RESEARCH REPORT

AN ANANGULA PERIOD CORE-AND-BLADE SITE ON AMAKNAK ISLAND, EASTERN ALEUTIANS

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ABSTRACT

UNL-469 is a prehistoric site located on Amaknak Island, in the city of Unalaska. Test excavations conducted in 2007 recovered a number of blades and microblades, as well as flake tools and a single biface. Radiocarbon analysis of charcoal samples resulted in dates ranging from 8040 cal BP to 6740 cal BP. The dated occupation occurred during the Late Anangula period, one of the least-known phases of Aleutian prehistory. The lack of investigation of sites dating from this period has led some previous investigators to suggest a hiatus in the human occupation of the eastern Aleutians. Excavations at UNL-469 have filled the gap and also produced the oldest biface known from this region.

INTRODUCTION

UNL-469 (called the "Amaknak Quarry Site" after a nearby modern sand and gravel pit) is located on the eastern side of Amaknak Island's southern peninsula, approximately 15 m above current sea level (Fig. 1). The site was discovered in 2003 by Richard Knecht, who noted blades and other lithic artifacts eroding from the bank along the quarry access road. A charcoal sample collected in 2005 by U.S. Army Corps of Engineers archaeologist Diane Hanson yielded a date of 6150±50 BP (Beta 208986).

In August 2007, archaeologists from Cultural Resource Consultants, LLC, tested the site to determine its boundaries and characterize the age and extent of cultural deposits (Fig. 2). Ten 50 cm by 50 cm test units were excavated at various points around the site, one of which was later expanded to 75 cm by 75 cm.

STRATIGRAPHY

As a result of military construction in the 1940s, topography in the immediate vicinity of UNL-469 has been significantly altered from its prewar form. Approximately 1 m of modern overburden overlays much of the site, and trenching operations were necessary to reveal the original (pre-WWII) ground surface.

The uppermost stratum beneath the original ground surface was a thin (ca. 3 cm) layer of loamy soil and decomposed organic material. This "A" horizon represents the only apparent soil development in the stratigraphic sequence. Sediment below the original surface consisted of numerous layers of bedded volcanic tephras (Fig. 3). Several "signature" strata were observed throughout the

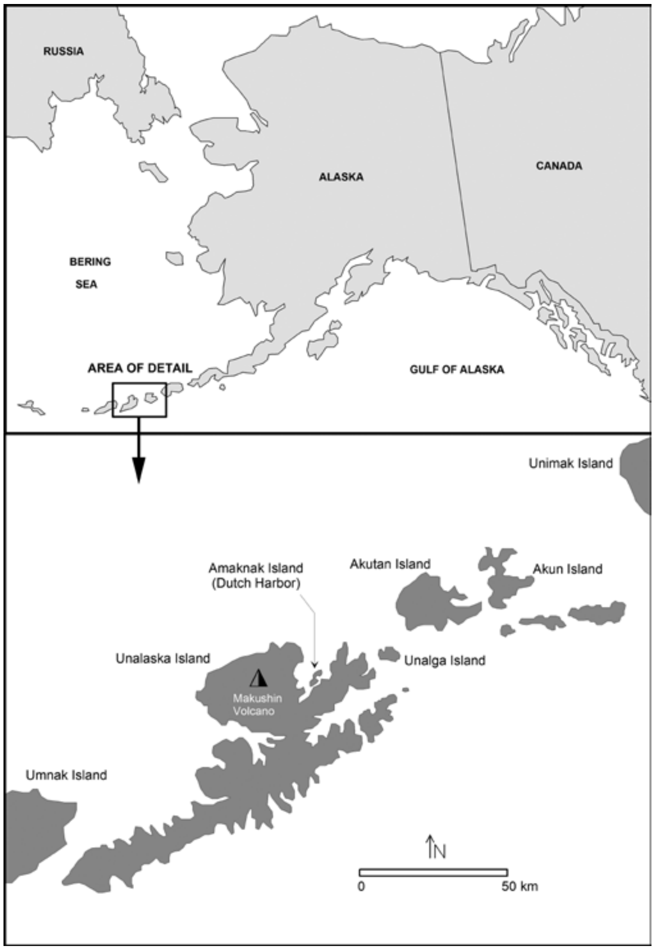

Figure 1. Location of Amaknak Island

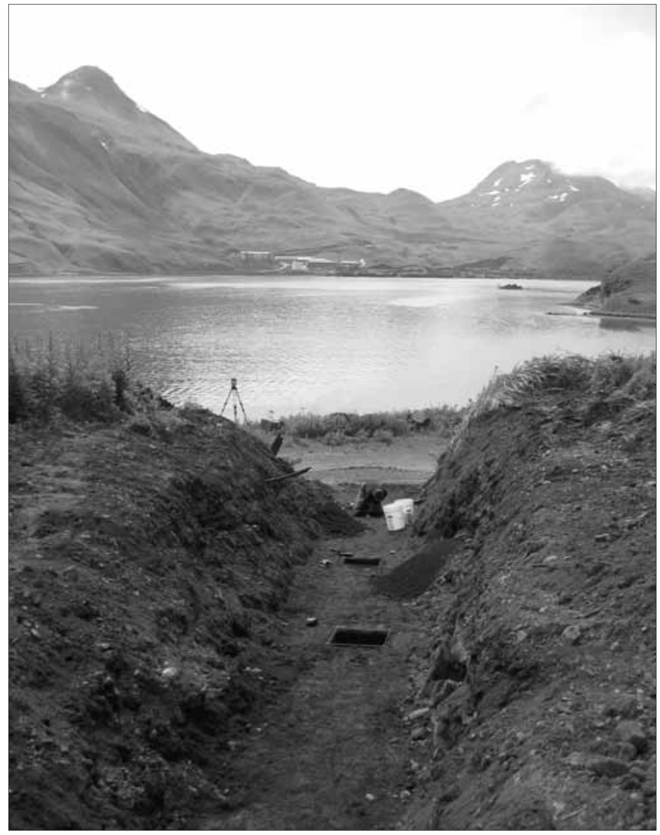

Figure 2. Excavation at UNL-469, view to the south

excavation, most notably an orange layer near the surface and the coarse yellow-orange ash of the 9,000-year-old Makushin pyroclastic event. This distinctive layer, immediately underlying the cultural deposits at this site, is a diagnostic horizon marker for the entire Unalaska Bay region (Dumond and Knecht 2001:27). Cultural deposits consisted entirely of lithic artifacts and charcoal flecks, and, in rare cases, charcoal lenses. No cultural material was observed in or below the Makushin layer at UNL-469. The significance of the Makushin pyroclastic layer in the context of regional chronology and culture history will be discussed later in this article.

RADIOCARBON DATES

Four radiocarbon dates were obtained from the 2007 excavations at UNL-469, and one from 2005 testing by the U.S. Army Corps of Engineers. All but one of the samples were wood charcoal, the single exception being an unidentified substance, possibly a soil organic (Beta-237111). AMS analysis was used for all samples. Results are presented in Table 1.

The dates obtained from radiocarbon analysis span a period of approximately one thousand years, from 8040 cal BP to 6740 cal BP. The youngest date (6000±40) was obtained from an eroding face of the site at the uppermost limit of cultural material. The oldest date (7160±40) may be unreliable in that the sampled material was likely a soil organic and not charcoal. However, a charcoal date obtained from the same excavation unit was dated to 6820±40 (7730–7580 cal BP). A number of charred and scorched rocks were present in this square, as was a relatively large amount of charcoal. This feature, located from 20 cm to 30 cm below the surface, was tentatively identified as a hearth (Fig. 4).

ARTIFACT ANALYSIS

Lithic materials were the only artifacts recovered from the site; organic artifacts did not survive in Amaknak's highly acidic volcanic soil. A total of 172 discrete stone artifacts (cores, tools, and debitage) were collected. Of

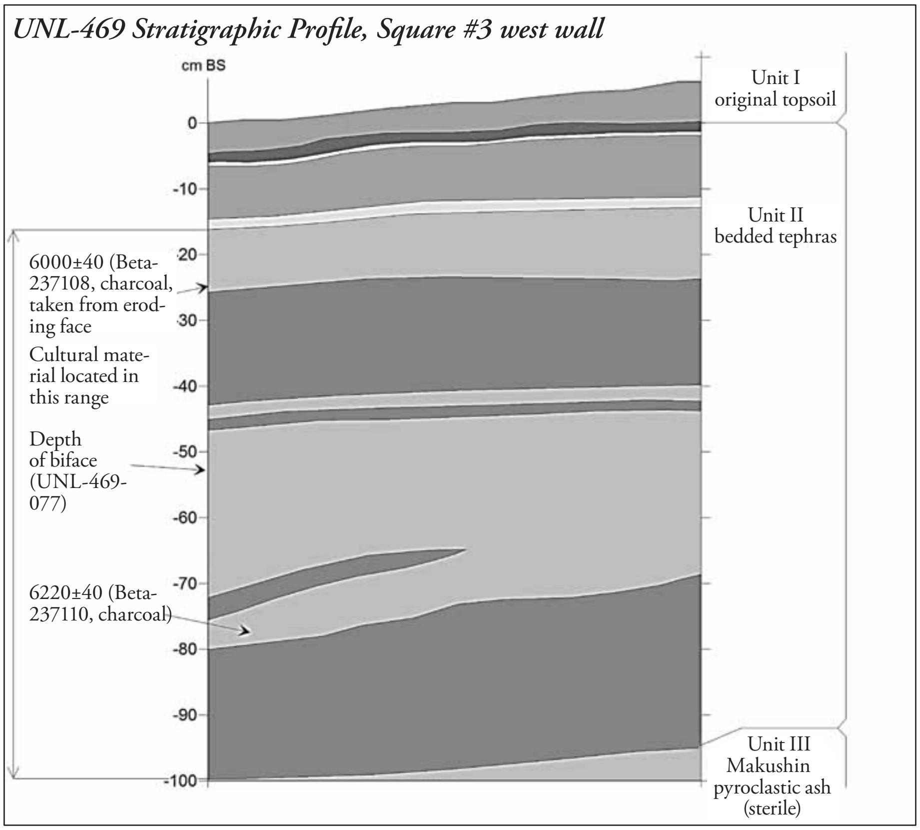

Figure 3. Stratigraphic profile

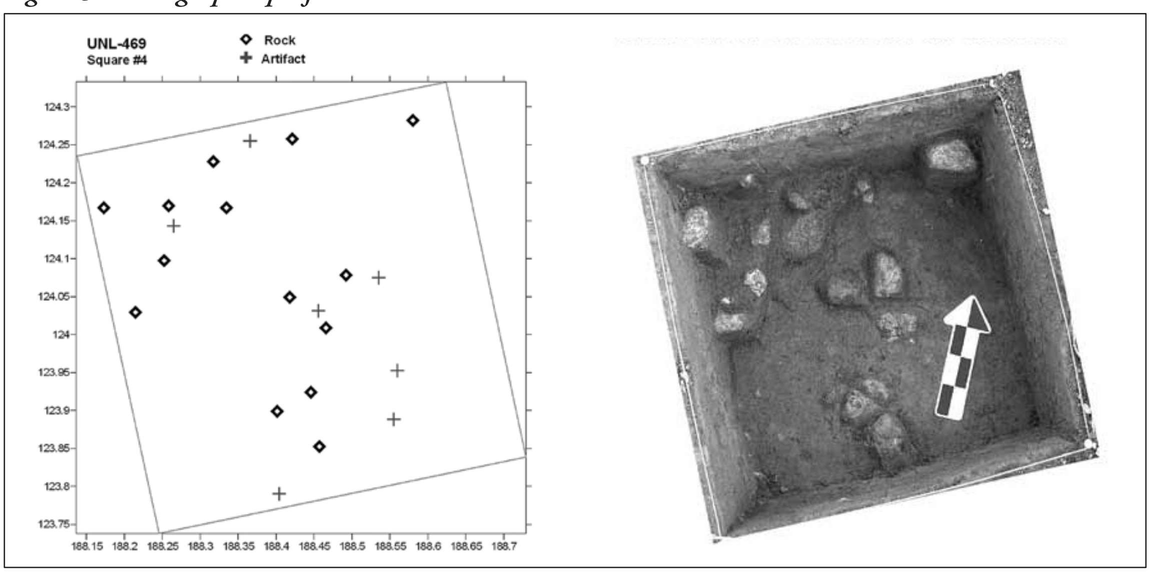

Figure 4. Possible hearth feature

Table 1. Results of radiocarbon dating analysis for UNL-469

Description	^{14}C Years BP	Calibrated Age*	Lab Number
Eroding face (2005)	6150±50	7170–6890 cal BP	Beta-208986
Eroding face (2007)	6000±40	6950–6740 cal BP	Beta-237108
Square 4, 12 cmbs	6820±40	7730–7580 cal BP	Beta-237109
Square 3, 80 cmbs	6220±40	7080–7000 cal BP	Beta-237110
Square 4, 30 cmbs	7160±40	8040–7920 cal BP	Beta-237111

* Radiocarbon determinations were calibrated with OxCal 3.1 using the IntCal 04 curve; see Bronk Ramsey 1995, 2001)

these, twenty-two pieces were surface finds eroding from the site's exposed face, and 150 pieces were collected from six different excavation units. The majority of recovered material was debitage, comprising 75% of the collections (129 pieces). There were twenty-six blades and microblades (15% of the total collection), ten retouched or utilized flakes (6%), three large cobble choppers, and a single biface. A burin spall, an angular piece of pumice, and a single core fragment were also recovered.

Basalt, crypto-crystalline silicates, and obsidian are the basic raw materials for chipped stone industry at UNL-469, together comprising 93% (by weight) of the total assemblage. These are consistently the key materials for lithic industry throughout the eastern Aleutian archaeological sequence, from the Anangula period to early historic times (Knecht and Davis 2004:89–90). Obsidian is the single most significant lithic material, making up nearly half of the artifacts found at this site. Siliceous sedimentary argillite (chert) was favored for blades and microblade production at the site, while obsidian was preferred for retouched flakes and was also used for the single biface point found at the site. Basalt was the least frequent material across all tool categories, used for just 25% of flake tools and only a single blade. Other rock types occurring in limited quantities include sedimentary rocks such as siltstone and mudstone.

Considerable effort was likely involved in procuring raw materials. Of the major rock types present in recovered artifacts, only basalt is widely available in the eastern Aleutians (from bedrock outcrops, beach cobbles, and volcanic flows). The source of the extremely fine-grained basalt found at UNL-469 is not known, although the origin of basalt from three sites on Umnak Island was determined to be a single flow at Black Creek on Mount Vsevidov (Mason and Aigner 1987:604–605). Chert outcrops are scarce, although sources are present at nearby Pyramid Peak (2 km distant) as well as Beaver Inlet (approximately 10 km distant).

Two obsidian samples from UNL-469 were analyzed by X-ray fluorescence (XRF) spectroscopy at the Smithsonian Institution's Museum Conservation Institute. In both cases the source was determined to be the Okmok caldera on Umnak Island, over 150 km from Amaknak (Slobodina and Speakman 2008). Although obsidian also occurs on Akutan Island, Okmok is the geologic source responsible for more than 95% of all sourced obsidian in the Aleutians. No obsidian sources are known on Amaknak or Unalaska. In general, the obsidian used for tool production was not of particularly high quality, containing numerous air bubbles, inclusions of nonglassy stone, and other impurities.

BLADES AND MICROBLADES

Blades and microblades constitute the basis for lithic industry at this site, comprising 63% of the tool count (Fig. 5). Crypto-crystalline silicates (especially cherts) were clearly the favored materials for blade and microblade production at UNL-469, accounting for 65% (by frequency) of the recovered examples. This compares with 57% for the Anangula collection (Del Bene 1982:177, 183), and 43% for the Russian Spruce site on nearby Hog Island (Dumond and Knecht 2001:26). Obsidian accounted for less than one-third of the UNL-469 blade collection (31% by frequency), and there was only a single example made from fine-grained basalt. Preferential material use is even more apparent when examining microblades only: 75% are of chert and 25% are obsidian. Approximately 25% of the blades from the site show evidence of retouch or use-wear.

A recurring question in studies of Aleutian lithic industries is whether microblades exist as a functional class of tools distinct from larger blades and flakes. An examination of blade size distribution in the recovered assemblage may elucidate aspects of this problem. To maximize the sample by including broken sections, blade width is used as an indicator of length. Previous studies have shown that while there may not be a direct linear relationship, there is still a strong correlation between blade width and length (Aigner 1978:88; Dumond and Knecht 2001:20). When frequency is plotted against blade width (in 4 mm intervals), a break in the curve is apparent at 13 mm, and edge modification is restricted to the widest blades (Fig. 6). One medial blade fragment is bimargin-

Figure 5. Microblades from UNL-469

ally retouched, and three others show unifacial retouch (all wider than 25 mm). Although the sample size is quite small (n = 26), the size and retouch distribution is similar to that described for UNL-115 (the Russian Spruce site on Hog Island, ca. 9000 cal BP). The Hog Island distribution (n = 150) showed a break in the curve at 10 to 12 mm, and retouch was restricted to blades wider than 11 mm (Dumond and Knecht 2001:20). As noted by Dumond and Knecht (2001:28), this distribution does not match that from Anangula, where Aigner (1978) has argued that there was no separate class of microblades. In his appraisal of the Anangula collection, Del Bene (1982:207) found a unimodal distribution over a wide range of sizes, supporting Aigner's hypothesis. A larger sample from UNL-469 would undoubtedly have filled in some blank areas in the curve, but similarity with at least one other regional site is nonetheless apparent.

SHAPED TOOLS

The single shaped tool recovered from UNL-469 is a fragment of a pointed obsidian biface (Fig. 7). The piece, recovered from 53 cm below the surface, is broken across its width, leaving a fragment 3.2 cm in length, 2 cm in width, and 6.5 mm in thickness. Dorsal and ventral faces are discernable, indicating manufacture from a flake blank or perhaps a large blade. The tool was crafted with bifacial parallel pressure flaking on both the dorsal and ventral faces. Although extensively shaped on both faces, the flaking is more evident on the dorsal side. No denticulation is apparent, although fine, feathered retouch is present on both margins near the point's tip. Slight notching is apparent on both margins, suggesting the presence of a hafting element.

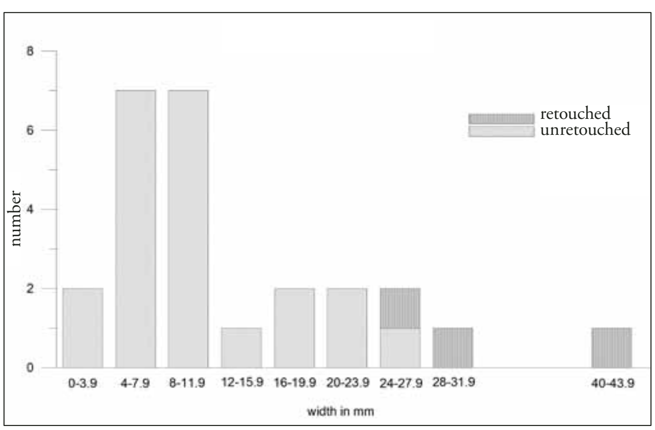

Figure 6. Blade and microblade width distribution, n = 26

Eighteen whole pointed bifaces and a number of fragments were recovered from the Sandy Beach Bay site on Umnak (6000–5000 BP). However, the Sandy Beach Bay bifaces are all flaked from tabular basalt, which Aigner interpreted as a pragmatic adaptational response to changing raw material type and form (Aigner 1983b:53). The significance of early Holocene bifacial manufacturing in the Aleutian context is taken up later in this analysis.

OTHER ARTIFACTS: CORES, BURINS, FLAKES, AND CHOPPERS

A single chert blade core fragment was recovered from the site (UNL-469-0005). The piece is tablet-shaped, removed to rejuvenate or prepare a striking platform. Some crushing is apparent on one margin, while two microblade scars are visible on separate faces. The scars are at right angles to each other, indicating core rotation of approximately 90° during the blade manufacturing process. A similar core side was recovered from Hog Island, seemingly removed in preparation for rotation (Dumond and Knecht 2001:18).

A single burin spall of green chert (UNL-469-0165) was recovered from the site investigation. Like all burin spalls from the Anangula collection (Aigner 1977:84), this one shows no evidence of use or retouch. The material (chert) is consistent with evidence from Anangula,

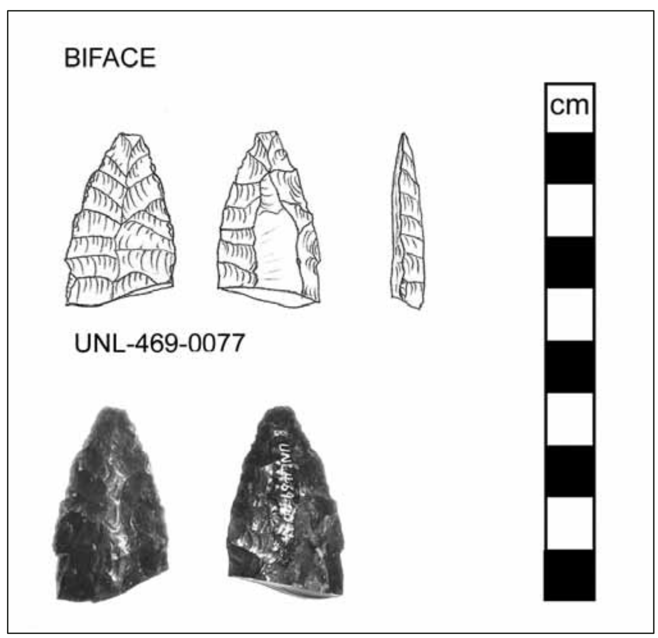

Figure 7. Biface fragment

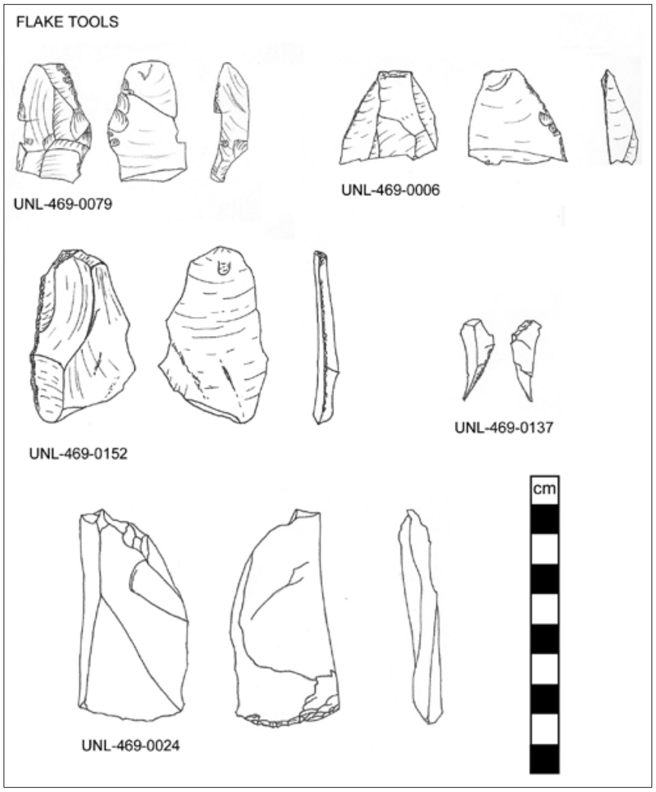

Figure 8. Flake tools

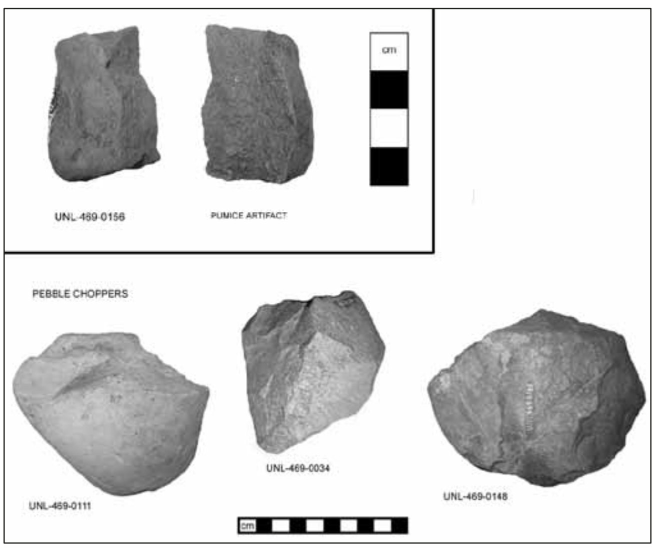

Figure 9. Cobble choppers and pumice artifact

where 79% of the spalls were of siliceous argyllite (Del Bene 1982:204). In form the spall is indistinguishable from the Anangula examples (illustrated in Aigner 1977:93). Burins and burin spalls, along with microblades, are considered to be essential components of the Anangula technological format. Used as scrapers or engravers, burin spalls were employed to cut grooves on bone and ivory for microblade insets and thus were important for manufacturing composite projectile points (Del Bene 1982:72, 303).

Twelve lithic flakes recovered from UNL-469 show either retouch or use-wear. These were generally tools of expediency, used for multiple tasks such as cutting, scraping, and piercing. Such ad-hoc tools are common from sites throughout the Aleutian sequence, although this classification may mask much functional variation (Aigner 1983b:99; Knecht and Davis 2004:96). Obsidian was the favored raw material used for these flake tools, exactly 50% by frequency. Occurrence of chert and basalt was 25% each. A selection of retouched flake tools is shown in Fig. 8.

In addition to the smaller artifacts, three large worked cobbles were recovered from UNL-469. These pieces are sized 11 x 9 cm, 9 x 7 cm, and 9 x 6 cm (Fig. 9). The sizes are quite comparable to the 11 x 7 cm "pebble chopper" recovered at Hog Island (UNL-115-898, Dumond and Knecht 2001:33) and the four "split pebbles…used for hacking" from Anangula (Aigner 1977:99). Similar pebble choppers also occur frequently around Nikolski Bay on Umnak Island (Laughlin 1975:514). Large cobbles might have been used as net sinkers as well (Laughlin and Aigner 1966:48), although the pieces in question do not resemble the distinctive grooved weights and sinkers from later phases of the Aleutian sequence. All three examples are extremely fine-grained basalt or andesite with few phenocrysts or silicate inclusions.

Flaking is apparent to varying degrees on all three examples. Remaining portions of water-worn cortex indicate these artifacts' origin as beach cobbles. A deliberate cutting edge is apparent on only one (UNL-469-0148), while the other two examples may have been flake cores used as choppers.

With only a single exception, all artifacts collected at UNL-469 are chipped or flaked. Only one possible example of ground stone, a burned and blackened piece of vesicular volcanic rock (a pumice or scoria), was recovered. Pumice was used to fashion abraders, and several were recovered from the Russian Spruce site on Hog Island (Dumond and Knecht 2001:24). This example, however, shows no scoring or use facets, and has clearly been cracked and burned by fire (Fig. 9). This artifact was recovered from a feature tentatively identified as a hearth (Fig. 4).

CLIMATE, ENVIRONMENT, AND PHYSICAL GEOGRAPHY

The degree of global climate change during the Holocene (ca. 11,000 BP to the present) has been small in comparison with events such as the rapid cooling of the Younger Dryas (ca. 12,500 to 11,500 BP) (Meese et al. 1994:1680; Stager and Mayewski 1997:1834), although still significant in impacts on human occupation and subsistence. A major globally distributed Holocene cooling event (sometimes called the "Younger Younger Dryas"; see Mason 2001) occurred between ca. 9000–8000 BP. Global indicators of the ninth millennium cold period are evident from the GISP2 Greenland ice cores, diatom deposits from Lake Victoria in East Africa, and the ice core from Taylor Dome in Antarctica (Stager and Mayewski 1997). In Alaska, a similar record is presented by diatom deposits in the Bering Sea (Baldauf 1982; Sancetta and Robinson 1983; both quoted in Mason 2001), presumably associated with the expansion of both sea ice and terrestrial glaciers. The end of the Younger Younger Dryas around 8000 BP signaled the retreat of large continental ice sheets and stabilization of global sea levels (the "Early to Mid-Holocene Transition" or EMHT) (Stager and Mayewski 1997:1834). This transition ushered in the "Postglacial optimum" or the Atlantic Period in the classic European sequence. It is in this context that the occupation at UNL-469 occurred.

Sea-level records in the Aleutian chain following the last glacial maximum are poorly delineated and extremely localized due to the great variety of glacio-tectonic and geomorphic paleoenvironmental settings (Jordan 2001:509). Subduction of the Pacific plate along the Aleutian trench generates great thrust earthquakes, and the Quaternary volcanoes extending along the Alaska Peninsula and Aleutian chain are among the largest and most explosive of the entire circum-Pacific region. Eustatic sea-level rise from a minimum around 18,000 BP was thus complicated by regional tectonic movements and related volcanism (Mann et al. 1998:122–125).

Raised beaches and marine terraces (relict shorelines) are common throughout the Aleutians and may offer relevant evidence for reconstructing local sea-level histories. Dates from archaeological sites are also useful indicators of potential early shorelines. Three of the oldest sites in the eastern Aleutians (UNL-469, Hog Island, and Anangula) are all located on ancient marine terraces between 15 and 20 m above current mean high tide, suggesting a higher sea level during the early Holocene.

Data from the western Alaska Peninsula indicate emergent shorelines at 25, 16, 6, and 2–3 m asl (Jordan 2001:517). Radiocarbon dates from these features, used to construct a sea-level curve, demonstrate a general pattern of shoreline emergence as isostatic uplift matched or outpaced eustatic sea-level rise (Fig. 10). Jordan (2001:517) concluded that the 16 m shoreline on the Bering Sea side of the western Alaska Peninsula was the most significant leveling-off during the early Holocene, as this stand lasted for about 1500 years (from about 9000 to 7500 BP). Both the dating and position of this stand are in fairly close agreement with findings from UNL-469 (14–15 m asl, dated from 8000 to 6800 BP).

A hypothetical reconstruction of Amaknak and Unalaska around 7000 BP showing sea levels at the 15 m contour, not accounting for highly localized tectonism and isostasy, is likely only an approximate representation of the actual paleo-shoreline. The reconstruction (Fig. 11) nonetheless offers useful insight regarding general topography during the eighth millennium stillstand. Inundation of topographic lows on Amaknak formed at least three individual islands and several smaller islets. Many of the barrier strands and spit formations had not yet developed or were beneath sea level (including the spit that forms Dutch Harbor and the beach containing the historic village and modern town of Unalaska). The numerous islands and embayments would have offered an abundance of sites suitable for habitation and subsistence activities. Maritime adaptation is inferred from the lack of terrestrial faunal habitat as well as the obvious need for watercraft.

HUMAN COLONIZATION OF ALASKA AND THE ALEUTIANS

Pope and Terrell (2008:11–12) concluded that major Late Pleistocene climate and sea-level oscillations slowed or thwarted circum-Pacific migrations before 50,000 BP and that unstable coastal environments made living on the coasts difficult. A postulated overland human entry into Alaska after major deglaciation around 14,000 BP coincided with the Bölling-Alleröd warming event. Ice-free coastal environments were present by ca. 17,000 BP,

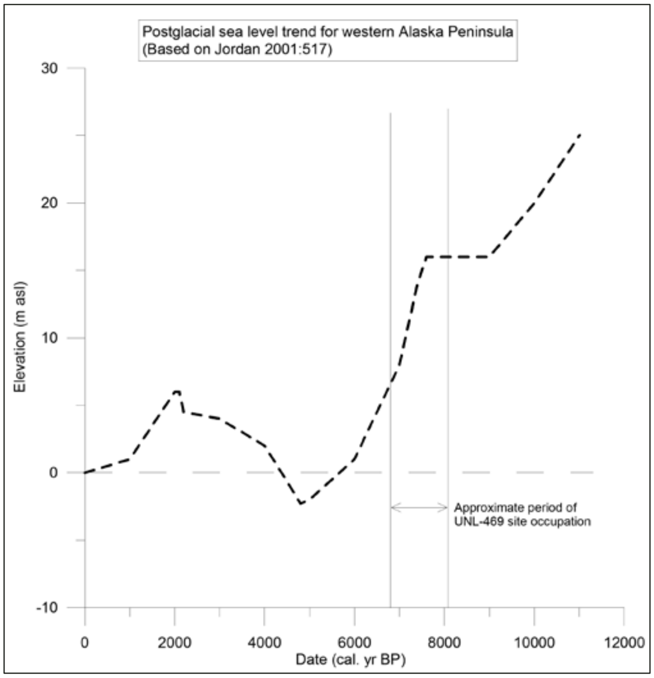

Figure 10. Sea-level curve (after Jordan 2001)

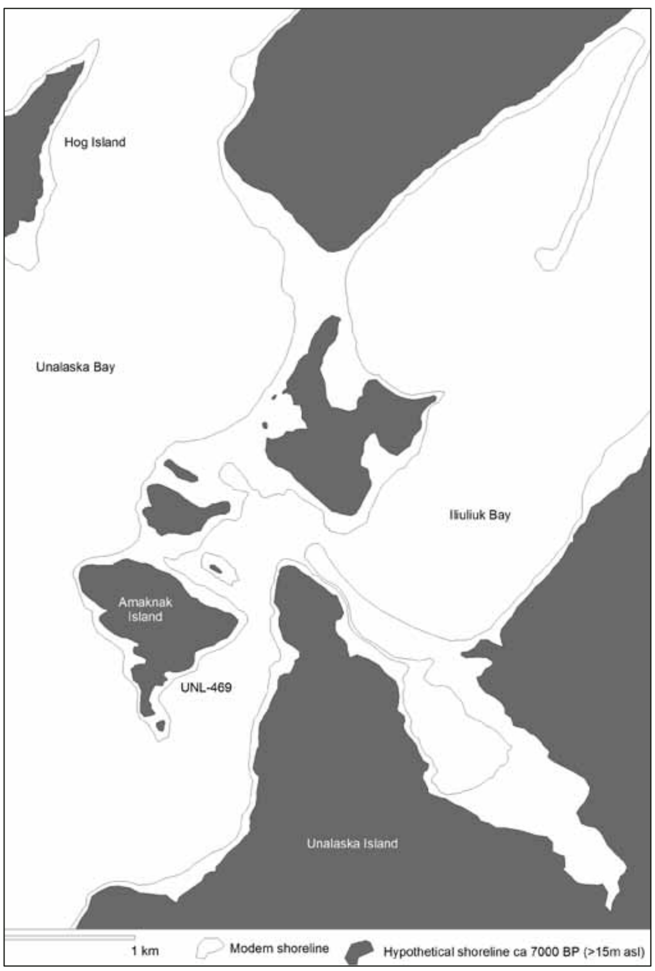

Figure 11. Reconstructed shoreline of Unalaska Bay ca. 7000 BP

however, leaving open the possibility of early coastal migrations (Fedje and Christiansen 1999; Fladmark 1979; Josenhans et al. 1997), the significance of which is obvious in the Aleutian context. Fossil insect evidence from seafloor cores also indicates a sea-level stillstand at the –50 m contour as late as 11,000 BP, leaving substantial portions of the Bering land bridge accessible for human migration (Elias 1996:117–118).

On the basis of extrapolated tephra accumulation rates, Dumond and Knecht (2001:27) concluded that deglaciation of the lower elevations in the eastern Aleutians was complete by 11,000 BP or even earlier. This date corresponds with that postulated by R. F. Black (1975:161) for glacial retreat from the lowlands of Umnak Island. The earliest known human occupation of the Aleutians is documented at the Anangula Blade site on Ananuliak Islet off Umnak Island. Radiocarbon dates from Anangula, though potentially suspect in their reliability, span a period from approximately 10,000 to 8000 cal BP (Aigner 1977:72; Mason 2001:108). The only other Aleutian sites known from this period are on Hog Island in Unalaska Bay, dating from 9300–8300 BP, although numerous undated sites containing core and blade material have been located in the general vicinity (Veltre et al. 1984). Anangula occupation ceased by 8200 BP, and that at Hog Island by 8000 radiocarbon years BP, coinciding with the onset of the EMHT. As noted by Erlandson and Moss (1996), this period was a time of intense transition for Pacific communities, reacting to postglacial warming, deglaciation, sea-level changes, and biotic adjustment.

The occupation at UNL-469 occurred precisely during the EMHT, a period when the general lack of known or investigated sites has led archaeologists to speak of a gap in the record or even a "hiatus" of human presence. Indeed the general paucity of early Holocene sites across eastern North America led Caldwell (1958) to posit a major population reduction due to the difficulties of adjusting to postglacial conditions. In the intervening five decades it has become increasingly apparent that a great part of the problem lies in the difficulty of finding early Holocene sites, buried by tons of alluvium (and in the Aleutian context, volcanic ash) (Knecht and Davis 2001:272; Yesner 1996:246). Nonetheless various theories supporting the hiatus (at least in the Aleutians) have been advanced, notably the catastrophist explanation suggesting that enormous volcanic eruptions extinguished human life (L. T. Black 1981; R. F. Black

1975). A more recent hypothesis is that advanced by Mason (2001), proposing that an adverse climatic effect (warming following the Younger Younger Dryas) extinguished the Anangula culture and related communities on Unalaska. Mason suggests that the Anangula subsistence strategy was dependent on ice-obligate species such as walrus and ringed seal and that the resource base collapsed as sea ice retreated during the eighth millennium. Lack of faunal preservation at Anangula-age sites means that evidence is lacking and conclusions inferred; however, remains of similar pagophilic species are found in relative abundance at Neoglacial period (ca. 2500 to 3500 BP) sites such as Margaret Bay and Amaknak Bridge on Unalaska (Crockford and Frederick 2007; Davis 2001).

CATASTROPHIC SCENARIOS

The dating of the occupation at UNL-469 and the position of cultural deposits within the stratigraphic sequence have considerable significance for regional cultural history. As mentioned previously, the distinctive coarse ash stratum representing the Makushin pyroclastic event is a diagnostic horizon marker throughout the Unalaska Bay region. In the course of the 1997 Hog Island site investigation, this layer was radiocarbon dated by researchers at the Department of Geology and Geophysics at the University of Alaska Fairbanks to 8070±50 (ca. 9000 cal BP). The investigation concluded that "the volcanic material was deposited in a rapid and cataclysmic surge that would surely have eliminated any living thing in its path" (Dumond and Knecht 2001:27). Dumond and Knecht (2001:27) speculated that the occupation at Hog Island (and by extension anywhere around Unalaska Bay) might have been ended by this catastrophic eruption.

The "catastrophic scenario" has a well-known parallel precedent on neighboring Umnak Island; it has long been suggested that the powerful eruption that created the Okmok caldera also overcame the Early Holocene settlement at Anangula. The event either annihilated outright this oldest known Aleutian occupation or disrupted the resource base to such an extent that the inhabitants were forced to flee elsewhere (L.T. Black 1981; R.F. Black 1976; McCartney and Turner 1966). This cause of the so-called "post-Anangula hiatus" has been challenged in recent years, with new research suggesting that adverse impacts from climatic factors were more to blame than catastrophic volcanic eruptions (Mason 2001:117). This hypothesis has great significance for regional culture history, as the author suggests that an ecological vacuum resulting from warming climates at the end of the Younger Younger Dryas extinguished the Anangula peoples on both Umnak and Unalaska. These islands were, in this interpretation, subsequently recolonized from the Alaska Peninsula by newcomers deriving from the bifacial Takli Alder culture (ca. 6800–6500 BP).

Results from the excavations at UNL-469 appear to refute the idea of a lengthy hiatus. Site stratigraphy and dating indicate that reoccupation of Unalaska Bay began quickly following the massive eruption, because deposits of cultural material at UNL-469 directly overlay the Makushin pryoclastic layer. At Hog Island as well, several blades were recovered from just above the Makushin tephra (Dumond and Knecht 2001:12), closely matching the stratigraphic position of cultural material from the Quarry site. The duration of any human absence from Unalaska Bay was so brief as to be virtually invisible in the stratigraphic record. The introduction of new technologies from the Alaska Peninsula is not ruled out, although continued reliance on core and blade techniques for several more millennia also suggests considerable cultural continuity in the eastern Aleutian region.

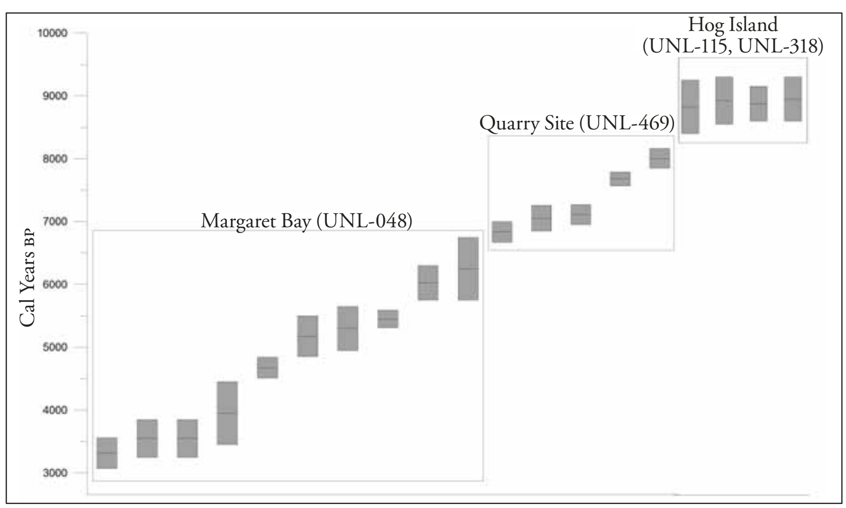

Figure 12. Radiocarbon dates from sites around Unalaska Bay (data from Dumond and Knecht 2001, Knecht et al. 2001; dates calibrated with OxCal 4)

ALEUTIAN CHRONOLOGY AND BIFACIAL TECHNOLOGY

The five radiocarbon dates obtained from UNL-469 date the site to between 8000 and 6800 BP. This date range crosses the somewhat arbitrary boundary between the Early and Late Anangula phases of Aleutian prehistory (9000 to 7000 BP and 7000 to 4000 BP respectively). This period is the least-known segment of the Aleutian Tradition (Knecht and Davis 2001:273), and UNL-469 is the first from this "chronological gap" to be investigated (see Fig. 12). Of particular interest in this context is the emergence of bifacial technology, a technique not seen in the exclusively unifacial lithic industry of the Early Anangula phase. Bifacial techniques are assumed to appear at the onset of the Late Anangula phase (ca. 7000 to 4000 BP), although Knecht and Davis (2001:272) suggested that "bifaces will eventually be found to be a rare, but present, component of the Early Anangula tool kit." The oldest occupation at the nearby Margaret Bay site (Level 5, ca. 6000 BP) contained stemmed and bipointed bifaces, becoming more abundant in later levels (Knecht et al. 2001:56). Bifacial flake artifacts dating to ca. 6000 BP were also found at Sandy Beach Bay on Umnak (Aigner 1983b; Aigner et al. 1976) and formed the fundamental basis of lithic industry by ca. 3000 BP at the Amaknak Bridge site.

Retouch on the assemblage recovered from UNL-469 is almost exclusively unifacial. Bimarginal retouch was evident on three pieces, while true bifacial manufacturing was present on a single artifact, the broken projectile point (UNL-469-0077). At least two obsidian flake tools (UNL-469-0006 and UNL-469-0079) show retouch on both faces along a single margin. One medial blade fragment (UNL-469-0033), also obsidian, is bimarginally retouched. The rarity of both bimarginal retouch and bifacial flaking indicates that unifacial technology was the dominant mode of lithic industry at this time. The presence of a true biface, likely the oldest example ever recovered from the Aleutians, raises questions about the origins, development, and adaptation of this technology. Bifaces, which to the best of our knowledge appear in the archaeological record just at this time, increase steadily over time until the core and blade format finally disappeared during the Amaknak phase (after 3000 BP) (Aigner 1977:100; Knecht and Davis 2001:278).

The next-oldest bifaces so far recovered in the Aleutian Islands are those from Sandy Beach Bay on Umnak (ca. 6000–5000 BP), where eighteen whole pointed bifaces and a number of fragments were recovered. Based on excavations at Sandy Beach Bay, Aigner (1983b:53) explained the emergence of bifacial flaking as a pragmatic adaptational response to changing raw material type and form. Earlier Anangula industry, exclusively unifacial, was suited to the locally available fine-grained argillites. Regular blades produced from this material required only expedient unimarginal retouch. The tabular basalt at Sandy Beach Bay and Chaluka produced irregular flakes, requiring a new (bifacial) production system. Bifaces from the nearby Idaliuk Bay site (ca. 4200 BP) were also of basalt, although of a substantially glassier variety than those from Sandy Beach Bay (Aigner 1983a:92). Aigner's interpretation, based solely on indications from a single island (and indeed from sites within a 20 km radius), becomes less plausible when the broader regional picture is examined. Evidence from Unalaska demonstrates true bifaces both far earlier (i.e., immediately post-Anangula) and of disparate materials (obsidian and fine-grained basalt).

UNL-469, a thousand years older than either Margaret Bay or Sandy Beach Bay, shows substantial affinity with Hog Island and Anangula. Continuity is demonstrated by reliance on the core and blade technological format as well as other overlap in artifact forms and type. The geomorphological similarity between Hog Island (20 m asl) and Anangula (17–20 m asl) noted by Dumond and Knecht (2001:28) (both situated on ancient marine terraces with relatively high elevations) is also shared with UNL-469, at 14–15 m asl. Other known (although undated) core-and-blade sites from around Unalaska Bay are situated at similar elevations (Veltre et al. 1984).

SUMMARY AND SIGNIFICANCE

Analysis of lithic materials recovered from UNL-469 demonstrates considerable similarity to earlier sites in the region and supports the basic continuity of Aleutian prehistory as suggested by Laughlin (1975), Dumond (2001) and Knecht et al. (2001). Not surprisingly, the closest affinity is with the Russian Spruce site on nearby Hog Island. The types and usage of raw materials and lithic technology format all suggest a close relationship between the occupations. The material culture is clearly a continuation of the technology seen at Anangula, the earliest known occupation of the Aleutian chain. Radiocarbon dates obtained from the Quarry site overlap with those from both Hog Island and Anangula.

The (admittedly scarce) occurrence of bifacial tools at UNL-469 is the earliest evidence of this technology from the Aleutians. The appearance of bifaces is still somewhat puzzling and may be evidence of new technology deriving from cultures on the Alaska Peninsula. Conversely, bifacial flaking may have been an autochthonous development representing a technological shift in response to changing climate conditions (Mason 2001:116). The well-developed form of the UNL-469 biface, however, may suggest an external influence.

The dating of UNL-469 also extends our knowledge of human presence in this region into the "hole in the progression of clearly dated occupations," and may support Dumond's contention that the site at Chaluka, lacking blades, was erroneously dated much older than it actually is (Dumond 2001:290–292). There is now a clearly dated succession of prehistoric sites from around Unalaska Bay, from the Early Holocene to the Early Modern contact period. The sites include Hog Island (ca. 9000 BP), the Amaknak Quarry site (ca. 8000 BP to 7000 BP), Margaret Bay (6000 BP to 3000 BP), the Amaknak Bridge site (3000 BP to 2000 BP), and Summer Bay (3000 to 1000 BP). Dating of the Quarry site suggests that neither volcanism nor adverse climatic impacts extinguished life on Umnak and Unalaska between 9000 and 6000 BP. Similarity of technological format links the site with both previous and later occupations, spanning the Early to Middle Holocene ecological transition. There is no appreciable Middle Holocene gap in the occupation, lending credence to the suggestion that human presence in the eastern Aleutians was continuous throughout prehistory.

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