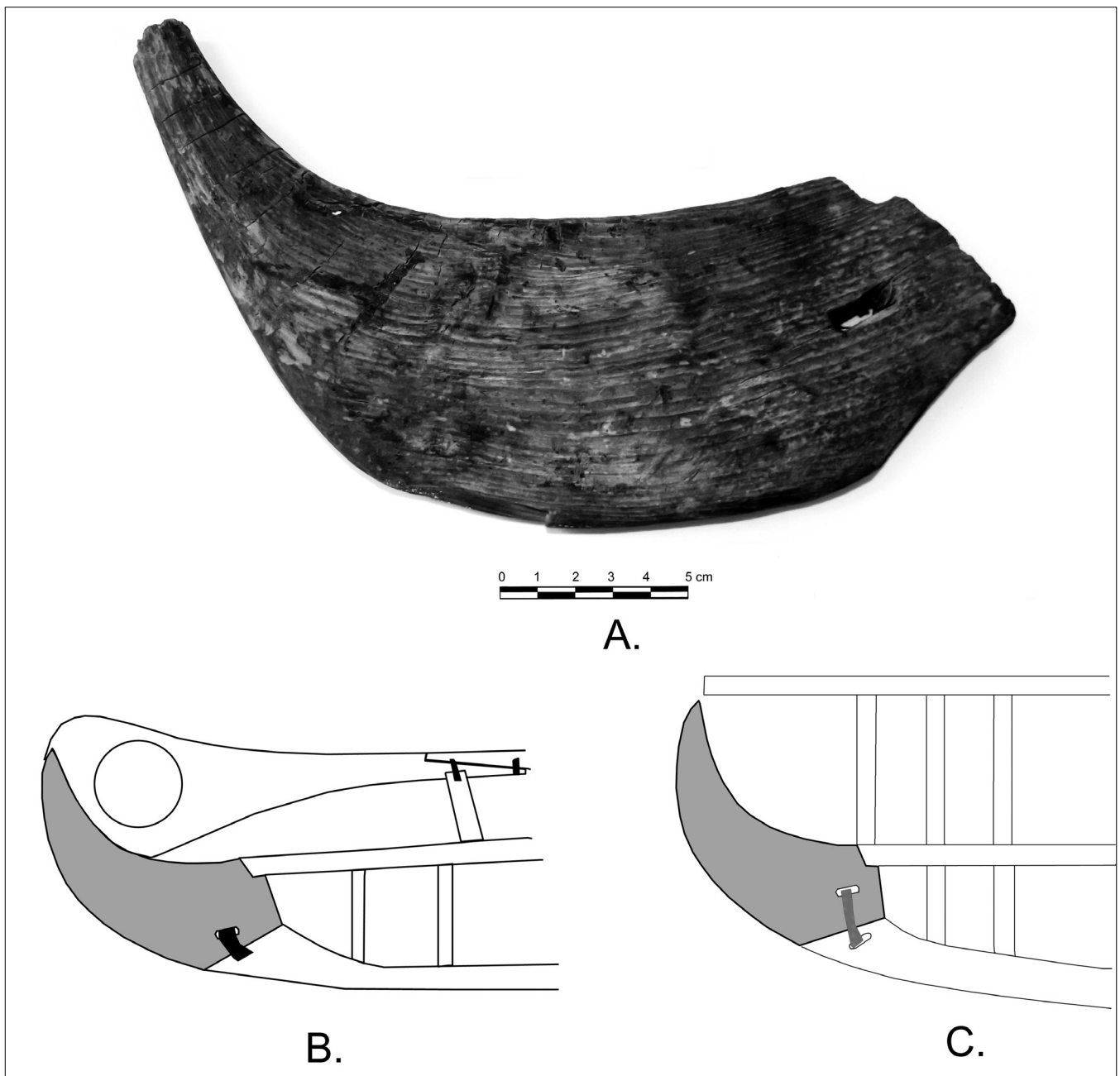


Figure 15. *Kialegak bow fragment. (A) artifact NMNH A347028; (B) reconstruction of the Kialegak bow in Hooper Bay style; (C) reconstruction of Kialegak bow in Norton Bay style. Photo and graphics by E. Anichtchenko.*

bifurcation can be seen in bow grip holes of Bering Strait and King Island kayaks, and are completely lacking north of Bering Strait.

A 15-cm-tall cockpit stanchion (NMNH A346893) from the lower half of cut 2 in the south midden of the Kialegak 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 the lower stem piece, this provides information

on the approximate height of the kayak, which in this case is 35–40 cm.

The Kialegak bow was sampled for  $^{14}\text{C}$  AMS dating (Table 2). 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), suggest that the connection between St. Lawrence Island and Norton Sound kayak technology existed for over half a millennium. The ties with the Aleutian Islands, based exclusively on miniatures, are more speculative. Given the uncertainty of dating of miniatures

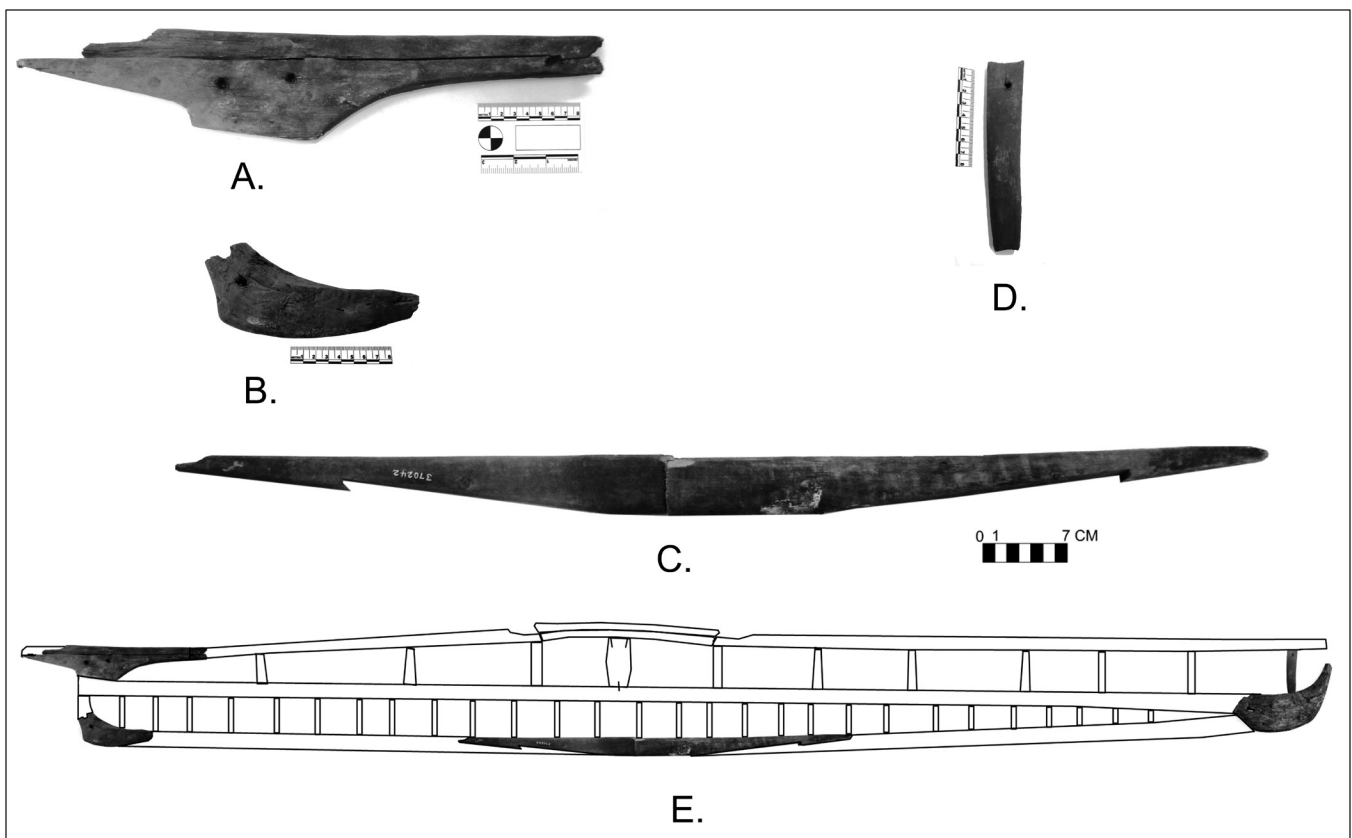


discussed above, and the fact that most of them come from the northwestern side of the island while Kialegak is positioned at its southeastern extent, the evidence may also attest to the coexistence of two different bow designs (Aleutian and Norton styles) at different locations on the same island. Alternatively, the Norton-style bow may have evolved from more a pronouncedly bifurcated variant resembling bows of ethnographically known kayaks from the Aleutian Islands and Kodiak Archipelago.

In contrast with archaeological data pertaining to the kayak bow, miniatures' references to a transom stern remain unsubstantiated by full-scale kayak artifacts. The only artifact 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 two lashing holes—one at each end of its longer side (Fig. 16b). The artifact's triangular cross-section and perpendicular turn suggest that this is a bottom stern piece. The narrow

broken end may at some point have been attached to the kayak's keel, while the wider mortised end received the upper part of the stern.

Three 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. 16c), a fragment of deck rider (NMNH A370242-a; Fig. 16a), and a deck rider stanchion (NMNH A370193; Fig. 16d). All three came from cut 19, section 18, 1.85 m below the surface, and likely belonged to the same kayak. The keel was later cut in two by Collins to obtain a sample for dendrochronological analysis, the results of which have not been published or otherwise recorded. The total length of the artifact 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. Both ends are fashioned into diagonal hooked scarphs. Judging from this artifact'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



*Figure 16. Kayak fragments from Miyowagh archaeological site: (A) deck rider (NMNH A 370242-a); (B) kayak stern fragment (NMNH A369827); (C) middle piece (NMNH A 370242-b); (D) deck rider stanchion NMNH A370193; (E) reconstruction of archaeological fragments placement in the kayak frame with Kialegak bow. Photos and graphics by E. Anichtchenko.*

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), cal AD 1095 to 1120 (cal BP 855 to 830), and cal AD 1140 to 1145 (cal BP 810 to 805) (Table 2).

The Miyowagh deck rider is a carefully crafted wooden timber. Judging from a 3-cm-tall stanchion with two lashing holes, the fragment represents a stern end of the rider. The frame is 5 cm wide and 45 cm long, broken at both ends. In the complete kayak frame, the rider rested on the stern bottom piece and was lashed to it (Fig. 16e). However incomplete, the Miyowagh deck rider suggests two important constructional observations. First is that a section of gunwale 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 two kayak miniatures discussed above. The second is that the kayaks used in Miyowagh

in the eleventh-to-twelfth century AD had ridged decks, as evident from the stanchion that elevated the rider 3 cm above the gunwale. The 15-cm-high rider stanchion A370193 indicates that deck ridge had higher elevation toward the watercraft's midsection and front. Several examples of deck crosspieces from Kukulik and Ievoghiyaq support this observation (Fig. 17).

St. Lawrence Island kayak builders used mortise and tenon technology, as is evident from a number of archaeological fragments, including a gunwale recycled into a paddle shaft from the Ievoghiyaq site. Dated to cal AD 1215–1280 (Beta-409145, Table 2; Fig. 18), this 35-cm-long, 3-cm-wide artifact features two mortise holes spaced 7 cm apart. Other examples of St. Lawrence kayak gunwales demonstrate even more closely spaced ribs, which in some instances were only 5 cm apart, which is unusually close for North American kayaks but is similar to the rib spacing pattern of Chukotka kayaks (Zimmerly 2000a:12–



Figure 17. Deck cross piece from Kukulik archaeological site. UAMN 1-1935-3626. Photo by E. Anichtchenko.



Figure 18. Paddle blade (NMNH A355721) and paddle shaft (NMNH355720) from Ievoghiyaq archaeological site. The shaft is a recycled kayak gunwale. Photo by E. Anichtchenko.

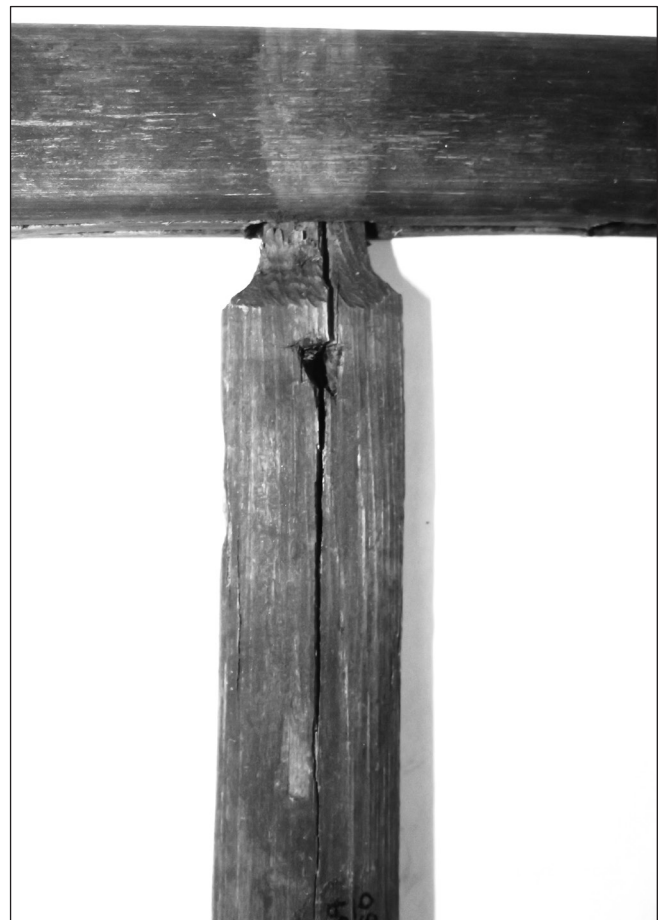
13). The Ievoghiyaq gunwale, therefore, indicates that the St. Lawrence kayak may have been under some influence of Chukotka Peninsula technology. The evidence of thirteenth-century mortise joinery is also noteworthy: that is, the precontact existence of mortise-and-tenon technique remains a highly debatable subject among kayak researchers, some of whom believe that it was not practiced prior to the appearance of metal tools.

All kayak ribs from St. Lawrence archaeological sites are straight fragments measuring between 3 and 3.5 cm in width and 23 to 28 cm in length. The extant examples show no traces of chew marks or bending, which may indicate that the craft they represent had flared straight sides. Ribs were mortised into gunwales and secured with lashing as evident from rib and gunwale fragments from the Ketngipalak site (UAMN 1939-2951 and 1939-2955; Fig. 19).

St. Lawrence kayaks were propelled by single-bladed paddles with handgrips. The St. Lawrence archaeological record contains many full-scale and miniature examples, but it is hard to differentiate between those used for kayaks and umiaks, if there was in fact a difference between kayak and umiak paddles. Four different variants can be distinguished on the basis of miniature paddle blade shape and proportions (Fig. 20), and at least two of them (Variant I and Variant III) are represented by full-scale examples. Geist mentions that a complete paddle of 110 cm in length was found in the Kukulik House 1 Test Cut. Carved from a piece of soft driftwood, the paddle's blade was 37 cm long and 8.5 cm wide. The handle was 4 cm in diameter and "slightly enlarged at the butt" (Geist and Rainey 1936:121–122). Unfortunately, this artifact was not located during the author's collections research. All reviewed examples of full-scale paddles from Kukulik were fragmented. The most complete Kukulik paddle was found on the floor of House 2 Test Cut (UAMN 1-1932-1483). The 61-cm-long artifact has a 10-cm-wide blade with a broken tip and resembles Variant III. The paddle tip UAMN 2-1934-357 and miniature 1-1935-4105 from the Kukulik site also correspond to the same variant. The 54-cm-long paddle blade UA 2-1934-285 is an example of a full-scale Variant I.

Although there are several exceptions, most extant St. Lawrence Island paddles are composite, meaning that blade and shaft were fashioned out of two separate pieces of wood and then bound together. Artifacts NMNH A355720 and NMNH A355721 from House 7 of the Ievoghiyaq site at the western tip of St. Lawrence illus-

trate how the blade was attached to the shaft. NMNH A355720 is a 59-cm-long and 9.5-cm-wide paddle blade fragment with a broken tip. 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. NMNH A355721 is a fragment of the corresponding paddle shaft with similar diagonal scarph and peg holes that line up with those at the neck of the blade and are smeared with the same clay substance (Fig. 18). 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 scarph. As discussed above, the shape of the shaft and rectangular mortise carved into it suggest that the shaft was made out of a recycled kayak gunwale. The dates yielded by radiocarbon analysis of this artifact attest that composite paddle technology was in place by the thirteenth century AD and, judging from ethnographic samples, lasted until the beginning of the twentieth century. In ethnographic



*Figure 19. Ketngipalak kayak rib and gunwale fragment (UAMN 1939-2951 and 1939-2955). Note lashing line discoloration on the gunwale. Photo by E. Anichtchenko.*



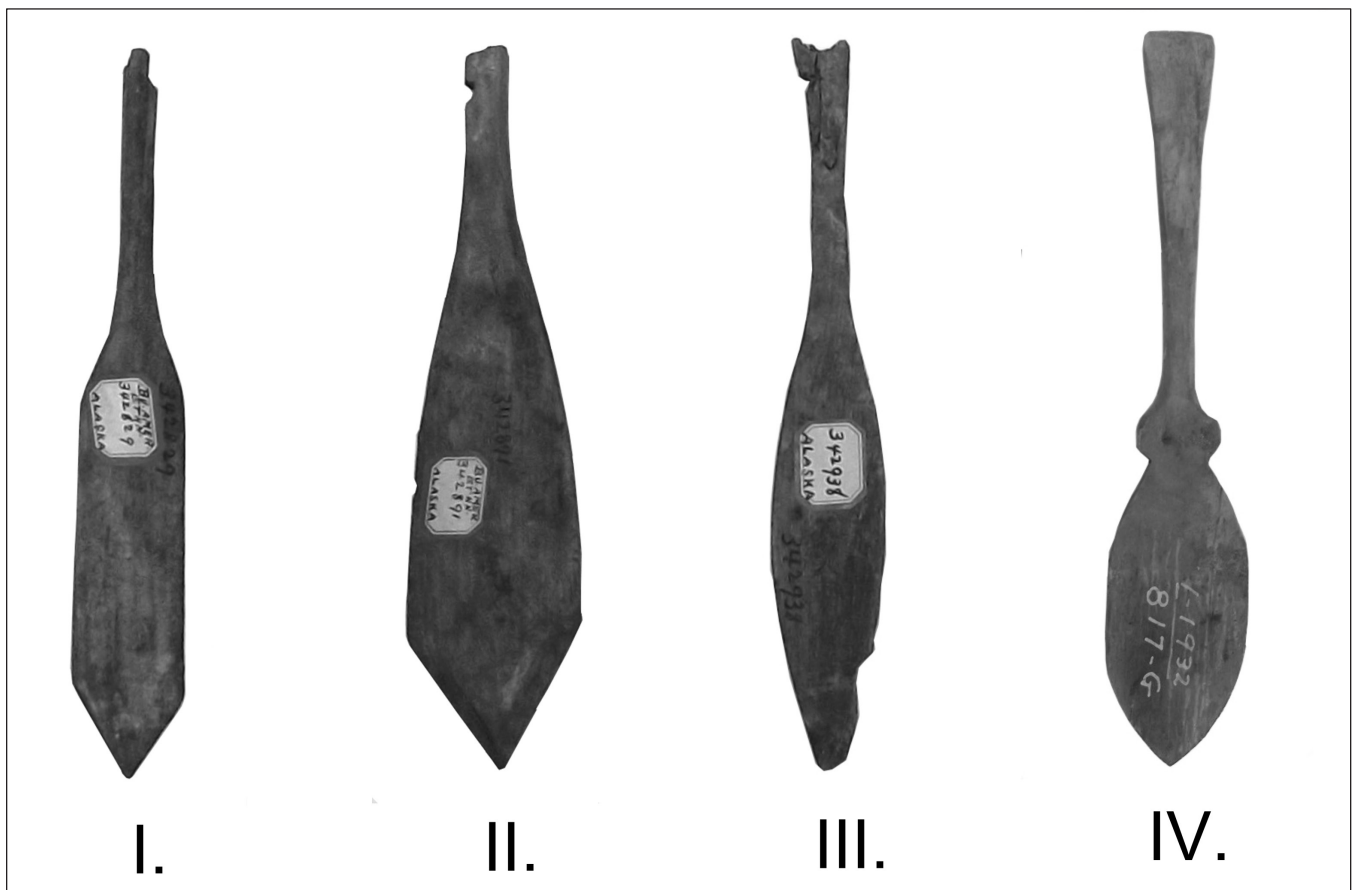


Figure 20. St. Lawrence Island paddle variants: (I) NMNH A 342629, National Museum of Natural History, Kialeagak; (II) NMNH A342891, Kialeagak; (III) NMNH A342938, Kialeagak; (IV) UAMN 1-1932-817. Photo by E. Anichtchenko.

times paddles were sometimes ornamented with simple geometric designs (NMNH 260268). Ochre residue on paddle blade NMNH A370699 from Miowagh site cut 23, section 16 (excavated from a depth of 2.057 m) attests that some form of paddle decoration was also practiced in the distant past.

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 nineteenth century and even the beginning of the twentieth, vanishing around the 1930s. Kayaks used on St. Lawrence Island at that time closely resembled the Norton Sound type with a characteristic teardrop-shaped gap at the bow and a stern handgrip. Both elements had long roots in the history of St. Lawrence kayaks. The earliest evidence for a stern handgrip and ridged deck is provided by the Miyowagh gunwale dated to cal AD 990–1145. The Kialeagak bow attests that kayaks with cleft prows similar to the Norton Sound type were present on

the island by cal AD 1310–1425. Together with photographs taken by Collins in 1929, this appears to be strong evidence in support of consistency 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.

Discussions on similarities between different regional kayak technologies typically evoke two theoretical frameworks: environmental determinism (i.e., mutually independent development of similar features in response to similar environments), and diffusion (i.e., direct transfer of knowledge and tradition through travel and interaction) (Durham 1960:9; Heath 1978:21–22, 2004:7; Kankaanpää 1989:33–34; Laughlin et al. 1991:184–186;

Petersen 1986:42–60). Environmental determinism appears to be an ineffective platform for understanding relationships between different kayak variants in Alaska. The Bering Strait region, for instance, has one of the most diverse kayak traditions of the entire circumpolar north, while maritime subsistence practices and natural conditions in this region display only marginal variability. Furthermore, as technology designed for travel, boats are inherently mobile and as such are meant to respond to a variety of maritime conditions and environments.

Instead of being a purely technological response to a natural setting, kayaks tend to have stronger connection with cultural identities of particular groups. The Unangan kayak type, for instance, spans the entire length of the Aleutian chain and part of the Alaska Peninsula not because the ocean conditions were identical along the entire chain of the islands but due to cultural and ethnic continuity. When kayak constructional features transcend ethnic boundaries, appearing in geographically removed regions, it is very likely a sign of either shared ancestry or interactions—whether friendly or hostile—between the peoples of these locales. Such interactions would have to be direct and regular: direct because mediated boat exchange between different groups is unlikely, although theoretically possible, and regular because a single chance encounter with boats of friends or foes is not as a rule sufficient for intercultural borrowing. And in the case of maritime technology, these interactions imply ocean travel (Anichtchenko 2012:174–175).

The constructional features of the St. Lawrence Island kayak may thus be interpreted as evidence of long-distance sea voyaging ranging in length between 65 km and over 500 km and at different times directed to different destinations. The connection with Norton Sound kayaks, for instance, implies that a distance of 165 km across the open sea was not an impassable obstacle for skin boats. Indeed, eighteenth-century European explorers reported that indigenous kayakers were capable of maintaining speeds between 11 and 16 km an hour (Robert-Lamblin 1980). In 1791, Captain Gavriil Sarychev witnessed Unangan/Aleut kayakers keeping up with their sailing ship when it was going at the rate of four leagues (22.2 km) per hour (Sarychev 1969:73). At such a speed, the distance between St. Lawrence Island and mainland Alaska could be covered in ten to fifteen hours—a long but not an unthinkable passage, which would be even faster in a two-man kayak or umiak, particularly if sails were employed (Anichtchenko 2016:294). Longer voyages would require

landfall but were also evidently undertaken, perhaps as far as Bristol Bay and the Alaska Peninsula, where interaction with Aleutian boat technology may have occurred.

Historical records also attest that skin-covered watercraft were capable of staying in the water for several days, and even weeks. Bill Tcheripanoff, an Unangan tradition bearer born on Akutan Island in the eastern Aleutians in 1902, told his father's story about a storm that destroyed a large party of kayak hunters. Bill's father managed to attach his kayak to that of a fellow hunter, 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 tradition (Fienup-Riordan 2000:67). A King Island story ("Two King Islanders Adrift") tells about the adventures of Avauraq and his companion, who were forced away from their home shores after the southeast wind broke shore ice, and reached the Northwest Cape of St. Lawrence Island after five days at sea (Kaplan 1988:147–157). Combined with the kayak speed record discussed above, this translates into an open-water distance of 500 km or more.

In sum, the ethnoarchaeological review of the St. Lawrence Island kayak suggests that its functions were not constrained by localized subsistence use but included an extensive range of long-distance movements. This recognition, in turn, invites a greater awareness of skin-covered watercraft and the practice of indigenous seafaring in the Bering Sea region and the Arctic and subarctic zones in general. As agents and artifacts 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 sociopolitical 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.

## CONCLUSION: FROM SKIN BOATS TO MARITIME NETWORKS

The role of seafaring in Alaska prehistory is not by any means a new subject in Arctic archaeology. Coastal migration is now accepted as a feasible theory of the initial peopling of the Americas, and models of early population movements such as following the "kelp highway"—an ecologically rich coastal zone that supported a rich variety of sea mammals and shellfish—has gained

significant recognition (Erlandson et al. 2007:167). In more recent prehistory, ocean crossing is understood as a necessary prerequisite of the first millennium AD trans-continental trading network evident from the appearance of Asian iron on St. Lawrence Island and the Alaska mainland, although the active agency in this trade is ascribed to the East Asian seafarers (Mason 1998:296–299). Similarly dependent on maritime transportation is the invasion that Siberia-based Punuk militias launched upon St. Lawrence Island ca. 1000 AD (Mason 2009:77–79), the expansion of the north-Alaskan Birnirk culture onto the northeastern shores of Siberia (Okladnikov and Beregovaya 1971), and the Thule migration. Despite these understandings, however, the logistics, social dimensions, and *longue durée* of prehistoric circumpolar seafaring remain unconsidered.

The inquiry into the history of the St. Lawrence kayak presented above shows that the study of archaeological skin boat remains can increase our understanding of not just constructional details of prehistoric watercraft but also, potentially, of the structure and chronological development of large-scale maritime networks that likely influenced the culture-history of the region. The concept of prehistoric indigenous maritime network requires further development and analysis, but the first step in this direction is reconsideration of the importance and intensity of maritime mobility in so-called “sedentary” prehistoric societies of the Bering Sea. The ultimate goal of this article, therefore, is to show the value of archaeological skin boat research and to challenge scholars of Arctic prehistory to consider maritime mobility as an important factor that not only facilitated diffusion of materials and cultural influences but also shaped people’s identities through the very process of the movement, friendly and hostile interactions with other nations, and kinetic and emotional engagements with various land- and seascapes.

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