

UIVVAQ: A STRATIFIED IÑUPIAQ OCCUPATION AT CAPE LISBURNE, NORTHWEST ALASKA

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ABSTRACT

The Uivvaq site, near Cape Lisburne in Northwest Alaska, was abandoned in 1950 after its acquisition by the U.S. Air Force. In 2000 and 2002, reconnaissance archaeological investigations (15 m²) were undertaken at one of the surviving mounds. A trench excavation revealed three principal components dating between AD 950 and 1650, based on a suite of seventeen ¹⁴C assays. Paleotemperatures were estimated from associated beetle remains and correlated with storm stratigraphy. The three archaeological components include (a) the lowermost (AD 950–1050) associated with Natchuk and Thule II harpoon heads, succeeded by (b) a middle component (AD 1050–1150) that yielded a Punuk “trident,” or counterweight, while (c) the uppermost (AD 1300–1600) contained a Thule IIc multibarbed harpoon head and an Intermediate Kotzebue assemblage.

BACKGROUND TO THE PROJECT

The Uivvaq project originated as an exploratory effort to examine a large archaeological mound that had escaped the attentions of subsistence diggers and archaeologists due to its federal impoundment as an Air Force installation for over fifty years. An archaeological survey by Hoffecker (1998) and the cultural resource management

assessment by Reynolds (1989) persuaded the National Science Foundation to support reconnaissance at Uivvaq in 2000. The U.S. Air Force had inadvertently destroyed part of the site in the 1950s and decided in the early 2000s to conduct archaeological mitigation in conjunction with the cleanup of hazardous materials (Mason 2003).

Uivvaq, located in Northwest Alaska, contains a 1- to 2-meter deeply stratified succession of midden deposits and presents a unique opportunity to examine culture and climate change. Uivvaq promised to inform arctic archaeologists on the causes of major shifts in Northwest Alaska prehistory. Two major stumbling blocks are the scarcity of undisturbed archaeological deposits that are well-stratified and the lack of radiometric dates for the region. Although dendrochronology and horizontal beach-ridge stratigraphy were crucial in defining chronologies (e.g., Giddings 1952, 1966), due to uneven research priorities many uncertainties remain concerning the temporal relationships and absolute ages of sites and individual occupation horizons. By conducting interdisciplinary research at Uivvaq, we are able to provide a millennial record as a preliminary step in such reconstructions.

THE IPIUTAK COLLAPSE AND THE MEDIEVAL CLIMATE ANOMALY

During AD 900 to 1200, Northwest Alaska witnessed drastic changes in climate and human population that had far-reaching consequences for the circumpolar zone of North America (Bockstoce 1973; Mason and Barber 2003; McGhee 1969/70, 1981). The tenth century AD opened with a brief cold oscillation and a sustained interval of increased storminess (Mason and Gerlach 1995; Mason and Jordan 1993). However, by the late twelfth century, summer temperatures had significantly warmed, inaugurating the Medieval Climate Anomaly (MCA) (cf. Xoplaki et al. 2011) across the northern hemisphere.

Shifts in the weather associated with the MCA apparently upset the political geography of Northwest Alaska and triggered several social and cultural transformations (Bockstoce 1973, 1976; Mason 1998, 2009a, 2009b; Maxwell 1985; McGhee 1969/70, 1981). As one possible correlate, around AD 900 the regionally dominant Ipiutak polity centered at Point Hope disintegrated as its considerable military and spiritual power dissipated (Mason 1998, 2000, 2006, 2009b). Its demise correlated with climatic shifts, but it is unclear if storm track shifts or warmer or cooler conditions were adverse (Mason and Jordan 1993). The political and economic niche occupied by Ipiutak was subsequently filled after AD 1000 by the Birnirk people, who established a small settlement at Jabbertown, 7 km east of Point Hope (Larsen and Rainey 1948; Mason and Bowers 2009).

Unlike the Ipiutak people, the Birnirk, presumed ancestors of the Iñupiat (Mason 2009a; Mason and Bowers 2009; Maxwell 1985; Morrison 2001; Stanford 1976), employed a sophisticated technology to hunt bowhead whales from Point Hope and other strategic locations in Northwest Alaska (Bockstoce 1976, 1979; Harritt 1995; Larsen and Rainey 1948; McCartney 1995; Stanford 1976). The mechanism of the subsistence and technological transformations was either passive influence (“trait diffusion”) or direct “invasion” or colonization by both Birnirk and Punuk people from the western side of Bering Strait, who occupied sites along the northern and western coasts of Alaska (Collins 1964; Ford 1959:67; Mason 2009b:94). The conventional climate paradigm proposes that warming increased opportunities for open-water whaling (Bockstoce 1976; McGhee 1969/70). In this scenario, Iñupiaq settlements expanded in size and distribution by the thirteenth century AD and eventually spread across arctic Canada to Greenland (Maxwell 1985; McGhee 1969/70, 1981, 2000). Coupled with the expansion of the whaling economy, Bockstoce (1976:42) postulated a broadening of the subsistence base and greater reliance on caribou.

LOCATION AND SETTING

The Uivvaq mounds are 3 km east of Cape Lisburne at 68° 53' North, 166° 08' West along the eastern Chukchi Sea coast of Northwest Alaska. Situated 65 km northeast of Point Hope, Cape Lisburne experiences (1954–1984 baseline) a July mean temperature of 7°C and a January mean of –18°C, although February and March are usually much colder (WRCC n.d.). Annual precipitation averages only 29 cm, with the highest rainfall (7 cm) in August and with about one meter accumulating as snow. Land-fast ice typically forms at the cape and its adjoining coast between October and June (Fig. 1).

Cape Lisburne is a steep and jagged bedrock promontory rising 289 m above sea level that forms the northwest terminus of the Lisburne Hills, composed of Carboniferous limestone and shale interbedded with chert (Collier 1906:16). The abundance of high-quality raw material for stone tool manufacture proved attractive for Uivvaq. Other valuable minerals were available nearby, including coal and black shale (Burch 1981:34–35; Collier 1906). Cape Lisburne marks an abrupt shift in coastal alignment and represents one of the stormiest locales in

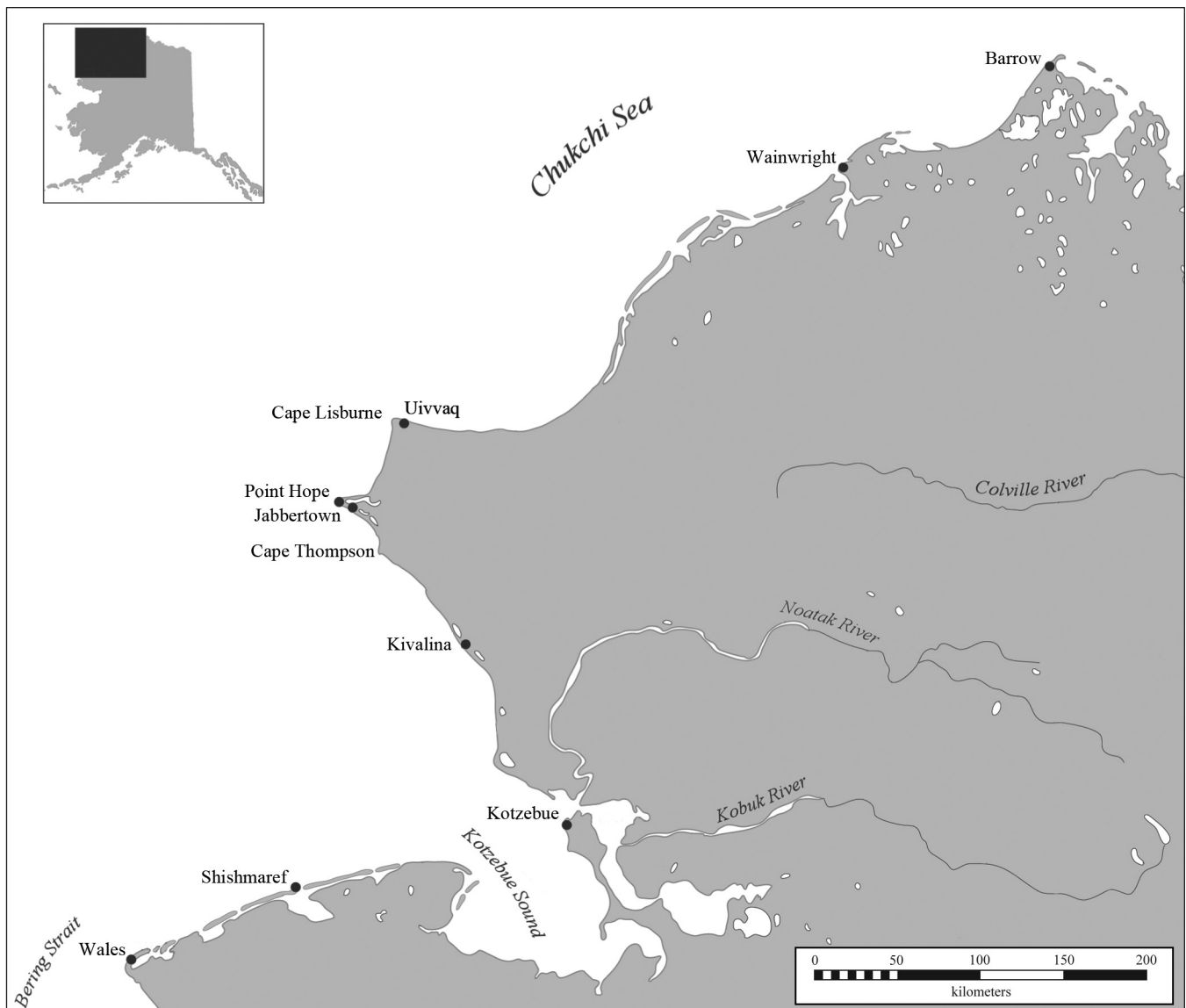


Figure 1. Northwest Alaska.

northern Alaska (“a famous wind hole... passed safely in a small boat only during fair weather” [Collier 1906:8]). However, Uivvaq was sheltered from westerly winds by the Lisburne Hills and protected from northerly winds by formation of a local high-pressure zone at the base of the cliffs (VanStone 1977:67). Oriented west–east, Uivvaq was also protected from the impact of southerly storms along the northern coast by the Lisburne Hills. Recent storm surge events have had only minimal effects on the beach—evidence is lacking for either erosion or beach ridge formation (e.g., Kowalik 1984), and modern driftwood is limited to a few medium-sized logs (Alix 2002, field observations). The Alaska coastal current flows northeast at

the cape and subsequently follows a clockwise return flow from Icy Cape (Fleming and Heggarty 1966:705). The southwest counter-current has contributed to sediment accumulation in the form of submarine gravel and sand north of Cape Lisburne (Sharma 1979).

**UIVVAQ ARCHAEOLOGY:
AN INTERDISCIPLINARY APPROACH**

Although the Uivvaq middens (XPH-045) were recorded by several archaeological surveys of Cape Lisburne (e.g., Hoffecker 1998; Neakok et al. 1985; Reynolds 1989), no substantive field research (i.e., shovel probes, excavation, or

detailed mapping) had been conducted prior to 2000. NSF funding in 2000 supplemented by a Department of Defense contract in 2002 (Mason 2003) recognized the potential of the deep and relatively undisturbed middens to yield valuable archaeological data. The resulting project sought an interdisciplinary perspective integrating ethnohistory and traditional knowledge with geology, paleoecology, paleoclimatology, and archaeology. Because of Uivvaq's historic bond to Tikiġaq (Point Hope), the project was undertaken in concert with the Elders Advisory Council and the Native Village of Point Hope. Members of the North Slope Borough Commission on Iñupiat History, Language, and Culture (IHLC) also participated in the project.

The research design addressed several issues in the prehistory of Uivvaq: When did occupation of the site begin and by whom? Did subsistence use of the site change in tandem with climate change? How did the sociopolitical relationship between Point Hope and Uivvaq evolve over time, and did their relationship extend back into the Ipiutak phase, i.e., prior to AD 900? What was Uivvaq's relationship to sites across Northwest Alaska and in Chukotka? Hopefully, the archaeological study of Uivvaq could shed light on broader issues, for example, the emergence of the Thule culture and a whaling economy.

Data about Uivvaq's recent past were compiled from several sources, including archived oral history recordings (e.g., Reynolds 1989) and historical accounts (e.g., Burch 1981; Lowenstein 1981, 2009; VanStone 1962). In addition, IHLC staff conducted new oral history interviews with Point Hope elders (Mason 2003). As a consequence, the modern history of Uivvaq provides a cultural context for the investigation of its remote prehistory.

UIVVAQ HISTORY: 1800–2000

Two hundred years ago, Uivvaq was part of a Tikiġagmiut polity that controlled 10,000 km² across Northwest Alaska, as reconstructed from Native informants by Burch (1981, 1998). Although described as a “tribe” by Ray (1975), in Iñupiaq the terminology is similar to a nation or “city” state (Burch 1998:8–12). Around AD 1800, the Tikiġagmiut nation extended from 25 km below Cape Thompson in the south to near Cape Beaufort in the north. As many as 1,300 people resided within the borders of the Tikiġagmiut, according to Burch (1981:11–14). The large settlement at Tikiġaq served as the social and spiritual hub of the Tikiġagmiut—and the winter residence of over half the population (Foote 1992; Rainey 1947).

Uivvaq, despite its small size, was the second most important winter settlement within the *nunatqatigiit* and was the only other place to conduct a spring bowhead whale hunt (Burch 1981:37–42). Uivvaq (or “coming around the point”) specifically refers to Cape Lisburne, but served as shorthand for the adjacent village named *Uivaum Initugliat* (Neakok et al. 1985:41). Although the population of Uivvaq declined significantly in the nineteenth century, its numbers were never substantial. Burch (1981:14) inferred that *only* about seventy people inhabited Uivvaq prior to the intrusion of Euro-Americans ca. AD 1850. Even this estimate could be high, considering that the Russian explorer A. F. Kashevarov visited the village in July 1838 and counted only twenty people (VanStone 1977:20). However, a major battle had just occurred near Cape Lisburne (Burch 2005:272–273), and very likely the families at Uivvaq were still recovering from that catastrophe.

The spring bowhead whale hunt at Uivvaq differed from that at Tikiġaq (Lowenstein 1981:62ff; Rainey 1947:257–263). The number of crews was smaller, of course, perhaps only one or two, with eight men each. Crews were positioned on landfast ice one kilometer north of the cape along the margin of a recurring shore lead. On occasion, Uivvaq whalers intercepted and killed escaped bowheads wounded by whalers at Point Hope (Burch 1981:24–25). With its small population, the Uivvaq community (Fig. 2) probably also conducted less elaborate ceremonial feasting, as compared with the regional center at Tikiġaq.

Uivvaq's primary appeal for its inhabitants lay in its variety of food sources, several terrestrial in origin, especially mountain sheep and birds, with access to nearby caribou (Burch 1981:56, Lowenstein 1981:74). Like most coastal locales, walrus were typically available during the early summer and fall, while beluga whales appeared in the spring and summer (Burch 1981:69). Small seals were hunted throughout the year, although not all three species (e.g., ringed seal or *natchuq*) were reliably present, due to turbulent seas (Lowenstein 1981:16). Polar bears were commonly encountered (Lowenstein 1981:40). On land, Uivvaq people hunted caribou, sheep, bear, and foxes, subject to seasonal availability. Birds nested in the cliffs around the cape in the thousands, and their eggs were collected from rock ledges in July (Burch 1981:26–32).

During the nineteenth century, the population of the Tikiġagmiut nation underwent a nearly catastrophic decline, due to the consequences of internecine warfare



Figure 2. *The village of Uivvaq, photographed by Alfred M. Bailey in March 1922. Image Archives, Denver Museum of Nature and Science (cat. no. IV.BA21-033.P).*

(Burch 1981, 2005), resource collapse (Burch 2012), and the appearance of outsiders bearing infectious disease, alcohol, and firearms (Lowenstein 2009). Between 1800 and 1840, Point Hope clashed with neighboring nations in three battles that cost many lives and shifted the regional balance of power against Tikiġaq (Burch 2005:111ff). Around 1800, a conflict with Noatak and Kivalina people forced the Tikiġaqmiut (Burch 1981:14) to cede territory as far south as Kivalina (VanStone 1962:19). Shortly thereafter, another sizable Tikiġaqmiut community, *Nuvuraluaq*, was attacked by Dihai Gwich'in from the upper Noatak (Burch 1981:14–15, 2005:111ff). For Uivvaq, a battle in the late 1830s was devastating; it occurred just southwest of the site and its aftermath was described by Kashevarov (Burch 1981:15, 2005:272; VanStone 1977:54): “human bones strewn everywhere and...bodies that had not yet decomposed.” This attack involved the Qiqqtarzurmiut, people from modern-day Kotzebue; the population of

Uivvaq was nearly decimated (Burch 1981:14–15). The presence of Russian traders at Bering Strait did lead to a precipitous decline in internecine warfare (Burch 2005:233).

Despite the cessation of warfare, the decades following 1850 were marked by population declines in Tikiġaq and Uivvaq and by collapse of the whaling economy associated with commercial whaling in the Chukchi Sea (Bockstoce 1986; Burch 1981; Lowenstein 2009). The whale and walrus populations were significantly depleted by 1870 (Bockstoce 1986), a catastrophe coupled with the inadvertent introduction of several infectious diseases. One of the first, a measles epidemic in 1865, reportedly caused hundreds of deaths (Burch 1981:15). A subsequent smallpox outbreak in 1900 is termed the “Great Sickness” and led to further population decline (Lowenstein 2009:235ff). Dire effects, possibly climatic, also affected crucial subsistence resources. By 1870, the Uivvaq whale hunt had ceased

and by 1880, the U.S. Census recorded only thirteen residents, representing one or two families, although many more people visited the cliffs of the cape to collect murre eggs (Lowenstein 1981:74ff; VanStone 1962:62). The regional collapse of the Western Arctic caribou herd (Burch 2012:83ff) also led to famine in Point Hope in the winter of 1885–1886, and by 1905 the entire Tikigaḡmiut nation was reduced to less than 200 people (Burch 1981:15–21; Foote and Williamson 1966:1046–1048; Lowenstein 2009:235).¹

An increase in population at Uivvaq after 1910 reflected an economic upturn driven by the resurgent world market for furs, especially the locally abundant arctic fox (Burch 1981:19; Rainey 1947:281). However, when the fur market collapsed with the onset of the Great Depression, permanent residency at Uivvaq declined. Several families remained at the site until 1950, and accounts by Point Hope elders for this project (cf. Mason 2003) record village life during the first half of the twentieth century.

In 1950, the U.S. Air Force constructed a radar station at Cape Lisburne as part of the Aircraft Control and Warning (AC&W) network (VanStone 1962:61). The network was intended to provide early warning of trespass by Soviet aircraft. The radar was emplaced on the cape summit and support facilities were erected below, 1.5 km east of Uivvaq village, although the airstrip was immediately adjacent. During construction of the airstrip, several abandoned sod houses were destroyed (roughly half of the former village), but two large middens remained intact. Possibly, the presence of the Air Force installation protected the surviving midden by inhibiting subsistence digging, a common and long-standing practice in communities across Northwest Alaska from Point Hope to Barrow (cf. Ford 1959; Larsen and Rainey 1948).

THE ARCHAEOLOGY OF UIVVAQ

A principal objective of the Uivvaq project was the documentation of an undisturbed sequence of occupations to obtain a high-resolution record within a well-dated stratigraphic framework. With exceptions (e.g., Tikigaḡ [Larsen and Rainey 1948] or Walakpa [Stanford 1976]), deep and stratified multioccupation sequences are rare in northern Alaska, especially those from the Birnirk to Thule transition. Excavation focused on the midden periphery (Fig. 3) to avoid the disruptions resulting from a superimposed series of house constructions and burials in the midden's center (cf. Ford 1959; Reynolds 1995). Mound margins, by

contrast, offer greater potential for sequence stratigraphy (e.g., Ford 1959:36–37; Rosen 1986:19). This approach was largely successful, but the uppermost deposits of the midden periphery had been disturbed by the excavation of several cache pits during a late occupation, as described below (Fig. 4).

The site was excavated in 5-cm arbitrary levels. All excavated sediment was sieved through fine mesh (1/8 in.) screens employing pressure hoses, available at the DEW-line facility, which maximized the recovery of small objects. Water screening yielded tiny jet beads largely unknown from other north Alaska sites of comparable age, amber beads and fragments, and substantial quantities of small lithic waste flakes. Water sieving also increased the recovery of smaller pottery fragments, which may be difficult to distinguish from the sedimentary matrix in a coarse midden deposit. In 2002, random sediment samples from each unit and level were water-screened for small fragments of wood and charcoal, providing data on wood technology and fuel use.

CHRONOLOGICAL AND PALEOCLIMATIC RECONSTRUCTIONS

RADIOCARBON CHRONOLOGY

Radiocarbon dates ($n = 17$) were obtained from a range of materials excavated in stratigraphic context from the midden deposits (Table 1). These ¹⁴C assays were supplemented by tree-ring analysis of structural wood. Six beetle chitin macrofossils, identified by Elias, were assayed by the University of Colorado radiocarbon laboratory (CURL) with a further eleven radiocarbon samples measured by Beta Analytic on phocid seal ($n = 2$), walrus ($n = 1$), caribou ($n = 1$), and wood macrofossils (willow [*Salix* spp.], $n = 3$; spruce [*Picea* spp.], $n = 1$), identified by Alix.

Overall, the corpus of seventeen ¹⁴C ages was stratigraphically consistent, albeit with several nonsystematic departures. Insect remains were initially expected to provide the most reliable basis for the chronology of Uivvaq occupation. Because the AMS radiocarbon technique allows the assay of exceedingly small samples, chitin from insect exoskeletons offers an alternative to bone and is generally less susceptible to younger carbon contamination. However, the dating of insect remains at Uivvaq revealed unexpected ambiguities: Several dates were anomalously old given their stratigraphic position and the other dates, including the other insect assays. For example, the

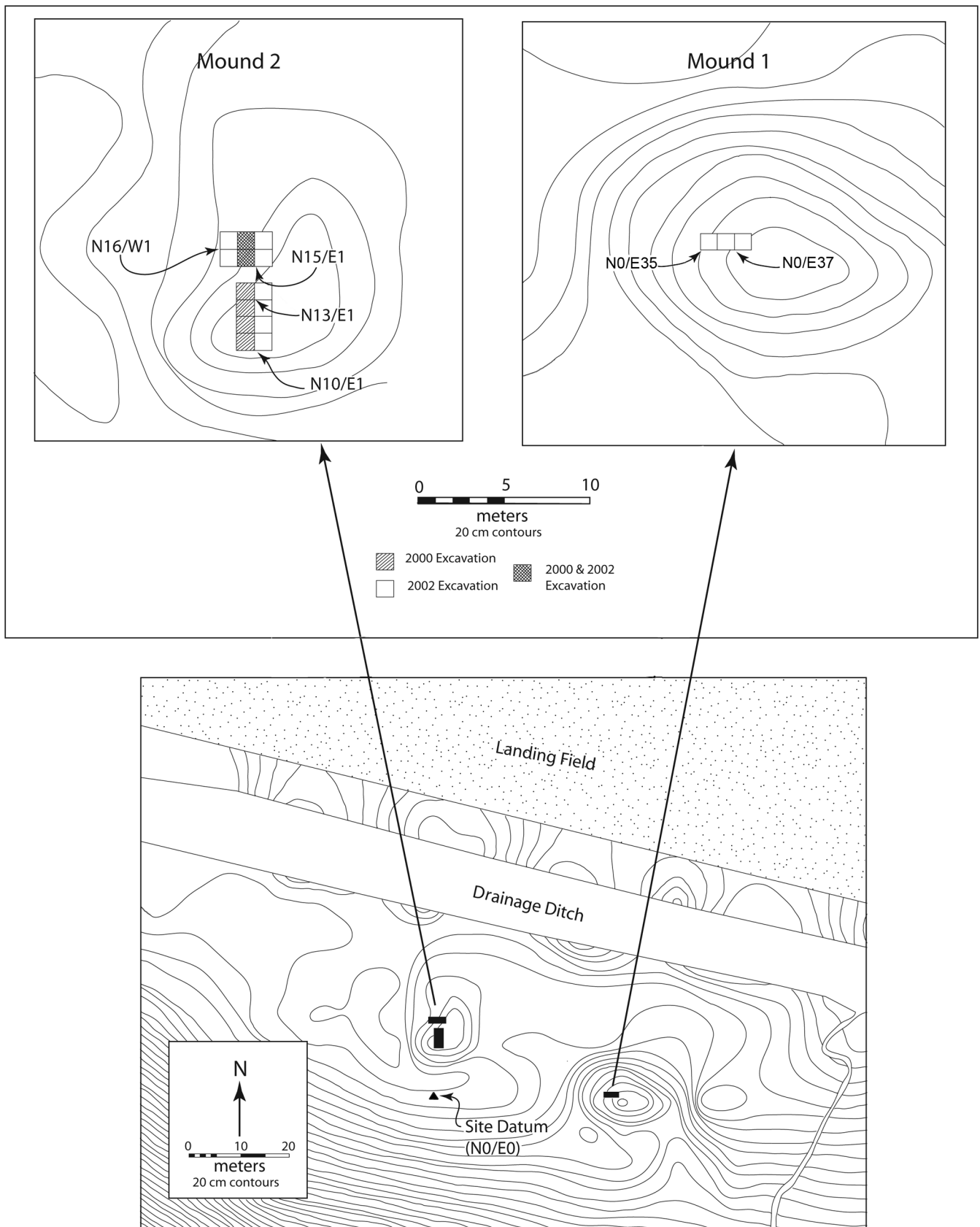


Figure 3. The Uivvaq site, showing the location of the two large middens, Mounds 1 and 2.

Table 1. Radiocarbon assays and calibrated ages from Uivvaq.

Lab Number	Conventional ¹⁴ C Age BP	Calendar Age AD	^{13/12} C (‰)	Stratigraphic Context	Cultural Diagnostics	Material Dated
Beta-173868	260 ± 40	1520–1590, 1620–1670, 1770–1800, 1940–1950	–24.7	N15 E1 (42–47 cm bs)	Intermediate Kotzebue	<i>Salix</i> wood and charcoal
Beta-173867	330 ± 40	1460–1650	–27.7	N15 E1 (57–62 cm bs)	Intermediate Kotzebue	<i>Salix</i> wood
Beta-173869	390 ± 40	1430–1530, 1550–1630	–22.5	N13 E1 N wall (70–84 cm bs)	Intermediate Kotzebue	Adzed timber; outer ring, <i>Picea</i> sp.
CURL-6927	470 ± 30	1410–1454	–25.9	N13 E0 E wall (25–30 cm bd)	Intermediate Kotzebue	Beetle exoskeleton
Beta-174356	610 ± 70	1270–1430 corrected by Beta	–19.0	N12 E1 (41 cm bd of N13 E2)		Seal (<i>Phoca hispida</i>) pelvis
CURL-5767	785 ± 65	1153–1306	–24.63	N13 E0 E wall (35–40 cm bs)		Beetle exoskeleton from bulk sample
Beta-173866	840 ± 40	1060–1080, 1150–1270	–24.6	N13 E1 (57–62 cm bs)		<i>Salix</i> charcoal
CURL-6928	960 ± 35	1016–1162	–25.5	N13 E0 E wall (50–55 cm bd)		Beetle exoskeleton
CURL-5947	1010 ± 35	980–1153	–25.0 (est.)	N13 E0 E wall (65–70 cm bs)	Punuk counter- weight above, at –67 cm	Beetle exoskeleton from bulk sample
Beta-174357	1210 ± 60	1060–1300	–12.0	N12 E1 (41 cm bd of N13 E2)		Caribou tibia fragment
Beta-174355	1340 ± 70	1342–1664,* 1502–2002**	–13.3	N12 E1 (51 cm bd of N13 E2)		Seal (<i>Phoca hispida</i>) tibia
Beta-174354	1410 ± 60	1311–1554,* 1465–1808**	–13.7	N13 E2 (43 cm bd)		Walrus skull fragment
CURL-6929	1620 ± 30	384–536	–25.7	N13 E0 (70–75 cm bs)	Punuk counter- weight above, at –67 cm	Beetle exoskeleton
CURL-5438	1390 ± 35	598–691	–23.4	N13 E0 E wall (95–100 cm bs)	Natchuk harpoon head; Thule 2 harpoon head; human figure	Beetle exoskeleton from bulk sample
Beta-180330	1020 ± 40	975–1041	–28.1	N13 E1 (97–102 cm bd)		<i>Salix</i> twigs
Beta-180816	980 ± 40	987–1160	–26.3	N13 E1 (114 cm bd)		<i>Salix</i> charcoal
Beta-180331	870 ± 40	1036–1261	–28.6	N13 E1 (112–117 cm bd)		<i>Salix</i> twigs

* 510 ± 57 marine reservoir correction

** 720 ± 53 marine reservoir correction (Dumond and Griffin 2002)

bs = below surface

bd = below datum

oldest age from Uivvaq was a beetle assay of 1620 ± 30 BP (CURL-6929) at 70–75 cm below surface, nearly 40 cm above a younger beetle age of 1390 ± 35 BP. The anomalously old beetle ages may have resulted from (a) the ingestion of old carbon by the beetles; (b) storm redeposition of underlying older midden not reached by this project; (c) post-depositional digging by the beetles or (d) by people; or (e) upward displacement of beetle parts due to frost action. Upward displacement is unlikely as no evidence of cryogenic processes was apparent in the stratigraphy. Of these possibilities, human agency is the most likely, considering that people could have inadvertently redeposited older sediments containing insect remains in younger layers through the periodic cleaning of house interiors (Reynolds 1995:142–144).

Another source of dating uncertainty at Uivvaq might be the three bone assays: Two on marine mammals and one on caribou are possibly problematic. All three had elevated $\delta^{13}\text{C}$ values (–12 to –19‰), widely considered to indicate marine or anomalously old carbon. However, by employing the regional marine carbon offset of 512 ± 57 years proposed by Dumond and Griffin (2002), the seal, walrus, and caribou assays do accord reasonably well with the wood or charcoal ages. Nonetheless, one seal pelvis dated to 610 ± 70 BP (Beta-174356) cannot be reliably calibrated since its age would be essentially modern.

To interpret the anomalous ages from the insects and adjusted sea mammal assays, we favor a greater reliance on the ages of the short-lived *Salix* macrofossils. From this perspective, the lower half of the Uivvaq midden was deposited in the eleventh to twelfth centuries AD, adding 50 cm within over twenty discrete storm beds. At its upper end, an angular disconformity, the leading edge of a cultural pit, delineates the upper component from the lower. The ^{14}C ages of the upper midden are generally concordant: e.g., the beetle age of 470 ± 30 BP (CURL-6927) is only slightly older, at AD 1410–1454, than an assay on short-lived *Salix* of 330 ± 40 BP (Beta-173867), calibrated to AD 1460–1650 (Beta-173867).

CLIMATE RECONSTRUCTION FROM INSECT MACROFOSSILS

A local climate history for Uivvaq was reconstructed with insect macrofossils (especially *Coleoptera*) recovered in stratigraphic context within the midden. Radiocarbon-dated beetle exoskeletons allow paleotemperature estimates through the application of the Mutual Climatic

Range (MCR) method (Elias 1994:74–79). Direct dating of six chitin fragments (Table 1) produced a paleotemperature curve (Fig. 5) that offers a first approximation for Northwest Alaska (Elias 2003). The MCR temperature estimates derived from the samples were corrected to account for previously observed effects of arctic coastal settings (Elias et al. 1999) and were complemented by observations on midden sediments (e.g., texture, organic matter), which also reflect variations in climate. The MCR and ^{14}C dated insect remains provide an alternative to employing hemispheric models of climate history that are often out of phase with northern Alaska (Mason and Gerlach 1995:102).

MIDDEN STRATIGRAPHY, CULTURE CHRONOLOGY, AND CLIMATE HISTORY

Field research for the project started in 2000² with the excavation of a trench (1 x 7 m) into the smaller of the two major surviving midden mounds at Uivvaq, designated Mound 2 (Fig. 3). Mound 2 occupies an area of 15 x 20 m and has an apparent elevation of 1.5 m above the present ground, although its subsurface extent is unknown. The 2000 trench was expanded in 2002, to a total of 15 m². Several smaller test units (1–2 m²) were also excavated in other areas during 2000 to characterize the site, and a small trench (1 x 3 m) was opened up on the larger midden (Mound 1) in 2002 but excavated only to shallow depth due to time constraints (Fig. 4).

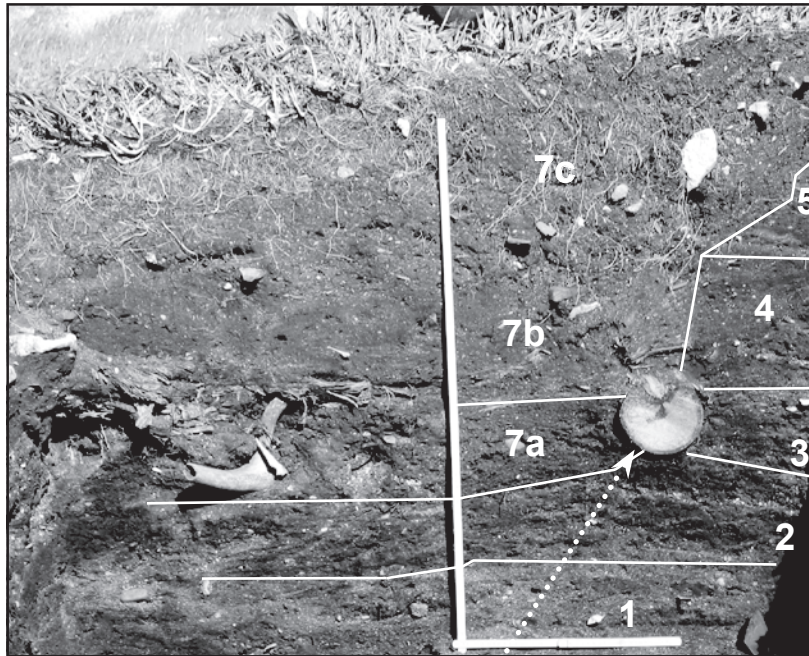
By definition, archaeological middens are the result of a complex interplay of natural and cultural formation processes (Butzer 1982:87–93; Rosen 1986; Waters 1992). Most midden investigations have occurred in temperate or arid environments, including shell middens of the Northwest Coast (Stein 1992); a modern systematic study of midden formation in an *arctic* coastal setting, where cold climate is a factor, has yet to be undertaken. Potentially significant for interpreting the stratigraphy and chronology of an arctic midden is the interaction between frost activity (e.g., frost heaving, cryoturbation) and human ground disturbance and house construction (Hall n.d.; Reynolds 1995).

Mound 2 at Uivvaq accumulated over several periods during the last 1000 years, the result of four major formation processes (cf. Waters 1992): (1) the onshore deposition of sand and gravel during storms, (2) eolian deposition of sand during high wind events, (3) organic decay and downward movement of silt through beach gravels due

Intermediate Kotzebue

Unit 7 (30–0 cm bs)

- AD 1410–1454 (CURL-6927)
- AD 1270–1430 (Beta-174356)
- AD 1153–1306 (CURL-5767)
- AD 1520–1590, 1620–1670, 1770–1800, 1940–1950 (Beta-173868)



Intermediate Kotzebue

Unit 7a (outer ring of spruce timber)

AD 1430–1530, 1550–1630 (Beta-173869)

Punuk

Units 3, 4 (55–70 cm bs)

- AD 1060–1080, 1150–1270 (Beta-173866)
- AD 1016–1162 (CURL-6928)
- AD 980–1153 (CURL-5947)
- AD 384–536 (CURL-6929)

Birnirk

Unit 1 (95–115 cm bs)

- AD 598–691 (CURL-5438)
- AD 975–1041 (Beta-180330)
- AD 987–1160 (Beta-180816)
- AD 1036–161 (Beta-180331)

Figure 4. Stratigraphic profile of the east wall of Unit N13 E0, Mound 2 at Uivvaq with selected radiocarbon dates.

to soil weathering, and (4) purposeful and inadvertent discard behavior and ground disturbance by humans (i.e., pit cut and fill). Slope processes apparently played a negligible role in midden sediment accumulation. Seven principal stratigraphic units were defined in Mound 2 and a summary description of each is presented below, from the bottom up (Table 2). Depth measurements were from the surface in the highest excavation unit, N13 E0. Excavations in both 2000 and 2002 ceased before firmly establishing the base of the midden by reaching culturally sterile deposits, so total depth remains uncertain. Mound 2 could include Ipiutak or earlier occupations, such as Choris, Norton, or possibly Denbigh.

The lithostratigraphy of Uivvaq is divisible into seven depositional units, defined by granulometry, sedimentary structures, and color, as detailed in Table 2. Geological strata were defined by Arabic numbers bottom to top,

whereas cultural stratigraphy was defined by Roman numerals. The five lowermost lithostratigraphic units, 1 to 5, resulted predominantly from periodic storm overwash overprinted by cultural practices. Evidence of any modifications for architecture or cache pits is negligible in the lower levels. By contrast, the uppermost lithostratigraphic units, 6 and 7, lack visually discernible internal strata. The lower stratigraphic contacts of units 6 and 7 represent an unconformable truncation of the earlier storm sequence due to pit excavation by site residents.

Unit 1 represents a sequence of storm gravels marking seven discrete events, interstratified with debris produced by human occupation. Unit 1 contained three strata with cultural material (Ia, Ib, and II) that were associated with thin beds (≤ 1 cm thick) of compressed organic material and exhibit sharp upper contacts. Dated beetle remains from the base of the unit indicate

Table 2. Lithostratigraphy of Uivvaq Mound 2.

Elevations refer to depth below surface of grid square N13 E1.

-
- Unit 1 (>130 to 110 cm below surface):** The lowermost excavated layer; broadly level with the present-day ground surface surrounding the midden. Very dark brown (10 YR 2/2), poorly sorted, coarse and medium sand and silt with a significant percentage of small pebbles (1–2 cm).
-
- Unit 2 (110–90 cm bs):** Coarse angular gravel within a silt matrix; the largest clasts are rounded and only 1 to 2 cm in diameter. Upper and lower contacts defined by thick organic-rich silt beds 1 to 2 cm thick.
-
- Unit 3 (90–75 cm bs):** Series of massive silt beds with a small sand fraction that alternates with thin laminae of medium to coarse sand and granules. Highly clayey silt is present in the lower portion of the unit. A thick occupation horizon (Cultural Level IV) at the top serves as a contact with overlying Unit 4. Several discrete lenses (>1 cm thick) of coarse to very coarse sand and granules extend seaward towards the center of the midden.
-
- Unit 4 (75–50 cm bs):** Complex internal microstratigraphy containing six very dark brown (10 YR 2/2) beds of pebbly sands and granules separated by silt beds (1 to 2 cm thick) with occasional dense lenses filled with oblong pebbles, some >3 cm.
-
- Unit 5 (50–25 cm bs):** Six thin sand beds that alternate with dark, compact silt horizons; contains a high percentage of organics. Sharp contacts between the beds. The unit is only minimally observable in the eastern part of the trench due to post-depositional disturbance. Cultural Level VI lies at the base of this layer, which separates it from underlying Unit 4.
-
- Unit 6 (50–0 cm bs):** Massive fine to medium sand with numerous cobbles (10–15 cm) and fire-cracked rocks (7–10 cm). The unit is discomformable, cutting through several older units, primarily Unit 5. Larger clasts are more common in the lowermost 15 to 20 cm of the unit.
-
- Unit 7 (30–0 cm bs):** Uppermost portion of the midden is a poorly sorted dark brown (7.5 YR 3/4) silt with a minor fraction of sand and granules. Cobbles measuring up to 15 cm occur in a discrete zone (Unit 7d) about 50 cm below surface. Unit 7 represents cultural fill of a pit excavated into older deposits.
-

cool weather. However, this material is likely out of context and its climatic significance is problematic, since younger insect samples yielded MCR temperature estimates that reflect gradual warming (Fig. 5). Although one assay on insect chitin suggests an earlier age, most radiocarbon dates from this layer indicate a calibrated age between AD 950 and 1000 (Table 1).

In Unit 2, storms were less intense, as indicated from smaller clast size (Table 2). Cultural materials occur within discrete lenses of fire-cracked rock and bone fragments—including a bowhead whale bone—ca. 100 cm below surface. While Unit 2 gravels resulted from repeated storms, the silt likely accumulated due to human occupation, producing Cultural Level III. MCR temperature estimates derived from the analysis of beetle remains reflect a warming trend as much as 1.7°C warmer than previously during the summer months. The layer is not dated directly, but bracketing ages lead to an inferred age between AD 1000 and 1100.

The alternation in storm intensity is reflected in the contrasts between Units 3 and 4. The lower portion of Unit 3 reflects a period of fewer storms, as recorded in the occasional sand and gravel beds. In general, the massive silt beds accumulated as a result of onshore wind, probably during the winter months. The layer is not dated directly, but apparently antedates AD 1100. By contrast, Unit 4 marks a return to stormy conditions that characterized the deposition of Units 1 and 2 and contains some of the largest clasts in the midden sequence, a circumstance that indicates particularly violent storms. Cultural Level V is associated with these stormy conditions. Temperature estimates based on samples of beetle remains suggest a series of rapid small-scale oscillations (within +1°C of the modern summer mean). Radiocarbon dates indicate an age in the eleventh century AD.

Unit 5 consists of several sand beds, of only limited preservation across the site, with Cultural Level VI at the base of this layer, which separates it from underlying

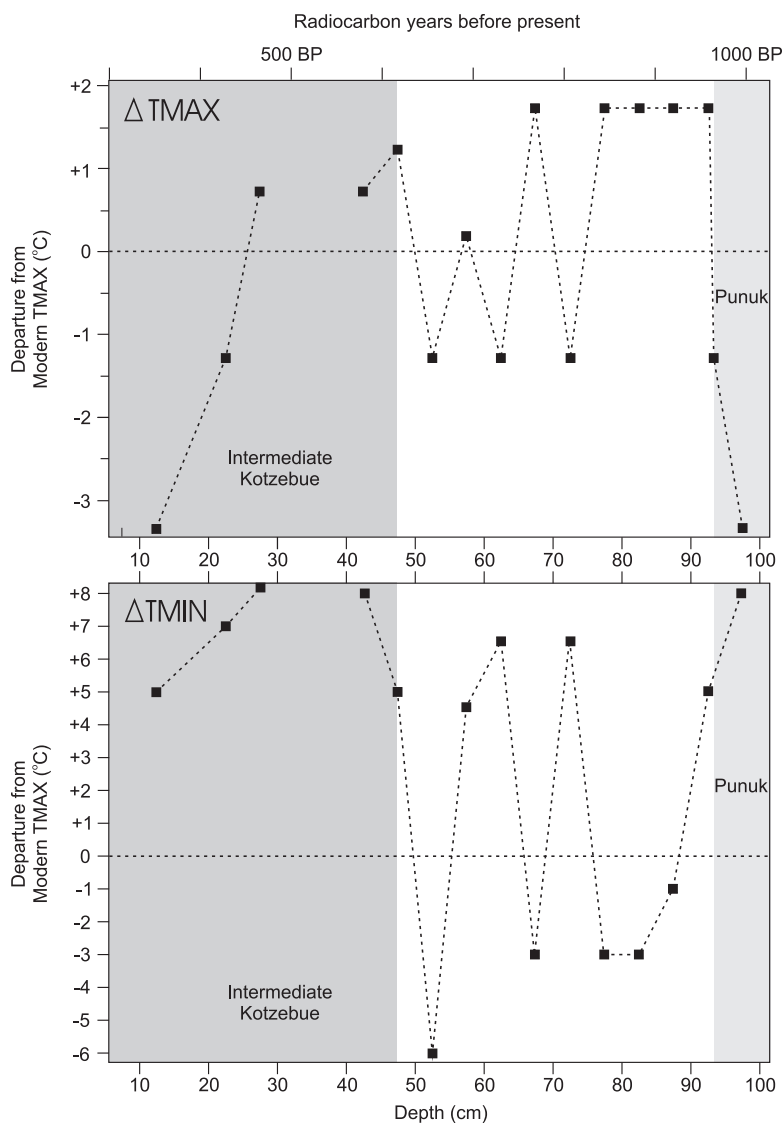


Figure 5. Reconstruction of mean July temperatures (above) and mean January temperatures (below) at the study site, based on Mutual Climatic Range analysis of fossil beetle assemblages. The dashed horizontal line in both diagrams represents the modern mean July and mean January temperatures at the site, based on climate data from Point Hope, Alaska. The shaded zones represent the different cultural horizons found in the excavation. Figure by S. A. Elias.

Unit 4. The thin sand beds of Unit 5 represent onshore winds that lofted beach sand on land, very likely during winter; the age of the unit can be bracketed to the twelfth century AD by ¹⁴C assays on upper and lower deposits.

The poorly sorted matrix of Unit 6 represents the fill of a series of intrusive pits, which—for reasons that are unclear—were excavated into the slope of the midden. The cultural fill within the pits was likely obtained either from the nearby beach or unoccupied parts of the midden.

While some samples sieved for beetle remains from this layer yielded no specimens, others produced temperature estimates that suggest continued mild climates. Two radiocarbon dates, one on insect chitin, indicate the age of Unit 6 falls in the mid-twelfth to thirteenth centuries (Table 1).

The uppermost Unit 7 rests disconformably atop underlying sediments and represents the purposeful horizontal arrangement of wood and sod blocks by site residents. The uppermost sample of beetle remains, recovered from the top 15 cm of the unit, yielded the lowest temperature estimates of the Uivvaq sequence (3°C below modern mean summer temperature), corresponding to the cooling associated with the Little Ice Age (Fig. 5). Four radiocarbon dates, one on insect chitin, from Unit 7 provide a calibrated date between AD 1470 and 1640. However, the presence of industrial goods (e.g., iron nails, stove parts) in the uppermost unit suggests that a younger occupation (post-1800) also occurred.

UIVVAQ CULTURE HISTORY: AD 950–1600

Uivvaq was first occupied at least 1000 years ago, discounting the problematic sixth century AD radiocarbon age on insect remains. An age estimate within the tenth or eleventh centuries was younger than expected, because the depth of the midden and the apparent stability of the coastline suggested that the occupation of Uivvaq might span two thousand years. Nonetheless, the midden accumulated rather rapidly, resulting from closely spaced intervals of storm deposition.

Buried artifacts and faunal remains in the Mound 2 sequence are concentrated in dark brown organic-rich beds. These interstratified beds vary in coarseness (often including pea and larger gravel) and were derived from storm events. Sand and silt were deposited by wind action. The pattern does not reflect the long-term occupation and abandonment of Uivvaq, but rather the annual and decadal processes of midden formation. The storm and wind deposits accumulated rapidly, in contrast to the levels with concentrations of cultural debris, which represent

stable living surfaces of variable duration from months to years, sometimes in conjunction with limited soil formation. Only one possible hiatus in occupation was identified—between the middle and upper components—and this may simply reflect the limited area excavated so far, combined with the effects of disturbance on the depositional units (6 and 7) forming the upper component.

Three broad archaeological components, “lower,” “middle,” and “upper,” are defined within the Uivvaq midden sequence, described below. Each component includes one or more cultural levels, designated using Roman numerals; these levels do not necessarily represent distinct cultural phases. Levels were defined by both natural levels and in arbitrary 10 cm excavation levels. Although each component yielded one or more diagnostic items (e.g., Natchuk harpoon head) that probably reflect temporal phases in Thule prehistory (e.g., Jensen 2007; Stanford 1976), the overall pattern revealed by Mound 2 reflects cultural continuity that prevails across northern Alaska (cf. Stanford 1976).

OFF-MOUND TESTING, PRE-AD 950

A small, off-mound test excavation in 2000 uncovered traces of occupation in beach sediments inferred as stratigraphically underlying the midden. The test unit (N38–39 E20) was located 15 m northeast of Mound 2 and yielded artifacts and associated mammal remains at 45 cm below the surface in an organic-rich horizon. Among the artifacts recovered was a gray chert stemmed knife similar to specimens recovered from the Birnirk site (Ford 1959:166–170). The undated occupation horizon buried in the beach deposits may precede the lowest unit in Mound 2.

LOWER COMPONENT (AD 950–1050)

The lower component of Mound 2 comprises cultural levels I to III within lithostratigraphic units 1 and 2 and dates between AD 950 and 1050, a relatively stormy century. The lower component marks the transition from the Birnirk to the Thule culture, dated to the eleventh century AD across northern Alaska (Anderson 1984:91–92; Mason 2000; Mason and Bowers 2009; Morrison 2001). Diagnostic artifacts in the lower component fall within late Birnirk and/or early Thule phases (Fig. 6), following Ford (1959:83, 86) and Stanford (1976:18ff), based on an antler Natchuk harpoon head (00-889) and the incomplete basal section of an ivory Thule 2 (or Thule II) har-

poon head (00-1029). The Natchuk sealing harpoon head is diagnostic of the Birnirk–Thule transition, according to Morrison (2001:80). Significantly, its inferred age at Uivvaq, during the eleventh century AD, is concordant with similar ¹⁴C assays from Jabbertown and Deering (Mason and Bowers 2009) as well as at Birnirk (Morrison 2001:80). Other Birnirk objects include a bone float nozzle (00-886) that resembles the wooden pieces found at the Birnirk site (Ford 1959:101–105) and an antler arrowhead, often considered diagnostic of the Birnirk–Thule transition, that has a shoulder-less base with a tapering tang (00-1025) (e.g., Ford 1959:128; Larsen and Rainey 1948:169–173; Stanford 1976:33 [Type I]). A similar tapering but bulbous tanged arrowhead from Jabbertown was carved in the eleventh century AD (Mason and Bowers 2009:31). Such tanged antler points were used for several centuries, based on the sixteenth-century AMS date on one recovered at Cape Denbigh, far south of Uivvaq (Murray et al. 2003:98–100).

Fishing equipment at Uivvaq reflects both jigging and spearing efforts. Several leister prongs were recovered from the upper component, including a slender multibarbed form (Fig. 6; 02-1735). A twin-barbed fishhook for tomcod (Fig. 6; 02-1724) is identical to one from Qit Chauvik in Norton Sound dated to AD 500–600 (Mason et al. 2007: plate IV a, c) but also has similarities to specimens from Kotzebue that are considerably younger, ca. AD 1500 (Giddings 1952: pl. 36).

Two bola weights recovered at Uivvaq (Fig. 7) show affinities with both Birnirk and later Thule assemblages (for typology, see Ford [1959:139–141]). Typically “found only in Birnirk” (Ford 1959:141) is a Type G bola, an oval ivory piece from the middle component (02-648). An ivory bola weight of subspherical form with two holes drilled at one end (02-1611) corresponds to Class E of Ford (1959:139–141) and occurs in both early and late contexts, although precise age estimates are rare from elsewhere. A perforated bone (02-555) from the upper component (27–32 cm bd, N13 E1) may be a bola. Rudenko (1961:pl. 30) identifies similar Penuk objects from Sireniki as amulets.

The majority of the artifacts recovered from all three components are debris produced by the manufacture and resharpening of chipped stone tools. In this respect, Uivvaq seems unique among Thule sites, which have yielded only negligible or modest quantities of lithic debris (e.g., Stanford 1976:68). The abundance of lithic waste in Mound 2 is a function of the local availability of high-quality flaking stone, combined with the sieving

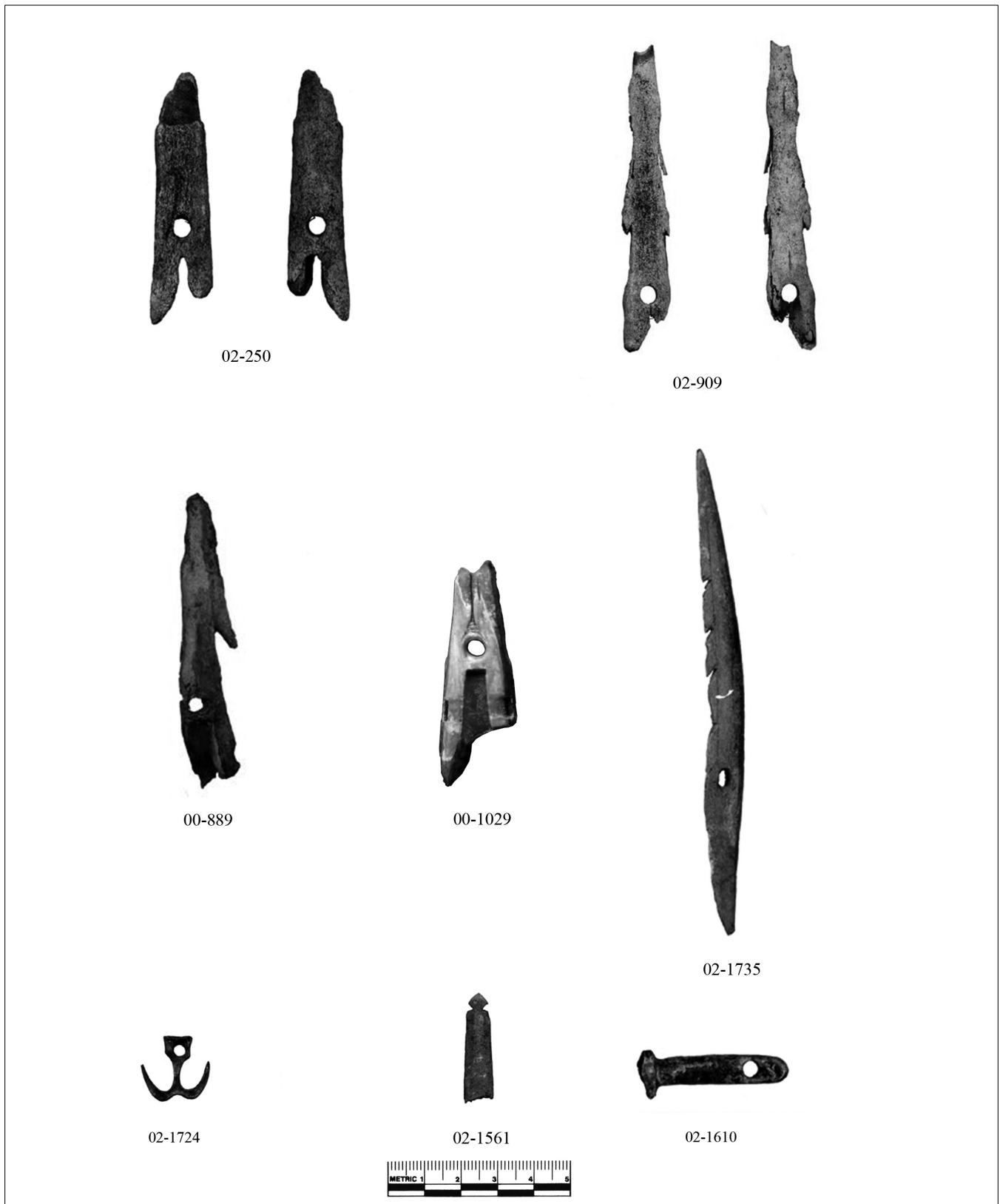


Figure 6. Diagnostic subsistence equipment from Uivvaq. From upper component: closed socket toggling harpoon head with no parallel in the region (upper left; 02-250); open socket multibarbed Thule IIc harpoon head (upper right; 02-909); leister prong (middle right; 02-1735); swivel for dog line (lower right; 02-1610). From lower component: Natchuk harpoon head (middle left; 00-889); Thule 2 harpoon head base (center; 00-1029); tomcod fish hook (lower left; 02-1724); miniature wooden bow fragment (lower center; 02-1561).

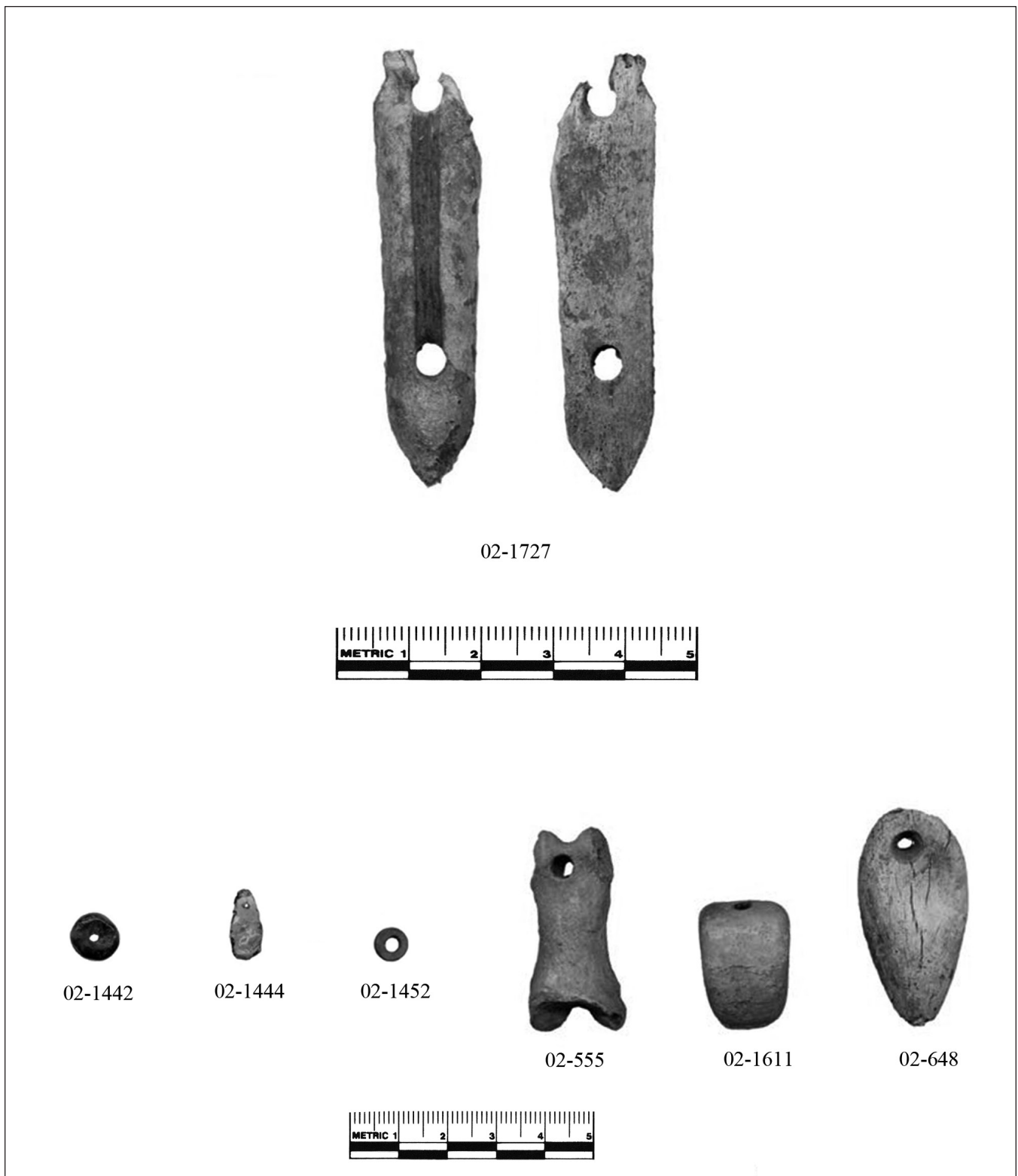


Figure 7. Decorative, fishing, and birding implements from Uivvaq. Top: Antler object of unknown function, possibly used as a net float (02-1727). From left to right: amber bead (02-1442); amber pendant (02-1444); jet bead (02-1452); three perforated objects: bone (02-555; upper component); ivory object similar to Ford's Class E bola (Ford 1959:141) (02-1611; lower component); oval ivory bola similar to Ford's Class G (Ford 1959:141) (02-648; middle component).

of all excavated sediment. Local chalcedony predominates among raw material. Analysis of the waste flakes and cores indicates that chipped stone implements were manufactured on blanks produced from unstandardized flake cores. The majority of finished tools and weapons were bifacially retouched with soft-hammer or pressure-flaking techniques, similar to those used by the Tikiġaġmiut in the late nineteenth century (Driggs 1905:94).

Despite the abundance of high-quality raw material, the occupants of Uivvaq still produced only the small number of finished chipped stone implements typical in Birnirk–Thule sites across northern Alaska (Ford 1959; Giddings 1952; Stanford 1976). The gray chert stemmed knife buried in the beach deposits stratigraphically underlying the midden can be tentatively associated with the lower component. While several bifaces and scrapers were recovered from cultural levels I, II, and III (Fig. 8), none are definitive evidence of the Birnirk–Thule transition.

Ground slate implements ($n = 44$) of both the locally available green and black types (Hoffecker and Mason 2003:153) were recovered in all three components, although diagnostic slate tools and fragments were slightly more common in the middle and upper components. Slate debitage was considerably less frequent than chalcedony debitage and was concentrated in the Punuk cultural levels (Elias 2003). Traces of grinding and polishing on these implements are visible with low-power magnification. Although absent in Ipiutak, slate grinding is broadly characteristic of the Northern Maritime Tradition (cf. Collins 1964). Most ground slate artifacts at Uivvaq represent rounded ulus (women's knives), stemmed knives, or small harpoon end blades.

Most of the ceramics ($n = 488$) were recovered (Mason 2003:table 10-1) in the uppermost levels of Units 6 and 7 (ca. 50%), although the lower component did yield a significant number of pottery fragments (25%). The recovery of small ceramic fragments was enhanced by sieving excavated sediment, although recovery methods may have fostered the fragmentation of ceramics. Uivvaq pottery is typical of Birnirk–Thule assemblages—“crude” in appearance due to its thickness (average = 12.2 mm), coarse grit temper, and blackened due to its low-temperature firing (Oswalt 1955). A small number of sherds (< 0.5%; $n = 24$), especially in the lower component, exhibit curvilinear design on the external surface (e.g., 00-1007). Most are likely fragments of pots (some of them large), although none can be firmly attributed to a lamp.

Wood recovery was enhanced by water-screening, with nearly 1,000 fragments out of a total of nearly 3,000 specimens (Mason 2003:table 12-2). Worked wood fragments or chips ($n = 228$) and several artifacts ($n = 13$) were predominantly recovered from the lower component, with two deserving of special note. One (Fig. 6) is the end fragment of a miniature bow with a triangular nock carved on coniferous wood (02-1561; 30 x 8 mm). Similar miniature bows with triangular nocks are found in early Thule houses, e.g., House 2 at Sisualik (Giddings and Anderson 1986:pl. 54i) and House 1 at Deering (Alix 2009). Miniature bows made of baleen with triangular nocks are known from the Old Bering Sea period (e.g., the Mayughaaq site near Gambell on St. Lawrence Island [Collins 1937:134, pl. 56]), and wooden bow remains are common in Early Thule sites across the North American Arctic (Alix 2001). The most noteworthy wooden artifact is a human figure carved in cottonwood bark (02-1725) (Fig. 9). The 10-cm carving apparently portrays a slender female with small breasts, a pronounced belly and pubis that suggests pregnancy. The head and lower limbs are missing and the arms are stumps. The carving resembles a bark figure recovered from Birnirk, both in its shape and the breakage or purposeful removal of the head and legs (cf. Ford 1959:224, fig. 110a).

Amber beads and fragments were found ($n = 24$; 2002 collection, Fig. 7) in the lower component and presumably represent items that were traded or imported from other areas. The availability of amber during the Birnirk–Thule transition may be unusual, since amber is usually associated with late Thule occupations (e.g., Stanford 1976:60; Young 2002). The sizable quantity of amber recovered from all components at Uivvaq is probably a function of sediment sieving. In 2000, Uivvaq also yielded more than seventy tiny jet beads (02-1452) from the lower component (Fig. 7). Jet beads have not been reported previously in Thule occupations in northern Alaska, although jet was used for beads in the nineteenth century (Burch 2007:257). Such beads were inset in Ipiutak ivories (Larsen and Rainey 1948:74, 120, 141).

MIDDLE COMPONENT (AD 1050–1150)

The middle component comprises cultural levels IV and V within stratigraphic Units 3 and 4 and dates to ca. AD 1100. Analysis of the sediments and beetle remains suggests that this interval witnessed fewer storms and warmer summer

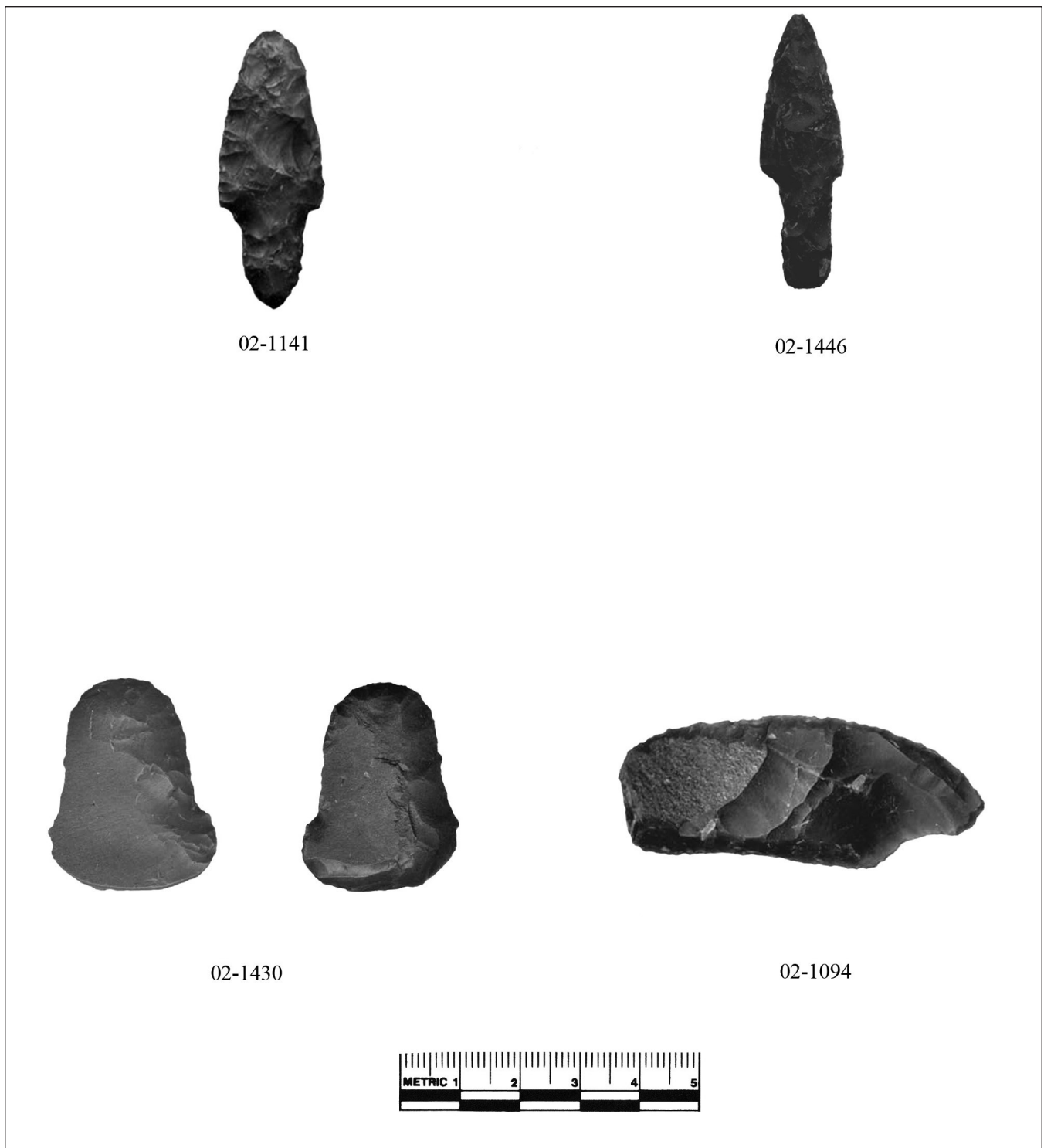


Figure 8. Lithic artifacts from Uivvaq. Top row: (left) gray chert stemmed point, similar to that found at Ekseavik by Giddings (upper component; 02-1141); (right) gray chert point with tapering stem, similar to stemmed points recovered at Walakpa (02-1446). Bottom row: (left) gray chert endscraper (02-1430); (right) unifacial flake knife (middle component; 02-1094).

temperatures, but was followed by a return to stormy conditions and temperature oscillations. The middle component likely reflects the technological and genetic imprint of Bering Strait societies and the western Chukchi Sea coast in Siberia. Uivvaq, as seen below, shows evidence of direct contact with the Punuk culture, known on St. Lawrence Island and from Chukotka (Ackerman 1984:109–113;

Collins 1937; Mason 2009a; Rudenko 1961). Some researchers, including several Russians (e.g., Dikov 1977, 1979), have referred to such assemblages as Thule–Punuk (e.g., Collins 1964:99).

The artifact (02-1275) from the middle component most characteristic of Punuk is the decorated ivory “trident”—or more properly, an atlatl counterweight

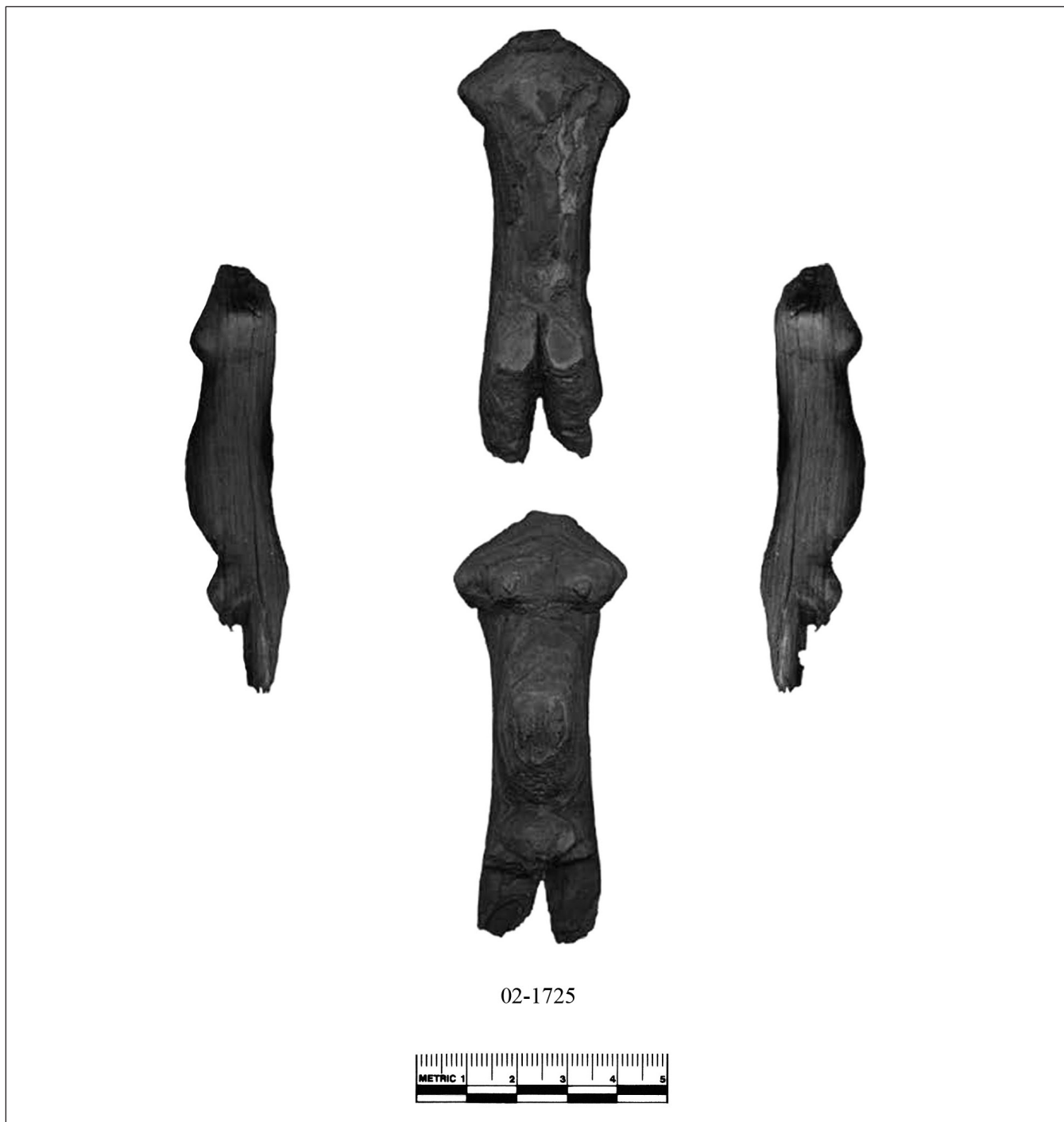


Figure 9. Human figure of cottonwood bark (02-1725) recovered from the lower component in Mound 2; 10 cm.



Figure 10. Puvuk counterweight (three views) of ivory recovered from the middle component in Mound 2 at Uivvaq (02-1275).

(Fig. 10). Although one of its lateral prongs and a portion of the adjoining base are missing, the form is nearly identical to Puvuk counterweights recovered at Sireniki in Chukotka (Rudenko 1961:pl. 29:24), St. Lawrence Island (Collins 1937:pls. 68, 69), and the northern coast of Alaska (e.g., at Nunagiak near Point Belcher [Ford 1959:61]). The surface of the Uivvaq counterweight exhibits an abstract symmetrical curvilinear/triangular design also nearly identical to designs on those from St. Lawrence Island (Collins 1937:pls. 68, 69). Drilled holes on the central prong and base were probably used to attach it to the end of the harpoon shaft to balance the harpoon head. The Uivvaq specimen, however, is the first counterweight recovered in a stratified and reasonably well-dated context.

The remainder of the middle component assemblage is similar to that of the lower component, although lacking items diagnostic of the early Thule phase (e.g., the Natchuk harpoon head). Seal hunting gear includes a spool-shaped float nozzle (02-1405) similar to the nozzle found in the lower component. Among the bird hunting equipment is a teardrop-shaped bola weight (Fig. 7)

of ivory (02-648) that corresponds to Class G of Ford (1959:139–141). Notably, at Walakpa, Class G bola weights were most common in early Thule levels (Stanford 1976:38). Other hunting implements include a fragment of a bow limb; its nock end is missing but the characteristics of the wood, the lashing marks and its general shape are consistent with this identification. It was made of spruce compression wood, commonly used for hunting bows since early Thule (Alix 2003).

As in the lower component, most artifacts are lithic debris from the production of chipped stone tools and weapons. A stemmed bifacial point (Fig. 8) flaked on dark gray chert (02-1446) is similar to long-stemmed points in both early and late Thule levels at Walakpa (Stanford 1976). Ground slate items include ulus, stemmed knives, and harpoon end blades. The middle component also yielded a large quantity of thick pottery fragments similar to those found in the other two components. A small percentage of sherds exhibit curvilinear designs on the outer surfaces. Amber beads and fragments are present, but the small jet beads encountered in the lower component are absent.

UPPER COMPONENT (AD 1300–1600)

The upper component includes Cultural Level VI in lithostratigraphic Units 5, 6, and 7. Units 6 and 7 reflect pit excavation and other human disturbances on the southern periphery of Mound 2. While Unit 5 is undated, Unit 6 may date as early as 1300 and Unit 7 postdates 1400. Local climate conditions were relatively mild during the deposition of both Units 5 and 6, but beetle remains from Unit 7 yielded the lowest summer and winter temperature estimates in the sequence, apparently reflecting the onset of the Little Ice Age.

The upper component is assigned to a later phase of the Thule culture and contains a number of diagnostic “Late Thule” artifacts within an assemblage that remains broadly similar to the underlying components. More specifically, the upper component yields some forms that appear in both coastal and interior sites of Northwest Alaska dating to 1400 and later (Giddings 1952; 1964:28–29; VanStone 1955). These sites exhibit features that probably reflect responses to the cooling climates of the fifteenth century. Some evidence suggests increased fishing, the heavier use of cache pits, and dog traction—all of which may be interrelated (e.g., Anderson 1984:134; Giddings 1952:58ff; Mason 2009a).

Especially diagnostic of Late Thule is a harpoon head (Fig. 6) of antler with multiple sets of barbs, open socket, and a round line hole (02-909). Recovered near the top of the midden, it is similar to harpoon heads from the Late Thule levels at Walakpa, classified by Stanford (1976:22) as Thule IIc. Another harpoon head from the upper component (Fig. 6) possesses dual prongs at the base and a closed socket (02-250), but lacks any regional parallel. Also related to ice hunting and fishing is an ice scoop fragment of bone (02-1165), an object usually associated with later Thule occupations (e.g., Ford 1959:108).

Land hunting equipment includes the square, shouldered base of an antler arrowhead with a knobbed tang (00-1028), a type usually associated with Late Thule (post-1400) across northern Alaska (e.g., Larsen and Rainey 1948:170; Stanford 1976:108; VanStone 1955:95). However, an earlier age is possible, considering the AMS assay of AD 1210 to 1270 on a similar arrowhead from Nukleet on Norton Sound, >1,000 km south (Murray et al. 2003:100). This earlier age may be supportable considering that the arrowhead was recovered from the uppermost 25 cm of the midden trench, possibly in sediments redeposited by the purposeful pit excavation. On the other

hand, most artifacts were consistent with post-fifteenth century ages. For example, among chipped stone artifacts related to land hunting, a stemmed point of gray chert from the upper component (02-1141) (Fig. 8) resembles an Ekseavik piece from the Kobuk River dating to ca. 1400 (Giddings 1952:48; 1964:28–29).

Evidence of fishing equipment includes a barbed prong (Fig. 6) of antler (02-1735) that is similar to fish leister prongs from the Late Thule levels at Walakpa (Stanford 1976:41) and Kotzebue (Giddings 1952:pl. 36). Alternatively, this piece might represent the prong of a bird dart. Only isolated fish remains have been found in Mound 2, with none from the upper component. The traces of pits observed in Unit 6 could reflect increased use of cache pits for fish storage. This, in turn, may be related to the development of dog traction. The upper component yielded a dog-line swivel (Fig. 6) of bone (02-1610) that resembles specimens from both ethnographic and archaeological contexts in northern Alaska (e.g., Ford 1959:154; Giddings 1964: pl. 31; Nelson 1899:210).

Other objects of interest include a bone comb with a handle apparently carved in the shape of a bird’s head (00-412). It is similar to combs (usually carved out of walrus ivory) found in later Thule or historic contexts (e.g., Ford 1959:208–209; Murdoch 1892:149–150). Traces of industrial technology (e.g., iron nails, possible stove parts) in the upper component postdate 1800. However, some are deeply buried in the uppermost stratigraphic units but presumably were incorporated into older materials as a result of disturbance in the last 200 years.

RECONSTRUCTING SUBSISTENCE

The occupants of Uivvaq appear to have maintained a consistent, broad-spectrum diet and economy much like modern Tikiġagmiut (Burch 1981:23–34; Foote and Williamson 1966). Fauna were analyzed from multiple units.³ Elements were quantified using number of identified specimens (NISP) or a bone count. The analysis is incomplete. To date, 979 elements have been identified, 481 coming from N13 E0 (Table 3). Based on the information available, the economically important fauna are small and medium pinnipeds and caribou.

As elsewhere in the Arctic, small and medium seals were the dietary mainstay of the Thule/Iñupiaq economy (Murdoch 1892:61–62; Stanford 1976). Seal bones dominate the Uivvaq assemblage in almost all levels in N13 E0. Pinniped representation was: lower component,

57.2%; middle component, 75.5%; upper component, 62.9%. Most remains identified to species were ringed seal (*Phoca hispida*; $n = 117$); few were identified as spotted or harbor seal (*P. larghalvitulina*; $n = 8$). Many seal bones were placed in a more general *Phoca* spp. ($n = 102$) or medium phocid/not ribbon seal category (not *Phoca fasciata*; $n = 9$). Both axial and appendicular elements are well represented, and it appears that carcasses were transported intact to Uivvaq. Flipper elements are particularly numerous (but not yet quantified), as expected if flippers were stored, processed, and consumed. Butchering marks were observed on many seal bones, including round puncture holes through the blades of three scapulae. The holes may have been from a projectile, punctured to hang meat for drying, or from erosion through the thinnest part of

the blade. The hole through a spotted seal scapula blade was intentional and there are cut marks around the hole, possibly to remove a harpoon head. Carnivore chewing is present, but not ubiquitous, on small pinniped elements, and erosion of some elements may have been caused by passing through the digestive system of a carnivore or omnivore.

There are isolated remains of the large bearded seal (*Erignathus barbatus*; $n = 3$ in Unit N13 E0) and a walrus (*Odobenus rosmarus*) skull fragment in N12 E1 (43 cm bd). More walrus bones were expected because there is a haul-out on the west side of Cape Lisburne (Burch 1981:20). Walrus move northward through leads as the ice is breaking up in the spring and summer and haul out on the ice. Males tend to stay in the Bering Sea and females

Table 3. Number of identified specimens for Uivvaq fauna

	Upper Component (0–40 cm bd)		Middle Component (40–80 cm bd)		Lower Component (80–120 cm bd)		Overall NISP (including N13 E0)	NISP (N13 E0)
	overall*	N13 E0	overall*	N13 E0	overall*	N13 E0		
Carnivores								
small canids	49	13	49	3	41	32	139	48
canid/medium canid	18	5	11	3	11	4	40	12
<i>Ursus</i> spp. (bear)	6	0	18	3	26	5	50	8
Ungulates								
<i>Rangifer tarandus</i> (caribou)	104	13	98	23	31	15	233	51
<i>Ovis dalli</i> (Dall sheep)	2	0	2	1	1	1	5	2
ungulates	26	2	29	4	9	3	64	9
Pinnipeds								
small/medium pinnipeds	85	79	145	1,421	93	93	323	314
<i>Erignathus barbatus</i> (bearded seal)	1	1	0	0	2	2	3	3
<i>Odobenus rosmarus</i> (walrus)	0	0	1	0	0	0	1	0
Cetacean	41	10	15	3	2	1	58	14
Land Mammal Unidentified	20	4	12	4	15	9	47	17
Gastropod	5	0	3	1	1	0	9	1
Fish	0	0	1	1	1	1	2	2
Unidentified	4		1		0		5	0
NISP	361	127	385	188	233	166	979	481

* overall NISPs include N13 E0

and immature walrus move into the Chukchi Sea (Sease and Chapman 1988). In the fall, they will haul out on shore during their journey south.

Evidence of whaling is of interest because of its historic economic and social importance, but because of the immense size of the prey, large whale hunting typically exhibits low visibility in the zooarchaeological record (McCartney 1995). Historically, large whale carcasses were left on the ice and few elements of the skeleton were brought back to the living areas. Bone appears as artifacts and as byproducts of tool manufacturing and not as recognizable food debris. Two large whale skulls were on the ground surface on either side of Mound 2, and a beluga (*Delphinapterus leucas*) whale skull was on the surface of one mound. They were also observed in back dirt from a bear excavation. A whale skull embedded within the wall of N14 and N15 E1 was not collected, nor was a scapula 120–125 cm bd in the east wall of N13 E0. Most whale bone identified was from the upper levels of Mound 2. Whale bone was identified sporadically in the lower levels. Weathered bones (e.g., crania, mandibles) were on the surface of the middens and surrounding ground, although their age and relation to past occupations is unknown.

Beluga whales winter in the Bering Sea, using polynyas and open leads near Point Hope, Shishmaref, Wales, and the Diomed Islands (Hazard 1988). As the ice melts, the whales migrate northward beginning in April or May, continuing through July (Hazard 1988). A set of eleven beluga vertebrae were found in Unit N16 E1 at 42 cm bd. Traces of meat and blood residue adhered to the ventral surfaces of the bones on the caudal end of the articulated skeleton. The vertebral processes were gnawed by carnivores, and a large chip and transverse processes were torn away from the right side of the caudal end of the skeleton while the bone was fresh. Morseth (1997: 249–250) stated that the vertebrae from the lumbar to the caudal vertebrae and the cervical vertebrae are either eaten shortly after the animal was killed or were given to the dogs in modern Buckland. The abundance of fly pupal cases and soil mites in the samples of insect remains at the site, in general, support the interpretation that some bones were exposed on the midden surface, particularly during the summer months, as may have occurred with this beluga. Two vertebrae on the cranial portion of the articulated skeleton were charcoal stained and burned through the foraminae. The burning probably occurred long after the skeleton was scavenged and after the meat was removed. Three other small cetacean elements were recovered that may be from

beluga. A rib fragment from N13 E0 was cut square on both ends and is a manufacturing byproduct (70–75 cm bd); a forelimb fragment was badly chewed by a large carnivore, probably by a bear (88 cm bd, N13 E0). A third element from N14 E15 was a vertebra epiphysis. All other cetacean remains were from large whales.

The only burned bones were sea mammal, except for three fox or small canid bones and three other bones that are either stained or burned. The remaining burned bones were pinnipeds ($n = 20$), cetaceans ($n = 11$), and unidentified mammal bones ($n = 3$). None were from caribou or other ungulates. Spencer ([1959] 1976:471) and Edna Hunnicutt (Hall 1975:65) both noted that sea mammal bones were burned when a house was moved. Hunnicutt (Hall 1975:65) also stated that sea mammal bones were burned when there was no ice:

At the coast you couldn't go into anybody else's tent. A family always puts all the ugruk and seal bones together in one pile so when there was no more ice, when they don't hunt, they burn those bones, and some bones burn real bright and fast and some people's pile of ugruk and seal bones doesn't burn bright, and that family's pile of bones that don't burn good the family will "be missing" again ["be missing" means one of the family will die or something will happen to the family], and the family's bones that are burning brightly always have good luck. After they burned the bones they could visit other tents.

Beluga bones were burned in the nineteenth century in western Alaska, a pattern that can be inferred and extended to prehistoric Uivvaq and the present-day Buckland area (Morseth 1997:250–251). Burned sea mammal bones were found in association with a number of wood charcoal fragments, burned soil, and fire-cracked rocks in the midden, especially in the lowest levels of excavation Unit N13 E1 (Cultural Levels I, II and III) and in the upper component.

Caribou (*Rangifer tarandus*) was a significant terrestrial food source in the nineteenth century (Burch 1981:27–28) and its remains occur throughout the midden deposits. Caribou were secondary in importance to seals at Uivvaq even factoring in different processing methods, taphonomy, and body weight. When the NISP of caribou ($n = 51$) are compared to the NISP of pinnipeds in N13 E0 caribou are 14% of the sum of the two taxa in all components. Many limb bones exhibit tool cut and/or percussion marks and all limb bones, and most foot bones, were shattered, presumably for marrow extraction.

The over-representation of limb bones relative to the axial skeleton may be attributed in part to the higher fragmentation rate of appendicular elements relative to unfragmented axial elements. The axial elements are also less dense and are more likely to be removed from the assemblage by carnivore chewing. To examine possible effects of post-depositional processes on caribou element representation, dense limb bone articular ends were compared to the more porous portions with thinner cortical bone. In the small assemblage of all ungulate appendicular elements ($n = 87$), there are more dense fragments than fragments with thinner cortical bone and greater porous, cancellous components. The difference in the numbers is small and a larger data set is required to determine if this discrepancy is an accurate reflection of the site assemblage overall, and if it does indicate that thinner, more porous bones were destroyed by carnivore activity.

The only other ungulate identified to species from Mound 2 came from isolated Dall sheep (*Ovis dalli*, $n = 5$) elements. The elements in the trench between 75 and 90 cm bd were a scapula and two first cervical vertebrae. On the surface and 12 cm bd were a mandible and a tooth. There is little basis for interpretation of the importance or use of these ungulates. The low numbers may be due in part to an incomplete comparative collection at the time of analysis. Dall sheep were common on Cape Lisburne during the early historic period, 1825–1840 (Burch 1981), but by the 1920s their numbers were dwindling. Sheep are now rare in the Lisburne Hills (Foote and Williamson 1996:1047; Georgette and Loon 1991).

Large and medium carnivores were important to the Uivvaq economy in the nineteenth century. Four elements were from polar bear (*Thalarctos maritimus*, $n = 4$), but two were molars in the same unit and level, and a third molar may be associated. The remainder ($n = 46$) may be a mix of polar bear and grizzly bear (*Ursus horribilis*), but a comparative polar bear postcranial skeleton was unavailable to make the determination. The elements from Uivvaq tended to be larger than the female grizzly bear skeleton used for comparison. Both bears frequent the Uivvaq area today. Bear bones, chiefly lower extremities, occur in low numbers throughout the midden, with the greatest number in the middle component of N10 E0 (a femur, humerus, skull fragment, and two phalanges between 40 and 60 cm bd) and a fore and hind paw of an immature bear in the lower component of N13 E1 between 107 and 117 cm bd (eighteen metapodials, six phalanges, and a navicular). Of all bear elements recovered, thirty-seven are foot

bones, three humeri, two femora, and a fibula. There are no axial elements other than skull fragments ($n = 2$) and teeth ($n = 4$). The numerous foot elements may have traveled with hides brought to the site.

Fox elements (total small canid NISP = 139) were identified as *Alopex lagopus* ($n = 4$), *Alopex/Vulpes* ($n = 118$), canid (fox) ($n = 10$), or small canid ($n = 8$). One bone was recovered during cleanup and is not included in Table 3. Fox elements are evenly distributed through all components. Both axial and appendicular elements of fox are well represented, reflecting the transport of whole carcasses, with butchering marks noted on some specimens. Arctic foxes must have been attracted to Cape Lisburne since they eat eggs and small birds from sea bird rookeries in the summer, and ringed seals in their dens in the winter, and will follow polar bears and scavenge their kills on ice (Banfield 1974:297; Bee and Hall 1956). Medium-sized canid elements from Uivvaq ($n = 40$) are stocky and shorter than wolf comparative specimens and are assumed to be from dogs (*Canis familiaris*). Axial and appendicular elements are both represented, as would occur if whole carcasses were deposited on the site. Gnawing on other bones at the site also support the conclusion that dogs were present. Medium-sized canid elements occur in similar numbers in all components. Nine of the medium canid elements were in the vegetation mat or on the surface and may be associated with historic activities at Uivvaq.

Bird bones were not as plentiful at Uivvaq as expected given its proximity to Cape Lisburne, one of the largest murre (*Uria* spp.) and kittiwake (*Rissa* spp.) colonies in northwestern North America. A cursory examination of the assemblage confirms the presence of gulls, murre, and ducks. There does not appear to be a selection for particular body parts, and the birds were likely brought back whole. Small bones from the ends of wings and the small toe bones are missing, but this may be due to sampling bias. Because birds were not systematically identified, they are not included on Table 3.

Fish were represented by two isolated vertebrae (N13 E0, 50–55 cm bd, and N13 E0, 100–105 cm bd). Both elements were eroded, as is typical of bones that have passed through a digestive system. The elements may come from gut contents of seals and therefore are not representative of subsistence activities at Uivvaq.

Isolated remains of gastropod opercula ($n = 9$) were found in all units and were presumably from stomachs of butchered pinnipeds. Walrus and bearded seal eat gastropods, and the opercula are recovered from the gut

contents, sometimes in the absence of shell (Johnson et al. 1966:911). Historic observations confirm that people consumed shellfish extracted from pinniped stomachs (Burch 1981:33). Three shells were also recovered but are not yet identified: a medium-sized bivalve (N13 E1, 27–31 cm bd), a fragment that appears to be a scallop (N13 E1, 42–47 cm bd), and another fragment from a barnacle (N13 E0, 0 cm). Little can be concluded about the use of invertebrates by the people of Uivvaq from this small assemblage.

The condition of the bone in the site varied, even within the same arbitrary level. Some bone appears nearly fresh; gastropod opercula, a keratinous material, came from 112–117 cm bd; and a caribou sternebra, a porous bone, also came from the lowest levels. These are evidence for excellent preservation at the site. At the same time, other bone is exfoliating badly or is so severely eroded that it was difficult to identify the element. Based on research from summer and winter houses at Cape Krusenstern, Darwent (2003) suggested that the season bones are discarded may affect their condition. Bone condition and a better understanding of their context may provide additional information about season of occupation, and from that, subsistence and other activities at Uivvaq.

Based on the analysis of the faunal sample from the N13 E0 quad, the relative proportions of seals and cervids changed little during the occupation at Uivvaq, contrary to Bockstoce's (1976) hypothesized increased reliance on caribou. The primary economically important animals at Uivvaq are small and medium seals, followed by caribou. Fox were brought back whole and skinned at the site, while bears appear to have been processed elsewhere and the hides and skulls brought back. The role of whales is more difficult to determine because meat, rather than bone, was usually transported back to settlements. The size of whale elements also create a sampling problem because the large bones may be more widely distributed and would require a large excavation to sample adequately. The skulls on the ground surface may be an indication of a more extensive assemblage of buried elements.

The interpretation of season of occupation from the animal remains is ambiguous. A walrus haul-out and an adjacent bird rookery do not seem to have contributed significantly to fauna or egg shells in the assemblage. The walrus haul-out would have been used in either the spring or fall migrations, and the bird rookery in the summer. Bird abundance is affected by climate, and if the ice melts late in the season, fish with which the birds feed their young

are inaccessible and bird populations plummet (Roseneau 2000:12). Temperatures, either cooler or warmer during the MCA or the Little Ice Age, may have limited bird populations at Cape Lisburne. Ringed seal are more accessible in the winter and spring (Burch 1981), and fox furs are likely to be in better condition in the winter. Caribou were hunted in the Lisburne area during the summer until the ice formed and seal hunting became the focus of subsistence activities (Burch 1981). The highly fragmented condition of caribou limb bones indicates that the marrow was heavily used, which could occur soon after a hunt was over (Spencer [1959] 1976:270). Alternatively, the appendicular bones might be stored and used later. Beluga whales were hunted in midwinter in polynyas and near shore by May or June (Hazard 1988:200; Huntington 1996). The insect larvae identified by Elias (2003) that are associated with rotting meat could be from meat scraps left behind to thaw through the summer months. Larvae do not indicate the season of capture, however. Based on the animals present and the animals expected but not present, it appears that Mound 2 at Uivvaq was used at least during the winter into the spring. However, the site may have been used during other seasons as well. Warmer seasons would have caused the sod houses, like the one at Mound 2, to be abandoned for drier tents, and the summer fauna may be found there.

DISCUSSION AND CONCLUSIONS: CONTINUITY AND DISCONTINUITY AT UIVVAQ

Excavations at Uivvaq represent only a sample of the site deposits and are biased due to concentration at the perimeter of Mound 2. We cannot confidently state that the base of the midden was established. Therefore, any conclusions must be tempered by such limitations. Uivvaq has a Thule component, linked to the historic Inupiat occupants of the site; its lower component was possibly transitional between the "late" Birnirk and early Thule (cf. Jensen 2007; Morrison 2001; Stanford 1976). Both are commonly included in the Northern Maritime tradition, as defined by Collins (1964:90–101), and believed to (a) derive from the western side of the Bering Strait and St. Lawrence Island, and (b) be ancestral to historic Inupiat, including the Tikigaġmiut. Although this conclusion currently rests on a very limited excavation, no other archaeological cultures or traditions have been identified at Uivvaq.

By the time that the lowest level of Mound 2 was deposited, Uivvaq may have assumed the political and economic roles that it enjoyed until the decline of the Tikigagmiut polity in the late nineteenth century. Although absolute dates remain scarce, sites such as Jabbertown, in the Point Hope region, were occupied by Inupiat in the wake of the Ipiutak collapse (cf. Mason 2000, 2006, 2009a, 2009b). Uivvaq represents a contemporaneous occupation. Harpoon heads (i.e., the Natchuk and Thule 2 types) and other artifacts from the base of Mound 2 resemble those from Jabbertown (Qimiarzuq) House 2, seven km east of Point Hope (Larsen and Rainey 1948:170–175; Mason and Bowers 2009), which is of comparable age, ca. AD 1100. Assuming that whales were available, the Ipiutak people were unable to or uninterested in exploiting the potential of Point Hope for whaling—as evident from the dearth of both whale bone and artifacts related to whaling. With their improved techniques and equipment (cf. Bockstoce 1976), the new Thule occupants of the region established Point Hope as a major whaling center, later moving their village from Qimiarzuq to a position near the terminus of the spit. Termed Tikigag, the earliest record of this settlement is inferred to fall ca. AD 1300 based on comparison to the tree-ring dated assemblages in the Kobuk River sequence (Giddings 1952; Larsen and Rainey 1948:270).

The sequence of occupation in Mound 2 and the existence of four similar mounds suggests that Uivvaq was a small Inupiaq settlement used prior to contact in a manner similar to its use in the early nineteenth century. Both the artifacts and faunal remains recovered from the three major components suggest a pattern of year-round habitation and broad-spectrum foraging at Uivvaq prior to ca. 1870 (Burch 1981; Lowenstein 1981). This likely included a modest but consistent spring whaling effort, with heavy reliance on winter sealing, combined with hunting of caribou, bears, and foxes and exploitation of the many birds in the Cape Lisburne area.

Historical accounts reveal that by AD 1800, Uivvaq served as an important, but small, satellite community within the Tikigagmiut polity—possibly second only to Tikigag (Point Hope) itself. Although it was a very small northern outlier, possibly one-twentieth the size of Tikigag, the area was indeed occupied throughout the year by several families and was the staging point for a spring whale hunt, although the small size of the population at the site may have constrained whaling at cer-

tain points in its prehistory. During the warmer months (and perhaps at other times as well), visitors from other Tikigagmiut settlements came to Uivvaq to exploit its abundance of marine and terrestrial resources (Burch 1981; Lowenstein 1981).

The Uivvaq investigations provide a window into several macroscale processes across Northwest Alaska during the last millennium. These include the Birnirk–Thule transition, the development of the whaling economy, the pan-arctic spread of Thule, and the impact of Little Ice Age climates. Unfortunately, the Uivvaq data from 2000 and 2002 do not extend into Ipiutak deposits. For the Thule sequence, the preliminary results from Uivvaq Mound 2 indicate economic trends broadly similar to that at Walakpa (Stanford 1976:111–114), which is not surprising given the two sites' contemporaneity. The lengthy and uninterrupted stratigraphic succession at both sites suggests a stable society and economy, despite climate fluctuations that must have affected principal resources. Further, both Walakpa and Uivvaq were comparatively minor satellite communities distant from their respective polity centers at Utqiagvik and Tikigag. The most important change occurred after the onset of Little Ice Age climates, ca. 1400, with increased fishing and dog traction, which had considerable effect on Thule settlement and economy farther east (e.g., Maxwell 1985; McGhee 1969/70, 2000). However, no fundamental changes are evident in either artifact assemblages or faunal remains from the upper component at Uivvaq or the Late Thule levels at Walakpa (Stanford 1976:92–95).

The Uivvaq midden was younger than anticipated—its depth reflects rapidly accumulating storm deposits and numerous occupations. Insect remains were hypothesized to be the best means for high-precision dating; however, the results were ambiguous. The insect ages were no better, and possibly worse, than those of other materials. In contrast to the other assays, the radiocarbon assays on insect chitin suggested that, despite the well-stratified sequence, postdepositional admixture of materials occurred, very likely due to house cleaning. Major anthropogenic disturbance is evident in the uppermost levels and is apparently due to pit excavation and construction activity. These observations underscore the need for an improved understanding of formation processes in arctic coastal middens.

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NOTES

1. In response to the outsider perception of a deteriorating social situation at Tikiġaq, an Episcopal missionary, Dr. John B. Driggs, was dispatched to Point Hope in 1890 (Driggs 1905; Lowenstein 2009; VanStone 1962:24ff). Suffering a psychological breakdown (Lowenstein 2009:217ff, 299ff), Driggs was relieved of his post in 1908 and retired to Uivvaq, constructing a small wood frame house. Rev. Driggs died in 1914 and was buried on the slope behind the village, where at least a dozen unmarked graves are also located (i.e., *Iglak* cemetery).
2. The 2000 Uivvaq materials are curated at the Inupiat Heritage Center, Barrow; 2002 materials are curated at the University of Alaska Museum of the North, Fairbanks.
3. Fauna from the following units were analyzed: From 2000 excavations: Units N8 E0, N10 E0, N13 E0, N14 E15, N38 E20, N39 E20, S20 E59, S19 E59, S7 E60, S65 E70. From 2002 excavations: Units N10 E1, N13 E1, N15 E1, N15 W1, N16 E1, N16 W1, N0 E37. The faunal analysis is incomplete. Collections used for identification were the Alaska Consortium of Zooarchaeology and the Department of Anthropology faunal collections housed at the University of Alaska Anchorage and comparative pinnipeds, Dall sheep, and bear skeletons from the University of Alaska Museum of the North, Fairbanks.

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