EFFECT OF CRUDE OIL CONTAMINATION ON SOME ARCHAEOLOGICAL SITES IN THE GULF OF ALASKA, 1991 INVESTIGATIONS

by

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EXECUTIVE SUMMARY

The 1991 field study conducted by the Office of History and Archaeology, Alaska Division of Parks and Outdoor Recreation, investigated the presence of crude oil in 13 intertidal archaeological sites. The study assessed the effect of oiling at those sites on the ability to obtain radiocarbon dates for the archaeological remains. Five sites met the study criteria of possessing intertidal cultural remains with potential for recovering temporally distinctive artifacts and organic, datable materials. Ages of sites were estimated based on the types of artifacts recovered from subsurface deposits and compared with results of radiocarbon tests at those deposits.

The four archaeological sites from which adequate collections and radiocarbon samples were obtained were also sampled for sediments to test for presence of oil. Two sediment samples, one each from a site on Shuyak Island and one site on Chenega Island, tested positive for traces of oil. None of the sites yielded radiocarbon dates which appear to be significantly skewed from the expected age range. The results of the study show that reasonable dates can be obtained from the tested sites despite presence of oil remains on the beach surface or in the case of two sites from within the cultural deposits. The results of the study are applicable to the sites studied and useful for management decisions based on broad general conclusions. However, caution must be used in projecting those conclusions to other sites in the oil spill area in scientific studies because of the many factors which control such findings. Presence of oil in quantities and form different from that existing at the tested sites could well produce different results.

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INTRODUCTION

The northern Gulf of Alaska is an area rich in marine resources such as salmon, seal, sea lion, whale, shell fish, bottom fish, and salmon, to name but a small representation of the fauna. Such richness resulted in a prehistoric aboriginal culture intensely adapted to harvest of marine resources and occupation of the Gulf shores. The Good Friday Earthquake of 1964 and tectonic movements prior to that event submerged archaeological remains below the mean high tide level. That situation exposed many archaeological sites to contamination by oil and oiled debris left from the EXXON Valdez Oil Spill.

The archaeology of the northern Gulf of Alaska, although the subject of inquiry beginning in the late 19th Century with Johan Jacobsen's excavations in lower Cook Inlet (Jacobsen 1977:198) has not been extensively studied. The cultural chronology, normally a first focus of investigation, has been reconstructed only partially. Destruction of any part of the archaeological record for the area is therefore of the gravest concern simply because the importance of individual parts has not been established.

One of the major concerns voiced early in the aftermath of the EXXON Valdez Oil Spill was for the potential damage to the archaeological sites in the area. Specifically, a concern was voiced about the effect on the radiocarbon dating potential at sites contaminated by oiling. During 1990 a study funded by the State of Alaska and administered by the U.S. Forest Service, Alaska Region, experimented in a laboratory situation on the effects of oiling on the dating process. Conclusions from that study (Mifflin and Associates, 1991) prompted additional effort to examine the problem in a field setting. During the 1991 field season, the State of Alaska initiated such a study.

The geographic area of investigation includes parts of Prince William Sound, the outer coast of the Kenai Peninsula, and Shuyak Island (Figure 1). Those areas were selected because they were in the area affected by the oil spill and contained sites with intertidal cultural deposits. Additionally, most of the sites selected are bordered above the intertidal zone by land owned by the State of Alaska and therefore subject to provisions of the Alaska Historic

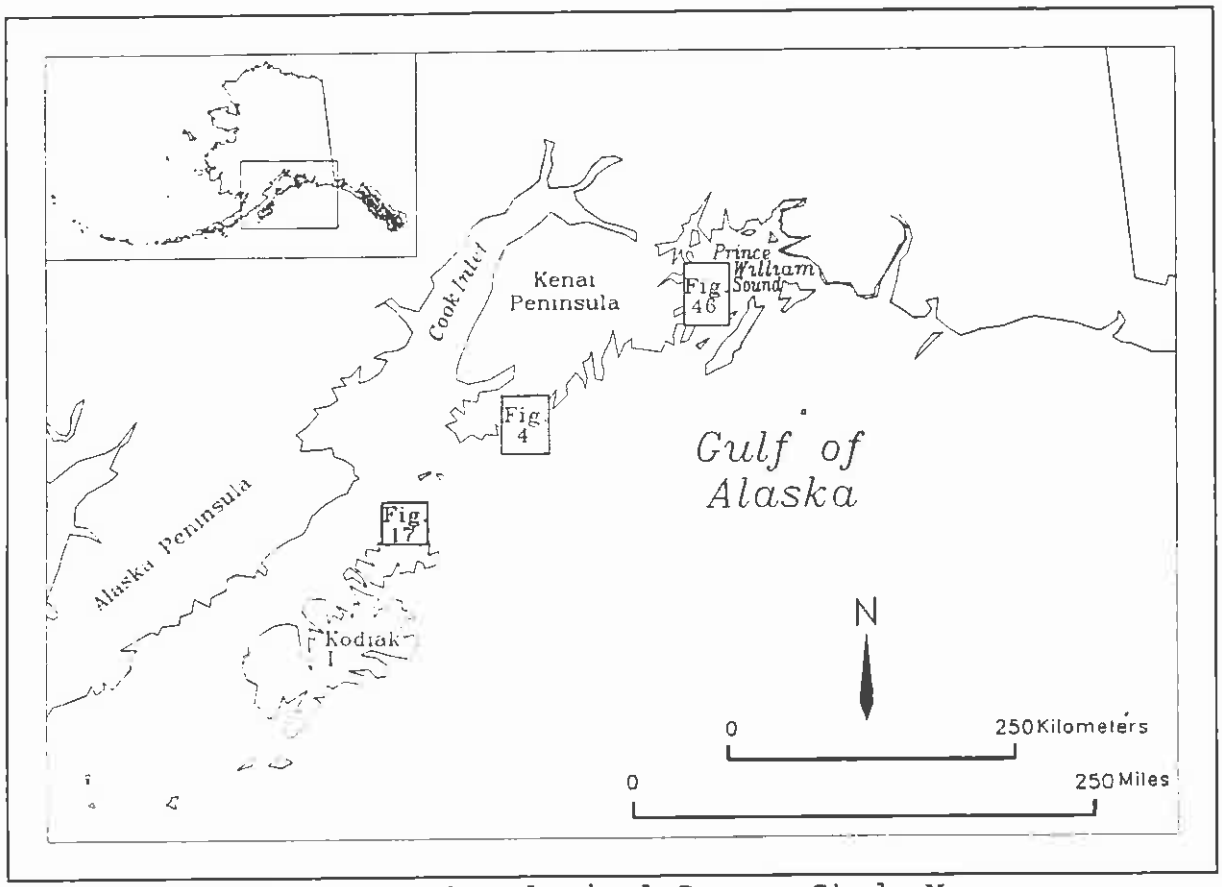

Figure 1: VOS 1991 Archaeological Damage Study Maps.

Preservation Act. All intertidal lands and archaeological remains belong to the State.

BACKGROUND

Prince William Sound was aboriginally the territory of the Chugach Eskimo (Chugachmiut), a group closely related linguistically to the Koniag Eskimo (Koniagmiut) inhabitants of the Kodiak Archipelago. The area of Prince William Sound specifically investigated during 1991 lies within the historic territory of the Chenega (Tanirmiut) people (de Laguna 1956:28). Shuyak Island, the focus of investigations in the Kodiak Island group was the historic territory of a subdivision of the Koniag (Tikhmenev, 1978: 16). A possible third group occupied the coast between Prince William Sound and Cook Inlet. That group, referred to as the Unixkurmiut, is mostly undocumented and may have been a subgroup of or at least related to the Chugach Eskimo (de Laguna 1956: 34). Occupants of all three areas are grouped by linguists as speakers of the Alutiq branch of Eskimo language and presumably shared ties beyond mutually understandable speech. Ethnographers frequently classify those groups under the single heading of Pacific Eskimo (Oswalt 1967: 12).

The Pacific Eskimo are known as hunters of sea mammals, including whale in the Kodiak

area, and as fishermen. Much of the fishing was for deep water bottom fish although salmon runs were intensively used. Dependence on such resources dictated a settlement pattern of semi-permanent main villages supported by widespred camps for seasonal resource harvest. The ethnography of the groups have been detailed elsewhere: Chugach (Birket-Smith, 1953; de Laguna,1956), Koniag (Clark,1984: 185; Davis,1984: 198). Little is known about the Unixkugmiut.

Village locations were selected for good protection from natural elements but where approaching visitors could be seen at a distance. Good access to the sea and a view of hunting prey were also important. Houses on Kodiak were semi-subterannean structures of wood covered partly with earth. Houses in the Chugach area seem to reflect influences from the Northwest Coast with wood plank walls although there is some suggestion a more Eskimo styled semi-subterranean house may also have been constructed.

The documented culture history of the Kodiak Island area generally covers the past 6000 years(Clark, 1966, 1968, 1970, 1974b, 1979, 1984; Dumond 1977, 1981). The earliest culture on Kodiak Island, Ocean Bay I, was a fully marine oriented culture focused on sea mammal hunting which began just over 6000 years ago. The subsequent cultural stage, Ocean Bay II, witnessed the introduction of ground slate and lasted until about 3500 years ago. The next cultural stage, the Kachemak Tradition, is a very rich marine oriented culture found both on the mainland and in the archipelago. It lasted from about 3000 years ago until about 1000 years ago. The Koniag period on Kodiak Island began about 800 years ago and lasted into the historic era.

Culture history of the Chugach area is only partially documented. The earliest stages documented at the Palugvik Site and at the Esther Passage Site (Yarborough and Yarborough, 1991) are related to the Kachemak Tradition of Kachemak Bay and Kodiak (de Laguna, 1956). The earlier Palugvik phases range from 2000 years ago to approximately 1000 years ago (Clark,1984: 137; de Laguna 1962: 167).Later Palugvik phases correspond to Chugach Eskimo and date from 1000 to 1500 years ago (de Laguna 1956). Recent excavations in the northwest part of Prince William Sound confirm those age estimates (Yarborough 1989; Yarborough and Yarborough, 1991). Sites from the late prehistoric period occur widely throughout Prince William Sound. The archaeologically unknown area between Prince William Sound and Cook Inlet is expected to reflect the chronology of surrounding areas.

METHODOLOGY

A basic assumption examined in the archaeology damage assessment field study was that damages from "oiling" did occur at the sites selected and could be documented. The method proposed to determine injury to the State's coastal archaeological sites was to archaeologically test sites and collect samples for testing presence of oil (Figures 2 and 3). The procedure was to dig test pits in the intertidal zone where oil had been observed to first confirm presence of archaeological deposits. Where archaeological deposits occurred,

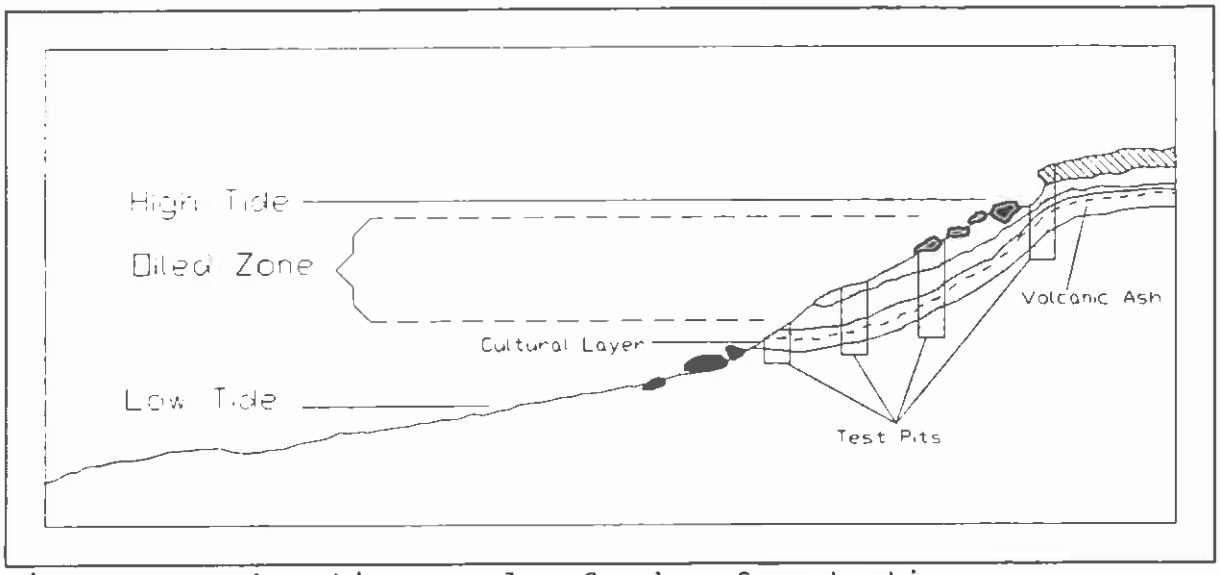

Figure 2: Schematic example of subsurface testing.

stratigraphy of the sediments was documented and presence of oil observed. Because oil can be present in amounts undetectable by odor or visually, sediment samples were collected for laboratory testing. Procedures for handling samples conformed to legal "chain-of-custody" procedures designed by the Alaska Department of Environmental Conservation (see below). Samples were selected by stratigraphic unit as possible from within site sediments. A column of sediments or midden representative of the archaeological stratigraphy was collected to preserve a representation of sediment stratigraphy.

Sites were tested at shoreward intervals in the intertidal zone (cf. Figure 2) to sample strata traceable into the supratidal zone. Test pits were excavated in various parts of the intertidal site area (Figure 3) to provide complete horizontal coverage as possible. The upland area adjacent to intertidal sites was examined for "oiling" and to provide a comparison control for "oiled" intertidal stratigraphic profiles.

Limits of sites in upland areas were to be mapped, described, and sampled to allow determination of cultural significance and development of suitable mitigation procedures. Remains were documented with black and white photographs and with color transparencies. Several views of each site were recorded.

A total of eight sediment and midden samples with duplicates were submitted for analysis by the HPLC/ UV Fluorescence method. The samples are being processed in the National Oceanigraphic and Atmospheric Administration \ National Marine Fisheries Service (NOAA\NMFS) Northwest Fisheries Science Center in Seattle. The samples were obtained from the SEL-215 Site on Nuka Island (N=3), the AFG-098 Site on Shuyak Island (N=4), and a single sample from the Kake Cove Site, SEW-068. The samples were handled as outlined below and transferred to the NOAA\NMFS laboratory via Federal Express on December, 19, 1991.

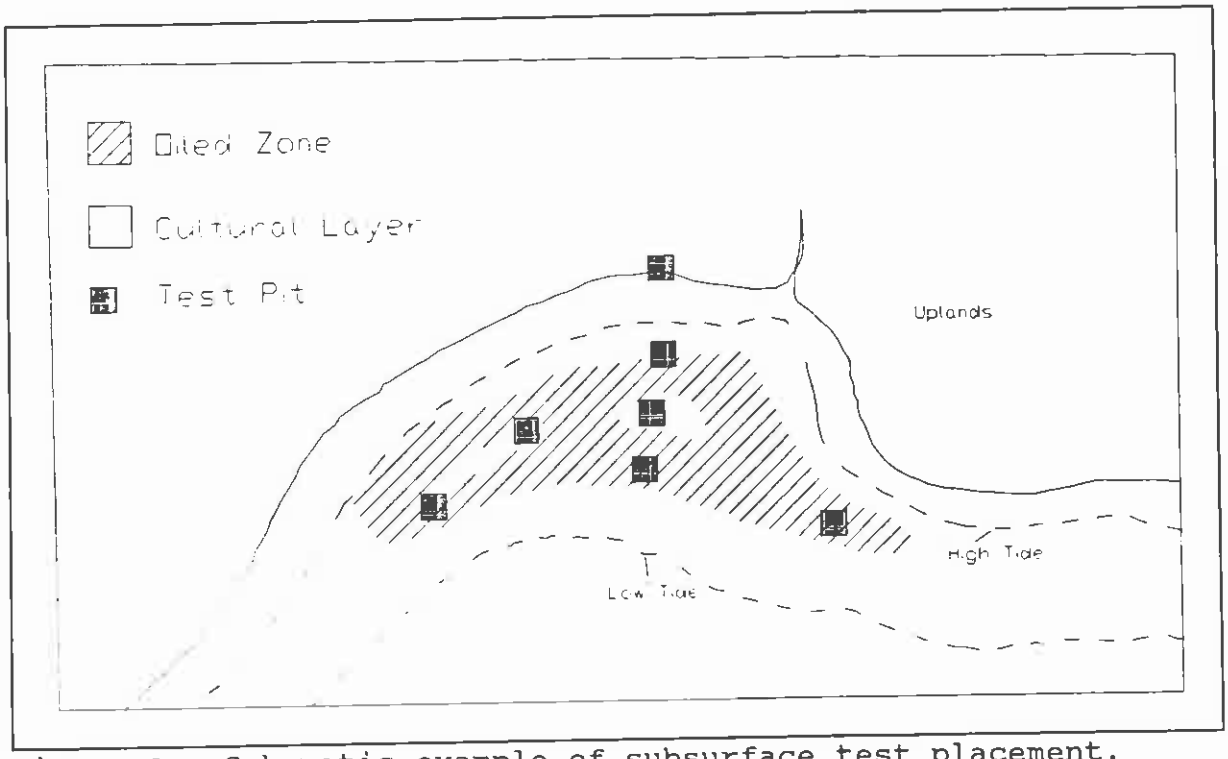

Figure 3: Schematic example of subsurface test placement.

Sample Treatment Procedures (Chain-of-Custody)

1) Chemically cleaned and analyzed sampling jars (250 ml) were used to collect sediment samples to test presence of oil.
2) Two jars (primary and duplicate samples) were filled as possible at each sampling site, using a wood tongue depressor and the sampler wearing PVC gloves.
3) A label with sample number (field number), date, time, location, sampler signature, and witness was provided for each sample. Duplicate samples were designated by the same sample number but with an "A" and "B" modifiers.
4) The jar(s) were sealed with evidence tape, then signed and dated. Chain-of-custody forms for the samples were maintained for each sample and submitted to the NOAA laboratory with submitted samples. Samples retained in frozen storage have chain-of-custody forms stored with them.

Personnel involved in the field work, analysis, and report preparation were both permanent employees of the Alaska Division of Parks and Outdoor Recreation, Office of History and Archaeology, and student interns of varied educational level. Oversight of the project from the administrative and scientific aspects was the responsibility of Douglas R. Reger. Personnel involved in fieldwork by area were:

Nuka Island - Charles E. Holmes, J. David McMahan, Rolfe Buzzell, Mark Pipkin, Tami McCann, Allen DePew, and Megan Partlow.

Shuyak Island - Douglas Reger, J. David McMahan, Mark Pipkin, Tami McCann,

Allen DePew, and Megan Partlow.

Prince William Sound - Douglas Reger, J. David McMahan, Mark Pipkin, and Allen DePew.

Laboratory analysis of the collections included faunal identification by R.Joan Dale and identification and interpretation of floral remains by J. David McMahan. Mark Pipkin drafted most of the figures using the AutoCad computer program. Tami McCann provided the line drawings of artifacts.

NUKA PASSAGE STUDY AREA

Archaeological testing and site evaluation work was carried out in the Nuka Passage area between June 6 and June 26, 1991. Six sites (SEL-196, SEL-215, SEL-216, SEL-217, SEL-218, and SEL-220) were investigated (Figure 4). All of the sites were previously recorded and reportedly contained cultural material within the intertidal zone (ITZ). Of the six sites investigated, only two sites where shown to have buried cultural deposits, SEL-215 and SEL-220, and the others have only occassional "heavy" artifacts ocurring as surface lag deposits resulting from shore erosion. Only site SEL-215 received additional excavation beyond the usual test pits and is the focus of this report section.

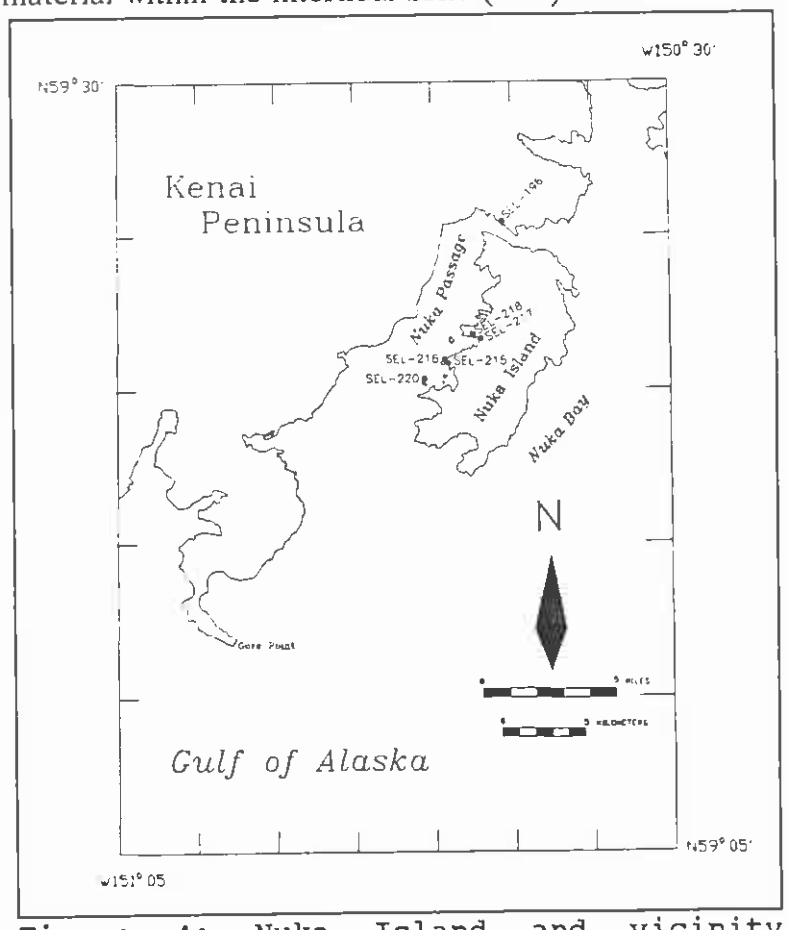

Figure 4: Nuka Island and vicinity archaeological sites.

Upon arrival at each test site the crew conducted a surface survey to relocate any intertidal artifacts reported by Exxon archaeologists in 1990 and to look for obvious signs of oiling in the intertidal zone. By using Exxon's 1990 field notes and sketchs of the sites, which mapped the distribution of surface artifacts, we were able to locate each site's field datum. Next, iron rebar control points with aluminum caps were set. A transit was used to map the 1990 Exxon datum, make a topographic map of the site, record beach transect profiles, record test pits, and locate surface artifacts and

features, such as peat patches. Except for SEL-218, multiple test pits (a minimum of 50cm square), were excavated by shovel and trowel.

SEL-215, Berger Bay ITZ Lithics Site

SEL-215 is located in Berger Bay on the west central side of Nuka Island (Figures 4 and 5). The site lies in a small protected cove on the north side of the bay, and occupies what once was a narrow forested peninsula. Subsidence, caused by the 1964 earthquake, has caused the peninsula to flood at high tide. Erosion has caused much of the forest to wash away, however, a few dead spruce trees are still standing in place (Figure 6). There is a small patch of peat exposed in the intertidal zone (Figure 7). The peat once covered a more extensive area of what is now a rocky, pebbly beach exposed only at low tide. There is a grassy flat area at the northeast end of the peninsula that only floods during storms and at very high tides. The trees here have died but none seem to have been washed away. Exxon archaeologists reported numerous artifacts (heavy lithic tools) exposed throughout the upper intertidal zone in 1990.

After the 1990 Exxon field datum was located, three control points, marked A, B, and C, were established. As surface artifacts were mapped, to compare with those mapped by Exxon, it became apparent that many of the artifacts had shifted position in the year since they were first recorded. Also, not all of the artifacts that had been mapped in 1990 could be relocated, and a few artifacts not recorded previously were found. Given the fact that artifacts were being lost and re-transported, all of the surface artifacts were collected.

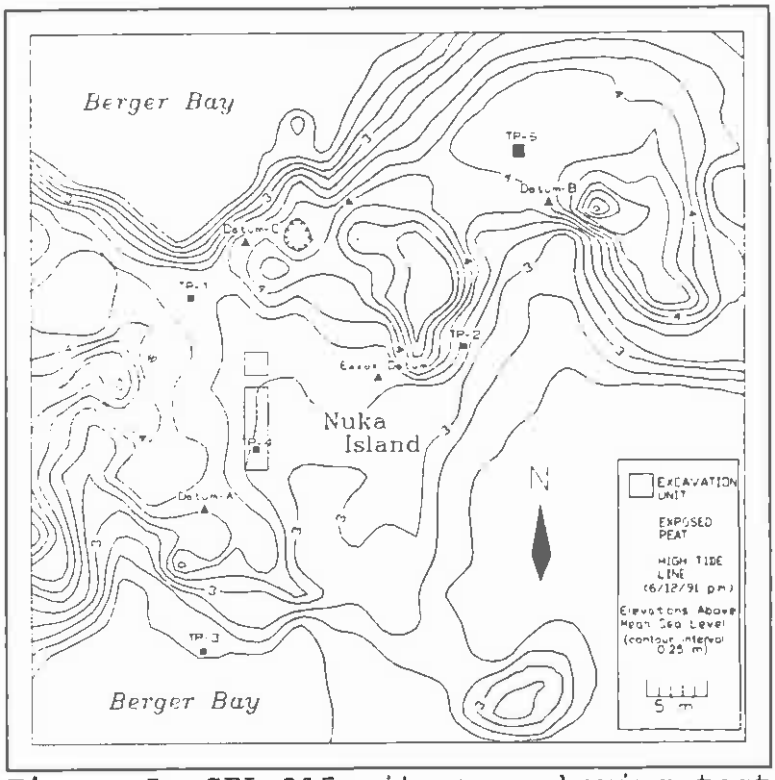

Figure 5: SEL-215 site map showing test pits and excavation trench.

Five subsurface test pits were excavated in the intertidal zone to expose the stratigraphy, search for buried cultural deposits, and provide for subsurface sampling of possibly oiled sediments (Figure 5). Test pits 2 and 3 (each 50 cm square) were placed in the low-middle intertidal zone and test pits 1 and 5 (each 1 meter square) were placed in the high intertidal zone. Test Pit 4 was placed at the edge of the peat in the upper-middle intertidal zone. A metric grid was established around

Figure 6: SEL-215 showing dead trees and eroding beach, view to north.

Figure 7: SEL-215 showing eroding peat at low tide, view to northeast.

test pit 4 50 cm x 1 m) that extended north across the peat layer.

An area 2 x 10 meters in size was excavated to provide *in situ* data necessary for the interpretation of the undisturbed deposits as well as the material collected from the surface (Figures 8 and 9). The excavation also provided organic materials (peat, wood, and charcoal) for radiocarbon analysis.

Sediment samples for oil analysis were collected from test pits 2, 3, and 4 using the established protocol. Photographs and video cassette recordings were made during each sample collection.

SEL-215 Test Stratigraphy

Test pits 1,2, and 3 were culturally sterile but test pits 4 and 5 revealed *in situ* subsurface cultural deposits. Test pit 1 was excavated in the high intertidal zone, test pits 2 and 3 were placed in the low-middle intertidal zone, test pit 4 in the upper-middle intertidal zone, and test pit 5 in the highest intertidal zone. All of the test pits filled with water as they were excavated.

Test pit 1 was excavated to a depth of 1 m below the surface and contained the following: 0-15 cm (angular shingle beach gravel); 15-25 cm (reddish brown silty sand with angular pebbles); 25-43 cm (reddish brown peat-like sandy silt with some angular pebbles); 43-100 cm (grayish brown sand with abundant cobbles and pebbles). Test pits 2 and 3 contained sediments similar to those described for test pit 1, only they were not excavated quite as deep.

Test pit 4 was excavated into the southern end of the remnant peat patch. After determining the presence of cultural deposits in the test (wood chips, fire cracked rocks(FCR), and charcoal), a metric grid was laid out across the peat that incorporated test pit 4. Refer to the stratigraphic profile of the excavation trench for a description of sediments.

Test pit 5 was excavated in the flat grassy area northeast of the peat patch to a depth of 80 cm beneath the surface. The stratigraphy is as follows: 0-20 cm (sod layer containing recently deposited beach pebbles); 20-43 cm (dark brownish peaty layer); 43-45 cm (band of yellowish brown clay); 45-50 cm (black organic rich layer with FCR and pebbles); 50-57 cm (band of yellowish brown clay); 57-60 cm (thin band of grayish tephra or volcanic ash); 60-65 cm (greyish brown clay with pebbles); 65-75 cm (brown peat); below 75 cm (grayish sand with beach gravel).

Four oily mousse patties were observed on the surface in the intertidal zone in the vicinity of the exposed peat and immediately to the southeast of the *in situ* cultural deposits. All four of these mousse patties were collected. Although there was not any noticeable oil sheen or odor associated with any of the test pits, subsurface sediment samples were

Figure 8: SEL-215, excavating trench across the peat patch, view to northeast.

Figure 9: SEL-215, trench flooding by incoming tide.

collected from test pits 2, 3, and 4 for testing.

The samples collected from SEL-215 test pits for determination of oil presence were all samples from the peat. The sample from test pit 2, field number VOS91OHA0609-6, was collected from a depth of 1-4 cm below the surface. The sample from test pit 4, field number VOS91OHA0609-5, came from within the cultural deposits, 11.5 cm below the surface. Both samples returned negative findings for presence of oil. The third sample from SEL-215, field number VOS91OHA0609-4, was collected in test pit 3 at a depth of 15 cm below the ground surface. A trace of oil from an unidentified source was detected in that sample. No comparative charcoal samples from test pit 3 were submitted for radiocarbon dating as that pit was culturally sterile and validity of the results could therefore not be checked.

A 2 x 10 meter trench excavation was placed along a north-south axis across the peat patch (Figure 8). It was only possible to excavate the trench during low tide because of the flooding which completely covered the peat patch twice each 24 hour period (Figure 9).

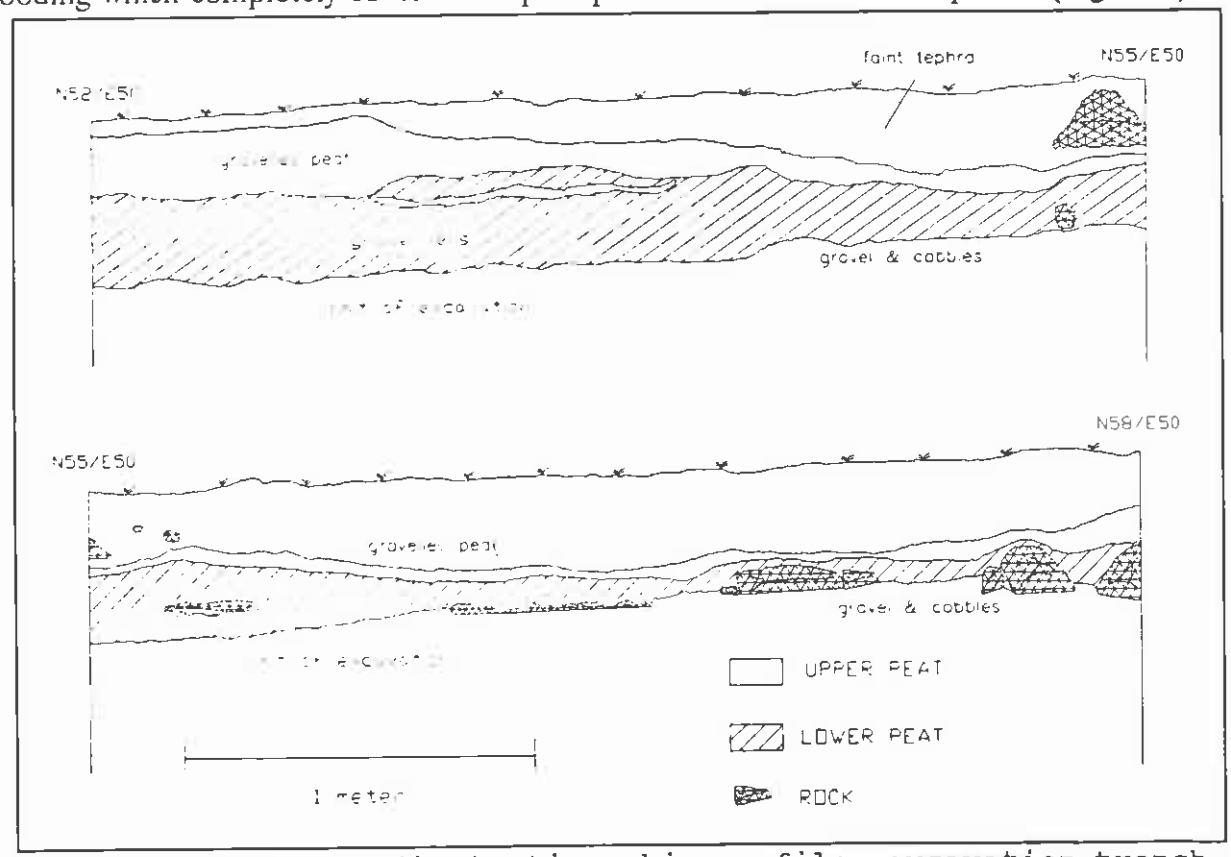

Figure 10: North/South stratigraphic profile, excavation trench, SEL-215.

Figure 10 illustrates the stratigraphy along an 8 meter segment of the trench between excavation units N50/E50 and N58/E50. The peat can be divided into upper and lower layers separated by a peaty fine gravel layer with intermittent thin gravel lenses. The upper peat layer contains a faint, discontinuous tephra and abundant spruce or hemlock roots or limbs (many in an excellent state of preservation). Artifacts and fauna were found scattered in low frequencies throughout the peaty layers.

SEL-215 Artifacts

Artifacts recovered from SEL-215 came from the surface of the intertidal zone and from excavated *in situ* deposits in Test Pit 5 and the trench. Excavated cultural materials include: organic (mussel shell, burned mammal bone, wood, charcoal, seeds?, and peat containing a variety of plant fibers and tissues of several species); lithic (polished slate tools, quartz flakes, pecked and ground tools, cobble and pebble hammers, and boulder spall tools); and European manufactured glass beads. The excavated materials will be described first.

Excavated artifacts

Wood. Wood shavings and chips, the result of extensive wood working activity, are by far the most abundant evidence of previous occupation of the site and were found in both the trench and test pit 5. The saturated nature of the peat deposit has preserved wooden pieces

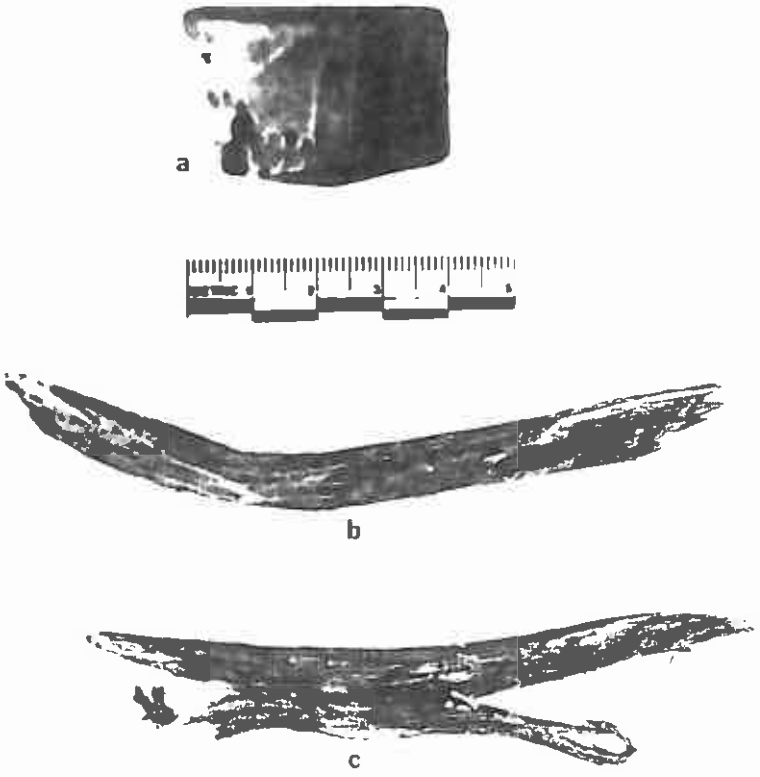

Figure 11: SEL-215, wooden artifacts from trench, a- "plug", b-wood chips.

perfectly, down to the last detail. Only a representative sample of the unworked chips were collected. The chips and shavings appear to have been produced by planing large pieces of spruce, yellow cedar, and possibly hemlock (Figure 11b,c), although hemlock has not been positively identified.

Carved or cut wooden pieces are represented by 6 pieces (UA91-95-016, -026, -027, -029, -030, and -038). These are not identifiable as particular tools or parts of tools but do exhibit cuts and marks showing workmanship.One well preserved long wooden shaft (UA91-95-144) is probably a dart shaft. It was found imbedded at an angle in the peat. It is broken with both ends missing and fractured in the middle. The shaft measures 83 cm long and is carved to taper from a diameter of 1.95 cm at one end down to a diameter of 1.35 cm at the opposite end. It appears very smooth and rounded, as if it were sanded with fine sandpaper. Macro and microscopic examination of tissue features by J. David McMahan gives an identification of yellow cedar, *Chamaecyparis nootkatensis*.Another wooden specimen (UA91-95-041) is recognizable as a "plug" (Figure 11a), but its function is unknown. It is a circular disk or puck shape, rather like a narrow rimmed hat. It measures 2.65 cm thick and has a maximum diameter of 3.8 cm at one end which constricts to a diameter of 3.65 cm. This specimen has been tentatively identified as yellow cedar.

Polished Slate. Five polished slate pieces were exvcavated from the trench. All specimens were found in the peat. UA91-95-042 is the base section of a broken projectile point or lance. It measures 8.2 cm long, 1.4 cm wide, and is 0.5 cm in thickness. It is lenticular to slightly diamond in cross section (Figure 12b and Figure 13a).

UA91-95-043 is a broken projectile point fragment of a point or lance (Figure 12a and Figure 13b). It measures 11.9 cm long, 1.6 cm maximum width, and 0.6 cm in thickness. There is a remnant of a barb at the break which suggests that the specimen may have been bilaterally barbed. The cross section is diamond shaped.

Two pieces are classified as knife blades of the "ulu" type. UA91-95-099 is a small thin irregular shaped fragment (4.8 cm by 2.8 cm by 0.2 cm) with edge retouch (Figure 13c). The second piece (UA91-95-100) is complete and measures 6.1 cm long, 2.8 cm wide, and is 0.5 cm thick (Figure 13f and Figure 12e). A third specimen (UA91-95-142) may also be a knife blade (Figure 12c and Figure 13e); however, it has a series of incised lines on one surface that appear to represent some kind of abstract design. This specimen has a chipped notch at one end apparently for hafting, but the opposite end is broken away. It measures 9.1 cm long, 4.5 cm wide, and 0.5 cm thick.

A nondescript, possible polished, slate fragment (UA91-95-098) measuring 3.4 cm by 2.2 cm and 0.3 cm thick was also recovered from the peat layer. A flat rectangular piece of slate (UA91-95-097) is bifacially trimmed around the margins and broken at one end (Figure 13d). It measures 6.3 cm long, 2.3 cm wide, and is 0.9 cm thick. This specimen appears likely to be a preform, possibly for a lance or point, that was broken in the initial stages of shaping prior to polishing.

Adzes. There are two specimens excavated from the trench that can be classified as pecked and polished adzes. UA91-95-096 is a well polished fragment (in this case a flake) removed from an adze made of greenstone (Figure 13g). It retains a remnant of a steep angled bevel at the proximal end of the flake that suggests the fragment broke away from the bit end of an adze. It measures 4.2 cm by 2.8 cm and is 0.5 cm in thickness. This fragment may be from a planing adze. De Laguna describes this form as, "... grooveless celts, wider than they are thick, and smaller and lighter than blades for splitting adzes." (de Laguna 1956:117).

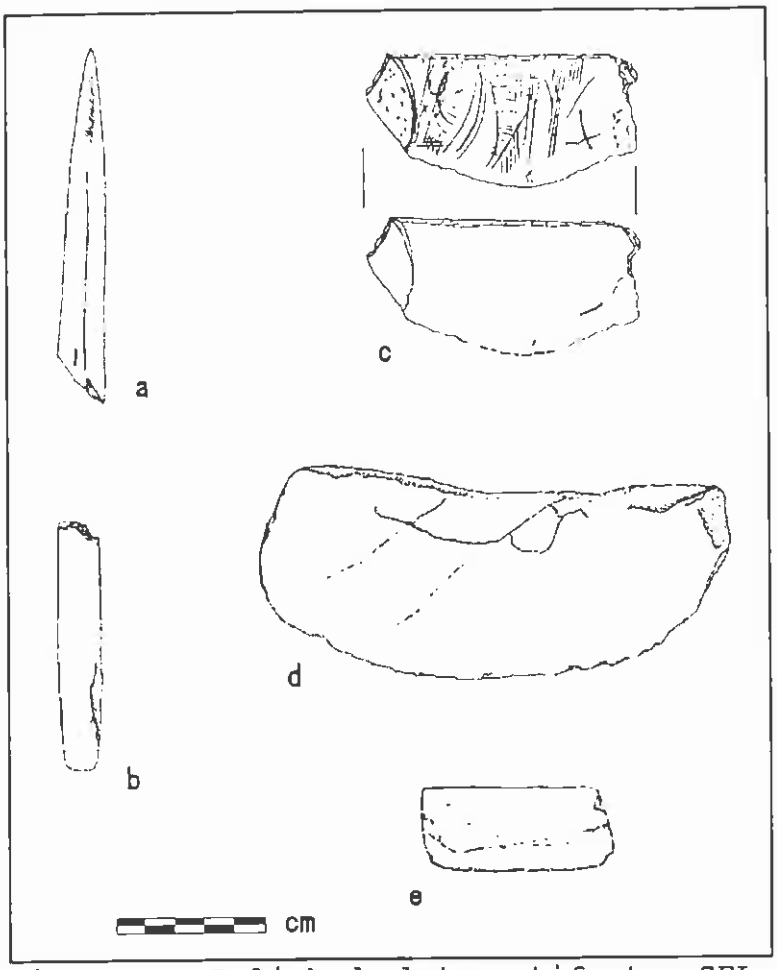

Figure 12: Polished slate artifacts, SEL-215. a- point blade, b- point base, c- incised slate piece, d- ulu blade, e- ulu blade. From trench except d.

The other excavated adze (UA91-95-093) is about three-quaters complete and made of graywacke (Figure 14c). This is of the common type characterized as "splitting adzes" by de Laguna. "These heavy blades, which are thicker than they are wide, were lashed directly to an elbow or T-shaped handle...." (de Laguna 1956:110). The bit is damaged and exhibits several flake scars. The butt end is missing. There are two knobs with a groove between to facilitate hafting of the adze to a handle. There is fine polish on the surface opposite the lashing groove. Metric attributes are: 754.1 g weight; 20.3 cm maximum length; 4.4 cm thick at lashing groove; 3.7 cm wide at lashing groove; 4.5 cm wide near the bit end; and 0.6 cm average knob height.

Quartz Crystal. A small quartz crystal (UA91-95-049) was excavated from the peat in the trench. It has been flaked into a wedge-shape that measures 1.85 cm long, 1.35 cm wide, and 0.81 cm thick. Remanents of five original crystal facets remain.

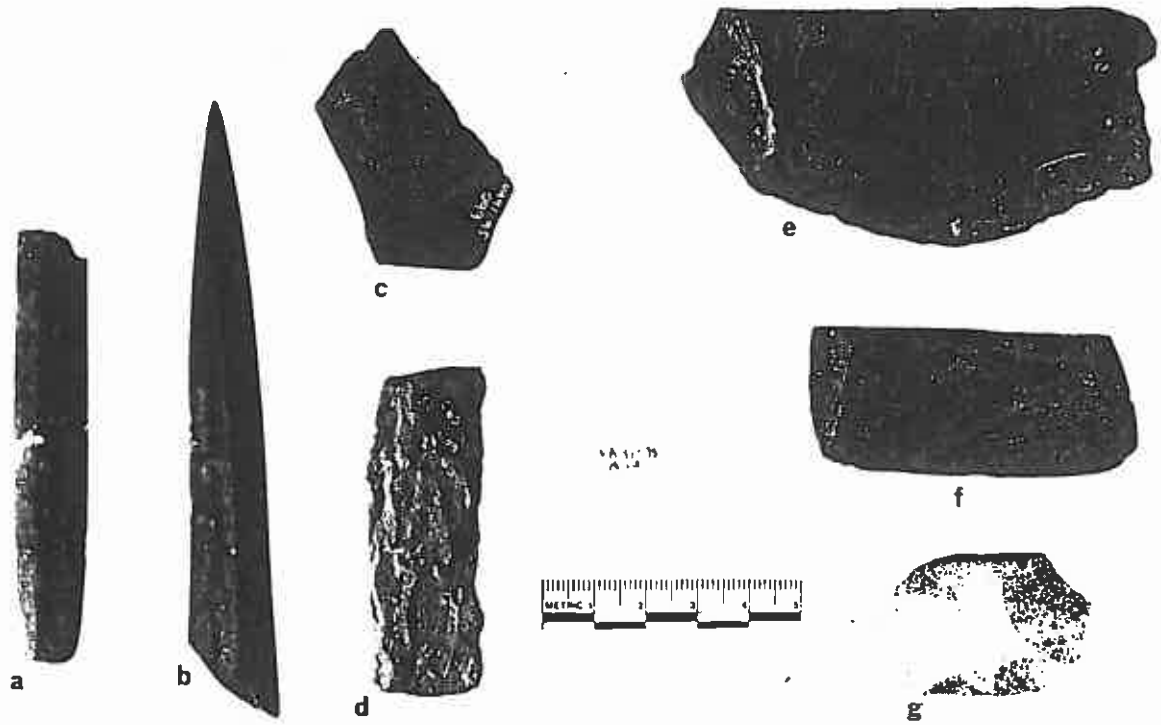

Figure 13: SEL-215, stone artifacts from trench.

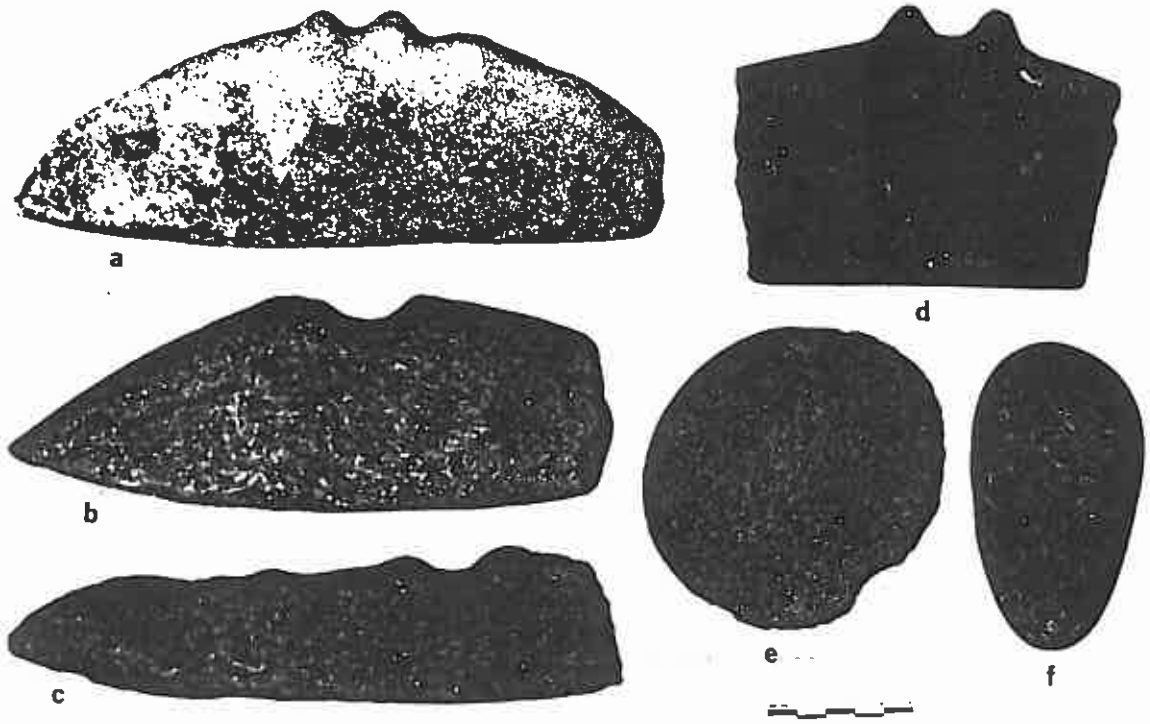

Figure 14: SEL-215, typical heavy stone artifacts, all surface except c.

Cobble Tools. This group consists of rounded cobbles that exhibit battering or a combination of battering and chipping. They all were likely used as hammers or possibly small anvil stones. Specimen UA91-95-048 is an oval shaped cobble that has had a few flakes removed to form a wedge-shape hammer with battering around the entire flaked margin. It weighs 565.7 g and measures 10.6 cm by 8.8 cm and 5 cm in thickness. Another flat rock (UA91-95-077) is a broken fragment with bifacial retouch and battering around the unbroken margins. It measures 5.1 cm by 4.8 cm and is 1.4 cm thick and weighs 42.2 g.

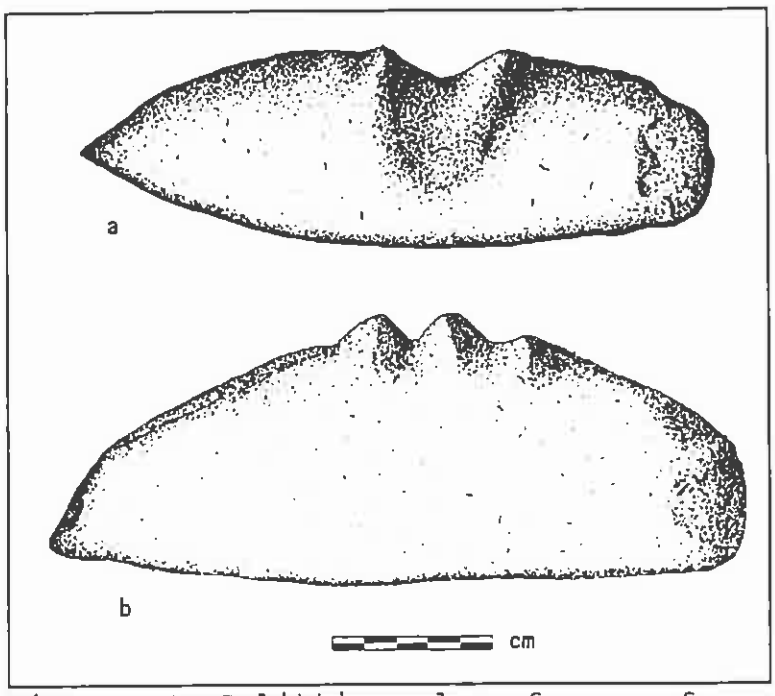

Figure 15: Splitting adzes from surface, SEL-215. a- wide groove, b- three knob.

An elongated cobble (UA91-95-082) excavated from test pit 5 is heavily battered at the narrow end. About 3-4 cm from the broad end there are battered pits opposite each other. This specimen weighs 549.4 g and is 16 cm long, 6.8 cm maximum width, and 4.4 cm thick. Two other elongated cobbles were excavated from the trench and exhibit only light battering at each opposing end of the long axis. One specimen (UA91-95-079) weighs 469.9 g and is 16.5 cm long, 5.4 cm maximum width, and 3.5 cm thick. The other specimen (UA91-95-083) weighs 612 g and is 12.6 cm long, 6 cm in diameter, and 5 cm thick.

Boulder Spalls. These tools are relatively common. Three were excavated from the trench and one from test pit 5. Boulder spalls also are fairly common at the McArthur Pass site (Betts *et al.* 1991). It is somewhat curious that so few are reported from Prince William Sound (de Laguna 1956, Yarborough and Yarborough 1991). De laguna remarked, "... only 4 boulder chips, that is sharp oval fragments split from beach cobbles, were found in Prince William Sound, in striking contrast to the hundreds discovered in Kachemak Bay from every site and every culture stage." (de Laguna 1956:131). Table 1 provides a description of the metric attributes for excavated boulder spalls.

Table 1. Excavated Boulder Spalls, SEL-215.

ID	Weight	Length	Width	Thickness
UA91-95-047	28.11	6.2	4.3	0.8
UA91-95-044	16.60	15.3	11.1	7.2
UA91-95-072*	21.25	27.0	11.7	8.4
UA91-95-046	27.00	25.2	10.2	8.7

Summary Statistics for Excavated Boulder Spalls (N=4)

Statistics	Weight	Length	Width	Thickness
Minimum	28.11	6.00	4.30	0.83
Maximun	269.12	11.70	8.70	2.70
Range	241.01	5.70	4.40	1.87
Mean	175.72	9.75	7.15	1.83
Variance	12304.44	6.63	4.03	0.62
Standard Deviation	110.93	2.58	2.01	0.79
Standard Error	55.46	1.29	1.00	0.39
Skewness(G1)	-0.55	-0.96	-0.83	-0.27
Kurtosis(G2)	-1.28	-0.82	-0.97	-1.145

Measurements in centimeters, weight in grams.
* From test pit 5.

European Manufactured Items. Only two glass beads provide evidence for an historic occupation at SEL-215. The beads are pale, translucent blue in color. One bead (UA91-95-035) measures 2.2mm long and 2.3mm in diameter. UA91-95-036 is 2.9mm long and 2.1mm in diameter. These specimens are very similar to the "Glacier Island" type discussed by de Laguna (1956:64,211). Yarborough and Yarborough (1991:267) suggest an age between about A.D. 1750 and no later than A.D. 1830 for similar beads found at the Uqciuvit site.

Surface Artifacts

These artifacts consist of stone only and many of the specimens are cobble size. As the shore and beach began to erode following the Good Friday Earthquake of 1964. Many of the artifacts at SEL-215 were eroded from primary context and literally washed away. As noted earlier, there was evidence of the movement of artifacts in the short interval between 1990, when Exxon archaeologists recorded them, to the state investigation in 1991.

Polished Stone Blade. It is not surprising that only a single polished greenstone "ulu' blade was recovered (Figure 12d). This specimen, UA91-95-073, is fairly large, 15.8cm long, 6.3cm wide, and 1.1cm maximum thickness. It likely survived, because of it being greenstone, whereas more fragile slate specimens would not endure 20 or more years of exposure to beach dynamics.

Adzes. Nine splitting adzes, five complete and four fragments were recovered (Figure 14a,b and Figure 15a,b). These all appear to be made of greenstone and graywacke cobbles by pecking, grinding, and polishing. Three of the complete adzes (UA91-95-088,-092, and -093) have a wedge-shape at the butt end at right angle to the orientation of the bit. This feature suggests that these tools may have functioned as chopping and cutting implements. Metric attributes and statistical summary is shown on Table 2.

Table 2. Surface Adzes, SEL-215.

ID	Weight	Length	Width	Thickness	Knobs	(Mean Knob Ht.)	Segment
UA91-95-087	697.9	13.0	2.8	8.7	2	0.95	middle
UA91-95-091	825.3	20.5	4.3	5.2	2	0.65	complete
UA91-95-092	974.4	22.0	3.1	7.6	3	0.48	complete
UA91-95-088	1101.6	20.0	4.9	6.0	2	0.85	complete
UA91-95-094	1097.9	21.5	4.7	6.8	2	1.20	middle/distal
UA91-95-089	927.9	24.5	3.9	6.0	1	1.25	complete
UA91-95-095	1099.9	20.5	4.5	6.6	2	1.10	middle/proximal
UA91-95-090	965.7	22.0	4.4	6.0	2	0.73	complete
UA91-95-147	489.6	13.1	4.0	5.5	2	1.05	middle

Summary Statistics for Complete Adzes (N=5)

Statistics	Weight	Length	Width	Thickness	Mean Knob Ht.
Minimum	825.30	20.00	3.10	5.20	0.48
Maximum	1101.60	24.50	4.90	7.60	1.45
Range	276.30	4.50	1.80	2.40	0.97
Mean	959.00	21.80	4.12	6.10	0.83
Variance	9864.90	3.08	0.45	0.80	0.14
Standard Deviation	99.30	1.75	0.67	0.90	0.37
Standard Error	44.40	0.78	0.30	0.40	0.17
Skewness(G1)	0.10	0.61	-0.52	0.96	1.02
Kurtosis(G2)	-0.64	-0.80	-0.76	-0.25	-0.31

Measurements in centimeters, weight in grams.

Cobble Tools. Six round beach cobbles show signs of having been used as hammers and/or anvils. Specimen UA91-95-076 is oval shaped with heavy battering and pitting adjacent to one end with lighter battering on the side opposite. It weighs 569.9 g, is 11.5 cm long, 7.1 cm wide, and 4.7 cm thick. Another cobble (UA91-95-084) is very heavily battered at one end and very lightly battered at the opposite. It weighs 1,220 g, is 13 cm long, 10,2 cm maximum width, and 5.9 cm thick. A third specimen (UA91-95-086) weighs 382.4 g and is 10.5 cm long, 5.6 cm wide, and 4.4 cm thick. It is an elongated oval in shape with battering and pitting at the narrow end and also about 3.7 cm from this end (Figure 14f). A disc shaped cobble (UA91-95-082) was so heavily battered at opposing ends that flakes were struck off. This specimen weighs 704.9 g and is 9.9 cm long, 8.7 cm maximum width, and 5.3 cm thick. A fifth specimen (UA91-95-081) is battered at only one end. It is 14.7 cm long, 5.8 cm wide, 3.7 cm thick, and weighs 465.5 g. The sixth specimen (UA91-95-078) is rectangular in section and has been broken at one end and battered at the opposite end. There is also battering midway along one of the "corners." It weighs 404.2 g and is 13 cm long, 5.3 cm maximum width, and 4 cm thick.

Boulder Spalls. As mentioned above, boulder spalls are common at SEL-215. Twenty-one specimens were collected from the beach (Figure 14e). Table 3 presents the metric attributes and a statistical summary.

Table 3. Surface Boulder Spalls, SEL-215.

ID	Weight	Length	Width	Thickness
UA91-95-069	93.75	9.84	6.82	0.90
UA91-95-059	351.40	11.05	9.90	2.40
UA91-95-054	167.24	9.69	8.02	1.70
UA91-95-065	223.70	10.45	8.45	2.10
UA91-95-066	164.94	10.10	7.10	1.40
UA91-95-061	336.00	10.90	9.60	2.50
UA91-95-057	277.31	11.50	9.00	2.20
UA91-95-062	194.41	10.60	8.50	1.80
UA91-95-064	292.16	12.60	7.00	2.50
UA91-95-068	153.52	9.30	8.30	1.60
UA91-95-052	316.90	12.10	9.00	2.10
UA91-95-055	246.84	12.00	8.30	1.60
UA91-95-056	102.59	7.80	6.60	1.70
UA91-95-080	156.39	11.30	4.90	1.90
UA91-95-053	83.56	8.30	5.30	1.80
UA91-95-067	177.30	13.00	6.20	1.60
UA91-95-063	106.49	8.80	7.10	1.40

UA91-95-071	254.95	10.10	8.20	2.70
UA91-95-070	135.78	9.70	7.60	1.60
UA91-95-060	247.94	11.80	6.80	2.40
UA91-95-058	168.82	11.50	6.50	1.60

Summary Statistics for Surface Boulder Spalls (N=21)

Statistics	Weight	Length	Width	Thickness
Minimum	83.56	7.80	4.90	0.90
Maximum	351.40	13.00	9.80	2.70
Range	267.84	5.20	4.90	1.80
Mean	202.48	10.60	7.57	1.88
Variance	6629.32	1.93	1.73	0.20
Standard Deviation	81.42	1.39	1.32	0.45
Standard Error	17.77	0.30	0.29	0.10
Skewness(G1)	0.30	-0.24	-0.21	0.04
Kurtosis(G2)	-1.03	-0.66	-0.61	-0.51

Measurements in centimeters, weight in grams.

Stone Lamp. One small, plain stone lamp (UA91-95-074) is made on a smooth beach cobble (Figure 16). It weighs 762 g and is 12.19 cm long, 9.55 cm wide at the middle, and has a maximum thickness of 4.2 cm. The bowl is 9.15 cm across the long axis, 6.55 cm wide, and the maximum depth in the center is 1.0 cm. There are obvious rough peck marks throughout the bowl area that suggest the possibility that the lamp was in an unfinished state. The size of this specimen is in the range of lamps from Prince William Sound that de Laguna has called "hunters lamps" (de Laguna 1956:143-146).

Radiocarbon Samples. Seven wood or charcoal samples submitted for radiocarbon analysis were collected from the upper peat in the SEL-215 Site. One sample, UA91-95-017, came from the lower limit of that peat and should provide an older limiting age for the deposit.

SEL-215 Artifact Comparisons

The bulk of materials recovered from SEL-215 can be assigned with confidence to the late prehistoric period after A.D. 1000. But the presence of glass trade beads indicates that there was an historic component as well. Seven radiocarbon dates, on wood and charcoal from the trench, give a range of about 340 years between A.D. 1100 and A.D. 1440 (calibrated age) [see discussion of radiocarbon dates in section by D. Reger]. Similar radiocarbon dates were obtained from an upland test pit dug at SEL-188 (Schaaf and Johnson 1990, Betts *et al.* 1991:126). Yarborough and Yarborough (1991:56) have divided the late prehistoric and early historic periods into two phases at the Uqciuvit site, the Late

Palugvik and Chugach phases which spans this time period.

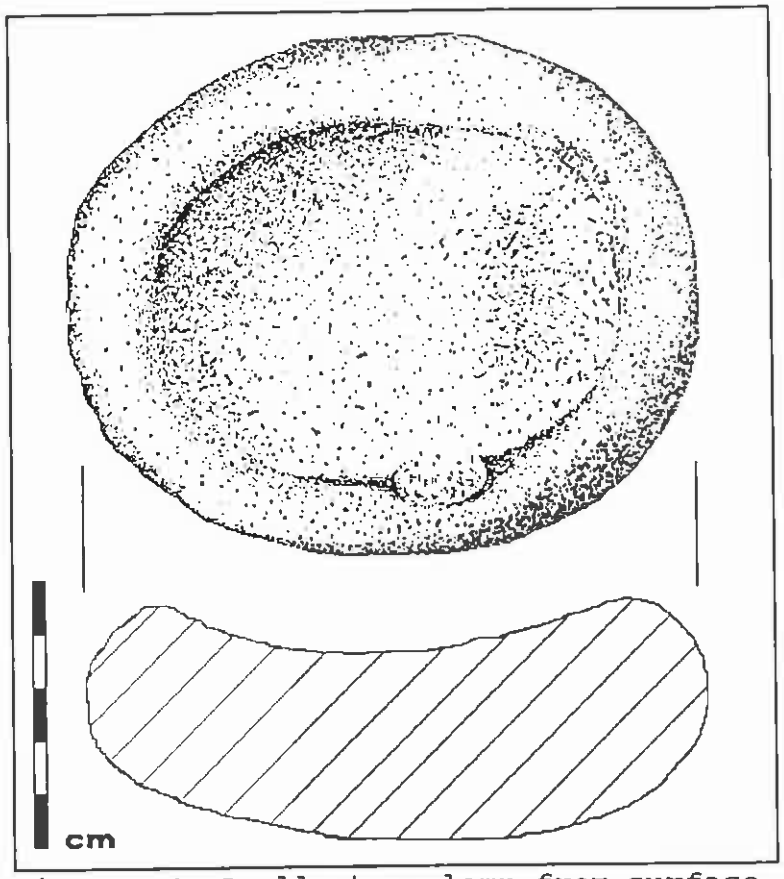

Figure 16: Small stone lamp from surface, SEL-215.

The inventory of diagnostic materials from SEL-215 is very small. Therefore, it is difficult to characterize the assemblage in terms of cultural affiliation. SEL-215 shares some traits with Koniag Phase, e.g., quartz crystal, boulder spalls, incised slate, barbed double- edged slate blades, hunters' lamps, and splitting adzes. Except for splitting adzes, these same traits are found in Late Kachemak Tradition. Similarities to the late prehistoric Prince William Sound sequence include: splitting adzes, barbed double-edged, incised slate, and hunters' lamps. Notched stones are notably absent. However, little significance should be placed on negative evidence. The presence of FCR at SEL-215 and also at SEL-220 could suggest the use of sweat baths, a trait common in late prehistoric times on Kodiak as well as in Prince William Sound and Cook Inlet (de Laguna 1956:266, Clark 1974a:140). The recovery of preserved wooden artifacts from the peat layers is extraordinary and has the potential to expand the inventory of material culture. Further data are required to be more specific in assignment of SEL-215 to any cultural affiliation with confidence. However, it does seem certain that with further investigation, it will be possible to assign SEL-215 to either Chugach or Koniag affiliation.

Although SEL-215 has undergone considerable erosion due to the Good Friday Earthquake of 1964, and continues to erode, there remain some undisturbed subsurface remnants of the site that are important to understanding the late prehistoric and early historic periods on a regional basis. SEL-215 is multicomponent. A late prehistoric component is associated with a buried peat deposit. The historic component is also associated with the peat layer. SEL-215 is important for several reasons: (a) the potential for the recovery of organic artifacts, especially those made of wood; (b) the possibility of deciphering the cultural sequence; and (c) the ability to address the question of Koniag and Chugach affiliation. Unfortunately, the undisturbed portion of the site, in particular the exposed peat patch, will continue to erode. Without prompt attention, the archeological record that remains at SEL-215 will be lost.

Investigations at Other Sites

SEL-196 is the only site in this study area that is not on Nuka Island. It is located just across the narrow strait between the northern end of Nuka Island and the mainland (Figure 4). It is situated on a small pocket beach between small rock outcrop points. Two control points, marked A and B (iron rebar with 2-inch aluminum cap), were established southeast and northwest of the reported site area and a beach transect profile was mapped. A surface search was conducted for the fire-broken rock scatter and adze reported by Exxon archaeologists to be within the intertidal zone. We were unsuccessful in relocating either the FCR scatter or the adze. Three test pits were excavated in the high intertidal zone where the site was reported to be. None of the tests produced evidence of cultural materials, although one test pit revealed a forest soil buried under storm washed gravel in the upper intertidal zone near drowned trees. No sediment samples were collected for analysis because no subsurface cultural deposits were found.

No evidence of oiling was noted on the surface in the intertidal zone. Also there was no apparent oiling noted in any of the subsurface test pits. Bedrock is very close to the surface and extrudes in places. There is very little likelihood that any intertidal subsurface cultural deposits have survived at this location.

SEL-216 is located on the northern side of Berger Bay just west of SEL-215 (Figure 4). The intertidal zone forms a narrow beach between rocky headlands. There is a large storm berm that has buried part of a drowned forest. The 1990 Exxon datum, at the end of a large, partially buried log, was located. Three reference points, A, B, and C, were established as at SEL-215. The beach and intertidal zone were searched for artifacts and other cultural materials, such as fire-broken rocks, as well as any signs of oiling. A transit was used to make a beach transect profile and map test pit locations. Four test pits were excavated within the intertidal zone to determine if any cultural deposits were present and to look for evidence of subsurface oiling. No cultural materials were located on the surface, nor was there any evidence of subsurface cultural deposits in any of the test pits.

One oily mousse patty was observed in the central part of the high intertidal zone in front of the storm berm, but it was not collected. None of the test pits indicated any presence of oil. Further investigation of SEL-216 does not appear to be warranted.

SEL-217 occupies a restricted rocky shingle and cobble beach situated in the northeast corner of Mike's Bay (Figure 4). There is a small creek and cove to the east and a rocky headland to the west. The steepness of the beach restricts the intertidal zone.

A surface survey revealed a number of heavy lithic artifacts in the intertidal zone. No artifacts were collected. Exxon's 1990 datum was located and two map reference points, A and B, were established. Two beach transect profiles were mapped and four test pits were excavated. Test pit 1 was excavated through a shallow peat deposit that is exposed at the western edge of the intertidal zone. Test pit 2 was dug into cobble beach deposits. Neither

test pit 1 nor test pit 2 produced any evidence of cultural materials. Two additional test pits, 3 and 4, were excavated in the forested upland beyond the beach. Neither of these test pits produced any cultural materials. There was not any sign of oiling on the surface or in the intertidal test pits.

SEL-217 surface artifacts likely represent erosional lag deposits and for the most part have lost their integrity. *In situ* cultural material appears unlikely in the intertidal zone.

SEL-218 is a relatively narrow cobble and boulder beach on the north side of Mike's Bay between SEL-217 and the mouth of the bay (Figure 4). There are rocky headlands at both ends of the beach. Prior to subsidence after the 1964 earthquake, the site occupied a low, narrow point or headland. The intertidal zone is restricted by the steepness of the beach.

A surface survey was conducted to search for reported artifacts and to search for signs of oiling. Exxon's 1990 datum was located and one mapping reference point, A, was placed in the upper intertidal zone near the middle of the beach. One heavy lithic artifact, an adze, was found on the surface in the mid-intertidal zone. The artifact was not collected. After inspection of the beach and adjacent upland, we concluded that there is no place suitable to dig test pits. A beach transect profile was mapped using a transit. There was not any evidence of oiling noted at SEL-218. SEL-218 does not appear to warrant further consideration.

SEL-220 is located in a small protected inlet on the south side of Berger Island at the opening of Berger Bay (Figure 4). The intertidal zone is flanked by low rock faces and headlands. A surface survey revealed heavy lithic artifacts, an adze and hammerstone, in the middle intertidal zone and whale bone and reworked FCR in the upper intertidal zone. Further reconnaissance resulted in finding a large concentration of FCR about 6-10 meters east of the main intertidal zone in an area that is flooded by very high tides and during storms. Two control points, A and B, were established to facilitate mapping of artifacts, beach transect profiles, and location of test pits.

Four test pits were excavated. Test pits 1 and 2 were excavated in the vicinity of the large fire-broken rock concentration. *In situ* cultural deposits (FCR and charcoal) were found in both of these tests from just beneath the surface to a depth of about 35 cm. Test pits 3 and 4 were excavated in the intertidal zone, Test pit 3 in the area of reworked FCR and Test pit 4 near the adze. However, neither test pit 3 nor test pit 4 produced any undisturbed cultural deposits. No evidence of oil was observed on the surface or in any of the test pits.

No artifacts were collected, but one charcoal sample was collected from 10-15 cm beneath the surface of test pit 1. SEL-220 has the potential add to the meager knowledge now available of late prehistoric and early historic cultures for the region. Further testing to determine the nature and extent of the *in situ* buried deposits that were identified in test pits 1 and 2 could prove valuable.

SHUYAK ISLAND AREA

The Kodiak Island area has the highest density of archaeological sites in the entire EXXON Oil Spill area. The State study concentrated on Shuyak Island within that area primarily because of the State ownership of much of the island and also because sites appropriate to the study occur there. Two sites, AFG-082 and AFG-098 received the most attention because they were felt to provide the best chance to test our assumptions (Figure 17).

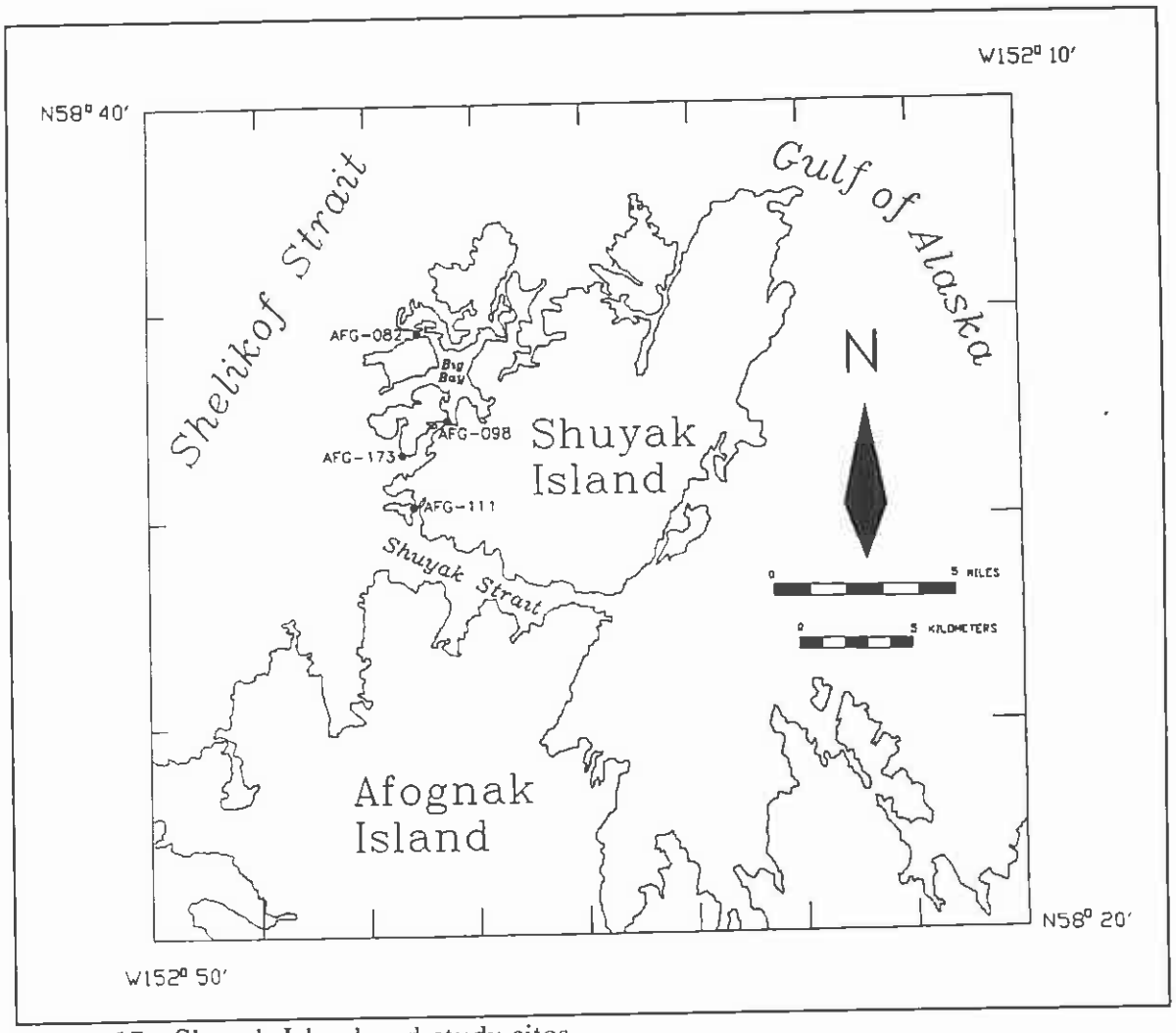

Figure 17: Shuyak Island and study sites.

AFG-082 SITE

AFG-082 is comprised of five circular to ovoid surface depressions and an eroding midden (Klingler 1983) located adjacent to a relatively exposed boulder/cobble beach. The features, measuring approximately 3-4 m in diameter, are located about 2.5 m above the beach in a small grassy area bounded on the north and east by spruce woodland, on the west by the

Figure 18: AFG-082, viewed from the beach, view to southwest.

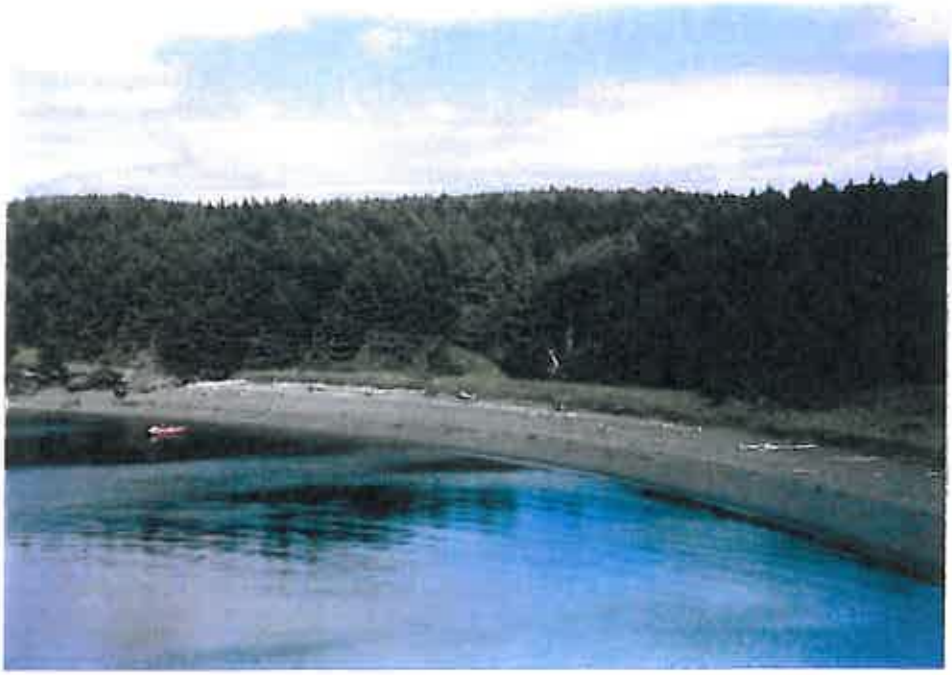

Figure 19: AFG-173 viewed to the northeast from VABM "Head".

beach scarp, and on the south by a grassy slope which descends to a debris-filled lagoon (Figure 18). Midden and fire cracked rocks (FCR), capped by Katmai ash, is actively eroding from the upper portion of the beach scarp.

Test/Trench Stratigraphy

Six test pits were placed across the site (Figure 20). Test pits 1 and 2 each measured 1 m x 1 m and were located within Features 4 and 2. Test pits 3 and 4, measuring 50 cm x 50 cm, were located to the east of the surface depressions at the forest fringe. Test pits 5 and 6, also 50 cm x 50 cm, were located at the top of the beach scarp at the southwest and northwest edges of the site. All subsurface tests revealed archaeological midden deposits capped by Katmai Ash with deposits thicker toward the beach scarp and just over 1 meter in test pit 6.

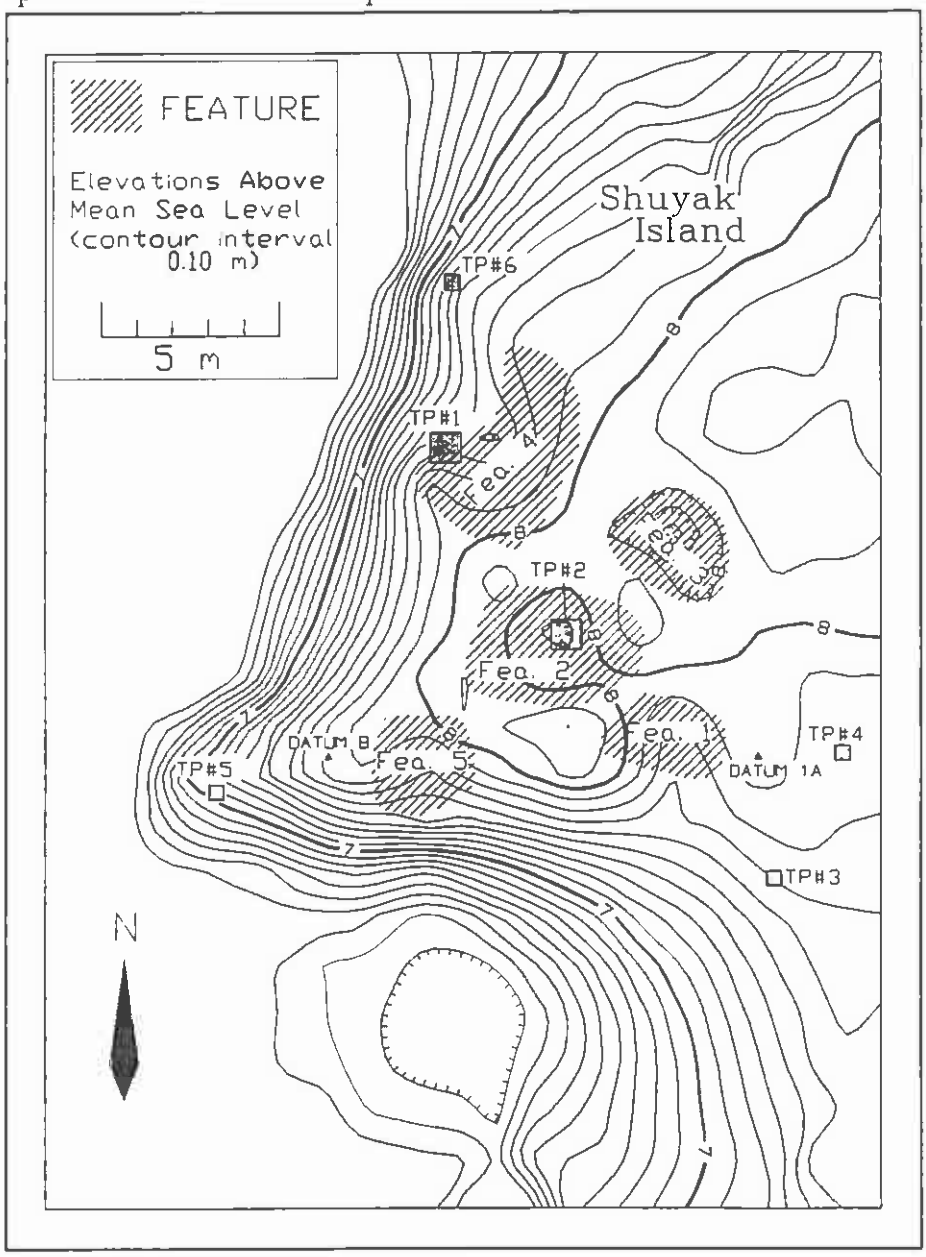

Figure 20: AFG-082 site map.

Test pit 1 revealed a 50 cm thick organic-enriched FCR midden zone immediately below the Katmai Ash (Figure 21). The lower 15-20 cm of the midden zone is an ashy, compacted charcoal layer, containing calcined bone fragments, which apparently represents hearth material associated with Feature 4. It is from this zone that two C^{14} dates are derived (see discussion in the radiocarbon dating section). The test pit revealed a series of postmolds and possible

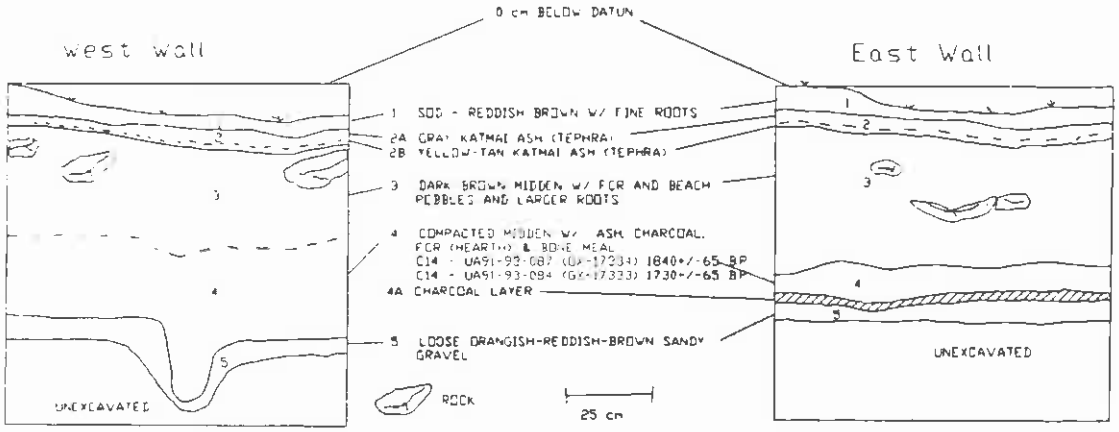

Figure 21: AFG-082, test pit 1 (Feature 4) stratigraphy.

postmolds intruding into underlying sterile orange sand/gravel (Figure 28).

Test pit 2 had similar but less discernable stratigraphy (Figure 22). A 40 cm thick midden zone, located between the Katmai Ash and underlying sterile yellow to reddish sand/silt, yielded flaking debitage, beach cobbles, and fragments of highly decayed shell and bone. A beach cobble and FCR pavement extends across the base of the midden and is underlain

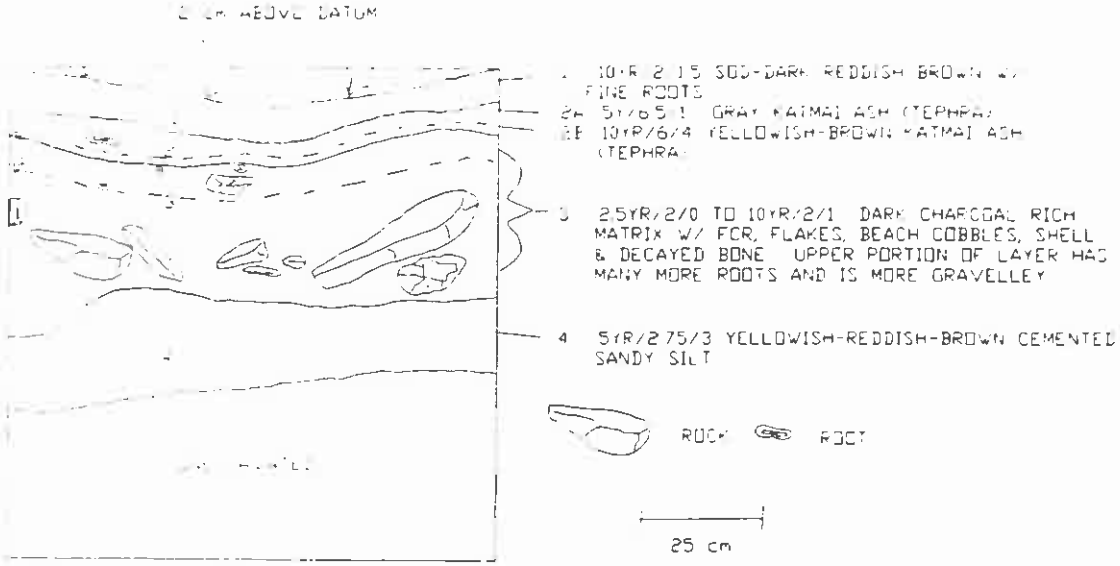

Figure 22: AFG-082, test pit 2, north wall stratigraphy.

by an apparent house floor.

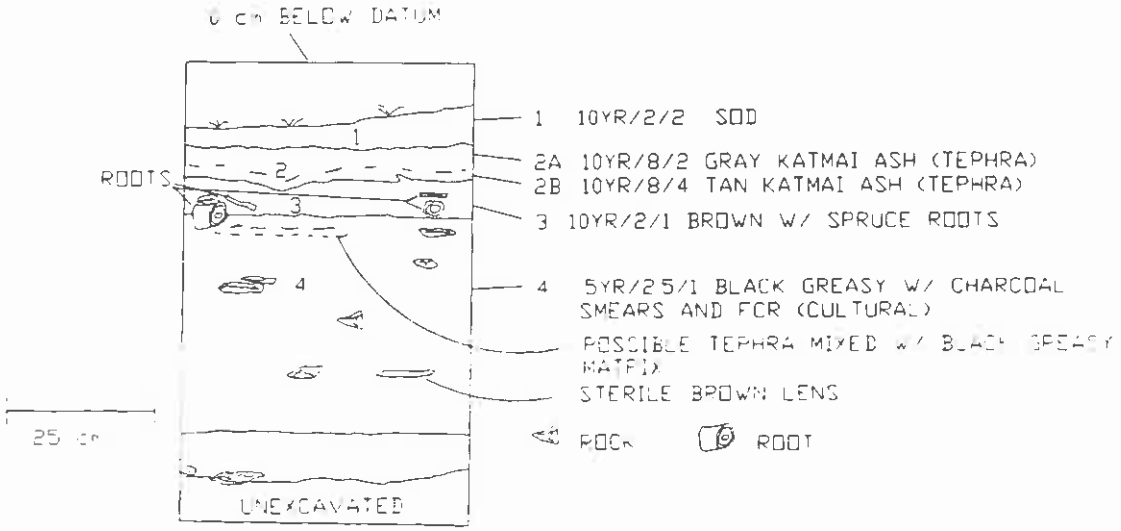

Figure 23: AFG-082, test pit 3, south wall stratigraphy.

Test pits 3 and 4 revealed zones of artifact-bearing loam but not the distinctive midden deposits present nearer the beach scarp (Figure 23). Each yielded a small number of artifacts, predominantly chipping debitage, to a depth of 50 cm. Test pit 5 exposed 10-15 cm of FCR bearing midden between the Katmai Ash and unconsolidated gravels /pebbles (Figure 24). A small stemmed slate projectile point (UA91-93-014) from just below the Katmai Ash, and two chert flakes were recovered in test pit 5. Test pit 6 revealed organic-enriched midden and abundant FCR between the Katmai Ash and sterile reddish brown silt (Figure 25). A small number of artifacts, including debitage, ground slate, a scoria fragment, and a few pieces of shell, were recovered.

Midden deposits within test pit 1 and test pit 6 may be divisible into two zones. In test pit 1, the upper zone was characterized by a preponderance of chipped stone tools and debitage, while the lower zone (more clearly associated with the house feature) contained more ground slate. It is notable that a tephra lens bisects artifact-bearing soils at a similar level in three of the test pits (3, 4, and 6) but continuity of the tephra cannot be demonstrated. At this point it is not possible to accurately correlate stratigraphy across the site and the collection is therefore treated as a single component.

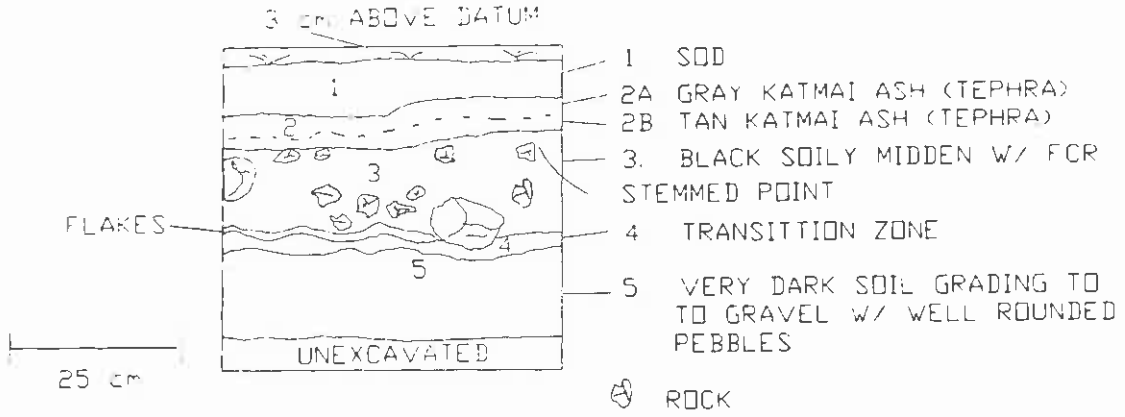

Figure 24: AFG-082, test pit 5, north wall stratigraphy.

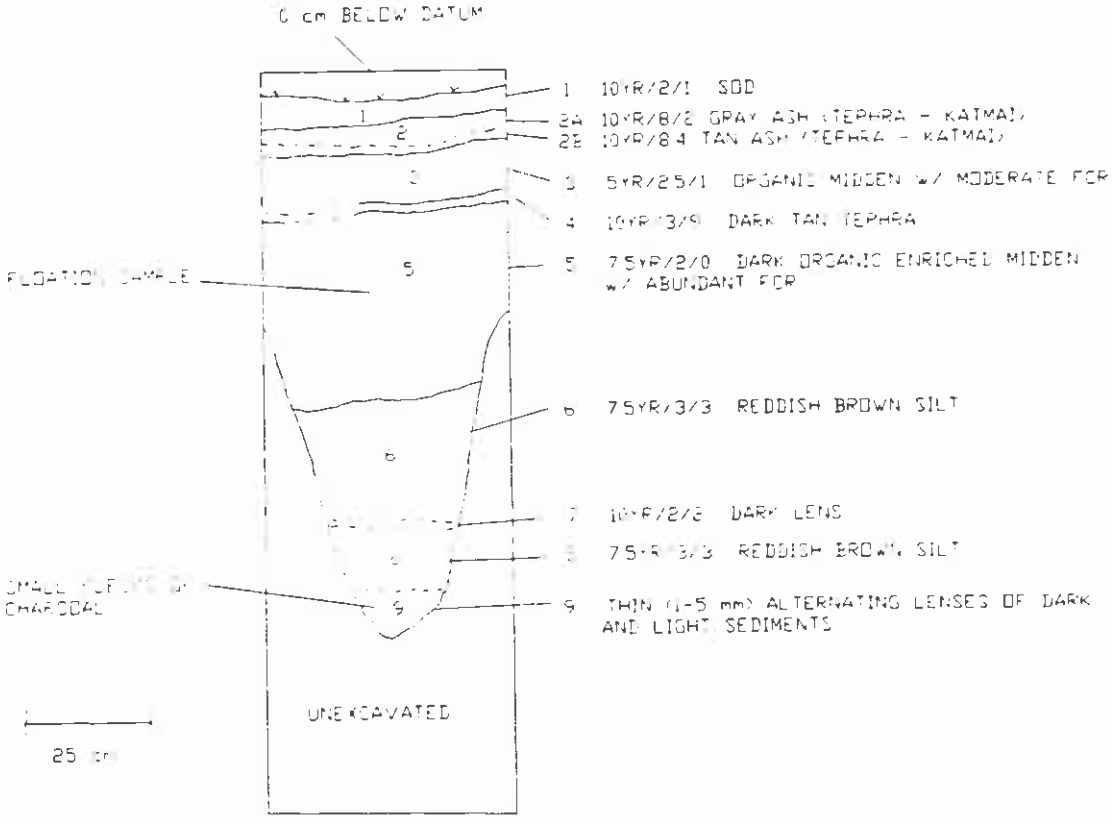

Figure 25: AFG-082, test pit 6, north wall stratigraphy.

AFG-082 Artifacts

Two hundred forty-three artifacts, including lithic flakes, lithic artifacts, C^{14} samples, and limited fauna and sediment samples, were collected from AFG-082. This includes a flaked biface midsection (UA91-93-027) which was collected from the eroded surface of the beach scarp (Appendix 3).

Categories of lithic artifacts represented include ulu fragments, undifferentiated ground slate fragments, ground stone projectile points, adzes and adze fragments, flaked bifaces, pumice/scoria fragments, battered cobbles, cobble spalls, ocher, flake cores, retouched flakes, and unretouched lithic debitage, including flakes and shatter fragments (Table 4). Twenty-one lithic material types are recognized in the assemblage on the basis of gross attributes (Table 5). In addition to lithic artifacts, the AFG-082 collection includes charcoal samples (n = 13), fauna (n = 7), tephra samples (n = 2), and a midden-derived soil flotation sample (n=1).

Ulu-shaped Blades. Twelve slate ulu-shaped blade fragments, which are characterized by relatively homogeneous thickness (< 5 mm), a broad form, and presence of cutting edges, were recovered from AFG-082. The fragments from which blade shape can be inferred (n = 8; UA91-93-001, -003, -006, -007, -008, -010, -013, and -155) are symmetrical or nearly symmetrical semi-lunar specimens with moderately curved to highly curved cutting edges (Figure 26d, f-i). This is analogous to D. Clark's (1974a:100) Form B ulu blade. The largest and most complete specimen (UA91-93-155) measures 14 cm between the lateral edge segments on either side (Figure 26a). Other specimens are generally too incomplete to infer size, although at least two (UA91-93-001 and UA91-93-013) appear to have been smaller (Figure 27c,b). The only blade fragment with an intact back (UA91-93-001) was hafted by a broad stem which has been ground blunt along the edges. A small interior fragment of undifferentiated ground slate (see below) has been biconically drilled and, if from an ulu, may indicate a hafting perforation.
Comparing the size and form of ulu blades from Koniag and earlier sites on Kodiak Island, Clark found that:

> "... subrectangular pieces and long, straight, narrow blades are characteristic of the first [ceramic Koniags]. Symmetrical semi-lunar ulus, with a straight back intersected by the arc of the evenly and highly curved cutting-edge, are characteristic of the older sites but are not entirely lacking in Koniag-phase sites" [D.Clark 1974a:105].

Comparative data for blade size suggest a late trend for greater length as well as for an increase in perforating (D.Clark 1970:79; 1974:105). The dichotomy between straight-edged and highly curved forms was less clear in deLaguna's (1975:74) Kachemak assemblages due to a range of intermediate forms. The one specimen from AFG-082 for which length could

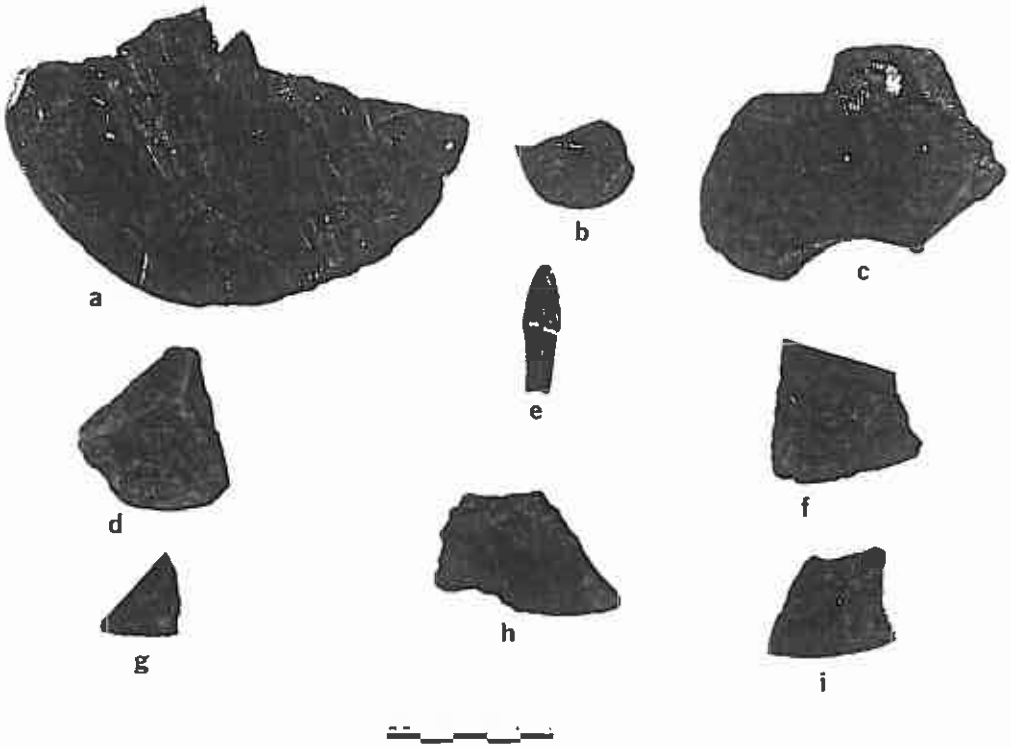

Figure 26: AFG-082, ground slate artifacts.

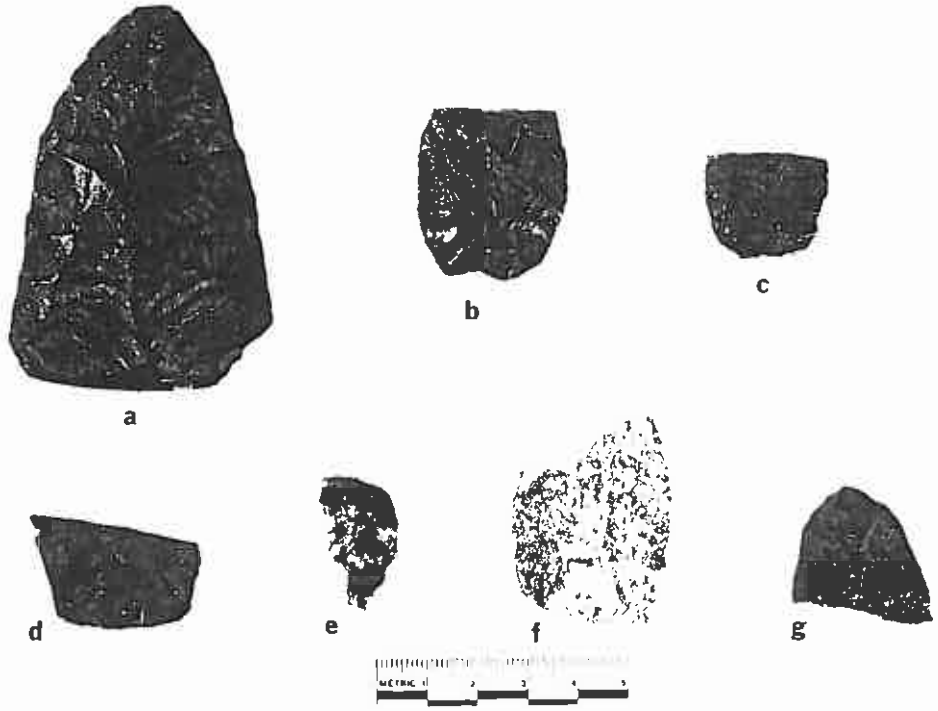

Figure 27: AFG-082, chipped stone artifacts.

be measured (14.0 cm) is intermediate between Heizer's (1956) large and small types at the early Koniag/pre-Koniag Uyak Site. The diagnostic significance of tangs, stems, and notched-back is difficult to assess for the Kodiak area, given their minor occurrence in both Kachemak and Koniag period assemblages. This trait is earlier and much more common in the Kachemak III assemblages of Kachemak Bay (Clark 1970:Table IX; 1974a:105; deLaguna 1975:74-75).

Table 4. AFG-082 Artifact Categories.

Artifact Class	Number
Ulu blades	12
Undifferentiated ground slate fragments (probably ulu fragments)	17
Ground slate projectile points	1
Ground stone adzes (whole and fragments)	3
Flaked bifaces	5
Pumice/scoria fragments	2
Battered cobbles	2
Cobble spalls	1
Ocher	1
Flake cores	2
Retouched flakes	1
Unretouched flaking debitage (flakes and shatter fragments)	174
Subtotal (lithic)	**221**
Non-lithic	
Charcoal samples	13
Fauna	7
Tephra samples	2
Soil flotation samples	1
Subtotal (non-lithic)	**23**
Total (lithic + non-lithic)	**244**

Undifferentiated Ground Slate. The 17 specimens which comprise this category are small interior fragments of ground slate, thinly ground (< 5 mm) and of homogeneous thickness. The majority of these are undoubtedly ulu fragments, but cannot be confidently typed due to their small size and lack of salient attributes. One of the specimens (UA91-93-015) has been biconically drilled, leaving a 0.5 mm-diameter perforation. The specimen, which has been broken along the perforation, exhibits a very small segment of a beveled edge as well as a portion of an incised rectilinear line pattern on one surface. It is not apparent whether this ground slate fragment is from an ulu, projectile point, or other type of artifact.

Table 5. AFG-082 Lithic Raw Material Categories.

	Raw Material Type	N	%
(1)	Coarse-grain gray CCS*	25	11.11
(2)	Medium-grain gray-brown chert	01	00.44
(3)	Fine-grain gray-green chert	03	01.33
(4)	Slate	72	32.00
(5)	Silicified slate	12	05.33
(6)	Fine-grain red chert (Uyak formation jasper)	64	28.57
(7)	Brown chert	06	02.67
(8)	Greenstone	03	01.33
(9)	Fine-grain dark gray chert	09	04.00
(10)	Fine-grain gray-brown banded chert	01	00.44
(11)	Brown banded chalcedony	02	00.89
(12)	Coarse-grain tan CCS	06	02.67
(13)	Fine-grain gray chert	07	03.11
(14)	Fine-grain tan CCS	01	00.44
(15)	Coarse-grain reddish CCS	05	
(16)	Medium-grain tan CCS	01	00.44
(17)	Coarse-grain undifferentiated igneous with 1-2 mm crystalline inclusions	01	00.44
(18)	Gray chalcedony	02	00.89
(19)	Vein quartz	01	00.44
(20)	Hematite	01	00.44
(21)	Scoria/Pumice	01	00.44
(?)	Indeterminate material	01	00.44

* CCS = Cryptocrystalline Silicate

Stone Projectile Point. A single small stemmed slate projectile point (UA91-93-014), measuring 3.9 cm in length and 1.3 cm in width, was recovered from the upper levels of test pit 5 and is the only specimen included within this category (Figure 26e). It is further characterized by an excurvate blade form, a slightly tapering stem which comprises about half the length of the specimen, rounded shoulders, a distinctive concave base, a rhomboidal cross-section, and a pronounced medial ridge. An apparent impact fracture has resulted in the removal of a hinge-fractured spall from one side of the distal end. The specimen is partially encrusted by a dark residue which tested moderately positive for blood when subjected to Castle-Mayer reagent.

The specimen does not match diagnostic types described in the regional literature, given its small size, rounded shoulders, and concave base. G. Clark (1977:Plate IV, No. 5, 6, 17, 18) did, however, recover specimens with similar attributes (i.e. unpronounced shoulders, rhomboidal cross-section, and basal concavity) from Takli Birch Phase context on the Alaska Peninsula. Vaguely similar forms, stemmed with concave bases (albeit with well-defined shoulders and a larger, broader blade form) have also been recovered from late Kachemak

and early Koniag contexts on western Kodiak Island (Crozier 1989: Figures 8 and 13). From the Kachemak Bay sequence, deLaguna (1975:Plate 31, No. 4) illustrates an endblade with similar blade and stem form, but without a concave base. DeLaguna's specimen, described as an "arrow (?) blade," was recovered from Yukon Island II or sub-III, which are Kachemak and late Kachemak period deposits, respectively.

Adzes. This category is represented by one complete adze (UA91-93-016), and two adze bit spalls or retouch flakes (UA91-93-148 and -228). The complete specimen (7.70 cm long, 5.20 cm wide, 1.8 cm thick), which has been chipped from a dense black siliceous material (possibly a variant of dark gray chert, material type 9), is triangular in form, with slightly excurvate sides and a highly polished double-tapered bit, ground more extensively on one side (Figure 27a). Artifacts of this type, which are ubiquitous in the Gulf of Alaska region, have been termed planing adzes by most writers (deLaguna 1975:57; Heizer 1956:44). Donald Clark (1974a:86-91) prefers the term "ungrooved adze" for this type of artifact. The AFG-082 specimen, with a slightly saddle-shaped cutting edge, would most likely have been used for adzing or planing by comparison to Clark's (1974a:89) typology. Specimens of similar form and material, G. Clark's Type 1 (1977:153, Plate III #12) from the Alaska Peninsula, are hallmarks of the Takli Alder and Takli Birch phases, but also occur in the Takli Cottonwood Phase (G. Clark 1977:30, 34, Table 22).

In addition to the specimen described above, excavations produced two flakes (one of greenstone and one of silicified slate or dark chert) with polished dorsal surfaces. It seems likely that these flakes were detached from the adze bits from use or intentional retouchof a damaged adze.

Flaked Bifaces. This category is comprised of five examples, all fragments. Four of the specimens, with an excurvate blade form and lenticular cross-section, are analogous to deLaguna's (1975:68-70, Plate 30, No. 33) "leaf-shaped knife (?) blade." They include two rounded-base proximal fragments of red chert (material type 6; UA91-93-026 and -028)(Figure 27b,c), one excurvate distal (?) fragment of gray chert (material type 1; UA91-93-029), and one excurvate mid-section of tan chert (material type 16; UA91-93-027)(Figure 27f) which was collected from the eroding beach scarp. The fifth specimen is a bifacially retouched flake of dark gray chert (material type 9; UA91-93-002) which appears to have been removed from a biface fragment similar to those described above. Throughout the Gulf of Alaska region, there is a tendency towards the gradual replacement of chipped stone technology with ground slate technology. DeLaguna (1975:69) found that chipped blades were more numerous than polished slate blades in the First and Second Periods (early Kachemak), but by the Third Period (late Kachemak) they were much fewer in proportion. This was recognized as one of the most important characteristics for distinguishing the earlier from the later periods in Kachemak Bay. In the Kodiak area, chipped stone tools are more common in the (early Kachemak) Old Kiavik Phase than in the preceding Ocean Bay II (Clark 1966: Figure 4), but decline in frequency from the Old Kiavik Phase to the (late Kachemak) Three Saints Bay Phase.

Pumice/Scoria Fragments. Two pebble-size, slightly facetted fragments of pumice or scoria were recovered from AFG-082 and are presumed to be abraders. Donald Clark presents the following synopsis of this artifact type:

> "It is noteworthy that so few pumice and scoria abraders were recovered from these and other Koniag-phase sites on Kodiak. Pumice and scoria abraders are better represented, sometimes very abundant, at earlier sites related to Three Saints and Kachemak III, especially at Kachemak Bay, Crag Point, a blown-out site at Ocean Bay (Clark n.d. a), and on Chirikoff Island. They are also common in Aleut sites [Clark 1974a:93]."

On the Alaska Peninsula, pebble-shaped abraders are present in Takli Alder and Takli Birch components, but more prevalent in the latter (G. Clark 1977:169, 190).

Battered Cobbles. The AFG-082 assemblage includes two end-battered cobbles which were likely utilized as hammers (UA91-93-017 and -019). One of the specimens, a small elongate cobble, is lightly pitted at both ends and may have been an aborted attempt at notching. Battered cobbles are ubiquitous on archaeological sites of the region and have little diagnostic value. Notched cobbles or "net-sinkers" are more prevalent on Kachemak than Koniag sites, and on the Alaska Peninsula are found in Takli Birch Phase and later components (G. Clark 1977:190, 195).

Ocher. The AFG-082 excavations produced a single pebble-size lump of red ocher which is presumed to have been used as pigment.

Lithic Debitage. This category includes (1) flake cores; (2) retouched flakes; and (3) unretouched lithic debitage, including both flakes and shatter fragments produced during the manufacture or repair of chipped stone implements.

Two flake cores, of fine-grain gray-green chert (material type 3; UA91-93-034) and fine-grain red chert (material type 6; UA91-93-066), were recovered. They are characterized by a lack of distinct striking platforms and by scars which are indicative of multidirectional removal of flakes. Although the term "core" implies that the role of this type of artifact in the lithic reduction process was solely to produce flakes, they may also represent aborted attempts to produce bifaces.

Lithic debitage (N=175) is the most abundant artifact class at AFG-082 and makes up 72% of the collection. Lithic shatter includes angular or chunky pieces of raw material (including unground slate) which exhibit no bulbs of percussion and are presumed to be secondary products of impact during the reduction sequence. There was no attempt to further categorize debitage.

The replacement of chipped stone with ground slate technology throughout the Gulf of Alaska was discussed under *Flaked Bifaces*. The presence of a substantial quantity of debitage in relation to ground slate at AFG-082 attests to the importance of chipped stone technology at the site.

Faunal Remains. Faunal preservation at AFG-082 is limited almost exclusively to small calcined bone fragments, the single exception being a chitinous shellfish covering. Most of the remains were recovered from test pit 1, which penetrated a house floor. The assemblage contains seven faunal accessions, comprised of either individual elements or groups of elements collected as a unit (i.e, level bags, etc.). Condition and size of the remains permit only non-specific identifications and basic separation/quantification. These results are presented in Tables 6 and 7. It was not possible to accurately estimate the minimum number of individuals (MNI) due to a lack of specifically diagnostic elements. The AFG-082 faunal assemblage is relatively diverse, given its small size, and is suggestive of a diffuse subsistence base including harvest of sea and land mammals, fish, shellfish, and birds.

Miscellaneous Collections\Observations. This category includes 13 charcoal (C^{14}) samples, two tephra samples which relate to a level below the Katmai ash, and 1 midden-derived soil flotation sample. The latter was floated and separated into heavy and light fractions, but has not been further processed. The six post molds noted in Test pit 1 probably describe part of the structure in an incompletely tested house (Figure 28). Too little of the structure was uncovered to estimate size or structural details.

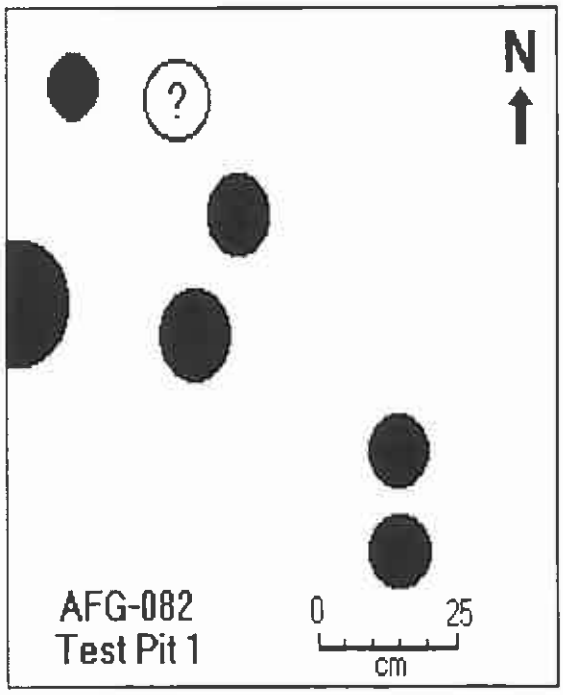

Figure 28: Distribution of postmolds in test pit 1, 0.64 m below the surface, AFG-082.

Radiocarbon Samples

Two charcoal samples from test pit 1, Feature 4) at AFG-082 (GX 17333 and GX 17334) have yielded dates of 1730 ± 65 and 1840 ± 65 radiocarbon years BP (at 1 sigma), respectively. One of the samples (GX 17334) was collected from the lower portion of a compact organic-enriched midden comprised of hearth ash, charcoal, fire-cracked rock, and bone meal. The other sample (GX 17333) was recovered 9 cm lower, at the interface of the above midden with an underlying unit of unconsolidated reddish sand and gravel. It is likely that both samples are related to a charcoal lens which occurs at the base of the compact midden and

is more apparent in the eastern half of the unit. See the section of radiocarbon dating for presentation and discussion of results of radiocarbon analysis.

AFG-082 ARTIFACT DISCUSSION

The AFG-082 artifacts, tentatively attributed to a single cultural component, allow limited comparisons with materials from other sites in the Gulf of Alaska region. These comparisons, based upon typology, suggest a Kachemak cultural/temporal affiliation.

Five chipped chert biface fragments and a large quantity of siliceous lithic debitage (72% of total) from AFG-082 indicate the importance of chipped stone technology, along with slate-working. The ratio of chipped stone to ground stone artifacts has long been recognized as an important characteristic for distinguishing earlier from later periods in the Gulf of Alaska region. In the Kodiak area, Donald Clark (1966: Figure 4) has shown that chipped stone tools decline in frequency from the (early Kachemak) Old Kiavik Phase to the (late Kachemak) Three Saints Bay Phase, a trend which continues into the Koniag period. Chipped chert bifaces are rare on Koniag sites, although crudely flaked slate bifaces and scrapers are relatively common.

A single ground slate projectile point was recovered at AFG-082 and is not specifically analogous with diagnostic types described in the regional literature. Vaguely similar types have been reported from late Kachemak and early Koniag contexts on western Kodiak Island (Crozier 1989:Figures 8 and 13), Takli Birch Phase contexts on the Alaska Peninsula (G. Clark 1977:Plate IV, No. 5, 6, 17, and 18), and Kachemak II or sub III deposits in the outer Cook Inlet sequence (deLaguna 1975: Plate 31). The prevalent AFG-082 ulu blade, a symmetrical semi-lunar form with a highly curved cutting edge, is characteristic of Kachemak period sites in the Kodiak area, but also occurs in Koniag sites (D. Clark 1974a:105). None of the long, straight, subrectangular blades, whichare associated with Koniag sites, were identified in the AFG-082 assemblage.

Table 6. AFG-082 Faunal Accessions Inventory.

Accession	Test Pit #	#/Type of Remains	Identification
UA91-93-078	TP-1	1 Prox. phalanx frag.	Med-Lg. sea mammal
UA91-93-079	TP-4	1 Chitinous covering, boat-shaped	Chiton ?

UA91-93-081	TP-1	1 Phalanx	Med. sea mammal?
UA91-93-082	TP-6	1 Shell frag., eroded	Clam, indeterminate
UA91-93-083	TP-1	1? Flat bone, rib?, highly fragmented	Lg. sea mammal
UA91-93-249	TP-1	3 Longbone fragments	Sm. land mammal
UA91-93-252	TP-1	1 Vertebra frag.	Med. Fish
		5 Caudal vertebra	Sm. mammal, immature
		5 Phalanges	Med. sea mammal
		4 Longbone frags.	Sm-Med. mammal
		1 Longbone frag.	Med. land mammal
		8 Longbone frags.	Med. bird
		5 Longbone frags.	Sm-Med. sea mammal
		4 Epiphyses, detached	Med. mammal

The only complete adze from AFG-082 is characterized by a triangular form with slightly excurvate (almost straight) sides and a highly polished double-tapered bit. While planing adzes are widespread in the Gulf of Alaska region, specimens of similar form and material are hallmarks of the Takli Alder and Takli Birch phases (with limited occurrence within Takli Cottonwood Phase context) on the Alaska Peninsula (G. Clark 1977:30, 34, 153, Plate III No.12). Two pebble-sized pumice/scoria abraders were described from AFG-082. This artifact type, while rare in Koniag contexts, is characteristic of late Kachemak sites on Kodiak Island and elsewhere in the Gulf of Alaska region (D. Clark 1974a:93). On the Alaska Peninsula the type is most prevalent in the Takli Birch Phase context (G. Clark 1977:169, 190).

Table 7. Distribution of AFG-082 Fauna Categories.

Category	# Elements	% of Total
Sea mammal	13	31.71
Land mammal	4	09.76
Mammal, undifferentiated	13	31.71

Bird	8	19.51
Fish	1	02.44
Shellfish	2	04.88
Total	41	100%

The AFG-082 assemblage, when interpreted as a whole, is decidedly Kachemak. Given the small size of the assemblage, however, and the possible inclusion of both early and late attributes, it is not possible to reach a more specific conclusion based upon artifact typology alone. Other AFG-082 site characteristics which support a Kachemak Phase affiliation include: small, single chamber housepits measuring 3-4 m in diameter and in a clustered arrangement (Jordon and Knecht 1988:232); poor representation of organic remains; and an absence of dense cow parsnip (*Heracleum*) and nettles (*Urtica*) thickets which are ubiquitous on later (i.e., Koniag) sites. AFG-082 site attributes which may be interpreted to suggest a Koniag Phase affiliation include a general lack of notched cobbles (which are often common on Kachemak sites) and an abundance of fire-cracked rock, which is a hallmark of Koniag sites and presumably associated with the use of sweat baths. These latter traits are subject to interpretation. Notched cobbles or "netsinkers" are not prevalent on all Kachemak sites and are presumed to be directly correlated to the use of nets, a geography-influenced technology which was undoubtedly more important at some sites than others. While fire-cracked rock is abundant at AFG-082, it does not reach the massive levels evident at most area Koniag sites, where it constitutes the bulk of thick midden deposits.

AFG-098 SITE

AFG-098, because of extensive subsurface archaeological deposits, was the focus of more intensive investigations than any of other sites investigated on Shuyak Island. The site consists of two loci, located at the easternmost point of Neketa Bay (Locus "A") and the southwesternmost point of Big Bay (Locus "B")(Figure 29).

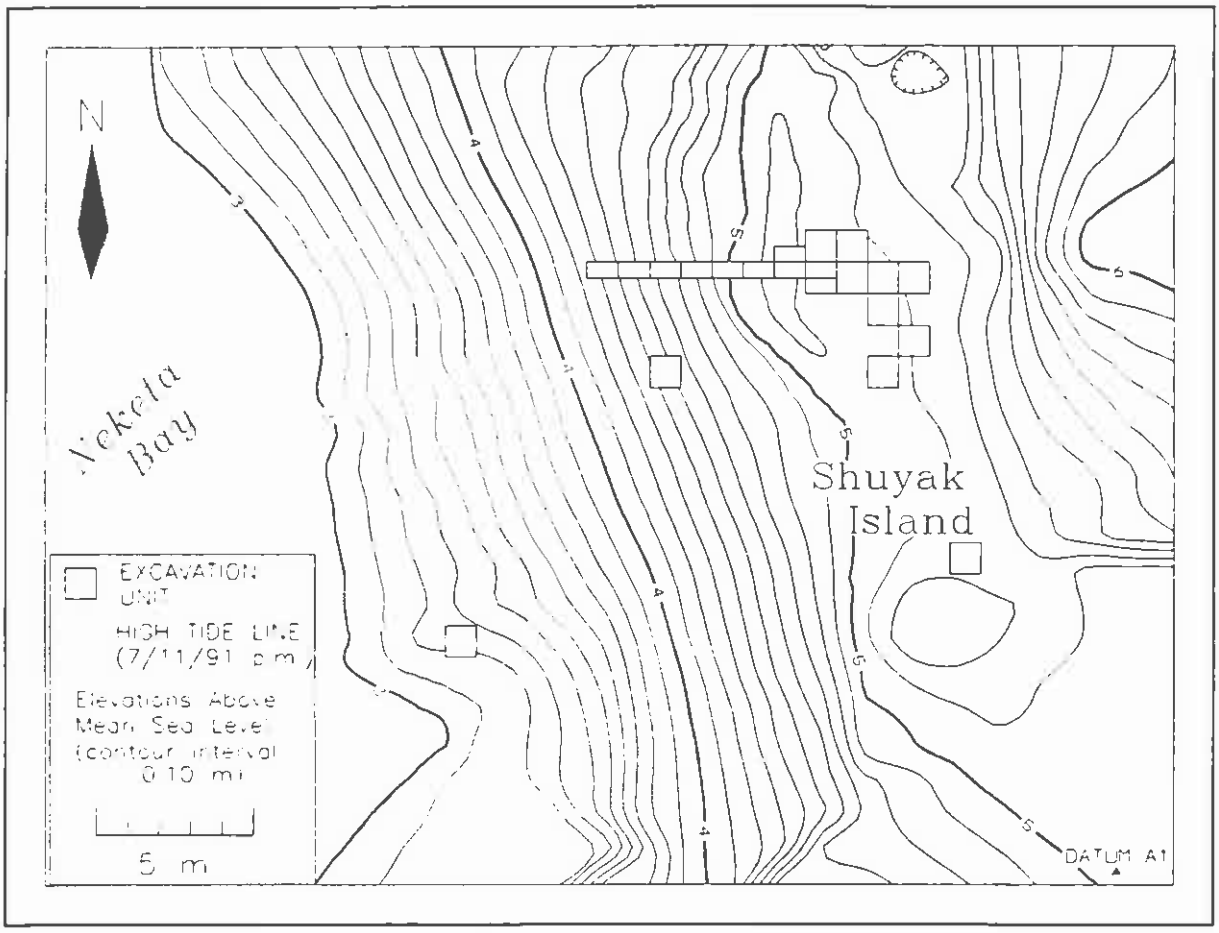

Figure 29: AFG-098 Site, Locus "A" test pits and trench excavation limits.

AFG-098 was first reported to the Alaska Division of Parks ranger seasonally resident on Shuyak Island as the location of a stone splitting adze. The find was reported from an area separate from what was later documented as the main part of the site, Locus "A". Early in the 1989 field season, J. David McMahan of the Office of History and Archaeology, Division of Parks examined the site and noted the remains eroding out of the beach at Locus A (McMahan 1989 fieldnotes). No subsurface testing was attempted. Later in the 1989 field season EXXON archaeologist, D.N. Abbott examined portions of the shoreline in the bay

Figure 30: AFG-098, overview of excavation area southeast.

Figure 31: AFG-098, Locus "A" excavations during backfilling.

but did not re-examine the site. Abbott did note that oiling in Neketa Bay was very light and consisted mainly of isolated mousse patties or tar balls (EXXON, 1989: 1). During July, 1990, the site was again visited by McMahan and by EXXON archaeologists Bruce Ream and Morley Eldridge. The latter made sketch maps of the site area and examined surrounding areas including adjacent beachs around Big Bay (EXXON 1990: 1). The second area with intertidal artifacts, Locus "B", was mapped and the upland between bays walked. No subsurface testing was attempted and no cultural features were positively identified in the upland area (Figure 30, 31).

During 1991, a 0.5 meter wide, 11 meter long trench was excavated from the middle intertidal zone into the supratidal zone above the low storm berm (Fig. 32). Nineteen test pits were scattered across the site from above the high tide line down to the middle intertidal zone. Twelve artifacts were collected from the surface of the middle and upper intertidal zone (see Appendix 4). These included whale bone, slate ulu fragments, notched and pecked cobbles, a slate projectile point fragment, and a fragment of sawn slate from Locus "A", and two slate projectile point fragments from Locus "B". The Locus "A" assemblage is suggestive of the late prehistoric Koniag tradition, whereas a distinctive notched slate projectile point fragment from Locus "B" is a hallmark of the Ocean Bay II tradition. Three mousse patties were collected on the tombolo and northeast shore at the head of Neketa Bay. Mousse patties were also observed in the area of Locus "A", on the Neketa Bay side, but were not collected as a very high tide removed them before they could be documented.

Excavations within the Locus "A" trench revealed the presence of cultural midden extending from the lower middle intertidal zone into the supratidal zone. Separation of the deposit into two lenses on the seaward side of the storm berm suggests the possibility of more than one depositional episode. The presence of postmolds, preserved posts, and a large hearth feature indicates a structure was present on the site. Approximately 250 specimens, including lithics, fauna, worked bone, soil samples, botanical specimens, and radiocarbon samples, were collected from AFG-098, the majority coming from the Locus "A" excavations. Notable is the presence of preserved organic materials, both carbonized and non-carbonized, which are normally not preserved in prehistoric context. These include cut wood, cut birch bark (basketry?), grass matting, and a woven textile fragment which appears to be spruce root basketry. A substantial quantity of fauna has also been recovered from archaeological context. The collection has been accessioned to the University of Alaska Museum, Fairbanks, and identified as much as possible by Rachel Joan Dale, Office of History and Archaeology.

Ten organic samples from AFG-098, including charcoal, bark, grass, and non-carbonized wood, were submitted to Geochron Laboratory for radiocarbon dating. The results are presented in the radiocarbon dating section of this report.

At least 49 items/samples of both worked or unworked plant materials were recovered from AFG-098 deposits as a result of preservation by carbonization or preservation in wet

deposits (Table 8). Categories consist of charcoal samples (n = 24); uncarbonized wood (n = 13); plant fiber materials, including a twined textile (probably basketry) fragment and possible matting (n = 6); hand-recovered seed samples (n = 2); and bark (n = 3). One composite sample (UA91-92-138) included charcoal, uncarbonized wood, and seeds. In addition to the items outlined above, 7 soil samples from various site contexts were processed by water flotation. The light (organic) fraction from one (Sample 1; UA91-92-236) was sorted microscopically, and remaining (unanalyzed) light fractions curated. The heavy (primarily mineral) fractions of all samples were scanned for possible inclusion of artifacts.

Because microscopic examination of plant materials is labor intensive, samples were prioritized based upon degree of cultural association, their expected interpretive value, and the estimated time necessary for taxonomic identification. The level of analysis to which plant materials were subjected was balanced against sample prioritization. For example, culturally altered materials were given a high priority while wood charcoal samples, which were collected primarily as potential radiocarbon dating samples, were given a low priority. A complete inventory of plant materials from AFG-098 is presented in Appendix 1, along with methods utilized in taxonomic identification.

Excavations revealed no indication of subsurface oil based upon vision or odor but several sediment samples were collected and frozen pending analysis for the presence of oil. The sediment samples were all collected from the midden area of the exploratory trench (Figure 32). Field sample VOS91OHA0720-1 was collected from the Lower Component deposits near the middle of the trench. HPLC/UV fluoresence analysis of the sample yielded a negative finding for presence of oil. Field sample VOS91OHA0720-2 came from Upper Component deposits near the west end of the trench, well within the intertidal zone. The sample was collected 20-25 cm below the beach surface and provided a negative finding from presence of oil. The third sample submitted to testing for presence of oil, field sample VOS91OHA0720-3 came from an apparent house floor near the base of the Lower Component. The sample was collected from a depth of 20 cm below ground surface at the normal upper tidal limit. A trace of oil was found but the source could not be determined by the applied test method. Radiocarbon determinations on charcoal samples in the immediate vicinity of the midden sample displayed no unexpected results. A charcoal sample collected 5 cm from the tested midden sample yielded a radiocarbon result within decades of results from other samples in the same stratigraphic level. That radiocarbon sample was treated with toulene during the cleaning process to remove traces of suspected oil. The possibility must be considered that the detected oil came from a source other than crude oil. Fish or sea mammal oil should be considered althougth those sources would introduce other factors which cause skewed results (see Arundale 1981:244ff, for discussion of sea mammal dates).

Preliminary analyses of data from AFG-098 indicate the site is significant in defining the later prehistory of the area. AFG-098, with extensive subsurface archaeological deposits,

structural remains, diagnostic artifacts, and preservation of textiles and other organic remains, has a an exceptional ability to place the site in regional perspective.
The collection recovered from AFG-098 during the 1991 field season is, as a whole, clearly related to the Konaig Phase of area archaeology. Some artifacts do occur which are typical of earlier phases but those are either surface occurrences or with the one excavated piece, probably collected by more recent site occupants. A midden deposit directly overlies the Katmai Ash and if still in original stratigraphic position is thus historic but did not yield any artifacts. The Koniag related collections can be further divided into two stratigraphic units each of which contain artifacts diagnostic of specific archaeological periods.

Locus "A" Stratigraphy

Trench N50/E42-51

The test trench in Locus "A" revealed a complex stratigraphic profile of the site from the supratidal zone down into the intertidal zone a meter below normal high tide. A number of the layers encountered were culturally sterile but at least three cultural levels were identified.

The uppermost stratigraphic unit identified is the loose beach gravel which comprises the storm berm at the head of the active beach. The berm is composed of dark greenish gray (5GY 4/1), flat, angular pebbles. The pebbles average between 0.5 cm and 1.0 cm diameter. The beach berm is thickest near the center of the trench and tapers away both up and down the beach profile but lies entirely west of the center of the trench. A discontinuous, very dark brown fibrous mat underlies the berm along the trench exposure. The vegetation mat is divided into upper and lower parts by a very thin sprinkling of coarse gray tephra. That ash also divides a remanent of older beach berm into two sub-units.

Beneath the berm and vegetation mat sequence near the center of the trench is a thin layer of midden which consists of very dark organic rich soil with some shell fragments and relatively numerous large volcanic ash lapilli. Some of the lapilli are as much as 2.5 cm in diameter and have the same color as the underlying Katmai Ash series. The midden-lapilli mix pinches out east of the trench mid-point and truncates westward by the angle of the present beach surface. The thin midden is underlain by as much as 10 cm of Katmai Ash. The midden may be post- Katmai eruption in age or may be sheet wash. Up the beach to the east of the center point in the trench, Katmai Ash and units above have been removed by erosion and older midden exposed. No artifacts were recovered from the thin unit. The east end of the trench revealed more Katmai Ash overlain by a vegetation mat within which occurs the coarse gray ash.

The west end of the trench profile beneath the Katmai Ash deposit is much less complex than the east half. Immediately below the Katmai Ash is a very strong smelling, highly fibrous, peaty deposit containing numerous pieces of wood. The lower limits of the intertidal peat contain cultural materials, especially wood and bone artifacts. This unit pinches out well before the center of the trench is reached. Some charcoal and a few rocks also occur

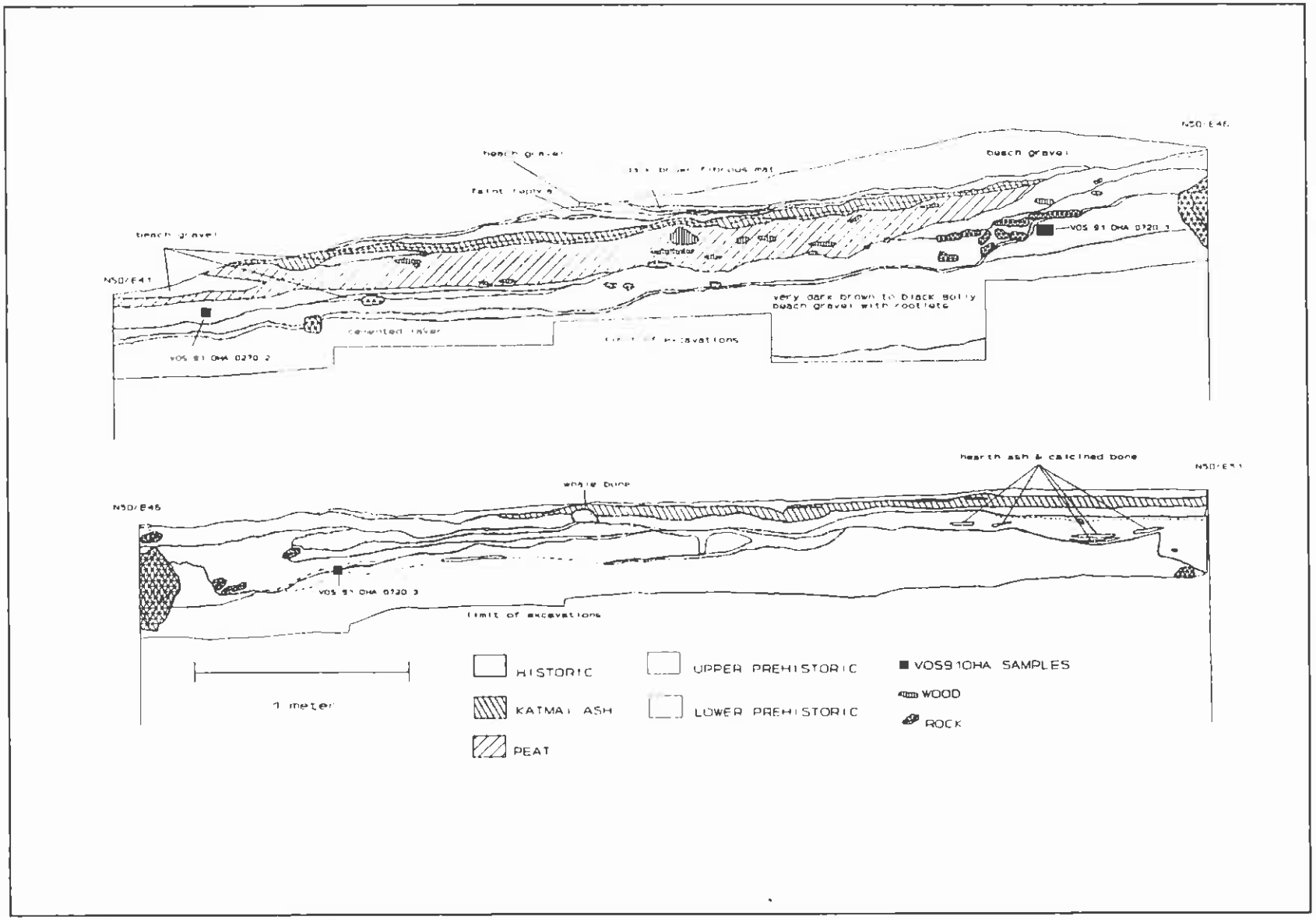

Figure 32: AFG-098, Locus "A", N50/E42 - E51.

in the peat. The lower part of the peat is a western facies of the cultural Upper Component. In the western end of the trench, the peat is underlain by a dark gravelly unit containing cultural remains. That gravelly unit is the western extention of the cultural Lower Component but thins out completely before the end of the trench profile is reached.

Near the center of the trench profile, the peat is separated from the lower gravelly midden by another midden deposit which is marked by what appears to be a wall of a structure. As the upper midden layer gets thicker to the east, the overlying peat pinches out completely. Eastward in the trench profile, the two cultural levels seem to be thinly superimposed floors with perhaps two superimposed structures. At the west end of the trench, a pit structure appears in the trench wall. That structure appears to originate with the Lower Component but contains thick Upper Component deposits as well.

The center of the trench and the west end revealed very dark brown to black soily beach gravel containing many small rootlets. This surface which pre-dates use of the immediate area by the AFG-098 occupants is capped by a cemented layer, very rich in iron compounds which has in places engulfed pieces of wood. The soily beach gravel is underlain by very dark grayish brown (10YR 3/2) gravel with cobbles. Excavations ceased before older stratigraphic units were uncovered.

Test pit N46-47\E42 -E43

A 1 m x 1 m testpit was placed beside an area in the upper intertidal zone where extensive FCR, large boulders, artifacts and pieces of bone were eroding from the beach. The intent of the test was to document extent and possible date of the surface materials.

Below a very thin veneer of beach gravels lay a 35 cm thick layer of black midden containing charcoal, shell, bone, and abundant fire cracked rock. Thin layers of shell and gravelly midden were encountered until a black compact, peaty layer, apparently the same peat encountered in the test trench was found. The peat contained wood, some faunal remains and perched on sterile dark brown (10YR 3/3) beach gravels.

Test pit 2

Testpit #2 is a 1 m x 1 m square excavated about 8m south of the test trench. It was located south of the east end of the trench in the supratidal zone. Immediately under the sod, a 15 cm thick deposit of Katmai Ash was found. The multiple falls of ash which comprise the Katmai Ash are readily evident in the pit profile. Below the Katmai Ash were several reddish brown organic mats overlain by other tan tephras. At about 30 cm below ground surface, a dark blackish brown cultural layer containing fire cracked rocks was encountered. The cultural layer was underlain by angular gravel beach deposits on which a thin dark soil had developed prior to occupation. The pit was excavated to a depth of 90 cm at which point digging ceased. The pit flooded during the afternoon high tide of July 11, 1991 which reached to within 55 cm of the ground surface. Based on preliminary results of

analysis, a sheen on the tidal water apparently was not crude oil.

Upper Component Artifacts

The Upper Component at AFG-098 covers most of the area tested at the site and occurs well into the intertidal zone. Much of the material exposed on the beach at the head of Neketa Bay belongs to that component.

Projectile Points. Ground slate projectile points in the Upper Component are primarily stemmed either with barbs (N= 4) or rounded shoulders (N=3). A single distinctive point with a central flute or butt facet carved from the broken base probably originated as a triangular form.

Two of the stemmed points with basal barbs have barbs which protrude from the stem at an acute angle. Both are missing stems but the break facets indicate the stems were 1.21 cm wide near the stem blade juncture. UA91-92-023 is missing most of the barbs but sufficient edge remains to indicate original presence of the barbs (Figure 33c). The point has a biconvex cross-section and some medial ridge near the tip. Width of the point blade is 2.57 cm, blade length is 7.48 cm and thickness 0.71 cm. The other point with acute angle barbs, UA91-92-007, is missing the tip as well as the stem (Figure 33b). It has a flattened diamond cross-section with a medial ridge running the length of the blade. It measures 2.29 cm wide and 0.62 cm thick. A third stemmed point with barbs, UA91-92-004, has barbs which protrude at a very slightly acute angle (Figure 33a). The complete point has straight, square stem edges which are slightly convergent and terminate at a rounded square base. The stem is 1.58 cm wide and 1.78 cm long. The short broad blade has a flat biconvex cross-section. The point is 5.51 cm long, 2.40 cm wide, and 0.36 cm thick. The final point included in this category (UA91-92-020) is probably not truely a projectile point (Figure 33h). It has a stemmed, sharp shouldered form but is not ground on the faces. The very thin artifact has a squared edge except near the broken tip where it is ground to a thin, sharper edge.

Three stemmed ground slate points have slight rounded shoulders. The stem of UA91-92-015 is broken but is 1.73 cm wide (Figure 33d). The blade is biconvex in cross-section, 2.50 cm wide and 0.49 cm thick. The tip of the point is missing. The second shouldered point (UA91-92-022) is missing the stem and blade tip (Figure 33e). Enough of the stem exists to measure a width of 2.06 cm. Both faces of the blade have a faint medial ridge which is off center. The blade has a flattened cross-section, is 2.76 cm wide and 0.59 cm thick. A small point with a stem (UA91-92-060) has very faint shouldering, convergent stem edges and the suggestion of a rounded base (Figure 33g). The 1.57 cm long stem edges are ground square. The blade had a biconvex cross-section and is missing the tip. Width of the blade is 1.31 cm and thickness is 0.32 cm.

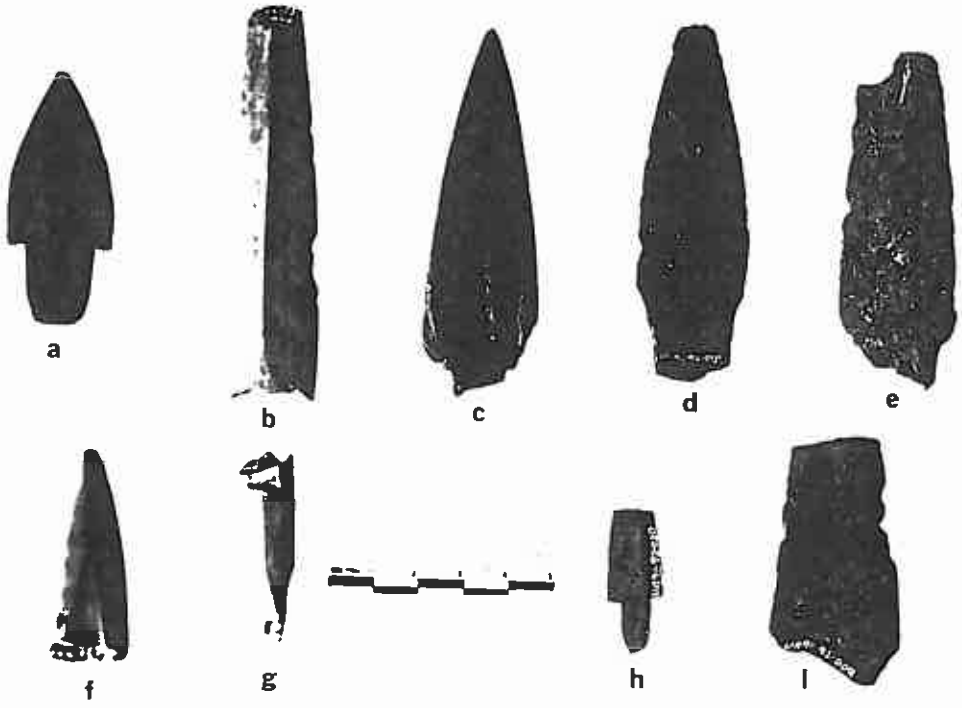

Figure 33: AFG-098, Upper Component, slate projectile points.

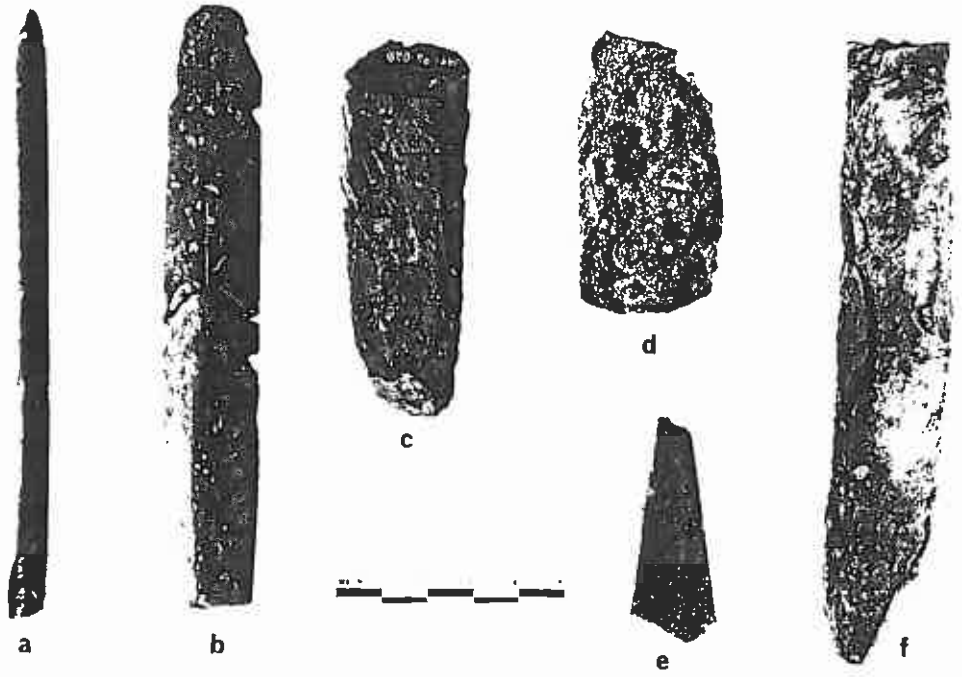

Figure 34: AFG-098, Upper Component, miscellaneous ground and chipped slate.

The single triangular ground slate point (UA91-92-013) has a broken base, is 1.78 cm wide and 0.32 cm thick (Figure 33f). The sharply defined "flute" or butt facet found on both faces extends at least halfway up the blade. The depression is carefully formed to retain the lateral ridges which parallel the point edges. A medial ridge extends from the end of the facet to the point tip.

Miscellaneous fragments of ground slate points include two mid-sections (UA91-92-009, -021/049) and two tips (UA91-92-011, -017). All have flattened biconvex cross-sections. The widest piece (UA91-92-009) may be the remanent of a shouldered, stemmed point but is missing the diagnostic pieces (Figure 33i). One fragment (UA91-92-039) has straight, parallel edges ground to form but no facial grinding. The fragment is 1.97 cm wide and 0.32 cm thick.

A mid-section fragment (UA91-92-010/012) found stratigraphically with the Upper Component probably was collected by site occupants from an earlier deposit (Figure 34b). The section has a thick, biconvex cross-section, straight parallel sites and notches ground into the edges. The notches are ground in at an angle and are paired opposite each other. A straight line has been incised down the middle of one face for a short distance. The blade is 2.20 cm wide and 0.71 cm thick. The style is more typical of the Ocean Bay II stage and most logically was obtained from a site of that age by Upper Component occupants.

Slate "Awl". A long ground slate rod or "awl" (UA91-92-002/003/218b) has a rounded square cross-section and a broken base (Figure 34a). The tip is ground to a point and has been girdled by a deep groove. The point of the tool is polished as from use. The "awl" is 13.2 cm long, 0.96 cm wide and 0.95 cm thick.

Knives. A wide variety of ulus are represented in the Upper Component at AFG-098. A complete ulu was recovered in two fragments found beside each other (UA91-92-064). The reconstructed knife has a long slightly curved, bifacially ground cutting edge and is relatively narrow front(cutting edge) to back (Figure 35f). A 0.55 cm diameter hole has been drilled from both faces which left the intersecting ridge where the two holes met. The lashing hole is located toward the widest end of the ulu. The narrower end is also offset from the back as if only the widest end were backed with a handle. The offset measures 0.77 cm. The ulu is 15.4 cm long, 3.96 cm wide, and 0.59 cm thick.

A second ulu fragment (UA91-92-068) with an intentional blade offset is missing both ends (Figure 35d). The ulu thus may have been formed with an offset at both ends but is missing one end. No lashing hole was drilled in this ulu. The blade is 3.82 cm wide at the widest point and is 0.57 cm thick. The offset in the back of the knife measures 0.70 cm. The cutting edge is slightly curved and ground bifacially.

A complete but small ulu (UA91-92-067) has a curved cutting edge which is bifacially sharpened. The back edge of the knife is relatively straight. The ulu is 5.82 cm long, 3.05 cm wide, and 0.18 cm thick.

Three large fragments of ulus have curved bifacially ground cutting edges. One fragment (UA91-92-066) has remains of the straight edged end which has been sawn and snapped to form (Figure 35e). The other two fragments (UA91-92-071 and UA91-92-072) are missing back and end edges. The three fragments range from 0.36 cm to 0.50 cm thick.
The rest of the ulu fragments with edge remanents appear to have straight cutting edges. The most complete ulu with a bifacial, straight edge (UA91-92-069) is broken at both ends and has a curved blunt back edge (Figure 35b). An indentation at one end of the back suggests notching to secure handle lashing. That fragment measures 5.36 cm back to cutting edge and 0.45 cm thick. Another ulu fragment apparently with a straight edge (UA91-92-030/031) is broken at one end but appears to have been rectangular in outline. The back edge is a natural squared break facet and the cutting edge is bifacially ground. The fragment is 0.25 cm thick. Three other edge fragments range from 0.25 cm to 0.55 cm in thickness. A single unifacial edge fragment (UA91-92-057) appears to be a split fragment of a thicker ulu which originally was bifacial.

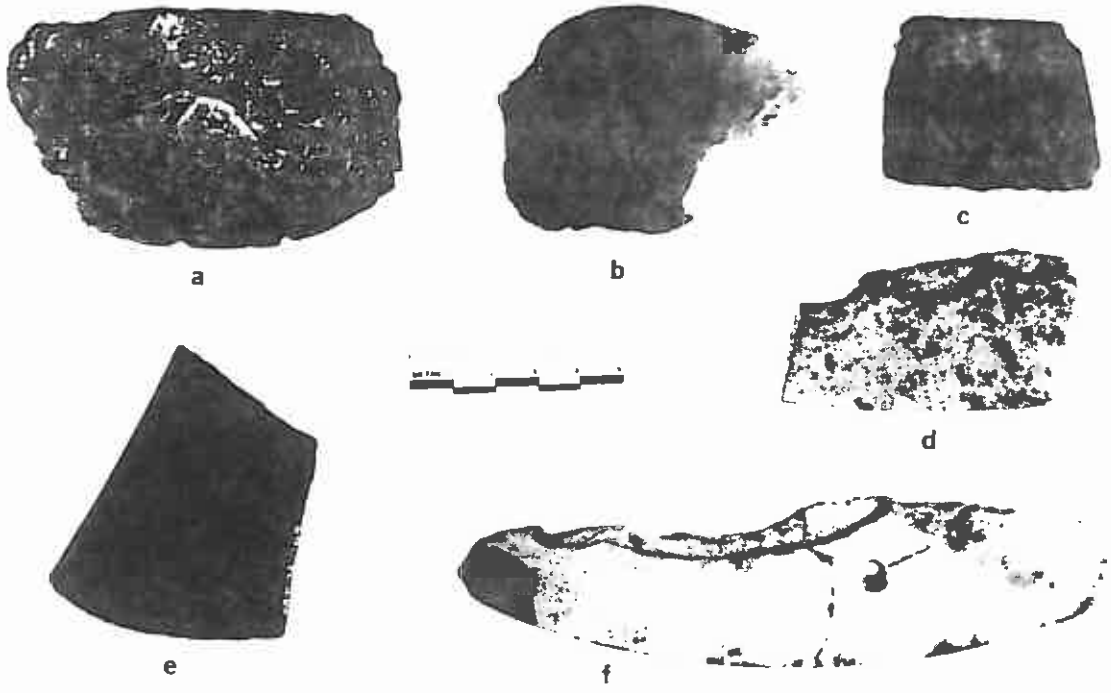

Figure 35: AFG-098, Upper Component, ulus and stone saws.

Grinding Slabs/Whetstones. A small but complete grinding slab (UA91-92-085) has depressions ground into the top and bottom faces and one edge is formed by two ground facets (Figure 36c). The stone is 8.83 cm long, 6.82 cm wide, and 2.27 cm thick. Another complete whetstone (UA91-92-111) is ground on all surfaces (Figure 36f). A straight edge was produced by sawing and snapping the stone into at least two pieces. A notch has been

ground into the curved edge of the whetstone and a mollusc fossil pits the grinding surface. This whetstone is 7.92 cm long, 3.48 cm wide, and 1.15 cm thick. A whetstone fragment

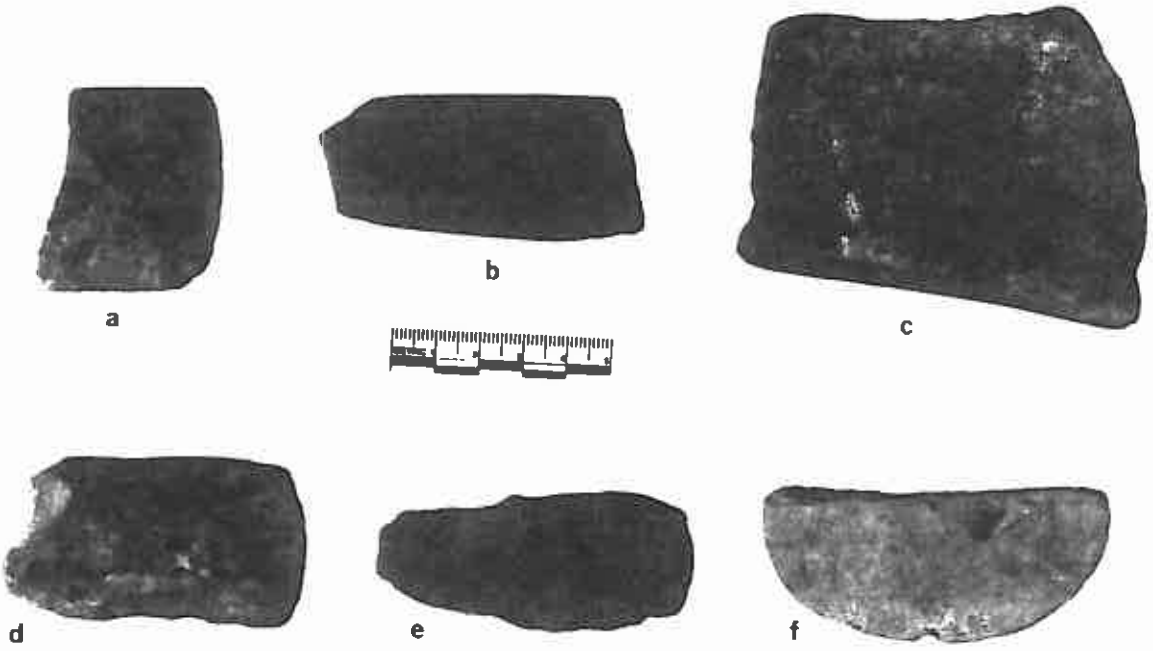

Figure 36: AFG-098, Upper component planing adzes and whetstones.

(UA91-92-107) bears a part of the grinding surface from the original piece. Like the other whetstones, the grinding surface is dished out.

Planing Adzes. Four planing adzes were recovered from the Upper Component at AFG-098. The most complete and well made adze (UA91-92-088) has straight, parallel sides, one chipped and the other formed by two ground facets (Figure 36d). The top and bottom faces of the tool have been ground. The adze has a plano-convex cross-section. The cutting edge has an edge angle of 38° and is straight. It is 7.01 cm long, 3.91 cm wide, and 1.62 cm thick. UA91-92-074 is the front portion of another planing adze with a straight cutting edge (Figure 36a). The edge has an angle of 25° between top and bottom faces and angles from side to side. All remaining surfaces were originally polished. The bit has a flattened oval cross-section, is 4.71 cm wide and 1.49cm thick. UA91-92-080 has straight parallel sides and a straight cutting edge viewed end on (Figure 36e). The cutting edge has an edge angle of 35°. It is 7.31 cm long, 3.21 cm wide, and 1.25 cm thick. The other Upper Component planing adze (UA91-92-076) has sporadic grinding on the upper and lower faces and straight well polished edges (Figure 36b). The body of the adze is flat, tabular, and beveled just at the cutting edge. The cutting edge has a side to side angle and is beveled to 39° just at the the battered edge. The butt of this adze bit is a natural fracture plane.

Miscellaneous Ground Stone. Two pieces of ground slate were recovered which have thick, square ground edges and a triangular outline. UA91-92-033 has a ground face with a depression worn into it (Figure 34e. The other face is fractured but the facial surface

remaining is ground smooth. The piece is 0.74 cm thick and may have functioned as a small whetstone or burnishing stone. The second example (UA91-92-051) has ground edges, is broken at the largest end, and is otherwise unmodified. It is 0.64 cm thick.

A stone saw (UA91-92-050)(Figure 35c) and a fragment of sawn and snapped slate (UA91-92-044) were found in the Upper Component. The saw is formed by edge chipping and the cutting edge is smoothed from use. The saw is 0.42 cm thick and the sawing edge 5.23 cm long. The sawn slate fragment is not otherwise modified. Another stone saw (UA91-92-084) was recovered without provenience as it apparently fell from a side wall in a 1m by 1m pit. The grinding edge is well smoothed, slightly convex and the edge is bifacial (Figure 35a). The saw is 9.08 cm long, 5.61 cm front to back and 0.63 cm at the sawing edge. Most of the cultural deposits in the excavation unit represent the Upper Component and the saw is most probably from that level.

Chipped Slate Preforms. Fragments of three chipped slate point preforms occur in the Upper Component collection. The longest, (UA91-92-081, measures 13.35 cm in length, 2.56 cm wide, and 0.90 cm thick (Figure 34f). It has straight parallel sides and a little facial grinding on one face. One edge is ground or smoothed by use. Another chipped slate preform fragment (UA91-92-028) is 2.83 cm wide and 0.69 cm thick (Figure 34c). It is ground or worn from use on both edges. This piece has no facial grinding. The final fragment of chipped slate preform (UA91-92-045) measures 3.15 cm wide and 0.69 cm thick (Figure 34d). Both faces exhibit some grinding. The lateral edges are not ground or worn and both ends are missing. This group of artifacts may be used as knives rather than simply being preforms.

Miscellaneous Stone. A single hammerstone (UA91-92-104) recovered from the Upper Component measures 11.19 cm long, 6.50 cm wide and 4.67 cm thick. Battering at one end is the only modification of the stone. Two rounded quartz cobbles (UA91-92-097 and UA91-92-100) each have a small polished facet on a flat surface. The two are otherwise not distinguishable from rounded quartz beach cobbles. A small quartz crystal (UA91-92-092) has some minor wear on the tip of the crystal. A hematite nodule (UA91-92-099) from the peaty soil of the site may have functioned as a "strike-a-light" or steel for making a fire.

Bone/Ivory/Antler Artifacts. Barbed bone/ivory dart heads were partially reconstructed from small pieces found in the peaty intertidal soil. The base of a barbed dart head of ivory (UA91-92-119) is offset from the shaft of the dart head (Figure 37d). A line hole was drilled near one margin of the thinned base. A subdued ridge occurs where the drill holes from both faces met in the interior of the dart. Lines are incised into the faces of the base to facilitate attachment. The ivory base is 2.15 cm wide and 0.60 cm thick.

A remanent of a multi-barbed dart head (UA91-92-173) displays indications of the same type of base as the dart described above (Figure 37a). The remaining barb base and facet of a missing barb are square in cross-section. The base is thinned and a fragmentary rim of the line hole is offset from the shaft of the dart head. The shaft of the sea mammal bone

dart is rectangular in cross-section. The tip (UA91-92-215) of a barbed bone dart is also manufactured from sea mammal bone (Figure 37c). The tip has a flattened cross-section and a single barb. The piece has a low medial ridge and measures 1.36 cm wide and 0.46 cm thick.

A barbed ivory spur or fishhook shaft fragment (UA91-92-229) has a triangular cross-section and backward pointing paired barbs at the pointed end (Figure 37b). The space between the paired barbs is grooved to accept some kind of narrow shaft. The shaft of the fragment is 0.81 cm wide and 0.69 cm thick. The barbs extend out 0.14 cm from the shaft. A small sea mammal bone barb (UA91-92-188) is triangular in cross-section and extended 0.55 cm out from the shaft.

Two awls are carved from split bird bone. The largest awl (UA91-92-222) is polished at the sharp end (Figure 37e). It is 7.27 cm long, 0.94 cm wide, and 0.21 cm thick. The smaller awl (UA91-92-223) is shaped around the entire circumference with a squared base and very sharp tip (Figure 37f). This awl is 4.97 cm long, 0.58 cm wide and 0.19 cm thick.

A carved piece of ivory (UA91-92-124) is elliptical in outline and has a hole drilled near the center (Figure 37g). It measures 4.48 cm long, 1.24 cm wide and 0.50 cm thick. The thickness is an estimate because the piece has badly exfoliated since recovery. An antler fragment (UA91-92-226) is a tine fragment broken at both ends (Figure 37i).

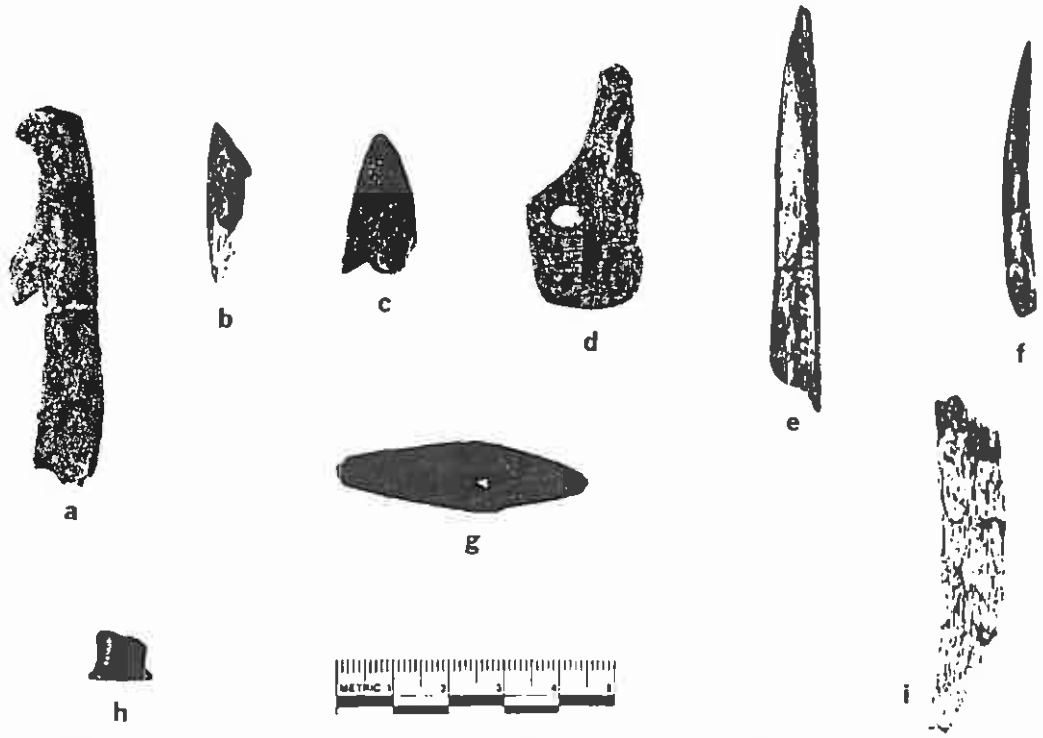

Figure 37: AFG-098, Upper Component (a-g, i) bone, antler, and ivory artifacts, h- Lower Component, jet labret.

Wood. Four examples of culturally altered wood were recovered from the upper component at AFG-098. A carved wood cylinder (UA91-92-094), from the upper component, is rounded at one end and broken at the other end. The heavily charred artifact is 6.21 cm long, 1.50 cm wide and 1.33 cm thick. It is carved from a spruce limb section. A smaller, slightly curved and elongate section of carved wood (UA91-92-124) is 6.5 cm long, 0.8 cm wide, and 0.3 cm thick (maximum dimensions). The item tapers in both width and thickness towards the ends, and has been perforated in the approximate center to accommodate a (0.2 cm wide) line or peg. It has been tentatively identified as spruce. A minute segment of badly deteriorated line or peg, which was present in the hole, was identified as undifferentiated plant material, probably softwood fiber. This artifact, which is uncarbonized, is of unknown function.

Another carved piece of spruce (UA91-92-177) is rounded at one end and at the time of recovery had a split in the carved end. The fragment is 6.10 cm long, 0.94 cm wide and 0.80 cm thick. A badly deteriorated post (UA91-92-233), which appears to relate to an upper component structure, was identified as spruce. The specimen measured approximately 15 cm in diameter at the time of recovery.

Unworked Wood/Charcoal. Wood which has not been culturally modified is described in Appendix 1.

Plant Fiber and Bark Materials. Five examples of fiber and bark materials, including modified birch bark, unmodified bark, grass matting, and a textile fragment, were recovered from the upper component. An unmodified bark fragment (UA91-92-132) which was initially collected for radiocarbon dating was not subjected to microscopic analysis. A probable container (UA91-92-145) is represented by several badly deteriorated birch bark sections which had been cut and stitched together (Figures 38 and 39). The preserved segment is L-shaped and measures 25 cm by 18 cm. The high resin content of the bark contributed to its preservation.

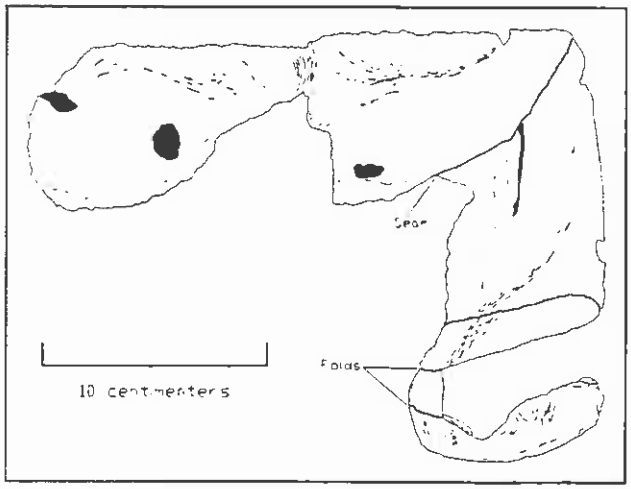

Figure 38: AFG-098, birch bark container. UA91-92-145.

A 1 cm^2 section of charred, twined textile (UA91-92-225), probably basketry, was also recovered from the upper component (Figure 40). The specimen is characterized by simple, close twining, with 4.5 wefts and 3 warps per cm^2. Wefts consist of two Z-twisted strands with average diameters of approximately 2.5 mm. Warps, comprised of single strands, are approximately 3 mm in diameter, although some shrinkage may have occurred as a result of carbonization.

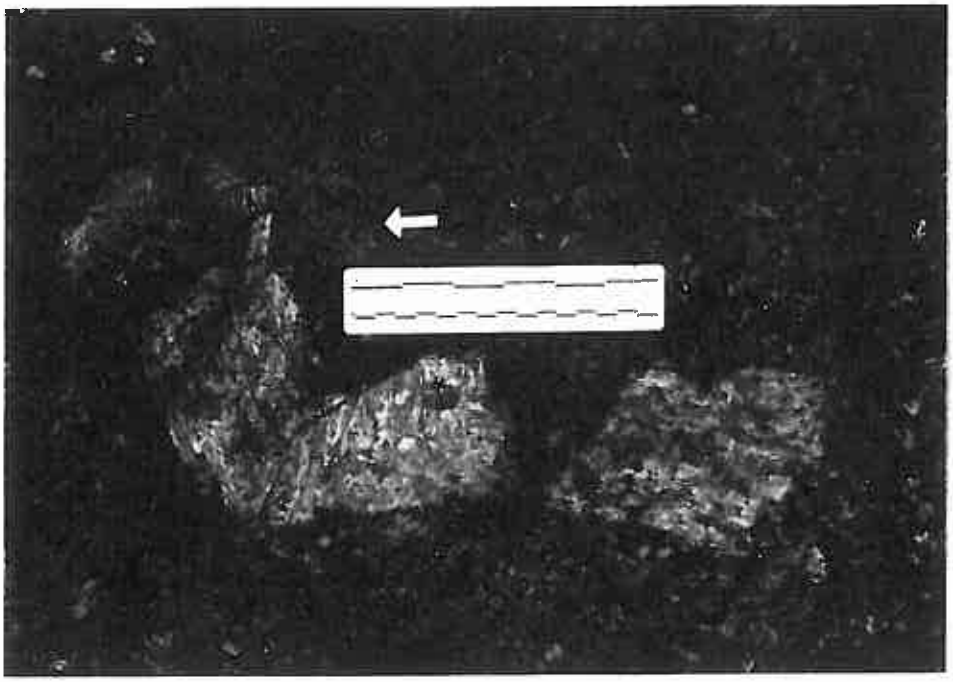

Figure 39: AFG-098, birch bark container (UA91-92-145) *in situ*.

Figure 40: AFG-098, burned textile fragment (UA91-92-225), scale = mm.

Both weft and warp strands have been microscopically identified as softwood fiber, although size and condition of the specimen has thus far precluded a specific taxonomic identification. Traditional softwood fiber materials used in twined basketry consist largely of westernredcedar (*Thuja plicata*) bark, Alaska yellow cedar (*Chamaecyparis nootkatensis*) bark, spruce (*Picea* spp.) root, or combinations of the above. Only spruce would have been locally available. The nearest yellow cedar is presently in Prince William Sound, and the nearest redcedar grows in southern Southeast Alaska. Photomicrographs and prepared slide mounts have been sent to the USDA Forest Products Laboratory in Madison, Wisconsin, and to the Purdue University Forestry Department in Lafayette, Indiana for examination. Twined basketry has a circum-Pacific distribution. In Alaska it has been documented among the Tsimshian, Haida, Tlingit, Copper River Eyak, Chugach, and Tanaina. Limited occurrences have also been documented among the Koniag and Bristol Bay Eskimo (de Laguna 1964:179; Larson 1950). Cressman (in Heizer 1956:29-30) described two types of twined basketry from the lower levels of the Uyak site, one of which was a simple close-twined Z-twist specimen with false embroidery. Materials were not specifically identified for the Uyak specimens.

One sample of carbonized grass (UA91-92-242) from the upper component apparently represents matting. This type of material, which is relatively common in both upper and lower components, is typically comprised of lenses of parallel, tightly clustered grass stems. No perpendicular binders were noted in any collected samples, but these may have been widely spaced if present. At the Uyak site Hrdlicka (1944:342) noted "Thick floor mats of parallel fibers originally held together, in all probability, by wide apart rows of stitching,...". Floors of all the Uyak houses were covered with grass mats. Koniag grass mats are also mentioned in the ethnographic literature, and said to be "much coarser than those of Oonalashka (Sauer 1802:175-176). Another sample of possible matting (UA91-92-170) could not be substantiated as grass, but microscopically appears to be of some other herbaceous plant fiber.

Seeds. Two aggregate seed concentrations, both uncarbonized, were recovered with adhering matrix. One of the samples (UA91-92-174) contained 1,171 whole and 347 fragmentary seeds. The bulk of the seeds (1,157 whole and 326 fragmentary) are attributed to red-berried elder (*Sambucus racemosa*). Another 14 seeds (whole and fragmentary) could not be confidently identified due to decomposition, but are believed also to be red-berried elder. The remaining seeds (5 whole and 15 fragmentary) have been identified as salmonberry (*Rubus spectabilis*). The other sample (UA91-92-214) was very similar to that described above, but seeds were not quantified. The sample, viewed under a low power dissecting microscope, revealed a preponderance of red-berried elder (*Sambucus racemosa*) seeds (probably several dozen) and a much smaller number (< 10) of salmonberry (*Rubus spectabilis*) seeds. A few possible grass seeds were also noted, along with a matrix of decayed wood and organic-enriched soil. Interpretation of both seed concentrations must consider possible derivation from human or animal fecal matter or rodent burrows, as well as cultural origins.

Flotation Sample 1 (UA91-92-236). A single flotation sample (Sample 1) from the upper component midden has been analyzed. Methods and procedures are described in Appendix 1. Results of the light (botanical) fraction analysis are presented in Table 8 and Figure 41. The bulk of >2 mm materials in the sample (58.5% by weight) consists of wood residues, which are predominantly carbonized (Table 8, # 1). Nine pieces of spruce (*Picea* spp.) charcoal and 1 piece of alder (*Alnus* spp.) charcoal were identified out of a random subsample of 10. The spruce is presumed to be Sitka spruce (*Picea sitchensis*), the only softwood species which is currently found on Shuyak or adjacent islands. This is substantiated by the presence of diagnostic *Picea sitchensis* needles in the sample. The alder is most probably Sitka alder (*Alnus crispa*), the only species currently native to the island.

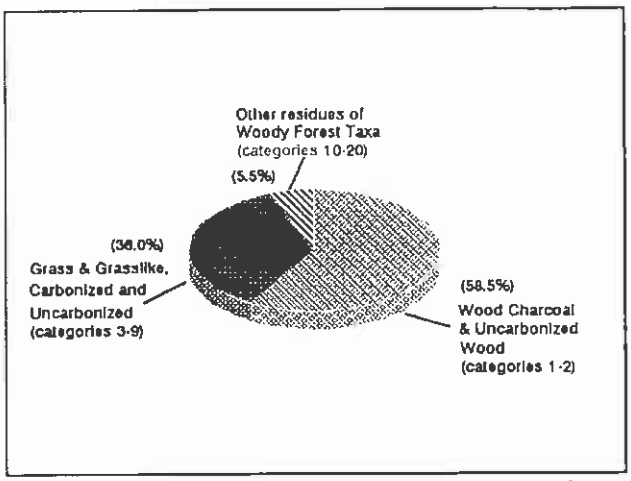

Figure 41: Categories of plant materials from Flotation Sample 1, AFG-098, UA91-92-236.

The second most abundant category (36% by weight) consists of herbaceous stems and rhizomes from an indeterminate species of grass (Table 8, # 3-9). The most likely candidate, based upon its common occurrence and known widespread use as a raw material, is lyme grass (*Elymus arenarius* subsp. *arenarius*), although eighteen genera (39 species) of grass presently occur on the island (Hulten 1968:82-197). Grass remains have been recovered from both upper and lower components, and is probably related to its use as a common raw material for matting (see UA91-92-242 discussion, above), fish cutting, insulation, and other uses. It is likely that species of grass occurred commonly within the beach fringe area adjacent to the site at the time of occupation. It is possible that the inhabitants of Shuyak Island routinely cut the grass around their homes and villages.
Residues of forest taxa, in addition to wood, comprise 5.5% (by weight) of the sample (Table 8, # 10-20). These include spruce (*Picea sitchensis*) twigs, needles, cone scales, and bark; possible cottonwood (*Populus* spp.) and willow (*Salix* spp.) buds; and a spinous stem fragment, probably from salmonberry (*Rubus spectabilis*).

Seventy-three whole and fragmentary seeds, representing 12 taxa, were recovered from the < 2 mm sample screens (Table 9). All taxa probably would have been available in the moist woodlands and clearings adjacent to the site. The degree to which the AFG-098 seeds are fortuitous inclusions or culturally derived is indeterminate. Although a comprehensive ethnobotany has not been published for the Kodiak area, it is known that various parts of all the taxa represented were used by inhabitants of adjacent areas (Kari 1987; Wennekens 1985; Graham 1985). Known ethnographic uses of plants represented at AFG-098 are summarized in Table 10.

Table 8. Light Fraction Constituents of AFG-098 Flotation Sample No. 1 (UA91-92-236).

Category/Taxon Description	Weight	Count	% by Wt	% by Count	Weight	Count	
(1) Wood Charcoal (refer Table 19)	2.59	415	55.11	40.97			
(2) Wood (unc)	0.15	029	03.19	02.86			
(3) Stems/rhizomes, noded, >1.5mm diam. (unc)	0.18	027	03.83	02.67			
(4) Stems/rhizomes, noded, >1.5mm diam. (c)	0.04	007	00.85	00.69			
(5) Rhizomes, noded, <1.5mm diam. (c)	0.01	003	00.21	00.30			
(6) Stems/rhizomes, unnoded, >1.5mm diam. (unc)	0.63	236	13.40	23.30			
(7) Stems, fibrous, herbaceous & grasslike (unc)	0.78	222	16.60	21.92			
(8) Stems, fibrous, herbaceous & grasslike (c)	0.01	002	00.21	00.20			
(9) Leaves, graminae	0.04	005	00.85	00.49			
(10) Twigs, *Picea* (c)	0.02	005	00.43	00.49			
(11) Twigs, unidentified (unc)	0.02	001	00.43	00.10			
(12) Needles, *Picea sitchensis* (unc)	0.01	001	00.21	00.10			
(13) Needles, *Picea sitchensis* (c)	<.01	010	<0.21	00.99			
(14) Cone scales, *Picea* (unc)	0.03	007	00.64	00.69		<.01	001
(15) Bud, *Populus*? type (c)						<.01	001
(16) Bud, *Salix*? type (unc)						0.01	001
(17) Bud, unidentified (c)						<.01	001
(18) Bark, *Picea*? (unc)	0.12	017	02.55	01.68			
(19) Bark, unidentified (c)	0.04	020	00.85	01.97			
(20) Stem, spinous, *Rubus*?, (unc)	0.02	001	00.43	00.10			
(21) Unid. botanical type 1, amorphous hemi-spheroid, thick-walled and hollow (c)	<.01	001	<0.21	00.10			
(22) Unid. botanical type 2, "sombrero-shaped," probably pedicels or peduncles (unc)	0.01	004	00.21	00.39			
(23) Seeds (unc; whole & fragments) (refer Table 9)						0.04	059
(24) Seeds (c; whole & fragments) (refer Table 9)						0.02	014
(25) Sample residue (c/unc; <2mm)						23.35	
(Subtotal), botanical only; basis for % calculations	**(04.70)**	**(1013)**	**(100%)**	**(100%)**		**(23.42)**	**(067)**
(26) Exoskeleton, crustacean?, chitinous/striated (c?)	0.06	015					
(27) Exoskeleton, insect, chitinous (unc)						<.01	001
(28) Insect galls	0.01	004					
(29) Contamination (unc; >2mm)	1.94	214					
(Total), including nonbotanical (categories 26-29)	**(6.71)**	**(1243)**				**(23.42)**	**(068)**

(c) = carbonized; (unc) = uncarbonized n

The columns in Table 8 are separated by size with the weight, count and percentage columns on the left displaying samples measuring less than 2mm and the two columns on the right representing samples greater than 2mm in size.

Table 9. Distribution of Seed Types by Frequency of Occurrence: AFG-098 Flotation Sample 1, Light Fraction (UA91-92-236)

Taxa/Category				
Carbonized		(N) Total		(N) Uncarb.(N) % of Total
Arctostaphylos alpina?		01	01	01.37
Chenopodium album	25		25	34.25
Cyperaceae	07	01	08	10.96
Galium boreale?	01		01	01.37
Galium trifidum?		02	02	02.74
Geum spp. (contaminant?)	01		01	01.37
Graminae	01	02	03	04.11
Picea spp.		02	02	02.74
Potentilla palustris?		03	03	04.11
Rosa spp. (*R. nutkana*?)		01	01	01.37
Rubus spectabilis	16		16	21.92
Sambucus racemosa	08		08	10.96
Unidentified Seeds		02	02	02.74
Total	(59)	(14)	(73)	(100%)

Table 10. Cultural Uses of Taxa Represented by Seeds in the Gulf of Alaska. AFG-098 Flotation Sample 1, Light Fraction (UA91-92-236)

Taxa/Category	Type Use/Notes	Citation
Arctostaphylos alpina? (Alpine Bearberry)	Berries consumed; dried powdered leaves used as cosmetic; leaves used as medicine or in a smoking mixture	Kari 1987:73 Graham 1985:103
Chenopodium album (Lamb's Quarters)	Leaves, buds, flowers, and seeds are edible; high in vitamins A and C; *C. album* is polymorphic and commonly found on archaeological sites outside Alaska	Graham 1985:34
Cyperaceae (Sedge Family)	*Eriophorum* flower heads used as fire starters or as pillow stuffing. Carex is said to have been used to make baskets. Other genera were probably also used.	Kari 1987:106 Osgood 1966:108) Wennekens 1985:61
Galium boreale? *Galium trifidum*? (Bedstraw)	Both *G. boreale and G. trifidum* are aromatic herbs similar to wormwood, with many medicinal uses. Leaves, seeds, and roots used in teas; crushed leaves used in poultices; leaves and roots are used to produce dyes.	Kari 1987:141 Graham 1985:45

Geum spp. (contaminant?) (Avens)	Dried rhizome, fresh plant, or leaves used in medicinal tonic; fresh leaves used in poultice. Seeds are hooked and become easily attached to clothes.	Graham 1985:72-73
Graminae (Grass Family)	Used to manufacture baskets and mats; fish is cut on bundles of grass, which is boiled in times of food shortage; burned as mosquito repellant; used as insulation, bedding, cache pit lining, etc. limited medicinal uses; to tie umbilical cords of newborn infants.	Kari 1987:102-104 Wennekens 1985:43,60,67 Hrdlicka 1944:342 Sauer 1802:175-176
Picea spp. (Spruce)	Armor, splitting wedges, sleds, shafts, digging sticks, etc.; construction materials; outer bark as a dye or to cut fish on; pitch is used as canoe/kayak caulking; roots used to make baskets or as cordage; sap has medicinal uses; bows used as bedding or as makeshift sleds; cambium is eaten; needles and cones used in tea	Kari 1987:28-35 Osgood 1966 Graham 1985:129-131 Wennekens 1985:22 Birket-Smith 1953:44
Potentilla palustris? (Marsh Fivefinger)	Dried leaves used in teas; medicinal and food uses are reported for other species	Graham 1985:74 Wennekens 1985:47
Rosa spp. (*R. nutkana?*) (Nootka Rose)	Fruits and flowers eaten; tea made with buds, leaves, and stems for medicinal use; inner and outer bark used to induce vomiting; fruits high in vitamin C, seeds high in vitamin E	Kari 1987:83-84 Osgood 1966:41 Kalifornsky 1984:62 Graham 1985:121-123
Rubus spectabilis (Salmonberry)	Berries, blossoms, leaves, and shoots are eaten or used in tea; bark and leaves used medicinally.	Kari 1987:75 Graham 1985:115-116 Wennekens 1985:29-30
Sambucus racemosa (Red-berried Elder)	Medicinal tea made from roots and tea; topical medicine made from bark; children make pop-guns from stems; fleshy portion of fruits are edible, but seeds said to be poisonous; fruit boiled and eaten with seal oil; yellow dye from leaves, red and lilac dyes from berries.	Kari 1987:89-90 Graham 1985:104-105 Wennekens 1985:36, 66, 71

Sample constituents other than those described above include two categories (Table 8, # 21-22), < 2 mm sample residue (refer Appendix 1), and non-botanical inclusions. The latter consists of insect and crustacean parts, carbonized insect galls, and contaminants.

Lower Component Artifacts

The Lower Component deposits occur mainly in the meter wide trence excavated from above the mean high tide into the middle tidal zone. An apparent house floor in the upper area of the trench yielded burned bone debris including fragmentary bone artifacts. Some of the more time specific artifacts from the site occurred in the Lower Component.

Projectile Points. Stemmed ground slate projectile points with acute angle barbs (N= 4) comprise the majority of the ground slate points in the Lower Component of AFG-098. Only complete point (UA91-92-019) is 10.05 cm long, 2.72 mc wide, and 0.58 cm thick (Figure 42a). The stem is 2.28 cm long, 1.86 cm wide, with converging sides and a rounded base. The barbs extend out at a barely acute angle and the point has a flattened diamond cross-section. A medial ridge extends along the blade length on one face of the point. The other face is convex.

UA91-92-018 and UA91-92-024 are similar in form with acute angle barbs and stems with straight, slightly convergent edges and straight base. The stem of UA91-92-024 is 1.58 cm wide, 1.82 cm long, and thins slightly to the base (Figure 42b). The blade portion of that point is 0.72 cm thick and biconvex in cross-section. The stem of UA91-92-018 is 1.61 cm wide (Figure 42c). The fourth stemmed and barbed ground slate point in this component is UA91-92-008)(Figure 42g). Most of the stem and the upper part of the blade is missing. The remaining part of the stem measures 1.31 cm wide. One barb is missing and the blade edges constrict slightly above the barbs before flaring back out toward the tip. Cross-section of the point is a very flat biconvex form. Blade width is 2.20 cm and thickness 0.33 cm.

The other whole ground slate point (UA91-92-025) has a triangular outline with a notch chipped into the base (Figure 42h). Both faces have a thinning facet ground from the base to approximately 1/3 of the point length. The point cross-section is biconvex but a medial ridge divides one face near the tip. This point measures 4.96 cm long, 2.27 cm wide, and 0.56 cm thick.

The burned tip of a slate point (UA91-92-027) is missing the entire lower part. The blade has a flattened diamond cross-section in the middle part of the blade with a medial ridge. The blade is 1.32 cm wide and 0.39 cm thick. Three more blade fragments have flattened biconvex cross-sections. One piece (UA91-92-219) has squared edges and probably is a narrowly rounded base.

Knives. An ulu fragment (UA91-92-216) with a slightly curved cutting edge which measures 0.41 cm thick. The fragment has a bifacially ground edge. Two other ground slate fragments are pieces which have been smoothed minimally on the faces and have a single

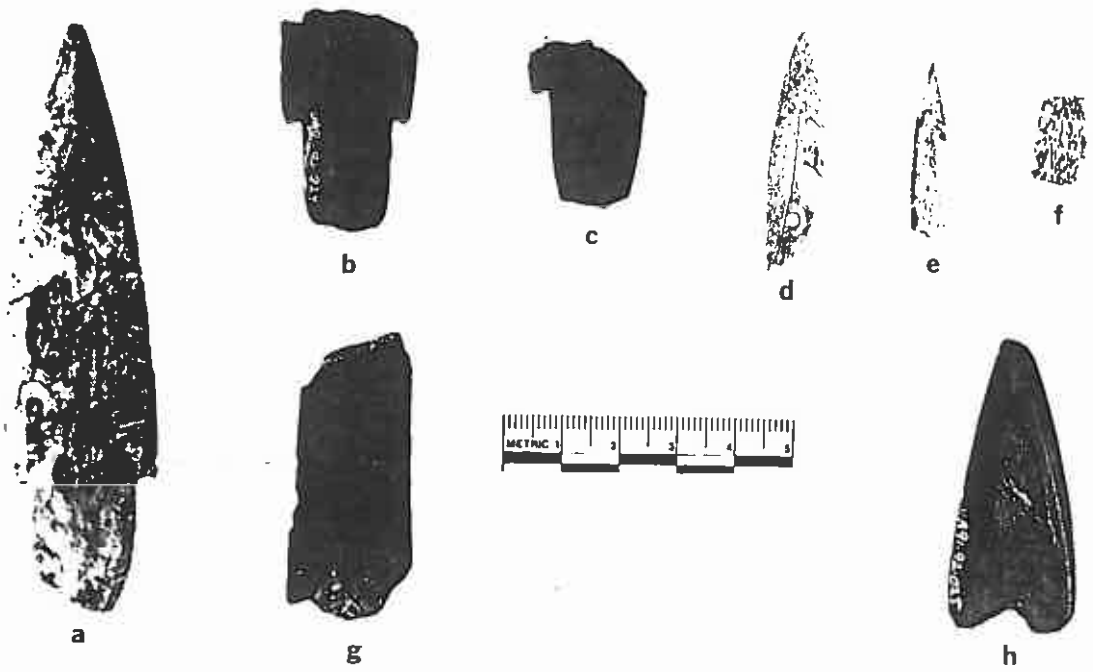

Figure 42: AFG-098, Lower Component, slate points and bone artifacts.

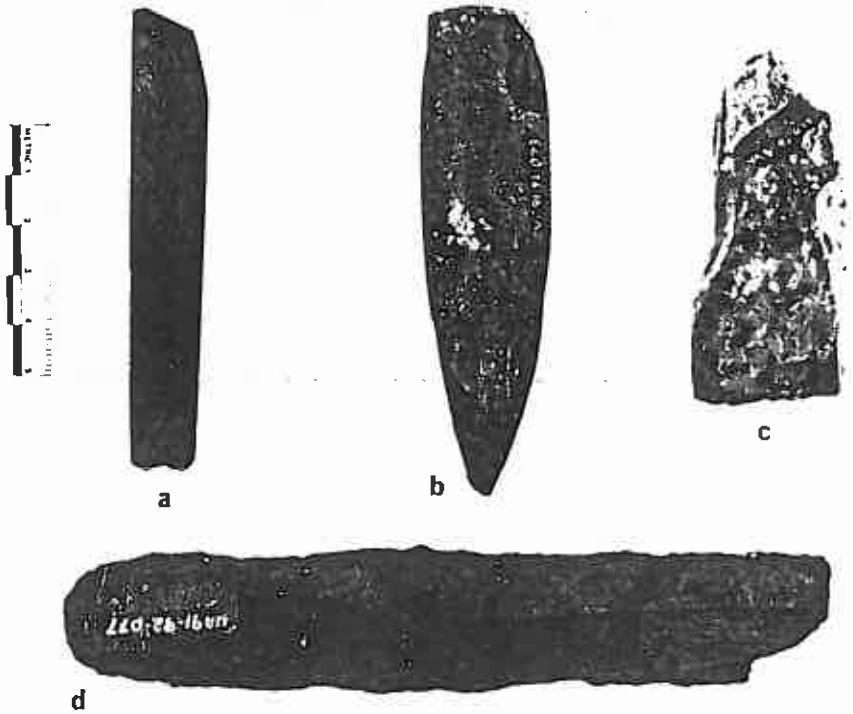

Figure 43: AFG-098, Lower Component, chipped and ground stone artifacts.

bifacially ground edge. Both appear to be cutting implements manufactured quickly and for brief use. UA91-92-034 appears almost complete with a straight cutting edge and a blunt prepared back edge. It measures 4.24 cm long, 2.17 cm wide, and 0.38 cm thick. The other piece (UA91-92-062) is similarly formed but is only a fragment and is 0.24 cm thick.

Planing Adzes. Two planing adzes were formed by polishing overall. The most complete adze (UA91-92-075) has highly polished top and bottom faces with chipped sides smoothed by polishing (Figure 43a). The butt is broken but appears to have been narrower than the bit and polished. The cutting edge angle is 32° and not angles laterally. The tool is 3.29 cm wide, 1.59 cm thick, and broken laterally. The second planing adze is broken even more thoroughly. UA91-92-073 had highly polished upper and lower faces (Figure 43b). It is split lengthwise on both sides but measures 9.56 cm long and 2.59 cm thick. The cutting edge angle is 42°.

Miscellaneous Ground Stone. A chisel-like implement ground from slate occurs in the Lower Component at AFG-098. The tool (UA91-92-001) tapers from the broken butt to a thin end with a square slanted terminus (Figure 43c). A natural fracture forms on lateral edge and the opposite side is formed by ground facets. Both upper and lower faces are well smoothed. The "chisel" is 9.24 cm long, 1.64 cm wide, and 0.68 cm thick.

Incised Slate. An incised slate fragment (UA91-92-220) bears an etching of a face. A "Y" configuration represents the eyebrows and nose with circular eyes in appropriate anatomical position. A hatched band crosses above the face. Five parallel, slanted bars mark the left margin of the image. The piece is etched on a split fragment of ulu which is 2.94 cm long and 2.26 cm wide (Figure 44).

Figure 44: AFG-098, Incised slate figurine.

Whetstones. Two whetstone fragments occur in this component. The largest example (UA91-92-098) is a fragment with a depression worn into the top. One edge has the original curved margin of the whetstone. This whetstone fragment is 7.37 cm long, 5.32 cm wide, and 2.23 cm thick. The smaller fragment (UA91-92-092) is a coarse sandstone piece with one face smoothed into a depression. It is 4.39 cm long, 2.07 cm wide, and 0.53 cm thick.

Stone Saw. A stone saw made from a schist was found in two pieces. The fragments form a triangular outline saw with a long straight sawing edge. Both faces have been minimally smoothed. The saw is 15.00 cm long, 6.40 cm wide, and 0.48 cm thick. The sawing edge measures 0.25 cm thick.

Jet Labret. A small labret fashioned from jet (UA91-92-079) is a flanged pin form but has a broken shaft (Figure 37h). The flanged face of the labret is oval, 1.20 cm wide, and 0.75 cm thick. The shaft measures 1.00 cm wide and 0.56 cm thick.

Chipped Slate Preform. A chipped slate blade preform (UA91-92-077) is long and narrow, measuring 15.40 cm long, 2.90 cm wide, and 1.25 cm thick (Figure 43d). One end is broken and the other end is rounded. Grinding on one face near the edge and smoothed edges suggest this piece was in a preliminary stage of manufacture but beyond the initial chipped form.

Miscellaneous Stone. Two hammerstones were recovered from the Lower Component excavations. UA91-92-089 is an oval, coarse grained rock with faint battering marks on one end. The other hammerstone (UA91-92-102) is roughly cylindrical and has peck marks on one end. The other end is broken and the resulting edge is well battered. A calcite crystal (UA91-92-110) has wear at the sharp end but otherwise has no evidence of wear. The final stone artifact to be considered for the Lower Component is a small, factted piece of siltstone. All surfaces are smoothed as if rubbed to obtain pigment. The piece is 1.98 cm in diameter.

Bone. A mostly complete, multibarbed bone dart head (UA91-92-218) has two barbs on one side (Figure 42d). The base is a rounded point and the line hole is near the center of the base. A line is incised down the center of the dart from the line hole to near the sharp flat tip. The dart outline seems to have been formed before the barbs were cut out. It is 4.19 cm long, 1.05 cm wide, 0.28 cm thick and the line hole 0.29 cm in diameter.

A barbed bone fish hook fragment (UA91-92-246b)(Figure 42e) was recovered with other fragments of worked and burned bone from floor deposits near the upper end of the trench. The hook has an oval cross-section shank, a sharp point, and a prominent barb. The shank is broken. Total length of the piece is 3.08 cm, 0.71 cm wide, and 0.44 cm thick. The triangular barb extends 0.30 cm out from the shank. UA91-92-246a and UA91-92-246c (Figure 42f) are both fragments of bone shaft with barbs cut into them.

UA91-92-227 is a split and broken piece of bone ground to a flat tip. The piece is 3.05 cm long, 0.70 cm wide, and 0.11 cm thick.

Wood. Three examples of culturally altered wood were recovered from the Lower Component at AFG-098. A bipointed wooden pin (UA91-92-122) has been tentatively identified as spruce. The specimen, which is uncarbonized and dark stained, measures 0.71 cm (maximum length) by 0.06 cm (maximum width) and is slightly compressed in cross-section. It appears to have been sharpened at each end, although one end is slightly broader and more steeply carved. The specimen is slightly curved, possibly as a result of drying. Another elongate section of carved wood (UA91-92-176), which is carbonized, is 40.6 cm long, 1 cm wide, and 0.45 cm thick. It tapers in width and thickness from a straight, hinge-fractured end to a blunt point at the opposite end. The artifact, which is roughly plano-convex in cross-section with a slight dorsal keel, is of unknown function. A sharpened cylindrical section of wood (UA91-92-221) has been carved from a larger section of spruce and may be a pin or small peg. It is thoroughly carbonized and measures 2.22 cm long by 0.48 cm wide by 0.44 cm thick.

Unworked Wood/Charcoal. Wood which has not been culturally modified is described in Appendix 1.

Plant Fiber and Bark Materials. Three examples of fiber and bark materials, including modified birch bark and samples of possible matting, were recovered from the lower component. The single birch bark specimen (UA91-92-126) consists of a solid, tightly wrapped roll which is 5.10 cm wide and 2.12 cm in diameter (maximum, as the roll has been compressed). No specific cut marks were visible. While birch bark sometimes has a tendency to shed and curl naturally, this roll's uniform width, tight wrapping, and presence within midden context suggest a cultural origin.

Two samples of possible charred matting were analyzed for structure and raw material identification. Samples were derived from lenses of densely compressed parallel strands of vegetal material. Like similar samples from the upper component, no perpendicular "binder" strands were noted. One of the samples (UA91-92-140) was microscopically identified as grass. The other sample (UA91-92-170), based upon microanatomy, appears to be vascular material from an herbaceous plant other than grass.

Surface Artifacts

Projectile Points. The most diagnostic point fragment (UA91-92-006) found on the surface of AFG-098 came from Locus B on Big Bay and typologically should belong in an Ocean Bay II component. The fragment has a stem offset from the blade by right angle shoulders. The stem tapers slightly to the straight base and is serrated on both lateral edges. The blade is biconvex in cross-section, is 4.27 cm wide, and 0.58 cm thick.

A badly water-worn and battered blade fragment (UA91-92-016) has several lines incised from side to side in each face. The point fragment is broken at one end, has a biconvex cross-section and measures 2.64 cm wide and 0.56 cm thick. It was recovered from the beach at least 30 m. south of the intertidal midden exposure in Locus A.

A narrow slate blade point tip (UA91-92-014) is broken to the mid-section of the blade. It has a cross-section which is convex on one face a medial ridge on the opposite face. The fragment measures 1.49 cm wide and 0.44 cm thick. It was found in the upper intertidal zone about 25 m. south of the exposed midden of Locus A.

Slate point fragment UA91-92-005 was found in the upper intertidal zone close to the fire cracked rock exposure of Locus A. The piece is a tip portion with a biconvex cross-section. It measures 2.05 cm wide and 0.47 cm thick.

Slate Knives. An apparent "man's" knife blade (UA91-92-055) has one slightly convex edge which is bifacially ground with the opposite edge formed by a natural fracture which probably was not ground. The knife has a biconvex cross-section. One end is broken, the other has a rounded end. It is 12.83 cm long, 3.65 cm wide and 0.48 cm thick.

An ulu fragment (UA91-92-070) is broken in half. It has a slightly curved bifacial cutting edge and measures 6.39 cm cutting edge to back and 0.65 cm thick. This fragment came

from the upper intertidal zone just to the northwest of the test trench in Locus A.
The third knife fragment recovered from the beach at AFG-098 (UA91-92-063) is a small ulu fragment with a unifacially ground edge. It is questionable whether that edge is a remanent of the cutting edge as an adjacent edge is blunted in the fashion normal for a back edge. The fragment is badly water-worn and 0.36 cm thick. It was recovered in the upper tidal zone about 10 m. south of the exposed fire cracked rocks in Locus A.
A piece of slate which was sawn and snapped was found in Locus A near the fire cracked rock exposure. The piece was sawn from both faces and is 0.63 cm thick. It was otherwise unaltered.

Miscellaneous Stone. Two notched beach cobbles were recovered from just northwest of the trench excavated in Locus A. UA91-92-105 is a cobble with notches at both ends which weighs 695 grams. The cobble is 9.98 cm long, 9.39 cm wide, and 4.43 cm thick. It came from the high intertidal zone. UA91-92-090 also came from the upper intertidal zone. It has notches at both ends, weighs 418 grams, and measures 9.61 cm, 7.17 cm wide, and 3.92 cm thick.

A hammerstone found in the high intertidal zone northwest of the test trench in Locus A, has both ends extensively flattened from pounding. It measures 8.60 cm long, 6.30 cm wide, and 4.99 cm thick. The stone weighs 452.4 grams.
A very small fragment of reddish brown chert (UA91-92-112) was found on the beach surface at one end of the exposure of fire cracked rocks in Locus A. The triangular piece is broken on all edges and appears to be the middle part of a thick flake.

AFG-098 Artifact Comparison

The two stratigraphic and cultural components at the AFG-098 Site possess diagnostic artifacts and traits which can be used to age the collections. Comparison with other, well dated, collections is a legitimate and frequently used method of aging collections and illustrating relationships between areas.

The major collections in the region which are well dated with an established radiocarbon date sequence are the Brooks River sites, Shelikof Strait-Alaska Peninsula sites, Karluk sites, Uyak area sites, Rolling Bay Site, Kiavak Site, and the Monashaka Bay Site for the Kodiak Island and Alaska Peninsula areas. In the Cook Inlet area, the SEL-010 Site, Chugachik Island Site, Cottonwood Creek Site, Yukon Island Fox Farm Bluff Site, sites on the Kenai River, and the Beluga Point Site provide comparisons. The Palugvik Site and the Uqciuvit Site in Prince William Sound provide radiocarbon dated cultural correspondences.

The AFG-098 collections combined are very clearly related in age to the Koniag Phase of Kodiak Island prehistory. The ground slate projectile points, ulus, planing adzes, slate rods or "awls", grinding slabs, stone saws, labrets, incised stone fragments, barbed bone darts, and bone fish hooks all mirror Koniag Phase collections or contemporary collections from areas

adjacent to the Kodiak Island group. Individually however, some artifacts and traits have a longer range through time than just the Konaig period, ca. A.D. 1000 to contact.

The stemmed and barbed ground slate points from AFG-098 are very similar to points from the KAR-029 Site in Koniag levels (Crozier, 1989:90) and transitional Koniag levels (ibid.: 91). The AFG-098 points occur in both Lower and Upper components. Similar points also occur in layer 3 of KAR-031 (Jordan and Knecht,1988: 254) and Koniag deposits at the Kiavak, Site 418 (D.Clark, 1974: 211). These points also occur in Kachemak related collections from the same area (D.Clark,1966: 365). Mound Phase materials from the Shelikof Strait shore of the Alaska Peninsula include barbed slate points of similar form but which have been typologically combined with some other forms which occur in times (G.Clark 1977: 245). As a broad grouping the Type 3 points span the entire time range of ground slate in that area(ibid.). Further afield, Dumond (1981: 201) classifies these forms as dart blades(class 6) which occur in the Brooks River Camp Phase.

Stemmed and barbed slate points occur in Kachemak related collections in the lower Cook Inlet area (Workman, Lobdell, and Workman, 1980: 392) but also in a Konaig related collection from upper Cook Inlet, Beluga Point, North III (Reger 1981: 157). Such points from Prince William Sound generally come from Kachemak related deposits and not the later Chugach or Koniag related levels(de Laguna,1956: 157; Yarborough and Yarborough,1991: 130).

The stemmed and shouldered ground slate points in both components of AFG-098 compare favorably with one from the Kizhuyak Site (D.Clark 1974: 131) but few comparisons can be found in the literature on Kodiak prehistory. The Shelikof Strait material of several phases contain comparable points, most specifically Beach Phase and Mound Phase(G.Clark,1977: 201) but also in Birch Phase.

The triangular ground slate points with butt grinding and those with a carved basal thinning channel provide perhaps the tightest time range of the ground slate points. Ground butt facet points such as that in the AFG-098 lower component occur in the middle levels of the New Karluk Site, KAR-001 (Jordan and Knecht 1988: 259ff), the Rolling Bay Site (D.Clark 1974a: 209), the Kizhuyak Site (D.Clark, 1974b: 15), and Monashka Bay Site, layer B (ibid.: 32) on Kodiak Island. Butt facetted points on the Alaska Peninsula occur in Brooks River Camp Phase as insert blade IV (Dumond 1981: 201) and on the Shelikof Straits as a Type 7 polished stone projectile point in the Mound Phase (G.Clark 1977: 193). Ground slate end blades with basal thinning from a ground facet recovered at the Uqciuvit Site has been assigned to the Chugach Phase (Yarborough and Yarborough, 1991: 130). A similar end blade was recovered from Level I in an upland test of the McArthur Pass Site, SEL-188 (Schaaf and Johnson, 1990: 11).

Ground slate end blades basally thinned by carving a central channel are found in the upper levels of KAR-001 (Jordan and Knecht,1988: 263) and in the Rolling Bay Site (D.Clark,1974: 53). End blades with similar treatment are found in the Brooks Rivers drainage of the

Alaska Peninsula during the Bluffs and Pavik phases (Dumond,1981: 195). None have been dated on Shelikof Strait shore of the Alaska Peninsula, the Cook Inlet area, or Prince William Sound.

Ulus similar to the straight blade, notched back variety from AFG-098 occur in the both the Rolling Bay Site and Kiavak Site 418 as Form A (D.Clark 1974a: 100ff). The New Karluk Site, KAR-001, does contain notched back ulus in layer 8 but they seem to have a much broader stem. Most phases on the Shelikof Strait shore of the Alaska Peninsula yielded notched back ulus but not exactly the same blade form (G.Clark 1977: 201). The most precise form match with the AFG-098 examples are found in the Ulu IV class of B.R. Camp, B.R. Bluff, and Pavik Phases (Dumond,1981: 195; Harritt,1988a: 121).

Incised slate tablets or pebbles provide another artifact specific to a very short time span which is useful to trace throughout the area. The example in the Lower Component of AFG-098 has a distinctive facial art motif which is spread over much of the present Pacific Eskimo (Alutiq) area. Incised stones per se occur over a larger area and through a relatively long span of time but the specific facial motif is much more restricted. D.Clark (1964:123) concluded, based on then current data, that incised figurine tablets were most common on the northern end of Kodiak Island and Afognak Island during early Koniag times. Jordan and Knecht (1988: 270) reached a similar age estimate but assigned a more precise age of A.D. 1350 to A.D. 1500 for the motif. Similar forms from the Alaska Peninsula are documented in the B.R. Bluffs Phase (Harritt 1988a:119; 1988b:203).

AFG-111 SITE

AFG-111, discovered by EXXON archaeologists in 1989, consists of an intertidal lithic scatter and historic debris on the northwestern shore of Shuyak Harbor, southwest Shuyak Island (Figure 45). OHA archaeologists, who visited the site during the summer of 1990, relocated the material reported by EXXON and documented additional lithic artifacts. The scatter is located around the eastern side of a small lagoon which is subject to tidal flooding. Mousse and tar balls were reported on and adjacent to the site in 1989 and 1990.

Reconnaissance of the lagoon area on July 25, 1991, revealed approximately 20 lithic flakes and artifacts broadly scattered around the eastern and northeastern edges. Artifacts were primarily jasper which is prevalent in the Kodiak Archipelago, particularly on pre-Koniag sites. There was a notable absence of slate artifacts on the site. Surface artifacts were not collected, although potentially diagnostic specimens were photographed.

Two datum caps were established to map test pit locations. Datum A is located on a prominent outcrop on the south side of the lagoon entrance. Datum B is located at the upper edge of the boulder beach on the north side of the lagoon, near the lagoon entrance. Four test pits were excavated into sterile sediments around the lagoon in areas where artifacts were noted. Three of the test pits were located in the middle or upper intertidal

zone, while the fourth was located in the upland forest fringe on the north side of the lagoon. None of the test pits revealed subsurface archaeological deposits, and surface artifacts are interpreted as lag deposits resulting from *in situ* site erosion.

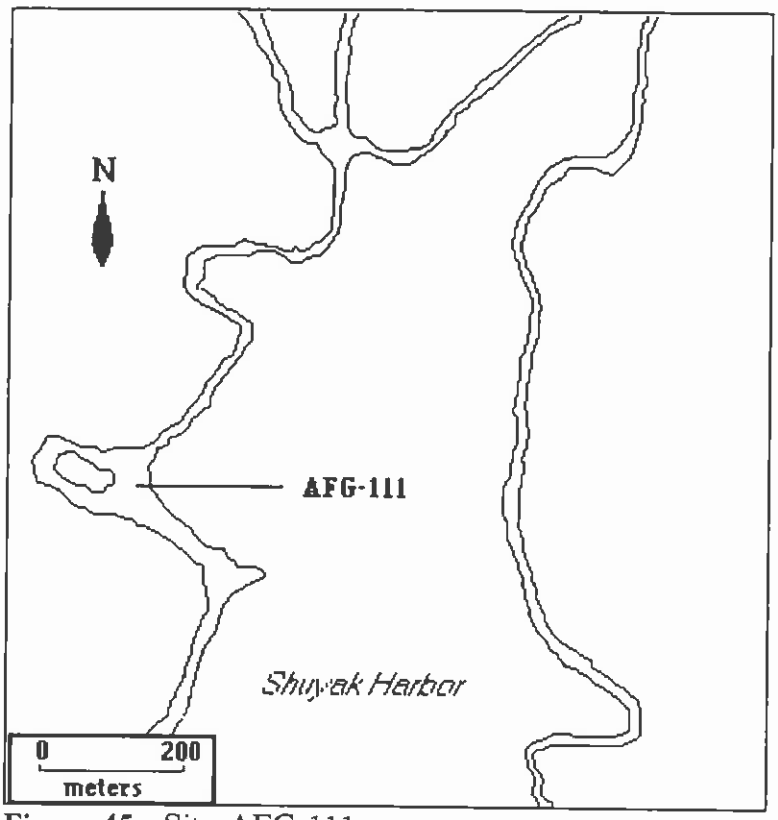

Figure 45: Site AFG-111

Test pit 1, located 4 m north of the tidal pool approximately midway down its length, penetrated 35 cm of mixed beach sand, gravels, and cobbles. These appear to be massive beach deposits, consistant with surface material, and are devoid of subsurface cultural material. Test pit 2 was located in the intertidal zone, just north of the tidal pool on the gravel bar which separates the tidal pool from Shuyak Harbor at low tide. Although a jasper biface fragment and flake were found on the surface in close proximity to the test pit, no subsurface cultural materials were noted. Sediments within the test pit were similar to the massive beach deposits encountered in test pit 1. Some sorting was evident in that 45 cm of mixed beach sand, gravels, and cobbles overlay a zone of larger beach cobbles to a depth of 60 cm. A small tarball was noted on the surface 50 cm southwest of test pit 2. Test pit 3 was located in the forested uplands on the north side of the tidal pool, approximately 50 m north of the outlet and 8 m above the beach. The culturally sterile test pit revealed a well developed forest soil comprised of 10 cm of duff and humus over 7 cm of Katmai Ash. Beneath the Katmai Ash was a humus underlain by an A_2 soil horizon or thin ash and a reddish sand/silt mineral soil to a depth of 43 cm. Test Pit 4, within the intertidal zone on the southeast side of the lagoon, was terminated at 25 cm after revealing sterile beach sand and gravels throughout.

Investigations at AFG-111 suggest that the site, due to an absence of subsurface archaeological deposits, has low potential to yield data important to an understanding of the prehistory of the area. Surface or near surface mousse was documented but no injury to archaeological materials is apparent. Due to the absence of buried archaeological deposits, no further work was deemed necessary at the site.

AFG-173 SITE

AFG-173 was recorded in 1989 by Exxon archaeologists on the basis of a small area of eroding FCR and possible organic-enriched soil (Figure 17). In 1990 OHA archaeologists visited the site and discovered two areas of apparent house depressions and midden separated by a pond. The site is located adjacent to an extensive gravel beach overlooking an unnamed bay north of Neketa Bay. Area A, located in a grassy area behind the south end of the beach, consists of three depressions, two of which are possibly multi-chambered, measuring 4-6 m in diameter. Testing revealed extensive midden deposits on a knoll just northeast of the depressions. Wild celery (*Heracleum lanatum*) is prevalent over this portion of the site. The FCR and organic-enriched soil discovered by Exxon is eroding from the beach scarp at the at the south end of the beach.

Area B consists of two subtle depressions, approximately 4 m in diameter, on a wooded terrace at the northern end of the beach. Testing in 1990 revealed midden deposits just south of the depressions on a *Heracleum*-covered knoll. Reconnaissance in 1991 revealed that midden is also eroding from a low beach scarp which borders a grass/low shrub saddle immediately below Area B (Figure 19). The saddle, which extends between the northern end of the beach and the pond. A decision was made to conduct subsurface testing at AFG-173 after the 1991 field reconnaissance revealed tar balls and oiled debris (Samples VOS91OHA-726-3 and --4) just above the exposed midden.

Test Stratigraphy

Only that portion of AFG-173 immediately behind the Area B midden exposure was tested. A single datum cap was installed on a bedrock outcrop at the northwest end of the beach, as a reference for mapping features, tar balls, and test pits. Four 50 cm^2 test pits were excavated across an 19 m area between the exposed midden and the pond to the east.

Test pits 1 and 3 were located just behind the beach scarp in the vicinity of the exposed midden. Test pit 1, 4.5 m behind the beach scarp, revealed 10 cm of peat and 10-15 cm of beach cobbles above the Katmai Ash. Below the Katmai Ash, the test pit penetrated approximately 6-7 cm of brown loam underlain by sandy beach gravels. This test pit, excavated to a maximum depth of 50 cm, was culturally sterile. Test pit 3, 2.0 m behind the beach scarp (i.e., between test pit 1 and the midden exposure), revealed 10-15 cm of midden overlain by 3 cm of Katmai Ash, 15 cm of peat, and 5 cm of beach gravels. The midden is underlain by sterile gravels and sand to a depth of 45 cm, the maximum depth of the test pit. The midden contains fish bones, various hardshell clams, FCR, and charcoal staining. A sediment sample (VOS91OHA-726-1A and -1B), was extracted from test pit 3 for chemical analysis and produced negative a finding for presence of oil.

Test pit 2 was located approximately 19 m from the beach scarp, on the northern slope of the saddle near the pond. The test pit revealed 10 cm of forest duff and 7 cm of Katmai

Ash underlain by approximately 15 cm of dark brown organic-enriched loam. The loam produced FCR, charcoal, a gray chert flake (UA91-94-006) and 6 unpolished slate flakes (UA91-94-001, -003, -004, -005, -007, and -008) to a depth of 40 cm. The test pit was excavated into a sterile dark reddish brown mineral soil to a maximum depth of 65 cm.

Test pit 4 was situated 10 m behind the beach scarp, roughly halfway between the midden exposure (test pit 3) and the northern end of the saddle (test pit 2). The test pit exposed 7-8 cm of duff, overlying 7 cm of Katmai Ash and 7-8 cm of dark brown forest soil. At the 20 cm level, the forest soil yielded a crude bifacially flaked and heavily battered greenstone implement which has the general shape of an ungrooved adze preform. A sediment sample (VOS91OHA0726-2A and -2B) was extracted from test pit 4 for chemical analysis but was not submitted for processing.

Preliminary data from AFG-173, while very limited, suggest that the site has the potential to yield data important to an understanding of the prehistory of the area. The site appears to meet eligibility requirements for inclusion on the National Register of Historic Places under Criterion D.

Three of the four test pits at AFG-173 (Area B) revealed midden or cultural materials between the beach scarp and the pond at the eastern edge of the site. The cultural materials, comprised of FCR, faunal remains, greenstone and slate flakes, chipping debitage, and a possible greenstone adze preform, are not culturally diagnostic. There is a likelihood, however, given the preservation potential for faunal remains and the apparent extent of artifact-bearing soils, that more excavations may produce diagnostic materials. There was no indication from sight or odor of oil within the test excavations despite surface finds.

PRINCE WILLIAM SOUND AREA

At the outset of the State of Alaska study of the impacts of oiling on archaeological sites, the Prince William Sound area was anticipated as being the prime location for suitable sites (Figure 46). Such was not the case, apparently for a number of reasons. A large portion of the Sound rose during the 1964 Good Friday Earthquake, placing many sites above the intertidal zone rather than lowering them into that setting. Another reason was that sites with rich and extensive cultural deposits on low shorelines in the subsidence area simply are not very common. Only the Kake Cove Site, SEW-068, provided the intertidal deposits necessary to address the question of effect on radiocarbon dating (Figures 47, 48). Three other sites were also examined but did not possess in situ intertidal deposits containing cultural remains. Two of the sites, SEW-077 and SEW-440, were not tested. The third site was tested with no cultural remains found.

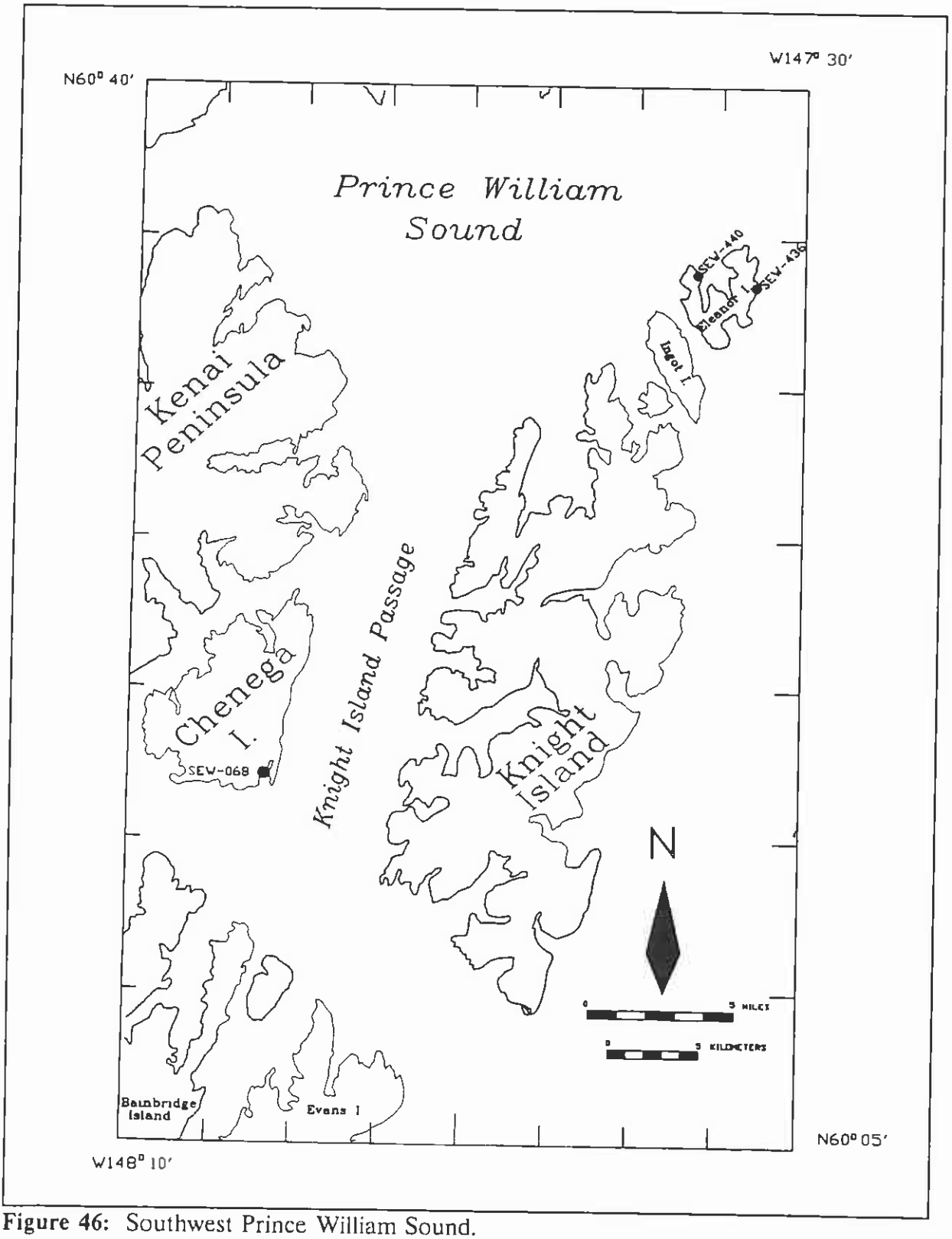

Figure 46: Southwest Prince William Sound.

SEW-068, KAKE COVE SITE

This site, known as the Kake Cove Site, was reported in 1956 by Fredrica de Laguna and the intertidal cultural deposits were briefly documented by EXXON archaeologists in 1990. Wooden artifacts were found eroding out of an intertidal peaty soil and stone artifacts were noted scattered over a large area of the beach (Figure 49). The adjacent upland is an historic fishing camp for the Chenega people who, through their Chenega Village Corporation, own the entire island. The site was visited 8/23/91 through 8/26/91. Prior to visiting the site, contact was made with the Chenega Village Corporation as they requested. A representative of the Chenega Board of Directors, Mr. Don Komkoff, traveled to the site and observed the State field crew during documentation of the site.

Figure 47: SEW-068, peaty soil with cultural remains eroding from the intertidal area.

The intertidal site area was examined July 11, 1989, by a EXXON field team who documented presence of "light" oiling in form of oil drops on boulders and a band of tar on the bedrock (EXXON,1989:1). A sketch map of the cove attached to the EXXON report indicates a pit was dug into the beach to a depth of 30 cm in an attempt to determine

presence of subsurface oil. The pit appears to have been placed in the immediate area of the exposed peaty soil but did not reveal any subsurface oil. Segment CH-17 was re-visited by the ADEC 7\18\89 and again on 10\11\89. The segment was re-assessed by a combined agency team on 4\20\90. A few patches of tar and drops were noted at that time (ADEC, 1990).Artifacts, both wood and stone, were mapped and collected. One locality containing a large number of bones was mapped and the bones collected for identification and analysis. All cultural remains were mapped relative to an iron reinforcing rod reference point (Datum "A") which was also referenced to the sketch map produced by EXXON archaeologists during 1990.

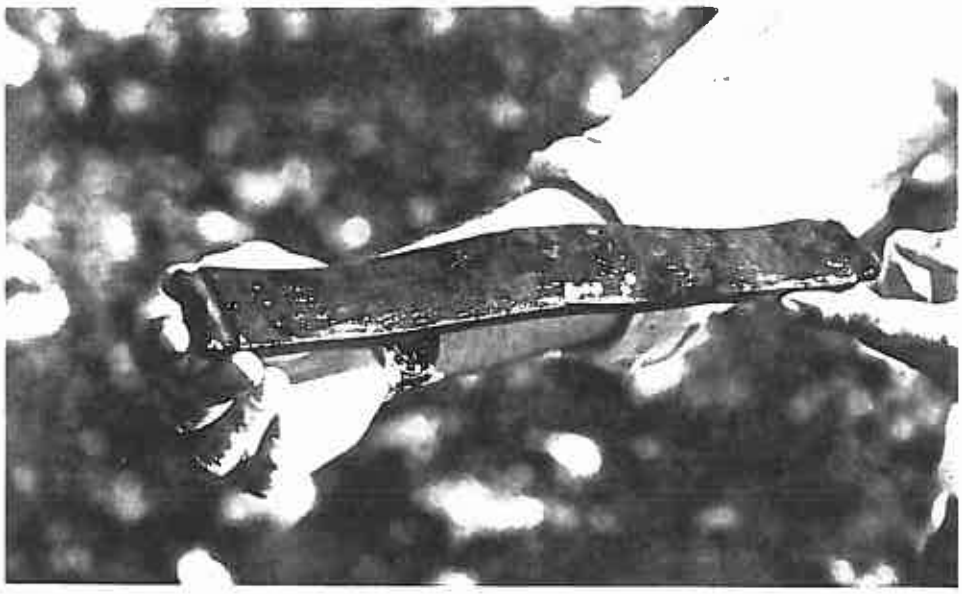

Figure 48: SEW-068, carved wooden artifact found during 1990 but lost from the intertidal area by 1991.

Test pits excavated where rounded cobbles cover the beach, revealed the cobble cover to be a thin armor overlying finer sediment and organic layers. Test Pit 4 contained a stratigraphic profile with cobbles and sand in the upper 5.0 cm overlying a peaty layer containing many small to medium size wood fragments. Intermittent lenses of sand interfinger with the peaty deposit. At 15.0 cm below the surface, a 5.0 cm thick layer of flat beach pebbles was encountered. At 20.0 -25.0 cm below the surface a highly fibrous, very sour peat containing no pebbles or wood, was found. That layer continued to at least 35.0 cm below the surface, the point at which testing was discontinued. The sour peaty soil is culturally sterile. None of the wood in the test appeared to be culturally modified nor were there any other indications of cultural activity. Test pit 3 yielded similar stratigraphy and lack of cultural evidence. Test pits 1 and 2 were not excavated because of the lack of results from 3 and 4.

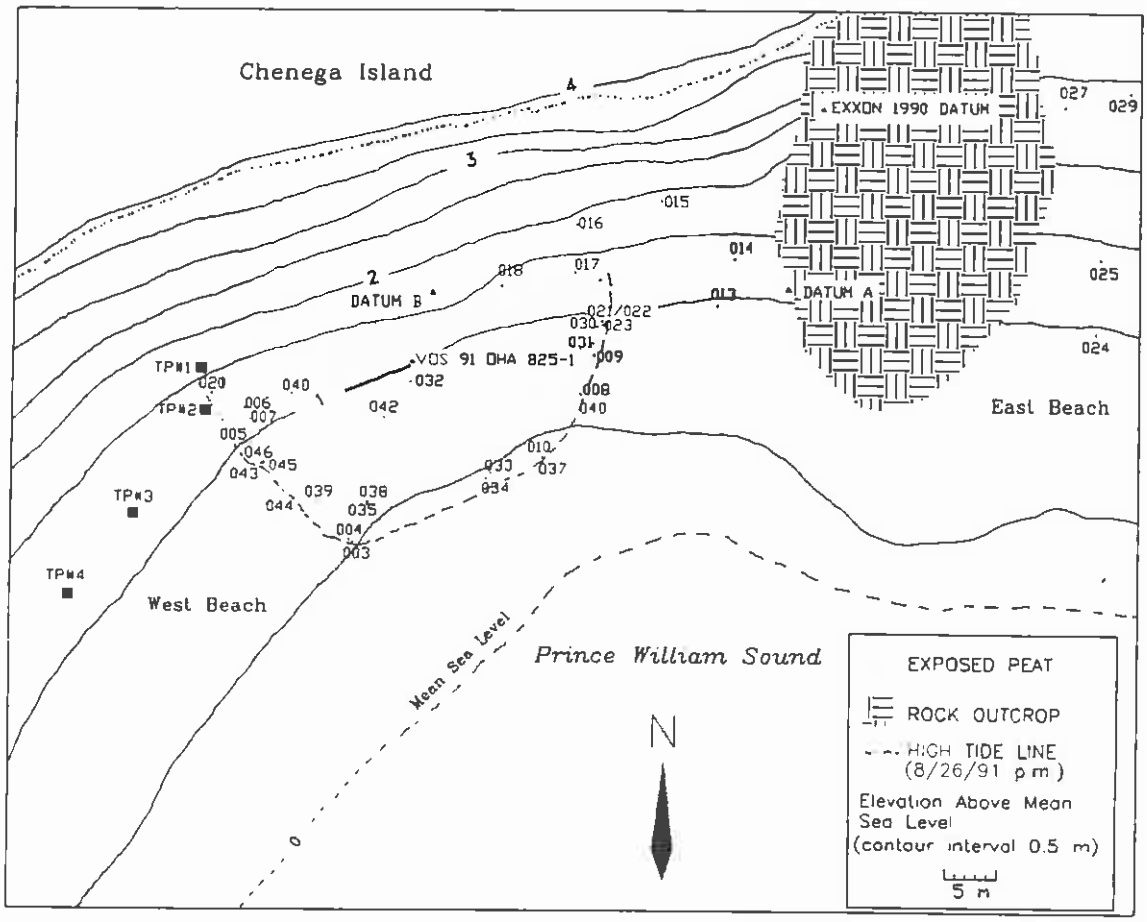

Figure 49: Kake Cove Site, SEW-068. Intertidal artifact distributions.

Two sediment samples from the beach where cultural items occur were field tested for presence of petroleum aromatic hydrocarbons. A Hanby Field Test Kit was used to test a sample of the peaty soil within which artifacts occur and a sample of sand from adjacent to the soil exposure. The latter sample tested negative but the soil sample yielded a slight positive result. The Hanby manual does caution that acidic soils can produce a slight positive result. Sample VOS91 OHA 825-1 was submitted to the National Oceanigraphic and Atmospheric Administration (NOAA)/ National Marine Fisheries Service for processing. Processing is being done in that agency's laboratory in Seattle however no results have yet been returned. The sample submitted was collected from the eroding peaty soil near the center of the exposure.

SEW-068 ARTIFACTS

The artifact collection from the beach area at Kake Cove is separable into categories of stone or wood and by areas of the beach. The area of eroding peaty soil is termed the "West Beach". Separated from the West Beach by a bedrock outcrop is a pebbly gravel beach termed the "East Beach". Wood artifacts occurred exclusively in the area of the eroding peaty soil deposit on the West Beach. Stone artifacts were concentrated in the peat area and in the upper tidal zone of the East Beach. The stone tools associated with the soil included planing adzes, slate "awls", a flaked stone point, numerous round stones presumed to be hammerstones, hammerstones with battered ends, grinding slabs, and grooved or notched cobbles. The stone tools found on a separate area of beach to the east were grooved splitting adzes, a planing adze, and a facetted hammerstone. Another, heavily battered, planing adze was isolated well west of the peaty soil associated artifact cluster.

West Beach Artifacts

Planing Adzes. Two complete water-worn greenstone planing adzes were found in the area of exposed soil. They are polished overall as well as at the cutting bit. The smallest planing adze (UA91-97-005) is widest at the cutting edge and tapers back to a smoothly finished poll (Figure 50a). The bit is strongly curved when viewed from the bit end. The bit is ground to an angle of 71°. The artifact is 6.12 cm long, 3.37 cm wide, and is 2.16 cm thick just forward of the midpoint. The other planing adze (UA91-97-020) measures 9.39 cm long, 4.56 cm wide and 3.01 cm thick at the mid point (Figure 50c). The bit is ground to an 80.5° angle and the cutting edge is vertically curved similar to the smallest specimen. Both adzes probably functioned as gouges.

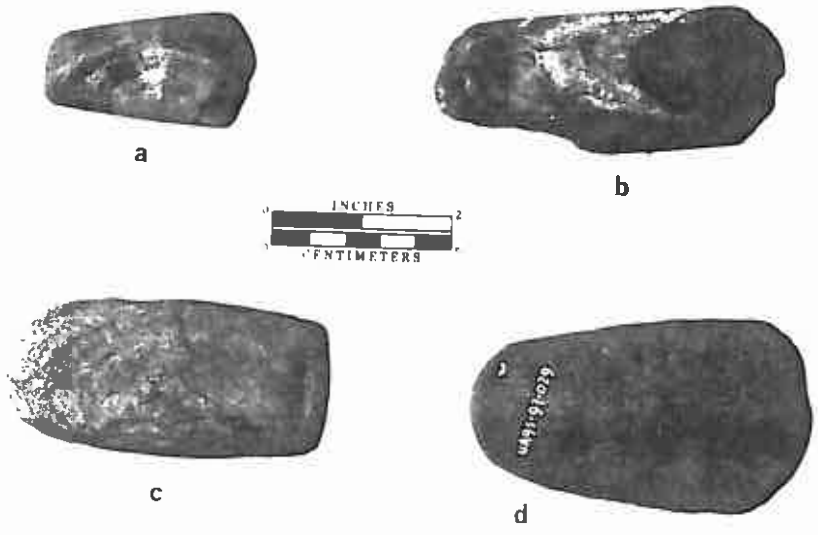

Figure 50: SEW-068, Planing adzes.

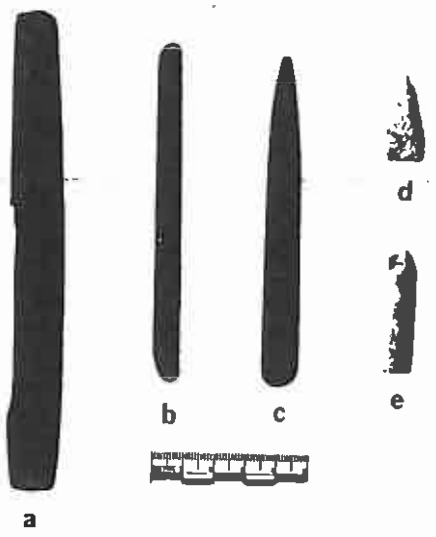

Figure 51: SEW-068, slate "awls" and chipped point blade.

A planing adze so battered that no portion of the cutting edge or facets remain was found near mean sea level and isolated to the west of the artifacts associated with the eroding peaty soil. The body of the adze has been ground to a rough hexagonal cross-section. The poll is also battered but does not appear to have been completely polished (Figure 50b). The incomplete adze is 10.22 cm long, 4,22 cm wide, and 2.62 cm thick near the mid-point.

Chipped Stone Point. A badly water-worn chipped point blade (UA91-97-018) was found near the upper margin of the peaty soil exposure (Figure 51d). The light tan chert point fragment may have remanents of shouldering but is so worn that such detail is uncertain. The collaterally flaked blade is 2.75 cm long, 1.23 cm wide and 0.40 cm thick. The hint of shouldering suggests that the point may have originally been stemmed.

Slate "Awls". Four ground slate artifacts were collected from the peaty soil area, two slate "awls" near the east margin, one slate "awl" from the center of the exposure, and a point or "awl" near the west margin. One of the slate "awls" from the east margin (UA91-97-016) has a round to oval cross-section, has straight parallel sides and is broken at both ends (Figure 51b). The ends are very water-worn. The artifact is 0.85 cm wide, 0.69 cm thick and 10.69 cm long. The other "awl" (UA91-97-017) has a flattened hexagonal cross-section and tapers to a rounded point at one end (Figure 51c). The other end is broken. The parallel sided "awl" is 1.20 cm wide, 0.59 cm thick, 10.45 cm long. A burned fragment of an "awl" (UA91-97-042) from the center of the peaty deposit is parallel sided and has a flattened oval cross-

section (Figure 51e). The fragment is 1.00 cm wide and 0.71 cm thick. Both ends are broken but one end is facetted on one face as if beginning to taper to a point.

A slate point or "awl" (UA91-97-006) found near the upper western margin of the peaty soil has a hexagonal cross-section and has a flattened,slightly hollow ground bevel on both faces at one end (Figure 51a). The generally parallel edges exhibit a slight taper at the opposite end. The specimen is 15.0 cm long, 1.70 cm wide, and 0.88 cm thick. The width and basal taper of the artifact suggests use as a point rather than an "awl" although its general attributes are similar to other "awls".

Notched Cobbles. A large notched stone weight (UA91-97-032) was found in the center of the peat exposure near a deposit of wood and bone eroding from the soil (Figure 52c). A notch is ground into each end of the cobble which measures 9.00 cm long, 6.23 cm wide, and 3.56 cm thick. The cobble weights 302.5 grams. A 632.6 gram cobble with a groove around its circumferance (UA91-97-007) was recovered from the west edge of the peaty soil (Figure 52d). The weight measures 8.76 cm long, 8.48 cm wide and 5.88 cm thick.

Miscellaneous Stone. A flat, battered beach shingle (UA91-97-036) was located just above the upper margin of the peaty soil. The shingle appears to be an unmodified crude chopping tool. It measures 15.8 cm long, 13.33 cm wide, and 3.01 cm thick. Another battered stone (UA91-97-040), a rounded cobble, may have been a small anvil stone (Figure 52b). The cobble is 10.75 cm long, 9.51 cm wide and 5.50 cm thick. Impact pits mark both faces and two opposite edges.

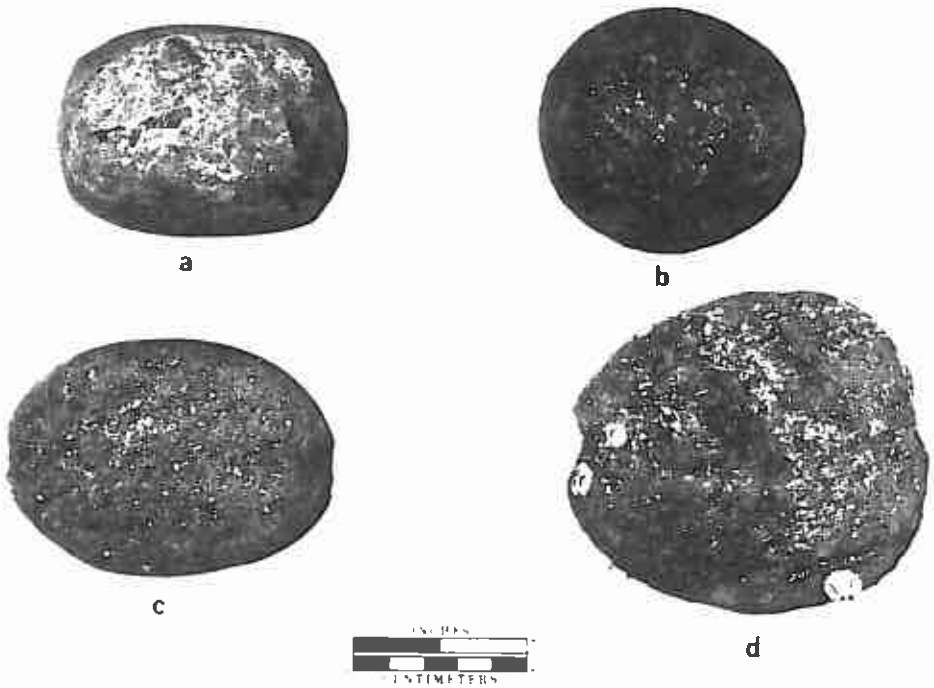

Figure 52: SEW-068, notched cobbles, hammerstones.

Grinding Slab/Whetstones. Two grinding slabs were eroding out of the soil around the edge of the remanent. The larger slab (UA91-97-044) is rectangular in outline with one smoothed face into which a wide shallow groove has been ground. The slab has not been purposefully shaped although one end is battered. The fine grained stone from which the slab has been fashioned is not particularly abrasive. The slab measures 32.0 cm long, 18.0 cm wide, and averages 4.0 cm thick. The smaller slab (UA91-97-034) is very coarse stone and has one slightly concave grinding surface. The slab outline is square and tabular. It measures 11.0 cm by 10.0 cm and is 3.5 cm thick.

Hammerstones. Numerous smooth, round cobbles occur scattered about the perimeter of the peaty exposure and within its boundaries. The stones all range about 10.0 cm to 15.0 cm in diameter and probably served as hammerstones. Some do exhibit a few battering marks.

Splitting Adze. A badly battered splitting adze (UA91-97-014)(Figure 54a) was found on the West Beach but is a significant distance from the cluster associated with the eroding peaty soil. The adze has shattered at the cutting end and the butt end. The widest part of the

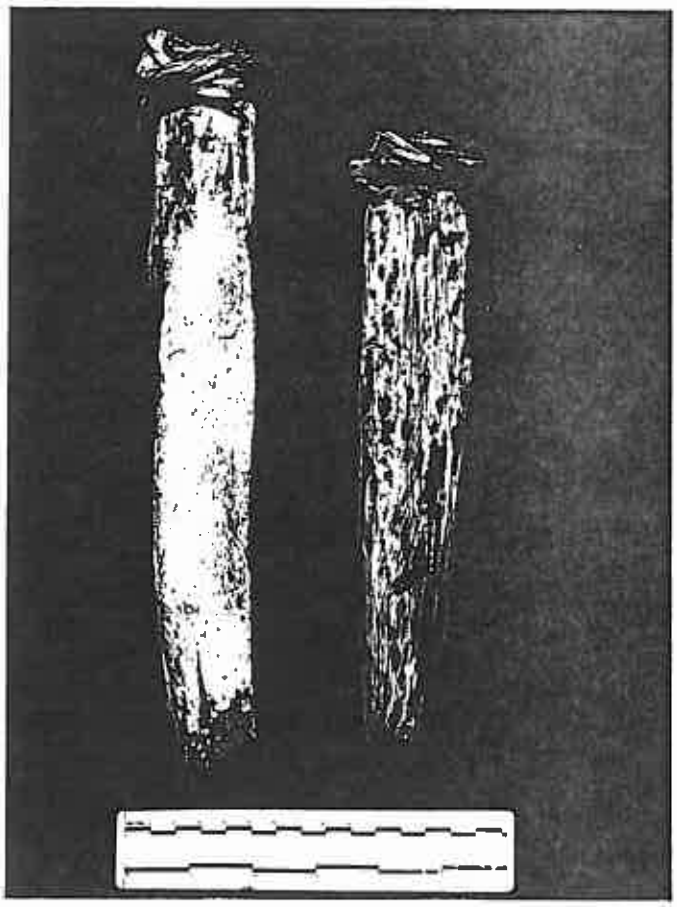

Figure 53: SEW-068, wooden wedges.

tool was at the cutting end and it narrowed toward the butt end. Two grooves were pecked into the top of the adze with an intervening high ridge. The groove and ridge lashing arrangement appears to be toward the butt of the tool from its mid-point. The broken specimen is 15.0 cm long, 6.75 cm tall, and 4.90 cm wide.

Wood Artifacts. Some more obviously culturally modified wood pieces from Kake Cove were subjected to microscopic examination to identify the type of wood used(see Appendix 1). Most of the wood was identified as spruce (*Picea* spp.) but a few pieces were fashioned from Yellow cedar (*Chamaecyparis nootkatensis*) and one shaft was carved from coast hemlock (*Tsuga heterophylla*). Spruce cannot be identified to species at this level of investigation however the species growing locally is Sitka spruce (*Picea sitchensis*). The wood artifacts consist of wedges, stakes, a round shaft, sharpened sticks or pins, cut limb fragments, and chips.

Wedges are differentiated from stakes by the degree of shaping of the wedges. They have been carved on all surfaces and thinned to a flattened oval cross-section. Stakes are usually round and have been sharpened at the bottom end. The tops of wedges and stakes are girdled by a groove or a lip which held a twisted root grommet. The function of the grommet was to reduce splitting or splintering of the implement as the top was hammered. Several of the stakes retain depressions around the top which are the impression of absent twisted root grommets. One spruce wedge ringed at the top by a spruce root grommet (UA91-97-003) is a complete tool and measures 24.3 cm long (Figure 53b, 57b). It is 4.5 cm maximum width. Cut facets from carving tools are still discernable along the entire length of the wedge. The split spruce root grommet was twisted in an left or S twist, several 0.7 cm diameter strands were twisted together around the top of the wedge in the opposite direction (right or Z- twist).

The stake with remanents of a grommet wrapped around the top (UA91-97-008) is fashioned from spruce while the grommet is yellow cedar (Figure 53a). It's sharpened tip is broken and partially missing. The stake is 28.5 cm long and has a maximum diameter of 4.5 cm. The top of the stake is flattened and splayed from pounding. The grommet is only loosely twisted and is badly decomposed. Three more spruce wood stakes (UA91-97-010, 021, 033) and a longtitudinal section of a fourth (UA91-97-023) were recovered from the peaty soil. All have remanents of the grommet groove, have splayed tops, and the three complete stakes have sharpend tips. The complete stakes measure between 27 cm and 34 cm long. All stakes seem to be fashioned from spruce limbs and the upper 1/3 appear to be smoothed. The last impression may result from wear rather than intention smoothing.

A straight shaft of hemlock (*Tsuga heterophylla*) is carved from the outer rings of a branch. It has one broken end and the other end is carved to square blunt end. The shaft is 27.6 cm long and is 1.10 cm diameter along its length.

Two pins carved from a split section of wood are sharpened at one end with the opposite end broken. One pin is curved, probably a distortion from drying. A 40.5 cm long wood pin

(UA91-97-046) has a triangular cross-section with one slightly rounded surface corresponding to the outer surface of the branch. The other pin (UA91-97-039) is 17.4 cm long.

A round piece of wood which appears to be a handle is 12.9 cm long and tapers from 3.36 cm and one end to 2.27 cm at the opposite end (UA91-97-019). A small groove (0.25 cm wide) crosses the large end, parallel to the grain of the wood.

Eleven pieces of wood exhibiting cultural modification range from simply a wood chip to limb fragments chopped off at both ends and smoothed for some unkown function.

East Beach Artifacts

The artifacts recovered from the beach located east of the soil exposure are all large stone tools: three splitting adzes, a splitting adze blank, a planing adze, and a hammerstone. The beach consists of pebble gravel with very little fine sediment in which small artifacts are not likely to have survived.

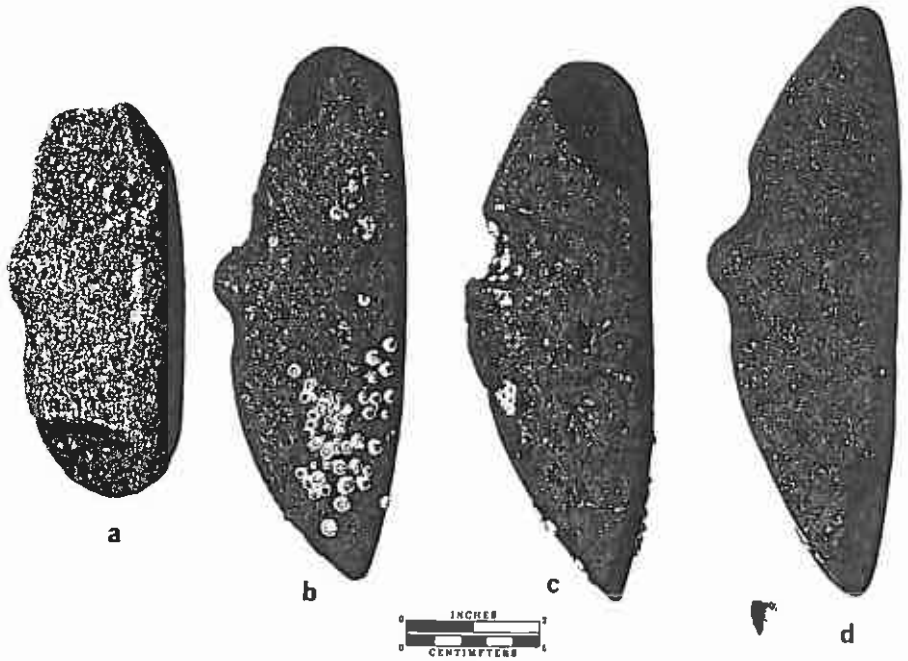

Figure 54: SEW-068, splitting adzes.

Splitting Adzes. The splitting adzes are of the grooved variety with the grooves located only on the upper surface. Two adzes (UA91-97-024, UA91-97-027) have two grooves with an intervening high lashing ridge. The cutting edges of both are broken but appear to have possessed edge angles of 39° and 40° respectively. UA91-97-024 is widest at the cutting edge, 4.73 cm, and tapers to 2.74 cm near the butt or poll end (Figure 54b). It is 20.5 cm long and 7.32 cm high through the ridge. The other double grooved splitting adze, UA91-97-027, is uniformly wide, 4.71 cm, along its length (Figure 54d). It measures 22.5 cm long and 7.23 cm high through the lashing ridge. The third grooved splitting adze (UA91-97-028) has a single lashing groove across the top (Figure 54c). The adze measures 20.0 cm long, 5.38 cm wide at the mid-point, and 7.10 cm high in front of the lashing groove. The lashing point for the three adzes falls slightly behind the balance point of each adze.

An adze blank or non-grooved adze (UA91-97-025) was also found on the East Beach. The artifact measures 29.50 cm long, 7.34 cm wide, and 6.72 cm high at the mid-point. One end is broken. Although the tool is water-worn, manufacturing peck marks remain on 80% of its surface. That and the blunt end suggest this is an unfinished blank rather than a finished tool. The edge angle of the unfinished adze is 22° but would probably have steepened as the cutting edge was finished.

Planing Adze. A badly water-worn planing adze (UA91-97-029) was found on the East Beach. It is widest, 5.65 cm, at the cutting edge which is rounded laterally (Figure 50d). The adze is 10.12 cm long and 2.45 cm thick near the butt. Chipping scars remain around the edges of the artifact but no evidence of smoothing remains.

Hammerstone. An oblong hammerstone (UA91-97-027) is the last of the artifacts found at Kake Cove (Figure 52a). It is unmodified except for the blunted end where other objects were struck. It is 12.93 cm long, 6.42 cm in diameter, and weighs 918 grams.

Fauna. A concentration of animal bones were exposed in the northcentral area of the exposed peaty soil. The immature remains of harbor seal (*Phoca vitulina*) plus a mandible and three teeth tenatively identified as mature harbor seal account for about half the remains. A series of 11 vertebrae from an immature small whale or porpoise are the other somewhat identifiable bones. Cranial fragments and a phalanx identifiable only as sea mammal were also collected from the concentration. All of the bones which were initially only partly exposed were excavated and associated with the soil.

Radiocarbon Samples. Two samples of culturally modified wood were selected from the abundant pieces eroding from the soil to submit for radiocarbon analysis. UA91-97-001 was collected near the eastern margin of the soil exposure. It was eroding from the surface but was clearly incorporated within the deposit. Half of the piece of charred spruce wood (*Picea* sp.) was submitted for radiocarbon analysis. The other sample, UA91-97-002, was a fragment of wood, probably spruce, which had been carved. The piece was collected near the center of the peaty soil exposure adjacent to the bone concentration. It was also clearly embedded in the soil.

SEW-068 Artifact Comparisons

The most diagnostic of the artifacts in the SEW-68 collection are the slate "awls", planing adzes, splitting adzes, and the chipped stone point blade. Unfortunately the distinctive carved wooden wedges with mounted grommets have no comparisons within the general northern Gulf of Alaska area. The logical direction to look for that type artifact would be toward the Northwest Coast area.

Slate "Awls". The slate "awl" with the hexagonal cross-section and beveled stem (UA91-97-006) is very distinctive and appears very similar to a slate tool from the lower levels of the Merrill Site on the Kenai River (Reger 1977:43). The bottom of the Merrill Site dates to the last few centuries B.C. Other ground slate rods or "awls" occur in Kachemak levels in the Kachemak Bay area (W.Workman ????) and on Kodiak Island. The upper levels of the Old Karluk Site, KAR-031, contain slate rods and are date to about A.D. 1000(Jordan and Knecht,1988:243) In the Prince William Sound area, de Laguna(1956: 161) documented that while slate "awls" occurred in all levels at the Palugvik Site, the artifacts were more numerous in the lower levels. Radiocarbon dates from the bottom of the Palugvik Site place the deposits in the first few centuries A.D. (de Laguna, 1962:167). de Laguna (ibid.) questions the validity of those dates but most investigators now accept that the dates are generally acceptable (D.Clark 1984: 144). Excavations at the Uqciuvit Site, SEW-056), revealed the early Palugvik levels contained most of the slate "awls" in the site (Yarborough and Yarborough, 1991: 140).

Planing Adzes. The planing adzes from the eroding peaty soil area of the Kake Cove Site are of diagnostic value because they are highly polished over most of the surfaces, have a blunted ground butt, and a relatively steep angle at the bit. Palugvik 1 and 2 levels of the Palugvik Site contained the most planing adzes for that collection (de Laguna, 1956:118), but many of the artifacts are not polished over the major portion of the surface. The adze bits which were most well finished in the Uqciuvit Site occurred in the early Palugvik levels (Yarborough and Yarborough, 1991:75). Adze bits with similar characteristics occurr in the Chugachik Site, SEL-033, in the lower (mid-Kachemak Tradition) levels (K.Workman 1977:9). D. Clark discussed the form and function of adzes at great length and concluded with the observation that adzes of this form and degree of finish were most common in the Three Saints phase of the late Kachemak Tradition (D.Clark, 1974a:91). Jordan and Knecht (1988:241) found well made adze bits with a steep bevel at the bit in lower levels (Layer 10) in the Old Karluk Site. Radiocarbon dates from that layer place the Kachemak age deposits at around the beginning of the Christian Era. W.Workman summarised a listing of Norton related traits in the southwestern area of Alaska to include steep bevels on planing adzes late in the tradition (1982: 106).

Splitting Adzes. The splitting adzes from the Kake Cove Site are of the grooved variety which occur early in the Prince William Sound area. Lower levels of the Palugvik Site contain a few of these adzes but most occur in the higher levels (de Laguna,1956:113). The Uqciuvit Site contains the earliest documented splitting adze in the northern Gulf of Alaska

region. Radiocarbon dates from the early Palugvik or Kachemak related period are associated with grooved splitting adzes (Yarborough and Yarborough,1991:71). Grooved splitting adzes seem to have arrived later in the Cook Inlet and Kodiak areas as noted by D.Clark (1974a: 92). Grooved splitting adzes have been radiocarbon dated to the first part of the second millenium A.D. (McMahan 1985:237) along the Kenai River. Kachemak Bay adzes also fall into that time range (Workman,Lobdell, and Workman,1980:394; Boraas and Klein,n.d.:31ff). The first appearance of grooved splitting adzes in the Kodiak area seems to occur about A.D. 1500 (D.Clark,1974b:48ff; Jordan and Knecht,1988:264). On the north side of the Alaska Peninsula, grooved adzes appear to occur in the Brooks River Camp Phase which ranges from A.D. 1050 ± 50 to A.D. 1450 ± 50 (Dumond 1981:161). Grooved splitting adzes have not been reported on the Shelikof Strait side of the Alaska Peninsula where the well documented record truncates with the Mound Phase at ca. A.D. 1500 (G.Clark 1977: 47).

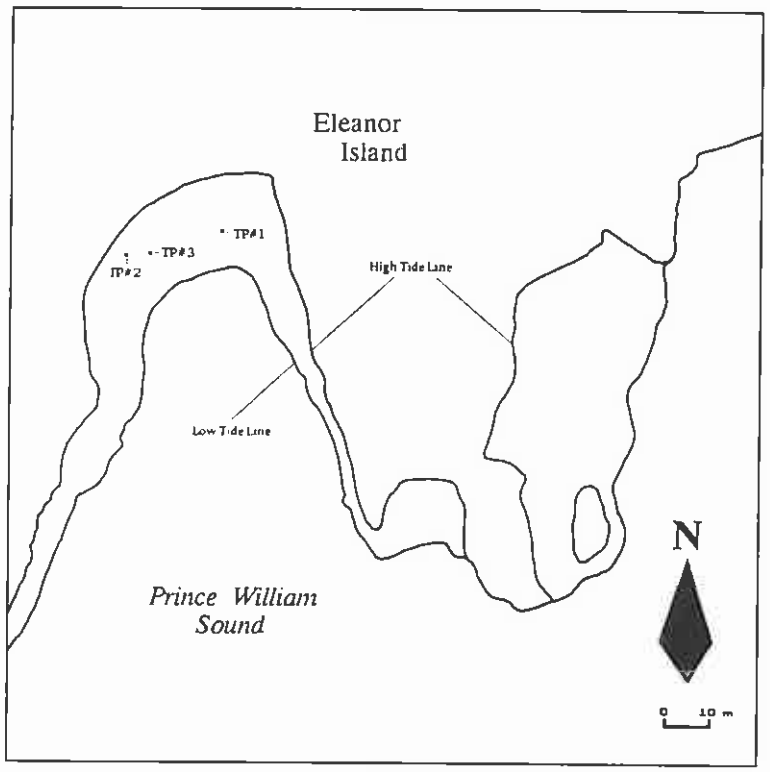

Figure 55: Site SEW-436, test pit locations (based on sketch).

Chipped Stone Point. The chipped stone point blade recovered from the intertidal area of the Kake Cove Site is reminiscent of stemmed points found along the Kenai River (Reger 1977:45; 1981:94) in Kachemak Tradition related contexts. Small stemmed points are particularly numerous along the Kenai River but less so in the Kachemak Bay area.Stemmed points are more common in middle Kachemak sites in Kachemak Bay (Workman, Lobdell, and Workman, 1980: 388; W. Workman, 1982:111).

SEW-436 SITE

The site is located on east side of Eleanor Island in a south facing bight (Figure 55). EXXON archaeologists documented an upland rockshelter at the location and collected a well made oil lamp from the upper intertidal zone (Mobley, et.al, 1990: 296). Three test pits

placed in the upper intertidal zone documented a peat deposit beneath a 20cm thick covering of washed cobbles. Two of the tests were excavated in the area where the lamp had been recovered and the third test was placed near the center of the beach.

SEW-440

This site was located at the head of a small southeast facing bight in Northwest Bay. It was visited 8/20/91. The beach has been extensively disturbed; apparently from digging during cleanup and was apparently bioremediated.
Fire cracked rock fragments are scattered over much of the beach however no subsurface cultural deposits were found. No sediment samples were collected.

RADIOCARBON DATES AND SITES AGE

Radiocarbon Dating. Radiocarbon dating is a technique of estimating absolute ages or ages stated in years ago rather than older or younger than some reference age. The technique was developed and became widely accepted by the scientific community during the 1950s. Since initial development processing techniques have changed considrably as has the knowledge about sources of error in results (Taylor, 1987; Browman, 1981). The process depends on the the atomic disintegration of the carbon 14 isotope(C^{14}) to form nitrogen 14 and a beta particle. The accepted half life of C^{14} has been established as 5568 (usually rounded to 5570) radiocarbon years. That means approximately half of the C^{14} originally in a sample will disintegrate in 5570 years. Statistical treatment of the rates and mathematical results are used to reduce process errors to a minimum. Results are stated in radiocarbon years ago with a statistical error factor expressed as a plus or minus conditional (e.g. 3500 $\pm$75 radiocarbon years ago). However estimating radiocarbon dates can be affected by a number of variables.

The radiocarbon dating process is based on the belief that radioactive carbon isotopes (C^{14}) exist in a relatively constant ratio to stable or non-radioactive isotopes (C^{12} and C^{13}) in a given material and therefore are a known percentage of total carbon present in a sample. The ratio varies in different materials and studies since the process was first developed show that the relative amount of C^{14} in the earth's atmosphere (and therefore in all living, datable materials) has also varied through time. Some of that variability is accounted for by dating materials of known age and monitoring the process to determine the differing amounts of radioactive carbon.

A source of error in the radiocarbon dating process widely recognized only recently is the fractionation of relative amounts of carbon isotopes in different datable materials. Investigations have shown that percentages of the two stable carbon isotopes will remain fairly constant to each other for a given material. The relative percentage of the radioactive

carbon isotope in a sample relative to non-radioactive isotopes can be statistically normalized by adjusting the C^{13} / C^{12} ratio and then the C^{14} / C^{12} ratio for compatibility with a known standard. Checking and adjusting ratios of stable carbon and thus the radioactive isotope, can minimize the effect of isotopic fractionation which causes ratios to change at varying rates.

Another source of potential problem is fluctuation of the rate of C^{14} disintegration in the atmosphere through time. That problem can be addressed by plotting disintegration measurements against measurements on samples of known age, e.g. wood aged through counting tree rings. Conversion of dates to a calendric reference system includes plotting the radiocarbon year age against a C^{14} disintegration profile generated from the dendrochronological curve of bristle cone pine. The result is a standardized date for the sample referenced to the most commonly used time scheme. Conversions for inter-site comparisons in this study are accomplished using a computerized program provided by the University of Washington Quaternary Istope Laboratory (Radiocarbon Calibration Program 1987, Revision 2.0). The advantage of converting radiocarbon dates to the calender or BC/AD convention is to standardize comparisons over broad regions and times.

Contamination. Contamination of datable samples is the major source of error in the radiocarbon dating process. Introduction of isotopic carbon skews the ratio between the radioactive isotope, C^{14}, and the two stable isotopes, C^{12} and C^{13}, and unless the addition is a known quantity, results in an incorrect age estimate. Contamination of samples by addition of ancient material composed of primarily stable isotopic carbon will produce radiocarbon dates which are older than expected. Conversely, contamination by carbon inordinately rich in radioactive carbon will produce dates more recent than expected.

Contamination of samples toward the older range has most frequently occurred from infusion of "dead" or radioactively inert carbon from coal or petroleum based substances. Microscopic examination of samples has been used to distinguish coal contaminants in samples (Tankersley, et al., 1987). Similar attempts by Reger (1987:99) and by Workman and Workman (1988:346) at Cook Inlet area sites failed to separate out lignite contaminants and resulted in dates obviously not compatible with the associated cultural remains. Recent findings suggest that contamination can occur from ground water transport of coa (and petroleum?) derived humic acids with exxagerated levels of "dead" carbon (Tankersly and Munson,1992). Impregnation of datable materials with petroleum based contaminants has also occured (Ho, et al., 1969:1051; Venkatesan, et al., 1982:517). Such an occurrence has been the fear and expectation for coastal archaeological materials following the EXXON Valdez Oil Spill.

Detection of oil contamination in archaeological sites in the Valdez Oil Spill area has been the primary goal of the State of Alaska archaeological damage assessment study. The first step of the study was to estimate the age of specific archaeological deposits through means other than radiocarbon dating at sites likely subjected to oiling. Radiocarbon dates were then obtained from those deposits and compared with the age estimates for lack of

agreement.

Samples collected by the State during the 1991 investigations were removed with standard archaeological techniques. The samples were excavated with trowels or tweezers using care to not handle them with bare hands. The samples were wrapped in aluminum foil and placed in plastic ziploc bags. In the archaeological laboratory, samples were examined under low magnification for presence of roots, rocks, or other contaminants. Those were removed and solid pieces of wood or charcoal retained. The samples were then dried, weighed, and submitted, again wrapped in foil and enclosed in plastic bags.

Precleaning methods at the Geochron Laboratories involve initial visual examination for rootlets or other intrusive materials. The samples were then washed in hot dilute hydrocloric acid (HCl) to remove carbonates and hot sodium hydroxide (NaOH) to remove humic soil acids (Krueger Enterprises, Inc., 1984). The samples identified as possibly petroleum contaminated are repeatedly washed in reagent grade toulene, a petroleum based solvent. Once cleaning with toulene is completed, the samples are washed in distilled water and oven dried. The sample is then converted to a gas and the rate of radioactive emission measured. The counting results are corrected for variability in the past ratios of C^{14} to C^{13} and a radiocarbon age estimated in radiocarbon years before present (AD 1950).

Contamination from substances added to a sample after burial in an archaeological site can usually be detected visually. Microscopic examination of samples is the primary way to detect presence of petroleum hydrocarbons or coal fragments. Discoloration of petroleum solvents after washing of samples is another method of detecting soluble contaminants. Both methods are used by Geochron Laboratory staff. Removal of the visible contaminants is the objective of laboratory cleaning efforts. The cleaning process aims at allowing normal counting procedures to produce acceptable results.

Mifflin and Associates Study. Prior to damage assessment field examinations a study was conducted by the firm of Mifflin and Associates, Inc., to determine the effect of petroleum contamination on radiocarbon dating various materials. The materials, peat, charcoal and wood, were contaminated with fresh Prudhoe Bay crude oil and with weathered crude oil spilled from the EXXON Valdez. Samples were split and some analyzed without cleaning and duplicate samples analyzed after cleaning was attempted with a variety of methods. As expected, the samples dated without benefit of cleaning returned ages well older than the reference ages obtained from non-oiled control samples. The study provided results of dating contaminated samples cleaned through various procedures. The results varied but showed that cleaning could correct much of the contamination error. Weathered crude oil tended to not penetrate the samples as much as fresh crude oil but was more difficult to remove and cleaning was more effective on wood and peat than charcoal. Some question has been raised about the appropriateness of using modern wood and charcoal in the study because of the nuclear contamination in the modern carbon pool. That may have masked significant results of tests on charcoal and wood and rendered them inconclusive. However, if the effect of contamination on those materials was significant, the resultant skewing of

radiocarbon dates should have been evident.

The study also investigated means by which contamination could be detected in a sample chemically rather than visually. Trace elements were measured and variance in carbon isotope ratios computed with equivocal conclusions for contamination identification. Mifflin and Associates concluded that although much of the error introduced by oil contamination can be eliminated with cleaning, some uncontrolled amount of error will remain (Mifflin and Associates, 1991: 69). Additionally, the procedures used to clean the samples in the Mifflin and Associates study and recommended by the study will increase the per sample cost of radiocarbon dates fourfold (Mifflin and Associates, 1991: 60).

RADIOCARBON ANALYSIS: THE 1991 DAMAGE ASSESSMENT STUDY

Test excavations during 1991 by the State of Alaska resulted in obtaining useful artifact collections from four archaeological sites. Artifacts from those collections can be compared with other collections in the study area which were radiocarbon dated prior to the EXXON Valdez spill. Comparison of distinctive or diagnostic traits between collections is a common and useful method of estimating comparative ages. Close similarity of trait suites frequently signals similarity of age between the collections. The basic aim of the 1991 State of Alaska study is to contrast ages derived from comparative dating and ages estimated through the radiocarbon method. The resulting agreement or discrepancy between the two methods will indicate whether contamination of the deposits occurred. The results of analysis are graphically portrayed in Figure 56.

SEL-215, BERGER BAY ITZ LITHICS I SITE

Little information is published about the sea level history of Nuka Island. Measurements following the 1964 Good Friday Earthquake indicated that the north end of the island subsided about 2.2 m (7.2 feet) during the event. Those estimates are based on differences between the pre-earthquake and post-earthquake upper limits of growth for barnacles (Balanus) along the shoreline. No good estimate of long term isostatic or tectonic subsidence during the Holocene exists although observers agree that the coast line has been subsiding in the long term. The elevation of the artifact bearing intertidal peat prior to the 2.2 m subsidence in 1964 would have been about 1.5 meters above the mean high tide line.

The cultural affiliation and age of SEL-215 cannot be precisely assigned due to the lack of diagnostic artifacts however, presence of splitting adzes does allow an estimate of age. Splitting adzes do appear in Kachemak age levels at Palugvik and Uqciuvit sites but are late in the cultural chronology in the Kodiak, Cook Inlet, and Alaska Peninsula areas. Specifically, splitting adzes do not appear in the prehistoric record of those areas prior to A.D. 1500. Considering the time slope to be expected between the Chugach Eskimo area of Prince William Sound and more southern areas, an age of approximately A.D. 1000 to A.D. 1500 might be proposed.

Seven wood and charcoal samples from SEL-215 submitted for analysis and all yielded ages within the past 1000 years. All were collected from the artifact bearing upper peat in the intertidal zone.

Table 11. Radiocarbon Samples, SEL-215

Accession No.	Lab No.	C^{14} Years B.P.	Material	Weight
UA91-95-010	GX-17335	670 ± 60	Charcoal	21.5g
UA91-95-012/13	GX-17336	665 ± 105	Charcoal	5.4g
UA91-95-015	GX-17337	840 ± 60	Charcoal	24.6g
UA91-95-016	GX-17338	655 ± 100	Wood	39.5g
UA91-95-017	GX-17339	920 ± 60	Wood	9.0g
UA91-95-030	GX-17340	425 ± 105	Wood	5.9g
UA91-95-031	GX-17341	635 ± 60	Wood	14.9g

The SEL-215 radiocarbon dates were corrected for the bristle cone pine growth curve by application of the CALIB Rev. 2 program. The following table illustrates the corrected calendar date results. Two samples, marked with an asterisk, intercept the curve at multiple points but all are included in the calculated range of possibilities at the 2 sigma level. The cited mid-points are the middle of the multiple intercept points.

Table 12. Radiocarbon Analysis Results, SEL-215

Lab No.	Calendar Date	Age Range	Range Probability
GX-17335	A.D. 1283	A.D.1256-1410	98%
GX-17336	A.D. 1284	A.D.1150-1440	99%
GX-17337	A.D. 1212	A.D.1154-1261[a]	88%
GX-17338	A.D. 1285	A.D.1190-1440	98%
GX-17339	A.D. 1122*	A.D. 996-1226	100%
GX-17340	A.D. 1442	A.D.1280-1660	99%
GX-17341	A.D. 1372*	A.D.1276-1415	99%

[a] This range was computed at the 1 sigma level because the results of computation with the CALIB, rev. 2, program established a 2 sigma range which excluded the calibrated mid-point.

The seven dates can be averaged to provide a fairly precise estimate of the age of the single component site. The dates average out to 729.4 ± 26.8 radiocarbon years ago or about A.D. 1284. Figured at the 2 sigma level of confidence, a 99% chance exists that the actual age of the occupation occurred between A.D. 996 and A.D. 1226.

AFG-082 SITE

The AFG-082 Site is not an intertidal site and hence attempts to age the site from geological evidence would be of little use. The main reason for testing the site was to determine whether crude oil had contaminated the deposits through storm tossed debris.

Estimates based on comparative typology studies provide at least a rough estimate of age. The general appearance of the site, small single chamber housepits measuring 3-4m in diameter in clustered distribution and absence of distinctive cover vegetation characteristic of later sites, suggest a Kachemak Tradition age. The collection from AFG-082 displays an abundance of chipped stone artifacts and debitage, a trait consistent with Kachemak collections. The ratio of chipped stone debris to ground slate is high. Ulu forms are similar to those in Kachemak age sites all over the Kodiak Island group. The complete planing adze head from AFG-082 is very similar to Takli Cottonwood and earlier adzes. Fire cracked rock accumulations do not approach the amounts commonly found in later Koniag sites. Kachemak Tradition sites in the Kodiak area range from about the middle of the second millenium B.C. (ca B.C. 1500) to about A.D. 1000 (D.Clark 1984: 136). Based on the relative abundance of chipped stone remains to ground slate, AFG-082 would probably fall somewhere near the middle or early part of the period. The collection from AFG-082 is not distinctive enough or large enough to more accurately compare with other sites.

The two radiocarbon samples from AFG-082 provide the third method of dating the collection and also check for obvious contamination from petroleum hydrocarbons. Both samples were treated with reagent grade toulene after microscopic examination at the Geochron Lab suggested presence of petroleum hydrocarbons. After repeated toulene washings, samples were dried and routine pre-treatment performed. Lack of color in the toulene wash suggests that either the possible contaminant was not removed or that it did not exist.

Table 13. Radiocarbon samples, AFG-082

Accession No.	Lab No.	C^{14} Years B.P.	Material	Weight
UA91-93-084	GX-17333	1730 ± 65	charcoal	23.5g
UA91-93-087	GX-17334	1840 ± 65	charcoal	24.1g

Results from analysis of the two samples were processed through the University of Washington Quaternary Center calibration program, CALIB, revision 2, to standardize calendar dates. The following table displays the results computed at the 2 sigma level. Each sample intercepted the bristlecone pine curve at multiple points and the calibrated age or middle intercept point is marked by an asterisk. All multiple intercept points are included within the age range cited. Range probabilities are factored on the two sigma computation.

Table 14. Radiocarbon Analysis Results, AFG-082

Lab No.	Calendar Date	Age Range	Range Probability
GX-17333	A.D. 288*	A.D.132-427	100%
GX-17334	A.D. 203*	A.D. 46-264	85%

The two samples come from a single component and an average age was therefore computed. The composite age was 1,785 ± 46 years ago with a calibrated calender date of A.D. 233. A range of probability computed at the 2 sigma level is A.D. 128 to A.D. 357. A 96% chance exists that the true date lies within that age range. The ages portrayed above and the average of the two dates all fall about the middle of the time range for the Kachemak Tradition. It would thus appear that the samples from the AFG-082 Site were either not contaminated or were cleaned by the pre-treatment process.

AFG-098 SITE

Cultural deposits at the AFG-098 Site occur both in the intertidal zone and in the adjacent uplands. Artifacts have been found widely scattered on both sides of the narrow land separating the two bays. Size and content of the collection from AFG-098 and the abundance of radiocarbon datable samples in the deposit provide an excellent opportunity to examine the possibility of petroleum hydrocarbon contamination at this site.

The collection from AFG-098, except for a few isolated artifacts, clearly is of the Koniag Phase. The ground slate points and incised slate figurine allow some refinement of detail even beyond that broad time span designation. The stemmed and barbed points have correspondences at KAR-029 with transitional Koniag (A.D. 1050 - A.D. 1250) and the Koniag (A.D. 1250 - A.D. 1500) materials (see Artifact description section for specific citations). Specific and well dated comparisons can also be drawn with points in layer 3, KAR-031 (post- A.D. 1000), Kiavak, Site 418 (ca. A.D. 1550-A.D. 1660), Brooks River Camp Phase (A.D. 1000- A.D. 1500), and Beluga Point North III (ca. A.D. 1150 - A.D. 1300). This suggests these points range in age of from A.D. 1000 to A.D. 1500 and that age of the AFG-098 Site also is within that range.

The triangular points from AFG-098 refine the comparisons for the stratigraphic levels within the site. The basally facetted point from the Lower Component, AFG-098 is almost identical to points in middle levels of the New Karluk Site, KAR-001 (ca. A.D. 1500), Rolling Bay Site (A.D. 1450 - A.D. 1500), Kizhuyak Site (ca. A.D. 1350), Monashka Bay Site, layer B (A.D. 1650), Brooks River Camp (A.D. 1000 - A.D. 1500), Mound Phase (A.D. 1000 - A.D. 1500), Uqciuvit Site (A.D. 1400 - A.D. 1778), and the McArthur Pass Site, SEL-188, level I (A.D. 1350 - A.D. 1400). This suggests that basally ground facet triangular points should date somewhere between A.D. 1300 and A.D. 1500.

The triangular point with the carved or ground medial "flute" or channel found in the Upper Component of AFG-098 compares well with points on Kodiak Island and the Alaska

Peninsula. Comparisons can be seen with points in upper levels of the New Karluk Site, KAR-001 (post A.D. 1600), the Rolling Bay Site (A.D. 1450 - A.D. 1500), the Brooks River Bluffs phase (A.D. 1400 - A.D. 1800), and Pavik Phase (A.D. 1800 - A.D. 1900). These occurrences indicate the point form should date from a period of approximately A.D. 1500 into the historic era.

Incised slate figurines provide a good vehicle for determining age of the Lower Component of AFG-098. Incised slate figurines with the art motif including a "Y" configuration with eyes and bordering decorations can be found on Kodiak Island and the Alaska Peninsula. Similar artifacts are found in dated context at the New Karluk Site, KAR-001 (A.D. 1350 - A.D. 1500), Monashka Bay Site (pre A.D. 1500), and Brooks River Bluffs Phase (A.D. 1400 - A.D. 1800). It would seem that an age prior to or about A.D. 1500 would be an appropriate estimate.

Geological studies to determine the effect of the Good Friday Earthquake of March 27, 1964, give some indication of the amount of subsidence of the Shuyak Island area during that event (Plafker,1969: Plate 1). Data from a 1965 temporary tide-gauge station near the north end of Skiff Pass indicated a subsidence of 1.0m (3.2 feet) for that part of the island. At Port Williams on the south end of the island, barnacle growth line changes measured in 1964 document a subsidence of 1.6 m (5.2 feet). Local observors estimated in 1965 that the amount of subsidence was about 1.2 m (3.9 feet). That amount of subsidence interpolated to the vicinity of AFG-098, approximately -1.3m, could easily account for the present elevation of cultural deposits in the intertidal zone. No evidence is available for long term subsidence or emergence and therefore geological methods of estimating age based on present information are of no utility.

Ten samples were submitted from AFG-098 for radiocarbon analysis. All were collected during testing of the site and were selected to provide deposit bracketing dates as well as dates to check consistency. Four of the samples (GX-17325, GX-17326, GX-17329, GX-17330) were microscopically identified at the Geochron Laboratories as possibly containing some petroleum hydrocarbon. Those samples were washed in reagent grade toulene and dried to remove traces of the toulene. No petroleum hydrocarbons were indicated by solvent discoloration during the wash process. All samples were otherwise pretreated and process with normal laboratory procedures.

Table 15. Radiocarbon Samples, AFG-098

Accession No.	Lab No.	C^{14} Years B.P.	Material	Weight
UA91-92-132	GX-17323	500 ± 60	bark, spruce?	60.7g
UA91-92-133	GX-17324	1055 ± 105	charcoal	10.3g
UA91-92-138	GX-17325	500 ± 105	charcoal	23.15g
UA91-92-139	GX-17326	500 ± 100	charcoal	15.45g

UA91-92-140	GX-17327	950 ± 65	grass, needles	20.96g
UA91-92-150	GX-17328	625 ± 60	charcoal	29.24g
UA91-92-154	GX-17329	1040 ± 105	charcoal	16.6g
UA91-92-160	GX-17330	1175 ± 110	charcoal	8.2g
UA91-92-210	GX-17331	570 ± 60	charcoal	33.98g
UA91-92-233	GX-17332	360 ± 125	spruce/ wood-bark	49.0g

These radiocarbon dates were processed with the CALIB rev. 2 program to convert the results with the bristlecone pine growth curve to standardized calendar dates. The following table illustrates the resulting calendar dates, age range computed at the 2 sigma level and the statistical probability that the age falls within the indicated range. Calendar dates marked with an asterisk are mid-points where a given sample result intercepts the growth curve at a number of points. All such intercept points fall within the stated age range.

Table 16. Radiocarbon Analysis Results, AFG-098

Lab No.	Calendar Date	Age Range	Range Probability
GX-17323	A.D. 1422	A.D.1376-1494	70%
GX-17324	A.D. 987	A.D. 770-1210	98%
GX-17325	A.D. 1422	A.D.1280-1530	86%
GX-17326	A.D. 1422	A.D.1200-1530	88%
GX-17327	A.D. 1143*	A.D. 978-1227	100%
GX-17328	A.D. 1370*	A.D.1277-1417	100%
GX-17329	A.D. 995	A.D. 770-1220	99%
GX-17330	A.D. 787*	A.D. 640-1040	100%
GX-17331	A.D. 1343*	A.D.1284-1428	100%
GX-17332	A.D. 1490	A.D.1390-1700	80%

The radiocarbon samples were projected against the stratigraphy in the site to check internal consistency of the dates. Samples GX-17324, GX-17327, GX-17329, and GX-17330 all correlate with a level in the site designated as the Lower Component. The remaining dates all fall within the Upper Component levels.

Averaging the radiocarbon dates by stratigraphic component provides documentation of two periods of occupation separated by at least 300 years. The Lower Component dates (N=4) averaged with the CALIB program have a composite average age of A.D. 999. Computed at a 2 sigma level, there is a 77% probability that the Lower Component occupation happened between A.D. 935 and A.D. 1067. There is 100% probability that the site was occupied by the Lower Component folks between A.D. 892 and A.D. 1154. The Upper Component dates (N=6) averaged an age of A.D. 1409. Factored to the 2 sigma level, the Upper Component occupation has a 100% probability that it occurred between A.D. 1320 and A.D. 1433.

Based on comparative ages expected from artifact traits and the results of the ten (10) analyses obtained from the two components of AFG-098, little indicates contamination of the samples submitted. Generally, the AFG-098 radiocarbon dates appear to run several centuries too old but the imprecise nature of the dating method does not allow a definite conclusion of contamination. Then too, the lack of knowledge about the prehistory of the Shuyak Island area contributes to the lack of definite finding. The types of artifacts used to estimate age of the occupations may in fact occur earlier on Shuyak Island the the other areas examined. A basic finding for the AFG-098 instance must be that there is no good evidence that radiocarbon dating of that site has occurred because of oiling. Stratigraphically consistent date distribution supports that finding.

SEW-068, KAKE COVE SITE

The Kake Cove Site is an intertidal wet site which contains considerable amounts of culturally modified wood. Determining the age of the occupation can be approached by several different methods: 1) comparison of cultural traits; 2) rate and extent of geological subsidence; and 3) radiocarbon dating of cultural deposits. Results of each method can be used to check validity of results from the other methods.

The artifacts collected during 1991 from the Kake Cove beach will not allow a precise estimate of age but will provide a general idea about the age of the collection. Taken as a collection without including the grooved splitting adzes which are areally separate, the collection appears to relate to Kachemak age collections from Cook Inlet and Kodiak (see artifact discussion section). This impression is based on the numbers of ground slate "awls", presence of notched cobbles, extremely well finished planing adzes, and similar chipped stone points in Kachemak related sites (K.Workman,1977:9; Reger,1985:259). Even if the artifacts from the Kake Cove beach not physically associated with the eroding soil are included in these considerations, the time estimate could still be the same. Grooved splitting adzes in the Chugach area are found as early as the middle of the first millenium A.D.(Yarborough and Yarborough, n.d.: 71). The collection then compares closely with traits in dated sites from Kodiak, Kachemak Bay, and Prince William Sound. Those sites date approximately from the beginning of the Christian Era through A.D.1000. The collection unfortunately does not contain enough time specific diagnostic artifacts or traits to refine the estimate further.

The Kake Cove Site rose during the Good Friday Earthquake of 1964 a total of 1.5 m (4.8 feet) relative to sea level due to tectonic adjustments (Plafker, 1969: I10). Despite that quick upward adjustment however, the coastline around the northern Gulf of Alaska apparently had been generally subsiding over the Holocene period. Plafker estimates a rate of subsidence for the coast between Cape Suckling and Seward of about 0.5 m (1.7 feet) per century (ibid.: I62). Local variations such as Latouche Island (-1.1 m (3.7 feet) per century) create uncertainty about application to specific locations but use of the general rate of subsidence can give a very rough estimate of time required to account for present positions.

The exposed soil with artifacts in the intertidal zone at Kake Cove occurs at about 0.5 m above mean sea level. The artifacts were probably deposited into a wet setting such as a swampy area between beach ridges which could account for preservation of the wood. Such a setting would probably have been above the normal high tide level and in all likelihood a little bit higher. An elevation of 1.0 meter above high water would be calculated to be approximately 6.0 meters above mean sea level. Given the above assumptions about elevations, factoring in the 1.5 m uplift of the 1964 Earthquake, and the estimated 0.5 m subsidence rate, a period of 1,500 years would be required for the intertidal deposits to reach their present elevation. That suggests the cultural deposits are a minimum of 1500 years old.

The third method of estimating the age of the Kake Cove Site material would normally be to use the radiocarbon dating method. The purpose here is to check the utility of that method by checking results of the other dating methods for compatability with the dates derived from the cultural deposits. Two wood samples were analyzed to obtain the radiocarbon estimates of age.

The two wood samples were culturally modified wood found partially buried in the eroding peaty soil. Half of sample UA91-97-001 was submitted for analysis and half retained for reference at a later time if necessary. Visual examination of the two samples at the Geochron Lab did not indicate presence of any petroleum hydrocarbons and the samples were normally pre-washed and processed.

Table 17. Radiocarbon Samples, SEW-068

Accession No.	Lab No.	C^{14} Years B.P.	Material	Weight
UA91-97-002	GX-17342	1985 ± 65	wood	27.25g
UA91-97-001	GX-17343	1665 ± 65	wood	37.5g

The ages in radiocarbon years ago were processed with the CALIB, Rev. 2, program to correct results against the bristlecone pine growth curve and provide more accurate calendar dates. The results are provided in Table 18.

Table 18. Radiocarbon Analysis Results, SEW-068

Lab No.	Calendar Date	Age Range	Range Probability
GX-17342	A.D. 10	170B.C.-A.D.135	92%
GX-17343	A.D. 391	A.D.226-541	99%

Averaging results of analysis for both samples provides a composite age estimate of 1825 ± 46 radiocarbon years ago. Application to the bristlecone pine curve (Stuiver and

Becker,1986) yields several intersection points centering around A.D. 199. The average age of the site, at the 2 sigma confidence level, has a 91% probability of falling between A.D. 70 and A.D. 259.

Results of the Kake Cove Site investigations indicate that the two radiocarbon dates obtained roughly correlate to the alternate methods of estimating the age of the site. Although they fall near the older end of the range of possibilities, the radiocarbon dates seem acceptable. One aspect of the radiocarbon dates from Kake Cove to consider is the degree of agreement between individual dates. The reported mid-points of the samples disagree by 320 radiocarbon years and both have a 1 sigma standard deviation of 65 radiocarbon years. Extending the standard deviations to 2 sigma (96% level of confidence) still leaves a gap of 125 years between possible convergence of sample ages. That gap, can be readily accounted for if woods of dissimilar ages were used or if the cultural occupation lasted over that length of time. Basically, for the purposes of archaeology, the samples provide acceptable radiocarbon dates.

Analysis of the collections and radiocarbon dates obtained during this study indicates that the ability to obtain useful dates from the study sites has not been diminished. The data collected will help fill the serious information gaps in the regional culture chronology. Figure graphically portrays the range of ages for the sites tested. The ages and locations of the sites make the data particularly important.

CONCLUSIONS

Investigations into the four primary sites examined during 1991 provided sufficient information to arrive at some conclusions about the effect of oiling on those sites. The most basic and important conclusion is that there appears to be no effect on the ability to obtain radiocarbon dates in the normal manner from those sites. The question of whether or not crude oil in its various forms effects the process of radiocarbon dating however has not been answered definitively. The answer to that question can only be obtained in a highly controlled field environment.

Based on typological comparison of the artifact collections recovered from the four sites and radiocarbon dates from the sites, there appears to have been no effect on the radiocarbon dating of the sites. Several possible scenarios can explain that conclusion. First, the sites may not have been subjected to the type of oiling which would contaminate them. The oil on the Shuyak Island and Nuka Island sites was documented in the form of tar balls and mousse patties. They were apparently not incorporated into the deposits either physically or chemically. The oil introduced onto the beach at the Kake Cove Site was characterized as "light" and apparently was either removed naturally or simply did not penetrate the exposed deposits and wood. Sites subjected to heavy oiling as defined in Prince William Sound need to be considered separately and much more critically because of the degree of oiling.

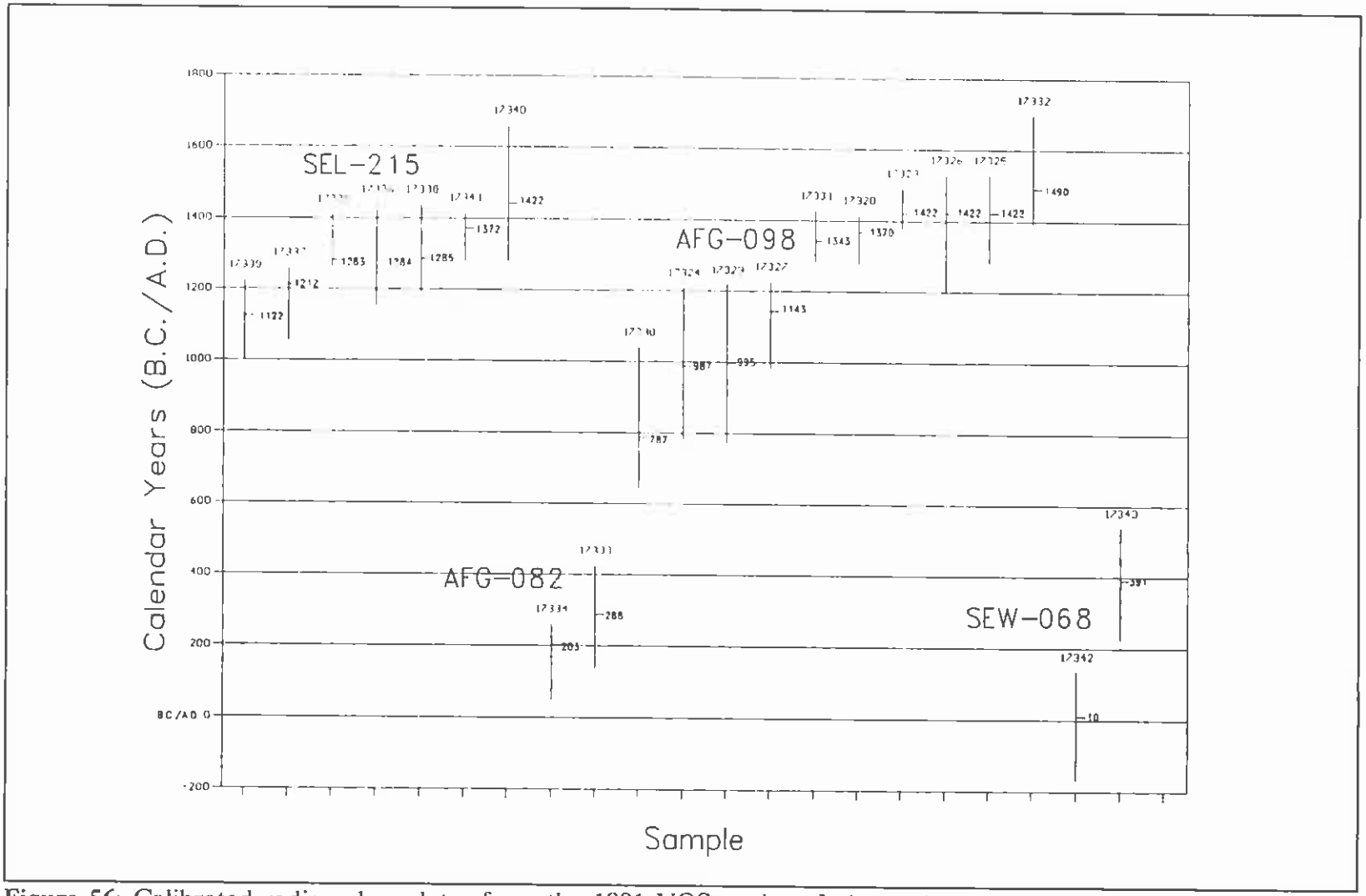

Figure 56: Calibrated radiocarbon dates from the 1991 VOS project. Lab numbers are preceded by the prefix GX-. Central points are noted in A.D. ages.

The second scenario may be that oil did penetrate the samples provided to the Geochron Lab but that the cleaning pre-treatment successfully removed the contaminant. The lack of evidence for oil during the pre-treatment (discoloration of the solvent toulene) indicates that no oil was present in the samples. The radiocarbon dates obtained were within the expected range even when toulene pre-treatment was not applied. Unanalyzed results reported for the sediment samples from the sites also indicate lack of oil in the deposits except for one sample in the AFG-098 Site and one sample from SEL-215.

Unfortunately the conclusions reached during this study about the effects of oiling on these sites can only be applied to these specific sites. Interpolation of the results to other area sites in similar settings can be a useful management exercise but for the purposes of scientific research cannot be completely reliable. The wide variety of environmental factors possible in the large numbers of sites reduces the accuracy of any predictions.

Uncertainty about reliability of radiocarbon dates in the spill area for the immediate future will make it prudent for researchers to analyze more samples from each site to check for internal consistency. Because of lack of research funding, most archaeologists can afford to process very few samples. The statistics of the radiocarbon dating procedure make that a risky practice at best but increased possibility of unrelaible dates heightens the concern. Researchers should in the future pay more heed to the necessity of obtaining multiple radiocarbon dates.

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APPENDIX 1. ANALYSIS OF AFG-098 PLANT MATERIALS: PROCEDURES, INVENTORY, AND MICROANATOMY

General Laboratory Procedures. Procedures used in the analysis of AFG-098 plant materials consisted of: (1) a cursory examination and description, including measurements and photographs of culturally modified items; (2) examination of macroscopic features under a 7x to 60x zoom stereoscope; (3) preparation of slide mounts and examination of micro-anatomy at up to 1000x by use of a light microscope and transmitted illumination; and (4) examination of materials under incident light at up to 500x. Primary instruments consisted of a Bausch and Lomb SVB-125 stereomicroscope, a Wolfe MH Series medical microscope, and a Leitz Ortholux research microscope. Observations of micro-anatomy were recorded in a log book and documented through frequent photomicrography. In some cases, when maintenance of aesthetics was not of primary concern (as in the case of unworked wood or fibers), it was desirable to observe macroscopic features by cleanly breaking the material to expose a cross-section (transverse) view. In cases of soft or extremely decayed materials, this was achieved by using liquid refrigerant to freeze fracture specimens. Identifications were made with a comparative collection in combination with several published references (e.g., Panshin and DeZeeuw 1980; Core et al. 1979; and Friedman 1975, 1978).

Slide preparation of uncarbonized plant materials consisted of the removal of minute sections with a fresh Exacto blade and mounting the section(s) under a coverglass with toluene-base Kleermount. Slides were heated at low temperatures to expel air and permeate the specimens, which were occasionally stained or bleached to increase the resolution of micro-anatomical features. A polarizing attachment was used in the examination of some materials, such as fibrous plant materials and mammal hair inclusions. Sections from culturally modified items were removed from such unobtrusive locations that scars are negligible. In a few cases, biological imbedding wax was used.

Slide preparation of carbonized plant materials, inasmuch as it is friable and relatively opaque, was more difficult. This has been a long-standing problem for archaeobotanists. Some analysts have reported success in epoxy embedding and either thin-sectioning (Pearsall 1989:185-189) or sawing and grinding specimens (Smith and Gannon 1973). These methods are labor/time intensive and require the use of a vacuum and specialized thin-sectioning equipment. In this case, charcoal was examined by pulverizing and slurrying <1 mm sections of the material with Kleermount on a microslide. This generally permits the observation of at least some diagnostic micro-anatomical features with transmitted light, although the random juxtaposition of features often requires considerable scanning to achieve results. Samples were sometimes bleached prior to mounting to improve translucence and resolution.

Plant materials recovered from AFG-098 are presented in Table 19, along with observed macro and microanatomical characteristics useful for identification. Availability or

for each analyzed specimen. Examples of microanatomical features with diagnostic potential are presented in Figure 57.

Flotation Procedures. Flotation and analysis of sediment samples followed standard methods (Pearsall 1989) and are consistent with techniques which have been used on the Kenai Peninsula (McMahan 1986). Samples were processed in a SMAP style flotation cell (Watson 1976) at the Alaska Department of Natural Resources hydrology facility at Eagle River. Water was pumped to the apparatus from a small creek through a 300 μ filter by means of an electric submersible pump and a garden hose. A second hose, attached via a Y fitting, was used to clean the apparatus between samples. Each sediment sample was poured slowly into a 330 μ mesh-bottomed insert with the water level just below the lip of the apparatus. Water pressure into the tank was gradually increased and hand-swirled until light fraction constituents, consisting largely of carbonized plant remains and organic contaminants, floated through the sluiceway and were caught in a 500 μ geological sieve. Another sieve was used manually to strain the suspended light fraction from the insert.

Heavy fraction constituents, which were retrieved from the bottom of the insert, consisted largely gravels and microfauna. Heavy fractions of all samples were weighed and any artifacts removed. These samples serve as controls for the evaluation of recovery techniques since essentially all cultural material within a given volume of earth was collected.

Light fractions were emptied from the sieve onto sections of clean cotton muslin, which were tied, labeled, and hung to dry. Dried samples were then transferred to clean zip-lock bags for curation. As indicated previously, only the Sample 1 (UA91-92-236) light fraction was analyzed. The sample was weighed and sifted through a series of standard laboratory sieves with mesh sizes of 2.00 mm, 1.00 mm, 500 μ, and 250 μ. Material greater than 2.00 mm was examined under low magnification and separated into various taxonomic/analytic categories, which were recorded by weight and count. Weights and counts were used to calculate the percentage of each component relative to the total. Small gravels, rootlets, and other materials considered to be recent intrusions or having no analytic value were quantified collectively as "sample contamination." Material passing through the 2.00 mm screen was optically scanned under low magnification for seeds and other botanical remains of diagnostic value. These were weighed and counted separately from the > 2mm material. The remainder of <2 mm material was weighed as "sample residue." Seeds were identified using comparative material as well as published descriptions and photographs (e.g., Martin and Barkley 1961).

Procedures for analyzing wood charcoal were similar to those which have been used previously described (McMahan 1986:III-6, III-7; 1989:75). A subsample of ten specimens was randomly removed from the separated > 2 mm wood charcoal to insure unbiased size representation. This was accomplished by scattering all of the charcoal (N = 415) throughout a cafeteria tray with hand-drawn numbered cells. Cells were selected with a list of random numbers and selected specimens analyzed following the procedures outlined above.

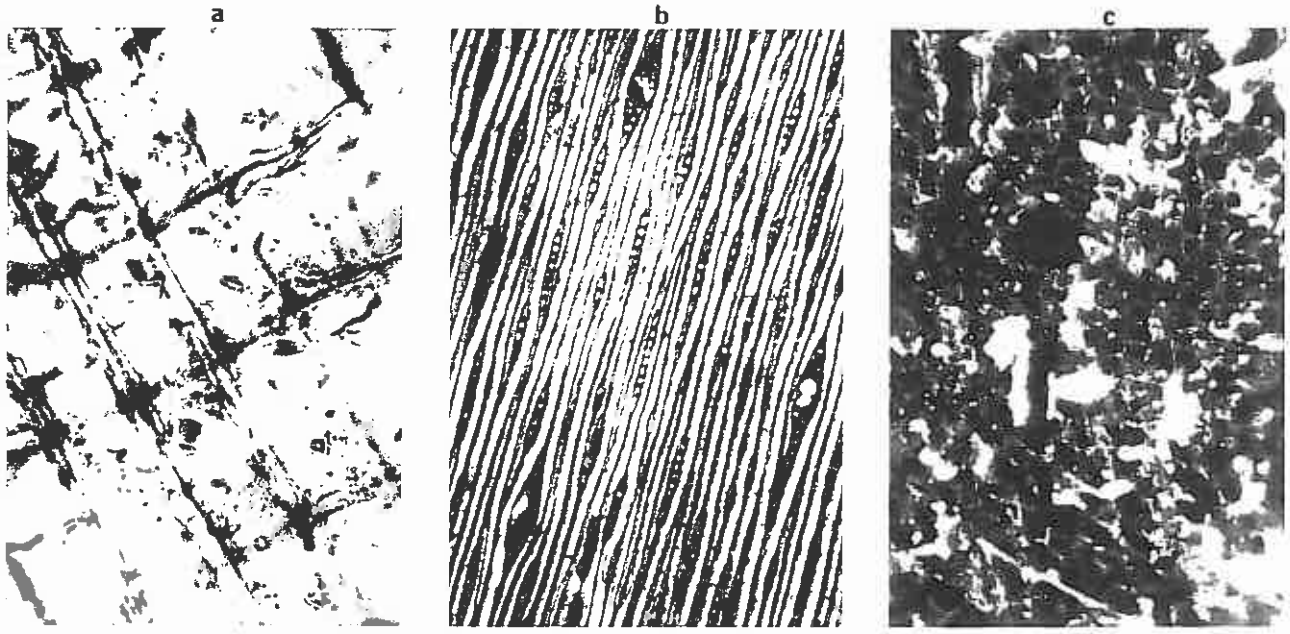

Figure 57: Microanatomy of archaeological plants materials from investigated sites.
(a) SEL-215 (UA91-95-144 shaft; probable yellow cedar):radial view of cupressoid type cross-field pits, 1000x with transmitted light. (b) SEW-068 (UA91-97-088 stake/wedge; spruce): tangentialview of fusiform and uniseriate rays, 100x with transmitted light. (c) AFG-098 (UA91-92-094 carved cylinder, charred spruce): transverse view of a thick-walled resin channel, 220x with incident light. (d) AFG-098 (UA91-92-094 carved cylinder, charred spruce): radial view of piceoid cross-field pits, 500x with incident light. (e) AFG-098 (UA91-92-140 grass matting, charred): long and short cells of the leaf epidermis, 400x with transmitted light. (f) AFG-098 (UA91-92-136 compressed plant material, charred spruce): cross-field (upper left) and uniseriate ray fragment (lower right), 400x with transmitted light.

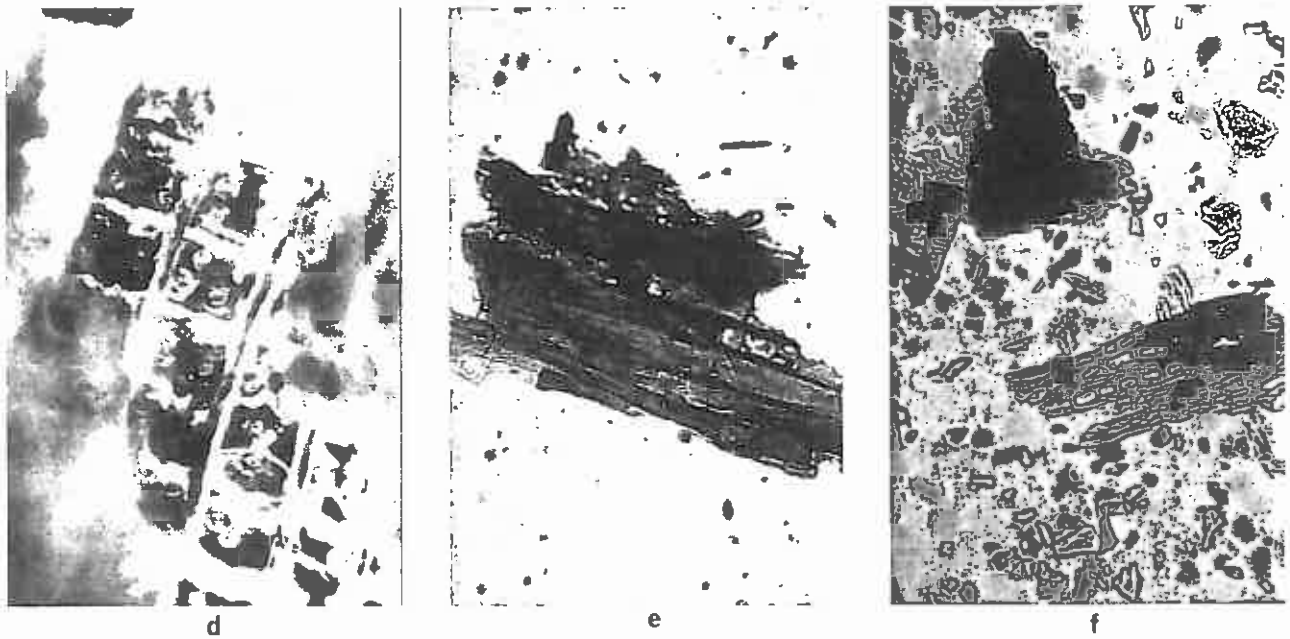

Table 19. AFG-098 Plant Materials and Micro-anatomical Characteristics.

Accession #	Description	Identification	Basis for Identification
UA91-92-094	Carved wood cylinder (c),	*Picea* spp. (1)*	Single rows Lg. bordered pits on radial surface; X-field pits 2-4 (usually 2-3) per field, piceoid; nodular end-walls; transverse resin canals present
UA91-92-120	Worked wood fragments?	Unidentified	
UA91-92-122	Bipointed wooden pin	*Picea* spp. (2)	Single rows Lg. bordered pits on radial surface; X-field pits piceoid, end-walls nodular/indentured; observed rays were all uniseriate
UA91-92-124a	Carved and drilled wood	*Picea* spp. (2)	Single rows Lg. bordered pits on radial surface; X-field pits piceoid, end-walls nodular/indentured
UA91-92-124b	Cord or peg from drilled hole	Undifferentiated (1) softwood	Very little structure left due to microbial decay; one X-field type structure was noted, and 1 uniseriate ray fragment
UA91-92-126	Birch bark roll	*Betula papyrifera* (1)	Macroscopic characteristics
UA91-92-131	Unmodified wood fragment	Undifferentiated (2) hardwood or shrub	Highly decayed, with little remaining structure; epidermal cells noted, and possible tracheids; is possibly a shrubby/stalky plant such as *Heracleum*
UA91-92-132	Bark (C^{14}) sample GX-17323	*Picea* spp. (3)	I.D. is based on visual inspection; no analysis of microanatomy
UA91-92-133	Charcoal (C^{14}) sample GX-17324	Unidentified	Not analyzed

Table 19, continued

UA91-92-136	Plant material lens	*Picea* spp. (1)	Numerous X-fields with indentured/nodular horizontal and end walls; no discernable X-field pits or Lg. bordered pits; good example of transverse thick-walled resin canal using incident lighting.
UA91-92-137	Unmodified wood fragment	Unidentified	Not analyzed
UA91-92-138	Aggregate sample of wood, charcoal, and seeds GX-17325	*Sambucus racemosa* (1) *Rubus spectabilis* (1) Undiff. graminae (2)	Macroscopic characteristics; only seeds were examined; sample was scanned, not quantified
UA91-92-139	Charcoal (C^{14}) sample GX-17326	Unidentified	Not analyzed
UA91-92-140	Compressed botanical, Matting? GX-17327	Undiff. graminae (1), possibly *Elymus arenarius* subsp. *arenarius* (3)	Dumbell-shaped stomata; long and short cells of leaf epidermis; stomata and "twinned" cells of lower glume epidermis
UA91-92-141	Charcoal (C^{14}) sample	Unidentified	Not analyzed
UA91-92-142	Charcoal (C^{14}) sample	Unidentified	Not analyzed
UA91-92-143	Charcoal (C^{14}) sample	Unidentified	Not analyzed
UA91-92-144	Charcoal (C^{14}) sample	Unidentified	Not analyzed
UA91-92-145	Charcoal (C^{14}) sample	Unidentified	Not analyzed
UA91-92-146	Charcoal (C^{14}) sample	Unidentified	Not analyzed
UA91-92-147	Charcoal (C^{14}) sample	Unidentified	Not analyzed
UA91-92-148	Charcoal (C^{14}) sample	Unidentified	Not analyzed

Table 19, continued

UA91-92-149	Charcoal (C^{14}) sample	Unidentified	Not analyzed
UA91-92-150	Charcoal (C^{14}) sample GX-17328	Unidentified	Not analyzed
UA91-92-151	Charcoal (C^{14}) sample	Unidentified	Not analyzed
UA91-92-152	Charcoal & mineral substance	*Picea* spp. (1)	Macro examination only; transverse thick-walled resin canals; light-colored substance, originally thought to be organic, is of mineral origin
UA91-92-153	Charcoal (C^{14}) sample	Unidentified	Not analyzed
UA91-92-154	Charcoal (C^{14}) sample GX-17329	Unidentified	Not analyzed
UA91-92-155	Charcoal (C^{14}) sample	Unidentified	Not analyzed
UA91-92-156	Charcoal (C^{14}) sample	Unidentified	Not analyzed
UA91-92-157	Charcoal (C^{14}) sample	Unidentified	Not analyzed
UA91-92-158	Charcoal (C^{14}) sample	Unidentified	Not analyzed
UA91-92-159	Charcoal (C^{14}) sample	Unidentified	Not analyzed
UA91-92-160	Charcoal (C^{14}) sample GX-17330	Unidentified	Not analyzed
UA91-92-170	Compressed botanical, matting?	Undiff. plant fiber (2)	Possible cortex/cork/epidermal structure noted, appears to be herbaceous
UA91-92-174	Aggregate seed sample	*Sambucus racemosa* *Rubus spectabilis*	Macroscopic comparison

Table 19, continued

UA91-92-176	Carved wood (c)	*Picea* spp. (2)	Softwood features; single rows Lg. bordered pits on radial surface; X-field pits distinctly piceoid, 2-3 per field
UA91-92-177	Carved wood (unc)	*Picea* spp. (1)	Single rows Lg. bordered pits on radial surface; X-field pits don't appear piceoid, but distinctive thick-walled transverse resin canal present
UA91-92-194	Unmodified wood (unc)	Undifferentiated (2) hardwood or shrub	Highly decayed, with little remaining structure; epidermal cells noted, and possible tracheids; is possibly a shrubby/stalky plant such as *Heracleum*
UA91-92-207	Unmodified wood (unc)	Unidentified	Not analyzed
UA91-92-208	Wood (chip?)	Unidentified	Not analyzed
UA91-92-209	Charcoal (C^{14}) sample	Unidentified	Not analyzed
UA91-92-210	Charcoal (C^{14}) sample GX-17331	Unidentified	Not analyzed
UA91-92-214	Seed sample	Unidentified	Not analyzed
UA91-92-221	Carved (peg?) (c)	*Picea* spp. (3)	Structure is that of a twig; I.D. difficult due to advanced checking; noted: single rows of Lg. bordered pits, piceoid X-field pit; tracheid diameter is mostly less than 20 μ but is probably reduced by shrinkage
UA91-92-224	Charcoal (C^{14}) sample	Unidentified	Not analyzed

Table 19, continued

UA91-92-225	Twined textile fragment (c)	Undiff. softwood	(1) Both single and double rows of large bordered pits (former seems to predominate) on radial tracheid walls; (2) Cross-field pits appear to be either cupressoid or taxodioid, 2-4 per field; (3) end-walls appear to be indentured &/or nodular; (4) horizontal walls appear to be indentured; (5) radial tracheid diameter Approx. 20-25 μ (6 sampled; measured at 1000x with optical micrometer); X-field diameter Approx. 20 μ^2; x-field pit L = 4 μ, W = 2 μ; Bordered pit diameter = 15 μ.
UA91-92-233	Post (unc) GX-17332	*Picea* spp. (2)	Advanced microbial decomposition; X-field pits appear to be piceoid
UA91-92-234	Flotation Sample # 3		Processed but not analyzed
UA91-92-235	Flotation Sample # 4		Processed but not analyzed
UA91-92-236	Flotation Sample # 1	See Report	Analyzed sample; described in the text
UA91-92-237	Flotation Sample # 2		Processed but not analyzed
UA91-92-238	Flotation Sample # 6		Processed but not analyzed
UA91-92-239	Flotation Sample # 5		Processed but not analyzed

Table 19, continued

UA91-92-240	Flotation Sample # 7		Processed but not analyzed
UA91-92-242	Grass matting	Undiff. graminae (1), possibly *Elymus arenarius* subsp. *arenarius* (3)	Dumbell-shaped stomata; long and short cells of leaf epidermis; stomata and "twinned" cells of lower glume epidermis; grass-like starch granules; possible pollen and seed fragments; in macro, stems/nodes are distinctly hollow; strands are in alignment; sample consists predominantly of vascular material, i.e., stems

* (1) = high confidence level identification, (2) = medium confidence level identification, (3) = low confidence level identification

APPENDIX 2

SEL-215 Artifact Catalog

NUMBER	ARTIFACT	STRATA	COMMENTS
UA91-95-001	CHARCOAL SAMPLE	MIDDLE ZONE OF PEAT LAYER	
UA91-95-002	CHARCOAL SAMPLE	MIDDLE LAYER OF PEAT	
UA91-95-003	CHARCOAL SAMPLE	PEAT	
UA91-95-004	CHARCOAL SAMPLE	PEAT	
UA91-95-005	CHARCOAL SAMPLE	UPPER PEAT	
UA91-95-006	CHARCOAL SAMPLE	MIDDLE ZONE OF PEAT LAYER	
UA91-95-007	CHARCOAL SAMPLE	TOP OF PEAT LAYER	
UA91-95-008	CHARCOAL SAMPLE	UPPER PART OF FIRST PEAT LEVEL	
UA91-95-009	CHARCOAL SAMPLE	FIRST PEAT LAYER	
UA91-95-010	CHARCOAL SAMPLE	MIDDLE PEAT	SUBMITTED TO GEOCHRON 10/28/91 - WEIGHT 21.5 G, DRY
UA91-95-011	CHARCOAL SAMPLE	DARK BROWN PEAT	
UA91-95-012	CHARCOAL SAMPLE	PEAT	SUBMITTED TO GEOCHRON 10/28/91 - COMBINED W/UA91-95-013 WEIGHT (TOTAL) 5.4 G, DRY
UA91-95-013	CHARCOAL SAMPLE	PEAT	SUBMITTED TO GEOCHRON 10/28/91 - COMBINED W/UA91-95-012 WEIGHT (TOTAL) 5.4 G, DRY
UA91-95-014	CHARCOAL SAMPLE	BOTTOM OF PEAT	
UA91-95-015	CHARCOAL SAMPLE	PEAT	SUBMITTED TO GEOCHRON 10/28/91 - WEIGHT 24.6 G, DRY
UA91-95-016	WOOD PIECE	FIRST PEAT LAYER	SUBMITTED TO GEOCHRON 10/28/91 - WEIGHT 39.5 G, DRY
UA91-95-017	WOOD FRAGMENT	PEAT/COBBLE	SUBMITTED TO GEOCHRON 10/28/91 - WEIGHT 9.0 G, DRY

Appendix 2 continued...

NUMBER	ARTIFACT	STRATA	COMMENTS
UA91-95-018	BURNED WOOD	UPPER PEAT	
UA91-95-019	WOOD CHIP	PEAT LAYER	
UA91-95-020	WOOD CHIPS	UPPER PEAT	
UA91-95-021	WOOD CHIP	UPPER PEAT	
UA91-95-022	WOOD CHIP	UPPER PEAT	
UA91-95-023	WOOD CHIP	PEAT	
UA91-95-024	WOOD CHIP	UPPER PEAT	
UA91-95-025	WOOD CHIP	UPPER PEAT	
UA91-95-026	CUT WOOD CHIP	UPPER FIRST PEAT LAYER	
UA91-95-027	CUT WOOD CHIP	UPPER FIRST PEAT LAYER	
UA91-95-028	WOOD CHIP	BROWN PEAT	
UA91-95-029	CARVED WOOD FRAGMENT	UPPER PEAT LAYER	
UA91-95-030	WORKED WOOD CHIP	UPPER PEAT	SUBMITTED TO GEOCHRON 102891 - WEIGHT 5.9 G, DRY
UA91-95-031	CHARRED WOOD FRAG	FIRST PEAT LAYER	SUBMITTED TO GEOCHRON 102891 - WEIGHT 14.9 G, DRY
UA91-95-032	WOOD CHIP	FIRST PEAT LAYER	
UA91-95-033	WOOD CHIP	FIRST PEAT LAYER	
UA91-95-034	WOOD CHIP	UPPER PEAT	
UA91-95-035	GLASS BEAD	UPPER PEAT	
UA91-95-036	GLASS BEAD	UPPER PEAT	
UA91-95-037	WOOD CHIP	FIRST PEAT LAYER	
UA91-95-038	WORKED WOOD	FIRST PEAT LAYER	
UA91-95-039	WOOD CHIP	BROWN PEAT	
UA91-95-040	WOOD CHIPS		
UA91-95-041	WORKED WOOD	BASE OF GRAVELLEY LENS IN FIRST PEAT	
UA91-95-042	GROUND SLATE POINT FRAGMENT	BEACH GRAVELLY PEAT DEPOSIT	
UA91-95-043	GROUND SLATE POINT FRAGMENT		
UA91-95-044	BOULDER SPALL FRAGMENTS (2)	PEAT LAYER	
UA91-95-045	BOULDER SPALL	UPPER PEAT LAYER	
UA91-95-046	BOULDER SPALL		
UA91-95-047	BOULDER SPALL	PEAT/BEACH GRAVEL	
UA91-95-048	UTILIZED COBBLE	BEACH ROCK LAYER JUST BELOW 2ND PEAT	
UA91-95-049	WORKED QUARTZ CRYSTAL	PEAT/BEACH GRAVEL	
UA91-95-050	QUARTZITE FLAKE	FIRST PEAT	

Appendix 2 continued...

NUMBER	ARTIFACT	STRATA	COMMENTS
UA91-95-051	QUARTZITE FLAKES(5)	FIRST PEAT LAYER	
UA91-95-052	COBBLE SPALL(OHA#31)	SURFACE COLLECTION	
UA91-95-053	COBBLE SPALL	SURFACE COLLECTION	
UA91-95-054	COBBLE SPALL	SURFACE COLLECTION	
UA91-95-055	COBBLE SPALL	SURFACE COLLECTION	
UA91-95-056	COBBLE SPALL	SURFACE COLLECTION	
UA91-95-057	COBBLE SPALL	SURFACE COLLECTION	
UA91-95-058	COBBLE SPALL	SURFACE COLLECTION	
UA91-95-059	COBBLE SPALL	SURFACE COLLECTION	
UA91-95-060	COBBLE SPALL	SURFACE COLLECTION	
UA91-95-061	COBBLE SPALL	SURFACE COLLECTION	
UA91-95-062	COBBLE SPALL	SURFACE COLLECTION	
UA91-95-063	COBBLE SPALL	SURFACE COLLECTION	
UA91-95-064	COBBLE SPALL	SURFACE COLLECTION	
UA91-95-065	COBBLE SPALL	SURFACE COLLECTION	
UA91-95-066	COBBLE SPALL	SURFACE COLLECTION	
UA91-95-067	COBBLE SPALL	SURFACE COLLECTION	
UA91-95-068	COBBLE SPALL	SURFACE COLLECTION	
UA91-95-069	COBBLE SPALL	SURFACE COLLECTION	
UA91-95-070	COBBLE SPALL	SURFACE COLLECTION	
UA91-95-071	COBBLE SPALL	SURFACE COLLECTION	
UA91-95-072	COBBLE SPALL	BROWN PEAT	
UA91-95-073	ULU		
UA91-95-074	STONE LAMP	SURFACE COLLECTION	
UA91-95-075	TEPHRA SAMPLE	UPPER PEAT	
UA91-95-076	BATTERED COBBLE	SURFACE COLLECTION	
UA91-95-077	UTILIZED SPALL	ROCK LAYER BELOW SECOND PEAT LATER	
UA91-95-078	BATTERED COBBLE	SURFACE COLLECTION	
UA91-95-079	HAMMERSTONE(?)/ HONING STONE	MIDDLE PEAT	
UA91-95-080	BOULDER SPALL?	SURFACE COLLECTION	
UA91-95-081	BATTERED COBBLE	SURFACE C0LLECTION	
UA91-95-082	BATTERED COBBLE /HAMMERSTONE	BROWN/BLACK (?) PEAT	
UA91-95-083	BATTERED COBBLE	PEAT/COBBLE LAYER	
UA91-95-084	BATTERED COBBLE	SURFACE COLLECTION	
UA91-95-085	NOTCHED COBBLE	SURFACE COLLECTION	
UA91-95-086	HAMMERSTONE	SURFACE COLLECTION	
UA91-95-087	DOUBLE NIPPLED ADZE FRAGMENT	SURFACE COLLECTION	
UA91-95-088	GROOVED ADZE	SURFACE COLLECTION	
UA91-95-089	ADZE FRAGMENT	SURFACE COLLECTION	
UA91-95-090	DOUBLE NIPPLE ADZE	SURFACE COLLECTION	
UA91-95-091	GROOVED ADZE	SURFACE COLLECTION	
UA91-95-092	DOUBLE(3?) NIPPLE ADZE	SURFACE COLLECTION	
UA91-95-093	GROOVED ADZE	PEAT /BEACH GRAVEL	

Appendix 2 continued...

NUMBER	ARTIFACT	STRATA	COMMENTS
UA91-95-094	DOUBLE NIPPLE ADZE FRAGMENT	SURFACE COLLECTION	
UA91-95-095	GROOVED ADZE	SURFACE COLLECTION	
UA91-95-096	POLISHED GREENSTONE FLAKE		
UA91-95-097	CHIPPED SLATE BLADE	GRAVELLY, COBBLE MATRIX	
UA91-95-098	WORKEDSLATE(?)/INCISED?		
UA91-95-099	GROUND SLATE FRAGMENT W/ EDGE	BOTTOM OF PEAT/FCR/COBBLE	
UA91-95-100	GROUND SLATE ULU?		
UA91-95-101	BLACK SEED	UPPER PART FIRST PEAT LAYER	
UA91-95-102	RED SEED SAMPLE	MIDDLE SECOND PEAT LAYER	
UA91-95-103	RED SEED SAMPLES	LOWER PART SECOND PEAT LAYER	
UA91-95-104	SEED SAMPLE	IN PEATY DEPOSIT	
UA91-95-105	FAUNA, CRUSTACEAN	NEAR TOP FIRST PEAT LAYER	
UA91-95-106	MUSSEL SHELL FRAGMENT	BETWEEN PEAT AND BEACH GRAVELS	
UA91-95-107	MUSSEL SHELL	UPPER PEAT	
UA91-95-108	FAUNA, CRUSTACEAN?	PEATY MATRIX	
UA91-95-109	FAUNA, BEAK?	TOP FIRST PEAT LAYER	
UA91-95-110	FAUNA, MUSSEL?	FIRST PEAT LAYER	
UA91-95-111	FAUNA, MUSSEL	BROWN PEAT	
UA91-95-112	FAUNA	FIRST PEAT LAYER	
UA91-95-113	FAUNA	FIRST PEAT LAYER	
UA91-95-114	FAUNA, MUSSEL SHELL FRAGMENT		
UA91-95-115	FAUNA, MARINE		
UA91-95-116	FAUNA, MUSSEL SHELL	PEAT WITH BEACH GRAVELS	
UA91-95-117	FAUNA, MUSSEL SHELL	TOP PEAT LAYER	
UA91-95-118	FAUNA, MUSSEL	UPPER PEAT	
UA91-95-119	FAUNA, BURNED BONE FRAGMENTS		
UA91-95-120	FAUNA ?	PEATY/ROCKY LAYER	
UA91-95-121	FAUNA, MUSSEL SHELL	UPPER PEAT	
UA91-95-122	FAUNA, CRUSTACEAN	PEAT (HEARTH)	
UA91-95-123	FAUNA, MUSSEL SHELL	BROWN PEAT (MUCK)	
UA91-95-124	FAUNA, SHELL	MIDDLE PEAT LAYER	
UA91-95-125	FAUNA, MUSSEL SHELL	UPPER PEAT	
UA91-95-126	FAUNA, MUSSEL SHELL	BOTTOM UPPER PEAT	
UA91-95-127	FAUNA, MUSSEL SHELL	GRAVELLY PEAT MATRIX	
UA91-95-128	FAUNA, MUSSEL SHELL, BEAK	TOP PEAT LAYER	
UA91-95-129	FAUNA, MUSSEL SHELL	PEAT LAYER	
UA91-95-130	FAUNA, MUSSEL SHELL	BOTTOM BROWN PEAT LAYER	
UA91-95-131	FAUNA, MUSSEL	UPPER PEAT	
UA91-95-132	FAUNA, MUSSEL SHELL	BROWN PEAT	

Appendix 2 continued...

NUMBER	ARTIFACT	STRATA	COMMENTS
UA91-95-133	FAUNA, MUSSEL	UPPER PEAT	
UA91-95-134	FAUNA	LOWER PART UPPER PEAT	
UA91-95-135	FAUNA, MUSSEL	DARK BROWN PEAT	
UA91-95-136	FAUNA, MUSSEL	MIDDLE PEAT	
UA91-95-137	FAUNA, MUSSEL	UPPER PEAT	
UA91-95-138	FAUNA	UPPER PEAT	
UA91-95-139	FAUNA, CRUSTACEAN	PEAT	
UA91-95-140	FAUNA, MUSSEL	BROWN PEAT	
UA91-95-141	FAUNA, MUSSEL	FIRST PEAT	
UA91-95-142	INCISED GROUND SLATE PIECE	PEAT	
UA91-95-143	QUARTZ PIECE	GREYISH BROWN WITH BEACH PEBBLES	
UA91-95-144	WOOD SHAFT	FROM FIRST TO SECOND PEAT	BELOW DATUM MEASUREMENT FROM 11 CM BD TO 36 CM BD
UA91-95-145	RETOUCHED(?) FLAKE	UPPER PEAT	
UA91-95-146	TEPHRA SAMPLE		
UA91-95-147	ADZE FRAGMENT		

APPENDIX 3

SITE AFG-082 ARTIFACT CATALOG

NUMBER	ARTIFACT	STRATA
UA91-93-001	ULU FRAG	COMPACTED MIDDEN
UA91-93-002	RETOUCHED CCS FLAKE	DARK BROWN SOIL
UA91-93-003	GROUND SLATE FRAG	
UA91-93-004	GROUND SLATE FRAG	BELOW HEARTH ASH LAYER
UA91-93-005	GROUND SLATE FRAG	MIDDEN
UA91-93-006	ULU FRAG	MIDDEN
UA91-93-007	ULU FRAGMENT	BELOW HEARTH ASH LAYER
UA91-93-008	ULU FRAGMENT	BELOW HEARTH ASH LAYER
UA91-93-009	GROUND SLATE FRAG	COMPACT HEARTH MATRIX
UA91-93-010	ULU FRAG	BELOW COMPACT ASH MATRIX
UA91-93-011	ULU FRAGMENT	COMPACT HEARTH MATRIX
UA91-93-012	ULU FRAGMENT	
UA91-93-013	ULU FRAGMENT	DARK BROWN MIDDEN LAYER
UA91-93-014	STEMMED SLATE POINT	
UA91-93-015	GROUND FRAG W/HOLE	COMPACT MIDDEN LAYER
UA91-93-016	PLANING ADZE	BELOW HEARTH ASH LAYER
UA91-93-017	BATTERED SPLIT ROCK	POST HOLE FEATURE
UA91-93-018	RED OCHRE CHUNK	DARK BROWN/BLACK SOIL
UA91-93-019	NOTCHED STONE FRAG	DARK BROWN MIDDEN
UA91-93-020	SCORIA/PUMICE PIECE	
UA91-93-021	IRON STONE??	BOTTOM OF HEARTH/MIDDEN
UA91-93-022	TEPHRA SAMPLE	
UA91-93-023	BIFACIAL FLAKE	DARK BROWN MIDDEN
UA91-93-024	UTILIZED (?) FLAKE	DARK MOTTLED CHARCOAL FCR
UA91-93-025	COBBLE SPALL	DARK BROWN MIDDEN
UA91-93-026	BIFACIAL CHERT FRAG	DRK MOTTLED MATRIX
UA91-93-027	BIFACE FRAGMENT	
UA91-93-028	BIFACE FRAGMENT	TOP OF ASHY COMPACT
UA91-93-029	BIFACE FRAGMENT	DARK BROWN SOIL
UA91-93-030	UTILIZED (?) PUMICE	DARK CHARCOAL LAYER FCR
UA91-93-031	FLAKE CORE?	CHARCOAL RICH FCR LAYER
UA91-93-032	FLAKE CORE	CHARCOAL RICH FCR LAYER
UA91-93-033	FLAKE CORE?	MIDDEN
UA91-93-034	FLAKE CORE?	2ND DARK BLACK BROWN SOIL
UA91-93-035	FLAKE CORE?	CHARCOAL RICH FCR LAYER
UA91-93-036	FLAKE	CHARCOAL LAYER W/ FCR
UA91-93-037	FLAKE SLATE	
UA91-93-038	BIFACE FRAGMENT	CHARCOAL RICH BELOW KATMA
UA91-93-039	FLAKE	BLACK SOIL BELOW ROOTS
UA91-93-040	FLAKE CC	CHARCOAL LAYER W/ FCR
UA91-93-041	FLAKE CCS	BLACK SOIL
UA91-93-042	JASPER FLAKE	
UA91-93-043	FLAKE CCS	CHARCOAL LAYER W/ FCR
UA91-93-044	FLAKE SLATE	BLACK SOIL BELOW ASH
UA91-93-045	FLAKE CCS	BLACK SOIL BELOW ASH

Appendix 3 continued...

NUMBER	ARTIFACT	STRATA
UA91-93-046	FLAKE CCS (CORTEX)	CHARCOAL LAYER W/ FCR
UA91-93-047	FLAKE SLATE	BLACK SOIL
UA91-93-048	BLADE LIKE FLAKE	DARK BROWN SOIL
UA91-93-049	FLAKE CCS	DARK REDDISH BROWN SOIL
UA91-93-050	FLAKE CCS	BLACK/BROWN SOIL
UA91-93-051	BLADE LIKE FLAKE	CHARCOAL RICH LAYER W/FCR
UA91-93-052	FLAKE CCS	CHARCOAL RICH LAYER W/FCR
UA91-93-053	FLAKE CCS	BLACK SOIL BELOW KATMAI
UA91-93-054	FLAKE CCS	BLACK SOIL BELOW KATMAI
UA91-93-055	FLAKE CCS	BLACK MIDDEN WITH FCR
UA91-93-056	FLAKE?	BLACK SOIL
UA91-93-057	FLAKE CCS	BLACK SOIL BELOW ASH
UA91-93-058	FLAKE SLATE	BLACK SOIL BELOW ASH
UA91-93-059	FLAKE SLATE	
UA91-93-060	FLAKE CCS	VERY DARK BROWN SOIL
UA91-93-061	FLAKE CORE?	2ND BLACKISH BROWN LAYER
UA91-93-062	FLAKE	CHARCOAL RICH LAYER W/FCR
UA91-93-063	FLAKE	
UA91-93-064	FLAKE CCS	VERY DARK BROWN SOIL
UA91-93-065	FLAKE CCS	BLACK SOIL
UA91-93-066	FLAKE CCS	2ND BLACKISH BROWN LAYER
UA91-93-067	FLAKE	
UA91-93-068	FLAKE CCS	2ND BLACKISH BROWN LAYER
UA91-93-069	FLAKE SLATE	BLACK SOIL BELOW ASH
UA91-93-070	FLAKE CCS	BLACK SOIL BELOW ASH
UA91-93-071	FLAKE	
UA91-93-072	FLAKE	BLACK SOIL
UA91-93-073	FLAKE CCS	2ND BLACKISH BROWN LAYER
UA91-93-074	FLAKE	
UA91-93-075	FLAKE CCS	GREASY BLACK LAYER
UA91-93-076	FLAKE CCS	CHARCOAL RICH LAYER W/FCR
UA91-93-077	FLAKE CCS	CHARCOAL RICH LAYER W/FCR
UA91-93-078	CALCINE BONE	MIDDEN
UA91-93-079	FAUNA	DARK BROWN SOIL
UA91-93-080	FAUNA	CHARCOAL RICH LAYER W/FCR
UA91-93-081	PHALANGE?	MIDDEN
UA91-93-082	FAUNA SHELL FRAGS	
UA91-93-083	FAUNA	COMPACTED HEARTH MATRIX
UA91-93-084	CHARCOAL SAMPLE	ORANGE GRAVELLY MATRIX
UA91-93-085	CHARCOAL SAMPLE	DARK BROWN MIDDEN
UA91-93-086	CHARCOAL SAMPLE	
UA91-93-087	CHARCOAL SAMPLE	COMPACT HEARTH LIKE LAYER
UA91-93-088	CHARCOAL SAMPLE	
UA91-93-089	CHARCOAL SAMPLE	
UA91-93-090	CHARCOAL SAMPLE	FROM ASHY HEARTH LAYER
UA91-93-091	CHARCOAL SAMPLE	DARK BROWN MIDDEN
UA91-93-092	CHARCOAL SAMPLE	2ND ORANGE HEARTH LAYER
UA91-93-093	CHARCOAL SAMPLE	BLACK SOIL BELOW KATMAI
UA91-93-094	CHARCOAL SAMPLE	COMPACT HEARTH MATRIX

Appendix 3 continued...

NUMBER	ARTIFACT	STRATA
UA91-93-095	FLAKE	CHARCOAL RICH LAYER W/FCR
UA91-93-096	FLAKE	CHARCOAL RICH LAYER W/FCR
UA91-93-097	FLAKE	CHARCOAL RICH LAYER W/FCR
UA91-93-098	FLAKE	CHARCOAL RICH LAYER W/FCR
UA91-93-099	FLAKE	CULTURAL MIDDEN
UA91-93-100	FLAKE	CULTURAL MIDDEN
UA91-93-101	FLAKE	CULTURAL MIDDEN
UA91-93-102	FLAKE	CULTURAL MIDDEN
UA91-93-103	FLAKE	CULTURAL MIDDEN
UA91-93-104	FLAKE	CULTURAL MIDDEN
UA91-93-105	FLAKE	CULTURAL MIDDEN
UA91-93-106	FLAKE	CULTURAL MIDDEN
UA91-93-107	FLAKE	CULTURAL MIDDEN
UA91-93-108	FLAKE	CULTURAL MIDDEN
UA91-93-109	FLAKE	CULTURAL MIDDEN
UA91-93-110	FLAKE	CULTURAL MIDDEN
UA91-93-111	FLAKE	CULTURAL MIDDEN
UA91-93-112	FLAKE	CULTURAL MIDDEN
UA91-93-113	FLAKE	CULTURAL MIDDEN
UA91-93-114	FLAKE	CULTURAL MIDDEN
UA91-93-115	FLAKE	CULTURAL MIDDEN
UA91-93-116	FLAKE	CULTURAL MIDDEN
UA91-93-117	FLAKE	CULTURAL MIDDEN
UA91-93-118	FLAKE	CULTURAL MIDDEN
UA91-93-119	FLAKE	CULTURAL MIDDEN
UA91-93-120	FLAKE	CULTURAL MIDDEN
UA91-93-121	FLAKE	CULTURAL MIDDEN
UA91-93-122	FLAKE	CULTURAL MIDDEN
UA91-93-123	FLAKE	CULTURAL MIDDEN
UA91-93-124	FLAKE	CULTURAL MIDDEN
UA91-93-125	FLAKE GROUND	CULTURAL MIDDEN
UA91-93-126	RETOUCHED FLAKE	CULTURAL MIDDEN
UA91-93-127	FLAKE	CULTURAL MIDDEN
UA91-93-128	FLAKE	CULTURAL MIDDEN
UA91-93-129	FLAKE	CULTURAL MIDDEN
UA91-93-130	FLAKE	CULTURAL MIDDEN
UA91-93-131	FLAKE	CULTURAL MIDDEN
UA91-93-132	FLAKE	CULTURAL MIDDEN
UA91-93-133	FLAKE SLATE	BLACK SOIL BELOW KATAI ASH
UA91-93-134	FLAKE SLATE	BLACK SOIL BELOW KATAI ASH
UA91-93-135	FLAKE SLATE	BLACK SOIL BELOW KATAI ASH
UA91-93-136	FLAKE SLATE	BLACK SOIL BELOW KATAI ASH
UA91-93-137	FLAKE SLATE	BLACK SOIL BELOW KATAI ASH
UA91-93-138	FLAKE GROUND	MIDDEN
UA91-93-139	FLAKE GROUND	MIDDEN
UA91-93-140	FLAKE GROUND	MIDDEN
UA91-93-141	FLAKE GROUND	MIDDEN
UA91-93-142	FLAKE	MIDDEN
UA91-93-143	FLAKE	MIDDEN

Appendix 3 continued...

NUMBER	ARTIFACT	STRATA
UA91-93-144	FLAKE	MIDDEN
UA91-93-147	FLAKE SLATE	MIDDEN
UA91-93-148	ADZE FRAGMENT?	MIDDEN
UA91-93-149	FLAKE SLATE	BLACK GREASY LAYER
UA91-93-150	FLAKE SLATE	BLACK GREASY LAYER
UA91-93-151	FLAKE SLATE	2ND BLACKISH BROWN LAYER
UA91-93-152	FLAKE SLATE	2ND BLACKISH BROWN LAYER
UA91-93-153	FLAKE SLATE	2ND BLACKISH BROWN LAYER
UA91-93-154	FLAKE SLATE	2ND BLACKISH BROWN LAYER
UA91-93-155	GROUND SLATE ULU	COMPACT HEARTH MATRIX
UA91-93-156	FLAKE	BELOW ASHY HEARTH LAYER
UA91-93-157	FLAKE	BELOW ASHY HEARTH LAYER
UA91-93-158	FLAKE GROUND	BELOW ASHY HEARTH LAYER
UA91-93-159	FLAKE	BELOW ASHY HEARTH LAYER
UA91-93-160	FLAKE	BELOW ASHY HEARTH LAYER
UA91-93-161	FLAKE	BELOW ASHY HEARTH LAYER
UA91-93-162	FLAKE	BELOW ASHY HEARTH LAYER
UA91-93-163	FLAKE	BELOW ASHY HEARTH LAYER
UA91-93-164	FLAKE	BELOW ASHY HEARTH LAYER
UA91-93-165	FLAKE	BELOW ASHY HEARTH LAYER
UA91-93-166	FLAKE	BELOW ASHY HEARTH LAYER
UA91-93-167	FLAKE	BELOW ASHY HEARTH LAYER
UA91-93-168	FLAKE	BELOW ASHY HEARTH LAYER
UA91-93-169	FLAKE	BELOW ASHY HEARTH LAYER
UA91-93-170	FLAKE	BELOW ASHY HEARTH LAYER
UA91-93-171	FLAKE	BELOW ASHY HEARTH LAYER
UA91-93-172	FLAKE GROUND	BELOW ASHY HEARTH LAYER
UA91-93-173	FLAKE	MIDDEN BELOW KATMAI ASH
UA91-93-174	FLAKE	MIDDEN BELOW KATMAI ASH
UA91-93-175		MIDDEN BELOW KATMAI ASH
UA91-93-176	FLAKE	MIDDEN BELOW KATMAI ASH
UA91-93-177	FLAKE	MIDDEN BELOW KATMAI ASH
UA91-93-178	FLAKE	MIDDEN BELOW KATMAI ASH
UA91-93-179	FLAKE	MIDDEN BELOW KATMAI ASH
UA91-93-180	FLAKE	MIDDEN BELOW KATMAI ASH
UA91-93-181	FLAKE	MIDDEN BELOW KATMAI ASH
UA91-93-182	FLAKE	MIDDEN BELOW KATMAI ASH
UA91-93-183	FLAKE	MIDDEN BELOW KATMAI ASH
UA91-93-184	FLAKE	MIDDEN BELOW KATMAI ASH
UA91-93-185	FLAKE	MIDDEN BELOW KATMAI ASH
UA91-93-186	FLAKE	MIDDEN BELOW KATMAI ASH
UA91-93-187	FLAKE	MIDDEN BELOW KATMAI ASH
UA91-93-188	FLAKE	MIDDEN BELOW KATMAI ASH
UA91-93-189	FLAKE	MIDDEN BELOW KATMAI ASH
UA91-93-190	FLAKE	MIDDEN BELOW KATMAI ASH
UA91-93-191	FLAKE	MIDDEN BELOW KATMAI ASH
UA91-93-192	FLAKE	MIDDEN BELOW KATMAI ASH
UA91-93-193	FLAKE	MIDDEN BELOW KATMAI ASH
UA91-93-194	FLAKE	MIDDEN BELOW KATMAI ASH

Appendix 3 continued...

NUMBER	ARTIFACT	STRATA
UA91-93-195	FLAKE	MIDDEN BELOW KATMAI ASH
UA91-93-196	FLAKE	MIDDEN BELOW KATMAI ASH
UA91-93-197	FLAKE	MIDDEN BELOW KATMAI ASH
UA91-93-198	FLAKE	MIDDEN BELOW KATMAI ASH
UA91-93-199	FLAKE	MIDDEN BELOW KATMAI ASH
UA91-93-200	FLAKE	MIDDEN BELOW KATMAI ASH
UA91-93-201	FLAKE	MIDDEN BELOW KATMAI ASH
UA91-93-203	FLAKE	MIDDEN BELOW KATMAI ASH
UA91-93-204	FLAKE	MIDDEN BELOW KATMAI ASH
UA91-93-205	FLAKE	MIDDEN BELOW KATMAI ASH
UA91-93-206	FLAKE	MIDDEN BELOW KATMAI ASH
UA91-93-207	FLAKE	MIDDEN BELOW KATMAI ASH
UA91-93-208	FLAKE	MIDDEN BELOW KATMAI ASH
UA91-93-209	FLAKE	MIDDEN BELOW KATMAI ASH
UA91-93-210	FLAKE	MIDDEN BELOW KATMAI ASH
UA91-93-211	FLAKE	MIDDEN BELOW KATMAI ASH
UA91-93-212	FLAKE	MIDDEN BELOW KATMAI ASH
UA91-93-213	FLAKE	MIDDEN BELOW KATMAI ASH
UA91-93-214	FLAKE	MIDDEN BELOW KATMAI ASH
UA91-93-215	FLAKE	MIDDEN BELOW KATMAI ASH
UA91-93-216	FLAKE	MIDDEN BELOW KATMAI ASH
UA91-93-217	FLAKE	MIDDEN BELOW KATMAI ASH
UA91-93-218	FLAKE	MIDDEN BELOW KATMAI ASH
UA91-93-219	FLAKE	MIDDEN BELOW KATMAI ASH
UA91-93-220	FLAKE	MIDDEN BELOW KATMAI ASH
UA91-93-221	FLAKE	MIDDEN BELOW KATMAI ASH
UA91-93-222	FLAKE	MIDDEN BELOW KATMAI ASH
UA91-93-223	FLAKE	MIDDEN BELOW KATMAI ASH
UA91-93-224	FLAKE	MIDDEN BELOW KATMAI ASH
UA91-93-225	FLAKE	MIDDEN BELOW KATMAI ASH
UA91-93-226	FLAKE	MIDDEN BELOW KATMAI ASH
UA91-93-227	FLAKE	MIDDEN BELOW KATMAI ASH
UA91-93-228	FLAKE	MIDDEN BELOW KATMAI ASH
UA91-93-229	FLAKE	MIDDEN BELOW KATMAI ASH
UA91-93-230	FLAKE	MIDDEN BELOW KATMAI ASH
UA91-93-231	FLAKE	MIDDEN BELOW KATMAI ASH
UA91-93-232	FLAKE	MIDDEN BELOW KATMAI ASH
UA91-93-233	FLAKE	MIDDEN BELOW KATMAI ASH
UA91-93-234	FLAKE GROUND	MIDDEN BELOW KATMAI ASH
UA91-93-235	FLAKE GROUND	MIDDEN BELOW KATMAI ASH
UA91-93-236	FLAKE	MIDDEN BELOW KATMAI ASH
UA91-93-237	FLAKE	MIDDEN BELOW KATMAI ASH
UA91-93-238	FLAKE	MIDDEN BELOW KATMAI ASH
UA91-93-239	FLAKE	MIDDEN BELOW KATMAI ASH
UA91-93-240	FLAKE	MIDDEN BELOW KATMAI ASH
UA91-93-241	FLAKE	MIDDEN BELOW KATMAI ASH
UA91-93-242	FLAKE	MIDDEN BELOW KATMAI ASH
UA91-93-243	FLAKE	MIDDEN BELOW KATMAI ASH
UA91-93-244	FLAKE	MIDDEN

Appendix 3 continued...

NUMBER	ARTIFACT	STRATA
UA91-93-245	FLAKE	MIDDEN
UA91-93-246	SLATE FLAKE	BLACK SOIL
UA91-93-247	CHERT FLAKE	2ND BLACKISH BROWN LAYER
UA91-93-248	FLOTATION SAMPLE #1	MIDDEN
UA91-93-249	BONE FRAGMENTS	MIDDEN
UA91-93-250	CHARCOAL SAMPLE	
UA91-93-251	CHARCOAL SAMPLE	BLACK SOIL
UA91-93-252	FAUNA LEVEL BAG	MIDDEN

APPENDIX 4

AFG-098 Artifact Catalog

NUMBER	ARTIFACT	COMPONENT
UA91-92-001	GROUND SLATE "CHISEL"	LOWER
UA91-92-002	GROUND SLATE ROD FRAGMENTS	UPPER
UA91-92-003	GROUND SLATE ROD FRAGMENT	UPPER
UA91-92-004	GROUND SLATE POINT	UPPER
UA91-92-005	SLATE POINT	SURFACE
UA91-92-006	SERRATED SLATE POINT BASE	SURFACE
UA91-92-007	GROUND SLATE POINT FRAGMENT	UPPER
UA91-92-008	GROUND SLATE POINT MIDSECTION	LOWER
UA91-92-009	GROUND SLATE POINT FRAGMENT	UPPER
UA91-92-010	GROUND SLATE POINT FRAGMENT	UPPER
UA91-92-011	GROUND SLATE TIP	UPPER
UA91-92-012	GROUND SLATE POINT FRAGMENT	UPPER
UA91-92-013	GROUND SLATE POINT	UPPER
UA91-92-014	GROUND SLATE POINT	SURFACE
UA91-92-015	GROUND SLATE POINT	UPPER
UA91-92-016	GROUND SLATE POINT,INCISED	SURFACE
UA91-92-017	GROUND SLATE POINT TIP	UPPER
UA91-92-018	GROUND SLATE POINT FRAGMENT	LOWER
UA91-92-019	GROUND SLATE POINT	LOWER
UA91-92-020	GROUND SLATE POINT	UPPER
UA91-92-021	GROUND SLATE BLADE? FRAGMENT	UPPER
UA91-92-022	GROUND SLATE POINT FRAGMENT	UPPER
UA91-92-023	GROUND SLATE POINT	UPPER
UA91-92-024	GROUND SLATE POINT FRAGMENT	LOWER
UA91-92-025	GROUND SLATE POINT	LOWER
UA91-92-026	GROUND SLATE POINT FRAGMENT	LOWER
UA91-92-027	GROUND SLATE POINT FRAGMENT	LOWER
UA91-92-028	SLATE PREFORM	UPPER
UA91-92-029	ULU FRAGMENT	UPPER
UA91-92-030	ULU FRAGMENT	UPPER
UA91-92-031	ULU FRAGMENT	UPPER
UA91-92-032	GROUND SLATE FRAGMENT	LOWER
UA91-92-033	GROUND STONE	UPPER
UA91-92-034	GROUND SLATE	LOWER
UA91-92-035	ULU FRAGMENT	UPPER
UA91-92-036	FIRE CRACKED ROCK	
UA91-92-037	GROUND SLATE FRAGMENT	
UA91-92-038	GROUND SLATE FRAGMENT	
UA91-92-039	WORKED SLATE	UPPER
UA91-92-040	SLATE FRAGMENT	
UA91-92-041	SAWN/SNAPPED SLATE	SURFACE
UA91-92-042	SLATE FRAGMENT	
UA91-92-043	ULU FRAGMENT	UPPER
UA91-92-044	SAWN/SNAPPED SLATE	UPPER
UA91-92-045	FLAKED SLATE BLADE FRAGMENT	UPPER

Appendix 4 continued...

NUMBER	ARTIFACT	COMPONENT
UA91-92-046	GROUND SLATE FRAGMENT	
UA91-92-047	ULU FRAGMENT	UPPER
UA91-92-048	STONE SAW FRAGMENT	LOWER
UA91-92-049	GROUND SLATE BLADE FRAGMENT	UPPER
UA91-92-050	WORKED SLATE	UPPER
UA91-92-051	WORKED?SLATE	UPPER
UA91-92-052	GROUND SLATE FRAGMENT	UPPER
UA91-92-053	GROUND SLATE	
UA91-92-054	GROUND SLATE	
UA91-92-055	SLATE BLADE	SURFACE
UA91-92-056	STONE SAW FRAGMENT	LOWER
UA91-92-057	ULU FRAGMENT	UPPER
UA91-92-058	GROUND SLATE FRAGMENT	LOWER
UA91-92-059	SLATE FRAGMENT	
UA91-92-060	STEMMED SLATE POINT	UPPER
UA91-92-061	GROUND SLATE FRAGMENT	LOWER
UA91-92-062	ULU FRAGMENT	LOWER
UA91-92-063	ULU FRAGMENT	SURFACE
UA91-92-064	ULU	UPPER
UA91-92-065	ULU FRAGMENT	UPPER
UA91-92-066	ULU FRAGMENT	UPPER
UA91-92-067	SLATE ULU	UPPER
UA91-92-068	ULU FRAGMENT	UPPER
UA91-92-069	ULU FRAGMENT	UPPER
UA91-92-070	ULU FRAGMENT	SURFACE
UA91-92-071	ULU FRAGMENT	UPPER
UA91-92-072	ULU FRAGMENT	UPPER
UA91-92-073	PLANING ADZE FRAGMENT	LOWER
UA91-92-074	PLANING ADZE FRAGMENT	UPPER
UA91-92-075	PLANING ADZE	LOWER
UA91-92-076	PLANING ADZE	UPPER
UA91-92-077	FLAKED SLATE PREFORM	LOWER
UA91-92-078	FLAKED SLATE PREFORM	LOWER
UA91-92-079	JET LABRET FRAGMENT	LOWER
UA91-92-080	PLANING ADZE	UPPER
UA91-92-081	CHIPPED SLATE PREFORM	UPPER
UA91-92-082	BOULDER SPALL?	
UA91-92-083	BOULDER SPALL	
UA91-92-084	STONE SAW	UPPER
UA91-92-085	GRINDING STONE	UPPER
UA91-92-086	FLAKE	LOWER
UA91-92-087	FLAKE	UPPER
UA91-92-088	PLANING ADZE	UPPER
UA91-92-089	HAMMERSTONE	LOWER
UA91-92-090	NOTCHED COBBLE	SURFACE
UA91-92-091	QUARTZ CRYSTAL	UPPER
UA91-92-092	WHETSTONE? FRAGMENT	LOWER
UA91-92-093	ROUNDED STONE	
UA91-92-094	CARVED SPRUCE FRAGMENTS	UPPER

Appendix 4 continued...

NUMBER	ARTIFACT	COMPONENT
UA91-92-095	POLISHING STONE	LOWER
UA91-92-096	FLAKE	UPPER
UA91-92-097	FACETTED COBBLE	UPPER
UA91-92-098	WHETSTONE FRAGMENT	LOWER
UA91-92-099	HEMATITE NODULE	UPPER
UA91-92-100	FACETTED COBBLE	UPPER
UA91-92-101	WHETSTONE	UPPER
UA91-92-102	HAMMERSTONE/PECK STONE	LOWER
UA91-92-103	HAMMERSTONE	SURFACE
UA91-92-104	HAMMERSTONE	UPPER
UA91-92-105	NOTCHED COBBLE	SURFACE
UA91-92-106	WHETSTONE FRAGMENT	
UA91-92-107	WHETSTONE FRAGMENT	UPPER
UA91-92-108	SMOOTH ROUND PEBBLE	
UA91-92-109	RED OCHER? FRAGMENT	
UA91-92-110	QUARTZ CRYSTAL	LOWER
UA91-92-111	WHETSTONE	UPPER
UA91-92-112	FLAKE	SURFACE
UA91-92-113	BONE	
UA91-92-114	CUT? BONE	
UA91-92-115	BONE FRAGMENT	
UA91-92-116	BONE FRAGMENT	
UA91-92-117	WHALE BONE FRAGMENTS	
UA91-92-118	BONE FRAGMENTS	
UA91-92-119	DART BASE FRAGMENT	UPPER
UA91-92-120	WORKED WOOD FRAGMENTS	LOWER
UA91-92-121	FACETTED PIGMENT STONE	LOWER
UA91-92-122	WOOD PIN	LOWER
UA91-92-123	FAUNA	
UA91-92-124	CARVED/DRILLED WOOD	UPPER
UA91-92-125	FAUNA	
UA91-92-126	BARK ROLL	LOWER
UA91-92-127	FAUNA	
UA91-92-128	FAUNA	
UA91-92-129	FAUNA	
UA91-92-130	FAUNA	
UA91-92-131	WOOD FRAGMENT	LOWER
UA91-92-132	BARK SAMPLE C14	UPPER
UA91-92-133	CHARCOAL SAMPLE	LOWER
UA91-92-134	FAUNA	
UA91-92-135	WHALE BONE	
UA91-92-136	PLANT FIBER/MATTING?	LOWER
UA91-92-137	WOOD	
UA91-92-138	WOOD/CHARCOAL/SEED	UPPER
UA91-92-139	CHARCOAL	UPPER
UA91-92-140	CHARCOAL	LOWER
UA91-92-141	CHARCOAL	
UA91-92-142	CHARCOAL	
UA91-92-143	CHARCOAL	

Appendix 4 continued...

NUMBER	ARTIFACT	COMPONENT
UA91-92-144	CHARCOAL	
UA91-92-145	CUT BIRCH BARK/BASKET?	UPPER
UA91-92-146	CHARCOAL	
UA91-92-147	CHARCOAL	
UA91-92-148	CHARCOAL	
UA91-92-149	CHARCOAL	
UA91-92-150	CHARCOAL	UPPER
UA91-92-151	CHARCOAL	
UA91-92-152	CHARCOAL W/ ORGANICS(?)	LOWER
UA91-92-153	CHARCOAL	
UA91-92-154	CHARCOAL	LOWER
UA91-92-155	CHARCOAL	
UA91-92-156	CHARCOAL	
UA91-92-157	CHARCOAL	
UA91-92-158	CHARCOAL	
UA91-92-159	CHARCOAL	
UA91-92-160	CHARCOAL	UPPER
UA91-92-161	FAUNA LEVEL BAG	
UA91-92-162	FAUNA	
UA91-92-163	FAUNA LEVEL BAG	
UA91-92-164	FAUNA LEVEL BAG	
UA91-92-165	BONE	
UA91-92-166	FAUNAL LEVEL BAG (1 OF 4)	
UA91-92-167	FAUNA LEVEL BAG	
UA91-92-168	SHELL FRAGMENTS	
UA91-92-169	FAUNA	
UA91-92-170	ORGANIC MAT SAMPLE	UPPER
UA91-92-171	FAUNA LEVEL BAG	
UA91-92-172	FAUNA LEVEL BAG	
UA91-92-173	BARBED BONE DART FRAGMENT	UPPER
UA91-92-174	SEED SAMPLE	UPPER
UA91-92-175	FAUNA/RODENT MANDIBLE	
UA91-92-176	WOOD PEG	LOWER
UA91-92-177	WORKED WOOD	UPPER
UA91-92-178	FAUNA LEVEL BAG	
UA91-92-179	FAUNA (MUSSEL)	
UA91-92-180	FAUNA (MUSSEL)	
UA91-92-181	FAUNA	
UA91-92-182	BONE FRAGMENTS	
UA91-92-183	BONE FRAGMENT	
UA91-92-184	FAUNA	
UA91-92-185	FAUNA	
UA91-92-186	FAUNA	
UA91-92-187	FAUNA	
UA91-92-188	BONE BARB	UPPER
UA91-92-189	FAUNA	
UA91-92-190	FAUNA	
UA91-92-191	FAUNA	
UA91-92-192	FAUNA LEVEL BAG	

Appendix 4 continued...

NUMBER	ARTIFACT	COMPONENT
UA91-92-193	FAUNA	
UA91-92-194	WOOD FRAGMENT	LOWER
UA91-92-195	FAUNA	
UA91-92-196	FAUNA	
UA91-92-197	FAUNA	
UA91-92-198	FAUNA	
UA91-92-199	CANINE TOOTH	
UA91-92-200	FAUNA	
UA91-92-201	FAUNA	
UA91-92-202	FAUNA	
UA91-92-203	FAUNA	
UA91-92-204	LAPILLI SAMPLE	
UA91-92-205	FAUNA	
UA91-92-206	BONE, SEA MAMMAL?	
UA91-92-207	WOOD	
UA91-92-208	WOOD CHIP	
UA91-92-209	CARBONIZED WOOD	
UA91-92-210	CHARCOAL	UPPER
UA91-92-211	FAUNA LEVEL BAG	
UA91-92-212	FAUNA LEVEL BAG	
UA91-92-213	BIRD BONE	
UA91-92-214	SEED SAMPLE	UPPER
UA91-92-215	BARBED BONE DART TIP	UPPER
UA91-92-216	ULU FRAGMENTS	LOWER
UA91-92-217	CHUNK	UPPER
UA91-92-218	BARBED BONE DART	LOWER
UA91-92-219	WORKED STONE FRAGMENT	LOWER
UA91-92-220	INCISED SLATE FRAGMENT	LOWER
UA91-92-221	WORKED WOOD / PEG?	LOWER
UA91-92-222	BONE AWL	UPPER
UA91-92-223	WORKED BONE	UPPER
UA91-92-224	WORKED? WOOD (CARBONIZED)	
UA91-92-225	TWINED TEXTILE	UPPER
UA91-92-226	CALCINED ANTLER	UPPER
UA91-92-227	WORKED BONE FRAGMENTS-AWL?	LOWER
UA91-92-228	FAUNA	
UA91-92-229	BARBED SPUR	UPPER
UA91-92-230	FLAKE	LOWER
UA91-92-231	WORKED BONE FRAGMENT	
UA91-92-232	LAPILLI SAMPLE	
UA91-92-233	WOODEN POST	UPPER
UA91-92-234	FLOTATION SAMPLE #3	
UA91-92-235	FLOTATION SAMPLE #4	
UA91-92-236	FLOTATION SAMPLE #1	UPPER
UA91-92-237	FLOTATION SAMPLE #2	
UA91-92-238	FLOTATION SAMPLE #6	
UA91-92-239	FLOTATION SAMPLE #5	
UA91-92-240	FLOTATION SAMPLE #7	
UA91-92-241	FAUNA LEVEL BAG	

Appendix 4 continued...

NUMBER	ARTIFACT	COMPONENT
UA91-92-242	COMPRESSED GRASS/TEXTILE?	UPPER
UA91-92-243	LARGE BONE FRAGMENT	
UA91-92-244	WHALE BONE	
UA91-92-245	WHALE BONE	
UA91-92-246	BONE FRAGMENTS	LOWER
UA91-92-246a	BARBED BONE FRAGMENT	LOWER
UA91-92-246b	BARBED BONE FISH HOOK	LOWER
UA91-92-246c	BARBED BONE FRAGMENT	LOWER
UA91-92-247	FAUNA LEVEL BAG	LOWER

APPENDIX 5

AFG-098 Fauna List

NUMBER	BONE	ANIMAL	AGE
UA91-92-113			
UA91-92-114			
UA91-92-115fa	AXIS FRAG	SEA MAMMAL	
UA91-92-116fa	LONGBONE FRAG	LAND MAMMAL	
UA91-92-117fa	FRAGMENTS	WHALE?	
UA91-92-118fa	LONGBONE FRAGMENTS	LAND MAMMAL, LARGE	
UA91-92-123fa	PERIOSTRACUM	MOLLUSK	
UA91-92-125fa	BEAK	CEPHALOPOD	
UA91-92-127fa	CANINE TOOTH	HARBOR SEAL?	
UA91-92-128fa	PERIOSTRACUM	MOLLUSK	
UA91-92-129fa	LONGBONE FRAGMENTS	BIRD	
UA91-92-130fa	AUDITORY BULLA	HARBOR SEAL	
UA91-92-130fb	LONGBONE	SEA MAMMAL	
UA91-92-134fa	TIBIA FRAGMENTS	LAND MAMMAL, LARGE	
UA91-92-135fa	FRAGMENT	WHALE	
UA91-92-161fa	HUMERUS	HARBORSEAL	IMMATURE
UA91-92-161fb	PHALANX	STELLARS SEA LION	IMMATURE
UA91-92-161fc	CRANIAL FRAGMENTS	SEA MAMMAL	
UA91-92-161fd	SCAPULA FRAGMENT	HARBOR SEAL?	MATURE
UA91-92-161fe	SCAPULA FRAGMENT	SEA MAMMAL	IMMATURE
UA91-92-161ff	AXIS	HARBOR SEAL	MATURE
UA91-92-161fg	LONGBONE FRAGMENTS	SEA MAMMAL	IMMATURE?
UA91-92-161fh	VERTEBRA	HALIBUT?	
UA91-92-161fi	VERTEBRA/ FRAGMENTS	SEA MAMMAL	IMMATURE
UA91-92-161fj	HUMERUS	HARBOR SEAL	IMMATURE
UA91-92-161fk	HUMERUS	HARBOR SEAL	IMMATURE
UA91-92-161fl	CARPAL	STELLARS SEA LION	IMMATURE
UA91-92-161fm	VERTEBRA	BEAR?	IMMATURE
UA91-92-161fn	RIB FRAGMENTS	SEA MAMMAL	
UA91-92-162fa	CARPAL	NORTHERN FUR SEAL	MATURE
UA91-92-162fb	CARPAL	NORTHERN FUR SEAL	MATURE
UA91-92-162fc	AUDITORY BULLA	HARBOR SEAL	MATURE
UA91-92-162fd	FRAGMENTS, MISC.	SEA MAMMAL	
UA91-92-163fa	PHALANGES, ETC	SEA MAMMAL?	IMMATURE
UA91-92-164fa	LONGBONE FRAGMENTS	MAMMAL	
UA91-92-165fa	INNOMINATE	HARBOR SEAL	
UA91-92-166fa	FRAGMENTS, MISC.		
UA91-92-166fb	VERTEBRAE/ FRAGMENTS	FISH, SALMONOID	
UA91-92-166fc	HUMERUS FRAGMENTS	HARBOR SEAL	IMMATURE
UA91-92-166fd	TIBIOTARSUS	BIRD	
UA91-92-166fe	VERTEBRAE	HARBOR SEAL?	IMMATURE
UA91-92-166ff	LONGBONE FRAGMENTS	BIRD	
UA91-92-166fg	TIBIOTARSUS, END	MURRE?	
UA91-92-166fh	CORACOID	DUCK?	
UA91-92-166fh	CORACOID	BIRD	

Appendix 5 continued...

NUMBER	BONE	ANIMAL	AGE
UA91-92-166fi	SCAPULA	CORMORANT	
UA91-92-166fj	FRAGMENTS, MISC.	SEA MAMMAL	IMMATURE
UA91-92-166fk	PHALANGES	SEA MAMMAL	
UA91-92-166fl	FRAGMENTS, MISC.	SEA MAMMAL	
UA91-92-166fm	VERTEBRAL SPINE	SEA OTTER	MATURE
UA91-92-166fn	HUMERUS	GULL	
UA91-92-166fo	2 CANINES, 1 MOLAR	OTTER?	
UA91-92-166fp	EAR BONE	MAMMAL	
UA91-92-166fq	HUMERUS, LOWER	HARBOR SEAL	IMMATURE
UA91-92-166fr	PHALANX	SEA MAMMAL	IMMATURE
UA91-92-166fs	PHALANGES	SEA MAMMAL	
UA91-92-167fa	FRAGMENTS, MISC.		
UA91-92-167fb	FRAGMENTS	FISH	
UA91-92-167fc	CORACOID	PUFFIN	
UA91-92-167fd	PELVIS	CORMORANT	
UA91-92-167fe	STERNUM	CORMORANT	
UA91-92-167ff	CLAVICLE?	BIRD?	
UA91-92-167fg	PHALANGES FRAGMENTS	SEA MAMMAL	
UA91-92-168fa	PLATES	CHITON	
UA91-92-169fa	AUDITORY BULLA	HARBOR SEAL	
UA91-92-171fa	FRAGMENTS, MISC.		
UA91-92-171fb	SHELL	GASTROPOD	
UA91-92-171fc	FRAGMENTS(2)	COCKLE	
UA91-92-171fd	VERTEBRAE/ FRAGMENTS	FISH	
UA91-92-171fe	LONGBONE FRAGMENTS	BIRDS	
UA91-92-171ff	STERNUM	PUFFIN	
UA91-92-171fg	PHALANX, TERMINAL	HARBOR SEAL	
UA91-92-171fh	STERNUM FRAGMENT	GULL?	
UA91-92-171fi	CARPOMETACARPUS	GULL?	
UA91-92-171fj	HUMERUS FRAGMENT	CORMORANT	
UA91-92-171fk	PHALANX	BIRD	
UA91-92-171fl	CORACOID	CORMORANT	
UA91-92-171fm	CORACOIDS (2)	GULL?	
UA91-92-171fn	LONGBONE FRAGMENTS	BIRD	
UA91-92-171fo	HUMERUS HEAD	SEA OTTER	IMMATURE
UA91-92-171fp	PHALANX, HEALED	SEA MAMMAL	
UA91-92-171fq	TIBIOTARSUS	CORMORANT?	
UA91-92-171fr	VERTEBRA FRAGMENT	BIRD	
UA91-92-171fs	LONGBONE FRAGMENTS	BIRD	
UA91-92-171ft	FRAGMENTS, MISC.	MAMMAL?	
UA91-92-171fu	CARPALS	SEA MAMMAL	IMMATURE
UA91-92-171fv	FRAGMENTS, MISC.	SEA MAMMAL	
UA91-92-171fw	ULNA	SEA MAMMAL	IMMATURE
UA91-92-171fx	PHALANGE FRAGMENTS	SEA MAMMAL	
UA91-92-171fy	HUMERUS, DISTAL END	HARBOR SEAL	IMMATURE
UA91-92-171fz	RIB FRAGMENTS	SEA MAMMAL	
UA91-92-171fA	VERTEBRAE FRAGMENTS	SEA MAMMAL	IMMATURE
UA91-92-171fB	SESAMOIDS(2)	SEA MAMMAL	
UA91-92-172fa	PERIOSTACUM	MOLLUSK	

Appendix 5 continued...

NUMBER	BONE	ANIMAL	AGE
UA91-92-172fb	LONGBONE FRAGMENTS	SEA MAMMAL	
UA91-92-175fa	MANDIBLE	MICROTINE	
UA91-92-178fa	FRAGMENTS	CARIBOU	MATURE
UA91-92-178fb	FRAGMENTS	MAMMAL	
UA91-92-179fa	PERIOSTRACUM	MOLLUSK	
UA91-92-180fa	PERIOSTRACUM	MOLLUSK	
UA91-92-181fa	PERIOSTRACUM	MOLLUSK	
UA91-92-182fa	FRAGMENTS	SEA MAMMAL	
UA91-92-228fa	VERTEBRA BODY?	SEA MAMMAL	IMMATURE
UA91-92-228fb	STERNUM	SEA MAMMAL	
UA91-92-183fa	HUMERUS	BIRD	
UA91-92-184fa	FRAGMENTS	MAMMAL	
UA91-92-185fa	FRAGMENTS	MAMMAL	
UA91-92-186fa	FRAGMENTS, MISC.	MAMMAL	
UA91-92-186fb	LONGBONE FRAGMENTS	LAND MAMMAL	
UA91-92-186fc	FRAGMENTS	CARIBOU?	
UA91-92-186fd	LONGBONE FRAGMENTS	LAND MAMMAL	
UA91-92-186fe	RIB	MAMMAL	
UA91-92-184fb	PERIOSTRACUM	MOLLUSK	
UA91-92-187fb	PERIOSTRACUM	MOLLUSK	
UA91-92-189fa	AUDITORY BULLA	HARBOR SEAL	
UA91-92-190fa	FRAGMENTS	SEA MAMMAL?	IMMATURE
UA91-92-191fa	PERIOSTRACUM	MOLLUSK	
UA91-92-192fa	CANCELLOUS FRAGMENT	SEA MAMMAL	
UA91-92-193fa	LONGBONE FRAGMENT	SEA MAMMAL	
UA91-92-195fa	VERTEBRAE FRAGMENTS	SEA MAMMAL	IMMATURE
UA91-92-196fa	FRAGMENTS	SEA MAMMAL	
UA91-92-197fa	LONGBONE FRAGMENTS	BIRD	
UA91-92-198fa	HUMERUS	HARBOR SEAL	MATURE
UA91-92-199fa	INCISOR, 3RD	STELLARS SEA LION	
UA91-92-200fa	LONGBONE, FRAGMENTS	BIRD ?	
UA91-92-202fa	TIBIA, DISTAL FRAGMENT	SEA OTTER	
UA91-92-203fa	VERTEBRAE FRAGMENTS	SEA MAMMAL	IMMATURE
UA91-92-205fa	FRAGMENTS	SEA MAMMAL	
UA91-92-206fa	AUDITORY BULLA	HARBOR SEAL	
UA91-92-211fa	FRAGMENTS		
UA91-92-211fb	VERTEBRAE, MISC.	HALIBUT?	
UA91-90-211fc	LONGBONE FRAGMENTS	BIRD, SMALL	
UA91-92-211fd	TIBIOTARSUS, DISTAL	CORMORANT	
UA91-92-211fe	ULNA	LAND MAMMAL, SMALL	
UA91-92-211ff	VERTEBRA	CORMORANT?	
UA91-92-211fg	FEMUR	CORMORANT	
UA91-92-211fh	TIBIOTARSUS?	CORMORANT?	
UA91-92-211fi	CARPOMETACARPUS?	BIRD	
UA91-92-211fj	TIBIOTARSUS	CORMORANT	
UA91-92-211fk	VERTEBRA	SEA MAMMAL	IMMATURE
UA91-92-211fl	VERTEBRA	SEA MAMMAL	MATURE
UA91-92-211fm	FRAGMENTS(2)	PACIFIC LITTLENECK CLAMS	
UA91-92-211fn	ECHINODERM	SEA URCHIN	

Appendix 5 continued...

NUMBER	BONE	ANIMAL	AGE
UA91-92-211fo	SHELL	GASTROPOD	
UA91-92-211fp	FEMUR HEAD	HARBOR SEAL	IMMATURE
UA91-92-211fq	FRAGMENT	FISH?	
UA91-92-211fr	AUDITORY BULLA	HARBOR SEAL	
UA91-92-211fs	PHALANGES, FRAGMENTS	HARBOR SEAL	
UA91-92-211ft	VERTEBRAL FRAGMENTS	SEA MAMMAL	IMMATURE
UA91-92-211fu	RIB FRAGMENTS	HARBOR SEAL ?	
UA91-92-211fv	PATELLA	HARBOR SEAL ?	
UA91-92-211fw	HUMERUS FRAGMENT	HARBOR SEAL	
UA91-92-211fx	VERTEBRAE FRAGMENTS	SEA MAMMAL	
UA91-92-211fy	FRAGMENTS	SEA MAMMAL	
UA91-92-211fz	PHALANGES	HARBOR SEAL	IMMATURE
UA91-92-211fA	CLAVICLE	CORMORANT?	
UA91-92-212fa	RIB FRAGMENT	MAMMAL, LARGE	
UA91-92-212fb	CARPAL/TARSAL	HARBOR SEAL	MATURE
UA91-92-212fc	FRAGMENTS	FISH	
UA91-92-212fd	CARPAL	SEA MAMMAL	
UA91-92-212fe	HUMERUS FRAGMENT	BIRD	
UA91-92-212ff	FRAGMENTS	BIRD	
UA91-92-212fg	FRAGMENTS	BLUE MUSSEL	
UA91-92-212fh	PHALANGES(3)	SEA MAMMAL	
UA91-92-212fi	SKULL FRAGMENT	MAMMAL	
UA91-92-212fj	LONGBONE FRAGMENTS	SEA MAMMAL	
UA91-92-212fk	FRAGMENTS	UNIDENTIFIABLE	
UA91-92-213fa	LONGBONE FRAGMENTS	BIRD	
UA91-92-226			
UA91-92-231fa	LONGBONE FRAGMENT	LAND MAMMAL, LARGE	
UA91-92-241fa	FRAGMENTS		
UA91-92-241fb	VERTEBRAE/FRAGMENTS	FISH, SALMONOID	
UA91-92-241fc	CORACOIDS(2)	PUFFIN	
UA91-92-241fd	TIBIOTARSUS?	BIRD	
UA91-92-241fe	FEMUR, DISTAL	CORMORANT	
UA91-92-241ff	BEAK	MURRE?	
UA91-92-241fg	LONGBONE SHAFTS	BIRD	
UA91-92-241fh	TIBIOTARSUS?	BIRD	
UA91-92-241fi	FEMUR	GOOSE?	
UA91-92-241fj	RADIUS	HARBOR SEAL	
UA91-92-241fk	PHALANX FRAGMENT	SEA MAMMAL	
UA91-92-241fl	RIB FRAGMENTS(4)	HARBOR SEAL	
UA91-92-241fm	PHALANGES(3)	HARBOR SEAL	
UA91-92-241fn	RIB FRAGMENTS(2)	SEA MAMMAL	
UA91-92-241fo	FEMUR	HARBOR SEAL	IMMATURE
UA91-92-241fp	PHALANGES(2)	SEA MAMMAL	
UA91-92-241fq	METAPODIAL	SEA MAMMAL	IMMATURE
UA91-92-241fr	ULNA FRAGMENTS(2)	HARBOR SEAL?	
UA91-92-241fs	CARPAL	SEA MAMMAL	IMMATURE
UA91-92-241ft	FRAGMENTS	SEA MAMMAL?	
UA91-92-241fu	VERTEBRAL BODY	SEA MAMMAL	IMMATURE
UA91-92-241fv	RADIUS HEAD	SEA MAMMAL	IMMATURE?

Appendix 5 continued...

NUMBER	BONE	ANIMAL	AGE
UA91-92-241fw	PHALANX FRAGMENT	SEA MAMMAL, MEDIUM-LARGE	
UA91-92-243fa	CENTRUM?	WHALE	IMMATURE?
UA91-92-244fa	CENTRUM FRAGMENT	WHALE	IMMATURE?
UA91-92-212fl	RADIUS SHAFT	HARBOR SEAL	IMMATURE
UA91-92-212fm	RADIUS FRAGMENT	HARBOR SEAL	IMMATURE
UA91-92-212fn	PHALANGES(3)	HARBOR SEAL?	
UA91-92-212fo	CARPAL	HARBOR SEAL?	
UA91-92-212fp	EPIPHYSEAL FRAGMENTS	HARBOR SEAL?	
UA91-92-212fq	LONGBONES FRAGMENTS	HARBOR SEAL	IMMATURE
UA91-92-212fr	ULNA FRAGMENT	HARBOR SEAL?	
UA91-92-212fs	RIB FRAGMENTS(4)	SEA MAMMAL	
UA91-92-212ft	CANINES(2)	HARBOR SEAL	
UA91-92-212fu	CARPAL	SEA MAMMAL	MATURE
UA91-92-212fv	FIBULA	HARBOR SEAL	IMMATURE
UA91-92-212fw	FEMUR	HARBOR SEAL	IMMATURE
UA91-92-212fx	VERTEBRAE FRAGMENTS	SEA MAMMAL	IMMATURE
UA91-92-212fy	VERTEBRAE FRAGMENTS	SEA MAMMAL	MATURE
UA91-92-212fz	VERTEBRA	SEA MAMMAL?	IMMATURE
UA91-92-212fA	VERTEBRA	SEA MAMMAL	IMMATURE
UA91-92-204fa	EPIPHYSEAL FRAGMENT	HARBOR SEAL?	MATURE
UA91-92-166ft	EPIPHYSEAL FRAGMENTS	SEA MAMMAL	
UA91-92-166fu	PERIOSTRACUM	MOLLUSK	
UA91-92-166fv	SCAPULA FRAGMENT	SEA OTTER	IMMATURE
UA91-92-166fw	VERTEBRAL FRAGMENTS	FISH	
UA91-92-166fx	CARPALS	SEA OTTER?	
UA91-92-166fy	ASTRAGALUS	SEA OTTER	MATURE
UA91-92-166fz	VERTEBRAL CENTRA(2)	SEA MAMMAL	MATURE
UA91-92-166fA	LONGBONE FRAGMENTS	BIRD	
UA91-92-166fB	TIBIA FRAGMENT, DISTAL	SEA OTTER	MATURE
UA91-92-166fC	FEMUR FRAGMENTS	SEA OTTER	IMMATURE
UA91-92-166fD	HUMERUS FRAGMENTS	SEA OTTER	
UA91-92-166fE	TIBIA FRAGMENTS	SEA OTTER	
UA91-92-166fF	FEMUR FRAGMENTS	SEA OTTER	IMMATURE
UA91-92-166fG	CARPAL	SEA MAMMAL	
UA91-92-166fH	MANDIBULAR MOLAR	SEA OTTER	MATURE
UA91-92-166fI	RADIUS FRAGMENT	SEA OTTER?	MATURE
UA91-92-166fJ	MOLARS(2), CANINES(2)	HARBOR SEAL?	IMMATURE?
UA91-92-166fK	FRAGMENTS	MAMMAL	
UA91-92-166fL	VERTEBRAL FRAGMENTS	SEA MAMMAL	IMMATURE
UA91-92-166fM	AUDITORY BULLAS(2)	HARBOR SEAL	
UA91-92-247fa	FRAGMENT	MAMMAL	
UA91-92-247fm	LONGBONE FRAGMENTS	LAND MAMMALS	

APPENDIX 6

AFG-173 Artifact Catalog

NUMBER	ARTIFACT
UA91-94-001	FLAKE LEVEL BAG
UA91-94-002	ADZE FRAGMENT

APPENDIX 7

SEW-068 Artifact Catalog

NUMBER	ARTIFACT	STRATA	COMMENTS
UA91-97-001	CARBON SAMPLE	PEAT	SUBMITTED TO GEOCHRON 10/28/91 - WEIGHT 27.25 G, DRY, SEE ALSO ACCESSION NO.UA91-97-002, A.D. 391 +/-65 CALIB.
UA91-97-002	CARBON SAMPLE	PEAT	SUBMITTED TO GEOCHRON 10/28/91 - WEIGHT 37.5 G, DAMP -NOTE: PART OF THIS ARTIFACT STILL LEFT, SEE ALSO ACCESSION NO. UA91-97-041, A.D. 10 +/1 65.
UA91-97-003	WOODEN WEDGE	SURFACE	FIELD # 68- 1
UA91-97-004	WOOD CHIP	SURFACE	FIELD # 68- 2
UA91-97-005	ADZE FRAG.	SURFACE	FIELD # 68- 3, DISTAL
UA91-97-006	SLATE LANCEOLATE POINT	SURFACE	FIELD # 68- 4
UA91-97-007	GROOVED COBBLE	SURFACE	FIELD # 68- 5
UA91-97-008	WOOD STAKE	PEAT	
UA91-97-009	WOOD STAKE?	DISPLACED FROM UNKNOWN LOCATION	CUT ENDS
UA91-97-010	WOOD STAKE		
UA91-97-011	FAUNA	PEAT	NOTE: LOCATION OF THIS FAUNA WAS AT MEAN BETWEEN AZIMUTH OF 39.0 & 25.O DEGREES, DISTANCE OF 7.75 & --- , ELEVATION OF 1.51 & 1.38 M
UA91-97-012	WOOD CHIP		NOTE THIS ARTIFACT WAS LOCATED AT THE MEAN OF AZIMUTHS OF 39.0

			& 25.0 DEGREES, DISTANCE OF 7.75 & 8.20 M, & AND ELEVATIONS OF 1.51 & 1.38 M.
UA91-97-013	WORKED WOOD		
UA91-97-014	GREENSTONE ADZE		
UA91-97-015	WORKED WOOD	DISPLACED FROM UNKNOWN LOCATION	
UA91-97-016	SLATE ROD		
UA91-97-017	SLATE AWL		
UA91-97-018	FLAKED POINT		
UA91-97-019	WORKED WOOD	DISPLACED	
UA91-97-020	PLANING ADZE		
UA91-97-021	WORKED WOOD	PEAT	
UA91-97-022	WORKED WOOD	PEAT	
UA91-97-023	WOOD STAKE	PEAT	
UA91-97-024	SPLITTING ADZE	SURFACE	
UA91-97-025	ADZE PREFORM	SURFACE	
UA91-97-026	HAMMERSTONE	SURFACE	FACETTED
UA91-97-027	SPLITTING ADZE		SINGLE NIPPLE
UA91-97-028	SPLITTING ADZE		SADDLE GROUND
UA91-97-029	PLANING ADZE		GREENSTONE
UA91-97-030	WORKED WOOD	PEAT	
UA91-97-031	PEAT BULK SAMPLE	PEAT	
UA91-97-032	NOTCHED COBBLE	SURFACE	
UA91-97-033	WOOD STAKE	PEAT	
UA91-97-034	GRINDING SLAB	SURFACE	
UA91-97-035	WORKED WOOD	PEAT	
UA91-97-036	STONE CHOPPER	SURFACE	
UA91-97-037	WORKED WOOD	DISPLACED	
UA91-97-038	WORKED WOOD	PEAT	
UA91-97-039	WOOD PIN	PEAT	
UA91-97-040	BATTERED COBBLE	SURFACE	
UA91-97-041	WORKED WOOD	PEAT	
UA91-97-042	SLATE ROD FRAGMENT		BURNT
UA91-97-043	WOOD SHAFT	PEAT	
UA91-97-044	GRINDING SLAB	SURFACE	
UA91-97-045	WORKED WOOD	PEAT	
UA91-97-046	WOOD PIN	PEAT	
UA91-97-047	PLANING ADZE		