Site Protection and Oil Spill Treatment at SEL-188

An Archaeological Site in Kenai Fjords National Park, Alaska

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EXECUTIVE SUMMARY

Exxon Company, USA implemented a Cultural Resource Program to identify sites, determine the effect of treatment, and mitigate potential impacts to cultural sites located in the area affected by the *Exxon Valdez* oil spill in Prince William Sound and the Gulf of Alaska. A field program overseen by the Coast Guard and conducted under six state and federal permits ensured that disturbance to SEL-188 during treatment in 1990 and in 1991 was minimized. In compliance with state and federal law and regulations, state and federal agencies and Native organizations were provided with the opportunity to review and comment on the work plan developed by Exxon's Cultural Resource Program to protect cultural resources at SEL-188 during cleanup.

This report documents the administrative aspects of discovery and treatment, describes the sequence of treatment events in 1990 and 1991, summarizes the results of uplands and intertidal archaeological investigations conducted in response to planned treatment, and presents environmental, historical, and archaeological data relevant to understanding SEL-188 in relation to other nearby coastal sites. The report is essentially a case study in protecting cultural resources from potential impacts resulting from a marine oil spill and subsequent treatment.

SEL-188 is a pre-contact archaeological site located on the outer Kenai Peninsula coast. The site was discovered in 1989 during a Shoreline Cleanup Assessment Team (SCAT) survey conducted in response to the March 24, 1989 grounding of the *Exxon Valdez* in Prince William Sound. Treatment plans for each beach segment were reviewed and assessed by the Cultural Technical Advisory Group (CTAG). CTAG determined the level of constraint necessary to protect sites depending on the location, type, intensity, and potential cultural resource impact of treatment. Exxon archaeologists inspected and monitored archaeologically sensitive treatment areas. The shoreline subdivision in which SEL-188 is located is one of the areas which was monitored in 1990 and 1991.

The stone artifacts which are present at SEL-188 are in the intertidal zone on state land, while the upland portion of the site (above mean high tide) is located on land currently administered by the National Park Service (NPS). The uplands have been selected by the English Bay Village Corporation and the Port Graham Village Corporation as part of their Alaska Native Claims Settlement Act land entitlement, although the land has not been conveyed out of government ownership. Chugach Alaska Corporation (CAC), the regional Native corporation, is entitled to the subsurface estate upon transfer of the land

under ANCSA. The site is also protected by both state and federal laws pertaining to historical and archaeological sites.

Stone artifacts were deposited into the intertidal zone from the upland portion of the site following shoreline subsidence and erosion after the 1964 Alaska earthquake. Oiling of the rocky intertidal zone occurred in a discontinuous band four to ten meters wide and more than 100 m long consisting of pooled oil, mousse, and an approximately 64 square meter asphalt pavement. Oil penetrated intertidal sediments to a maximum of 20 cm. The decision to treat the beach required a work plan to evaluate and protect cultural resources. The work plan was developed in consultation with cultural resource personnel from Exxon, NPS, the Alaska Office of History and Archaeology, and CAC, and was executed during 1990 and 1991.

The major components of the work plan included mapping of intertidal artifacts by Exxon archaeologists and excavation of an uplands test pit by NPS and CAC archaeologists. Three different treatment events which entailed manual removal of oiled sediment and pooled mousse, hot water spot washing with cold water flooding, and bioremediation using Customblen granular fertilizer were conducted in August, 1990. In 1991, treatment consisted of the breakup and removal of a minor patch of asphalt. A comprehensive education and monitoring program in which Exxon archaeologists closely supervised cleanup workers removing oil and oiled sediment from the intertidal zone was central to the protection of SEL-188.

The cleanup effort effectively treated the shoreline with a minimum of disturbance to SEL-188. More than 5,900 kg (13,000 lbs) of oiled debris and sediment were removed from the intertidal zone near the site. Forty-two artifacts were collected from the intertidal zone to facilitate cleanup; artifacts located outside the oiled area were mapped, photographed, and left in place. Analysis of collected and uncollected artifacts and the results of the upland test pit indicate SEL-188 is a stratified pre-contact site occupied between approximately 600 and 1,300 years ago. Evaluation of the site in relation to other archaeological sites in the region indicates that the upland portion of SEL-188 is one of many coastal sites in the area with the potential to illuminate aspects of Alaska Native history and culture.

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List of Abbreviations and Acronyms

ACHP	Advisory Council on Historic Preservation
ADEC	Alaska Department of Environmental Conservation
AHRS	Alaska Heritage Resource Survey
AOHA	Alaska Office of History and Archaeology
ANCSA	Alaska Native Claims Settlement Act
ARPA	Archaeological Resources Protection Act
ASAP	August Shoreline Assessment Program
CAC	Chugach Alaska Corporation
CMT	Culturally modified tree
CTAG	Cultural Technical Advisory Group
DNR	Department of Natural Resources
FCR	Fire cracked rock
FOSC	Federal On-Scene Coordinator
ISCC	Inter-agency Shoreline Cleanup Committee
ITZ	Intertidal Zone
KEFJ	Kenai Fjords
MAC	Multi-agency Committee
MHT	Mean high tide
MAYSAP	May Shoreline Assessment Program
NOAA	National Oceanic and Atmospheric Administration
NPS	National Park Service
RAC	Russian American Company
RMAC	Resource Multi-agency Committee
SCAT	Shoreline Cleanup Assessment Team
SHPO	State Historic Preservation Office
SSAT	Spring Shoreline Assessment Team
TAG	Technical Advisory Group
USDAFS	USDA Forest Service
USCG	US Coast Guard

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CHAPTER 1

INTRODUCTION

This volume reports the cumulative results of cultural resource investigations at SEL-188, an archaeological site on the outer Kenai Peninsula coast in Kenai Fjords National Park, Alaska. SEL-188 is the Alaska Heritage Resource Survey (AHRS) designator for a pre-European contact site located near the north end of the Pye Islands (Figure 1.1). The site lies within the Alutiiq (Pacific Eskimo) culture area. Archaeological monitoring was required to protect SEL-188 during oil spill treatment activities associated with the March 24, 1989 grounding of the T.V. *Exxon Valdez* in Prince William Sound.

Exxon responded to the spill with an emergency shoreline treatment program during the spring and summer of 1989, and continued treatment on selected shorelines in 1990 and 1991. Exxon developed and funded a Cultural Resource Program to ensure that the potential impact to archaeological sites located within the spill area was minimized during periods of shoreline treatment. Contract archaeologists worked with state, federal, and Native organizations to protect cultural resources during episodes of shoreline treatment.

SEL-188 was originally identified in 1989 during reconnaissance archaeological survey conducted as part of Exxon's Shoreline Cleanup Assessment Team (SCAT) oil spill evaluation process. Concerns for the protection of SEL-188 were largely responsible for postponing treatment in the immediate vicinity until 1990. Site protection strategies were discussed during the spring 1990 Cultural Technical Advisory Group (CTAG) meetings following field investigations conducted in 1989 by the National Park Service (NPS), Chugach Alaska Corporation (CAC), and Exxon. Additional field investigations by Exxon, NPS, and CAC archaeologists in 1990 and 1991 included monitoring of four separate beach treatment events.

The goal of all parties was to simultaneously remove oil from the shoreline and protect the site. Each interested party raised its concerns and proposed avenues for implementing effective site protection. The parties included the National Park Service, which manages the uplands; the State of Alaska, which manages the tidelands; English Bay Village Corporation, which has filed for the coastal uplands in the region as part of their Alaska Native Claims Settlement Act (ANCSA) entitlement; Port Graham Village Corporation, which has also filed for the coastal uplands as part of their ANCSA entitlement; Chugach Alaska Corporation, which is entitled to the subsurface rights of village corpora-

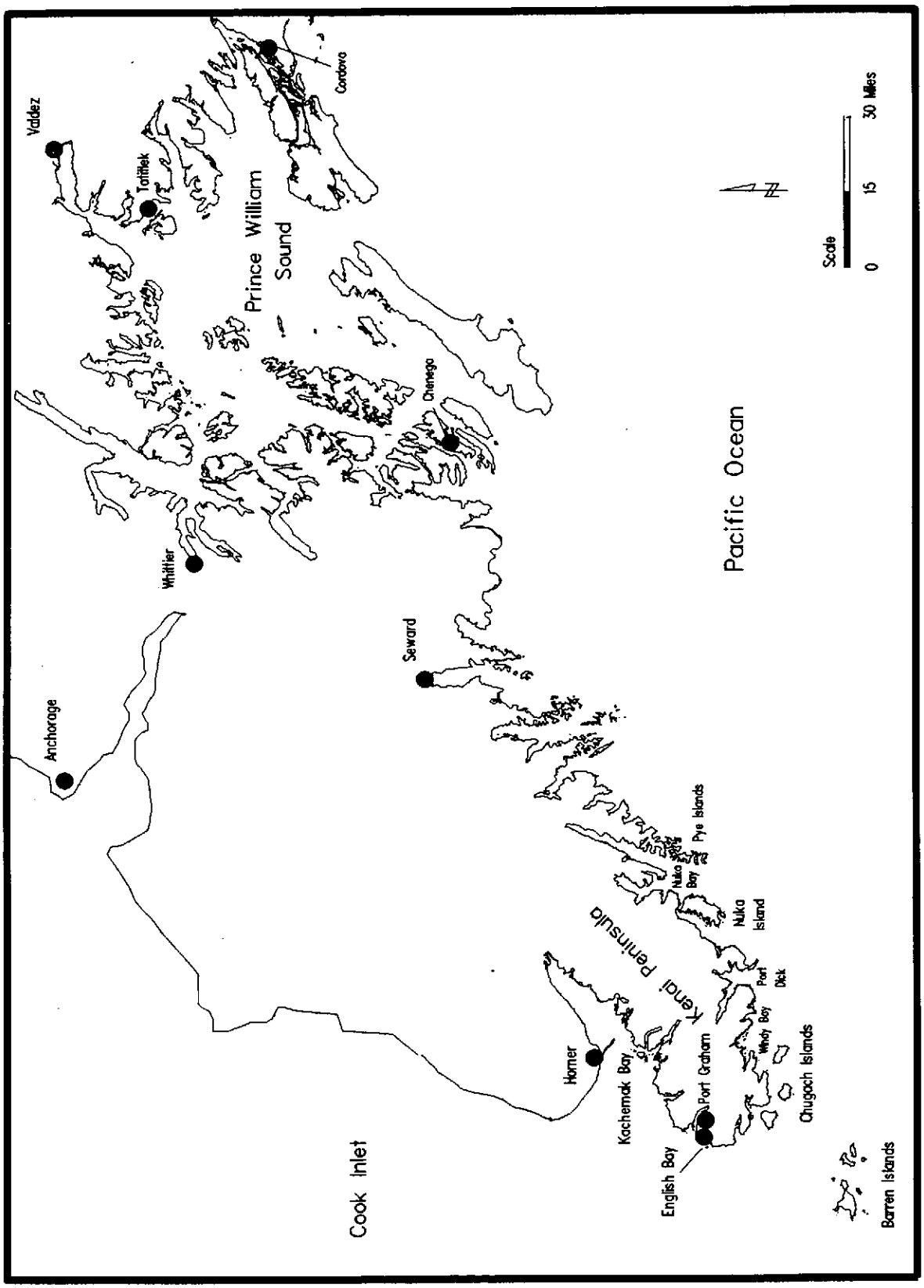


Figure 1.1 Map of the outer Kenai Peninsula coast and adjacent regions

tion lands upon conveyance under ANCSA; and Exxon, which was responsible for conducting oil spill treatment while protecting cultural resources under the terms of state and federal permits. This volume reports information concerning SEL-188, and, by agreement, includes the results of separate NPS/CAC upland investigations undertaken on August 1-2, 1990.

Background information pertinent to the results and methodology is also included. The results of the 1989 Cultural Resource Program have been summarized and reported (Mobley and Haggarty 1989a, 1989b; Mobley *et al.* 1990) as have the activities and results of the 1990 program (Haggarty and Wooley 1990; Haggarty *et al.* 1991). Some of the background information in this volume has been summarized from *The 1989 EXXON VALDEZ Cultural Resource Program* (Mobley *et al.* 1990).

Regulatory and Compliance Responsibilities

The *Exxon Valdez* oil spill containment and cleanup is a federal undertaking, as defined by 36 CFR 800 (Protection of Historic and Cultural Properties) and is guided by the Coast Guard as the Federal On-Scene Coordinator (FOSC). Federal permits which are required for federal undertakings trigger provisions of the National Historic Preservation Act of 1966 and the Archaeological Resources Protection Act (ARPA) of 1974. These provisions necessitated the involvement of other state and federal agencies, most notably the USDA Forest Service (USDAFS) as the lead cultural resource agency advising the Coast Guard. The Advisory Council on Historic Preservation (ACHP) monitors compliance with federal laws, and the Alaska State Historic Preservation Officer (SHPO) acts in an official capacity as a liaison with the ACHP while also serving as a consulting authority for the State of Alaska.

Exxon was required to obtain ARPA permits from the NPS regional office (89-KENAI FJORDS-ARO-001) and Special Use Permits from the park superintendent (ARO-9845-9500-008) prior to undertaking general cultural resource protection measures in Kenai Fjords National Park during 1989 and 1990. NPS issued a separate ARPA permit (90-Kenai Fjords-ARO-001) specifically for 1990 protection efforts at SEL-188. These federal permits were extended to cover archaeological monitoring for treatment which occurred in June, 1991. NPS consulted with CAC and English Bay Village Corporation to obtain comment on stipulations in the 1990 ARPA permit for SEL-188.

The State of Alaska, through the Department of Natural Resources (DNR), claims ownership and control of the intertidal zone below mean high tide in Alaskan waters (DNR 1989). Although federal agencies such as the Forest Service (USDAFS 1989) contest ownership of the intertidal zone, the matter has yet to be resolved before the Interior Board of Land Appeals and the US Supreme Court. Access to tide and submerged land was authorized in 1989 under DNR Land Use Permit SCV 89-004 and State of Alaska Archaeology Permit 89-5, and in 1990 under DNR Land Use Permit SCV 90-005 and State of Alaska Archaeology Permit 90-2. The State of Alaska's cultural resource interests are handled by the Office of History and Archaeology (OHA) which also handles the SHPO function.

Communication between these and other federal, state, and private parties in 1989 was facilitated by the Inter-agency Shoreline Cleanup Committee (ISCC) and smaller working group meetings arranged as needed during the emergency circumstances. The Cultural Technical Advisory Group (CTAG) was formed in 1990, comprised of state and federal agency and Native organization representatives with cultural resource protection interests in the oil spill area. CTAG meetings enhanced communication regarding cultural resource matters in 1990, as did monthly meetings called by the SHPO.

Overview of Activities at SEL-188

Exxon contract archaeologist Mike Yarborough identified SEL-188 on July 31, 1989 during a SCAT survey. Reconnaissance site documentation was

Table 1.1 Chronology of Cultural Resource Investigations and Treatment Monitoring at SEL-188

Date	Activities	Tasks	Party/Agency
7/31/89	SCAT Survey	Surface collection	Exxon
8/10/89 through 8/12/89	Documentation (ITZ/Uplands)	Permanent datum Site mapping Surface collection Subsurface testing	NPS NPS, OHA, CAC NPS, OHA NPS, CAC
4/25/90 through 4/26/90	Documentation (ITZ only)	Site mapping Subsurface testing Artifact collection Beach profile	Exxon, CAC Exxon, CAC Exxon Exxon
8/1/90 through 8/4/90	Treatment (8/2/90 through 8/3/90) Upland Work	ITZ monitoring Artifact collection Subsurface testing Artifact collection Upland profile	Exxon Exxon, NPS NPS, CAC NPS NPS
8/26/90	Treatment	ITZ monitoring	Exxon, NPS
8/28/90 through 8/29/90	Treatment	ITZ monitoring Artifact collection Site (oil) mapping	Exxon, NPS Exxon Exxon
6/11/91	Treatment	ITZ monitoring	Exxon, NPS

completed at that time, and Yarborough collected eight artifacts from the intertidal zone under the discretionary authority provided by state permits. A team of NPS, CAC, SHPO, and Exxon archaeologists returned to SEL-188 on August 10-12, 1989 to map the surface distribution of cultural material in the intertidal zone, collect additional surface artifacts, and conduct limited subsurface testing in the intertidal zone and uplands. The investigators concluded that a substantial mitigation effort would be required prior to and during treatment (NPS 1989). Mitigation and treatment activities in the SEL-188 vicinity were postponed until 1990 by the scheduled suspension of oil spill treatment activity in the fall of 1989.

A multi-agency Spring Shoreline Assessment Team (SSAT) survey documented the condition and amount of oil in the intertidal zone "subdivision" containing SEL-188 on March 31, 1990. The multi-agency Technical Advisory Group (TAG) recommended that treatment of the subdivision occur, but only after cultural resource issues were addressed. Additional site investigations were conducted between April 25-26 by Exxon and CAC to collect information to devise a monitoring plan, but archaeologists were restricted to the portion of the site below mean high tide because of concerns raised by English Bay Village Corporation. Archaeologists mapped intertidal artifact and oil distributions and excavated two intertidal test units. No artifacts were collected during the April 1990 investigations

except for those encountered in the intertidal test units.

Three separate treatment events comprising five days of treatment activity took place at SEL-188 during August 1990, and Exxon and NPS archaeologists were present at each event. The most intensive treatment occurred on August 2-3, 1990 and involved manual pickup of oiled sediment and pooled mousse, hot water spot washing with cold water flooding, and bioremediation using Customblen granular fertilizer. Concurrent with beach monitoring and treatment, NPS and CAC personnel conducted separate upland investigations that included limited subsurface testing. TAG recommended further manual pickup and bioremediation upon review of the August 12, 1990 August Shoreline Assessment Program (ASAP) oil evaluation. This second effort entailed five hours of treatment on August 26, 1990, and work was terminated by the rising tide before bioremediation took place. The third treatment event on August 28-29, 1990, consisted of manual pickup of oiled sediment and the application of a granular fertilizer (Customblen) which stimulates growth of naturally-occurring oil degrading bacteria.

Oil conditions at SEL-188 were further evaluated during the May Shoreline Assessment Program (MAYSAP) in 1991. Based on the MAYSAP evaluation, TAG recommended no further treatment at the site. This decision was reconsidered by the Coast Guard after NPS objected to the no treatment decision, and Exxon returned to SEL-188 in June, 1991 to recover a small area of asphalt pavement. On June 11, 1991, three hours of manual pickup followed by application of Customblen was monitored by one Exxon and one NPS archaeologist. No additional artifacts were collected in 1991 and only one previously unmapped artifact was documented during treatment.

Archaeologists investigated SEL-188 seven times between the initial discovery of the site on July 31, 1989 and the final shoreline treatment on June 11, 1991 (Table 1.1). Exxon archaeologists were involved with all seven investigations, four of which involved monitoring Exxon treatment crews working in the intertidal zone. NPS archaeologists were present on five occasions, CAC archaeologists on three, and a State of Alaska archaeologist on one. Three subsurface tests were excavated in the intertidal zone, one by the NPS in August, 1989 and two by Exxon archaeologists in April, 1990. Surface collections from the intertidal zone were made on three occasions in 1989 and 1990 by Exxon and once in 1989 by the NPS. NPS and CAC archaeologists excavated an upland test unit in August, 1989, and reopened and expanded this test in August, 1990. Subsurface artifacts were collected from the upland test unit in both 1989 and 1990. Subsurface testing with soil probes was conducted by NPS and CAC in the uplands in August, 1990. These investigations are the focus of this report, following an overview of the natural environment and regional cultural background.

CHAPTER 2

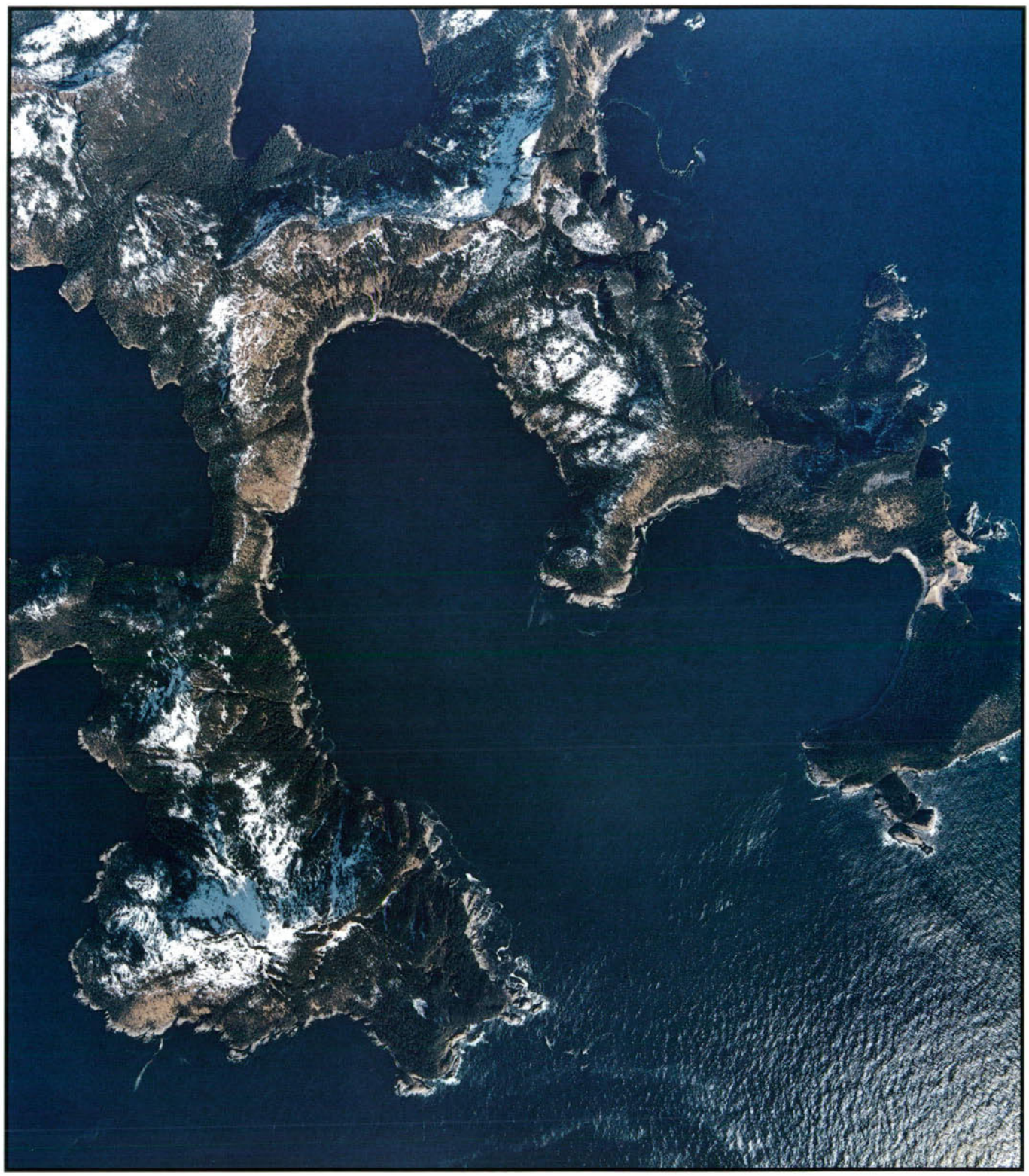
THE NATURAL ENVIRONMENT OF THE OUTER KENAI PENINSULA

The natural environment of the outer Kenai Peninsula coast is discussed in detail in *The 1989 EXXON VALDEZ Cultural Resource Program* (Mobley *et al.* 1990). This chapter summarizes the region's physiography, geology, geomorphology, soils, and oceanography based on that volume and other sources (NPS 1984; Selkregg 1974:Vol. 1). The climate and vegetation of the Kenai Peninsula (particularly the Gulf of Alaska coast) are briefly described, and the marine and terrestrial fauna are examined. Aspects of the regional paleoenvironment are discussed, as are microenvironmental aspects of the general SEL-188 site area.

Physiography and Geology

The Pacific Border Ranges Province lies within the physiographic zone known as the Pacific Mountain System (Wahrhaftig 1965). The outer Kenai Peninsula coast is part of the Pacific Border Ranges Province which extends southwest to include the Kodiak Archipelago and southeast to include Baranof Island in southeastern Alaska. The SEL-188 site is located near the Pye Islands on a small strip of shoreline amid steep glacially sculpted peaks which form a part of the Kenai-Chugach Mountains subdivision of the Pacific Border Ranges Province. The Kenai-Chugach Mountains rise to altitudes of 1,000 to 2,000 m (3,250-6,500 ft), with local ranges along the coast often inundated to form steep-sided peninsulas and islands among deep fjords and submarine valleys extending into the Gulf of Alaska. The Pye Islands represent such a submerged glacial topography, with McArthur Pass separating the mainland peninsula from the partially-submerged peaks forming the Pye Islands further out in the gulf (Figure 2.1).

The Pacific and North American plates of the earth's crust have converged at the average rate of 5-6 cm/year over the last 200 million years (DeMets *et al.* 1987; Lahr and Plafker 1980). This convergence has created the major lithologic, structural, and tectonic features of the Gulf of Alaska region. Most of the outer Kenai Peninsula coast consists of Jurassic and Cretaceous sandstones, mudstones, siltstones, slates, argillites, and oceanic basalts welded together by plate tectonics. During the subsequent Eocene epoch, some now-exposed rocks were metamorphosed by granitic intrusions. The SEL-188 lo-



(Aeromap U.S., Inc.)

Figure 2.1 Aerial photograph showing topography of the Pye Islands

cale and the nearby Pye Islands represent such intrusions.

Geomorphology

Four major processes are responsible for the geomorphology of the study area: glaciation, isostatic rebound, eustacy, and tectonics. Glaciation involves the movement of thick ice sheets across the landscape. Isostatic rebound is the lifting of the earth's crust after a heavy weight such as glacial ice has been removed. Eustacy refers to the global rise and fall of sea level, and tectonics refers to the large-scale mountain-building brought about by pressures along plate boundaries, often evidenced by earthquakes.

Repeated glaciation has scoured almost all of the Kenai Peninsula's land surface. Remnants of massive ice caps include the Harding Icefield 15 km to the north of the Pye Islands. The coastline contains many fjords (glacial valleys now submerged by the sea), including the large McCarty Fjord into which McArthur Pass opens to the west. Cirques, U-shaped valleys, and various types of moraines are prominent glacial features in the regional geomorphology in both upland and submarine contexts.

The gradual inundation of glacial features by marine waters reflects a combination of isostatic rebound, global sea level changes, and tectonic movement. These processes have contributed to the shoreline morphology of the outer Kenai Peninsula and have potentially removed whole classes of sites from the region's archaeological record. Global sea level has been more or less stable since about 5000 or 6000 B.P. (Fairbanks 1989). Isostatic rebound generally tends to uplift formerly depressed land surfaces, although areas just beyond the margins of large ice sheets which bulged up when nearby land was pressed down by glacial ice can be exceptions. Isostatic rebound is difficult to measure separately from the effects of tectonic events (Mann 1986), and such effects are known to have severely affected the Gulf of Alaska shorelines in the past. It has been estimated that the Kenai Peninsula experiences an earthquake of magnitude 7.3 or greater on the Richter scale approximately every 75 years (NPS 1984:14).

The complexity of tectonic activity in the Gulf of Alaska is revealed by studies of the major Alaska earthquake of March 27, 1964 (Plafker 1965, 1967, 1969; Plafker and Kachadoorian 1966; Plafker and Rubin 1967, 1978). While most of the larger islands in Prince William Sound were uplifted by as much as 11.5 m (37.8 ft), the quake caused up to 2.4 m (7.8 ft) of subsidence along the outer Kenai Peninsula coastline, with the axis of maximum subsidence intersecting the coast at Nuka Bay. Terrestrial plants on drowned shorelines were killed by sea water exposure, and many dead standing trees are still visible (McMahan and Holmes 1987:5-6; Mobley *et al.* 1990:19).

These combined geomorphological processes, especially glaciation and tectonic activity, have produced primary coasts with exposed rocky headlands and wave-cut platforms in high energy environments (Fairbanks 1989), and gravel and mixed sand beaches in sheltered areas (Hayes 1986; Hayes and Ruby 1979).

Soils

Soils of the outer Kenai Peninsula are formed primarily from local bedrock, glacial moraines and outwash, and volcanic ash. Most Kenai Peninsula soils have formed in place since deglaciation, interrupted in some coastal contexts by uplift and subsidence. Soils of the Kenai Peninsula are predominately well-drained and horizonated spodosols (orthods), where leaching of iron, aluminum, and carbon from the upper to the lower soil horizons has formed a spodic horizon (Rieger *et al.* 1979). The outer Kenai Peninsula coast has soil associations consisting of primarily humic cryorthods (spodosols) in well-drained areas, and terric cryotemists (histosols or mucky peats) in poorly-drained areas (Rieger *et al.* 1979). No permafrost exists near sea level along the coast (Ferrians 1965).

Oceanography

The warm waters of the North Pacific Ocean flow through the Gulf of Alaska at speeds of up to 100 cm/s (.28 ft/sec) to create a 40 km-wide current (the Alaska Coastal Current) along the outer Kenai Peninsula coast (Royer 1982; Reed and Schumacher 1987). The Gulf of Alaska is rarely calm, and mean significant wave heights (calculated as the mean height of the highest 1/3 of all waves) range seasonally between one and four meters, with maximum recorded wave heights of seven to nine meters (Wilson and Overland 1987). Maximum tidal range exceeds 10 m (32.8 ft).

Climate

The outer Kenai coastline does not experience the extreme temperature fluctuations associated with the more northerly coastal regions or continental interiors of Alaska because of the warming influences of the North Pacific Ocean currents and cool air drainage from the Harding Icefield in the summer (McMahan and Holmes 1987:5). Two distinct climate zones, the maritime zone and the Cook Inlet transitional zone, are separated by the Kenai Mountains and divide the Kenai Peninsula. SEL-188 lies within the maritime zone, characterized by moderate temperatures and high precipitation (NPS 1984). Fall and early winter are the wettest times of the year, with spring usually the driest. Mean annual temperature at Seward is 4.2° C (39.5° F) (Wise and Searby 1977). The Gulf of Alaska is often cloudy. Precipitation varies between 60 and 800 cm/year (24 to 315 in/yr) along Alaska's Gulf coast (Royer 1983; Arctic Environmental Information and Data Center 1974:34), with 200 cm/year (79 in/yr) as a reasonable estimate for the outer Kenai Peninsula coast near the study area (Royer 1983).

Vegetation

The south coast of the Kenai Peninsula can be divided into three vegetation and physiographic zones (Alaska Planning Group 1975:71-79). The eastern and western zones contain broad lowlands with corresponding coastal forests, in contrast to the central zone (from Resurrection Bay to Gore Point, including the SEL-188 area), where lowland vegetation along the rugged fjords and headlands is limited to discontinuous distributions within 10 km of the shore. The treeline on the Kenai Peninsula is lower than that of Prince William Sound, occurring at approximately 150 - 300 m (500 - 1,000 ft) within Kenai Fjords National Park (NPS 1984), and Sitka spruce and western hemlock form a narrow forest belt along the coastline and some inland valleys (NPS 1984). The Kenai Peninsula constitutes the westernmost range of the western hemlock in Alaska.

Common understory components along the outer Kenai Peninsula coast include salmonberry, devil's club, blueberry, huckleberry, and highbush cranberry (McMahan and Holmes 1987:6). The marine environment also contains vegetation important to human residents in the Gulf of Alaska region. The upper and middle intertidal zones often contain rockweed (*Fucus distichus*) and other algae (Lees and Rosenthal 1977; Zimmerman *et al.* 1979; Mobley *et al.* 1990:35), and a number of kelp species are present in the lower intertidal and subtidal zones, particularly *Laminaria* (Mobley *et al.* 1990:35). A more detailed discussion of terrestrial vegetation in the region is available in Mobley *et al.* (1990:29-31), and Native use of the area's flora is summarized in Wennekens (1985).

Fauna

The 1989 Cultural Resource Program final report contains detailed discussions of the faunal distribution throughout southcentral Alaska (Mobley *et al.* 1990:31-44) and lists land mammals, marine mammals, intertidal faunal communities, marine fish, and birds. A summary of that information is presented here, categorized by land mammals, marine mammals, mollusks and crustaceans, fish, and birds.

Marine mammals are common in the Gulf of Alaska (Mobley *et al.* 1990:Table 3) and were a primary focus of traditional Alutiiq subsistence. Gray,

humpback, minke, sei, fin, blue, and right whales are baleen whales seasonally present in the area (Science Applications Inc. 1980; Leatherwood *et al.* 1982). Gray whales migrate through the SEL-188 area in March and April (Miller 1987), and other large baleen whales frequently feed on krill and herring at the mouths of fjords and inter-island channels (Miller 1987). Toothed cetacean species found in the Gulf of Alaska include Pacific white-sided dolphin, killer whale, harbor porpoise, Dall porpoise, beluga, and sperm whale (Science Applications, Inc. 1980; Leatherwood *et al.* 1982; Hall 1979; Miller 1987).

An estimated 40,000-50,000 Steller sea lions (Otariids) live in the northwestern Gulf of Alaska (Scheffer 1972), and a colony of over 4,000 animals on Outer Island in the Pye Islands is among the largest rookeries on the outer Kenai Peninsula coast (Miller 1987). Northern fur seals are seasonally common in the Gulf of Alaska during June, but are rare between August and October (Baker *et al.* 1963). The most abundant pinnipeds are harbor seals, with concentrations (especially at fjord heads) in Nuka Bay, Day Harbor, Aialik Bay, Northwestern Fjord, and McCarty Fjord (Miller 1987). Counts of 500 to 1,600 animals in Aialik's upper glacial basin are common in June (Miller 1987). Sea otters are less common on the outer Kenai Peninsula than they are in Prince William Sound or Kodiak waters, but approximately 1,500 otters are estimated to be present in the Kenai Fjords National Park area (Schneider 1976:Figures 33,34; Miller 1987).

Shellfish are present along most shorelines of the Gulf of Alaska. Limpets, littorinids, barnacles, and mussels (*Mytilus*) are all found in rocky intertidal areas. Bivalves found in beach sediments with the proper grain size and other conditions include butter clam (*Saxidomus giganteus*), littleneck clam (*Protothaca staminea*), Nuttall's cockle (*Clinocardium nuttalli*), softshell clam (*Mya truncata*), bent-nosed clam (*Macoma sp*), and horse clam (*Tresus capax*).

Over 287 species from 55 families of fish are found in the Gulf of Alaska (OCSEAP 1987; Mobley *et al.* 1990:Table 5). Deep-water fish like halibut (*Hippoglossus stenolepis*) and other bottom fish spend much of the year at great depths beyond the continental shelf, and migrate into shallow waters in the spring and summer (Blackburn 1979; Blackburn and Jackson 1987; OCSEAP 1987). Herring (*Clupea harengus pallasii*) spawn between March and June in the intertidal and subtidal zones (OCSEAP 1987). Seasonal availability characterizes all five salmon species found in the gulf: pink (*Oncorhynchus gorbuscha*), sockeye (*O. nerka*), chum (*O. keta*), coho (*O. kisutch*), and chinook (*O. tshawytscha*), as well as steelhead trout (*Salmo gairdneri*), Dolly Varden char (*Salvelinus malma*), and sea-run cutthroat trout (*Salmo clarki clarki*) (Rogers 1987; Tamm 1980). These anadromous species spawn in streams, rivers, lakes, or the intertidal zone at various times between early summer and early fall.

Millions of birds representing more than 147 species are present in the Gulf of Alaska, including 26 species of seabirds, 42 shorebird species, and 35 species of ducks (Miller 1987; DeGange and Sanger 1987; Mobley *et al.* 1990:Table 7). Raptors include the bald eagle (*Haliaeetus leucocephalus*), seven species of owls, and several types of hawks and falcons (Isleib and Kessel 1973; DeGange and Sanger 1987; Mobley *et al.* 1990:Table 7).

Thirty-four indigenous taxa of land mammals are present on the Kenai Peninsula (Mobley *et al.* 1990: Table 2; ADFG 1973, 1978), 22 of which occur in Kenai Fjords National Park (NPS 1984). The larger species include black bear (*Ursus americanus*), mountain goat (*Oreamnos americanus*), Dall sheep (*Ovis dalli*), moose (*Alces alces*), and wolf (*Canis lupus*)(NPS 1984). On the outer Kenai Peninsula coast, brown bears (*Ursus arctos*) range primarily east of the Aialik Peninsula, although they are reported in the Nuka River drainages (NPS 1984). The rugged terrain and scarcity of wooded alluvial valleys limit the number of moose found in the vicinity (ADFG 1985b:95), but mountain goat and Dall sheep prefer such mountainous alpine environments and mountain goats are abundant on the outer Kenai Peninsula coast. Smaller fur-bearing mammals such as mink, marten, river otter, and wolverine were probably important prehistorically and were targeted by historic trappers.

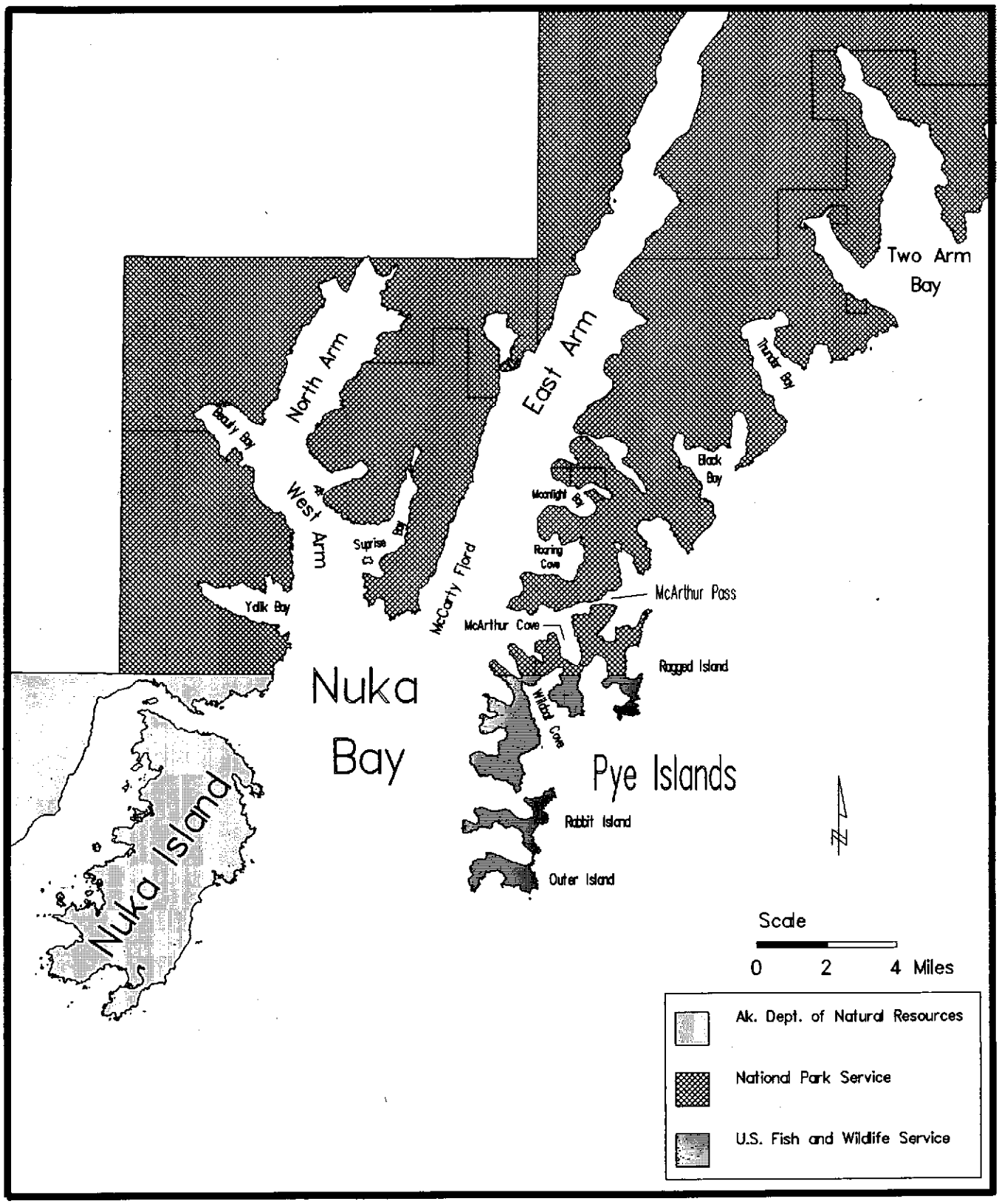


Figure 2.2 The Pye Islands area, outer Kenai Peninsula coast

Paleoenvironment

The paleoenvironmental record in the Gulf of Alaska region reflects the dynamic interplay between climatic change, tectonic activity, and many other processes. Information pertinent to the outer Kenai Peninsula coast is summarized here. A more complete discussion is available in Mobley *et al.* (1990:40-47).

The central Kenai Peninsula mountains were deglaciated about 14,500 B.P. according to Rymer and Sims (1982). Most valley glaciers reached their maximum recent extent between A.D. 1850 and 1900 and have since been retreating (Hamilton and Rice 1989). The re-vegetation pattern following deglaciation has been tentatively reconstructed using pollen studies in the region. One core in particular from Hidden Lake on the Kenai Peninsula spans the last 14,000 years (Ager 1983). A herb tundra vegetation appeared immediately after deglaciation, followed by a dwarf birch shrub tundra between 13,700 and 10,300 B.P., in turn replaced by a mix of shrub tundra and deciduous forest containing poplar and willow. Alder arrived in the area after 9500 B.P. and spruce at about 8000 B.P., followed by mountain hemlock sometime between 5000 and 4000 B.P. (Ager 1983). Heusser (1960, 1985) suggests that shrub tundra/alder cover persisted longer in Prince William Sound, with forestation occurring between 3000 and 2000 B.P. If so, then the

(Robert Betts 91-4:9 Exxon)

Figure 2.3 **Aerial view of SEL-188. NPS upland test is located at center of photo, left of the largest drowned tree in the intertidal zone**

present vegetation character of the outer Kenai Peninsula coast was essentially in place several thousand years ago.

Fauna colonized the outer Kenai Peninsula coast sometime after deglaciation and subsequent revegetation. Information on the timing of species colonization is sparse, however, and it is generally assumed that most mammal species currently occupying the outer Kenai Peninsula coast arrived sometime after the present vegetation character became established several thousand years ago. Recent arrivals include Sitka black-tailed deer (ADFG 1985a:47-48) and coyote.

The configuration of the outer Kenai Peninsula coastline has changed through time due to such processes as tectonic activity, most recently as a consequence of the 1964 Alaska earthquake. Efforts to model those processes by Plafker (1969) and others are summarized elsewhere (Mobley *et al.* 1990:17-26). For the general SEL-188 area, the subsidence caused by the 1964 Alaska earthquake would appear to be one of the most significant changes requiring reconstruction and is addressed later in this volume using data collected at SEL-188.

The Microenvironment at SEL-188

The Pye Islands consist of Ragged, Rabbit, and Outer islands and form the seaward extension of a formerly glaciated mountain range now partly submerged by rising sea level (Figure 2.2). The open water of the Gulf of Alaska lies to the east, and McCarty Fjord, with McCarty Glacier at its head, opens up into the exposed waters of Nuka Bay to the west. McArthur Pass is an 8 km [five mile] east-west channel, with a central constricted portion less than 305 m (1,000 ft) wide which separates Ragged Island from the mainland peninsula.

Overland access to SEL-188 is extremely difficult due to the steepness of the mountain slopes extending down into the sea. As a consequence, movement of terrestrial animals through the area is restricted. Movement of marine animals through Nuka Bay, however, is facilitated by the presence of McArthur Pass. The route is often preferred by local boats avoiding the open water south of Outer Island and likely was preferred by past Native residents as well. The small cove in which the site is situated provides some wind and wave protection from most directions.

SEL-188 is not located near any significant terrestrial fauna habitats, but it is situated near sea lion rookeries and haulout areas, as well as gull, kittiwake, and puffin colonies. Although no anadramous fish streams are present in the immediate vicinity of SEL-188, anadramous and resident marine fish species are abundant in the area and would have likely been harvested in addition to sea mammals and waterfowl.

Cultural material is present in the intertidal zone as well as in the uplands at SEL-188. Rocky outcrops border either side of the small cove in which the site is located. Between these outcrops, the intertidal gradient is less steep, and the portion in front of the site currently consists of large and small boulders. At high tide, water laps up against a vertical face of soil marking the beginning of the uplands, and the bleached stumps of drowned trees (victims of the 1964 Alaska earthquake) extend for several meters into the intertidal zone (Figure 2.3). Additional details of the microenvironment at SEL-188 are discussed in this report as they pertain to the compliance effort. The following summary of the cultural background of the outer Kenai Peninsula provides the ethnographic and historical context of the site.

CHAPTER 3

UNEGKURMIUT CULTURAL BACKGROUND

Information about the outer Kenai Peninsula Alutiiq people (Unegkurmiut) at the time of European contact is meager. While no ethnography of the Unegkurmiut exists, recent archaeological survey data (Mobley *et al.* 1990; Haggarty *et al.* 1991) indicate that Alutiiq groups traditionally utilized the coast, probably most intensively during the late pre-contact period. This chapter draws on ethnographic data summarized in Mobley *et al.* (1990) and discusses implications of recent archaeological surveys on the outer Kenai Peninsula coast.

Fragments of Unegkurmiut ethnographic data are found in Birket-Smith (1953), D. Clark (1984b), de Laguna (1956), Johnson (1984), Leer (1978, 1980), and unpublished oral traditions (ANLC n.d.). Modern ethnographic research in the adjacent Chugach region consists primarily of linguistic and oral history research. Reed (1962) collected Chugach texts from Chenega and Tatitlek people, Ketz (1980) and others collected oral accounts in support of ANCSA-related research, Johnson (1985) collected several Eyak texts from elders and included them in a compilation of reprinted Eyak legends, and Hassen (1974, 1978) focused research on cultural dynamics of European contact with the Chugach.

Nearly all outer Kenai Peninsula archaeological surveys prior to 1989 had been conducted in either the Seward or the Nuka Island areas. Recent surveys by archaeologists from the State of Alaska Office of History and Archaeology (McMahan and Holmes 1987), the National Park Service (Griffin 1985), Chugach Alaska Corporation, and the Exxon Cultural Resource Program (Mobley *et al.* 1990; Haggarty *et al.* 1991) have expanded knowledge of site type and distribution along the Kenai Peninsula coast. Site-specific 14(h)(1) investigations have recently been conducted in the area by the Bureau of Indian Affairs (Dotter 1988a, 1988b; Kent 1990 personal communication).

Post-Contact History of the Outer Kenai Peninsula

The Exploration and Russian Fur Trade Period [1741 - 1867]

Russian contact with Unegkurmiut people was not recorded during any of the earliest Russian explorations in the Gulf of Alaska, although it is possible that Unegkurmiut experienced indirect effects of Russian interaction with Aleut people dur-

ing the 1760s and 1770s. In the summer of 1785, Gregorii Shelikhov sent out parties of Russian workers and Koniag and Aleut hunters from the Russian colony at Three Saints Bay to reconnoiter and obtain furs over a wide area of the Gulf of Alaska (Pierce 1981:15). One of the parties, composed of 52 Russians, 11 Fox Island Aleut, and 110 Kodiak islanders, was sent in four baidaras to investigate the region including Kenai Bay (Cook Inlet) and Chugach Bay (Prince William Sound). This expedition presumably travelled the outer Kenai Peninsula coast. No specific mention of the region is made in Shelikhov's journal, however. The group returned in August of 1785 with ". . . 20 Native hostages from various tribes" (Pierce 1981:16).

Shelikhov was able to establish Russian rule on Kodiak Island and throughout the region by military force and by influencing Native leaders through coercion, murder, and trickery. In 1784, the Russians attacked and annihilated a large multi-village gathering of men, women, and children who had sought refuge at a defensive site on Sitkalidak Island, adjacent to southeast Kodiak Island (Pierce 1981:13). Shelikhov also suppressed a revolt by Shuyak Island people and ". . . 1,000 Kenaitsy [who] came from the American coast to Shuyak" (Pierce 1981:48). Shelikhov later reported that "the enterprise of the Kinais was annihilated" (Pierce 1981:48). The "Kinais" were presumably the Kenaitze (Tanaina) people of Cook Inlet.

Russian activities appear to have brought about political instability in the region. The existence of abandoned villages in strategic trade locales such as the one in Valdez Arm noted by Walker (1982:140) in 1786, the late pre-contact encroachment of Tlingit people into the Controller Bay area, tales of Konaig war parties in Cook Inlet (de Laguna 1956:34), and the fluctuating boundaries and population decline of Ahtna and Eyak people during the mid 1700s all indicate that major cultural changes commenced early in the contact period.

Published data related to the Russian Fur Trade period (1784 - 1867) on the outer Kenai Peninsula coast are scarce, although unpublished Russian Orthodox Church and Russian American Company (RAC) records may contain additional information regarding Russian activities in the region. The effect of the RAC fur trade on the Alutiiq people of the outer Kenai Peninsula is inferred from the RAC's activities in Cook Inlet and Prince William Sound.

A Russian fort was established at Alexandrovsk (English Bay) at the southwestern tip of the Kenai Peninsula in 1785 but was not occupied permanently. By 1793, Baranov had established a shipyard and settlement called Voskresenskoe in Resurrection Bay (Dilliplane 1990:131). Also in 1793, Fort Constantine (later Nuchek Station), an important village and trading post, was founded by the Russians in Prince William Sound (Hassen 1978:129).

Following their usual pattern, Russian traders on the Kenai Peninsula are likely to have appointed "toyons" (chiefs) from among the local Alutiiq to supervise village hunters and arrange the sale of pelts to the Russians. The Russians also probably imported Native hunters from the Aleutians and Kodiak to conduct hunting expeditions along the outer Kenai Peninsula coast as they did throughout southcentral Alaska. Regional consequences of Russian rule and the sea otter trade which probably affected the Unegkurmiut included rapid population decline, epidemic disease, and the breakdown of the traditional maritime economy. Patterns of settlement, marriage, trade, war, and ceremonial practices were also altered.

Sustained European contact with the Chugach people of Prince William Sound began in May 1788 when a hunting party from the *Resolution*, one of Captain James Cook's two ships, encountered and exchanged gifts with twenty Chugach in two skin boats at Port Etches (Hassen 1978). The Chugach ". . . were already in possession of glass beads and spears affixed with iron blades" (Hassen 1978:112), likely obtained in trade from Koniag and Tlingit neighbors. Competitive sea otter trading with English, Spanish, Russian, and American ships in Prince William Sound took place prior to the establishment of a Russian monopoly in 1796, and the movement

of a declining Chugach population into aggregation villages may have occurred during this era.

In comparison with adjacent regions, records of early interaction with Native people along the outer Kenai coast are rare. In 1779, a Spanish expedition planted a cross in what is now Port Chatham. Ignacio Arteaga observed:

> . . . [there] were seen three huts of Indians, for as soon as they saw our Boat they fled in two small canoes. Nothing was found in their house except 4 skinned seals, one of them roasted, and also a dried fish. Their houses were so small that they barely held three men, badly built and leaky (Moore n.d.:107).

Arteaga was probably describing a temporary Alutiiq campsite, although the cultural affinity of the Natives is uncertain because of the lack of direct communication. In August 1788, the Spanish expedition of the *San Carlos* commanded by Lopez de Haro visited Prince William Sound and observed a "large house" with four windows on Montague Island. Subsequent discussions with the Russian Delarov at Three Saints Bay indicated that the structure was a Russian house, and Delarov indicated the extent of Russian activities in the Gulf of Alaska at the time:

> First, he pointed with his finger to his Village, and said he had 60 Russians and 2 galiots [boats] . . . then he pointed out another settlement on the W side of Cape Elizabeth [Alexandrovsk?], and counted 40 Russians. Afterward he pointed out another settlement on Cabo de Rada [Point Banks, NE Shuyak Island?], and counted 37 Russians;. . . another on the mainland of Cook's River [Kasilof?]. . . and counted 40 Russians; and at the end of the said river a Galiot with 70 Russians; on the mainland at Lat. 55 15′ . . . a settlement with 55 Russians and a Galiot; in the Island of Oonalaska they had another settlement with 120 Russians and 2 galiots; then he pointed out a house on the W side of Montague Island, and another at 61 degrees, and a galiot with 40 Russians . . . and that the House which they used at 61 degrees was a Warehouse for Furs which this Galiot collected in this region during the summer; and at the beginning of winter it returned to his village (Moore 1975:21).

Nuka Bay was described in 1790 by Captain Joseph Billings and Captain Gawrila Sarychev (Sarytschew), commanders of a Russian expedition conducting geographical and astronomical investigations along the southern coast of Alaska. Upon entering Nuka Bay on July 12, 1790, the Billings expedition encountered "... two Americans, rowing up to us in a single-seated baidar" (Sarytschew 1807:II,20-21, cited in McMahan and Holmes 1987:12). Carl Heinrich Merck, naturalist on the Billings expedition, reported:

> . . . one man wore a parka made of *evrashka* [ground squirrel] skin, the other a bear-parka. Both wore rain shirts over the top, which reached only to a little above the knee and a little above the elbow" (Merck 1980:111, cited in McMahan and Holmes 1987:13).

The first European reference to the specific SEL-188 site area is contained in Sarychev's journal in which he states:

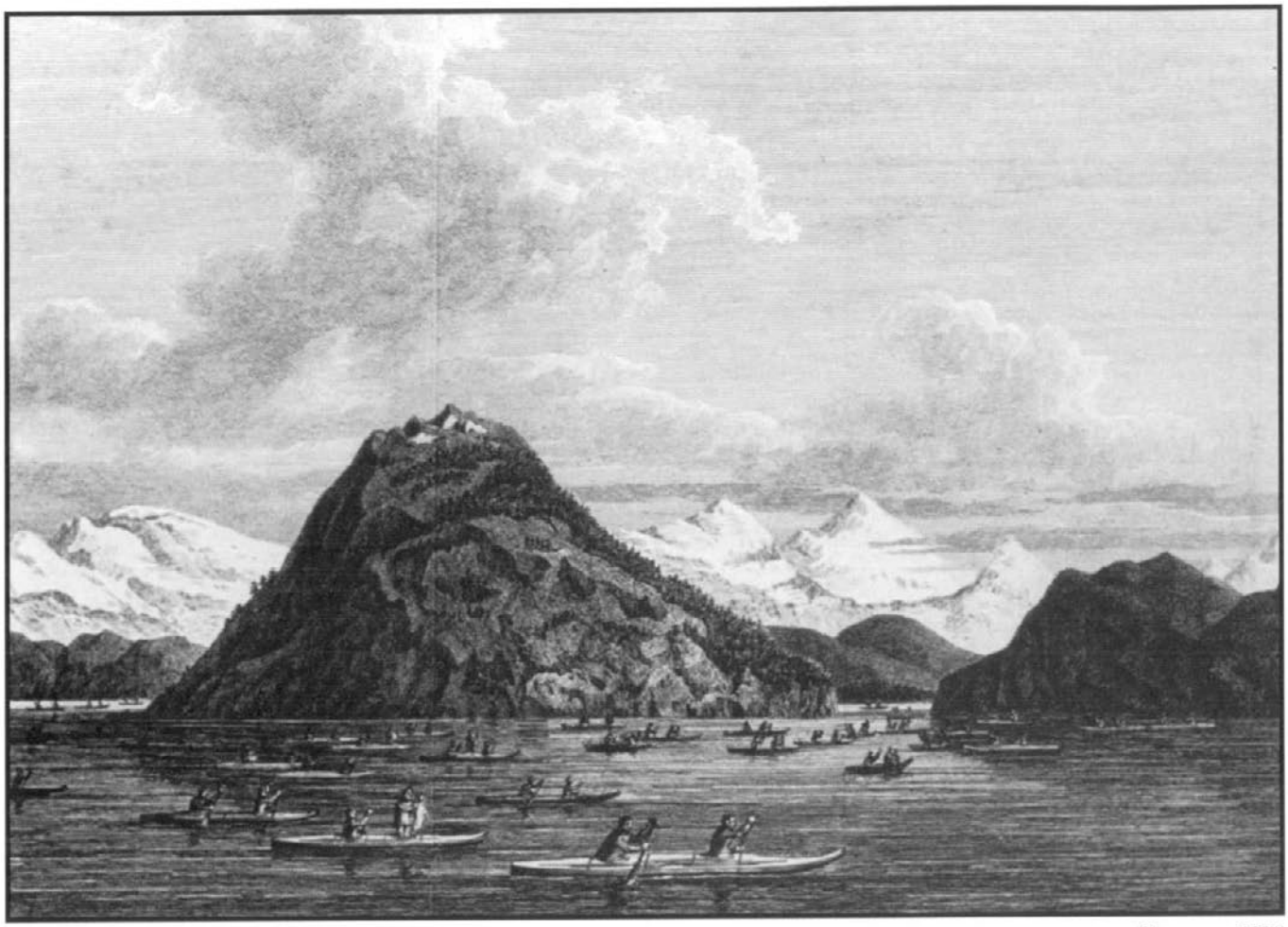
> From these Americans, we learned, that the bay ahead of us was called Nuka, and the cape that presented itself on its eastern side, belonged to an island, which was separated from the main land only by a strait (Sarytschew 1807:II,20-21, cited in McMahan and Holmes 1987:12).

The two Natives encountered by the Billings expedition indicated they lived in one of the coves within Nuka Bay, and they invited Billings to visit their habitations. After attempting to enter the bay, Billings considered the risk to his ship too great and returned to the open sea.

George Vancouver, commanding the *Discovery*, sailed east from Cook Inlet in 1794 and entered Port Dick, approximately 10 miles southwest of Nuka Island. Vancouver describes an encounter with a group of Natives (Figure 3.1):

> A numerous fleet of skin canoes each carrying two men only were about the *Discovery* . . . it was computed that there could be not less than four hundred Indians present. They were almost all men grown, so that the tribe to which they belonged must consequently be a very considerable one (Vancouver 1984:1264).

The Natives wore bird and animal skin clothing, traded hunting and fishing implements, and " . . .



(Vancouver, 1984)

Figure 3.1 Natives in kayaks, outer Kenai Peninsula, 1794

conducted themselves with great propriety" (Vancouver 1984:1265). De Laguna (1956:36) speculated that Vancouver had encountered a fleet of Native sea otter hunters under Russian control, rather than a resident population. The early accounts of European explorers indicate that there were Native residents of the outer Kenai Peninsula, but interactions were brief and observations regarding the cultural affinity of the Natives are lacking.

Coal, first reported by Portlock 60 years earlier, was rediscovered near the entrance to Port Graham Bay in 1850. The Russian American Company (RAC) established a mine there (Coal Village) in 1855, and attempted to establish other commercial fishing and farming enterprises during this era, but the effect of these ventures on the Alutiiq of the outer Kenai Peninsula has not been researched. It is possible that Russian Orthodox Church activities in areas such as Kenai, Upper Cook Inlet, and on the Alaska Peninsula during the early and mid 1800s drew residents away from the outer Kenai coast. Regardless of the specific mechanisms which caused culture change in the region, a shrinking amalgam of Russian, Alutiiq, Tlingit, Eyak, and Ahtna people was the cultural legacy of the Exploration and Fur Trade period in southcentral Alaska.

The American Period [1867 - present]

Depopulation during the Exploration and Fur Trade period reduced the outer Kenai Peninsula population to a single village - Yalik - where 32 "Eskimo" lived according to the 1880 census (Petroff 1884:28). In 1911, a US Geological Survey crew reported that the village of Yalik had been aban-

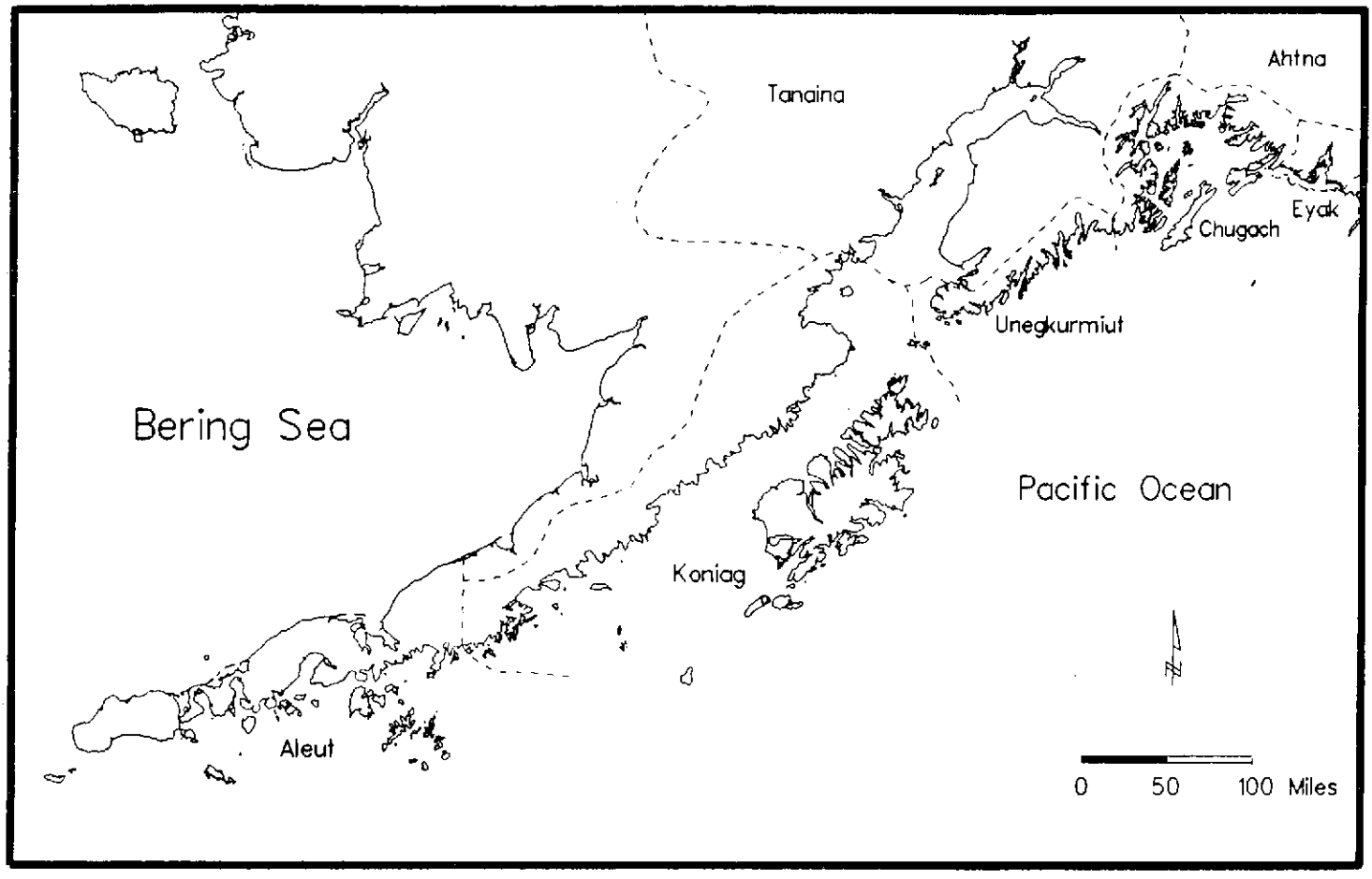


Figure 3.2 Ethnic boundaries of southcentral Alaska

doned (Grant and Higgins 1913:pl. 2, cited in McMahan and Holmes 1987). While Yalik was reportedly the only Kenai village inhabited during 1880, artifactual evidence exists for potentially contemporaneous historic occupation of sites in adjacent areas (Schaaf 1988:22; McMahan and Holmes 1987:33).

The Russian Orthodox Church continued to influence Alutiiq culture during the American period. Porter (1893:69, cited in Stanek 1985:43) noted that Russian Orthodox missionaries based in Kenai requested that Natives living in coastal villages at Yalik and Nuka Bay move to Alexandrovsk to be closer to the missionaries. The residents of these villages apparently did so.

> In 1890 the only residents on the whole coast of 120 miles from Cape Puget at the entrance to Prince William Sound to Cape Elizabeth at the entrance to Cook Inlet were a white man and his half-breed (sic) wife who had settled in Resurrection Bay (near the present site of Seward). At present the only Eskimo settlements in all this former Eskimo area are those of Port Graham, English Bay, and Koyoktolik (Dogfish Bay), on the east coast of Cook Inlet, below Kachemak Bay. I am uncertain whether any Eskimo still live in Port Chatham, just above the mouth of the inlet" (de Laguna 1956:35).

The Alutiiq syncretized their surviving traditions and beliefs with Russian Orthodox beliefs during the late 18th and early 19th centuries.

US Geological Survey studies were conducted in Nuka Bay on several occasions between 1905 and 1911 (McMahan and Holmes 1987), and the US Coast and Geodetic Survey vessel *McArthur* sur-

veyed portions of the outer Kenai Peninsula in 1906 (Orth 1967:606). Copper was mined in Port Dick on the outer Kenai Peninsula at the turn of the century by the Alaska Commercial Company, and later by a James O. Buzzard (Seward Gateway 1905:1). Prospecting began in the Nuka Bay area in 1909 and gold was discovered there in 1918. Active development of mining interests in the Nuka Bay area commenced in 1920 with at least four mines in operation by the 1930s (NPS 1984). Mining activity continued until 1942 when it was shut down by the federal government at the start of World War II (NPS 1984). Chromite mining ensued at the settlement of Chrome on the outer Kenai Peninsula during World War I, and coal mining occurred in Kachemak Bay and Port Graham throughout the early 20th century. Fox farming, which became commercially important in the economy of Prince William Sound in the late 1880s, was established on Nuka Island during the 1920s. US military activity in the Pye Islands during the 1940s is implied by sites documented during the 1989 Exxon Cultural Resource Program archaeological surveys.

Unegkurmiut Ethnography

The outer Kenai Peninsula coast falls within the Alutiiq language region, which extends from just west of the mouth of the Copper River to Stepovak Bay on the Alaska Peninsula (Krauss 1980:8) (Figure 3.2). The coastal inhabitants of the outer Kenai Peninsula exploited maritime and riverine resources prior to contact, a tradition which has continued into the present (Stanek 1985). A hallmark of North Pacific maritime cultures such as the Alutiiq is cooperative harvesting and consumption of subsistence resources by large kin-based households.

The Alutiiq shared many cultural traits with their Tanaina, Aleut, Yupik, interior Athapaskan, Eyak, and Tlingit neighbors as a result of intergroup trade, ceremonial exchange, warfare, and occasional intermarriage. Systems of lineage affiliation and social ranking, which divided societies into social classes including commoners and slaves, prevailed among all cultures of Alaska's southern coast (Townsend 1980). Each group was linguistically distinct but economically, technologically, and socially related, sharing artistic, religious, and ceremonial practices. Populations and social relationships flourished during the late prehistoric period in adjacent regions, and this was likely the case among the Unegkurmiut as indicated by the presence of housepit villages and at least one fort (Mobley *et al.* 1990; Haggarty *et al.* 1991).

Russian and American exploration and exploitation profoundly affected the Native cultures of the Gulf of Alaska (Hassen 1978). Nearly 150 years of Euroamerican interaction passed before systematic ethnographic research occurred among the Chugach and Eyak (Birket-Smith 1953), and among the Tanaina (Osgood 1937). By the 20th century, Alutiiq society had adapted to the Western cash economy through reliance on manufactured goods and purchased foods. The intensity of post-contact culture change is a major factor in the dearth of reliable data regarding life in the region at or before contact.

Language, Territories, and Population

The Native language of the region is Alutiiq (also termed Pacific Eskimo, Sugpiaq, suk/suk, and Sugcestun), one of five Yupik languages spoken from Siberia to southwest Alaska (Woodbury 1984:49-50). Alutiiq has two dialects, Koniag and Chugach. Koniag has two subdialects: one spoken on Kodiak and Afognak islands, and one spoken on the Alaska Peninsula (Leer 1978, cited in Woodbury 1984:53). The Chugach dialect also has two subdialects: one spoken in the Prince William Sound area, and one spoken by the people of Port Graham and English Bay.

The outer Kenai Peninsula coast supported an indigenous population prior to European contact, but villages along the entire length of the outer coast were abandoned by 1890. Neither the original population, the number of independent groups which comprised the Kenai Peninsula Alutiiq, nor the number of villages occupied at contact was known in the 1930s (de Laguna 1956:35):

> There were Eskimo settlements on the south shore of Kenai Peninsula in former times, al-

> though the inhabitants were not considered to be Chugach and were called by the latter the unixkuyiut. The territory of this group seems to have extended from somewhere in the vicinity of Puget Bay....to Cook Inlet, including Kachemak Bay (de Laguna 1956:34).

According to Davis (1984:199):

> The Chugach called the Kenai Peninsula Eskimo *un xkuymiut* 'people out that way' (i.e., toward the open sea), rendered Unikhkurmiut (Birket-Smith 1953:99) and Unegkurmiut (practical orthography).

Oswalt (1967:9, cited in Davis 1984:199) referred to the Kenai Peninsula Alutiiq as Unixkugmiut, and stated ". . . hardly anything more than the name is known." Donald Clark (1984b:185) recognized that the inhabitants of the lower Kenai Peninsula may have been distinct from the Chugach of Prince William Sound, but repeated ". . . there is little early information extant for them." Chugach people reported to de Laguna (1956:35) that Prince William Sound and Kenai Peninsula Alutiiq sometimes fought each other, at other times were allied in raids on the Tanaina, and sometimes intermarried.

The Alutiiq elders interviewed by de Laguna could tell her little about the Unegkurmiut except for one clear reference to Yalik: "Port Graham and Chugach informants spoke of a village . . . The inhabitants, yaleymiut, were an independent tribe with their own chief (de Laguna 1956:36)."

Basic archaeological survey and testing data are required before even a rudimentary chronology of settlement size, location, and abandonment in the outer Kenai Peninsula region can be reconstructed. Nevertheless, one might speculate from de Laguna's remark about the Yalik "tribe" that a pre-contact settlement pattern of politically independent, territorially-constrained local groups existed on the outer Kenai Peninsula. This pattern is typical of the larger Alutiiq area (Haggarty *et al.* 1991: Chapter 7).

The heritage of contemporary Alutiiq people on the outer Kenai Peninsula is essentially representative of the whole Alutiiq culture area as a result of post-contact displacements and population decline. The Native ancestry of current residents of two Lower Kenai Peninsula Alutiiq communities (Port Graham and English Bay) can be traced to villages in Prince William Sound (Tatitlek and Nuchek), the Kenai Peninsula (Yalik Bay), Kodiak Island, and the Alaska Peninsula (Chignik) (Stanek 1985:1; J. Johnson pers. communication 1991).

Unegkurmiut Maritime Adaptations

The following discussion is based on inferences from adjacent Alutiiq groups because of the lack of outer Kenai Peninsula Alutiiq ethnographic data. Late pre-contact Native population growth resulted in single or multi-village sociopolitical units ("local groups" or "societies") elsewhere on the Pacific and Bering Sea coasts, and some variant of this pattern would likely have been operational on the outer Kenai coast as well. Much of the year was spent in permanent villages located near large concentrations of mammals, birds, fish, and shellfish, with occasional seasonal dispersals to specialized resource locations. With increased population pressure, marginal areas would also have been inhabited more intensively, and kin-based systems of inter-village food sharing and regional trade would have become increasingly important.

Pre-contact settlement patterns apparently reflected sedentary adaptations to a maritime environment. Outer bay locations were usually preferred for permanent settlements because they were located adjacent to high densities of food resources, and they provided a view of possible intruders (see Chapter 9). Villages were often situated in the protected setting of a small bay, or in the lee of a headland or small island (D. Clark 1984b:191; Townsend 1981:628). Defensive refuge or fort sites on steep-sided islands or rocky headlands served as retreats in times of conflict. Fishing camps were located near the mouths of salmon streams, and temporary hunting and travel camps were constructed when and where needed. Other site types include petroglyph and pictograph sites, and rockshelters used for temporary occupation or burial.

Table 3.1 Cultural Chronology of Southcentral Alaska

Years B.P.	Regional Chronology	Prince William Sound[1]	Outer Kenai Peninsula	Outer Cook Inlet	Kodiak	Alaska Peninsula (Pacific Coast)	Alaska Peninsula (North Coast and Interior)	
	Historic Culture	Chugach	Unegkurmiut	Tanaina	Koniag			Yupik
0	**Late Prehistoric**	Chugach Phase			Koniag		Thule Phases	B.R. Camp
1000		Late Palugvik	SEL-188	Kachemak IV		Mound		
				Kachemak III	Three Saints Bay	Beach	Norton Phases	B..R. Falls
2000	**Kachemak**	Early Palugvik	?	Kachemak Sub-III	?	Cottonwood ?	?	
3000		?		Kachemak II	Old Kiavik		Arctic Small Tool	
		Uqciuvit Component		Kachemak I		Takli Birch		B.R. Strand
4000	**Ocean Bay II**	?		?	Ocean Bay II		Northern Archaic Phases	
5000						Takli Alder		
	Ocean Bay I				Ocean Bay I			
6000								
7000	--?							
					Crag Point ?			Koggiung
8000								
	Paleoarctic		Presumed Paleoarctic					
9000							Ugashik Narrows	
10000								
			Hypothetical Coastal Paleoarctic Horizon					
11000								

BR = Brooks River

1. Yarborough (1991 in press)

Table 3.2. Diagnostic Attributes of Cultural Stages in Kachemak Bay (from Mobley *et al.* 1990:Table 9)

Contact Period
(post 200 B.P.)

Appearance of early trade goods, adoption of Euroamerican material culture and dwellings with retention of selected pre-contact organizational and utilization patterns.

Late Prehistoric
(800 - 1100 B.P. to 200 B.P.)

Termed Kachemak IV by de Laguna (1975:30, 126) from upper levels of Yukon Island sites and Cottonwood Creek. Later refined by Workman and Lobdell (1979). Poorly documented period when ancestral Tanaina Athapaskans replaced Eskimo people, though ethnic association with assemblages remains problematic. Appearance of native copper and pottery, bone awls and chisels, splitting adzes, planing adzes, bilaterally barbed bone points, stemless triangular slate blades, ground slate scrapers, chipped stone industry emphasizing exotic material, stone wedges, plain stone lamps, sharply defined housepits with supplementary rooms, abundant fire-cracked rock suggesting use of vapor steam bath. Suggested relationships with Koniag occupations in the Kodiak Archipelago (Reger 1981:102).

Kachemak III
(2000 - 1200 B.P.)

Best known from Yukon Island and Cottonwood Creek, also present at Moose River (KEN-043) in the Kenai River area. This period represents the climax of the Kachemak tradition and is marked by a florescence of decoration on many artifact classes, personal adornment, and diverse mortuary practices suggesting differential wealth and social status. The assemblage is marked by a predominance of notched stones, decorated and anthropomorphic stone lamps, sawn slate, barbed and stemmed slate points, triangular slate points, splitting adzes, slate awls and rods, slate mirrors, notched ulus, varieties of barbed points and dart heads, bone and shell beads, incised decorations, wooden semi-subterranean houses with entrance tunnels, stone lined hearths. Strong affinities with Three Saints Bay phase on Kodiak Island (D. Clark 1966:365), suggested association with Prince William Sound occupations.

Kachemak sub-III
(2400 - 2000 B.P.)

Known principally from Yukon and Chugachik islands, also appears at Merrill Site (Reger 1981:89). Thought to be a transitional period between Kachemak II and III, marked by a florescence in artifact types and numbers. Many notched stones, large stones grooved about circumference and over one end, increased working of slate with stone saws, polished barbed slate blades, slate awls, excavated hearth pits, incised decoration suggesting use of metal blades, and flexed burials with artificial eyes, labrets, and clay masks (de laguna 1975:123-125). On Chugachik Island: numerous chipped stone bifaces, points and scrapers, later appearance of slate points, notched adze heads, potential for wooden semi-subterranean houses (W. Workman 1978:28).

Kachemak II
(3200 - 2400 B.P.)

Earliest dates are from the Kenai Peninsula outside Kachemak Bay. Known from Yukon Island, Chugachik Island, and the Merrill Site. Persistence of chipped stone and end grooved weights, large notched stones, drilled slate, barbed slate points, flexed burials with grave goods, disarticulated burials, appearance of semi-subterranean houses constructed of stone, wood, and whalebone suggest of Norton culture influence. Some elements may correlate with part of the Old Kiavik phase on Kodiak (D. Clark 1966:363).

Kachemak I
(3300 B.P. or earlier)

Known from lowest levels of SEL-001. Dated at 2748 $\pm$ 118 B.P. from a combined antler sample from the lowest level (Rainey and Ralph 1959:365-374). Challenged by de Laguna (1975:ix; 1962:166-167) on basis of probable sample contamination. Possible affinities with Old Kiavik complex of Kodiak Island dated to 3300 B.P. (D. Clark 1966:370). Preference for chipped stone, absence of notched stones, large stone weights grooved about end, barbed points, and toggled harpoon forms exhibiting Norton culture attributes.

Travel was primarily by water, in skin-covered kayaks and large open umiaqs. Alutiiq people used one and two-hatch kayaks, and a three-hatch form was added at Russian instigation (D. Clark 1984b:189). Kayaks and umiaqs also were used by the Kachemak Bay Tanaina, who traded for the finished craft and replacement covers, possibly with their outer Kenai Peninsula neighbors.

The outer Kenai Peninsula provides a wealth of marine food resources. Whales were prized for their blubber and rendered oil, meat, and bone, and were actively hunted by the Koniag, some Chugach groups, and probably by the outer Kenai Peninsula Alutiiq. If they did hunt large whales, the Unegkurmiut probably used darts with poisoned blades as was the case with the Koniag and Chugach people. Stranded or "drift" whales, some of which died from the effects of poison and drifted ashore, were an economic windfall. The harpoon line and float method was used to hunt smaller sea mammals. The Tanaina hunted belugas but did not hunt large whales. They did trade with neighbors for blubber and oil, possibly with the Unegkurmiut.

Small whales, sea lions, and porpoises were highly valued and were harpooned in open water from kayaks. Seal hunting involved the use of decoys and nets, as well as harvesting immature animals at haulouts. Sea otters were pursued prior to European contact and were hunted in historic times for their valuable fur by groups of hunters who surrounded the animals and killed them with darts propelled with the aid of throwing boards.

Bottomfish such as cod, halibut, and rockfish were taken year-round with baited hooks or lures. Halibut could be caught during summer in shallow, offshore waters. Herring were likely collected in huge quantities with fish rakes as in adjacent regions. From May through early October, salmon were exploited by all groups. Fishing was concentrated in the lower stretches of streams, where salmon could be trapped, gaffed, harpooned, or speared as they congregated behind weirs (D. Clark 1984b:190).

Intertidal resources such as clams, chitons, snails, sea urchins, sea cucumbers, and octopi were harvested throughout the year. The availability of these species to women, children, and the elderly made them important resources (Erlandson 1988), and these resources are still harvested by Alutiiq people (Stanek 1985:104). Other important marine resources included birds such as gulls, murres, and puffins. Their eggs were a valued resource, although available in harvestable quantities for a limited time. Port Graham and English Bay people still harvest a variety of plant species from the area such as wild celery, wild rhubarb, "goose tongue" (narrow leaf plantain), berries, kelp, and seaweed (Stanek 1985:105), resources which pre-contact outer Kenai Peninsula Alutiiq presumably used as well.

Land mammal species, particularly mountain goats, black bears, and marmots, were hunted for meat and hides, and their importance is inferred from early accounts of the Alutiiq dress.

This description of Chugach dress and diet by de Haro in 1788 provides a portrait of the Alutiiq:

> ...[they] are of medium stature, Light Color, and Blackhaired. They have the Lower Lip perforated, in which they place a Broad piercer with many beads hanging from it. And they have their ears pierced also, in which they hang many Strings of Beads, very symmetrically, so that at first sight it seems they are wearing little saucers. They cover their bodies with a Cloak made of skins of Bear, Wildcats and Sea-lions, and others of Skins of Ducks, all well sewn and arranged on their bodies . . . Their canoes are in the shape of a Harp, formed outside with skins perfectly sewn with fine sinews. The frame work of these canoes is wrought of very thin strips of wood woven in the shape of a perfect lattice-work, and the Deck has the same pattern, and in the middle a Round Opening like the Mouth of a Jar, in which the Indian places himself, and however high the sea is running, most of his body is protected from wet, leaving his Arms free to handle his Paddle. It has been noted that [they] esteem Iron greatly, and they set great store by Beads. On their Heads they wear a Hat perfectly woven of Rushes, and they adorn it with Beads

Table 3.3 Diagnostic Attributes of Cultural Stages in Prince William Sound

Historic Period
(after 1783)

Appearance of small "Glacier Island" trade beads and other European goods associated with the beginning of Russian expansion into region, human bones with evidence of introduced disease, Christian burial practices.

Protohistoric Period
(undated)

Same assemblage as Younger Prehistoric with large blue "Cook type" beads (and presumably some iron).

Younger Prehistoric Period
(undated)

Less shell decomposition, emphasis on use of grooved splitting adzes, the appearance of stone picks, very small adze blades or scrapers, small ground chisels, barbed slate points, socket pieces with plain bases, the presence of war clubs, abundant fire-cracked rock (sweatbath refuse), presence of native copper, absence of European trade goods.

Older Prehistoric Period
(before 1750 B.P.)

Decomposed shells in midden, incised stone plaques, a relative abundance of planing adzes and smaller woodworking tools, a preference for simple stemmed slate blades and slender, awl-like slate points over barbed slate blades, chipped ulu-shaped scrapers, socket pieces with bifurcated bases, a greater abundance of bone or shell beads, a scarcity of fire-cracked rock, and the absence of native copper.

(from Mobley et al. 1990: Table 8)

very elegantly. They decorate their Faces with color like Red Ochre, and others paint their faces with Black and lead color. They find our food disgusting; their meats are limited to Whale, Sea-lion, and all sorts of fishes, raw, and in place of Bread they eat Whale, jerked. i.e., dried in strips. Their weapons are Arrows in abundance, some of Flint, others of pebbles and Whale bone, and some harpoons with which they carry on their fishing for food, as has been said. They also use Blades of Iron on long poles in imitation of javelins. They sharpen their iron until they get a blade to cut things; and lacking iron, they manage with Flint (Moore 1975:10-11).

The Unegkurmiut Archaeological Record

Cultural developments to the east and west of the outer Kenai Peninsula coast form a context in which to study the culture history of the SEL-188 site and its environs (Table 3.1). Available data on Alutiiq prehistory were compiled in the 1989 and 1990 Exxon Cultural Resource Program reports (Mobley *et al.* 1990; Haggarty *et al.* 1991) and are summarized here to provide regional background data for understanding the SEL-188 site. A review of past archaeological investigations of outer Cook Inlet, Prince William Sound, and the outer Kenai Peninsula coast illustrates the lack of research in Unegkurmiut territory.

Research History of Outer Cook Inlet

The earliest archaeological work in outer Cook Inlet was Jacobsen's 1880s excavation at "Soonroodna," a village in Kachemak Bay (Jacobsen 1977). Stone lamps with human figures found in the 1920s were recognized as evidence for a pre-Athapaskan occupation of Kachemak Bay (Mason 1928:170-194; Marsh 1956:113-115). De Laguna's excavations at Yukon Island and Cottonwood Creek in the 1930s resulted in a floating chronology for the region (de Laguna 1975:121).

Recent research has illuminated the maritime cultural sequence of the Lower Cook Inlet, Kachemak

Bay, and the southern Kenai Peninsula (Bacon and Maxwell 1986; Beck 1984; Boraas and Klein 1988, 1989; Cook Inlet Historic Sites Project 1975; de Laguna and Workman 1979; King 1987, 1989; Dixon and Johnson 1973; Kegler 1971; Mobley *et al.* 1985; Ream and Weaver 1989; Reger 1982; Schledermann 1964, cited in W. Workman 1978; Steele 1979; West 1981; Wiersum 1978, 1981; Yarborough 1987; Zinck *et al.* 1977; Zollars 1982, 1983). Much of that work has consisted of survey and test excavation, interpreted within a chronological framework contributed by excavations under the direction of William Workman (K. Workman 1977, 1978, 1979; W. Workman 1977, 1978, 1980a; W. Workman and Lobdell 1979; Lobdell 1975a, 1976a; Workman *et al.* 1980).

Prehistory of Outer Cook Inlet

Human occupation of Kachemak Bay and the western Kenai Peninsula began about 3500 B.P. and continued uninterrupted until 1200 B.P., according to information from coastal midden sites at Cottonwood Creek, Yukon Island, Chugachik Island, Fish Creek, Kenai and Moose rivers, and Beluga Point (Workman *et al.* 1980; Reynolds 1984:22; Reger 1981:81-98). Increasing interaction with people from Kodiak Island and the Alaska Peninsula is suggested during that interval (Clark 1984a:140), and an elaborate burial complex with abundant grave goods indicates social stratification comparable to the Koniag. A sudden loss of population is suggested by the scarcity of archaeological sites after about 1200 B.P., although eventually Athapaskan Tanaina occupied the region (Workman and Workman 1988; Lobdell 1980:vii).

Regardless of ethnic background, indigenous peoples in the Kachemak Bay area maintained similar marine adaptations. Seals and porpoise were exploited over whales, with halibut and cod dominating the fish bone assemblage as a possible result of rigorous disposal patterns for salmon remains (Lobdell 1980:263-264). Large and small mammals, birds, and shellfish are all represented in the midden deposits, although estimates of their relative contributions to the human diet vary (Yesner 1976:4,11; de Laguna 1975:41; W. Workman 1978:34).

Artifacts found in Kachemak Bay and western Kenai Peninsula assemblages display variety in function, morphology, and raw materials. Generally, ". . . basic forms are pervasive through time, with changes primarily in frequency or morphological attributes . . . changes in Kachemak assemblages include a gradual replacement of chipped stone with implements of sawn and ground slate, and increased frequency in objects of bone (possibly related to better preservation), an emphasis on personal adornment and objects associated with mortuary practices, and increases in ornamental elaboration of utilitarian objects" (Mobley *et al.* 1990:64). Summaries of the artifact array through time are tabulated here (Table 3.2) and presented in more detail in the cultural resource report for the 1989 oil spill treatment effort (Mobley *et al.* 1990:61-65).

Research History of Prince William Sound

Systematic anthropological research in Prince William Sound began in the 1930s with the work of Frederica de Laguna and her associates (Birket-Smith 1953; Birket-Smith and de Laguna 1938; de Laguna 1956). De Laguna worked with Native guides to compile and map traditional use sites and was able to confirm some of them in the field. Her excavations at COR-001, supplemented by investigations at the Palutat rockshelter (de Laguna 1956), provided the basis for developing a cultural chronology for Prince William Sound (Table 3.3). With one exception, subsequent investigations in Prince William Sound have consisted of site surveys (Workman 1970; Lobdell 1975b, 1976b; Mitchell and Johnson 1982; Stern 1982; Stern and Gibson 1982; Bacon *et al.* 1982; Ketz 1983; Ketz and Johnson 1983; Mattson 1978, 1985a, 1985b, 1986, 1987; Diters 1982; Clark 1976). When sites were found, the authors used surface features and artifacts to correlate them with the chronology proposed by de Laguna (1956). Similar efforts were made by agencies documenting traditional use sites selected by CAC under ANCSA (Kent 1987; Dotter 1988a, 1988b; Frost *et al.* 1988).

The exception consists of excavations at the Uqciuvit Site sponsored by the USDAFS in 1988 (Yarborough and Yarborough 1991).

Prehistory of Prince William Sound

The earliest evidence of human occupation in Prince William Sound comes from stratified midden deposits at SEW-056 (the Uqciuvit Site), and from SEW-430, a rockshelter midden identified during the 1989 Exxon Cultural Resource Program surveys. A radiocarbon date of 3810 ± 90 B.P. has been obtained from the earliest component at SEW-056 (Yarborough and Yarborough 1991), and samples collected from SEW-430 in 1990 yielded an uncorrected charcoal date of 3970 ± 150, and an uncorrected shell date of 4440 ± 70 B.P. (Erlandson *et al.* 1991).

De Laguna's (1956) chronology, until recently the only basis for discussing details of Prince William Sound prehistory, has been refined and expanded as a result of the excavations at the Uqciuvit Site (Yarborough and Yarborough 1991). A suite of 14 radiocarbon dates indicates that SEL-056 was initially occupied between 3,300 and 3,800 years ago and was apparently utilized for over 3,600 years. A single occupation haitus occurred during the advance of late Holocene glaciers in northwestern Prince William Sound between 2,500 and 3,200 years ago (Yarborough and Yarborough 1991:53-54).

Yarborough and Yarborough (1991) have defined a four-phase cultural chronology for Prince William Sound based on excavations at SEL-056. The Uqciuvit Component, characterized by slate grinding and sea mammal hunting, is represented by a preneoglacial occupation dated to 3380 ± 110 (1430 B.C.) and 3810 ± 90 (1860 B.C.). The site was reoccupied during the Palugvik phase about 2350 B.P. following apparent abandonment during the neoglacial period. Yarborough and Yarborough have divided the Palugvik phase into Early Palugvik and Late Palugvik, corresponding to de Laguna's (1956) Palugvik 1-2 and Palugvik 3-4 levels. Radiocarbon dates from Early Palugvik levels at SEL-056 range from 2000 ± 110 (50 B.C.) to 2370 ± 70 (420 B.C.). The Late Palugvik occupation is a late first or early second millennium A.D. occupation with associated dates of 960 ± 60 (A.D. 990) and 1020 ± 60 (A.D. 930). The most recent occupations at Uqciuvit are labelled the Chugach phase which encompasses "... late prehistoric, protohistoric and possibly early historic components" (Yarborough and Yarborough 1991:54). Abandonment of SEL-056 occurred sometime after the mid 1700s.

Analysis of faunal material from the Uqciuvit Site provides information on Native resource utilization which may reflect a general pattern for Prince William Sound and perhaps the outer Kenai Peninsula coast. Yarborough and Yarborough (1991) report that marine mammal bones and shell made up 41% of their faunal collection with fish elements (11%), terrestrial mammals (5%), and birds (1%) also present. Of the marine mammals, 94% of the recovered faunal material was seal and 6% was porpoise or whale. The relative proportions of sea mammals to other vertebrates did not appear to change to a large degree over time (Yarborough and Yarborough 1991:219). Complete descriptions of the Uqciuvit collection are still in press, but the materials appear comparable to that recovered by de Laguna at COR-001 (Yarborough 1989).

Apparent low pre-contact site density in west-central Prince William Sound was evident in the 1989 and 1990 Cultural Resource Program survey results (Mobley *et al.* 1990:175-177; Haggarty *et al.* 1991); however, the lack of extensive systematic archaeological research and site destruction caused by subsidence and erosion are factors which may result in the appearance of low site density.

The limited amount of archaeological excavation in Prince William Sound was briefly summarized in terms of site and feature types by Mobley *et al.* (1990:59):

> ... the most common site types are rock shelters and villages. Village sites are invariably located close to shore, in protected locations, and strategically situated for early detection of potential enemies. Rock shelters often contain middens and human remains attesting to their multiple

function, and sometimes contain pictographs (de Laguna 1956:11). De Laguna (1956:92) also documented burials in village middens and on ledges of rocky islets or high cliffs. Disposal of the dead involved log or plank coffins, covering piles of stone, mummification, and possibly cremation. Smaller sites are known, consisting of stone artifacts in the intertidal zone, thin midden deposits, and culturally modified trees (CMTs) which may mark seasonal camps or procurement locales (AHRS 1989). Ethnohistoric accounts suggest that both surface and semi-subterranean forms may have been used at winter villages, both constructed of logs and split planks chinked with moss. De Laguna noted that house-sized depressions were sometimes found at small midden sites, and discusses evidence for both surface and semi-subterranean forms at Palugvik (de Laguna 1956:58-60). Yarborough (1989:4) reports rectangular and square depressions and a linear berm at Uqciuvit.

Artifacts from pre-contact sites in Prince William Sound include ground and pecked stone adzes, lamps, mortars, pestles, and net weights; ground slate projectile points, *ulus*, tablets, and rods; bone and shell tools, and items of adornment. Chipped stone artifacts are rare. Yarborough and Yarborough (1991:209) note that "Prince William Sound was apparently along the northeast edge of a Kachemak cultural continuum that began on Kodiak Island."

Research History of Outer Kenai Peninsula

The outer Kenai Peninsula coast is not well-known archaeologically, although recent investigations have documented enough sites to enable a preliminary assessment of site distribution (see Chapter 9). The known sites have been documented primarily as a result of State of Alaska surveys (McMahan and Holmes 1987), National Park Service surveys (Griffin 1985;), BIA 14 (h)(1) investigations (Dotter 1988a, 1988b), and Exxon Cultural Resource Program surveys (Mobley *et al.* 1990; Haggarty and Wooley 1990). Reynolds (1984) also conducted a survey along the Resurrection River, and Arndt (1983, 1984) surveyed in the Seward area.

De Laguna elicited information from Chugach elders of Prince William Sound regarding sites along the outer Kenai coast which has been verified archaeologically. SEL-228 may represent the site of Kagilik reported by de Laguna (1956:35) and Birket-Smith (1953:146-147). One of de Laguna's non-Native informants reported a possible site which may be SEL-188. The same individual reported two other sites, one of which appears to be SEL-119, a site investigated by McMahan and Holmes (1987).

Seventy-nine AHRS sites are currently known from the outer Kenai Peninsula coast east of Port Chatham and west of Resurrection Bay, including the Barren Islands. Systematic survey in this area related to 1989 and 1990 oil spill treatment added 46 sites to the AHRS. Based on survey data, 47 of the known sites in the area are pre-contact, 37 are post-contact, and 5 contain both pre-and post-contact components. Sixteen habitation sites (sites with housepit features) have been recorded in the area, as have numerous isolated artifacts and intertidal artifact scatters (see Table 9.1).

Three sites in the region have been dated either by C^{14} (SEL-188, XBS-020,) or tephra analysis (AFG-175); two others have produced historic artifacts (SEL-130, XBS-014). The transitional and late prehistoric period dates from SEL-188 are discussed in Chapter 8 of this report. XBS-020, an apparently large site originally recorded during 14(h)(1) investigations, produced radiocarbon dates of 140 $\pm$ 60 B.P., and 320 $\pm$ 50 B.P. (Dotter 1988a:8). Cultural deposits at AFG-175, a village site on the Barren Islands, are situated just above a Mt. Augustine tephra deposit dated ca. 750 B.P. (Haggarty *et al.* 1991: Chapter 6). Housepits at AFG-175 and another village site on the Barren Islands (AFG-103) are generally oval to subrectangular in outline, as are the housepits present at SEL-211, XBS-014, XBS-015, and XBS-020. Unfortunately, the housepit morphology of the outer Kenai Peninsula has not been established and it is not possible to estimate site age based on housepit configuration.

XBS-015 is a substantial housepit village site with about 250 CMTs in the area and is located in the vicinity of XBS-014, a site from which Russian and American period artifacts (1850 - 1900) were collected from a bulldozer scrape (Schaaf 1988). SEL-228, recorded during 14(h)(1) investigations in late 1990, contains prehistoric and historic deposit and is likely the site of Kagilik, mentioned by de Laguna (1965:35). These are the only Native sites in the area which have yielded temporal information.

Since at least 13 pre-contact sites in the region contain intertidal prehistoric artifacts, tectonic subsidence appears to have resulted in considerable site erosion over time. Until extensive systematic survey and site dating are conducted within a regional research framework, the Unegkurmuit cultural chronology will remain undefined, and evaluating the significance of single sites in the region will be difficult.

Several other village sites on the outer Kenai coast were reported to de Laguna (1956:35) by Chugach and Port Graham people. From east to west these include villages in Day Harbor (east of Resurrection Bay), in Resurrection Bay (in the vicinity of the present town of Seward), in Ayalik (Aialik) Bay, and in Rocky Bay, west of Port Dick near the southwestern tip of the Kenai Peninsula. Analysis of outer Kenai Peninsula Alutiiq place names (Leer 1980) in light of recent archaeological survey results may further our understanding of Unegkurmiut site settlement and distribution. More regional site survey and analysis will enhance knowledge of the relationships between sites on the outer Kenai Peninsula coast and sites on the Barren Islands, in Prince William Sound, and the Kodiak Archipelago.

Summary

This chapter summarized the historical, ethnographic, and archaeological background pertinent to investigations at SEL-188. Our understanding of outer Kenai Peninsula culture history is evolving. Russian fur trade-era data related to the region have yet to be synthesized, and linguistic analysis of the Alutiiq names of newly-discovered archaeological sites may illuminate aspects of the region's culture history. Since so little was known about sites in the region prior to 1989, great caution was used in planning treatment potentially affecting SEL-188.

CHAPTER 4

EVALUATION OF SEL-188 IN 1989

Coastal survey along the outer Kenai Peninsula coast by Exxon's Shoreline Cleanup Assessment Teams (SCAT) in the spring of 1989 followed the spread of oil southwest out of Prince William Sound and included reconnaissance archaeological survey within Kenai Fjords National Park. The SCAT survey identified a previously unknown prehistoric site with intertidal artifacts (SEL-188) near the Pye Islands. Additional fieldwork in 1989 by a multi-agency team of archaeologists further documented the cultural material and degree of oiling at the site. By the time appropriate protection measures were identified, the weather-determined date for suspension of field activities was approaching, so treatment was not undertaken at the site in 1989. This chapter describes the two archaeological investigations which occurred in 1989 and the involvement of the various agencies and groups responsible for protecting SEL-188.

SCAT Survey

SEL-188 was identified on July 31, 1989 during SCAT survey of the outer Kenai coast. The SCAT team consisting of archaeologist Mike Yarborough, oil geologist Dan Mann, and biologist Mike Fawcett, was assessing a 9,000 m (5.6 mile) segment of shoreline in the Pye Islands area. Confronted by expanses of high angle and vertical bedrock, the SCAT team surveyed by skiff with periodic landings to walk selected sections of coastline.

An intermittent band of mousse and oil-coated rock over 80 m (262 ft) long and up to four meters (13 ft) wide was observed on a narrow beach of boulders, angular rock, and exposed granite bedrock (Figures 4.1, 4.2). Mann observed a surface coating of fresh oil in the mid and upper intertidal zone with weathered mousse to a depth of five centimeters (2 in) in pockets between rocks. Oil penetration reached a depth of 10 cm (4 in) in the pebble and gravel matrix below the larger rocks. The SCAT team designated the oiled area Beach A within the segment.

Yarborough located a scatter of fire cracked rock (FCR) and several stone artifacts (some of which were oiled) near the northern limit of the oiled area, between two small freshwater streams. More FCR and two ground slate artifacts were noted where they had apparently eroded out of the beach face. One of the slate artifacts was collected (49SEL-188-1). A ground slate *ulu* fragment (49SEL-188-5) was collected from the bed of the smaller stream, and an oiled splitting adze (49SEL-188-8) from the larger

(Robert Betts 15:1 Exxon)

Figure 4.1 View of SEL-188 south, on August 1, 1990, along the mapping baseline from N200/E200. Tide at approximately +6 ft. level. Two drowned CMTs in foreground

northernmost stream. Two more *ulu* fragments (49SEL-188-2,3), a spent cartridge case (49SEL-188-4), and a splitting adze (49SEL-188-7) were collected from the intertidal zone at the stream mouths. At the southern limit of the artifact scatter, more artifacts were noted and another adze fragment (49SEL-188-6) was collected. Hammerstones, boulder spalls, ground slate, and slate flakes were observed in the intertidal zone. Eight artifacts (Table 4.1) were collected from the intertidal zone as authorized by the State of Alaska's Land Use Permit (SCV 89-004) and Archaeology Permit (89-5). In the absence of a permanent site datum, Yarborough noted the approximate locations of collected surface artifacts on a sketch map and described the artifacts and their locations in his field notes. Yarborough also noted bark-stripped culturally modified trees (CMTs) in the intertidal zone. The trees had died from the effects of post-1964 earthquake subsidence. More than 15 CMTs and several saw-cut stumps were observed in the intertidal zone and adjacent uplands.

In the uplands, Yarborough noted a moss-covered pile of logs 3.75 m (12.3 ft) in length near a point of land between the two streams at the northern end of the site. He could not determine whether this feature represented a collapsed structure, a stack of hewn lumber, or simply a pile of logs. A second spent cartridge case was found hammered into the end of an upright piece of wood at the southeast

(Robert Betts 15:8 Exxon)

Figure 4.2 View of SEL-188 north, August 1, 1990

corner of this moss-covered mound. Uplands reconnaissance revealed no evidence of house depressions or other surface cultural features.

ISCC Review of SCAT Evaluation

The block report containing the SCAT evaluation of the segment was submitted to the Inter-agency Shoreline Cleanup Committee (ISCC) on August 7, 1989 for review. Land managing agencies responsible for protecting cultural resources during shoreline treatment were concerned that treatment might adversely impact SEL-188, so they recommended no treatment at Beach A due to archaeological sensitivity, and also specified no treatment within the remainder of the segment due to light oiling. Archaeological constraints signed by the SHPO recommended no treatment at Beach A and required the presence of an archaeological monitor if treatment was conducted elsewhere in the segment.

Several land managers shared the responsibility for protection of cultural resources at SEL-188. The State of Alaska exercises authority over the intertidal zone, and thus over the intertidal portion of SEL-188, while the upland portion of the site is in Kenai Fjords National Park on land selected by both English Bay and Port Graham village corporations under the 1971 Alaska Native Claims Settlement Act. NPS consulted with English Bay Village Corporation regarding uplands testing, and CAC represented the interests of the village corporations during fieldwork at the site. OHA, NPS, and CAC were all directly involved in documenting and protecting SEL-188.

Multi-Agency Site Investigations

A multi-agency field team, consisting of archaeologists Ann Worthington (NPS), Pete Zollars (CAC), Joan Dale (OHA) and Mike Yarborough (Exxon), and NPS tort investigator Homer Leech, visited SEL-188 on August 10, 1989. The archaeologists familiarized themselves with the site setting and visited SEL-194, a nearby site (NPS 1989), then returned to SEL-188 on August 11 to begin site mapping, artifact collection, and subsurface testing. The following description of the August 10-12 investigation is compiled from field notes by Worthington, Dale, and Yarborough, and from a report (NPS 1989) on fieldwork at SEL-188 and SEL-194.

Site Mapping and Intensive Surface Survey

A permanent NPS site datum was established by drilling a hole in granite bedrock above the high tide line and cementing in a galvanized metal cap marked "NPS SEL-188 8-89." This datum was used by Worthington, Dale, and Yarborough to construct a site map to scale (Figure 4.3). Artifacts were flagged and left in place during the initial intensive site survey. Artifacts, FCR, CMTs, sawn stumps, surface oil, and test pit locations were mapped either directly from the NPS datum, or by using additional mapping stations tied to the datum.

Most artifacts were plotted individually, except for FCR and unmodified slate flakes, which were mapped as concentrations. Three apparent clusters of slate flakes and FCR were discernable in close proximity to the eroding cutbank (Figure 4.3) (Dale n.d.). Artifacts appeared to decrease in density with distance from the cutbank. Surface artifacts and FCR were reported to extend 112 m (367 ft) parallel to shore and 15 m (49 ft) out into the intertidal zone from the edge of the vegetated uplands. Many of the artifacts were located in vertical cracks and crevices in the fractured granite bedrock, and, except for greenstone adzes and rounded hammerstones which stood out from the angular granite beach rock, artifacts within the oiled band were difficult to see.

Artifact Collection and Testing in the Intertidal Zone

Surface artifacts which were considered diagnostic specimens potentially at risk from treatment were collected (Worthington n.d.). Ten oiled and 13 unoiled artifacts were collected along with other unmodified lithics (Table 4.2). Eight artifacts (KEFJ 249-256;49SEL-188-9-16) collected from the oiled

Table 4.1 Artifact Collections during 1989 SCAT Survey

Catalog #	Field #	Collector	Date	Description	Provenience
49SEL-188-1	1	Yarborough	7/31/89	Ground slate scrap	ITZ Surface
49SEL-188-2	2	Yarborough	7/31/89	Ulu end frag.	ITZ Surface
49SEL-188-3	3	Yarborough	7/31/89	Ulu midsection	ITZ Surface
49SEL-188-4	4	Yarborough	7/31/89	Henry .44 center fire cartridge case	ITZ Surface
49SEL-188-5	5	Yarborough	7/31/89	Ulu	ITZ Surface
49SEL-188-6	6	Yarborough	7/31/89	Adze fragment/ splitting wedge	ITZ Surface
49SEL-188-7	7	Yarborough	7/31/89	Splitting adze	ITZ Surface
49SEL-188-8	8	Yarborough	7/31/89	Splitting adze	ITZ Surface

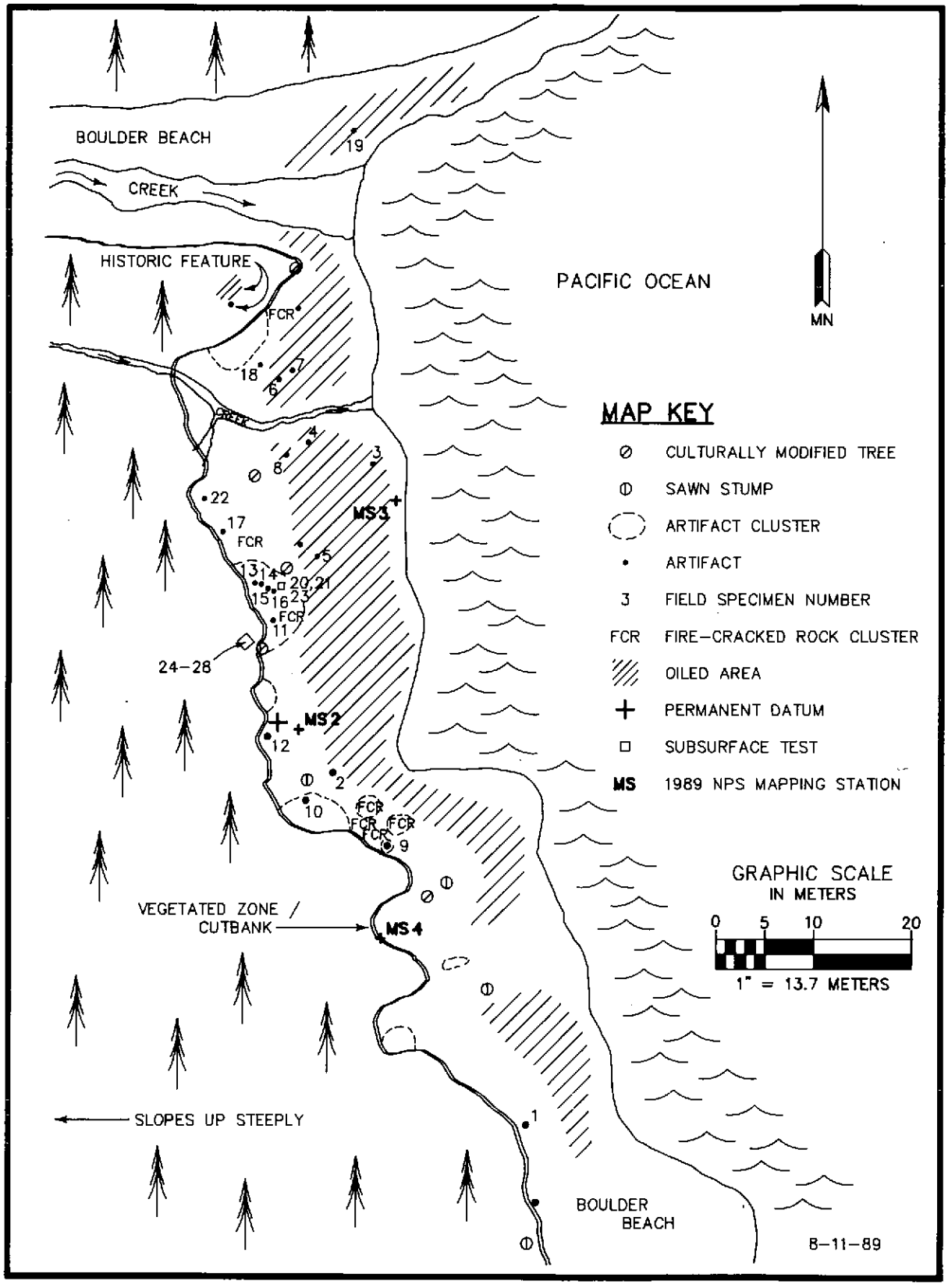


Figure 4.3 **NPS map of intertidal artifact distribution at SEL-188, August 1989 (Redrawn from Worthington 1989)**

Table 4.2 Collections from 1989 Multi-agency Investigations

NPS Catalog #	Field #	Date	Description	Provenience
KEFJ 249	1	8/11/89	Adze, splitting	ITZ Surface
KEFJ 250	2	8/11/89	Large flake tool	ITZ Surface
KEFJ 251	3	8/11/89	Hammerstone	ITZ Surface
KEFJ 252	4	8/11/89	Hammerstone	ITZ Surface
KEFJ 253	5	8/11/89	Hammerstone	ITZ Surface
KEFJ 254	6	8/11/89	Hammerstone	ITZ Surface
KEFJ 255	7	8/11/89	Hammerstone	ITZ Surface
KEFJ 256	8	8/11/89	Blade midsection (?)	ITZ Surface
KEFJ 257	9	8/11/89	Stemmed point, ground slate	ITZ Surface
KEFJ 258	10	8/11/89	Irregular chunk	ITZ Surface
KEFJ 259	11	8/11/89	Rod fragment, ground slate	ITZ Surface
KEFJ 260	12	8/11/89	Ground slate fragment	ITZ Surface
KEFJ 261	13	8/11/89	Ulu, notched, ground slate	ITZ Surface
KEFJ 262	14	8/11/89	Notched pebble	ITZ Surface
KEFJ 263	15	8/11/89	Rod fragment, ground slate	ITZ Surface
KEFJ 264	16	8/11/89	Stemmed point, ground slate	ITZ Surface
KEFJ 265	17	8/11/89	Unmodified lithic shatter	ITZ Surface
KEFJ 266	18	8/11/89	Rod fragment, ground slate	ITZ Surface
KEFJ 267	19	8/11/89	Adze, planing	ITZ Surface
KEFJ 268	20	8/11/89	Charcoal sample	Beach Test
KEFJ 269	21	8/11/89	Soil sample	Beach Test
KEFJ 270	22	8/11/89	Grooved cobble	ITZ Surface
KEFJ 271	23	8/11/89	Slate, sandstone fragments	Beach Test
KEFJ 272	24	8/11/89	Stemmed point, ground slate	Upland Test
KEFJ 273	25	8/11/89	Boulder spall, retouched	Upland Test
KEFJ 274	26	8/11/89	Abrader	Upland Test
KEFJ 275	27	8/11/89	Unmodified cobble	Upland Test
KEFJ 276	28	8/11/89	Incised slate tablet, ground slate fragment, unmodified slate (10)	Upland Test

area were retained by Homer Leach (NPS) as evidence supporting NPS tort investigations. The remaining 15 artifacts, with the exception of one heavily oiled adze (KEFJ 267;49SEL-188-027), were collected above the oiled area near the edge of the eroding cutbank. A grooved cobble (KEFJ 270;49SEL-188-030) is the only one of these artifacts which displays oil stains (Appendix E). All collected artifacts were assigned field specimen numbers (Table 4.2) and photographed in place prior to

Table 4.3 Soil Profile Description of the 1989 Upland Test

Unit	Depth Below Surface	Description
Unit 1	0 - 10 cm	Root mat and humus
Unit 2	10 - 16 cm	Brown humus, 6 cm thick
Unit 3	16 - 26 cm	Black, charcoal rich soil, 8-10 cm thick. Cultural
Unit 4	26 - 29 cm	Light brown soil (tephra?) 3 cm thick. Cultural
Unit 5	29 - 44 cm	Black silt and decomposed broken granite, up to 12 cm thick. Cultural

collection. Photographs of uncollected artifacts were also taken.

Slate fragments were found approximately 15 m (50 ft) south of the smaller of the two streams, and three meters (10 ft) from the cutbank in what appeared to be a "soil unit" below beach cobbles in the upper intertidal zone. A 20 cm (8 in) square trowel test at this location was excavated to a depth of 27 cm (10.6 in) where it was terminated by rock according to Worthington's notes. A seven centimeter (2.8 in) band of very dark brown or black "soil" containing slate fragments and what appeared to be charcoal was observed overlying an unoiled angular sand layer which also contained slate. Two matrix samples (KEFJ 268,269;49SEL-188-28,29) were taken from this black lens, one of which appeared to contain charcoal. Both samples were secured by Homer Leach for NPS tort investigations. Eleven slate fragments and a tabular sandstone fragment (KEFJ 271;49SEL-188-031) were collected from this test. Edges of the slate fragments recovered were generally sharp, indicating little wave abrasion, but none of the lithic material recovered from this test exhibited definite flake morphology or clear cultural modification (Appendix D).

Upland Survey and Testing

The upland portion of SEL-188 is separated from the beach zone by a one-to-two meter (3-6 ft) scarp of soil, or cutbank, with vegetation overhanging the embankment where it has been undercut by erosion. The dense mature spruce forest occupying the relatively flat bench of land immediately inland features an understory of willow and alder, with sphagnum moss, blueberry, grass, and occasional devil's club. The continuous vegetation mat precluded discovery of surface artifacts in the uplands except in the stream beds and where overturned trees exposed the underlying soil. Fire cracked rock and unmodified slate "flakes" (Appendix E) were observed in the bed of the smaller of the two creeks approximately 30 m (98 ft) upstream from its mouth (Yarborough, personal communication 1990).

CAC archaeologist Pete Zollars excavated an upland test unit measuring 85 cm x 115 cm (33 in x 45 in) to a depth of 44 cm (17.3 in). This test was

positioned in a relatively flat area approximately 1.5 m (5 ft) back from the cutbank and was aligned with a concentration of surface artifacts in the intertidal zone (where Worthington's intertidal test had revealed subsurface slate "flakes" and charcoal).

Sediments encountered in the upland test were extremely wet as a result of runoff from the steep terrain immediately upslope. The soil profile (Table 4.3) recorded by Yarborough in his notes consisted of up to 16 cm (6.3 in) of organic root mat and brown humus (Units 1,2) overlying an 8-10 cm black silt lens (Unit 3) containing charcoal and slate "flakes." A retouched boulder spall (KEFJ 273;49SEL-188-33) was recovered from 30 cm below the surface in Unit 3. Below Unit 3, a three centimeter (1.9 in) thick light brown silt lens (Unit 4), devoid of cultural material, was considered to be a possible ash or buried soil horizon. Below Unit 4, beginning at a depth of approximately 29 cm (11 in), was a black silt and decomposed granite horizon (Unit 5) up to 12 cm (4.7 in) thick, from which a ground slate point base (KEFJ 272;49SEL-188-32) was recovered from 36 cm (14 in) below the ground surface. An abrader stone (KEFJ 274;49SEL-188-034) and an unmodified cobble were also collected from Unit 5. The excavation terminated at 44 cm below the surface when a basal layer of broken granite bedrock was encountered. Laboratory examination of 12 slate "flakes" (KEFJ 276;49SEL-188-036) collected as a lot from this test revealed an "incised" slate tablet (49SEL-188-036a) and a ground slate flake (49SEL-188-036b). The remaining ten slate "flakes" were unmodified.

Conclusions of the Multi-agency Investigators

The multi-agency investigation in August 1989 confirmed that SEL-188 had both upland and intertidal components. The archaeologists documented the surface distribution of oiled and unoiled artifacts in the intertidal zone, and subsurface testing revealed the presence of some subsurface cultural material below mean high tide. Uplands testing indicated that at least part of the site remained intact and contained artifacts and carbonaceous soil in an apparently undisturbed context. The mapped distribution of intertidal artifacts and oil indicated that surface artifact density was greatest immediately adjacent to the cutbank, above the oiled area. The distribution of artifacts in some areas extended into the lower mid-intertidal zone below the oil band. Apparent artifact concentrations were also observed along the eroding beach face.

Ground slate points and ulus, retouched boulder spalls, hammerstones, greenstone adzes, notched pebbles, and both slate and argillite flakes were observed in 1989. Recovery of artifacts from two stratigraphic levels in the upland test pit suggested more than one pre-contact occupation. A cartridge case, CMTs, and sawn stumps in the intertidal zone indicated post-contact activity at the site. Drowned trees in the intertidal zone provided visible evidence of recent subsidence of the site as a result of the 1964 earthquake (NPS 1989). Taking into account the range of artifact types noted, the lack of evidence for housepits, and the strategic marine mammal hunting position of the site, NPS (1989) suggested that the site was a temporary seasonal hunting camp.

Administrative Choices and Decisions

The SHPO used the results of the August 1989 multi-agency investigation to develop a list of protection measures required by the State of Alaska if treatment was to occur at SEL-188. These mitigation tasks, communicated to the Seward Multi-agency Committee (MAC), included additional systematic mapping and collection of surface artifacts and subsurface testing in the intertidal and upland portions of the site to determine site boundaries. A written report on the results of the investigations was also a stated requirement.

Following the initial field recommendations of the archaeologists conducting the August 1989 investigation, Exxon planned to avoid treating Beach A due to its archaeological sensitivity. This deci-

sion conflicted with the Seward Resource MAC's (RMAC) desire to have oil removed from what it considered to be a high priority treatment location within Kenai Fjords National Park. Seward RMAC consequently recommended that archaeological protection measures be undertaken at SEL-188 to enable treatment.

NPS was responsible for consulting with affected Native groups to assure adequate protection of cultural resources above mean high tide because of SEL-188's location on land selected by both Port Graham and English Bay village corporations. NPS consulted with CAC to take into account the interests of both village and regional Native corporations in accordance with a Memorandum of Agreement signed by the CAC, Exxon, SHPO and USDAFS (Mobley *et al.* 1990:242). NPS issued a report in late August recommending protection procedures for various types of treatment options at SEL-188 (NPS 1989:1-3).

The agency estimated that two to three weeks of field work by four archaeologists would be necessary to evaluate the character and size of the site (NPS 1989:3). The report recognized the potential for hot water wash or manual treatment to adversely impact the site. Bioremediation, although not officially approved for use by the NPS, was seen as the treatment option having the least potential for site disturbance, but concern was raised over possible chemical contamination of organic material in cultural context. NPS mitigation suggestions called for systematic collection of artifacts in the oiled and unoiled portions of the intertidal zone prior to treatment, mapping of all surface features, and extensive systematic subsurface testing of the uplands and intertidal zone.

In response to the NPS report, the Exxon Cultural Resource Program advocated the "no treatment" option as the best means to protect SEL-188. The demobilization of the 1989 oil spill treatment program was planned for September 15, and Exxon believed the less than four weeks which remained in the season were insufficient to conduct both the mitigation effort and shoreline treatment. Exxon reasoned that postponing the effort until the following year would allow a planned mitigation study, and that the cleaning action of winter storms would reduce the amount of oil at the site.

The Coast Guard requested Exxon Operations to evaluate the feasibility of completing the necessary archaeological mitigation and treatment prior to the demobilization deadline (McCone 1989). Both the Cultural Resource Program and the SCAT program advised Exxon Operations that the most reasonable strategy for protecting the cultural resources at SEL-188 was to adhere to the initial "no treatment" recommendation due to time constraints. As a result, no treatment occurred at SEL-188 in 1989. Seward MAC subsequently placed the segment on the priority list for a spring 1990 assessment to re-evaluate Beach A for treatment, and explicitly recognized that additional archaeological mitigation work would be necessary prior to any planned treatment.

Summary

A SCAT assessment and a multi-agency archaeological investigation were conducted at SEL-188 in Kenai Fjords National Park in 1989. Surface collections were made on both occasions, resulting in the collection of 26 artifacts from the intertidal zone. Subsurface testing in the uplands by CAC and NPS archaeologists yielded five additional artifacts. Surface reconnaissance and mapping indicated that oiled and unoiled artifacts extended 112 m (367 ft) along the beach front. Uplands testing uncovered subsurface artifacts and potentially datable organic material along with a stratigraphy suggesting more than one pre-contact occupation. A small test in the intertidal zone uncovered slate fragments and an apparent carbonaceous soil suggesting the possibility of intact cultural deposits below mean high tide. Evidence for post-contact activity at the site was recognized, as was the potential of the site to add new information regarding the history of the region (NPS 1990).

Although the segment was considered a treatment priority, the investigating NPS, OHA, CAC, and Exxon field archaeologists initially recommended that treatment be avoided to protect cul-

tural resources. Exxon recommended no treatment due to archaeological considerations and the lack of time available to coordinate an adequate mitigation effort prior to the demobilization of cleanup crews. As a result, no oil spill treatment occurred at SEL-188 in 1989.

CHAPTER 5

EVALUATION OF SEL-188 IN 1990

The 1990 multi-agency Spring Shoreline Assessment Survey (SSAT) found that winter storms had removed little oil from the SEL-188 area. The multi-agency Technical Advisory Group (TAG) consequently recommended that Exxon treat the segment with the appropriate cultural resource protection measures in place. In late April, NPS completed a Scope of Work outlining research objectives to mitigate adverse impact from treatment activity at SEL-188. Exxon Cultural Resource Program Co-director Charles Mobley developed a field strategy focusing on specific research questions and field tasks in response to the NPS Scope of Work. A joint Exxon/CAC field team went to SEL-188 on April 25, 1990 to conduct additional investigations.

The team consisting of Exxon archaeologists Charles Mobley, Robert Betts, Paul Buck, and CAC archaeologist Lora Johnson mapped surface artifacts in relation to oil distribution and conducted limited subsurface testing in the intertidal zone. Planned upland investigations were not initiated due to concerns expressed by English Bay Village Corporation. After NPS and CAC reviewed a report of the April investigations (Mobley 1990b), the Exxon Cultural Resource Program developed a work plan to monitor treatment.

The SSAT Survey

Exxon participated in the SSAT survey in March 1990 to evaluate shoreline treatment needs on a segment-by-segment basis. The SSAT program included representatives from state and federal agencies and Native organizations. Exxon archaeologists did not participate in the SSAT survey since all segments scheduled for re-survey had been surveyed at the reconnaissance level in 1989 and additional reconnaissance cultural resource information was not required. Agency and Native organization archaeologists participated in the SSAT survey in some instances as land manager representatives.

The SSAT survey of Beach A in the segment was conducted on March 31, 1990. Archaeologist Peter Zollars (CAC) and geologist Dan Mann (Exxon) had both visited SEL-188 in 1989 and returned as SSAT team members. The SSAT team designated treatment subdivisions A through C within the original segment. All of the intertidal portion of SEL-188 and most of the oiled shoreline was included in subdivision A which extended for approximately 200 m.

The SSAT surveyors determined that only a small amount of oil had been removed from the subdivi-

(Charles Mobley 7:27 Exxon)

Figure 5.1 View south of supratidal zone at SEL-188

sion by natural weathering over the winter. Oil remaining in the middle and upper intertidal zones in the spring of 1990 included a discontinuous band of tar-coated rocks and pooled mousse over a distance of 180 m (591 ft). An asphalt pavement covering approximately 64 m^2 (689 ft^2) was identified. Oil penetration into the sediments underlying the asphalt pavement was observed to a depth of seven centimeters (2.8 in).

In his comments attached to the SSAT survey report, Zollars noted that over 100 "artifacts" were observed in the upper intertidal zone near the eroding beach face. Most were slate fragments, but Mann, who filmed the general site setting and degree of oiling as part of the SSAT evaluation, videootaped a ground slate projectile point and a notched pebble. All artifacts were left in place.

The SSAT crew dug four pits, positioned to avoid surface artifacts, to a depth of 10 to 20 cm (4-8 in) in the mid, upper, and supratidal zones to evaluate oil penetration. Intertidal testing revealed oiled cobbles and pebbles buried to a maximum depth of 20 cm (8 in) in a weakly-developed berm in the supratidal zone (Figure 5.1). The SSAT evaluation characterized the beach as 60 percent bedrock, 30 percent boulders, and 10 percent cobbles:

> The beach face is predominately shattered bedrock strewn with locally-derived boulders. . . protected from wave action. Surface sediments are sparse. Ongoing erosion of a low (<1 meter) scarp at the top of the upper ITZ [intertidal zone]

> is a source of stones (mainly angular cobbles and boulders). Clasts on the beach face show little evidence of abrasion. This is a youthful beach where frost quarrying and wave erosion at the seaward edge of the supratidal zone are the processes most important in sediment dynamics. Wave-abrasion and erosion of stranded oil along this shoreline will be slow, judging by the small amount of change observed over the past seven months (Mann 1990).

TAG/CTAG Considerations

The 1990 SSAT documentation was submitted to TAG in early April. The evaluation signed by the SHPO and approved by TAG on April 19, 1990, recommended treatment of the subdivision pending resolution of cultural resource issues. TAG recommended manual pickup of pooled oil, breakup and removal of the asphalt pavement (sometimes termed "tarmat"), and bioremediation of coated rocks and pooled oil. Manual displacement of cobbles and boulders was envisioned as necessary to gain access to pooled oil and tarmat. TAG estimated that a crew of 10 workers would need approximately three days to complete the proposed treatment and that approximately 250 40-pound (18 kg) bags of oiled sediment would be removed. The Exxon Cultural Resource Program still considered avoidance to be the preferred mitigative option, but environmental concerns expressed by Kenai Fjords National Park resulted in an NPS request that Exxon treat the subdivision after taking steps to protect the segment's cultural resources.

The NPS Scope of Work

At the SHPO's request, NPS took the lead in preparing a Scope of Work meeting the Secretary of the Interior's Standards and Guidelines for cultural resource protection. This Scope of Work (Appendix A), developed in consultation with the SHPO and CAC, was completed in April, 1990 and outlined procedures for minimizing adverse effects of treatment to SEL-188. The Scope was designed to set parameters for a resource protection plan accommodating a treatment operation of any scale since the horizontal and vertical extent of the site and the magnitude of treatment were unknown. Once the level of treatment was determined, the effort required to protect cultural resources was to be scaled accordingly and performed within the guidelines outlined in the Scope.

The NPS Scope of Work presented four research objectives to guide data recovery. These were: 1) identify and characterize the nature of the cultural components; 2) demonstrate the presence or absence of patterning of cultural remains on the beach; 3) determine whether the supratidal zone of the site survived the 1964 marine transgression intact; and 4) determine what subsistence activities were conducted at the site for as many identified activity areas and components as possible. The Scope of Work stressed that investigation of both the intertidal and upland portions of SEL-188 was required:

> One of the main research objectives is to determine the culture history of the site: to identify and characterize the nature of the cultural components at SEL-188, including identification and correlation of the components in the beach area and the adjacent upland. This will require data recovery, through subsurface testing and other appropriate means, from all of the three physiographic subdivisions of the site in order to link the cultural material in the intertidal zone to an intact cultural context contained in the uplands and possibly in the supralittoral zone (NPS 1990:4).

In the NPS view, the significance of the intertidal portion of the site would be determined largely by data obtained through subsurface testing concerning the nature and number of site components. If it was determined that SEL-188 was a single component site, the integrity and significance of the intertidal artifacts would be enhanced. This was the NPS rationale for expansion of data recovery effort into the uplands since the information could only be obtained through investigation of undisturbed deposits in the upland area and possibly in the supratidal and upper intertidal zones. Systematic collection of artifacts from the intertidal zone was also considered necessary by NPS, as was collection

of all faunal remains encountered during data recovery.

Exxon's Work Plan

In response to the NPS Scope of Work, the Exxon Cultural Resource Program developed a work plan (Mobley 1990a) to guide further evaluation efforts at SEL-188. The research objectives in the NPS Scope of Work were refined into five basic questions: 1) how much of the original site is located in the intertidal zone; 2) how extensive is the buried sediment containing cultural material in the upper intertidal zone, and does it represent a primary undisturbed deposit or redeposited sediment eroded from the cutbank; 3) does surface artifact distribution, in terms of artifact size and morphology, as well as density, match the subsurface artifact distribution and density; 4) is there horizontal artifact patterning in the intertidal zone; and 5) what is the horizontal relationship of the oil to the artifacts. It was necessary to address these questions to evaluate the importance of the cultural material in the intertidal zone and help direct site protection efforts.

Six field tasks were identified to answer the questions: 1) map the artifacts in the intertidal zone; 2) map the oil distribution in reference to the intertidal artifacts; 3) investigate the subsurface relationships of oil, soils, and artifacts in the intertidal zone; 4) inspect the stratigraphy at the interface of the intertidal zone and the uplands by profiling a vertical face on the high tide cutbank; 5) re-excavate the upland test dug in August, 1989 to re-evaluate the upland stratigraphy; and, 6) place test units near the suspected upland site margins to define the site limits. Only those artifacts encountered in a subsurface context were to be collected during the site evaluation. Collection of surface artifacts at risk of displacement from cleanup activities was to be deferred until treatment monitoring.

Lora Johnson, an archaeologist representing CAC, registered CAC's objection to upland testing at SEL-188 at a CTAG meeting on April 24 and circulated a letter from CAC to the NPS dated April 19, 1990 listing 13 detailed recommendations for cultural resource protection at SEL-188. CAC expressed a desire to ". . . maximize direct participation by English Bay Village Corporation and Chugach Alaska Corporation in all aspects of the undertaking" (Emmal and Johnson 1990). Lora Johnson's later inclusion as a member of the archaeological field team provided for CAC's direct participation in the site evaluation and protection effort.

Field Investigations in April, 1990

CTAG reviewed and approved the six-point Exxon plan for field work on April 23, 1990 and field investigations began the following day. Exxon archaeologists Charles Mobley, Robert Betts, and Paul Buck, with CAC archaeologist Lora Johnson, flew from Anchorage to SEL-188 on April 24, accompanied by Exxon representatives Mark Silbert and Michael Smith. The survey team transferred to the M/V *Sourdough* which was used as a base of operations.

On-site investigations began on the morning of April 25 at 0700 hrs. At approximately 0900 hrs., during initial reconnaissance, a radio message was received from Exxon Cultural Resource Program Co-director Jim Haggarty which directed the crew

Table 5.1 SEL-188 Baseline Coordinates Tied to NPS Datum

Bearing (True) from NPS Datum	Distance (m)	Baseline Coordinate
139	20.75	N140/E200
114	15.60	N150/E200
079	15.40	N160/E200
051	20.85	N170/E200

Note: N200/E200 point on Baseline is 1.12 m at 308° from the base of a CMT with a 98 cm x 22 cm scar on the west side.

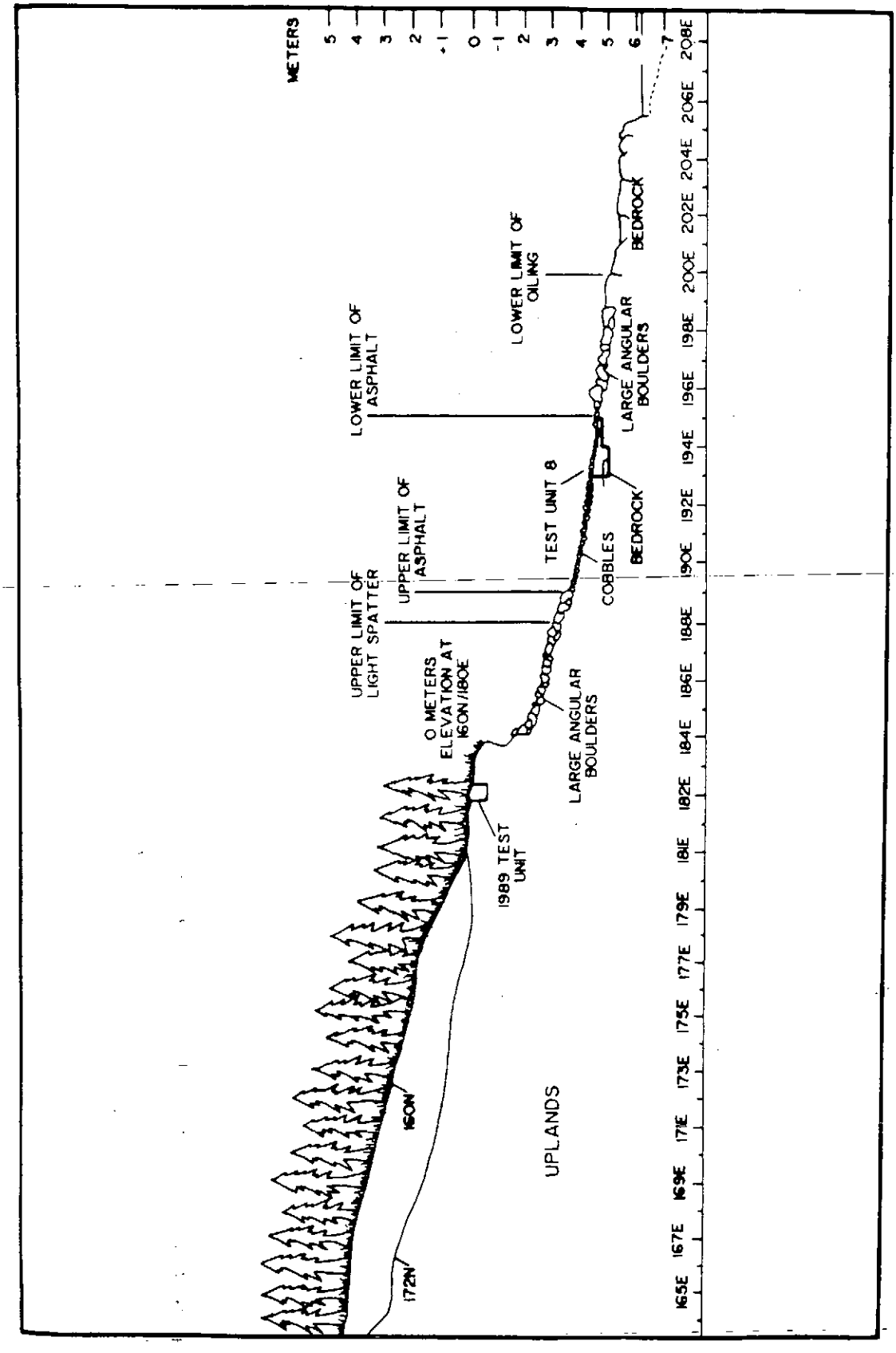


Figure 5.2 **Upland profiles at 160 N and 172 N showing relative depth of test units (from Schaaf and Johnson 1990:Figure 2, modified from Mobley 1990b)**

to suspend uplands activity immediately. NPS Acting Regional Archaeologist Ted Birkedal had notified Haggarty that English Bay Village Corporation was seeking a court injunction to stop all uplands evaluation at SEL-188. Within a few hours NPS also radioed the field team to request that they not access the uplands pending resolution of English Bay Village Corporation's concerns. The NPS Stop Work Order stated:

> All activity on any lands that English Bay Corporation has selected and to which they are entitled by conveyance will be halted immediately until such time as English Bay has had the opportunity to be brought into full consultation with all affected parties. The area involved includes the supra-littoral zone and any lands from mean high tide and above (Castellina 1990).

Restriction of activity to the intertidal zone allowed the investigators at SEL-188 to address only the first three of the six tasks previously identified. It was later learned that on the morning of April 24, 1990, while the field team was en route to the site, a telegram had been sent by English Bay Village Corporation to Exxon Corporation stating that English Bay ". . . strongly objects to any testing on or interference with these uplands at this time" (Emmal 1990).

Videotape footage was taken of the site setting, oiling characteristics, and subsurface testing in the intertidal zone. Artifacts were photographed and left in place. In addition to both plan view mapping of surface artifact and oil distributions, a beach profile cross-section was drawn on the N160 axis (Fig. 5.2) relating one of two intertidal tests (Test Unit B) to the beach morphology and oil distribution. Field investigations were completed on April 26.

Intertidal Artifact Survey and Mapping

A baseline for site mapping and archaeological control was established in the intertidal zone and four grid coordinates on the baseline were tied to the NPS site datum (Table 5.1). This baseline, arbitrarily designated the east 200 m grid axis, was orientated 010 degrees true north, approximately parallel to the shoreline. The N200/E200 coordinate was assigned to a point on the baseline located next to a CMT on a projecting point of land between two streams at the northern end of the artifact scatter. This N200/E200 coordinate was marked to facilitate re-establishment of the baseline during treatment monitoring. Once this point was established, 10 m intervals were taped along the baseline from N210 to N80 as temporary mapping stations for horizontal control. Yellow flags with coordinate designations were placed at baseline mapping stations and at other grid coordinates derived from the baseline which spanned the full distance of the intertidal artifact distribution.

The archaeologists prepared a map of the intertidal zone (Figure 5.3) and noted the location of surface artifacts and FCR, subsurface test locations, CMTs, drowned trees, and sawn stumps. They also plotted the tide line (-3.4 ft at the time of mapping) and the seaward extent of the overhanging cutbank. Surface artifacts located under the overhanging vegetation mat appear to be plotted in the uplands on the site map, but are actually located in the supratidal zone. Numbers used to identify artifacts, FCR, and other specimens mapped in the intertidal zone (Figure 5.3) are field specimen numbers, and, in some cases, refer to lots containing more than one specimen. Field numbers were used consistently for mapping since many of the artifacts mapped were not collected and did not receive accession numbers.

Preliminary and unsystematic observations had been made in the uplands prior to suspension of uplands activity. Mobley noted a battered cobble with wear patterns indicating cultural use in soil exposed by a fallen tree approximately 250 m inland at an estimated elevation of 80 m (Mobley 1990b:14). This artifact was not mapped prior to the termination of upland investigations, although NPS/CAC archaeologists Schaaf and Johnson relocated the artifact later in the year (Schaaf and Johnson 1990:20).

The archaeologists surveyed the intertidal zone by walking transects approximately 1.5 m apart parallel to the baseline. Since surface artifacts in the intertidal zone were not in stratigraphic context,

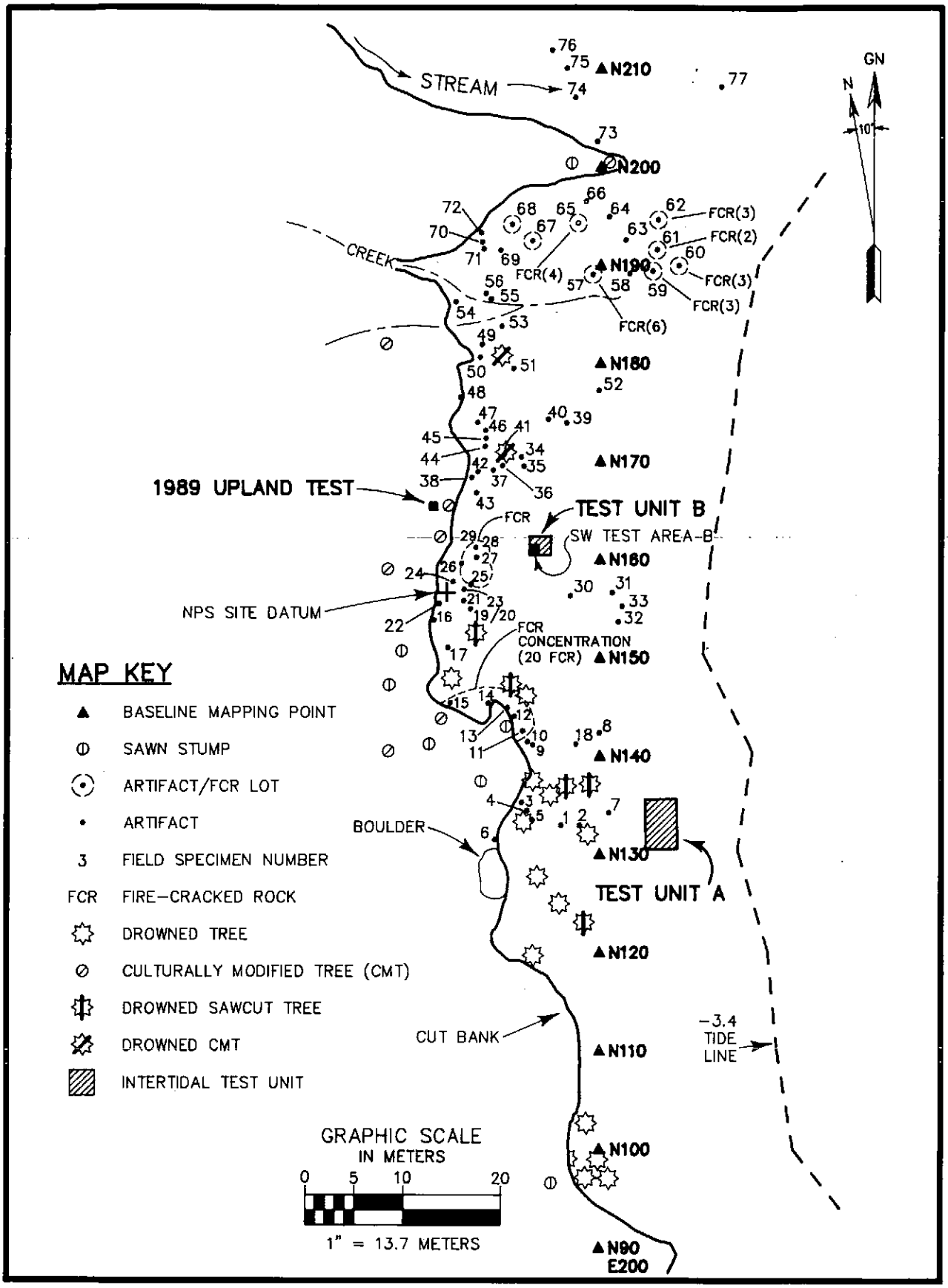


Figure 5.3 Map of artifact/FCR distribution at SEL-188 as observed April, 1990

Table 5.2 Artifact and Specimen Lots Mapped on April 26, 1990

Field Lot #	Catalog #	Description	Datum	Bearing	Distance (m)
1		FCR	N130/E200	300	4.40
2		FCR	N130/E200	292	7.20
3		FCR (3)	N130/E200	301	9.70
4		Battered sandstone slab	N130/E200	297	8.60
5		Battered cobble	N130/E200	285	8.00
6		Striated slate dowel	N130/E200	275	11.10
7		Glass	N130/E200	015	3.80
8		FCR	N140/E200	360	1.50
9		FCR (4)	N140/E200	275	6.30
10		Glass, modern	N140/E200	274	7.20
11		FCR (8)	N140/E200	282	7.90
12		FCR (4)	N140/E200	291	9.30
13		FCR (2)	N140/E200	291	10.30
14		FCR (4)	N140/E200	291	11.80
15		FCR (2)	N150/E200	252	16.70
16		Ground slate	N150/E200	261	18.20
17	49SEL-188-050	Adze frag.	N150/E200	272	16.10
18	49SEL-188-051	Adze frag. (?)	N140/E200	281	2.40
19		Ground slate	N150/E200	288	14.00
20		FCR	N150/E200	288	14.00
21		Striated slate frags. (2)	N150/E200	290	14.90
22		Striated slate frags. (2), FCR	N150/E200	258	1.40
23		Striated slate	NPS Datum	054	1.30
24		FCR	NPS Datum	360	1.90
25		FCR	NPS Datum	052	2.60
26		FCR	NPS Datum	360	2.90
27		Pecked cobble	NPS Datum	016	3.70
28		FCR	NPS Datum	026	4.90
29		FCR (2)	NPS Datum	026	5.90
30		Glass tube	N150/E200	330	6.20
31		Cobble chopper	N150/E200	010	5.90
32		Glass (2)	N150/E200	034	3.40
33		Glass	N150/E200	026	4.90
34	49SEL-188-052	Boulder spall	N170/E200	270	7.70
35	49SEL-188-053	Battered cobble	N170/E200	264	7.90
36		Notched pebble	N170/E200	264	9.90

Table 5.2 (cont'd)

Field Lot #	Catalog #	Description	Datum	Bearing	Distance (m)
37		Pecked cobble	N170/E200	262	11.10
38		Striated slate, chipped slate, cobble spall, chipped cobble spall, ground slate dowel	N170/E200	262	12.20
39	49SEL-188-054	Boulder spall	N170/E200	318	4.90
40	49SEL-188-055	Boulder spall	N170/E200	306	6.30
41		Pecked cobble, cobble spall, ground slate	N160/E200	317	13.72
42		FCR, ground slate (2), pecked cobble	N160/E200	304	15.00
43		FCR, boulder spall	N160/E200	296	14.10
44		Ground slate	N160/E200	316	15.70
45		Boulder spall	N160/E200	318	16.00
46		Ground slate	N160/E200	318	17.00
47		Pecked cobble	N160/E200	318	19.00
48		Ground slate	N160/E200	254	16.00
49		Polished slab, chipped flake, FCR, pecked cobbles (2)	N170/E200	314	16.70
50		Lamp frag., FCR (2), ground slate (2)	N170/E200	310	15.60
51		Ground slate point frag.	N170/E200	316	12.10
52		Aluminum	N180/E200	176	3.70
53	49SEL-188-056	Notched grooved cobble	N180/E200	288	10.70
54		Slate flake	N180/E200	292	15.90
55		Boulder spall	N180/E200	296	12.00
56		Slate flake	N180/E200	299	12.80
57		FCR (6)	N190/E200	182	1.80
58		Pecked cobbles (2), FCR (2)	N190/E200	102	3.85
59		FCR (3)	N190/E200	090	6.50
60		FCR (3)	N190/E200	090	8.20
61		FCR (3)	N190/E200	075	6.00
62		FCR (3)	N190/E200	053	7.20
63		FCR	N190/E200	046	3.70
64		FCR	N190/E200	010	5.00
65		FCR (4), iron plate	N190/E200	330	4.40
66		FCR	N190/E200	346	6.40
67		Slate flakes (4), FCR (5)	N190/E200	289	7.80
68		Pecked cobble, ground slate (2), FCR	N190/E200	293	10.30

Table 5.2 (cont'd)

Field Lot #	Catalog #	Description	Datum	Bearing	Distance (m)
69		Flaked slate	N190/E200	279	10.50
70		Ground slate	N190/E200	281	12.30
71		Pecked cobble	N190/E200	277	12.10
72		Ground slate (1), slate flake	N190/E200	285	12.90
73		Cobble spall (2)	N190/E200	182	7.80
74		Cobble spall	N210/E200	221	4.00
75		FCR (2)	N210/E200	269	3.70
76		FCR (4)	N210/E200	289	5.40
77		Cobble spall	N210/E200	099	12.10

Notes:

1. Artifacts with catalog numbers were collected on 8-3-90 during site monitoring.
2. Recent debris (glass, aluminum) is included.

and the potential for production of "naturefacts" from battering by wave action was present, Exxon archaeologists took a conservative approach to artifact identification. Demonstrable cultural modification was necessary to classify an object as an artifact (see Appendix E). Slate fragments lacking definite cultural modification were not plotted nor were unmodified rounded cobbles that contrasted with the angular granite comprising most of the rock on the beach. All non-granitic lithic material in the intertidal zone was examined for evidence of flaking, grinding, pecking, or other cultural modification. It was apparent that a small number of surface artifacts might not be identified as such due to the difficulty of recognizing subtle indications of cultural modification. In one case, an oiled adze bit fragment in the mid-intertidal zone (49SEL-188-52) was not considered an artifact until a conjoining grooved adze midsection (49SEL-188-51) discovered adjacent to the cutbank 17 m (56 ft) away indicated otherwise. Fire cracked rock (FCR) was distinguished:

> . . . on the basis of angular fracture planes, increased friability (compared to other rocks in the intertidal zone), irregular fractures partially penetrating the rock, potlids (circular spalls that pop off of flat faces due to thermally-induced

Table 5.3 Types and Frequencies of Specimens Mapped on April 25, 1990

Artifact Type	Frequency
Stone lamp fragment	1
Polished slab	2
Battered sandstone slab	1
Notched and grooved stone	1
Notched stone	1
Cobble chopper	1
Cobble spalls	13
Battered cobbles	13
Adze fragments	2
Ground slate	23
Chipped slate	9
Flake (not slate)	1
Fire cracked rock	81
Rusted metal plate	1
Glass	6
Aluminum strip	1
Total:	157

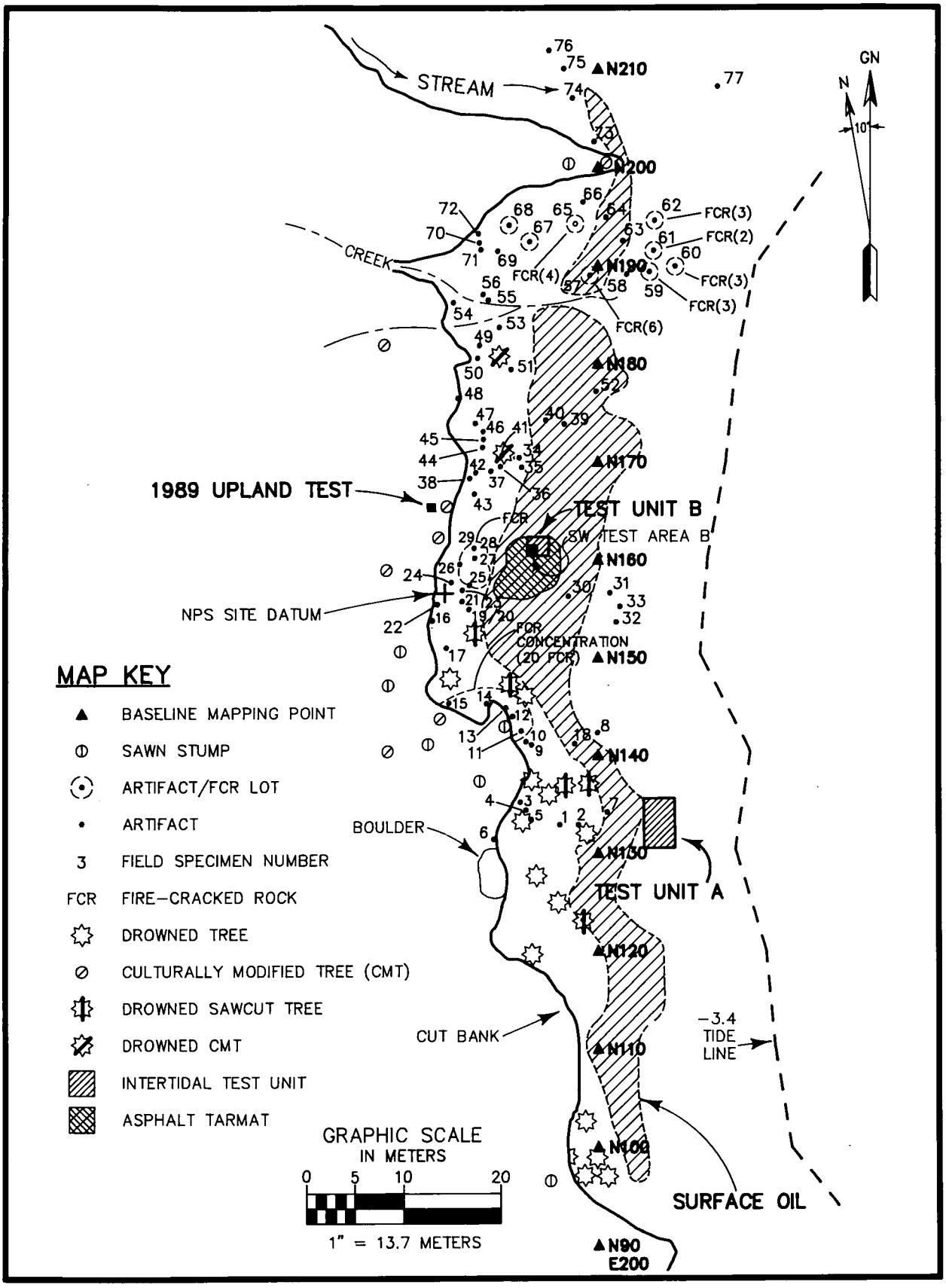


Figure 5.4 **Surface oil distribution in relation to artifact/FCR distribution at SEL-188, as observed April 1990**

> expansion and contraction), and discoloration (reddish), compared to unaltered rock (Mobley 1990b:4).

Most artifacts were plotted individually to the nearest 10 cm (4 in) from the closest temporary mapping station or the NPS datum. Artifacts or FCR less than 50 cm (20 in) apart were itemized and assigned a lot number with a single bearing and distance measurement. All single artifacts and artifact lots were photographed.

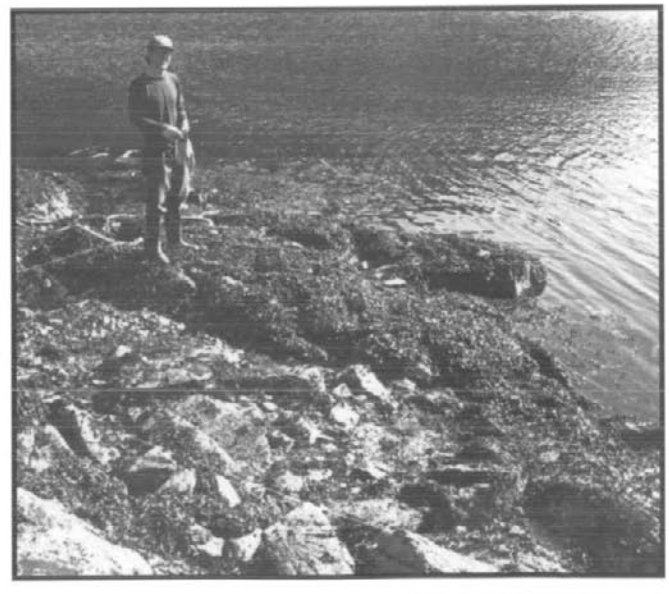
No artifacts were located in the *Fucus* zone during intensive survey of the lower intertidal zone at a -3.4 ft. tide. Although dense *Fucus* obscured visibility, transects were walked and medium-sized *Fucus* and algae covered rocks were overturned to inspect the clean cobble and rock substratum. Artifacts were found in the mid-intertidal zone, although oiling there made artifact identification difficult. Rounded cobble tools and pecked adzes which contrasted with the dominant angular granitic rock were the most conspicuous artifacts in the oil band. Most artifacts were observed in the upper and supratidal zones above the oil band.

Seventy-seven artifact lots containing 157 objects were mapped (Mobley 1990b)(Table 5.2) including 81 pieces of FCR and eight pieces of recent debris (including six fragments of glass from what is probably a single fluorescent light bulb). Twelve artifact classes were represented by the 68 prehistoric artifacts (Table 5.3). Mobley graphed the distance of artifacts from the cutbank (1990b:Figure 2), quantifying earlier perceptions that artifact density was highest close to the cutbank:

> The highest artifact density occurs within one meter of the cut bank, and decreases seaward (Figure 2). A trough in the distribution occurs between six and nine meters from the cut bank, followed by a second mode occurring between nine and twelve meters from the cut bank. The second mode is formed by approximately a dozen and a half pieces of fire-cracked rock and a few other artifacts located in the northern half of the site. An outlier located about 18 meters from the cut bank is a single cobble chopper. As the oil distribution map (Figure 1) shows, the majority of the oil is found in a band located roughly six to 17 meters from the cut bank. Few of the artifacts discovered that distance from the cut bank were located in the oiled zone, and it is probable that the reduced visibility contributed to the trough evident in the graph. At about 20 meters from the cut bank the *Fucus* obscured the

(Charles Mobley 2:5 Exxon)

Figure 5.5 View southwest of Test Unit A before *Fucus* removal



(Charles Mobley 2:10 Exxon)

Figure 5.6 Test Unit A with *Fucus* partly removed

surface (realizing that the *Fucus* distribution is not distance- to-cut-bank-dependent but rather elevation-dependent). Looking at the graphs, the artifacts taper off before the *Fucus* zone is reached, so the decreasing density would seem to reflect an actual artifact distribution (Mobley 1990b:5-6).

(Charles Mobley 7:17 Exxon)

Figure 5.7 **View northwest of Test Unit B as excavation begins**

(Charles Mobley 9:4 Exxon)

Figure 5.8 **View northeast of Test Unit B inundated by rising tide**

Intertidal Feature Mapping

Four drowned CMTs mapped in the intertidal zone included two bark-stripped examples at the northern end of the site and two burned examples in the central site area (Mobley 1990b:7). Mobley (1990b:7) observed that "healing lobes over the edges of the scars on these two drowned CMTs indicate conclusively that they were stripped prior to the 1964 subsidence." Six saw cut drowned trees in the intertidal zone and seven bark-stripped CMTs in the uplands, visible from the beach, were also mapped (Figure 5.3).

Oil Distribution Mapping

Surface oil was mapped using the same methods and scale used to record the artifact and feature distribution. Overlaying the oil distribution map on the artifact map clarified the spatial relationships between surface oil and artifacts (Figure 5.4). Oil characteristics were described in the field by Mark Silbert (Exxon), using the categories - coated rocks, coated rocks with pooling, splatter, and asphalt:

> The area of coating, as mapped during the archaeological survey, is a band three to eleven meters wide in the site area (from N130 to N212) amounting to approximately 460 square meters. Within that is an area of approximately 32 square meters of asphalt. The coating is also found in two small areas just north of the intertidal portion of the site, and extends south of the intertidal site portion to encompass approximately 150 square meters of intertidal area (Mobley 1990b:8).

The oil band was located mostly downslope from the artifact distribution. The archaeologists identified eight artifact lots (three containing glass and aluminum) in the oil band (Mobley 1990b). Two of the lots consisted of FCR; otherwise, only two boulder spalls and an adze fragment were identified in the oil band. Most artifacts collected in 1989 (by

Yarborough or Worthington, see Tables 4.1, 4.2) were unoiled specimens from the upper intertidal zone. Mapping in August, 1989 (Figure 4.3) indicated ten artifacts identified or collected from within the oiled area at that time.

Subsurface Testing in the Intertidal Zone

The archaeologists excavated Test Units A and B in the intertidal zone to determine whether the distribution of surface artifacts was representative of the subsurface distribution. Test Unit A was placed outside the oil band away from surface artifacts, and Test Unit B was placed within the oil band in close proximity to surface artifacts. The test units were not placed in locations with surface artifacts since one of the primary reasons for the tests was to determine if subsurface artifacts were present where there was no surface indication of cultural material.

Test Unit A, covering 15 m^2 (161 ft^2), was placed in the *Fucus*-covered mid-to-lower intertidal zone with its southwest corner at site grid coordinates N130/E205 (Figure 5.3). This test unit, measuring three meters (9.8 ft) by five meters (16.4 ft), was located near the southern extent of the observed surface artifact scatter (Figures 5.5, 5.6). Excavation entailed removing the *Fucus* from the test area and inspecting the underlying surface for artifacts. The exposed surface consisted of bedrock and boulders with granitic sand and cobbles in bedrock crevices. Excavation of this material, using trowels, produced two pieces of slate with no evidence of cultural modification. No artifacts or cultural features were found in Test Unit A (Mobley 1990b:9).

Test Unit B covered four m^2 (43 ft^2) and was placed north and east of Unit A at site grid coordinates N160/E173 (Figure 5.3). The test measured two meters by two meters (6.6 x 6.6 ft) and was positioned within the asphalt pavement (tarmat) in the upper intertidal zone approximately four meters below a scatter of surface artifacts (Figures 5.7, 5.8). No artifacts were observed on the surface of Test Unit B. Stratum 1 consisted of cobbles and

Table 5.4 Specimens Collected from Test Unit B

Catalog #	Collector	Date	Description	Provenience
49SEL-188-037	P. Buck	4/26/90	Glass, clear	Test B/Stra. 1
49SEL-188-038	P. Buck	4/26/90	Glass, clear	Test B/Stra. 1
49SEL-188-039	P. Buck	4/26/90	Glass, green	Test B/Stra. 1
49SEL-188-040	P. Buck	4/26/90	Glass, clear	Test B/Stra. 1
49SEL-188-041	P. Buck	4/26/90	Glass, clear	Test B/Stra. 1
49SEL-188-042	P. Buck	4/26/90	Glass, clear	Test B/Stra. 1
49SEL-188-043	P. Buck	4/26/90	Glass, clear	Test B/Stra. 1
49SEL-188-044	P. Buck	4/26/90	Glass, clear	Test B/Stra. 1
49SEL-188-045	P. Buck	4/26/90	FCR	Test B/Stra. 2
49SEL-188-046	P. Buck	4/26/90	Battered cobble	Test B/Stra. 2
49SEL-188-047	P. Buck	4/26/90	Cobble spall	Test B/Stra. 2
49SEL-188-048	P. Buck	4/26/90	Flake, basalt	Test B/Stra. 2
49SEL-188-049	P. Buck	4/26/90	Battered cobble	Test B/Stra. 2
49SEL-188-050	P. Buck	4/26/90	Grooved cobble	Test B/Stra. 3

boulders ranging from five centimeters to greater than 20 cm (2-8 in) in diameter, cemented together by an asphalt tarmat to a depth of five centimeters (2 in). Below the tar layer was another five centimeters (2 in) of oiled granitic sand and gravel (Stratum 2), with underlying unoiled granitic sand and gravel (Stratum 3). All of the asphalt tarmat (Stratum 1) was removed by trowel, as was most of the underlying oiled sand and gravel (Stratum 2). A rising tide threatened to inundate the test unit and a 0.8 x 1.0 m (2.5 x 3.3 ft) area in the southwest corner was quickly shoveled down to 80 cm (31 in), at which point the test was flooded, terminating further excavation.

Rocks and artifacts from the upper 10 cm of Test Unit B were heavily oiled, and positive identification of stone artifacts involved cleaning all possible artifacts with a solvent. Artifacts and other specimens recovered from Test Unit B are listed in Table 5.4. From the five centimeters of consolidated asphalt and underlying five centimeters of oiled sand and gravel, Mobley (1990b:10) reported "15 pieces of clear rounded glass (probably from a fluorescent light bulb), one piece of green bottle glass, three pieces of slate without cultural modification, and one pecked cobble (49SEL-188-46)," as well as a hammerstone (49SEL-188-049) from the contact between the oiled and unoiled sand/gravel layers. A grooved stone (49SEL-188-050) was recovered from the deeper shovel test at a depth of 20 cm (7.9 in) in the unoiled sand/gravel (Stratum 3).

Test Unit B demonstrated that subsurface artifacts were present in the intertidal zone, but neither Test Unit A nor B yielded evidence of a buried soil horizon. The coarse yellow sand containing weathered granite, cobbles, and pebbles overlying granite bedrock in Test Unit B could be interpreted either as a reworked beach deposit containing eroded artifacts or an intact regolith (C horizon) with artifacts in place; however, size sorting of beach deposits as observed in Test Unit B is indicative of wave action. The presence of modern glass with subsurface intertidal stone tools is additional evidence of intertidal sediment mixing. The intertidal artifacts constitute a lag deposit deflated from the upland portion of the site by marine erosion.

Summary of Field Investigations

Three field tasks were completed in April 1990: mapping of surface artifacts in the intertidal zone; mapping the oil distribution and its relationship to surface artifacts; and subsurface testing to clarify the relationships of oil, stratigraphy, and artifacts in the intertidal zone. Due to the suspension of upland investigations, three of the six planned fieldwork tasks were not conducted and the nature of the upland log feature was not determined.

The first question regarding how much of the original site subsided into the intertidal zone could not be addressed on a percentage basis since the upland boundary of the site was not determined. Mobley estimated the amount of shoreline which has eroded since the 1964 Alaska earthquake by using the distribution of drowned trees in the intertidal zone and their distance from the presently-eroding cutbank (Mobley 1990b:8). Assuming that the original site extended to the edge of the bank, between 475 and 656 m^2 of site has been deflated into the intertidal zone since 1964. The percentage of the site located in the intertidal zone is unknown because the upland extent of the site remains undetermined.

The second question addressed the issue of whether the buried sediment containing cultural material in the upper intertidal zone is in place or was redeposited from eroded matrices. The two tasks addressing that issue were the excavation of a clean profile on the cutbank and excavation of units in the intertidal zone. The former was prohibited by NPS in their Stop Work Order, but the latter was achieved. Intertidal work conducted in April of 1990 (Mobley 1990b:14) reported ". . . no indication of a brown soil buried in the intertidal zone, as noted by Worthington, was observed in the two test units excavated in the 1990 survey; the lens may have been a very localized phenomenon. . . " Subsequent observations conducted by archaeological monitors in August noted a small amount of organic soil in a

bedrock crack in the intertidal zone, but no intact matrices containing carbonaceous soil or artifacts were observed.

The third question asked whether the surface artifact distribution matched the subsurface artifact density in terms of artifact size, morphology, and density. Test Unit A had no artifacts on the surface and none were found below the surface. Subsurface artifacts were recovered from Test Unit B, with no artifacts on the surface and none within a four meter radius. The results from Test Unit B suggest a lack of correlation between surface and subsurface artifact distributions since subsurface artifacts occurred outside the surface distribution.

The fourth question asked whether there was horizontal patterning to artifacts in the intertidal zone. The investigations demonstrated that surface artifact density was greatest close to the cutbank. Artifact densities varied along that cutbank, but no cultural features were recognized as evidenced by horizontal artifact distribution in the intertidal zone. The clustering of artifacts and FCR as mapped by NPS in 1989 (Worthington 1989) was not as evident when individual artifacts and FCR were mapped in 1990. This is probably because a greater number of artifacts was mapped in April 1990 and most of the artifacts mapped by NPS in 1989 had been collected. Also, recognition and mapping of fire cracked rock may have varied during the two mapping events.

The last question called for study of the spatial relationships of oil to artifacts. Most of the surface artifacts were upslope from the oil although some bias may have been introduced by the fact that artifacts were somewhat less visible in the oil band. Excavation determined that oil had penetrated to a depth of approximately 10 cm (4 in) oiling subsurface artifacts in Test Unit B.

In summary, prohibition of upland access left unresolved basic questions concerning the extent of the upland site area and the relationship between the upland and intertidal portions of the site. Nevertheless, the field investigation acquired basic information about the intertidal portion of SEL-188 in order to further evaluate site significance and design protective measures facilitating oil spill treatment.

Development of a Site Protection Strategy

A report on the April, 1990 investigations at SEL-188 (Mobley 1990b) was completed and submitted for multi-agency review on April 30, 1990. The Exxon report identified four mitigation options for the subdivision: 1) no shoreline treatment; 2) treatment without mitigation; 3) treatment as proposed by TAG with archaeological monitoring; and 4) monitored treatment of pooled oil with asphalt tarmat left undisturbed. The report recommended the "no treatment" option.

On May 1, 1990, NPS provided Exxon with a Scope of Work requesting that a research design for protection efforts be developed and submitted to the NPS and SHPO by May 30, 1990 (Lidfors 1990). NPS also advised Exxon that a separate Archaeological Resource Protection Act (ARPA) permit would be required for work at SEL-188, to be issued on the basis of a submitted research design. On May 2, 1990, NPS informed Exxon that it would be necessary for NPS to take the archeological protection plan to the village of English Bay for discussion prior to any cultural resource protection effort or treatment.

The report documenting the April, 1990 work at SEL-188 (Mobley 1990b) was presented to CTAG on May 2, 1990. NPS completed their review of the report in early July. NPS felt strongly that site protection efforts should involve a field recovery program beyond the scope of standard archaeological monitoring as previously employed by Exxon at sites with intertidal artifacts. Commenting on the intertidal portion of the site, NPS stated: "Information from this zone could prove very important to an overall understanding of the site, despite the low density of artifacts and the apparent lack of stratigraphic deposits" (Birkedal 1990).

NPS proposed that Exxon conduct archaeological monitoring (including artifact collection) of oil spill treatment in the intertidal zone, concurrent with joint NPS/CAC upland investigations. The proposed NPS/CAC work included re-excavation of the 1989 upland test pit and the use of one-inch diameter soil probes to define the character and limits of the upland portion of the site. The NPS/CAC results were to be provided to the Exxon Cultural Resource Program which would be responsible for integrating the data into a comprehensive report.

Exxon responded to the NPS data recovery proposal by developing a work plan focused on monitoring of treatment activity in the intertidal zone and proposed that the asphalt tarmat be left in place to minimize subsurface disturbance. NPS reacted to Exxon's recommendation that the asphalt tarmat be left in place by stating that such an approach would be detrimental to the natural environment (Birkedal 1990). Discussions among CAC, SHPO, NPS, and Exxon resulted in a technical modification of the work plan to include tarmat breakup and removal with monitoring by Exxon archaeologists. The final work plan of July 20, 1990 (Appendix B) reflected the decision by NPS and CAC to initiate separate upland investigations at SEL-188 concurrent with Exxon monitoring of intertidal beach treatment. A mitigation plan acceptable to all parties was finalized, and treatment of the subdivision was scheduled for early August.

CHAPTER 6

SHORELINE TREATMENT AND ARCHAEOLOGICAL MONITORING

This chapter describes four separate treatment events which took place at SEL-188. Three took place in August, 1990 and one was conducted in June, 1991. 1990 treatment involved 10-person treatment crews operating from the M/V *Arctic Salvor* under the direction of Exxon supervisor Chris Katsimpalis. In 1991, a seven-person crew from the M/V *Auriga* directed by Exxon supervisor Randy Boyer concluded treatment at SEL-188. Exxon archaeologists monitored all work in 1990 and 1991 and briefed crew members, agency representatives, and supervisors on cultural resource issues prior to each shoreline treatment. NPS and CAC archaeologists conducted joint upland investigations during the initial treatment event (see Chapter 7). A detailed discussion of artifacts recovered during site assessment and treatment monitoring and of the results of archaeological investigations at SEL-188 is presented in Chapter 8.

Treatment and Monitoring on August 1-4, 1990

Exxon archaeologists Robert Betts and Aron Crowell arrived at the site area on July 31, and archaeologists Jeanne Schaaf (NPS) and Lora Johnson (CAC) joined them to conduct upland investigations.

The Federal On-Scene Coordinator (FOSC) authorized treatment including manual recovery of pooled oil trapped in bedrock crevices and between boulders, and breakup and removal of asphalt tarmat composed of cobbles and oiled granitic sand. The work plan restricted cleanup implements to trowels and large spoons. Only pooled oil was to be removed from outside the tarmat area, with the stipulation that larger rocks inadvertently scooped up in the manual removal of pooled oil would be returned to the beach surface. Bioremediation using Customblen granular fertilizer was scheduled for the entire oiled area upon completion of manual pickup. Exxon supervisor Katsimpalis requested a work plan addendum on August 2 after consulting with the archaeologists. This addendum, subsequently approved by both TAG and the SHPO, allowed hot water spot washing and cold water flooding to flush residual oil from bedrock and boulders after accessible mousse and pooled oil had been manually removed.

Field Activities Prior to Treatment

The NPS Scope of Work and Exxon's work plan required Exxon archaeologists to survey the intertidal zone and brief the treatment crew on cultural resource issues before treatment. High winds and heavy seas delayed treatment on August 1, 1990, but Katsimpalis, Mike Tetreau (NPS), and other agency representatives conducted a brief reconnaissance and identified treatment boundaries and the tarmat area. The first crew briefings took place on August 1, and a second crew briefing was conducted on August 2 prior to treatment.

Artifact Survey in the Intertidal Zone

The archaeologists re-established the April 1990 baseline using the previously marked N200/E200 coordinate, the known baseline orientation, and measurements from the NPS datum to four baseline coordinates (Table 5.1). They laid out a four-meter square grid system covering 160 m^2 (1722 ft^2), including all of the tarmat area, with yellow nylon cord and 40 cm (16 in) long wire rods at each grid intersection. Each grid intersection was flagged and identified in relation to the N200/E200 coordinate and each grid square was designated by the grid coordinate at its southwest corner.

Survey in the lower intertidal zone on August 1 was limited by a low tide of +6 feet, but the April 1990 survey effort (at a low tide of -3.4 feet) indicated that almost all surface artifacts occurred above the +6 foot tide level. Low tide remained above +4 feet during daylight hours through the four days of monitoring. Portions of the site baseline were underwater at +7 feet.

Exxon archaeologists relocated artifacts previously mapped during the April 25-26, 1990 site evaluation and conducted surface survey of grid squares in the tarmat area and transects outside the grid system. Surface artifacts were left in place and marked using red pin flags on 40 cm (16 in) long wire rods. Pin flags marking previously mapped artifacts were labeled with the same field numbers (1-77) used in the April site mapping. New artifacts were temporarily marked with unnumbered pin flags to differentiate them from previously mapped artifacts and assigned field numbers during later mapping. All artifacts identified within the grid system were removed prior to treatment, but the red pin flags marking their locations were left in place. The baseline, grid system, and flagged artifacts in the intertidal zone were photographed and videotaped.

Cultural Resource Orientation

The assistance of treatment personnel in identifying and recovering oiled artifacts in the work area was critical to the mitigation effort. All treatment workers, supervisory personnel, and agency monitors assigned to the M/V *Arctic Salvor* were required to attend cultural resource briefings conducted by Betts and Crowell. Orientation sessions focused on basic artifact recognition skills and motivating cleanup workers to use those skills to help archaeologists recover artifacts from the treatment areas. A 45-minute formal orientation session was held on board the M/V *Arctic Salvor* on August 1, 1990. The shipboard orientation presented a general overview of previous investigations at SEL-188 and a specific briefing on how treatment and monitoring would be conducted (Table 6.1). Much of the formal orientation concentrated on beach procedures, the grid system, and artifact recording methods.

Table 6.1 Topics Covered in Worker Orientation, August 1, 1990

Introduction to Exxon Cultural Resource Program
Land Status and Agencies Involved
Previous Investigations at SEL-188
Site Significance
Cultural History of the Pacific Eskimo
Role of Archaeological Monitors
Grid System and Flagging Procedures
Type of Artifacts Likely to Be Encountered
Cleanup Techniques
Procedures: Artifacts Encountered During Cleanup

Considerable emphasis was placed on the need for workers to carefully examine oiled sediment.

The second orientation was conducted immediately before work started on August 2, 1990. This 20-minute briefing familiarized beach workers with the range of stone artifacts that might be encountered, the baseline and grid system, and procedures for treatment. Flagged artifacts in the intertidal zone were used to illustrate artifact types likely to be encountered. Workers were encouraged to examine each artifact closely and were cautioned to leave all pin flags in place and to exercise care in examining and removing oiled sediment.

The number of questions asked by treatment personnel during orientation indicated a high level of interest in understanding the cultural resources at SEL-188 and in minimizing disturbance to the site. Beach workers and agency representatives meticulously examined oiled sediment for artifacts and took extra precautions to maintain the site grid system as requested during orientation. Workers indicated to Betts and Crowell that they appreciated the effort made to explain the nature of the cultural resources at SEL-188 as well as the efforts to include them in the mitigation process.

Treatment and Monitoring

Manual treatment began immediately after the beach orientation. Most known artifacts above the oil band had been flagged and workers were cau-

(Robert Betts 5:18 Exxon)

Figure 6.1 Treatment crew removing tarmat from vicinity of Test Unit B, August 2, 1990

tioned about avoiding flagged areas. Between 20 and 24 people were on the beach at any given time including the 10-person treatment crew, boat operators, supervisors, agency representatives, and archaeologists. All personnel except archaeologists were kept out of the uplands.

Treatment was initially concentrated in grid squares N160/E192 and N156/E196 to allow close monitoring. As treatment progressed and workers became more dispersed, the archaeologists circulated among them. Most large rocks manageable by hand were rolled over to gain access to underlying oiled sediment (Figure 6.1). Personnel worked individually or in pairs, troweling oiled sediment into five-gallon plastic buckets. The buckets were carried to a landing craft on the beach and emptied into a 2000 lb "supersack" for transport to the M/V *Arctic Salvor*. Supervisor Katsimpalis estimated that approximately 5443 kg (12,000 lbs) of mousse, pooled oil, and oiled sediment were removed during two days of treatment.

Asphalt tarmat was broken apart to examine rocks and cobbles for cultural modification. Workers marked the location of suspected artifacts and called archaeologists to examine them. Initially, workers presented hundreds of rocks and cobbles to be cleaned and inspected, only a few of which were determined to be artifacts. Possible artifacts were cleaned by spraying the solvent Orangesol and wiping it off using absorbent pads. When an artifact was encountered during treatment, an archaeologist showed it to each worker and explained

(Robert Betts 15:35 Exxon)

Figure 6.2 Treatment crew using hot water spot washing with cold water flooding, August 3, 1990

Table 6.2 Specimens Collected during Treatment Monitoring, August 2-3, 1990

Catalog #	Agency / Field #	Date	Description	Grid Provenience	Datum	Bearing	Dist. (m)
49SEL-188-051	17	8/02/90	Adze frag., midsection, grooved, single hafting ridge		N150 E200	272	16.1
49SEL-188-052	18	8/02/90	Adze, splitting, bit end		N140 E200	281	2.4
49SEL-188-053	34	8/02/90	Boulder spall, retouched		N170 E200	270	7.7
49SEL-188-054	35	8/02/90	End-battered cobble (Hammerstone)		N170 E200	264	7.9
49SEL-188-055	39	8/02/90	Boulder spall, retouched		N170 E200	318	4.9
49SEL-188-056	40	8/02/90	Boulder spall, unretouched		N170 E200	306	6.3
49SEL-188-057	53	8/02/90	Notched grooved cobble		N180 E200	288	10.7
49SEL-188-058	78	8/02/90	End-battered cobble core	N162.05 E193.36			
49SEL-188-059	79	8/02/90	Ulu, notched, ground slate	N163.00 E192.70			
49SEL-188-060	80	8/02/90	Cobble spall, retouched	N166.40 E192.26			
49SEL-188-061	82	8/02/90	Cobble spall, retouched	N167.04 E192.38			
49SEL-188-062	83	8/02/90	Bead, shale	N171.55 E192.55			
49SEL-188-063	84	8/02/90	Pick fragment	N158.40 E190.20			
49SEL-188-064	85	8/02/90	Notched, battered cobble	N165.30 E194.85			
49SEL-188-065	86	8/02/90	Lightly end-battered cobble	N161.92 E195.24			
49SEL-188-066	87	8/02/90	Unmodified sub-rounded pebble	N156.92 E191.36			
49SEL-188-067	88	8/02/90	Unmodified sub-rounded pebble	N170.40 E192.55			
49SEL-188-068	89	8/02/90	Rod midsection, ground slate	Quadrat N152/E192			
49SEL-188-069	98	8/02/90	Notched pebble		NPS Datum	006	19.1

Table 6.3 Artifacts Collected from Asphalt Tarmat Grid during Monitoring, August 2-3, 1990

Grid Square	Catalog #	Field #	Oiled	Description
N152/E192	49SEL-188-068	89	Yes	Rod midsection
N156/E188	49SEL-188-063	84	Yes	Adze, poll fragment
N160/E192	49SEL-188-058	78	Yes	Cobble w/spall removal
" "	49SEL-188-059	79	Yes	Ground slate fragment
" "	49SEL-188-065	86	Yes	Battered cobble
N164/E192	49SEL-188-060	80	Yes	Cobble spall
" "	49SEL-188-061	82	Yes	Cobble spall
" "	49SEL-188-064	85	Yes	Notched pebble
N168/E192	49SEL-188-062	83	No	Bead, slate

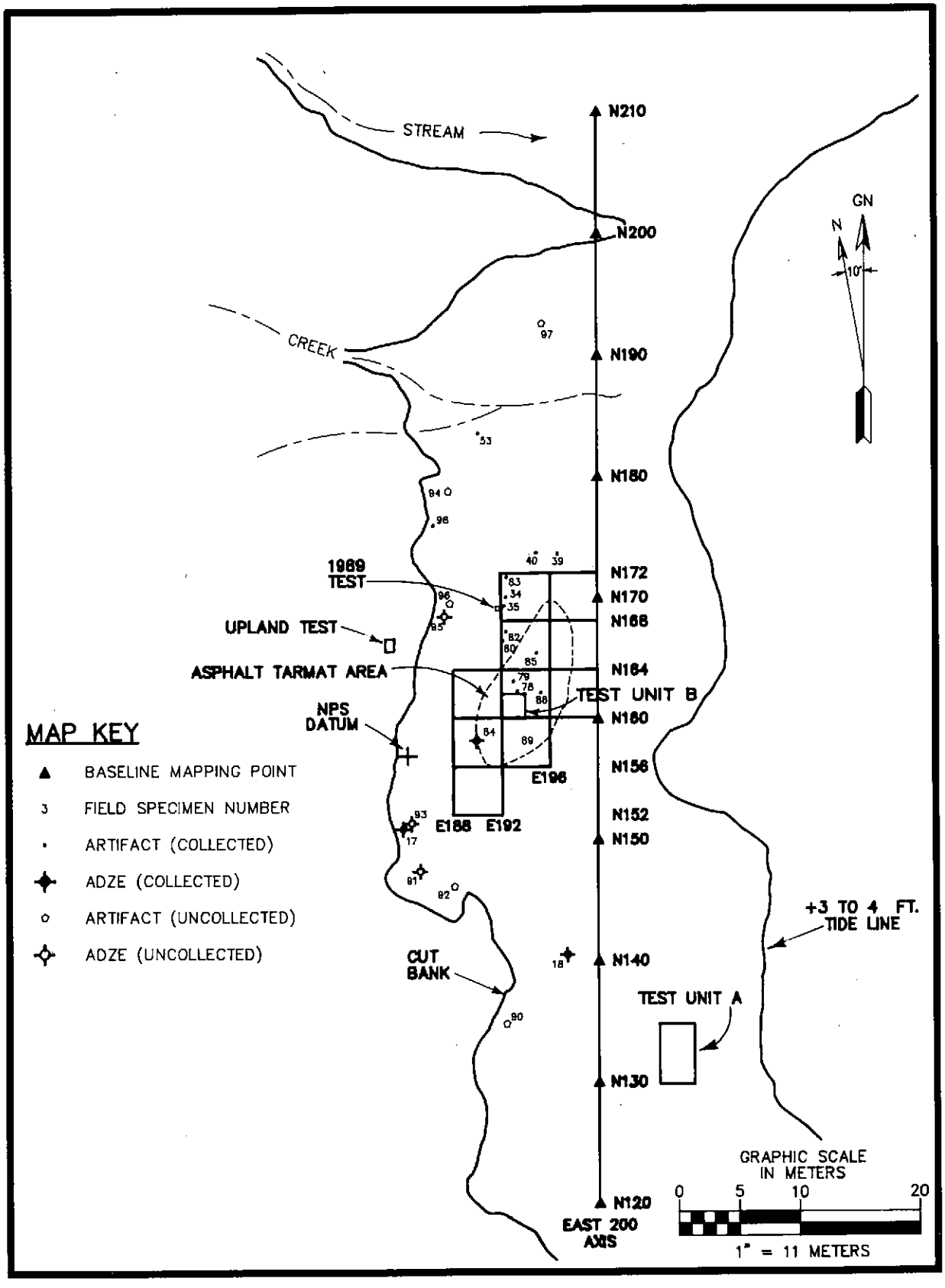


Figure 6.3 **Intertidal grid system and distribution of artifacts collected during treatment monitoring and site assessment, August 1-4, 1990**

Table 6.4 **Previously Unknown Surface Artifacts Mapped during Treatment Monitoring and Site Assessment, August 1-4, 1990**

Field #	Description	Datum	Bearing	Dist.
90	Ulu fragment, ground slate	N130/E200	300	8.9 m
91	Adze fragment, poll, greenstone	N150/E200	259	15.0 m
92	Cobble spall	N150/E200	251	12.6 m
93	Adze fragment, bit, greenstone	N150/E200	274	15.6 m
94	Notched cobble, three notches	N170/E200	305	15.3 m
95	Adze preform, complete, greenstone	N170/E200	262	12.5 m
96	Notched pebble	N170/E200	266	12.0 m
97	Flake, slate	N190/E200	298	5.3 m

Table 6.5 **Type and Frequency of Artifacts Collected or Newly Identified during Treatment Monitoring and Site Assessment, August 1-4, 1990**

Artifact Type	Collected	Uncollected	Total
Adze/adze fragment	2	3	5
Battered cobble	3		3
Bead, shale	1		1
Boulder/cobble spall	5	1	6
Flake, slate		1	1
Grooved/notched cobble	2	1	3
Notched pebble	1	1	2
Ground slate rod	1		1
Pick fragment	1		1
Ulu fragment	1	1	2
Totals:	17	8	25

why it was culturally modified. This increased the workers' and agency representatives' ability to recognize artifacts and fostered a competitive spirit among the workers to find artifacts, resulting in closer examination of oiled sediment. While treatment was confined to the tarmat area, one archaeologist remained "dirty," examining all oiled rocks presented as possible artifacts by the workers. The second archaeologist remained relatively "clean," recording artifact provenience data, bagging artifacts, and documenting treatment and monitoring. Manual pickup ranged from N120 to N210 and occurred throughout the oiled area. It became more difficult for two archaeologists to directly supervise 10 workers as treatment expanded beyond the tarmat area, but by then workers were disturbing less ground and had become more adept at identifying artifacts.

Steam spot washing began at approximately N152 on the baseline and progressed northward, using a single spray wand to clean individual boulders and bedrock (Figure 6.2). A portable pump with a two-inch diameter hose line provided a high volume of low pressure water for cold water flushing of oil down slope, where pom-pom booms were positioned to catch and absorb oily water. The spray wand operator was cautioned to minimize sediment movement. Sediment movement was negligible and occurred in areas from which all recognizable artifacts had been collected, and inspection immediately after spot washing did not reveal any artifacts exposed by the process.

NPS policy prevented application of the bioremediation product Inipol in Kenai Fjords National Park, limiting bioremediation to the use of Customblen, a granular fertilizer. Application of Customblen with a manual spreader involved one person and was accomplished in approximately 15 minutes without any beach disturbance. This application was monitored by one archaeologist. All treatment was complete by 1150 hrs. on August 3, 1990.

Documentation Methods

The beach orientation and all aspects of treatment and monitoring were videotaped and photographed as were some of the artifacts encountered during treatment. Artifacts discovered in the treatment area were plotted and assigned field numbers, continuing the sequence used during April 1990 site mapping. Artifacts found in the grid system were collected and placed in bags labeled with the grid coordinates and field number. A red pin flag bearing the assigned field number was placed at the artifact location, and work proceeded after an archaeologist examined the immediate vicinity. Individual artifact bags were placed in a larger bag marked with the grid square designation and positioned at the southwest corner of each four-meter grid, along with a bag for artifacts of unknown provenience within the square and a bag for "possible" artifacts that required further cleaning and examination.

The pin flags provided a visual record of where artifacts were being found during treatment, allowing beach workers and monitors to pay particular attention to those areas. It was originally planned that some or all of the artifacts removed during treatment would be replaced after treatment and pin flags were intended to facilitate replacement. However, after discussions with NPS and CAC archaeologists during treatment and with Exxon Cultural Resource Program Co-director Haggarty by phone, all artifacts were collected from within the grid system where disturbance to the surface of the intertidal zone had occurred.

Artifact Protection

Since no cultural features other than CMTs were identified in the intertidal zone, protection efforts focused on artifact identification. Eighteen previously unmapped artifacts were discovered in the intertidal zone during the August 1-4, 1990 monitoring and site assessment. Seventeen artifacts and two sub-rounded pebbles were collected during monitoring (Table 6.2). Two previously mapped artifacts were collected from within the grid system before treatment, and nine surface and subsurface artifacts were recovered by workers (Table 6.3). Five previously mapped artifacts and one new find, a notched pebble (49SEL-188-069), were collected

Table 6.6 Intertidal Surface Artifacts Inventoried by Post-Treatment Assessment, August 4, 1990

Catalog #	Field #	Artifact Type	Located Pre	Located Post	Condition	Comments
	4	Battered sandst. slab	No	Yes	Unoiled	
	5	Battered cobble	Yes	Yes	Unoiled	Rejected as non-cultural
	6	Slate rod	Yes	Yes	Unoiled	
	16	Ground slate	Yes	Yes	Unoiled	Ulu fragment w/ chipped notch
49SEL-188-050	17	Adze fragment	Yes	Collected	Unoiled	Articulates with #18
49SEL-188-051	18	Adze fragment	Yes	Collected	Oiled	Moved 4-26-90 beside #17
	19	Ground slate	Yes	Yes	Unoiled	Triangular knife/point preform
	21a	Striated slate	Yes	Yes	Unoiled	
	21b	Striated slate	Yes	Yes	Unoiled	
	22a	Striated slate	No	Yes	Unoiled	
	22b	Striated slate	No	Yes	Unoiled	
	23	Striated slate	No	Yes	Unoiled	
	27	Pecked cobble	Yes	Yes	Unoiled	
	31	Cobble chopper	Yes	Yes	Unoiled	
49SEL-188-052	34	Boulder spall	Yes	Collected	Oiled	
49SEL-188-053	35	Battered cobble	Yes	Collected	Oiled	
	36	Notched pebble	Yes	Yes	Unoiled	
	37	Pecked cobble	Yes	Yes	Unoiled	
	38a	Striated slate	Yes	Yes	Unoiled	
	38b	Chipped slate	Yes	Yes	Unoiled	
	38c	Cobble spall	Yes	Yes	Unoiled	
	38d	Chipped cobble spall	Yes	Yes	Unoiled	
	38e	Ground slate rod	No	Yes	Unoiled	
49SEL-188-054	39	Boulder spall	Yes	Collected	Oiled	
49SEL-188-055	40	Boulder spall	Yes	Collected	Oiled	
	41a	Pecked cobble	Yes	Yes	Unoiled	
	41b	Cobble spall	Yes	Yes	Unoiled	
	41c	Ground slate	Yes	Yes	Unoiled	
	42a	Ground slate	Yes	Yes	Unoiled	
	42b	Ground slate	No	No	Unoiled	
	42c	Pecked cobble	Yes	No	Unoiled	
	43	Boulder spall	Yes	Yes	Unoiled	
	44	Ground slate	Yes	Yes	Unoiled	
	45	Boulder spall	No	Yes	Unoiled	
	46	Ground slate	Yes	Yes	Unoiled	
	47	Battered cobble	Yes	Yes	Unoiled	Initially described as pecked cobble
	48	Ground slate	Yes	Yes	Unoiled	
	49a	Polished slab	Yes	Yes	Unoiled	
	49b	Chipped flake	Yes	Yes	Unoiled	
	49c	Pecked cobble	Yes	Yes	Unoiled	
	49d	Pecked cobble	Yes	Yes	Unoiled	
	50a	Lamp frag.	Yes	Yes	Unoiled	Confirmed through photo comparison
	50b	Ground slate	Yes	Yes	Unoiled	
	50c	Ground slate	Yes	Yes	Unoiled	
	51	Rod fragment, slate	No	No	Unoiled	Confirmed through photo comparison

Table 6.6 (cont'd)

Catalog #	Field #	Artifact Type	Located Pre	Located Post	Condition	Comments
49SEL-188-056	53	Notched, grooved cobble	Yes	Collected	Unoiled	
	54	Slate flake	Yes	Yes	Unoiled	
	55	Boulder spall	Yes	Yes	Unoiled	
	56	Slate flake	No	No	Unknown	
	58a	Flaked cobble biface	No	Yes	Unoiled	Initially described as pecked cobble
	58b	Pecked cobble	No	Yes	Unoiled	Rejected, not an artifact
	67a	Slate flake	No	Yes	Unoiled	
	67b	Slate flake	No	Yes	Unoiled	
	67c	Slate flake	No	Yes	Unoiled	
	67d	Slate flake	No	Yes	Unoiled	
	68a	Pecked cobble	No	Yes	Unoiled	
	68b	Ground slate	No	Yes	Unoiled	
	68c	Ground slate	No	Yes	Unoiled	
	69	Slate flake	No	No	Unknown	In creek channel, water transport?
	70	Ground slate	No	No	Unknown	" " " "
	71	Pecked cobble	No	Yes	Unoiled	
	72a	Ground slate	No	Yes	Unoiled	
	72b	Slate flake	No	Yes	Unoiled	
	73a	Cobble spall	Yes	Yes	Unoiled	
	73b	Cobble spall	Yes	Yes	Unoiled	
	74	Cobble spall	Yes	Yes	Unoiled	
	77	Cobble spall	Yes	Yes	Unoiled	
49SEL-188-058	78	Cobble w/ spall removal	-	Collected	Oiled	Found by cleanup workers
49SEL-188-059	79	Ground slate frag.	-	Collected	Oiled	" " "
49SEL-188-060	80	Cobble spall scraper	-	Collected	Oiled	" " "
49SEL-188-061	82	Cobble spall scraper	-	Collected	Oiled	" " "
49SEL-188-062	83	Shale bead	-	Collected	Unoiled	" " "
49SEL-188-063	84	Adze, poll frag.	-	Collected	Oiled	" " "
49SEL-188-064	85	Notched pebble	-	Collected	Oiled	" " "
49SEL-188-065	86	Hammerstone	-	Collected	Oiled	" " "
49SEL-188-066	87	Sub-rounded pebble	-	Collected	Unoiled	" " "
49SEL-188-067	88	Sub-rounded pebble	-	Collected	Oiled	" " "
49SEL-188-068	89	Rod midsection, slate	-	Collected	Oiled	" " " No Provenience
	90	Ulu fragment, slate	-	Yes	Unoiled	Outside oiled area
	91	Adze frag., poll,	-	Yes	Unoiled	" "
	92	Cobble spall scraper	-	Yes	Unoiled	" "
	93	Adze frag., bit	-	Yes	Unoiled	" "
	94	Notched cobble/3 notches		-	Yes	Unoiled " "
	95	Adze preform, complete		-	Yes	Unoiled " "
	96	Notched pebble	-	Yes	Unoiled	" "
	97	Slate flake	-	Yes	Unoiled	" "
49SEL-188-069	98	Notched pebble	-	Collected	Unoiled	" "

Note: FCR and historic debris not relocated during post-assessment artifact inventory.

Table 6.7 Artifacts Not Relocated by Post-Treatment Assessment, August 4, 1990

Field Lot #	Artifact Description	Condition
42 b	Ground slate fragment	Unoiled
42 c	Pecked cobble	Unoiled
51	Ground slate rod	Unoiled
56	Slate flake	Unoiled
69	Slate flake	Unoiled
70	Ground slate fragment	Unoiled

from outside the grid system (Figure 6.3). All nine artifacts found during treatment within the grid system were initially identified by treatment workers. Five of these were recovered from the asphalt tarmat. All provenienced artifacts recovered from the grid system were located west of the E196 grid axis (Figure 6.3), supporting earlier surface indications that artifact density decreased away from the cutbank. The exact horizontal provenience of all but one of the artifacts recovered from the grid system were identified and plotted prior to removal. The unprovenienced artifact, an oiled ground slate rod midsection (49SEL-188-068), had been placed in a bag labeled only with the grid square designation, among other "possible" artifacts to be re-examined after further cleaning. All artifacts recovered from the grid were oiled, with the exception of a stone bead (49SEL-188-062). The recovery of the bead, from clean sand below the oil, reflects the care exercised by workers in the effort to recover artifacts from the treatment area. Two subrounded pebbles (49SEL-188-066,067) were collected but later inspection did not indicate cultural modification (Appendix D). Six surface artifacts, three of which were unoiled, were collected from outside the grid system (Figure 6.3). The unoiled artifacts were collected during post-treatment assessment to increase the sample of potentially diagnostic artifacts, to obtain additional artifact types to define the range of activities at SEL-188, and to facilitate comparison with assemblages from other sites.

Eight other previously unmapped artifacts discovered outside the treatment area were left in place (Table 6.4, Figure 6.3). These artifacts were found during survey of the unoiled upper intertidal and supratidal zones west of the E196 grid axis between N134 and N194. Twenty-five artifacts (Table 6.5) were collected or newly identified and left in place during the August 1-4 activities.

Post-Treatment Assessment

Post-treatment assessment began after workers departed the beach on August 3, 1990. Exxon archaeologists removed all flagging and grid system string from the intertidal zone and cleaned and rebagged all artifacts. The cleaning of possible artifacts resulted in the recovery of a ground slate rod (49SEL-188-068).

Post-treatment assessment focused on relocating previously mapped but uncollected artifacts to document any displacement of artifacts located outside the area disturbed by tarmat removal. Not all previously known artifacts above the oil band had been relocated prior to treatment due to time constraints. Distance and bearing measurements from the April 1990 site mapping were used to relocate previously mapped uncollected artifacts (Table 6.6).

Eighty-seven stone artifacts were recorded in the intertidal zone during the April 1990 site mapping and the August 1-4, 1990 treatment monitoring. Eighty-one of these were accounted for by post-treatment assessment, although one specimen previously mapped as a battered cobble (Lot 5) was located but rejected as an artifact. Nineteen of the remaining 80 identified artifacts were collected during monitoring and 61 uncollected artifacts were relocated during post-treatment assessment.

All uncollected artifacts discovered during treatment monitoring were relocated; however, post-treatment assessment failed to relocate six artifacts mapped in April 1990: two ground slate fragments (FS 42b,70), two slate flakes (FS 56,69), a pecked cobble (FS 42c), and a ground slate rod (FS 51) (Table

6.7). The pecked cobble was the only one of the six artifacts located during pre-treatment assessment. The other five were small enough to have been moved or buried by wave action in the three months since they were initially mapped.

The intertidal zone was videotaped and photographed to document changes in the condition of the intertidal zone caused by treatment. Black and white photographs of selected artifacts enabled identification of previously recorded artifacts through comparison with photographs of uncollected artifacts taken in April, 1990.

Treatment and Monitoring on August 26, 1990

Exxon Operations informed Exxon Cultural Resource Program Co-director Jim Haggarty on August 22 that a re-application of granular fertilizer (Customblen) was planned for the SEL-188 area on August 24. In consultation with NPS and CAC, Haggarty decided that one NPS and one Exxon archaeological monitor would be adequate to mitigate any potential impact resulting from the limited treatment. On the evening of August 22, Exxon Supervisor Chris Katsimpalis notified the Exxon Cultural Resource Program that the treatment had been postponed pending completion of other cleanup tasks.

Oiling conditions in the subdivision had been reassessed by the multi-agency August Shoreline Assessment Program (ASAP) on August 12. TAG reviewed the ASAP oiling data on August 22 and recommended "Manual pickup of pooled oil accessible prior to second bioremediation application" (Work Plan Addendum, August 22, 1990). The TAG recommendation was received by the Exxon Cultural Resource Program on the afternoon of August 23 and approved by the SHPO that same afternoon, with the stipulation "the original archaeological constraints apply." The original monitoring constraint stated: "An Exxon archaeological monitor is required on site during shoreline treatment."

The treatment did not warrant re-establishment of the baseline and grid system since work areas had been thoroughly examined and all visible surface artifacts in the treatment zone had been mapped and collected during the August 2-3 event. Consequently, Director Haggarty assigned a single archaeologist, Assistant Director Chris Wooley, to monitor the second treatment tentatively rescheduled for August 26, 1990. When Haggarty and Wooley became aware of the rescheduled treatment date, they notified both NPS and CAC of the change in plans, and NPS arranged to have an archaeologist monitor treatment.

Field Activities Prior to Treatment

The Exxon Cultural Resource Program was notified on August 25 that treatment would take place the following day, and Wooley arrived aboard the M\V *Arctic Salvor* at 0720 hrs. on August 26, 1990. NPS monitors were enroute but did not arrive by the scheduled start of work due to transportation delays. Exxon supervisor Katsimpalis decided to initiate treatment without NPS monitors at 0830 hrs. when he realized he would lose the tide if he delayed longer. Wooley accompanied the treatment crew to the beach at 0845 hrs.

Wooley inspected the treatment area for surface artifacts prior to work but no new surface artifacts were identified. Wooley briefed the 10-person work crew on the archaeological sensitivity of the treatment area, summarized previous treatment and monitoring methods, and discussed artifact types previously encountered in the intertidal zone. Several workers had been on the August 2-3 treatment crew. All were shown surface artifacts located outside the treatment area, and they were cautioned to work slowly and carefully, to avoid disturbing beach sediment unless absolutely necessary, and to leave rocks larger than one inch in diameter in place. The crew was instructed to stop work upon encountering a potential artifact and to leave the object in place pending examination. All personnel were instructed to stay out of the uplands.

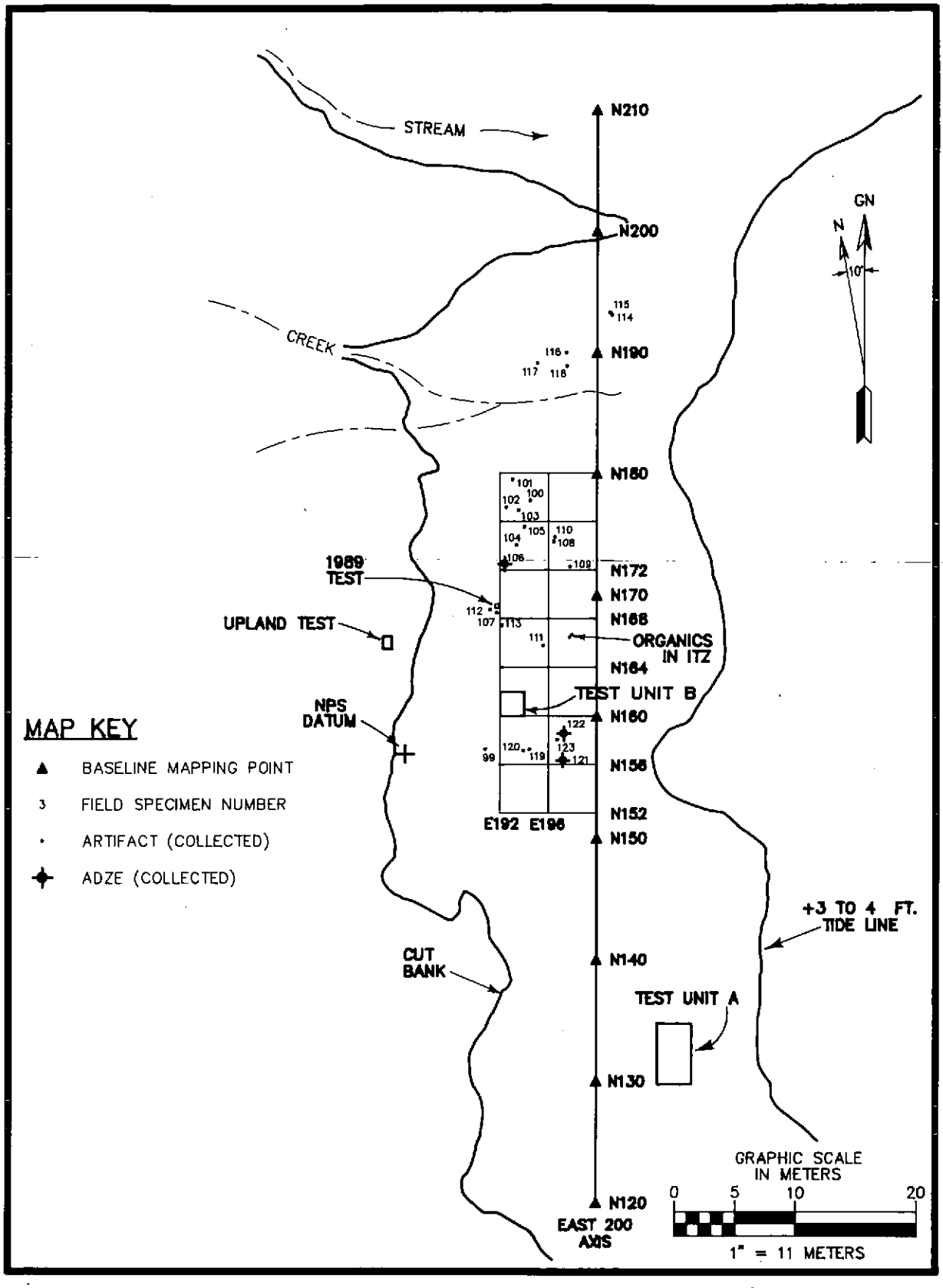


Figure 6.4 **Intertidal grid system and distribution of artifacts collected during treatment monitoring, August 28-29, 1990**

Table 6.8 Artifacts Collected during Treatment Monitoring August 28-39, 1990

Catalog #	Agency / Field #	Date	Description	Provenience	Datum	Bearing	Dist. (m)
49SEL-188-070	99	8/28/90	Rod, ground slate	N157.20 E190.80			
49SEL-188-071	100	8/28/90	Flake, retouched, green slate	N177.60 E194.40			
49SEL-188-072	101	8/28/90	Ulu fragment, ground slate	N179.38 E192.90			
49SEL-188-073	102	8/28/90	Flake, greenstone	N177.35 E192.45			
49SEL-188-074	103	8/28/90	Wedge fragment, bit, greenstone	N176.90 E193.50			
49SEL-188-075	104	8/28/90	Battered core fragment, greenstone	N174.05 E193.35			
49SEL-188-076	105	8/28/90	Boulder spall, retouched	N175.60 E194.00			
49SEL-188-077	106	8/29/90	Adze midsection	N172.60 E192.23			
49SEL-188-078	107	8/29/90	Grooved cobble	N168.97 E191.72			
49SEL-188-079	108	8/28/90	Boulder spall, unretouched	N174.45 E196.30			
49SEL-188-080	109	8/28/90	Ulu fragment, ground slate	N172.10 E197.85			
49SEL-188-081	110	8/28/90	Boulder spall, light retouch	N174.60 E196.40			
49SEL-188-082	111	8/29/90	Rod, ground slate	N165.65 E195.60			
49SEL-188-083	112	8/29/90	Flake, grinding striations, slate	N168.80 E191.10			
49SEL-188-084	113	8/29/90	Ground slate fragment, double bevel	N167.32 E192.17			
49SEL-188-085	114	8/29/90	Boulder spall, unretouched		N190 E200	019	3.10
49SEL-188-086	115	8/29/90	Boulder spall, retouched		N190 E200	019	3.10
49SEL-188-087	116	8/29/90	Flake, bifacially retouched and ground		N190 E200	286	2.60
49SEL-188-088	117	8/29/90	Slate scrap		N190 E200	258	5.05
49SEL-188-089	118	8/29/90	Shatter, greenstone		N190 E200	243	2.85
49SEL-188-090	119	8/29/90	Notched cobble, pecked	N157.05 E194.55			
49SEL-188-091	120	8/29/90	Ground slate	N157.05 E193.92			
49SEL-188-092	121	8/29/90	Adze, splitting, two hafting grooves	N156.45 E197.10			
49SEL-188-093	122	8/29/90	Adze fragment, splitting	N158.50 E197.35			
49SEL-188-094	123	8/29/90	Battered cobble (Hammerstone)	N158.00 E196.70			

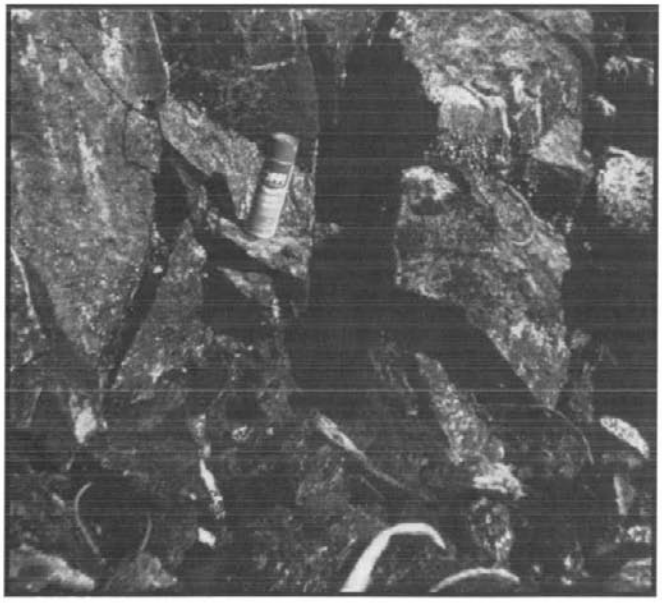
Treatment and Monitoring

Manual pickup of oil began after the beach orientation, with workers troweling pooled oil and attached sediment into five-gallon buckets. Wooley circulated among the crew examining each work area as workers wiped and scraped mousse off larger rocks and cobbles into buckets and replaced the larger rocks and cobbles on the beach. Each bucket of mousse and oiled sediment was inspected for cultural material before it left the beach.

Approximately 20 minutes after work had begun, NPS Resource Protection Officers David Wolfe and Don Killian arrived aboard the M/V *Kittiwake* and halted treatment after finding no NPS representatives on site. After discussions with Katsimpalis and radio contact with NPS headquarters in

Table 6.9 Type and Frequency of Artifacts Collected during Treatment Monitoring, August 28-29, 1990

Artifact Type	Frequency
Adze/adze fragment	3
Battered cobble	1
Boulder/cobble spall	5
Core fragment, greenstone	1
Flake, slate	1
Flake, non-slate	1
Grooved/notched cobble	2
Ground slate fragments	4
Ground slate rod	2
Ulu fragment	2
Slate scrap	1
Shatter, greenstone	1
Wedge, bit, greenstone	1
Total:	25



(Robert Betts 29:23 Exxon)

Figure 6.5 Bedrock crevice in which peat deposit was identified in the intertidal

Seward and Anchorage, Wolfe and Killian allowed treatment to resume. Wooley and Killian inspected all buckets of oiled sediment leaving the beach until approximately 1200 hrs. NPS archaeologist Kristen Griffin and NPS Resource Protection Officer Mike Tetreau arrived at 1245 hrs. and took over NPS monitoring. Manual pickup and monitoring continued until 1450 hrs. when treatment ended due to rising tide.

A worker identified one new artifact, a retouched boulder spall, and, after confirmation by Wooley, it was left in place (Wooley 1990). No artifacts were identified in the bucket checks although one unretouched boulder spall and a number of pieces of unmodified slate were recovered from the buckets and replaced on the beach. No artifacts were collected or mapped during the August 26 monitoring. Less than 454 kg (1,000 lbs) of oiled sediment and mousse were removed from the intertidal zone during the August 26 treatment (Katsimpalis, personal communication 1990).

Post-Treatment Assessment

Prior to leaving the beach, agency representatives discussed treatment effectiveness with Exxon supervisor Katsimpalis and the archaeologists. The general consensus was that the August 26 treatment was relatively inefficient because of the stipulation "accessible" pooled mousse. Coast Guard representative Van Pelt and ADEC representative Jay Vincent suggested that bioremediation with Inipol would be the most effective course of treatment, but Tetreau (NPS) responded that the NPS would not permit its use in the Park. Another treatment option discussed was to move all large boulders into the upper intertidal zone, treat the finer sediment, then re-armor the beach by moving the large boulders back into the mid-intertidal zone. Griffin and Wooley pointed out that the sensitivity of the beach precluded this option. Katsimpalis stressed that the archaeological sensitivity of the area was the primary factor in determining the type of treatment and asked that Wooley and Griffin discuss with their program directors ways in which the area

could be more effectively treated without destroying archaeological data.

CAC later voiced reservations about the degree of archaeological protection during the August 26 treatment and asked that all monitoring tasks outlined in the NPS Scope of Work and Exxon's work plan be applied to any treatment activity in the subdivision. A letter to the Exxon Cultural Resource Program dated August 27, 1990 stated: " . . . no treatment should begin . . . unless all archaeological constraints have been satisfied and Exxon archaeologists and National Park Service personnel are on site" (L. Johnson 1990). In response to CAC's concerns and because further intensive treatment was needed prior to effective bioremediation, the level of monitoring employed on August 2-3, 1990 was planned for the treatment event scheduled for August 28-29.

Treatment and Monitoring on August 28-29, 1990

The third treatment event began on August 28 at 1400 hrs. and continued through 1700 hrs. on August 29. Exxon archaeologists Bob Betts and Paul Buck arrived by helicopter on August 28 and were joined by NPS archaeologist Kristen Griffin. On shore, Betts and Buck discussed the monitoring schedule with Exxon supervisor Katsimpalis and Veco supervisor Rodney Reynolds. The proce-

(Robert Betts 91-2:7 Exxon)

Figure 6.6 View southeast from N164 E192 of manual removal of asphalt tarmat June 11, 1991

dures and documentation methods used on August 28 and 29 were essentially identical to those employed on August 1-2.

Field Activities Prior to Treatment

Buck, Betts, and Griffin re-established the north-south baseline and the four-meter-square grid system used during August 1-4 treatment (Figure 6.4). The grid, established west of the baseline between N160 and N180, initially covered 160 m^2 (1720 ft^2) of the most heavily oiled area (Figure 6.4). On the second day of treatment this grid was expanded eight meters south to N152, to cover an additional 64 m^2 (689 ft^2) and bring the total gridded area to 224 m^2 (2409 ft^2). A continuous barrier of green flagging tape was strung parallel to the cutbank along the upper limit of the work area to keep beach personnel away from unmarked surface artifacts located in the upper and supratidal zones.

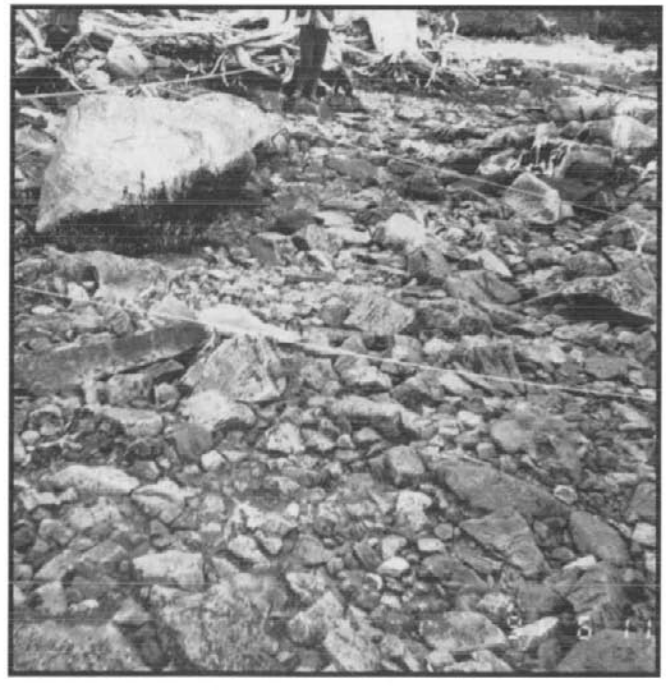
The archaeologists surveyed each grid square intensively and inspected the oiled area outside the grid by walking transects. The retouched boulder spall (49SEL-188-076) noted by Wooley on August 26 was immediately mapped and collected. Some uncollected artifacts outside the work area were marked with red pin flags. Green flagging restricted access outside the work area eliminating the need to flag individual artifacts between the barrier and the cutbank.

The condition of the intertidal zone was photographed and videotaped. As with the August 1-4 monitoring, some photographs were taken from specific grid locations to standardize the visual record and allow comparison of pre- and post-treatment photographs. Approximately three and a half hours were required to prepare for treatment, and by 1330 hrs. all beach personnel were assembled for on-site orientation.

Although the M/V *Arctic Salvor* was reassigned to work at the site, a new 10-person crew had come on board during a crew change at Seward on August 27. However, Exxon supervisors and agency representatives who had supervised earlier treatment at SEL-188 remained with the M/V *Arctic Salvor* providing continuity for all treatment in 1990. Since the work crew was already on shore, Betts and Buck conducted an expanded informal beach orientation there. All subjects covered in the earlier August 1 shipboard orientation (Table 6.1) were presented except for a discussion of the culture history of the region. Workers examined stone artifacts from outside the work area and expressed an interest in archaeology and the need for minimizing disturbance to cultural resources during treatment. The orientation was completed at 1400 hrs., and treatment within the grid began immediately.

Treatment and Monitoring

The work plan authorized manual pickup of accessible pooled oil with minimum disturbance of rocks in the intertidal zone, followed by bioremediation as approved by NPS. Trowels and spoons were again used to remove pooled oil and mousse



(Robert Betts 91-3:8 Exxon)

Figure 6.7 **View NW from N156 E196 of asphalt tarmat area prior to treatment June 11, 1991. April 1990 Test Unit B was excavated in front of large boulder in background**

from bedrock cracks and crevices, and from between rocks and boulders. Pom-poms were employed to absorb pockets of pooled oil and to wipe oiled rocks. Movement of larger rocks was avoided. Customblen granular fertilizer was applied throughout the oiled area using a manual spreader.

The third archaeologist increased efficiency; otherwise, monitoring was similar to the August 2-3 event. Archaeologists circulated among work areas, cleaning and examining suspected artifacts identified by the workers who were cautioned to examine each rock for signs of cultural modification before placing it in a bucket. Artifacts encountered in the treatment area were placed in individual bags and identified by their grid coordinates and later assigned field numbers.

Griffin (NPS) selected a sample of oiled intertidal sediment from a five-gallon bucket leaving the beach and split it into two plastic bags. She soaked one bag of sediment in Orangesol solvent, and, after repeated agitation, poured off the solvent and examined the sediment for cultural material. No artifacts were identified, but both the oiled and cleaned sediment samples were retained by the NPS to illustrate the effectiveness of the use of solvent to clean small samples of oiled sediment (Griffin, personal communication 1990).

A treatment worker found a small area containing rootlets and other organic matter and called over the archaeologists (Figure 6.5). This 25 cm (10 in) thick lens of organic-rich silt was located near the middle of grid square N164/E196, below beach cobbles in a 10 cm (4 in) wide, 70 cm (28 in) long crevice formed by vertical bedrock slabs. This pocket of soil apparently survived marine erosion following shoreline subsidence in 1964. No artifacts were associated with this organic-rich silt, but Griffin collected a sample and took it to the NPS laboratory in Anchorage.

Twenty-five apparent artifacts were collected during monitoring (Tables 6.8, 6.9) but this count includes two boulder spalls (49SEL-188-079,085) which did not appear to exhibit retouch after cleaning, and three other problematic artifacts (49SEL-188-073,088,089). Numerous fragments of slate without striking platforms, grinding, striations, or other evidence of cultural modification were examined and discarded during monitoring as non-artifacts. Large weathered slabs of slate in the intertidal zone, crumbling and fracturing along natural bedding planes, appeared to be at least partly responsible for the number of slate fragments on the beach.

Manual pickup continued on August 28 until the rising tide terminated treatment at 1700 hrs. Treatment resumed at 0700 hrs. on August 29, initially monitored by Betts and Griffin until Buck returned from Homer at 0815 hrs. Lack of berthing space prevented Buck from remaining overnight aboard the M/V *Arctic Salvor*. Manual pickup continued until 1630 hrs. and was followed by bioremediation. All treatment was complete by 1700 hrs. when the majority of beach personnel departed leaving four treatment workers behind to assist in removal of the site grid. Slightly over three "supersacks" or ap-

(Robert Betts 91-3:15 Exxon)

Figure 6.8 **Post-treatment photo to the north of grid square N156 E192 from which most asphalt tarmat was recovered on June 11, 1991**

proximately 2950 kg (6,500 lbs) of oiled sediment were removed during the August 28-29 treatment.

Post-Treatment Assessment

Less than an hour was available for post-treatment assessment due to logistics. Buck and Betts photographed and videotaped the condition of the intertidal zone and removed the grid system and green boundary flagging as well as flags marking uncollected artifacts outside the treatment area. It was not possible to completely clean collected artifacts or "possible" artifacts prior to leaving the site, so Buck and Betts took them to their next monitoring assignment at Kodiak for cleaning and cataloging before sending them to the Exxon Cultural Resource Program in Anchorage.

The recovery of only four additional artifacts (two ground slate flakes, a ground slate rod, and a notched cobble) from grid squares treated in early August indicates that the monitoring process which relied largely on workers to recognize artifacts was effective in recovering most oiled artifacts from the treatment area. Removal of oiled sediment from 272 m^2 (2928 ft^2) of gridded intertidal zone during the August 2-3 and August 28-29 treatment events resulted in the discovery of a single pocket of preserved soil in which no artifacts were present.

All twenty-five artifacts collected on August 28-29, 1990 were from the treatment area and all were oiled (Figure 6.4, Table 6.8). Workers found twenty artifacts between N156 and N180, within or immediately adjacent to the grid system. The remaining five were collected from the immediate vicinity of N190 on the site baseline, outside the grid area. Four artifacts were recovered from within the grid area treated on August 2-3, 1990 including two ground slate flakes (49SEL-188-84,91), a ground slate rod (49SEL-188-082), and a battered cobble (49SEL-188-90). Thirteen artifacts were recovered from new grid squares. The remaining eight artifacts were found outside the grid system. Except for two boulder spalls (49SEL-188-85,86) found near N195 on the baseline, all new artifacts were located west of the site baseline.

1991 MAYSAP Shoreline Evaluation

Oil remaining at SEL-188 in the spring of 1991 was evaluated during the May Shoreline Assessment Program (MAYSAP). On May 12, 1991, the MAYSAP survey identified a 5 x 5 m area of asphalt in the intertidal zone. The TAG group reviewed the MAYSAP evaluation on May 24 and considered the character of the asphalt in terms of potential environmental effect, the cost-effectiveness of conducting further treatment, and the archaeological sensitivity of the area. TAG recommended no further treatment at SEL-188, and both the SHPO and the FOSC concurred. Following the TAG decision, NPS urged the FOSC to reconsider the "no treatment" recommendation. A CTAG meeting to address the cultural resource implications of additional treatment at SEL-188 was held on June 10 at the request of the FOSC.

The CTAG representatives agreed that the remaining asphalt tarmat could be removed without adverse impact to cultural resources as long as treatment was closely monitored. The FOSC changed the initial "no treatment" decision and an Exxon work order was issued on June 11 calling for manual pickup of 25 m^2 (269 ft^2) of asphalt tarmat and application of Customblen to the treated area.

Treatment and Monitoring on June 11, 1991

Treatment plans accelerated immediately. NPS modified and extended the 1990 ARPA permit (90-KENAI FJORDS-ARO-001) and arranged for an archaeologist to monitor treatment on June 11. Archaeologists Robert Betts (Exxon) and Michele Jesperson (NPS) flew to the M/V *Auriga* on June 11 and made arrangements with Exxon supervisor Randy Boyer to orient all treatment personnel. Robert Betts conducted the orientation and covered essentially the same information presented prior to the August 2-3 treatment (Table 6.1). Betts used illustrations of artifacts previously collected at SEL-188 to familiarize treatment personnel with the type of stone artifacts present in the intertidal zone. Im-

mediately following the 90-minute orientation, the Exxon and NPS archaeologists proceeded to SEL-188 accompanied by Randy Boyer (Exxon), John McMahon (USCG), and Mike Tetreau (NPS).

Field Activities Prior to Treatment

Once on-site, Boyer and Tetreau identified the remaining asphalt tarmat while Betts and Jesperson re-established the 1990 site baseline on the E200 grid axis and laid out a four-meter square grid over the treatment area. The major portion of the remaining tarmat was located in grid squares N156 E192 and N156 E196, an area which had been gridded and treated in 1990 (Figures 6.3, 6.4) and from which eight artifacts had been recovered.

Once the grid was established, each square was surveyed for cultural material. No surface artifacts were identified, but five pieces of unoiled FCR were marked with pin flags, left in place, and workers were instructed not to disturb them. A second cultural resource briefing was conducted on-site to explain the grid system and artifact recording and monitoring procedures. Workers were shown examples of uncollected artifacts in the supratidal zone to further improve their ability to recognize stone artifacts in the treatment area. A line of red flagging parallel to the cutbank restricted treatment personnel to the immediate work area and protected surface artifacts in the supratidal zone.

Treatment and Monitoring

Treatment began at 1828 hrs. and was complete by 2120 hrs. The treatment crew consisted of six crew members supervised by Veco foreman Pete Sloan and Randy Boyer (Exxon). Work was initially confined to areas within the grid; however, it soon became apparent that subsurface tarmat extended a short distance to the southwest of the grid. After Betts inspected the beach surface outside the grid, workers recovered a small amount of asphalt from the area under Betts' close supervision. Workers broke up and removed consolidated asphalt with trowels and placed the oiled sediment in plastic bags which were taken to the M/V *Auriga* (Figure 6.6). All oiled sediment was closely examined by workers who called the archaeologists over to examine possible artifacts. Suspected artifacts were cleaned and examined. In addition to any unusual rocks, workers were asked to present all pieces of slate larger than a quarter for cleaning and inspection. Only one artifact, a ground slate flake, was identified in the treatment area. It was plotted at N159.40 E197.04 and temporarily replaced with a pin flag. The artifact was replaced after treatment. No other previously unreported artifacts were identified during treatment.

Jesperson inspected the oiled sediments being carried off the beach by carefully examining the contents of bags from different grid squares. She examined five bags of oiled sediment estimated to contain 16-18 kg (35-40 lbs) each. Jesperson also took two small samples of finer sediment from one bag and soaked them in solvent and inspected the cleaned sediment. Two bags of sediment removed from outside the southwest corner of the grid were selected for inspection since artifact density increased in proximity to the supratidal zone. A total of 50 bags (approximately 794 kg [1,750 lbs]) of oiled sediment were removed from the treatment area in 1991. Examination of approximately 10% of the sediment removed on June 11 did not reveal any artifacts included in sediments leaving the beach.

Betts, Jesperson, and Tetreau conducted post-treatment assessment and removed the grid system after treatment personnel left the beach. Post-treatment photographs and videotape duplicating pre-treatment documentation were taken prior to removal of the grid system and flagging (Figures 6.7,6.8). At 2210 hrs. Betts, Jesperson, and Tetreau departed SEL-188 and the M/V *Auriga* weighed anchor for Kodiak.The 1991 treatment event was a brief, low intensity effort with no apparent impact to SEL-188.

Summary of 1990 and 1991 Monitoring

Four treatment events at SEL-188 were monitored in 1990 and 1991 by Exxon archaeologists with assistance from NPS and CAC archaeologists. Approximately 8843 kg (19,495 lbs) of oiled sediment were removed during five days of work in 1990. All three 1990 treatment events involved 10-person work crews engaged primarily in manual pickup of pooled mousse and oiled sediment. Breakup and removal of tarmat primarily took place during the first and most intensive treatment on August 2-3 when 5,443 kg (12,000 lbs) of oiled sediment were removed from the intertidal zone. This first treatment also involved hot water spot washing and cold water flooding. The August 26 and August 28-29 treatments recovered 3400 kg (7,500 lbs) of additional accessible oiled sediment with minimal disturbance to the larger rocks in the intertidal zone. Bioremediation using granular fertilizer took place on August 3 and August 29.

Two Exxon archaeologists monitored the August 2-3 treatment and they also conducted pre- and post-treatment assessments on August 1 and 4. NPS and CAC archaeologists conducted upland site investigations and subsurface testing during this initial treatment. The second treatment on August 26, 1990 lasted approximately five hours and was monitored by an Exxon archaeologist and one NPS archaeologist who was present only during part of treatment. The final August 28-29 treatment was monitored by one NPS and two Exxon archaeologists. All monitoring included cultural resource orientation sessions prior to treatment. A grid system covering the asphalt tarmat area was established during the two most intensive treatment events.

A single treatment event on June 11, 1991 involving three hours of manual pickup of asphalt tarmat and application of Customblen was monitored by Exxon and NPS archaeologists. Approximately 794 kg (1,750 lbs) of oiled sediment were removed during this event. The 1991 monitoring followed the procedures established in 1990 including cultural resource orientations and establishment of a grid to facilitate artifact mapping.

Forty-three new artifacts were located in the intertidal zone during monitoring in 1990 and one additional artifact was recorded in 1991. Forty-two artifacts (including seven previously mapped in April 1990) were collected primarily from the oiled intertidal zone during the August 2-3 and August 28-29 treatment. No artifacts were collected during the short August 26, 1990 or June 11, 1991 treatments. Seventeen artifacts were collected during the August 2-3 monitoring and 25 were collected during the August 28-29 treatment. Eight previously unrecorded artifacts found outside the treatment area during monitoring activities on August 1-4 and one artifact identified within the grid system on June 11, 1991 were mapped and left in place.

No artifacts were discovered by archaeologists in spot checks of buckets or bags of oiled sediment leaving the beach during the August 26, 1990 or June 11, 1991 treatment events. Archaeologists mapped and collected intertidal artifacts encountered during treatment, ensured that potential displacement of artifacts during removal of oiled beach deposits was minimized, protected surface artifacts outside the treatment area from inadvertent disturbance, and enforced the "no upland access" restriction. Treatment of the subdivision occurred with no adverse impact to archaeological site SEL-188.

CHAPTER 7

UPLAND INVESTIGATIONS BY THE NATIONAL PARK SERVICE AND CHUGACH ALASKA CORPORATION

An NPS/CAC team investigated the upland portion of SEL-188 in August 1990 to evaluate the site's vertical and horizontal qualities. The NPS Scope of Work (Appendix A) stressed that data recovery from the upland portion of the site was necessary to place the intertidal artifacts in a cultural context (NPS 1990).

> One of the main research objectives is to determine the culture history of the site: to identify and characterize the nature of the cultural components at SEL-188, including identification and correlation of the components in the beach area and the adjacent upland. This will require data recovery, through subsurface testing and other appropriate means, from all of the three physiographic subdivisions of the site in order to link the cultural material in the intertidal zone to an intact cultural context contained in the uplands and possibly in the supralittoral zone. The scientific value of the artifacts on the beach lies largely in the ability to make this correlation. Mitigation of adverse effects of cleanup on the beach deposits must therefore include data recovery from the supralittoral zone and the uplands as well as from the intertidal zone. This information is essential in order to place the results of the data recovery effort in a meaningful archeological perspective (NPS 1990:4).

Subsurface uplands testing which was planned as part of the April 1990 Exxon/CAC site investigations was suspended, however, because of a potential court injunction by English Bay Village Corporation. The initial six-task work plan was modified accordingly and the three intertidal zone tasks were completed by Exxon. Three other uplands tasks remained: inspection of the stratigraphy by cleaning up a vertical face on the high tide cutbank, re-excavation of the 1989 upland test pit, and placement of test pits to determine the upland extent of the site.

NPS archaeologist Jeanne Schaaf and CAC archaeologist Lora Johnson conducted upland excavations on August 1-2, 1990 concurrent with treatment. By agreement between NPS, CAC, and English Bay Village Corporation, and in consultation with the SHPO, NPS/CAC ground-disturbing activities were limited to the expansion of the

upland test pit dug by CAC's Peter Zollars in 1989, and the use of one-inch soil probes. The results of the NPS/CAC upland work (Schaaf and Johnson 1990) are summarized in this report. NPS/CAC field procedures are described here, and their results are discussed in Chapter 8.

Re-excavation of the 1989 Upland Test Unit

The upland test unit which CAC archaeologist Peter Zollars excavated and backfilled was easily relocated in 1990. The fill had settled five centimeters, and the outline of the unit was distinguishable through a light covering of ferns, moss, and grass. The test pit is located approximately 1.5 m inland from the cutbank roughly at grid axis N165/E182 (Figures 5.3, 7.1). The ground surface at that locale is about 1.5 m above the base of the scarp. After the covering sod was peeled back, the backfilled matrices were removed down to the base of the original excavation which had terminated at a layer of horizontal granite slabs. The southern part of the original test was not re-excavated due to obstructing roots (Figure 7.1). Backfilled sediments were removed by trowel and sifted through by hand, yielding slate fragments, FCR, and a few stone tools (Schaaf and Johnson 1990:3).

The original test unit was expanded by excavating a narrow 12 x 68 cm strip along the west margin

(Robert Betts 15:12 Exxon)

Figure 7.1 1989 upland test pit after re-excavation and expansion by NPS/CAC in August 1990

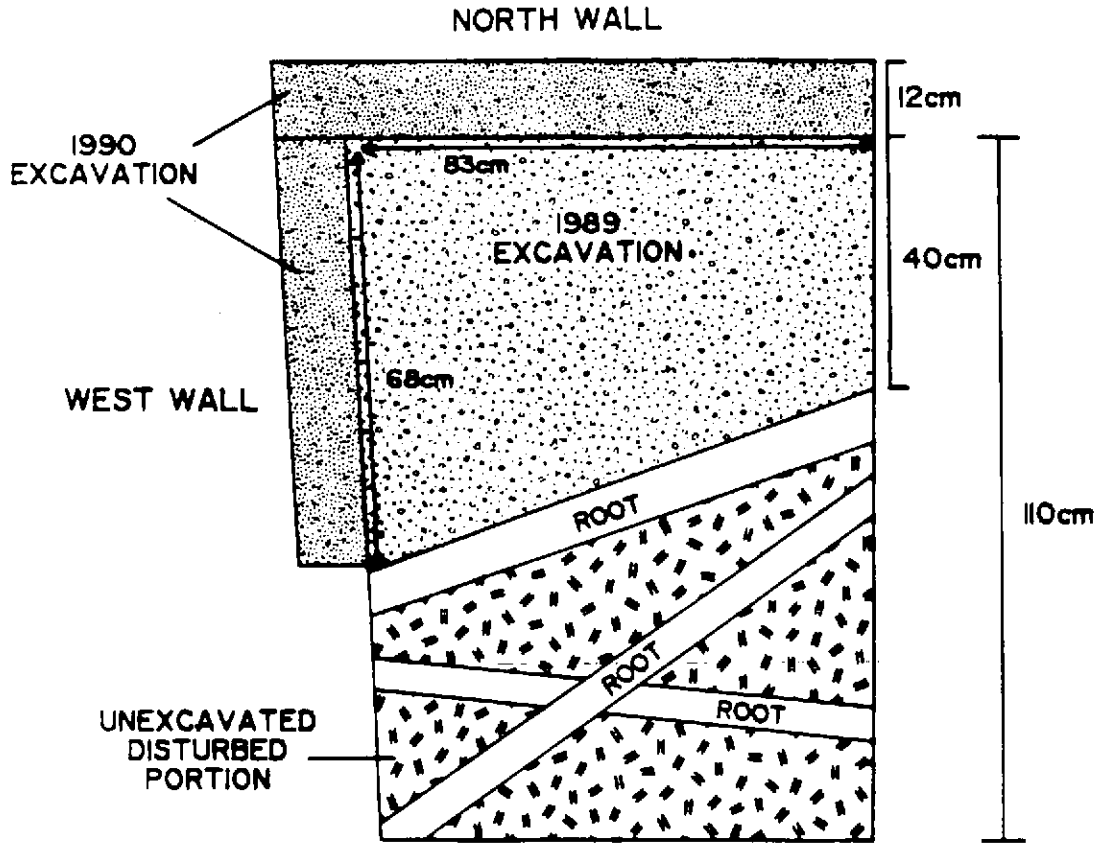


Figure 7.2 **Plan view of the upland test pit showing areas excavated, 1989 and 1990 (Schaaf and Johnson 1990:Figure 1)**

and another measuring 12 x 95 cm along the north margin (Figure 7.2). Natural layers observed in the stratigraphy were used to provenience recovered artifacts (Table 7.1). When the rock layer forming the base of the 1989 excavation was reached, the rocks were removed and excavation continued for another six centimeters across the entire unit, with a deeper exploratory hole dug 18 cm below the rock layer in the northeast corner.

Excavations were conducted during a "steady rain" and flooding from surface and ground water prohibited deeper excavation, even with the use of a hand-operated bilge pump. The unit was backfilled after recording was completed. Despite water saturation, a well-defined stratigraphy containing carbonaceous artifact-bearing deposits was evident in the walls of the unit (Schaaf and Johnson 1990:6). Details of the observed stratigraphy are described in the following chapter.

Soil samples from three cultural levels and three tephra horizons were obtained from the expanded test pit (Table 7.2). The tephra samples (M 6, 7, and 8) were identified as such in the laboratory by James R. Riehle of the US Geological Survey, although analysis is not complete (Schaaf and Johnson 1990:4). Schaaf and Johnson (1990:3-4) describe laboratory procedures used to process the soil samples:

> Soil samples 1 - 5 were air dried at room temperature and processed using water flotation at the National Park Service laboratory, Anchorage. The light fraction was further sorted during flotation by passing it through a series of graded sieves, the smallest being .175 mm (80 mesh). Charcoal was removed for radiocarbon dating from all five samples. The light fractions were

examined for small-scale floral and faunal remains under 10-20x power. Floral remains recovered were identified using comparative collections (University of Alaska, Anchorage Herbarium; Schaaf personal collection). Small-scale faunal remains recovered were identified by Robert C. Bright, University of Minnesota. Insect carapaces have not been identified.

Prior to flotation, small subsamples were removed from samples 1, 2, 4 and 5 and were sent to the Rock River Laboratory in Watertown, Wisconsin, for pH determination and phosphate analysis using a sequential fractionation method developed by Woods (1977). . . and tested in southeast Alaska by Moss (1984).

Crossen and Banks (1990) analyzed the samples (Appendix C). Prior to water flotation, charcoal for radiocarbon dating was picked with tweezers from the soil samples. The radiocarbon dates are discussed in Chapter 8 along with microfloral and microfaunal remains from the soil samples.

Expansion of the upland test yielded additional *in situ* artifacts from three cultural levels separated by tephra horizons. Schaaf and Johnson (1990:9-14) report 62 stone artifacts recovered from the three

Table 7.1 Artifacts, Unmodified Lithic Material and FCR Recovered from the Re-excavation of the 1989 Upland Test Unit by NPS/CAC, August 1990

Description	Distribution			
	Level I (.016 m^3)	Level II (.008 m^3)	Level I/II*	Level III (.0015 m^3)
Slate endblade	1			
Hammerstone		2	1	
Adze fragment, planing	1			
Boulder spall (retouched)			1	
Incised slate tablet			1	
Modified tabular slab		1		
Flaked slate (knife?)	1			
Ground slate tool fragment	2	2		2
Utilized flakes	2	3	1	1
Sub-Total (N=22)	7	8	4	3
Unmodified Lithics / FCR				
Boulder spall	1	1		
Slate "flakes", shatter	49	27	10	7
Non-slate "flakes", shatter		1	1	
Cobbles, pebbles, rocks	3	4	4	
Fire cracked rock	1	1	3	
Total Material Collected (N=135)	61	42	22	10

Table (based on Appendix E) modified from Schaaf and Johnson (1990:Table 3).

* Uncertain provenience, backfill.

cultural levels, excluding seventeen items recovered from the backfill, slate chips less than one centimeter in size, and fire cracked rock. The NPS inventory included unmodified pieces of slate (some with sharp edges) and other lithic material lacking clear indication of cultural modification. Evidence of cultural modification was required to class an item as an artifact in the analysis of the total site collection (see Appendix E). Consequently, the artifact count reported by Schaaf and Johnson (1990) for the upland test pit differs from that reported in this volume (Table 7.1).

Upland Survey and Soil Probe Investigations

Schaaf and Johnson attempted to identify the areal extent of the site using surface and subsurface observations in addition to re-excavating the 1989 test pit. Using soil probes in the uplands was allowed in the agreement NPS made with CAC and English Bay Village Corporation. The open face of the upland test unit, after it was expanded, provided a control stratigraphy for evaluating the probe's effectiveness in detecting subsurface cultural deposits. Soil columns were sought by inserting the probes very near the upland test, but "the results were negative - the waterlogged sediments oozed out of the probe as it was being pulled out of the ground" (Schaaf and Johnson 1990:20). Probing was discontinued, although Schaaf and Johnson (1990:20) suggest that given more time, "the site boundary could be approximated using probe samples on the basis of the presence or absence of charcoal beneath the modern humus and perhaps by phosphate tests on the probe samples."

Surface information acquired from the uplands is also limited. Cultural depressions were not observed. The intertidal surface profile originally completed in April of 1990 (Mobley 1990b:10) on the N160 axis was extended upslope into the uplands for another 20 m. Schaaf and Johnson (1990:20) confirmed the approximate elevation of a CMT reported by Mobley (1990b:14) at the 80 m contour and relocated the battered cobble (hammerstone) he reported near that CMT. The moss-covered pile of logs identified by Yarborough in 1989 was briefly examined and described:

Table 7.2 Soil Samples Collected from the Expansion of the 1989 Upland Test by NPS/CAC, August 1990 (Schaaf and Johnson 1990:Table 1)

Sample No.	Provenience	Sample Size	Analyses
M-1	North wall Level I	.6 liter	F, R, S, P, pH
M-2	West wall Level I	.7 liter	F, R, S, P, pH
M-3	North wall Level II	.35 liter	F, R, S, P, pH
M-4	West wall Level II	.3 liter	F, R, S, P, pH
M-5	North wall Level III	.3 liter	F, R, S, P, pH
M-6	West wall Level TI	ca. .2 liter	Tephra
M-7	North wall Level T2	ca. .2 liter	Tephra
M-8	North wall Level T3	ca. .1 liter	Tephra

F=flotation (NPS laboratory, Alaska Region), R=radiocarbon (Beta Analytic,Inc.), S=sediment size (C. Crossen, UAA), P=Phosphate 2-part fractionation and pH (Rock River Laboratory), Tephra (J. Riehle, USGS)

> It is a rectangular moss-covered, flat mound, measuring about 3 by 2 meters and less than 1 meter in height. At the southeast corner, there is an upright, squared-off timber with a saw-cut branch. A UMC 40-65 cartridge case is pounded into the top of this timber (Yarborough 1989). The ends of decomposing, possibly cut lumber, horizontally lain, are visible at the northeast corner (Schaaf and Johnson 1990:20).

Further information on this feature could not be obtained because "disturbance of the moss mat covering the feature for further examination was not authorized in the interagency agreement defining the upland investigations" (Schaaf and Johnson 1990:20).

Other Investigations

The NPS/CAC team inspected adjacent areas in the vicinity to obtain information on the natural occurrence of certain rock types found in the SEL-188 area. The question of whether or not all unmodified slate "flakes" in the intertidal zone represent cultural activity or may also, to some degree, reflect weathering of naturally occurring slate was a controversial issue among archaeologists investigating SEL-188. The presence of culturally unmodified rounded cobbles (possible manuports) among the predominate angular granite beach rocks was a related issue.

Surface survey by NPS and CAC in the uplands and along shoreline adjacent to SEL-188 attempted to resolve the question of whether slate and rounded cobbles occurred naturally in the site vicinity. Schaaf and Johnson (1990:20) report: "A cursory survey of upland granite bedrock exposures and the creek bed up to about 90 m a.s.l. [above sea level] failed to produce any evidence of local slate occurrence." Survey of adjacent shoreline also failed to identify natural slate but did locate an area where "numerous well-rounded cobbles, mostly granite with some dark stone present, are concentrated at the base of a massive, steep exposure of bedrock" (Schaaf and Johnson 1990:21). While Schaaf and Johnson indicate the production of rounded cobbles in the intertidal zone at this location may be attributable to "tidal action which rolls small cobbles up and down the smooth surface of the bedrock," the erosion of rounded cobbles from glacial deposits should also be considered as a potential source.

During the course of NPS/CAC fieldwork, another pre-contact site was located east of SEL-188 where an apparent midden consisting of black, organic-rich carbonaceous soil was exposed in a 1.5 m high cutbank (Schaaf and Johnson 1990:20). A double-grooved greenstone splitting adze and other stone artifacts were observed in the intertidal zone. Documentation of this site was not completed and no AHRS number has been assigned.

Summary

A NPS/CAC team conducted archaeological investigations in the upland portion of SEL-188 on August 1-2, 1990 while Exxon archaeologists monitored oil spill treatment in the intertidal zone. Schaaf and Johnson (1990) re-excavated and expanded the 1989 upland test unit to record the stratigraphy and obtain datable organics and soil samples from undisturbed contexts. Details of the stratigraphy, artifacts, and soil sample contents are presented in Chapter 8 and in appendices at the end of this volume.

An attempt was made to define the subsurface extent of the site using soil probes, but sediment saturation impaired effective use of the probes and the horizontal extent of cultural deposits was not determined.

Surface survey extended the beach profile drawn in April of 1990 along the N160 axis (Mobley 1990b) into the uplands but did not locate additional surface features or resolve the issue of a local source of slate. The upland log feature originally noted by Yarborough in 1989 was re-inspected and described, but the nature of the feature was not determined. Survey along adjacent shoreline identified another pre-contact site with intertidal artifacts east of SEL-188.

CHAPTER 8

RESULTS OF ARCHAEOLOGICAL INVESTIGATIONS

Information regarding the character and distribution of cultural material and features at SEL-188 was collected to identify the site's horizontal and vertical extent, evaluate the site's significance, and protect the site during oil spill treatment. Site evaluations in 1989 and 1990 and monitoring in 1990 and 1991 produced several data sets regarding site extent, artifacts, features, and the results of laboratory analyses. This chapter compiles the information and places it in a descriptive and interpretive framework.

Exxon archaeologist Michael Yarborough collected the initial data when he identified the site. The eight artifacts collected then have been described, and four have been illustrated (Workman and Workman 1990:284-285). The multi-agency field evaluation conducted later in 1989 has been summarized (Worthington 1989; NPS 1989) and all artifacts collected have been analyzed except for the eight withheld by NPS tort investigators. Mobley (1990b) reported April, 1990 Exxon intertidal investigations; Schaaf and Johnson (1990) described August, 1990 NPS/CAC upland investigations; Crossen and Banks (1990; Appendix C) analyzed soil samples retrieved by Schaaf and Johnson; and Exxon site monitoring reports document the four monitoring episodes. These reports are the basis of the following description and analysis of the artifacts and features at SEL-188.

Horizontal Extent of the Site

The horizontal dimensions of SEL-188 are unknown, but the extent of the intertidal artifact scatter is well documented. Intertidal artifacts were observed parallel to the shoreline for a total distance of 86 m (282 ft) (Figure 8.1). The southern limit of the scatter is at the N130 axis on the site grid, and the northernmost artifact is plotted at the N216 axis. If the intertidal portion of the site can be considered representative of the site as a whole, the best estimate for horizontal extent of the site is 86 m on an axis parallel to the shore.

On the opposite axis, artifacts and FCR were plotted in the intertidal zone as far as 10 m (32 ft) from the cutbank near the midpoint of the scatter (at the N165 axis), and up to 23 m (75 ft) from the cutbank near the northern end of the site at the N192 axis. The artifact and FCR scatter covers approximately 1,203 m^2 (12,949 ft^2) in the intertidal zone.

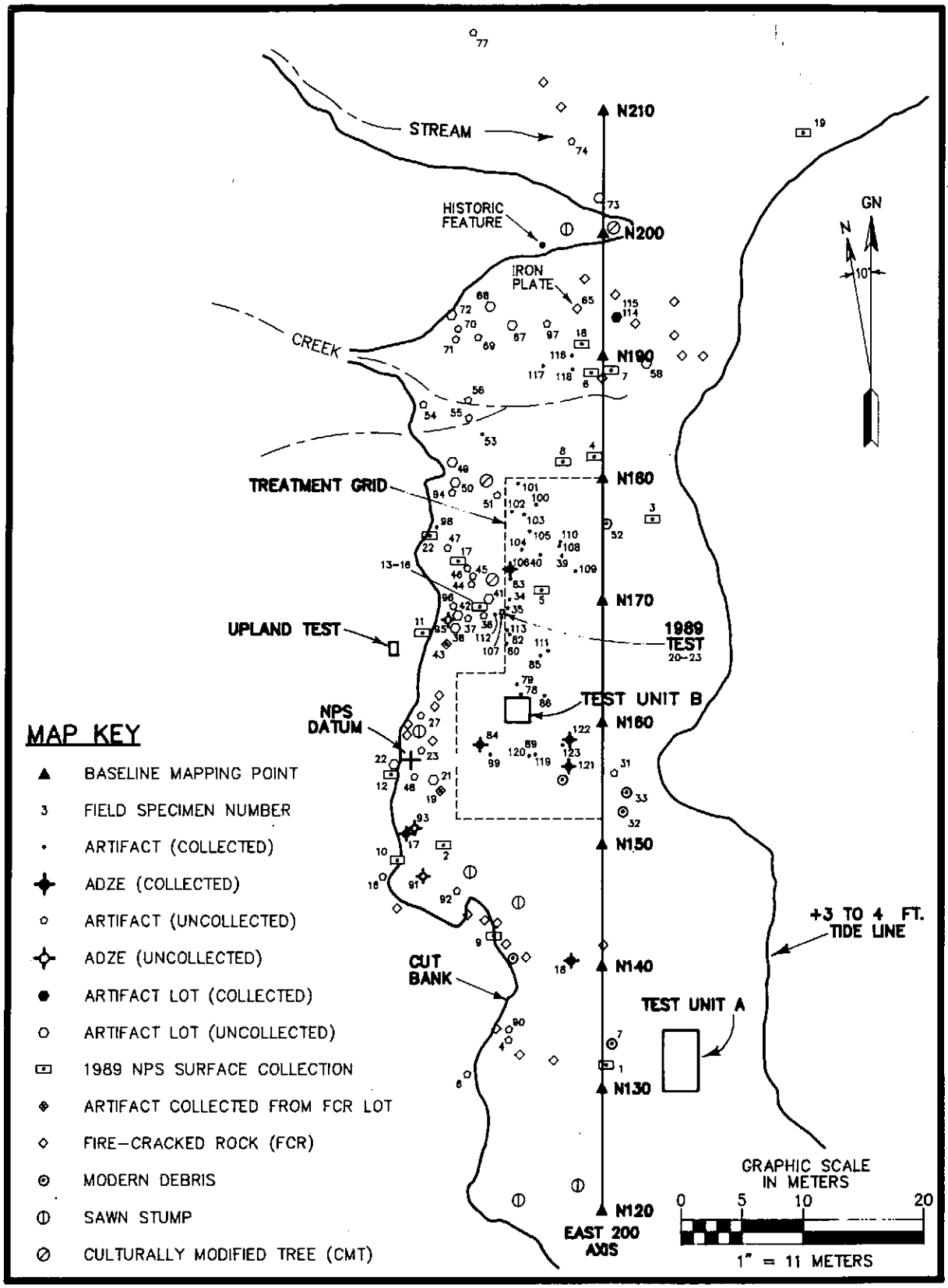


Figure 8.1 **Intertidal artifact and FCR distribution mapped in 1989 and 1990**

Within this total area, 96% of the artifacts were located in the 928 m^2 (9,989 ft^2) area south of the N200 grid axis (Figure 8.1). Based solely on surface artifact distribution, the site extends 23 m into the intertidal zone. A 1951 aerial photograph is unfortunately out of focus and shoreline detail prior to the 1964 earthquake is currently unavailable. Recent observations of drowned trees in the intertidal zone indicate that as much as eight meters of shoreline have been lost to erosion since the 1964 earthquake. Assuming that the archaeological site originally extended out to the pre-1964 shoreline, and based on the distribution of intertidal artifacts, approximately 8 meters of upland cultural deposit have deflated into the intertidal zone since 1964.

The upland extent of the site is unknown. The NPS/CAC upland test pit indicates that subsurface cultural material is present up to two meters inland from the cutbank, but no other subsurface information is available. Mobley (1990b:14) observed an isolated hammerstone approximately 250 m inland, but no subsurface cultural deposit or other artifacts were noted nearby and the relationship of this isolated find to SEL-188 is unclear.

Vertical Extent of the Site

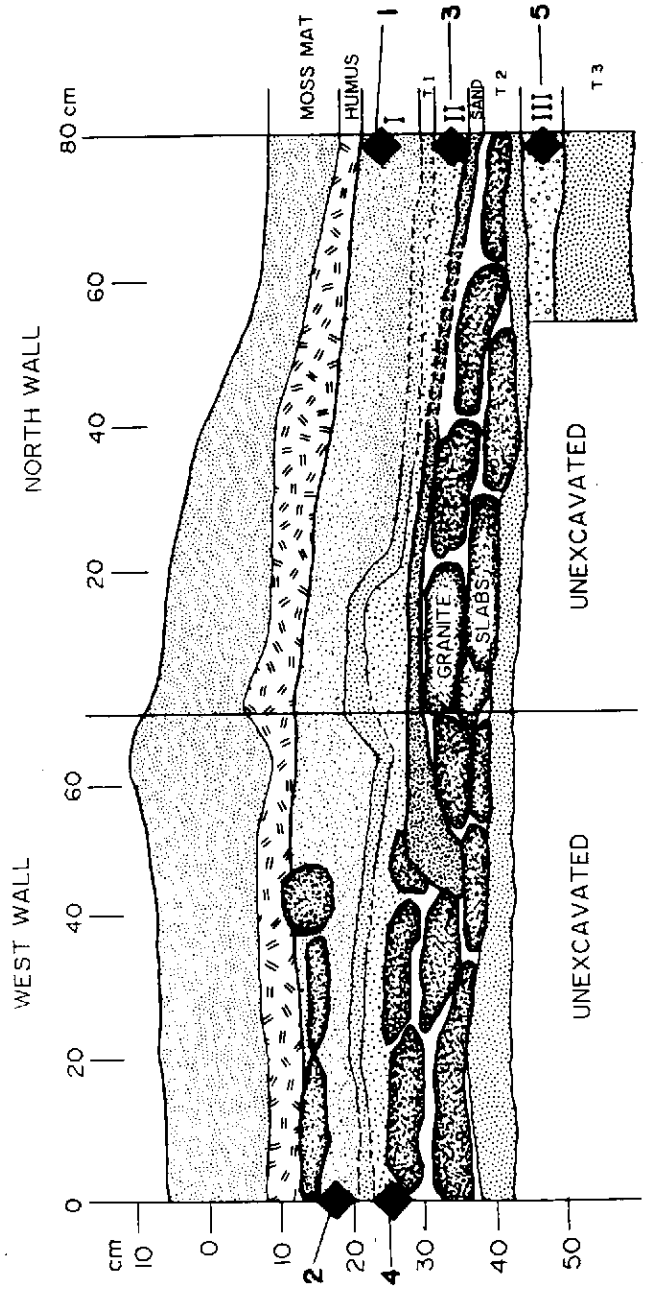
Information on the vertical extent of the site comes almost entirely from the upland test pit. Schaaf and Johnson (1990:6) reported the test pit stratigraphy (Figure 8.2):

> The stratigraphic profile shows evidence of three cultural levels separated by distinct tephra layers. The contact between the modern humus and the uppermost cultural layer (Level I) is distinct -- the layers peel easily apart. Level I is a black, organic-rich sediment with abundant charcoal, decomposing granite grains and a few rounded pebbles. A brown tephra deposit (T1) 3 cm thick separates Level I from the second cultural layer (Level II). This tephra is patchy along the north wall where the separation between Levels I and II is less clear. The description of Level II is the same as for Level I. A layer of horizontal granite slabs lies at the base of Level II and is probably a cultural feature. . . A thin lens of coarse sand occurs in Level II above the slabs. Beneath the slab layer, a second brown tephra (T2, 3-5 cm thick) caps a third cultural layer (Level III). Level III sediments are similar to Levels I and II but the charcoal content is less. Below Level III is a third brown tephra (T3) which appears to be about 10 cm thick. The stratigraphy probably continues below this point.

Cultural material was recovered to a depth of 44 cm below the present ground surface. The possibility of deeper cultural deposits cannot be discounted since the bottom of the T3 tephra had not been reached when the test pit flooded.

Artifacts

One hundred and fifty-two artifacts were identified during surface and subsurface investigations at SEL-188 in 1989 and 1990 (Table 8.1). One additional ground slate flake and five fragments of fire cracked rock, identified and left in place during monitoring in 1991, are not included in this analysis. Ninety-two artifacts were collected - 65 from the intertidal zone (including the NPS tort artifacts) and 27 from the NPS/CAC expansion of the upland test pit (Table 8.1). One hundred twenty-five artifacts were identified in the intertidal zone, 117 of which were mapped in relation to the NPS datum or treatment grid (Figure 8.1). Eight artifacts collected in July, 1989 prior to the establishment of the NPS permanent site datum are not plotted. Unretouched boulder spalls, unmodified "flakes," assorted unmodified cobbles and pebbles, modern glass, and FCR, totaling 45 intertidal and 124 upland specimens are not included in the final artifact count (Table 8.2). Accessioned specimens from SEL-188 are listed in Appendices D and E. Appendix D is a catalog of both Exxon and NPS accessions providing brief descriptions and provenience for each specimen. Appendix E contains detailed descriptions of collected specimens.



Modern humus: very dark brown, fine-textured, no rock, a few charcoal flecks

Level I: black, organic-rich, dense charcoal, decomposing granite, few rounded pebbles 7.5YR2/0 (wet)

T1: Tephra, very dark brown 10YR2/2 (wet) with patches of very dark gray 10YR3/1 (wet)

Level II: black, organic-rich, dense charcoal, decomposing granite, few rounded pebbles 7.5YR2/0 (wet)

Sand: Well-sorted layer of coarse sand

Slab layer: (Stylized representation) Flat, angular granite slabs averaging 40+ cm across and 8 cm thick, horizontally placed, slightly imbricate, in black sediment matrix (like Level II)

T2: Tephra, dark grayish brown 10YR4/2 (wet)

Level III: Black, organic-rich, charcoal abundant but less than levels I and II decomposing granite

T3: Tephra, dark grayish brown 10YR4/2 (wet)

◆ Radiocarbon dates: **(1)** 620 +/- 50 BP (Beta 39475), **(2)** 560 +/- 50 BP (Beta 39476), **(3)** 710 +/- 50 BP (Beta 39477), **(4)** 700 +/- 90 BP (Beta 39478), **(5)** 1350 +/- 70 BP (Beta 39479). Radiocarbon half-life = 5568 years.

Figure 8.2 Stratigraphic profile of 1989 upland test pit, west and north walls, as expanded in August, 1990 (Schaaf and Johnson 1990:Figure 5)

Typology Used

The terms used to describe artifacts in this report take into account published typologies, sample sizes, and circumstances of collection and context (Table 8.3). De Laguna (1956, 1975), and Workman *et al.* in Kachemak Bay (see references cited) have established regional typologies which use a combination of morphological, technological, and functional terms. This report uses terms derived primarily from de Laguna (1956, 1975) and Workman (1980b) to facilitate comparison with other collections from the region.

An artifact is an object produced, modified, or used by humans, usually identified on the basis of context or physical evidence of manufacture or use. The use of context as a factor in identifying objects as cultural was diminished because the compliance effort focused primarily on intertidal surface artifacts without site context. This analysis has taken a conservative approach regarding artifact identification - objects must display definite evidence of cultural modification in order to be classified as an artifact. The most problematic object classes to identify include slate flakes, boulder spalls, hammerstones, and FCR.

Characteristics which indicate cultural origin in chipped stone assemblages are not always evident in slate assemblages because of the nature of slate. Some slate artifacts collected at SEL-188 display negative scars indicative of percussion or pressure flaking. Slate subjected to deliberate flaking produces slate spalls or flakes, yet flake-like specimens

Table 8.1 Summary of Artifacts Collected and Uncollected in 1989 and 1990

Collected Artifacts[1]	Intertidal Zone	Uplands Test	Total
1989 Exxon	8		8
1989 NPS	10	5	15
1989 NPS Tort Artifacts	8		8
1990 Exxon 4/26	4		4
1990 Exxon 8/1 - 8/4	16		16
1990 Exxon 8/28 - 8/29	19		19
1990 NPS		22	22
Total:	65	27	92
Uncollected Artifacts			
1990 Exxon 4/25 - 4/26	52		52
1990 Exxon 8/1 - 8/4	8		8
Total Known Artifacts	125	27	152

[1] Includes only artifacts with clear evidence of cultural modification. See Table 8.2 for specimens excluded from this table.

Table 8.2 Collected Specimens Excluded from Stone Artifact Tabulations

	ITZ COLLECTIONS						UPLAND COLLECTIONS						
	1989		1990					1990 Test					
Classification	July	August	April	August 1-4	August 28-29	ITZ Total	1989 Test	Level I	Level II[1]	Level I/II[2]	Level III	Site Total	Total
Boulder spall (unretouched)			1	1	3	5		1	1			2	7
"Flakes", scrap shatter, chips (greenstone)		11			1 (2)	12 (2)	10	49	27 (1)	10 (1)	7	103 (2)	115 (4)
Unmodified rocks, cobbles, pebbles, chunks		15	1	2		18	1	3	4	4		12	30
Glass (modern)			7			7							7
Fire cracked rock			1			1		1	1	3		5	6
Total Collected:		26	10	3	6	45	11	54	34	18	7	124	169

1. Level II includes Ash 2 (T2).
2. Level I/II includes specimens with uncertain provenience.

Table 8.3 Collected Artifacts by Class

	ITZ COLLECTIONS						UPLAND COLLECTIONS						
	1989		1990					1990 Test					
Artifact Class	July	August	April	August 1-4	August 28-29	ITZ Total	1989 Test	Level I	Level II	Level I/II	Level III	Site Total	Total
Triangular Endblade								1				1	1
Double-edged Blade (barbed)		1				1	1					1	2
Stemmed Slate Point / Knife		1				1							1
Flaked Slate					1	1		1				1	2
Splitting Adze	2			2	3	7							7
Splitting Wedge	1				2	3							3
Planing Adze		1				1		1				1	2
Pick (?)				1		1							1
"Incised" Slate Tablet							1			1		2	2
Ground Slate Rod		3		1	2	6							6
Notched Pebble		1		1		2							2
Notched Cobble				1	1	2							2
Grooved Cobble		1	1	1	1	4							4

Table 8.3 Collected Artifacts by Class (cont'd.)

	ITZ COLLECTIONS						UPLAND COLLECTIONS						
	1989		1990			ITZ	1989	1990 Test				Site	
Artifact Class	July	August	April	August 1-4	August 28-29	Total	Test	Level I	Level II	Level I/II	Level III	Total	Total
Battered Cobble (Hammerstone)			1	3	1	5			2	1		3	8
Ground Slate Ulu													
Notched		2		1		3			1			1	4
Unnotched	3				2	5							5
Abrader							1					1	1
Tabular Slab									1			1	1
Bead (stone)				1		1							1
Boulder Spall (Utilized)				4	2	6	1			1		2	8
Ground Slate fragments	1				3	4	1	2	1		2	6	10
Utilized Flakes			1		1	2		2	3	1	1	7	9
Historic Artifacts	1		1?			2							2
Artifact Totals:	8	10	4	16	19	57	5	7	8	4	3	27	84

1. April 1989 tort artifacts (8) not included in this table.
2. Includes only artifacts with clear evidence of cultural modification. See Table 8.2 for specimens excluded from tabulation.

(Robert Betts 18:26 Exxon)

Figure 8.3 Slate boulder exfoliating among granite slabs in the intertidal zone at SEL-188

are also produced naturally by large exfoliating slate boulders which are present in the intertidal zone at SEL-188 (Figure 8.3). Schaaf and Johnson (1990:20) collected slate fragments from the upland test pit and considered them artifacts based on their sharp edges and context, but they also note that ". . . the presence of well-rounded slate pebbles in the test unit sediments argues for local occurrence perhaps in glacial deposits." A collected slate specimen exfoliated into two sharp-edged pieces in a collection bag, indicating that edge sharpness is an unreliable indicator of cultural origin. Natural processes explained the origin of slate particles identified in the soil samples recovered from the upland test (Crossen and Banks 1990):

> The slate particles are commonly subrounded to rounded. Because no local bedrock source exists for the slate, it must have been transported to the site by some mechanism. The rounding of the particles also agrees with the transport hypothesis. These could have been rounded by beach, stream, or glacial processes. They may be clasts contained in the glacial tills that cover the area, which were formerly eroded by either streams or waves and moved downslope to the site area, or they may have been deposited at the site vicinity by wave processes.

As a consequence, slate spalls without evidence of grinding, polish, retouch, or other definite cultural modification are excluded from the site artifact

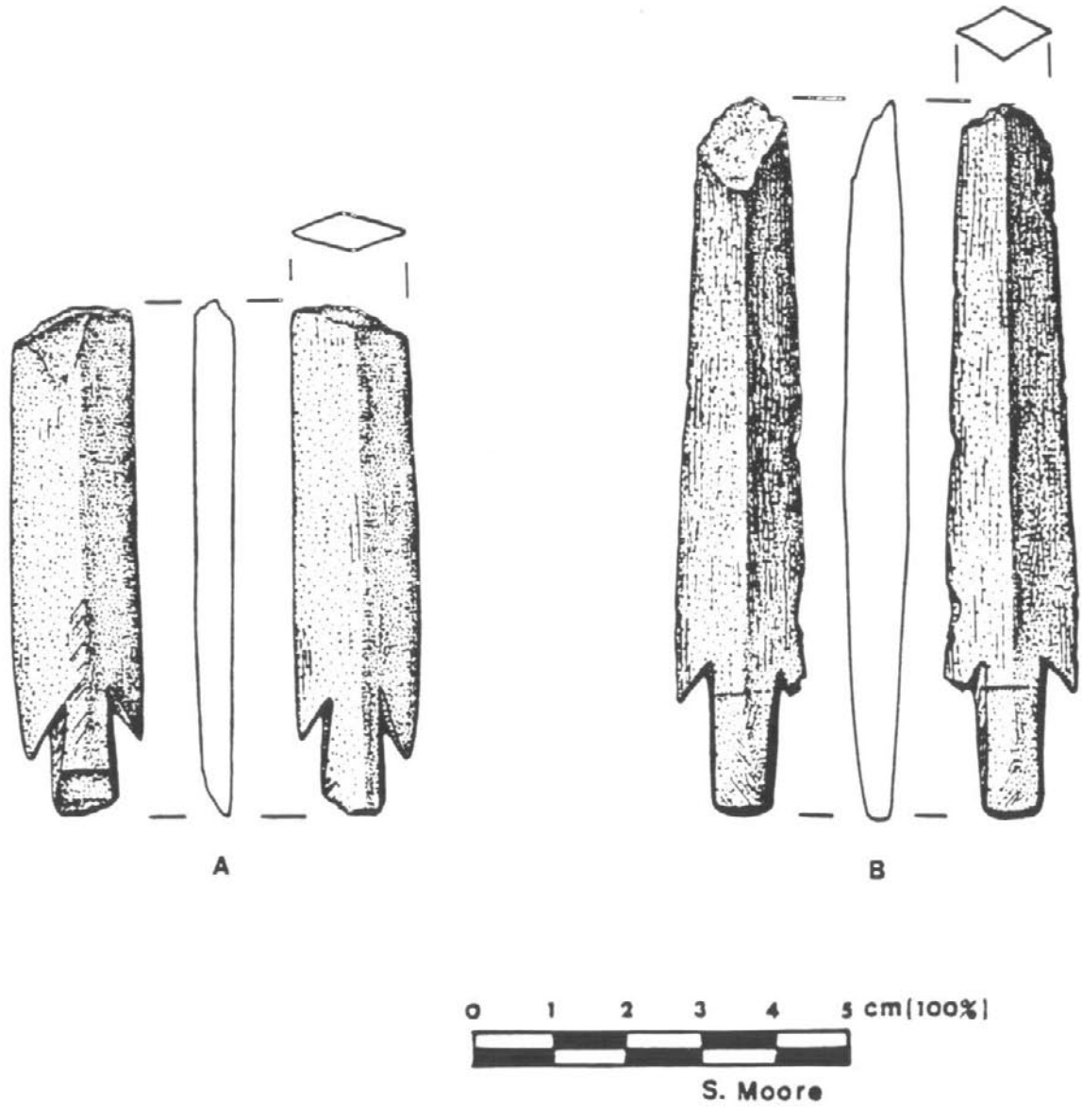


Figure 8.4 Double-edged blades a. 49SEL-188-024 from intertidal zone; b. 49-SEL-032 from 1989 upland test unit

count (Table 8.2), and the term "flake" is used when cultural modification is not evident.

Boulder spalls are primary cortical spalls, usually of coarse material displaying an acute angle between the ventral surface and the platform where detachment force was applied. Contextual information or evidence of use is necessary to classify boulder spalls as artifacts since they can be produced naturally in high-energy environments such as stream beds and intertidal zones. Specimens without clear cultural retouch or use wear are excluded from the artifact count.

Naturally-rounded cobbles are presumably present in local glacial deposits and are apparently actively being formed nearby in the intertidal zone from wave action (Schaaf and Johnson 1990:21).

Only cobbles which exhibited discrete areas of battering were identified as hammerstones.

Mobley (1990b:5) originally included fire cracked rock in the artifact count, but FCR is not classified as an artifact in this report because it does not exhibit evidence of intentional cultural modification. This change results in minor differences between the April 1990 artifact totals and those of subsequent investigations. Modern glass shards which Mobley (1990b:5) included in the artifact tally are excluded in this analysis.

Lithic Technology

Methods used to work lithic material at SEL-188 included flaking, grinding, pecking, and sawing, variously applied to slate and coarse igneous and metamorphic raw materials. Unifacial and bifacial flaking techniques were practiced, but most slate flaking was unifacial. A ground slate point with a flaked stem and a flaked slate tool (possibly a knife or point preform) were collected from the site. It appears that *ulus* were shaped by unifacial flaking prior to being finished by grinding. Flaked notches are also evident on small pebbles. Boulder spall production invariably involves percussion flaking using the anvil technique in which a cobble is struck against a larger anvil stone to remove a spall. Some of these boulder spalls were retouched by flaking, but often they were used without further modification. Two bifacially-worked cobbles (observed and left in place) were modified by percussion flaking to create sinuous edges that were subsequently battered by use. Other indications of flaking technol-

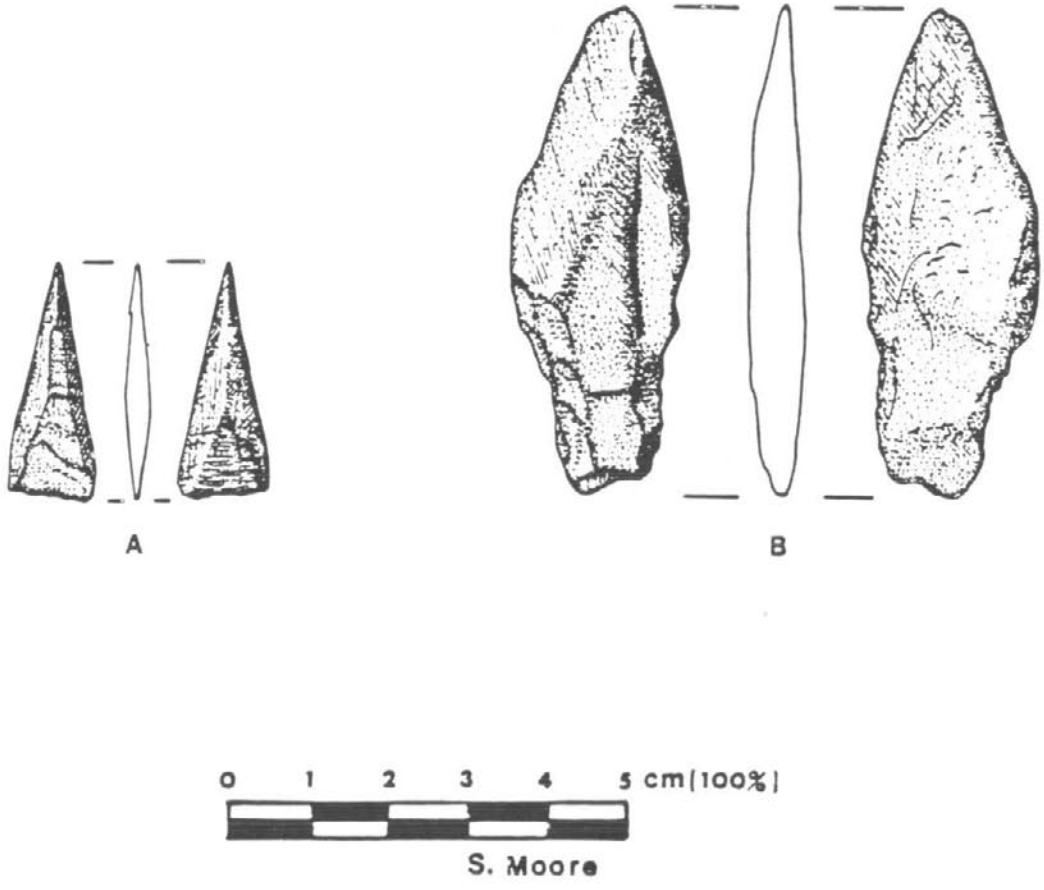


Figure 8.5 **Ground slate points. a. 49SEL-188-096, triangular endblade from upland test, 1990 Level I; b. 49SEL-188-017, stemmed point from intertidal zone**

ogy are the hammerstones recovered and observed at the site.

Pecking and grinding are evident in the manufacture of graywacke and greenstone splitting and planing adzes. Pecking is generally most extensive near the hafting knobs, where it was often not obliterated by subsequent grinding. Pecking was also used to groove cobbles.

Grinding is evident as a finishing technique in manufacturing several tool forms at SEL-188. Adzes were finished by abrasion, probably using a coarse-textured rock. The ground slate endblade from Level I in the upland test pit, and the two double-edged blades collected in 1989, are examples of finished tools. Most *ulu* fragments show grinding striations on one or both faces, and coarse grinding striations are evident on most of the ground slate rods recovered. Ground slate fragments were the most common artifact type identified at SEL-188 (Table 8.3). A cylindrical cobble of schist with one flattened, polished surface was evidently used as an abrader.

Sawing was used to cut the deeply-incised diagonal corner notches of two barbed double-edged blades and shape their rectangular stems. Sawing striations are visible on both sides of the stem of a barbed blade (49SEL-188-032) recovered from the upland test pit in 1989. Sawing striations are also visible at one square cut end of a ground slate rod (49SEL-188-023) collected from the intertidal zone. No stone saws were identified in the artifact assemblage.

The principal raw lithic materials used for tool manufacture at SEL-188 in order of frequency are slate, graywacke, basalt, and greenstone. Granite, schist, and quartzite are represented but rare. The collected splitting adzes are all made from graywacke although one greenstone wedge has been converted from a splitting adze. Both planing adzes collected from the site are made of greenstone. Graywacke and basalt are the most common raw materials utilized for boulder spalls and hammerstones. Three collected notched pebbles and cobbles and two grooved cobbles are also fashioned of graywacke or basalt. A grooved cobble of granite and one of schist were collected and an abrader collected from the upland test also utilized a piece of schist. Material other than slate is extremely rare in the unmodified lithic debitage collected from the intertidal zone or the uplands. Of 115 unmodified "flakes" collected from the intertidal zone and uplands, four (3%) are greenstone (Table 8.2). One basalt flake and one quartzite flake were also collected. Quartzite was utilized for one hammerstone. No chert or other cryptocrystalline material was identified at SEL-188.

Artifact Classes

Slate tools, groundstone tools, and pecked tools comprise the major artifact groups at SEL-188. Stone tools have been grouped into twenty-three classes for analysis. Historic artifacts are grouped into an additional class and FCR is addressed separately. The following discussion is a summary of the artifacts which occur within each class. Individual artifact descriptions are found in Appendix E.

Double-Edged Slate Blade (2)

Finely-ground slate blades (with and without barbs) reported from Prince William Sound and Kachemak Bay (de Laguna 1956:153-159,1975:70-74) are typically slender and straight-edged with the greatest width just above the barbs. They may be slightly or strongly faceted resulting in either lozenge or diamond-shaped cross sections. Tangs are flattened or wedge-shaped.

Two ground slate artifacts are classified as double-edged blades (Figure 8.4). Both are diamond-shaped in cross section and are missing the distal end. They exhibit lateral blade edges that terminate in sharply incised (sawn) short barbs at the shoulders, and have parallel-sided, rectangular stems. One example (49SEL-188-024;Figure 8.4a;Plate Ic) was collected from the upper intertidal zone in 1989. The second, almost complete example, (49SEL-188-032;Figure 8.4b;Plate Id) was recovered in 1989 from the upland test pit, probably associated with Level II. On this specimen, shallow incised "dashed" lines (possibly ownership marks) extend

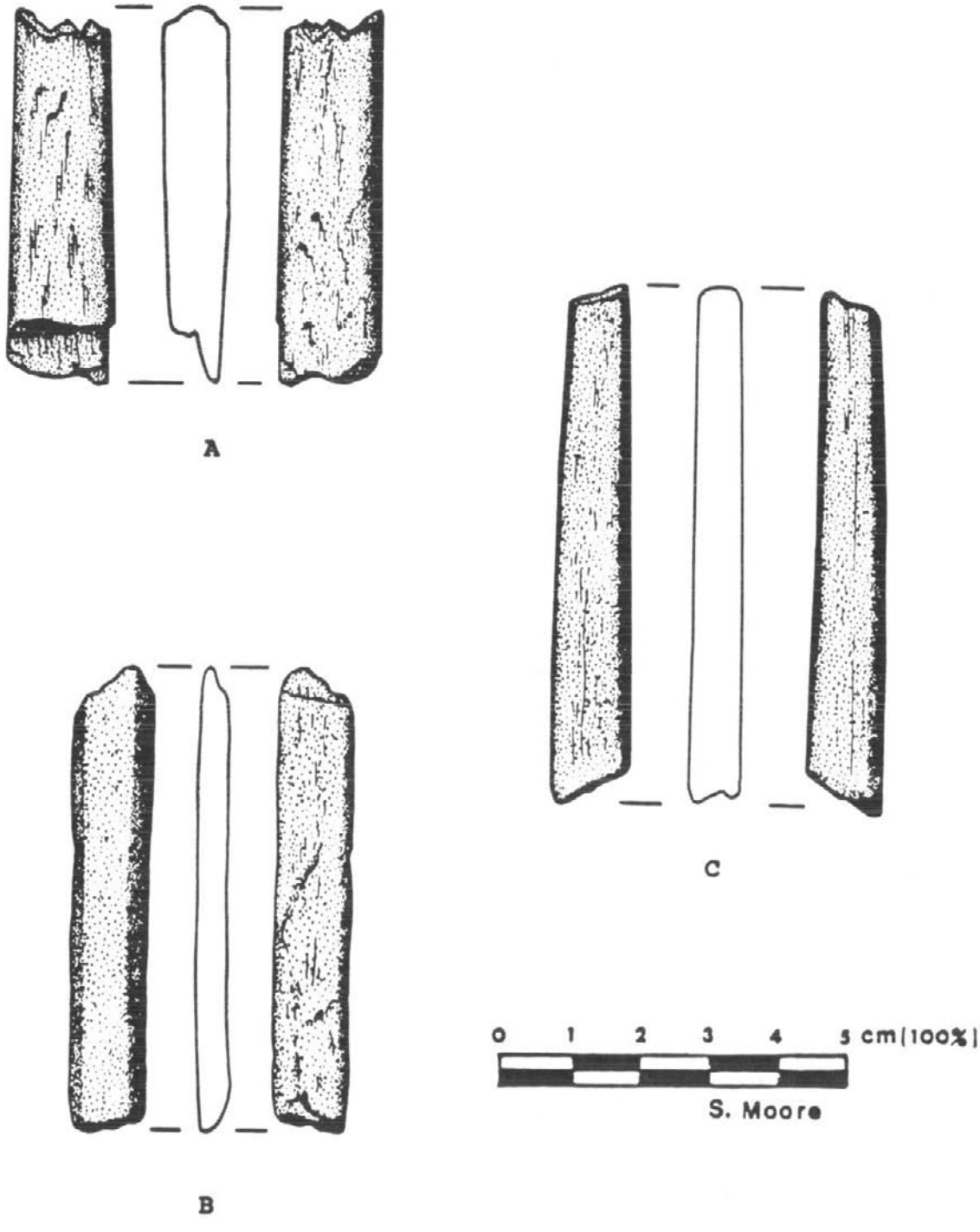


Figure 8.6 **Ground slate rods from intertidal zone. a. 49SEL-188-068; b. 49SEL-188-070; c. 49SEL-188-082**

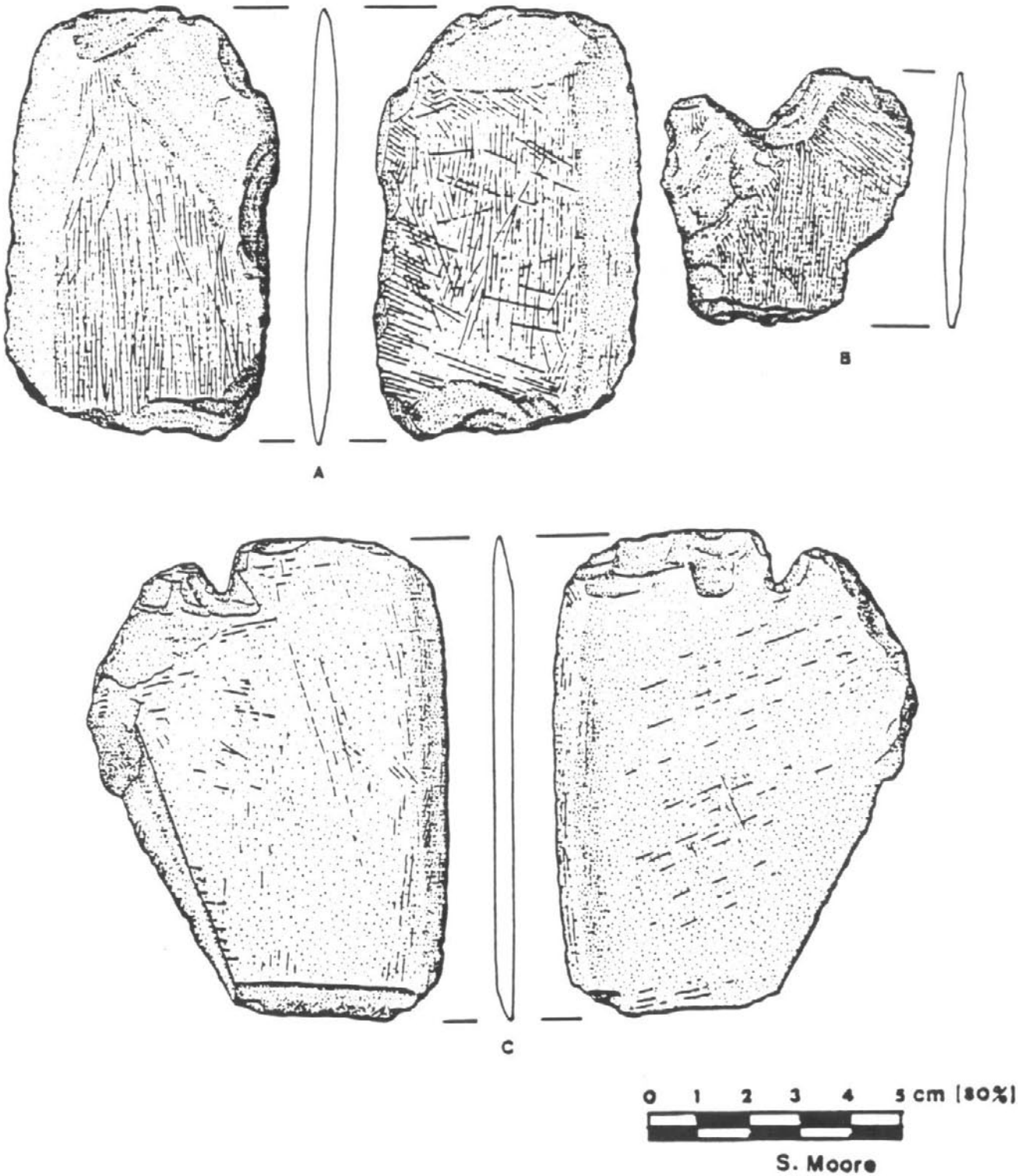


Figure 8.7 Ground slate ulus. a. 49SEL-188-005 collected from intertidal zone in 1989; b. 49SEL-188-114 upland test, 1990 Level II; c. 49SEL-188-021 collected from intertidal zone in 1989

across both faces of the stem between the barbs (see Clark 1970:97,Figure 3-G). NPS tort investigators collected a blade midsection (49SEL-188-016) in 1989 that might be a double-edged blade, but the artifact was not released for study.

Ground Slate Endblade (1)

An endblade is a finished haft element, widest at the base with sides that progressively contract toward the tip. One ground slate artifact classified as an endblade (49SEL-188-096;Figure 8.5a;Plate Ia) was recovered from the upland test pit at the contact between Level I and the first tephra layer (T1). The specimen is triangular in outline with a straight, thin, butt-facetted base.

Stemmed Slate Point (1)

One asymmetrical, flaked and ground slate point (49SEL-188-017;Figure 8.5b;Plate Ib) was collected in 1989 from near the southern extent of the artifact scatter, very close to the cutbank. The thick, apparently unfinished point (or possible knife) lacks prominent shoulders and has a parallel-sided stem shaped by flaking.

Ground Slate Rod (9)

Ground slate rods, referred to as "awls" by de Laguna (1956:159-161), are slender cylindrical objects with cross sections that ". . . tend to be round or oval at the point, hexagonal in the middle, and rectangular near the butt" although variations occur. Complete specimens from Prince William Sound range in length from 7 cm to 27 cm and taper to a point which typically shows no sign of wear.

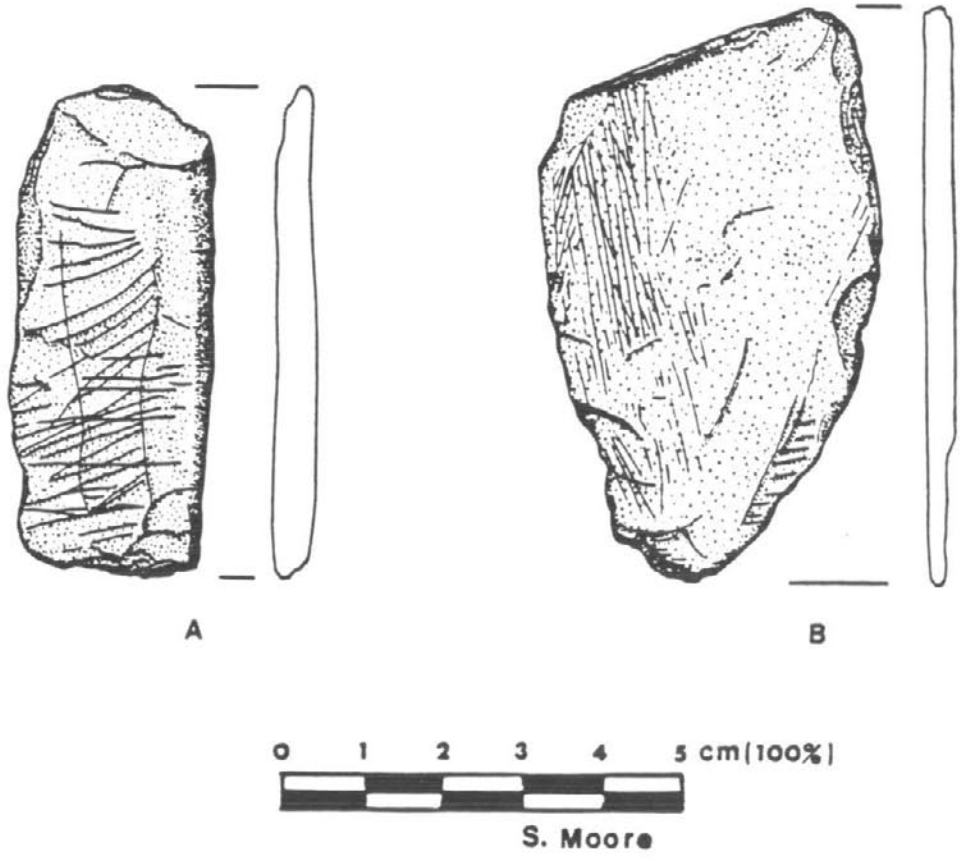


Figure 8.8 **"Incised" slate tablets. a. 49SEL-188-036a 1989 upland test; b. 49SEL-188-141 1989 upland test backfill, recovered in 1990**

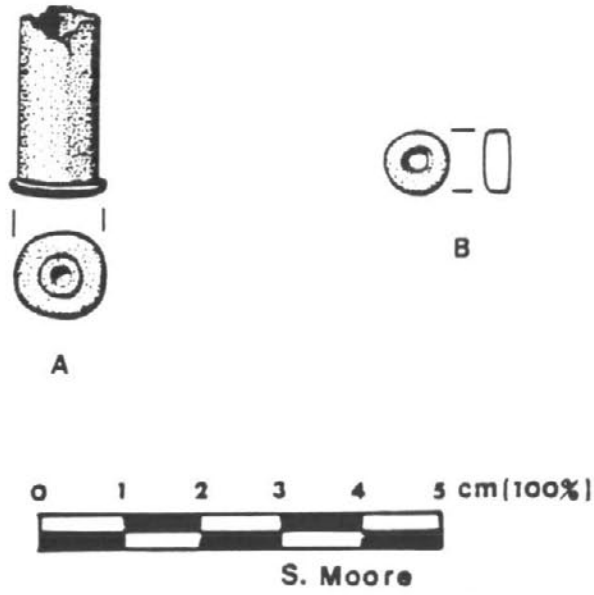


Figure 8.9 **a. 49-SEL-188-004 Henry .44 brass shell casing from intertidal zone; b. 49-SEL-188-062 stone bead recovered from below asphalt pavement in intertidal zone**

De Laguna (1956:159) states ". . . the butt ends show that these slate implements were always (generally?) hafted" and suggests that they may be a specialized type of lance point.

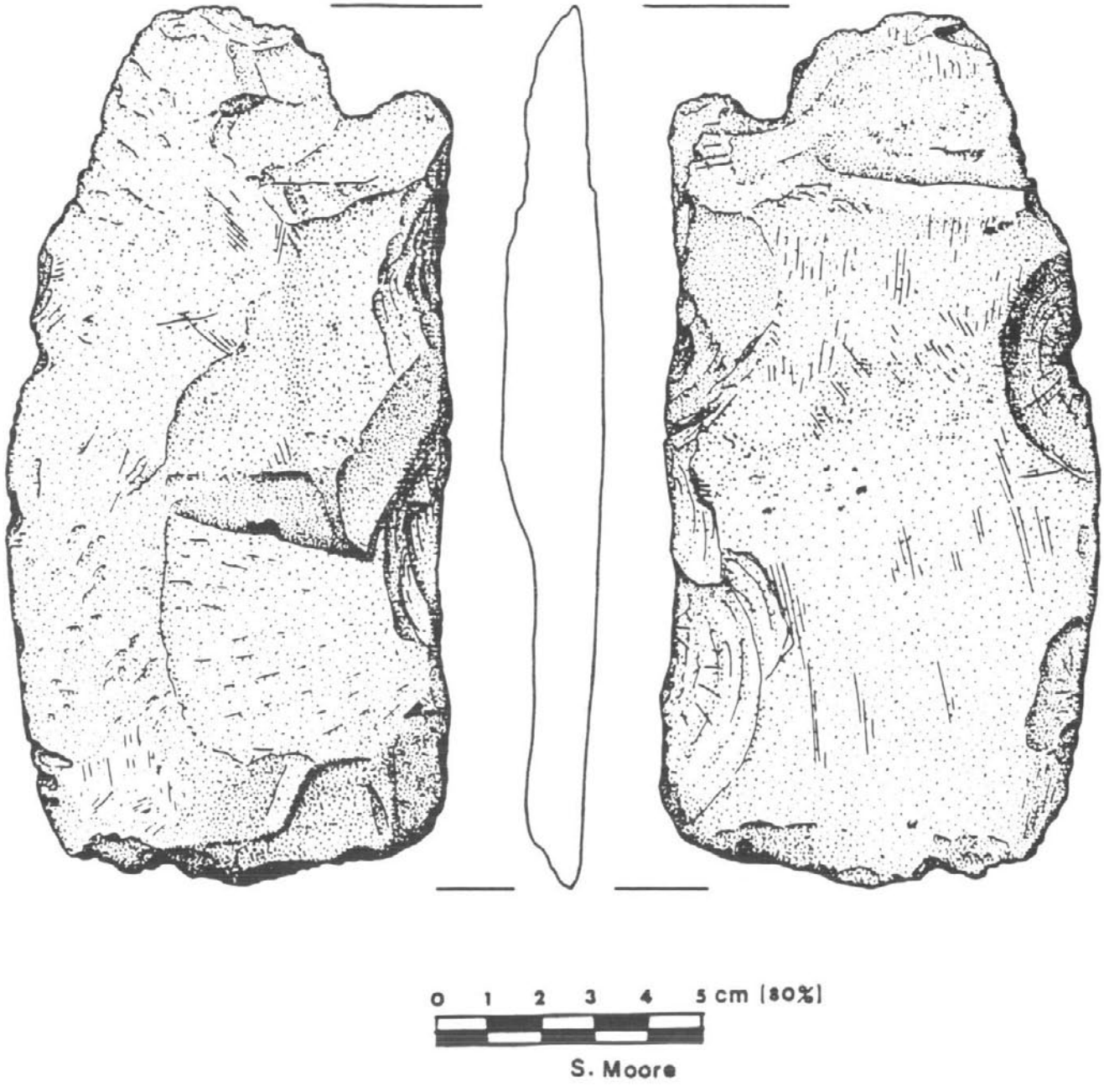
No complete examples were found at SEL-188 but nine rod fragments were identified in the intertidal zone (Figure 8.6;Plate IVc,d,e). Six were collected and three were left in place. All exhibit rounded, rectangular cross sections where cross sections are complete and have nearly parallel sides which sometimes taper slightly towards one end. The fragments range from 5.48 cm to 9.42 cm in length and from 1.04 cm to 1.68 cm in width. Shaping striations parallel to the long axis are usually evident and one example (49SEL-188-023) has sawing striations on one square cut end.

*Ground Slate **Ulu** (10)*

Ulus are thin, broad slate "knives" with a straight or convex lateral working edge beveled by grinding. Some are notched or have drilled holes for hafting into a wood or bone handle. Unfinished examples indicate initial shaping was by flaking and the tool was finished by grinding (de Laguna 1975:77). Ten ground slate artifacts (all but one incomplete) have been classified as *ulus*, although some small slate fragments with beveled working edges classified as ground slate flakes may be *ulu* fragments. Eight ground slate *ulu* fragments were collected from the intertidal zone, and one (FS 90) was left in place. Of the eight collected specimens, three were notched - two (49SEL-188-020,021) with deep V-shaped notches and one (49SEL-188-059) with a shallow flaked notch. The complete unnotched *ulu* (49SEL-188-005;Figure 8.7a;Plate IIc) is rectangular in outline and one notched example (49SEL-188-021;Figure 8.7c;Plate IIb) appears to have been rectangular in shape prior to breakage. Four have convex or subconvex working edges and three have straight working edges. Five show evidence of unifacial flaking, two of which (49SEL-188-020,059) show no evidence of grinding. Of the six examples with ground working edges, five are double-beveled and one is single-beveled. A ground slate tool fragment (49SEL-188-114;Figure 8.7b;Plate IIa) recovered from Level II of the upland test pit is probably a corner fragment from a notched *ulu* although it is difficult to tell as most of the working edge is missing.

"Incised" Slate Tablet (2)

In Prince William Sound, de Laguna (1956:201-204) reports irregular slate beach pebbles with scratched or incised geometric designs usually limited to one surface. These decorated slate plaques were unworked except for polishing and ". . . were not implements or tools of any kind" (de Laguna 1956:201). Two thin slate flakes (49SEL-188-036a,141) with what appear to be deliberate deep scratches were collected from the upland test pit; one in 1989 and the other in 1990, from 1989 backfill likely originating from Levels I or II. The edges are rounded and show wear. The straight, relatively parallel striations on one example (49SEL-188-141,Figure 8.8b;Plate IIIb) are largely confined to the edge of one face, whereas the non-parallel curving lines on the second example (49SEL-188-036a,Fig-



Sarah Moore, Illustrations

Figure 8.10 49-SEL-188-087 bifacially worked slate flake with grinding striations

ure 8.8a;Plate IIIa) occur over the entire surface of one face and appear to have been more purposefully made. Complex geometric or realistic patterns are not evident although the pattern on one example (49SEL-188-036a) bears some resemblance to a "ladder motif" illustrated by de Laguna (1956:Plate 19-4).

Bead (1)

A single, thin, round stone bead (49SEL-188-062;Figure 8.9b;Plate IVa) was found by a treatment worker in clean sand under oiled sediment, near the northern extent of the asphalt tarmat area. It appears to be made from gray slate or shale and has a straight hole drilled through its center. Light scoring is evident on the inside wall of the drilled hole.

Ground Slate Fragments (30)

Ground slate fragments were the most common artifact in the intertidal zone. Thirty were identified in 1990 and one more (not included in this analysis) was identified during monitoring in 1991. Three of the 23 ground slate flakes mapped in the intertidal zone in 1990 were collected during monitoring; two from the grid system and one from outside the grid. Two of the three have sharp edges. One has parallel striations from grinding on both surfaces and two have grinding limited to one surface. One example (49SEL-188-084), with coarse striations both parallel and at right angles to beveling on both faces, may be a double-beveled *ulu* fragment.

(Charles Mobley 5:28 Exxon)

Figure 8.11 Artifacts mapped in the intertidal zone on April 25, 1990; clockwise from left: flaked slate artifact, striated slate artifact, cobble spall, retouched cobble spall, ground slate rod (Lot 38)

Fragments and flakes of ground slate were recovered from all cultural levels in the upland test pit. Six examples show evidence of cultural modification. One ground slate flake (49SEL-188-036b) excavated in 1989 has a slightly beveled edge. Of the remaining five artifacts, two (49SEL-188-097,107) are from Level I; one (49SEL-188-118) is from Level II; and two (49SEL-188-134,135) are from Level III. One of the flakes from Level I (49SEL-188-097) has light bifacial use retouch on one lateral edge.

Flaked Slate (4)

Flaked slate tools show evidence of shaping by unifacial or bifacial flaking but may also exhibit grinding striations. Four artifacts have been classified as flaked slate tools and two were collected. One example collected from the intertidal zone (49SEL-188-087; Figure 8.10) has extensive battering and bifacial flake removal from one straight edge and lighter unifacial retouch along an opposite straight edge, in addition to grinding striations on both surfaces. A slate fragment (49SEL-188-099) from Level I of the upland test pit has a small amount of unifacial flaking along one edge and bifacial flaking along the entire length of the opposite edge. An artifact described as a "large flake tool" (49SEL-188-010) was collected by the NPS tort investigator from the upper intertidal zone in 1989 and a "chipped slate" artifact (Lot 38) was mapped in April 1990 (Figure 8.11).

Boulder Spalls (26)

Boulder (or cobble) spalls are primary flakes struck from rounded cobbles apparently employed as hastily made and disposable scraping tools. A

striking platform remnant is usually evident. Most are plano-convex in cross section, have completely cortical dorsal surfaces, show little or no intentional retouch of the distal working edge, and do not appear to have been shaped after removal from the cobble. Intentional retouch is limited to the working edge and is usually unifacial.

Of the 26 boulder spalls recorded at SEL-188, four were recovered from the upland test pit, 11 were mapped and left in place in the intertidal zone, and 11 were collected from the intertidal zone (Figure 8.11). Of the 11 collected, only six exhibit enough patterned retouch to rule out natural nicking from wave action. Of the 11 boulder spalls left uncollected, it is not known how many exhibit cultural retouch. Six retouched spalls from the intertidal zone and two of the four specimens from the upland test pit are clearly cultural (Table 8.1). Clustering of both retouched and unretouched spalls near the central part of the artifact scatter suggests that some or all of the unretouched spalls may also be cultural.

Four of the eight boulder spalls display the point of force on the ventral surface on one edge of the long axis, characteristic of what are sometimes called "side-struck flakes," while three "end-struck flakes" display the point of force on one edge of the short axis. The eighth specimen is of equal length in both axes.

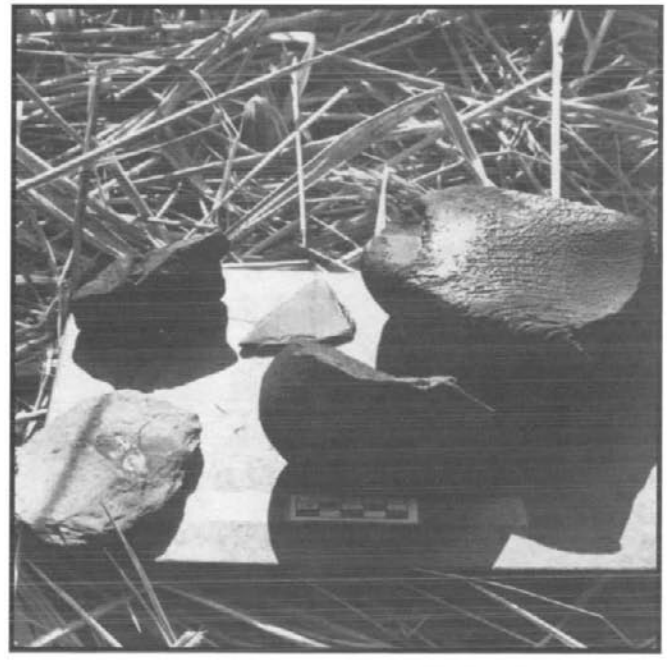
Cobble Biface (2)

Natural beach cobbles which have been bifacially flaked to form a sinuous cutting edge along one margin are classified as cobble bifaces. Two bifacially-worked cobbles were mapped and left in place in the intertidal zone. A heavy bifacially-flaked "cobble chopper" (Lot 31) was found 18 m from the cutbank near the central portion of the intertidal artifact scatter. The second example (Lot 58a) initially described as one of two "pecked cobbles" was mapped 12 m from the cutbank near the northern end of the artifact scatter. The artifact was later relocated and the description changed to "flaked cobble biface."

Utilized Flake / Flake (11)

Utilized flakes show evidence of unifacial or bifacial retouch resulting from use wear or intentional edge modification. Non-slate flakes which appear to be exotic to the local bedrock or have striking platforms or other morphological characteristics of culturally-produced flakes are included in this category.

Eleven flakes identified as clearly cultural in origin consist of seven recovered from the upland test pit in 1990, two recovered from the intertidal zone, and two observed and left in place in the intertidal zone. The latter group consisted of a "chipped flake" (Lot 49b) and a "slate flake" (FS 97). The two artifacts collected from the intertidal zone consisted of a basalt flake with a striking platform (49SEL-188-048) recovered from Test Unit B, and a green slate flake midsection (49SEL-188-071) with light unifacial retouch along both lateral edges.



(Charles Mobley 6:18 Exxon)

Figure 8.12 Artifacts mapped in the intertidal zone on April 26, 1990; clockwise from lower left: flake slate artifact, FCR, ground slate fragment, stone lamp fragment, FCR (Lot 50)

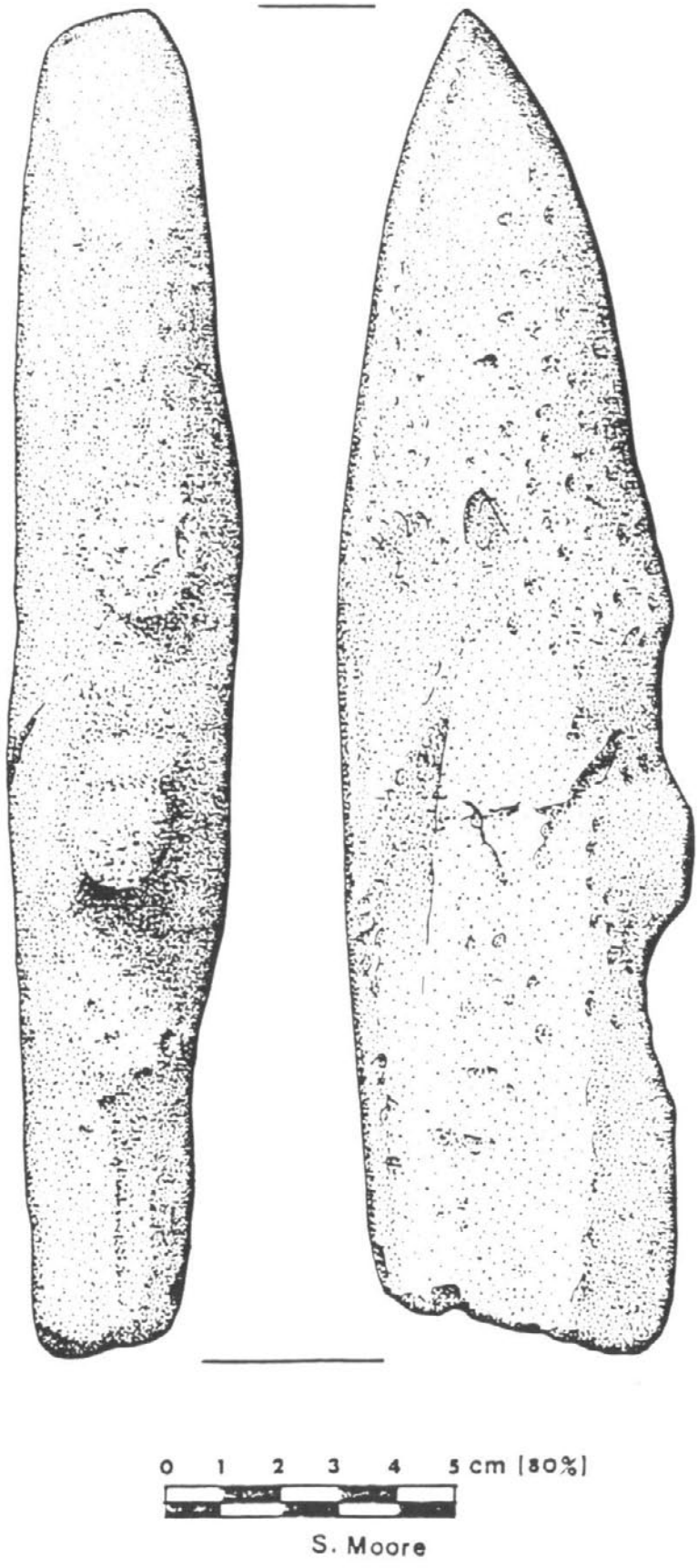


Figure 8.13 49-SEL-188-007 splitting adze with double grooves, collected from intertidal zone in 1989

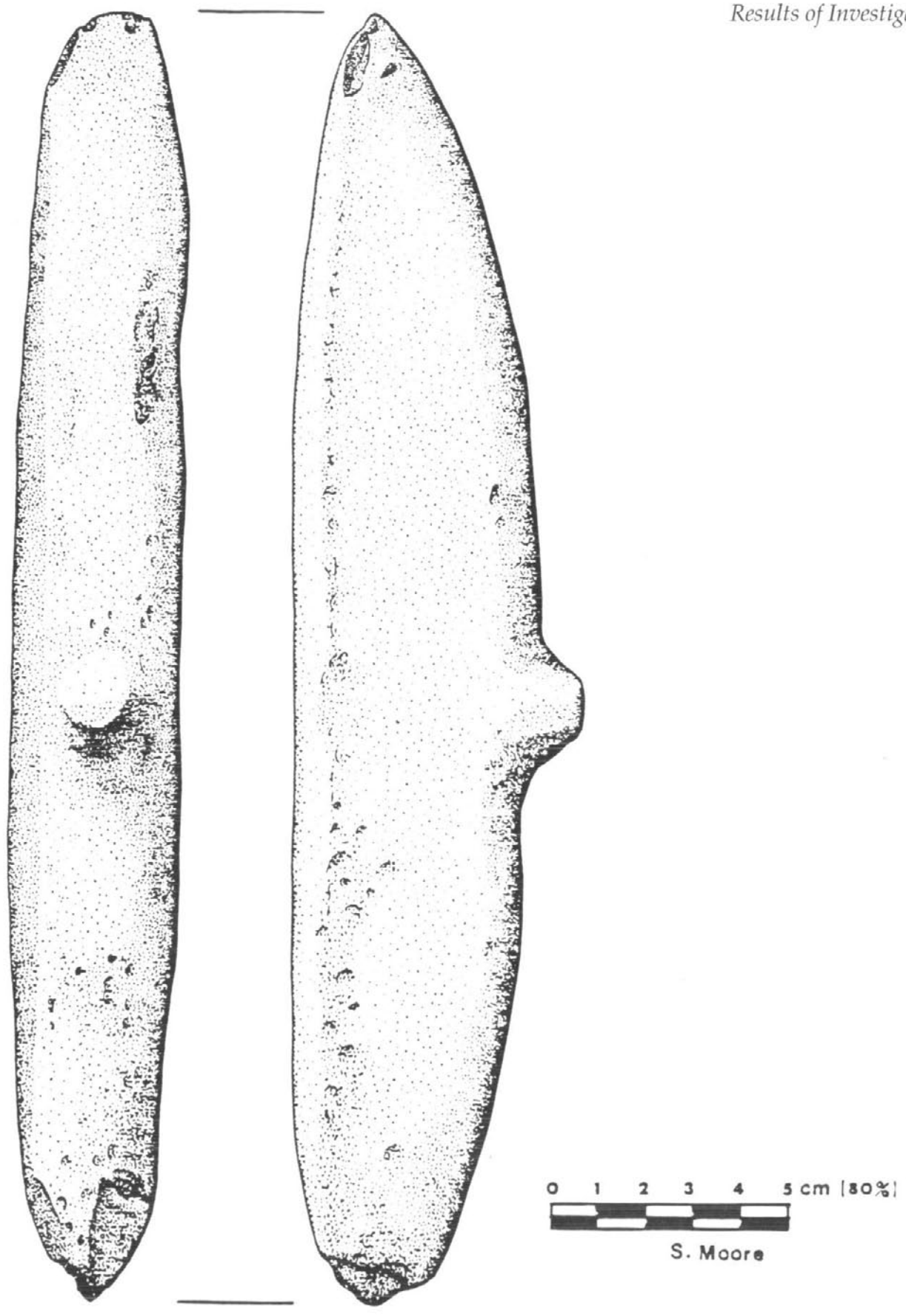


Figure 8.14 49-SEL-188-008 splitting adze with single hafting knob collected from intertidal zone in 1989

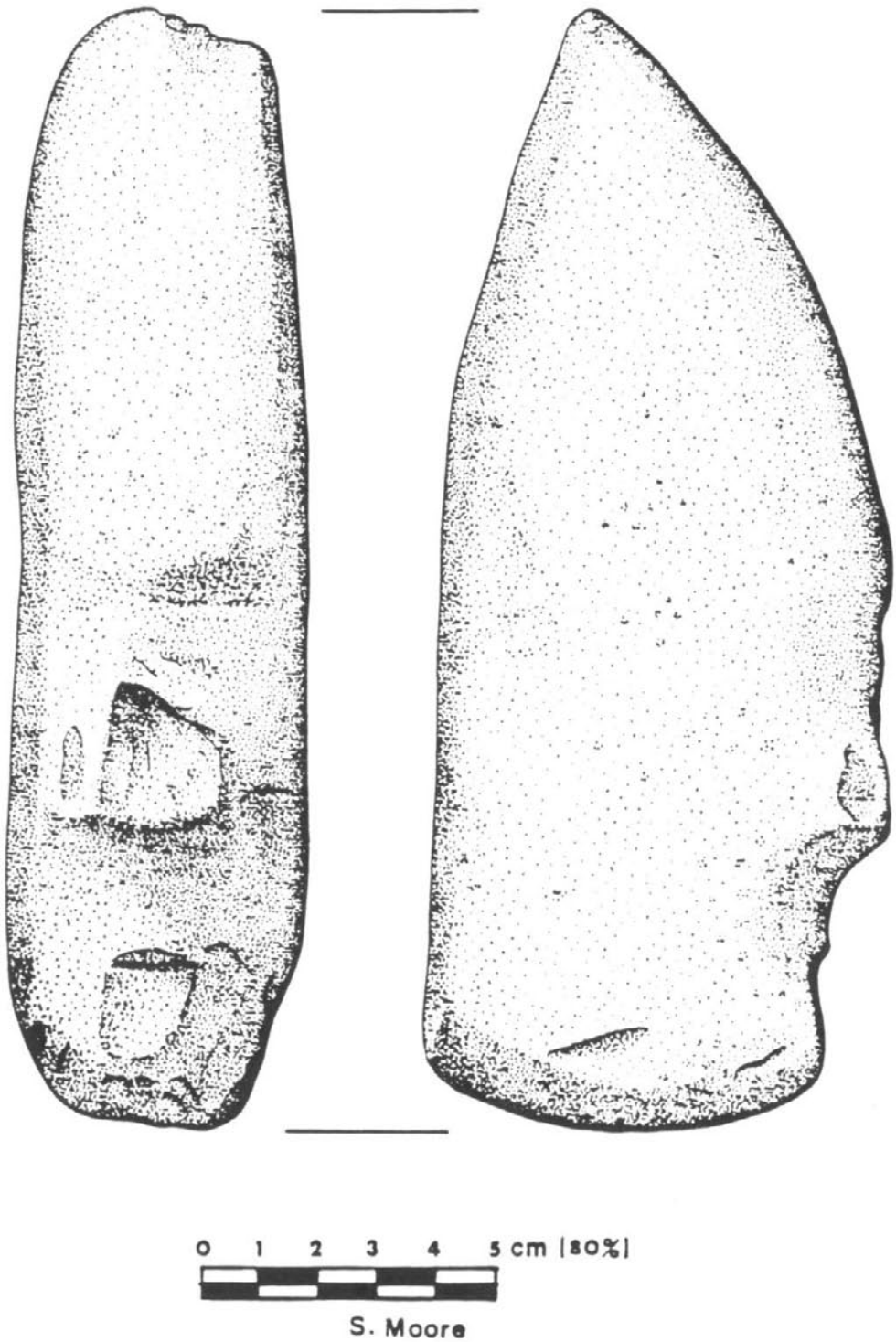


Figure 8.15 **49-SEL-188-092 splitting adze with two hafting grooves collected from intertidal zone during treatment monitoring in 1990**

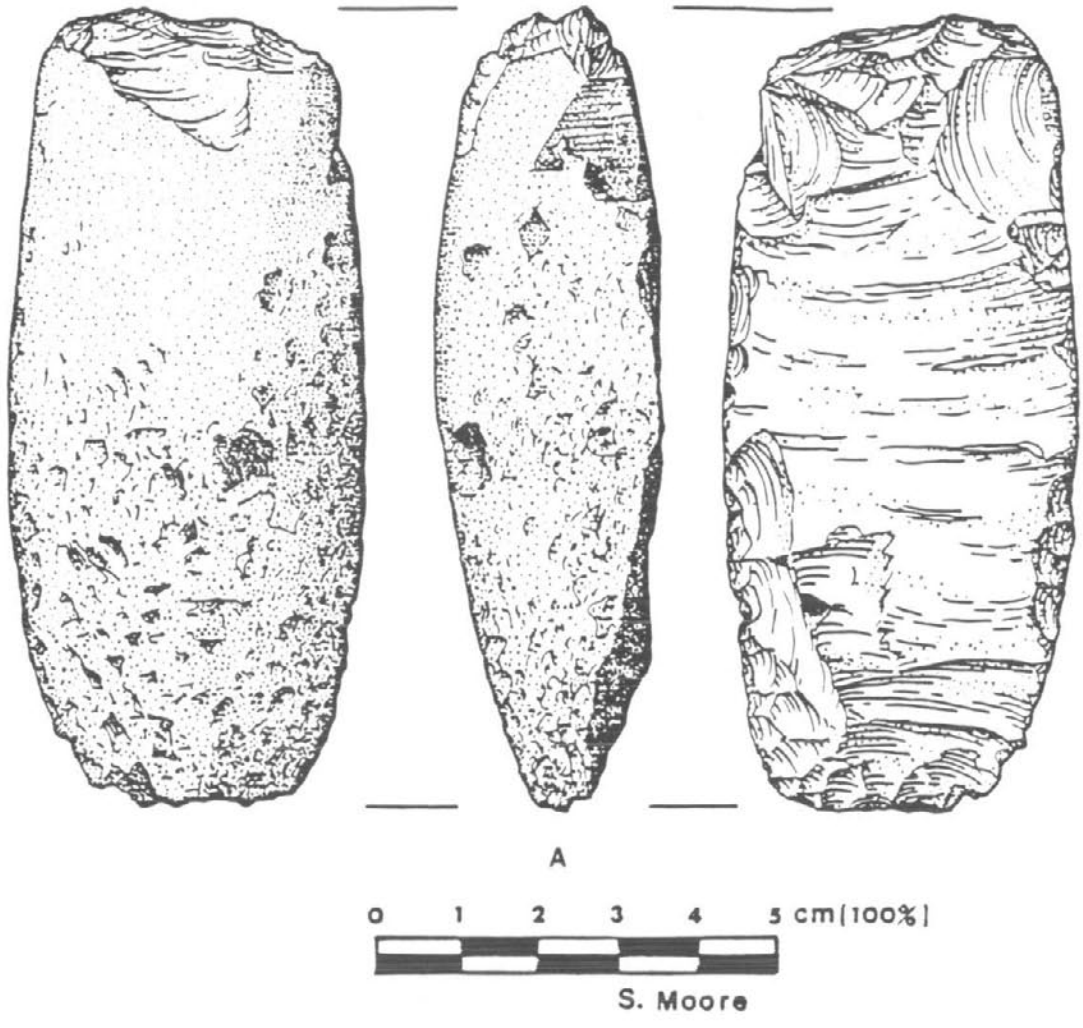


Figure 8.16 a. 49-SEL-188-006 adze fragment converted to a splitting wedge, collected from intertidal zone in 1989; b. 49-SEL-188-095 planing adze fragment from upland test 1990 Level I

Seven flakes recovered from the upland test pit in 1990 exhibit light use retouch. Two slate examples were excavated from Level I, one (49SEL-188-100) with a unifacially-flaked notch on one lateral side, and the other (49SEL-188-108) with light bifacial retouch evident along two edges. Three slate flakes with very light unifacial use wear were recovered from Level II, and one was recovered from the 1989 backfill (Level I/II). One flake of igneous rock with an apparent striking platform (49SEL-188-133) from Level III has light unifacial retouch near its proximal end.

Splitting Adze (7)

Splitting adzes are described in detail by de Laguna (1956:110-113). These are heavy pecked and ground stone tools, higher than they are wide, that typically have one or more knobs and grooves to facilitate hafting directly to an inverted L- or T-shaped handle. They are essentially wedges hafted adze-fashion and were "... presumably used for rough work, such as chopping down trees, splitting logs, etc." (de Laguna 1956:110).

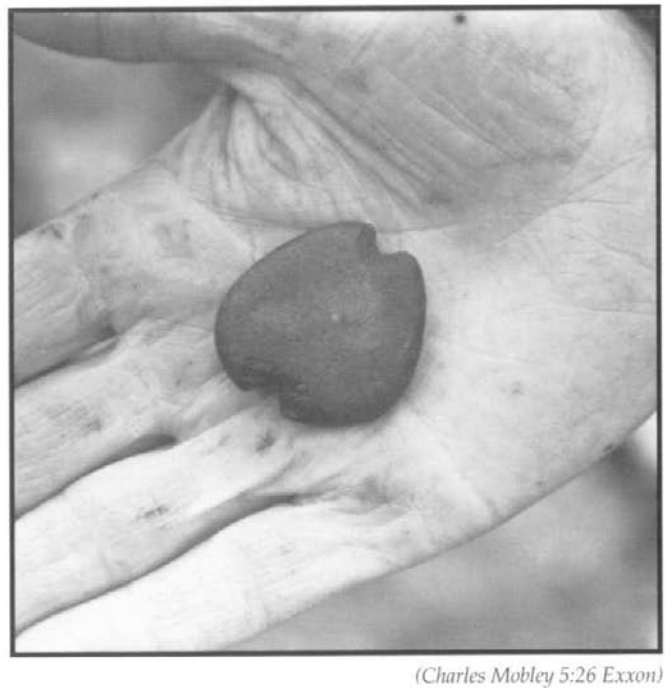
Seven graywacke splitting adzes or splitting adze fragments were collected in 1989 and 1990, representing six adzes. All have rounded rectangular cross-sections and flat parallel sides with the dorsal surface shaped by extensive pecking. Three complete adzes ranging in length from 18.86 cm to 27.70 cm were collected (49SEL-188-007,008,092). Two of the complete adzes are characterized by asymmetrical double-bevel bits with steeper upper bevels. One complete adze and one bit fragment (49SEL-188-008,052) have single-bevel working ends. The three complete adzes are all higher than they are wide and have flat bottoms and rounded tops. Two of the fragments have slightly rounded bottoms. Three examples (49SEL-188-008,051,093) have a single hafting knob, two of which have grooves distal to the knob. The third (49SEL-188-008;Figure 8.14;Plate VIb) has no indication of grooves associated with the central knob. Two examples (49SEL-188-007,092;Figures 8.13,8.15;Plates Vc,VIa) have two hafting knobs with associated grooves although the knobs on one (49SEL-188-092) have been largely destroyed by battering. Most collected adzes show evidence of heavy battering at either the poll or bit end.

One additional splitting adze was collected by the NPS tort investigator. A poll fragment, a bit fragment, and what was described as an "adze preform" were left uncollected. If these four artifacts are all splitting adzes, they would bring the total number of splitting adzes at SEL-188 to 11.

Pick (1?)

De Laguna (1956:130) reports a grooved greenstone "double-pointed war pick" with conical points at both ends from Palugvik in Prince William Sound. Another example, "... oval in section, with 2 encircling ridges at the middle setting off a groove for lashing" is also reported from Prince William Sound by de Laguna (1956:130).

One long, narrow, symmetrically pecked stone fragment (49SEL-188-063) with a conical point has been classified as a pick. The bit is battered and the



(Charles Mobley 5:26 Exxon)

Figure 8.17 Notched pebble (Lot 36) mapped in the intertidal zone on April 25, 1990

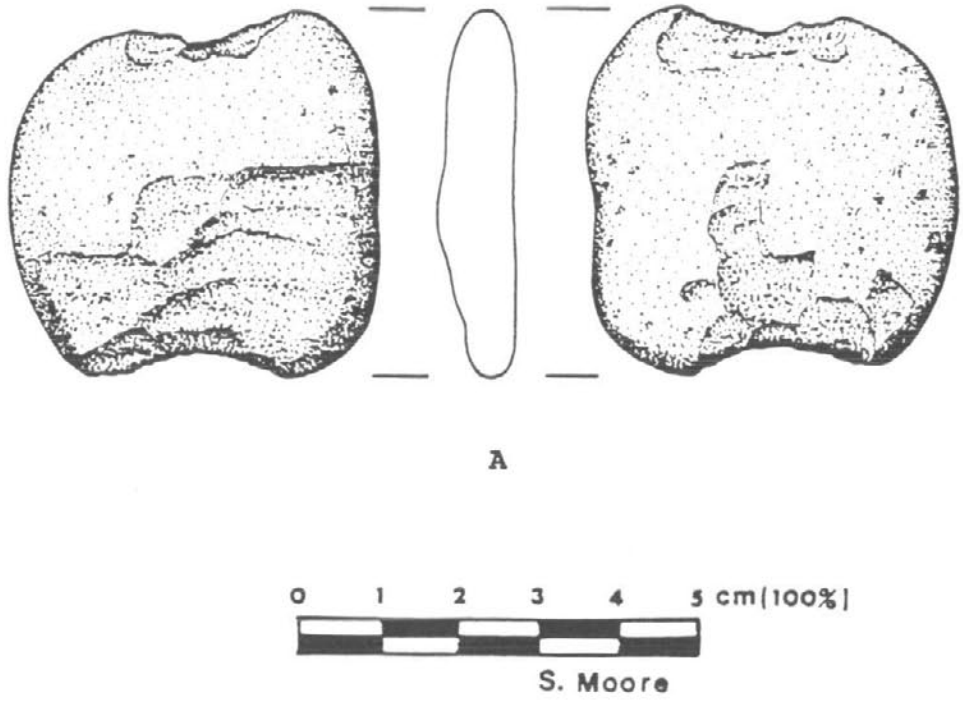


Figure 8.18 Notched pebbles from the intertidal zone. a. 49-SEL-188-022 collected in 1989; b. 49-SEL-188-069 collected in 1990

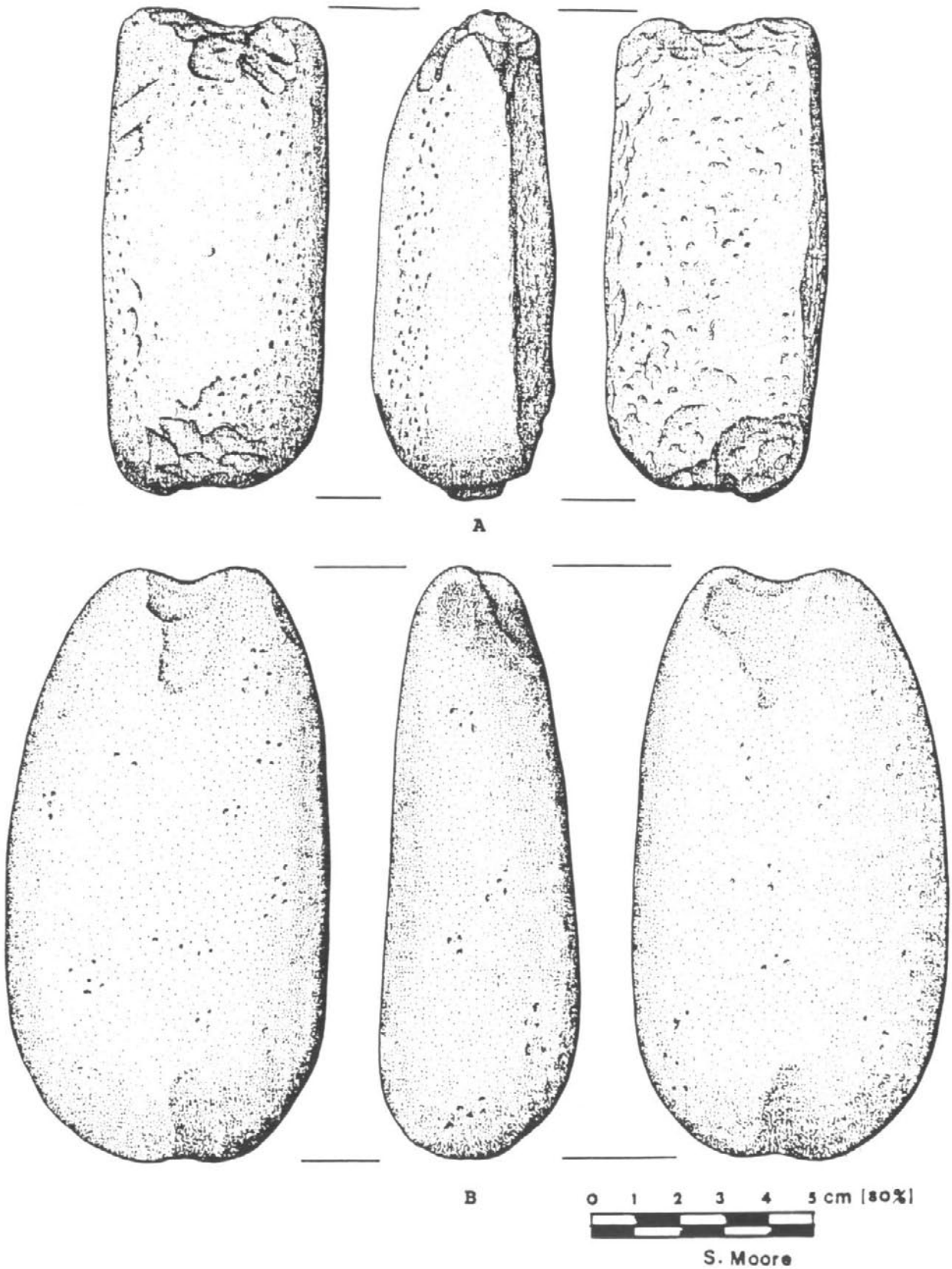


Figure 8.19 Notched cobbles collected from the intertidal zone in August 1990. a. 49SEL-188-064; b. 49-SEL-188-090

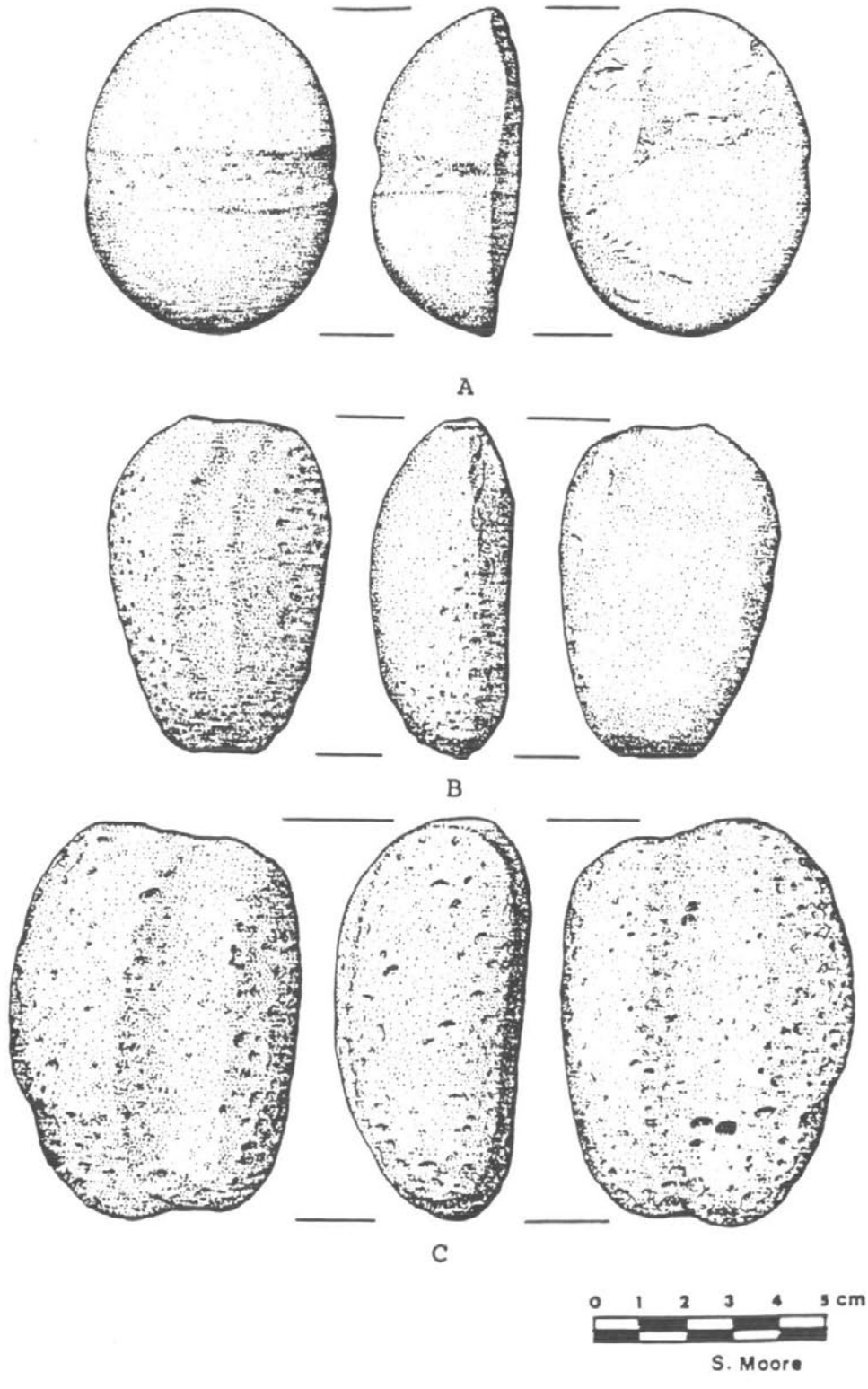


Figure 8.20 Grooved cobbles from the intertidal zone. a. 49SEL-188-050; b. 49SEL-188-057; c. 49SEL-188-078

artifact is split longitudinally. No indication of grooves or knobs is evident but the top portion of the midsection is missing. This extensively pecked tool appears to have been more rounded and conical than a typical splitting adze but its fragmentary nature cautions against asserting that the range of double-pointed picks (with a reported northern limit in Prince William Sound) may extend as far north as SEL-188. Workman and Workman (1990:285) classified a second complete pecked stone adze with a very narrow bit from SEL-188 (49SEL-188-008;Figure 8.14) as a splitting adze but indicated it might also be classified as a pick.

Planing Adze (2)

Planing adzes are described by de Laguna (1975:57) as "... a simple celt, sawed or chipped out, with a polished or chipped cutting edge. . . hafted in a bone or antler head, which in turn was lashed to a shouldered handle. . . larger specimens. . . may have been lashed directly to the handle." They are smaller and lighter than splitting adzes, are wider than they are high, and lack grooves for lashing.

Two artifacts are classified as planing adzes. One complete greenstone planing adze (49SEL-188-027) was collected in 1989 from the extreme northern end of the intertidal artifact scatter. The width is greater than the height and there is no indication of knobs or grooves. The working end tapers symmetrically to a sharp, finely-ground straight bit formed by a low angle single-bevel on the ventral surface. The second example is a fragment of a small, finely-ground, single-bevel greenstone adze bit (49SEL-188-095;Figure 8.16b;Plate Va) recovered from Level I of the upland test pit. One side of the working edge forms a right angle with the preserved edge of the tool.

Splitting Wedge (3)

Splitting wedges are smaller and lighter than adzes and exhibit a wedge-shaped working end with a single- or double-bevel ground edge. Extensive battering is frequently apparent at the poll end. De Laguna (1975:100) suggests that examples of whale bone and antler wedges from Kachemak Bay were used for splitting wood and stripping bark.

Three greenstone artifacts have been classified as splitting wedges (49SEL-188-006,074,075). The largest example (49SEL-188-006;Figure 8.16a;Plate Vb) has been converted into a splitting wedge from a larger pecked and ground adze which split longitudinally. A new convex working end was created by unifacial flaking, and the former adze bit converted to use as a poll. The other two artifacts are much smaller and heavily damaged by battering. One of these (49SEL-1898-074) has a definite double-bevel but most of the dorsal and ventral surfaces at the working end have been destroyed. The other example is possibly double-beveled at its thin distal end but battering and crushing have destroyed most of its working end. Both of these water-worn artifacts may be examples of small planing adzes but they are too battered and fragmentary to positively identify.

Stone Lamp (1)

Stone lamps are usually made from cobbles that have had the bowl hollowed out by pecking and grinding. Well-made lamps are frequently oval or roughly oval in outline and are typically broader at the back than at the front end where a lip was often placed (de Laguna 1956:145). Cruder specimens made from naturally hollow beach cobbles where the shape of the cobble has been only slightly altered are sometimes difficult to identify. De Laguna (1956:143) states stone lamps "... were used for light alone, not for cooking."

One pecked stone cobble (Lot 50) thought to be a lamp fragment was mapped and left uncollected in the upper intertidal zone (Figure 8.12). There is no decoration or defined rim, and a straight break passes through the middle of the pecked concavity. The fragmentary nature of this example makes its identification speculative.

Tabular Slab (3)

This class consists of relatively thin unshaped slabs of slate or sandstone which exhibit battering or polish. Two tabular slabs were mapped in the

(Charles Mobley 4:26 Exxon)

Figure 8.21 Fire cracked rock (Lot 12) mapped in the intertidal zone on April 25, 1990

intertidal zone and left in place, and another was recovered from the upland test pit. One "battered" sandstone slab (Lot 4) was mapped near the southern extent of the artifact scatter approximately one meter from the cutbank. A "polished" slab (Lot 49) was found near the northern end of the scatter, also about a meter from the cutbank. A one centimeter thick tabular slate slab (49SEL-188-126) recovered from Level II of the upland test pit shows bifacial flaking on one side at its midpoint.

Notched Pebble (4)

This class consists of water-rounded beach pebbles with two chipped notches roughly opposite each other. Four notched pebbles were recorded outside the treatment grid in the upper intertidal zone, two of which were collected. Both collected examples (49SEL-188-022,069;Figure 8.17,8.18;Plate VIIa,b) are flat pebbles less than five centimeters in diameter. One of the pebbles is basalt and the other graywacke and both have shallow flaked or battered notches on opposite edges.

Notched Cobble (3)

This class includes natural beach cobbles greater than 5 cm in diameter with two or more pecked notches. Two notched cobbles were collected from within the grid, and one outside the grid in the upper intertidal zone was left in place. The two collected examples (49SEL-188-064,090;Figure 8.19a,b;Plate VIIIb,c) are both elongated graywacke cobbles more than 11 cm long, displaying pecked grooves forming shallow notches at opposite ends. On one example (49SEL-188-064;Figure 8.19a), slight polishing, perhaps from lashing, is evident along the rounded top between two pecked notches, and battering at both ends suggests subsequent use as a hammerstone. The uncollected example (FS 94) is a flat elongated cobble over 10 cm long with three notches, two on opposite lateral edges and a third on one end.

Grooved Cobble (4)

This class consists of naturally-shaped ovoid beach stones that have been grooved by pecking, evidently for the purpose of receiving a thong or lashing of some kind (de Laguna 1975:54). All four grooved cobbles identified in the intertidal zone at SEL-188 were collected. One example (49SEL-188-050;Figure 8.20a) was recovered from 20 cm below the surface in Test Unit B prior to treatment, and the others were surface collected from outside the treatment grid. The cobbles range in length from 7.2 cm to 8.2 cm and the shallow pecked grooves are from .95 cm to 1.5 cm wide. Three of the specimens (49SEL-188-030,057,078) are grooved about the longer diameter so that the grooves form shallow pecked notches at the ends. Only one of these (49SEL-188-078;Figure 8.20c;Plate VIIIa) has a groove completely around the long axis of the cobble. One specimen (49SEL-188-030) split longitudinally after pecking, so that only the groove on the rounded dorsal surface is preserved. Another example (49SEL-188-057;Figure 8.20b;Plate VIId) is a complete cobble but the longitudinal groove termi-

nates after rounding the ends so that most of the flatter of the two sides is unmodified. This cobble has very light battering on one margin which appears to be from use as a hammerstone. The remaining cobble (49SEL-188-050;Figure 8.20a;Plate VIIc) is grooved about the middle but split longitudinally so that only one half of the original artifact was recovered.

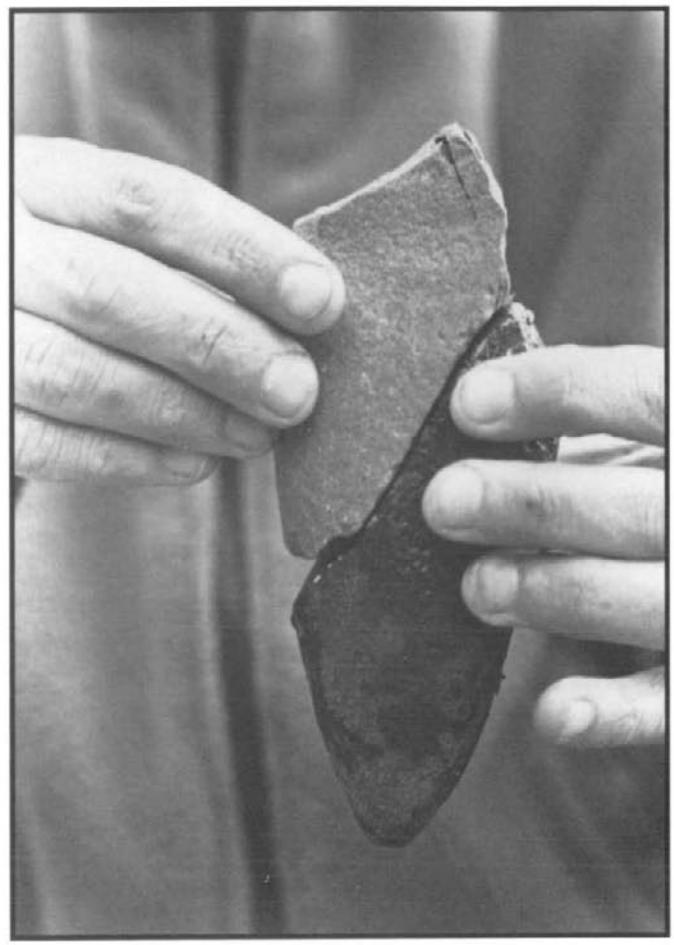
Battered Cobble / Hammerstone (23)

Battered beach cobbles vary in size from pebbles to cobbles and in shape from ovoid to cylindrical. They exhibit one or more discrete areas which are heavily crushed or battered, are sometimes flattened on one or both ends from extensive use, but are otherwise unmodified. They presumably were employed as unhafted hammers in tool manufacture involving percussion flaking or pecking.

Ten battered cobbles were mapped in the intertidal zone and left in place. Of thirteen others collected, five were retrieved from the intertidal zone in 1989 by the NPS tort investigator and are unavailable for study, one (49SEL-188-049) was recovered from Stratum II in Test Unit B, four were collected from the intertidal zone during treatment, and three were recovered from the upland test pit (Table 7.1). All are of igneous rock and range in length from 7.13 cm to 14.94 cm. Different configurations of battering are apparent, some showing battering on one or both ends, some exhibiting battering on one or both lateral margins, and others with battering on ends and sides.

Abrader (1)

Abraders are coarse-grained stones which show evidence of striations or polish from use as grinding or sanding implements but are usually otherwise unmodified. An abrader recovered from the 1989 upland test excavation is a cylindrical schist beach cobble (49SEL-188-034) with one lateral side worn flat by grinding.



(Charles Mobley 4:36 Exxon)

Figure 8.22 Two splitting adze fragments, oiled (bit) and unoiled (midsection), collected 17 m apart in the intertidal zone

Historic Artifacts (3)

A Henry .44 center-fire cartridge case (49SEL-188-004;Figure 8.9a;Plate IVb) and a piece of water-worn green bottle glass (49SEL-188-039) with bubbles suggestive of manufacture prior to the mid 1900s were collected from the intertidal zone. A rusted iron "plate" (Lot 65) noted in the intertidal zone was mapped but not collected. The collected cartridge case was an intertidal surface find although a second uncollected cartridge case (considered to be part of a possible feature, rather than tabulated as an artifact) was observed hammered into a piece of wood in the uplands. The bottle glass

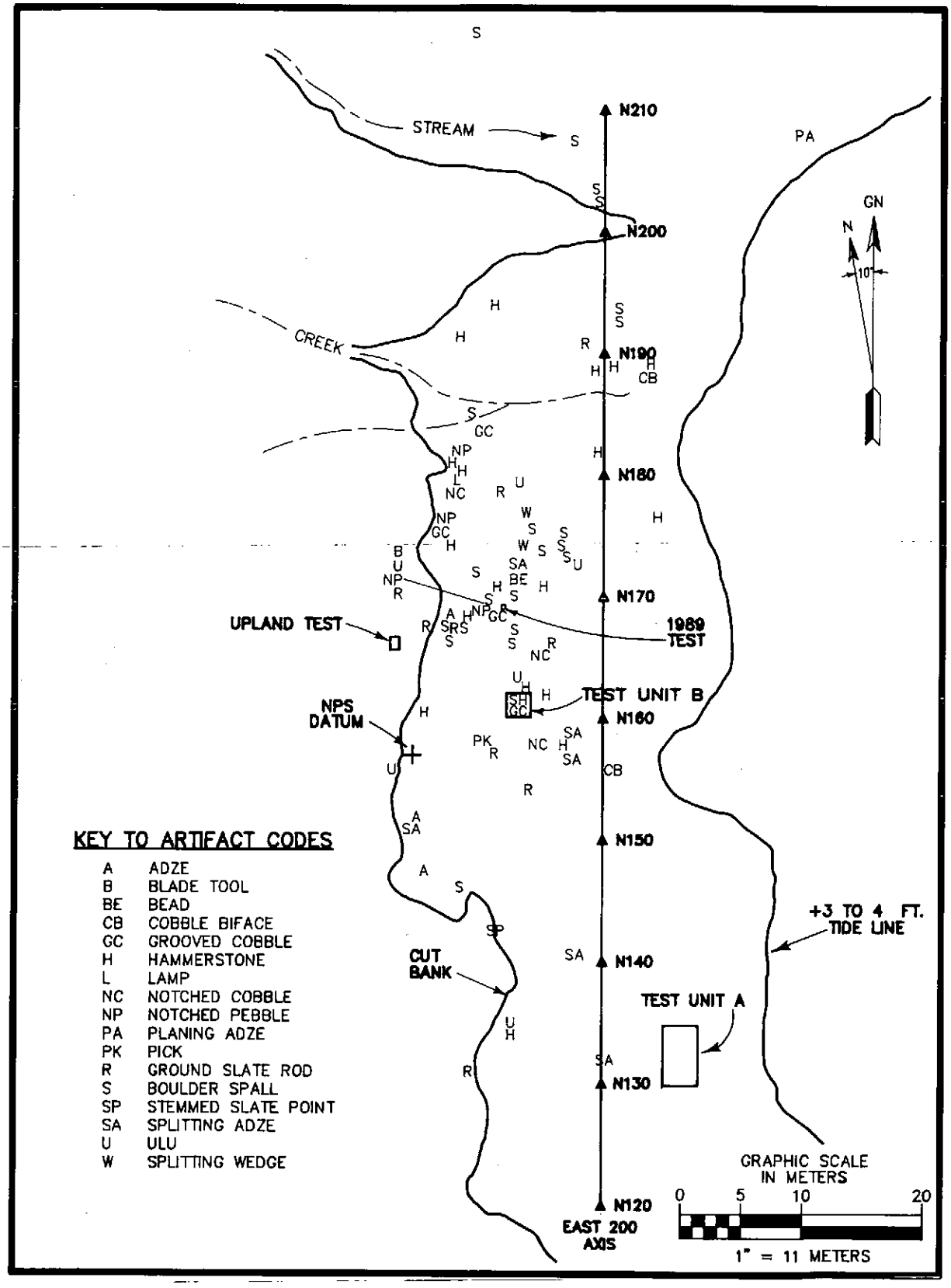


Figure 8.23 Artifact type distribution in the intertidal zone

was recovered during excavation of Test Unit B in the intertidal zone and could have floated to the site.

Fire Cracked Rock

Fire cracked or thermally altered rock consists of rock that has fractured and split as a result of rapid heating and/or cooling. Fragments are angular and often highly oxidized (reddish in color) and frequently contain evidence of shallow "potlid" spalls that have separated from the cortex. A large concentration of fire cracked rock in an archaeological context is often considered to be the by-product of an activity such as stone boiling or sweat bathing.

Fire cracked rock is found sporadically along the entire length of the intertidal artifact scatter (Figure 8.1, 8.21). NPS site mapping in August 1989 indicated concentrations of FCR but did not map individual fragments (Figure 4.3). Exxon site mapping in April 1990 plotted 81 pieces of FCR either individually or as lots (Figure 5.3). One additional piece of FCR was recovered during subsurface testing in the intertidal zone, increasing the FCR count in the intertidal zone to 82. Five pieces of FCR were also recovered from Levels I and II of the upland test (Table 7.1).

Vertical Artifact Distribution

The vertical distribution of artifacts at SEL-188 was observed in the upland test pit and in the subsurface tests placed in the intertidal zone. The intertidal artifacts at SEL-188 lost their original context due to erosion, and their vertical distribution is essentially insignificant.

Excavating the upland test pit in 1989 recovered artifacts that could be provenienced according to the 1990 stratigraphy only as Levels I/II (Schaaf and Johnson 1990:14). Using the requirement of demonstrable cultural modification to discriminate artifacts, the upland excavations resulted in the recovery of 27 artifacts from three stratigraphic levels (I-III) (Figure 7.2, 8.2). Five artifacts were recovered in 1989, and 22 artifacts were collected from the 1990 testing (Tables 8.1, 8.3). One hundred twenty-four specimens lacking cultural modification were also collected and cataloged from the upland test pit (Table 8.2). The majority of these specimens are unmodified pieces of slate, but two unretouched boulder spalls, five pieces of FCR, and other unmodified rocks and cobbles are included with this material.

Twelve artifact classes are represented by the 27 artifacts from the upland test. Artifacts from Level I include a triangular slate endblade, a flaked slate tool, a greenstone planing adze fragment, two ground slate fragments, and two slate flakes with use retouch. Level II contained two hammerstones, a notched ground slate *ulu*, a bifacially-retouched tabular slab, one ground slate fragment, and two (possibly three) flakes with use retouch. Three artifacts were recovered from Level III - two ground slate flakes and a flake with use retouch. A barbed double-edged slate blade, two "incised" slate tablets, a hammerstone, an abrader, two retouched boulder spalls, a ground slate fragment, and a flake with use retouch were collected in 1989 or recovered in 1990 from the 1989 backfill.

Intertidal subsurface excavation was limited to one small test by Worthington (NPS) in 1989 and two larger excavations by Exxon archaeologists in April, 1990. Eleven sharp-edged pieces of slate and a tabular piece of sandstone collected from the 20 x 20 cm NPS trowel test show no evidence of cultural modification, although they were collected from sediment reported to contain charcoal.

The larger 1990 tests covered a combined surface area of 19 m^2 (205 ft^2). Test Unit B, covering four square meters (43 ft^2) within the asphalt tarmat, produced a hammerstone (49SEL-188-049), a grooved cobble (49SEL-188-050; Figure 8.20a), an unretouched basalt flake (49SEL-188-048), and a piece of green bottle glass (49SEL-188-039). Fragments of modern glass were also recovered. The hammerstone was excavated from 10 cm (3.9 in) below the ground surface, and the grooved cobble was recovered from a depth of 20 cm (7.9 in). No cultural matrices or charcoal were observed in the unit, and nothing indicated the artifacts were in primary depositional context. The presence of modern glass with subsurface intertidal stone tools

is clear evidence of intertidal sediment mixing. Additional subsurface artifacts (including a single stone bead) were recovered by archaeologists and treatment workers from within and below oiled sediment in August 1990, and the material was clearly in secondary depositional context.

Horizontal Artifact Distribution

The single upland test pit allows little generalization about the horizontal distribution of artifacts in the uplands, but the mapping of surface artifacts in the intertidal zone provides a basis for discussing horizontal artifact distributions below the cutbank. Approximately two-thirds of the artifacts were located in the unoiled upper intertidal zone, with artifact density decreasing downslope towards the water (Figure 8.1). Of 134 artifacts (including 9 problematic specimens) mapped in the intertidal zone in 1990, 87 (65%) were located in the supratidal and upper intertidal zone above the oil; 42 (31%) were mapped in the oil band; and five (4%) were mapped below the oil. If eight unmapped (but unoiled) artifacts collected by Exxon in 1989 are included, 67% of the artifacts were identified above the oil band. Artifacts occur with decreasing frequency through the oil band, and none were identified in the lower intertidal zone.

Artifact density is variable parallel to the cutbank. Artifact and FCR clusters mapped by NPS in August 1989 (Figure 4.3) became less well-defined as the number of individual artifacts mapped during survey and monitoring increased (Figure 8.1). The largest, most obvious artifact concentration occurs west of the site baseline between the N164 axis and the N180 axis. In this area 58 artifacts and four FCR were mapped in approximately 200 m^2 (2,153 ft^2) between the cutbank and the baseline. This accounts for 47% of the artifact total and 5% of the FCR within approximately 17% of the total intertidal site area. An area at the southern extent of the intertidal artifact distribution identified as an FCR concentration in August 1989 was confirmed by subsequent mapping. This area, east of the baseline between the N130 axis and N144 axis, contained 28 FCR and five artifacts in an area of approximately 132 m^2 (1,421 ft^2). This amounts to 34% of the FCR and 4% of the artifacts identified within approximately 11% of the intertidal site area.

Two articulating adze fragments (49SEL-188-051,052) were discovered 17 m (56 ft) apart in the intertidal zone (Figure 8.22). Differential rounding of the articulating edges suggests that the bit fragment which was found in the mid-intertidal zone has been subjected to wave action longer than the midsection fragment which was found within a meter of the cutbank. The artifact was likely broken prior to redeposition. Since the two fragments probably did not enter the intertidal zone at the same time, they probably didn't enter the intertidal zone at the same place. The 17 m distance between the two does not necessarily indicate the degree of artifact movement caused by wave action.

Retouched and unretouched boulder spalls (N=13) are more common in the central portion of the site between the N164 axis and the N176 axis, covering an area 14 m long by six meters wide (Figure 8.23). Boulder spalls (N=22) were identified over almost the full north-south extent of the intertidal site area but 13 (59%) of the mapped spalls are concentrated in approximately 84 m^2 (904 ft^2) or 7% of the intertidal site area. This increases the likelihood that some or all of the unretouched spalls in this cluster are artifacts.

The intertidal distribution of splitting adzes, ground slate rods, ground slate *ulus*, and hammerstones is not visibly patterned (Figure 8.23). All notched pebbles, notched cobbles, and grooved cobbles (N=11) were located in the central part of the intertidal site area west of the E196 axis, and between the N156 axis and the N184 axis. However, many other artifact types were also located in this area and no distinct activity area is represented by culturally modified pebbles and cobbles.

Nine of 12 heavy pecked stone tools normally associated with woodworking activities are mapped or were collected by Yarborough in 1989 from the southern portion of the site between the N132 axis and the N173 axis. These tools include five collected splitting adzes, two uncollected adze

fragments, an uncollected adze preform, and a splitting adze converted into a splitting wedge. However, the distribution of adzes is not limited to the southern portion of the site, since Yarborough collected two unmapped splitting adzes in 1989 from near the mouth of the larger creek at the north end of the site, and NPS collected a planing adze in 1989 at the extreme northeast end of the site.

Fire cracked rock in the intertidal zone displays some patterning. Six specimens were located in proximity to each other at the mouth of the larger of the two creeks at the extreme north end of the site where they may have been deposited by creek runoff. Three concentrations of FCR were identified south of the N200 grid axis. The northernmost concentration consists of 33 fragments covering an area approximately 18 m (59 ft) long by eight meters (26 ft) wide between the smaller creek bed and the sharp point of land on the baseline at the N200 axis. This concentration extends eight meters (26 ft) east of the site baseline and up to 10 m (33 ft) from the closest point of the cutbank. South of the smaller creek almost all FCR is found within four meters (13 ft) of the cutbank. The middle FCR concentration, consisting of 16 fragments, occurs between the N154 axis and the N163 axis in the immediate vicinity of the NPS site datum. A concentration of 28 specimens at the southern limit of mapped artifacts occurs between the N130 axis and the N144 axis. Twenty-two fragments in this concentration form a relatively tight cluster less than two meters (6.6 ft) from the cutbank between the N140 axis and the N144 axis.

Although some artifacts and especially FCR appear to be unevenly distributed in the intertidal zone, no behavioral inferences can be made from the distribution. Differential upland erosion, mixing and sorting by wave action, differential artifact visibility, and differential treatment intensity are likely responsible for the apparent artifact and FCR concentrations. Also, since the upland test pit contained three strata, as many as three discrete distributions of cultural material were potentially deflated into the intertidal zone and churned by wave action. These factors plus the small sample size prevent making behavioral inferences from the intertidal artifacts.

Relationship Between Upland and Intertidal Artifact Assemblages

Redeposited artifacts recovered from a beach context normally provide scant information compared to artifacts excavated from primary cultural deposits. The 1990 upland excavation enabled rela-

Table 8.4 Plant Macrofossils Identified in Soil Samples from the Upland Test, August 1990

Sample No.	Sample Size	Provenience	Galium (seeds MNI)	Sambucus	Picea (needles)
M-1	.6 liter	North wall Level I	42[c]	1[c],3	Frequent[c]
M-2	.7 liter	West wall Level I	34[c]	1	Frequent[c]
M-3	.35 liter	North wall Level II	5[c]	1	Frequent[c]
M-4	.3 liter	West wall Level II	--	17	Frequent[c]
M-5	.3 liter	North wall Level III	--	--	Few[c]

[c] = carbonized

tionships to be established between intertidal artifacts and artifacts recovered from datable primary deposits. Eight of the artifact classes identified in the intertidal zone were also recovered from the upland excavation (Table 8.3): barbed, double-edge blades, planing adzes, notched *ulus*, hammerstones, boulder spalls, ground slate, flaked slate, and utilized flakes.

A barbed, double-edge blade slate point (49SEL-188-032;Figure 8.4b) recovered from 36 cm below the surface (probably Level II) during the 1989 excavation is slightly larger but very similar to a point (49SEL-188-024;Figure 8.4a) collected from the intertidal zone in 1989. Both points are comparable to Late Kachemak Three Saints Bay style points from Kodiak Island described by Clark (1970:90-91). These two artifacts provide the best linkage between the intertidal and upland artifacts and indicate a temporal relationship between the two assemblages.

Although planing adzes were recovered from both the intertidal zone and the uplands test, the adzes are quite different. The greenstone adze collected from the intertidal zone in 1989 (49SEL-188-027) is a massive adze 17.53 cm long with a finely ground, straight, single-bevel bit. It is similar to the larger planing adzes described by de Laguna from Prince William Sound and Kachemak Bay (de Laguna 1956:116-121;1975:56-57). A thin, tabular planing adze fragment (49SEL-188-095:Figure 8.16b) was recovered in 1990 from Level I in the upland test. This bit fragment is from a much smaller greenstone adze almost identical to an adze from Cottonwood Creek in Kachemak Bay illustrated by de Laguna (1975:Pl 19-7). Examples of both large and small types of planing adzes are reported from Prince William Sound and Kachemak Bay (de Laguna 1956,1975). In Prince William Sound an emphasis on very small adze blades, barbed slate points, grooved splitting adzes and abundant FCR is reported for de Laguna's Younger (Palugvik 3 and 4) Prehistoric period (Workman 1980b:79). In this respect, the small planing adze from the upland test fits well with the artifact assemblage from the intertidal zone.

(Charles Mobley 4:35 Exxon)

Figure 8.24 Drowned, culturally modified tree in the intertidal zone

Of nine *ulu* fragments identified at SEL-188, four had indication of notching. Notched *ulus* were recovered from the intertidal zone and the upland test. One corner fragment (49SEL-188-114; Figure 8.7b) of a notched *ulu* was excavated from Level II in the upland test and the remaining three (49SEL-188-020,021,059) were collected from the intertidal zone. Although they appear earlier in Kachemak Bay, hafting notches are most common in Late Kachemak tradition artifact assemblages (Workman 1980b:76).

Twenty hammerstones were identified in the intertidal zone, and three hammerstones were collected in 1990 from the upland test, two from Level II, and one from the 1989 backfill. While hammerstones have little diagnostic value, the fact that they occur in fairly high numbers in the intertidal zone and were well-represented in the uplands test demonstrates the similarity of the two collections. Activity involving cobbles as hammerstones must have been fairly common at SEL-188. Percussion flaking of slate tools and pounding of adzes (as

evidenced by battered poll ends) are two activities which probably involved hammerstones.

Retouched and unretouched boulder spalls are also well-represented in the uplands and intertidal zone. Twenty-two boulder spalls were identified in the intertidal zone and four were collected from the upland test. Of these, six collected from the intertidal zone and two from the upland test exhibited either intentional or use retouch. One of the excavated retouched spalls was recovered from 30 cm below the surface in 1989 (probably Level II) and the other spall was recovered from the 1989 backfill in 1990. The highest density of retouched and unretouched boulder spalls in the intertidal zone occurred in the area immediately northeast of the upland test (Figure 8.23). The four spalls from the upland test further indicate the similarity of the artifact assemblages from the intertidal zone and uplands.

Ground slate flakes (n=6) and flakes with intentional retouch or use wear (n=7) were recovered from all cultural levels in the upland test and were also recovered from the intertidal zone (Table 8.3). Unmodified slate "flakes" were also collected from the upland test (n=103). Ten sharp-edged unmodified slate "flakes" were excavated from an intertidal test in 1989, reportedly from a carbonaceous matrix (Worthington 1989). Numerous unmodified slate flakes were observed but not mapped on the surface of the intertidal zone. The presence of unmodified slate "flakes" in association with clearly cultural levels in the uplands test suggests that some are debitage from slate flaking activity although natural transportation of slate to the site area is also possible (Crossen and Banks 1990;Appendix C). The cultural origin of unmodified slate "flakes" was not as apparent in the intertidal zone due to the lack of context and the frequency of rounded, waterworn edges on slate fragments.

The upland and intertidal artifacts are similar in terms of artifact types, lithic technology, and raw material suggesting the intertidal assemblage is very likely related to artifacts from Levels I and II in the upland test dated to the second millennium A.D. Relationship of the intertidal artifacts to a first millennium A.D. occupation is unclear since artifacts recovered from Level III consist of only three ground or retouched slate flakes. The absence of many of the intertidal artifact classes from the upland artifact assemblage is not unexpected given the small size of the uplands test pit. Many of the classes not recovered from subsurface testing in the uplands (splitting adze, ground slate rod, notched pebble, notched and grooved cobble, etc.) would very likely be encountered with further upland testing.

Floral and Faunal Remains

Floral and faunal remains were recovered only from the 1990 expansion of the upland test pit (Table 8.4). While limited inferences can be made, the presence of microfauna and microfloral remains does indicate the potential for preservation of such items at SEL-188. The material was described in detail by Schaaf and Johnson (1990:14-18):

> Carbonized hollow spheres from 1-3 in diameter, relatively thick-walled in cross-section, were identified as Galium spp. (bedstraw, Figure 7.8; Martin and Barkley 1961:122,199; UAA Herbarium specimen no. 803; Schaaf, personal collection). Some of the seeds have a faint surface texture and an attachment scar. Galium is very abundant in level I (N=76) and is well-represented in level II (N= 5) given the small sample size. Several species of Galium have ranges that include the SEL-188 Area (Hulten 1974:837-840). Galium fruits mature in August (A. Batton and G. Davies personal communication) and their presence in the sediments may indicate episodes of late summer/fall site use. Because forest fires are extremely rare in the area (Rice, personal communication), the abundant charcoal in levels I, II and III is considered to be culturally produced. The seeds, attached to plants growing onsite or utilized at the site or perhaps transported to the site on fur or clothing, were carbonized during the activities which produced the charcoal.
>
> Galium had a wide range of medicinal uses in a number of North American native groups, including the outer inlet Denai'na (Moerman

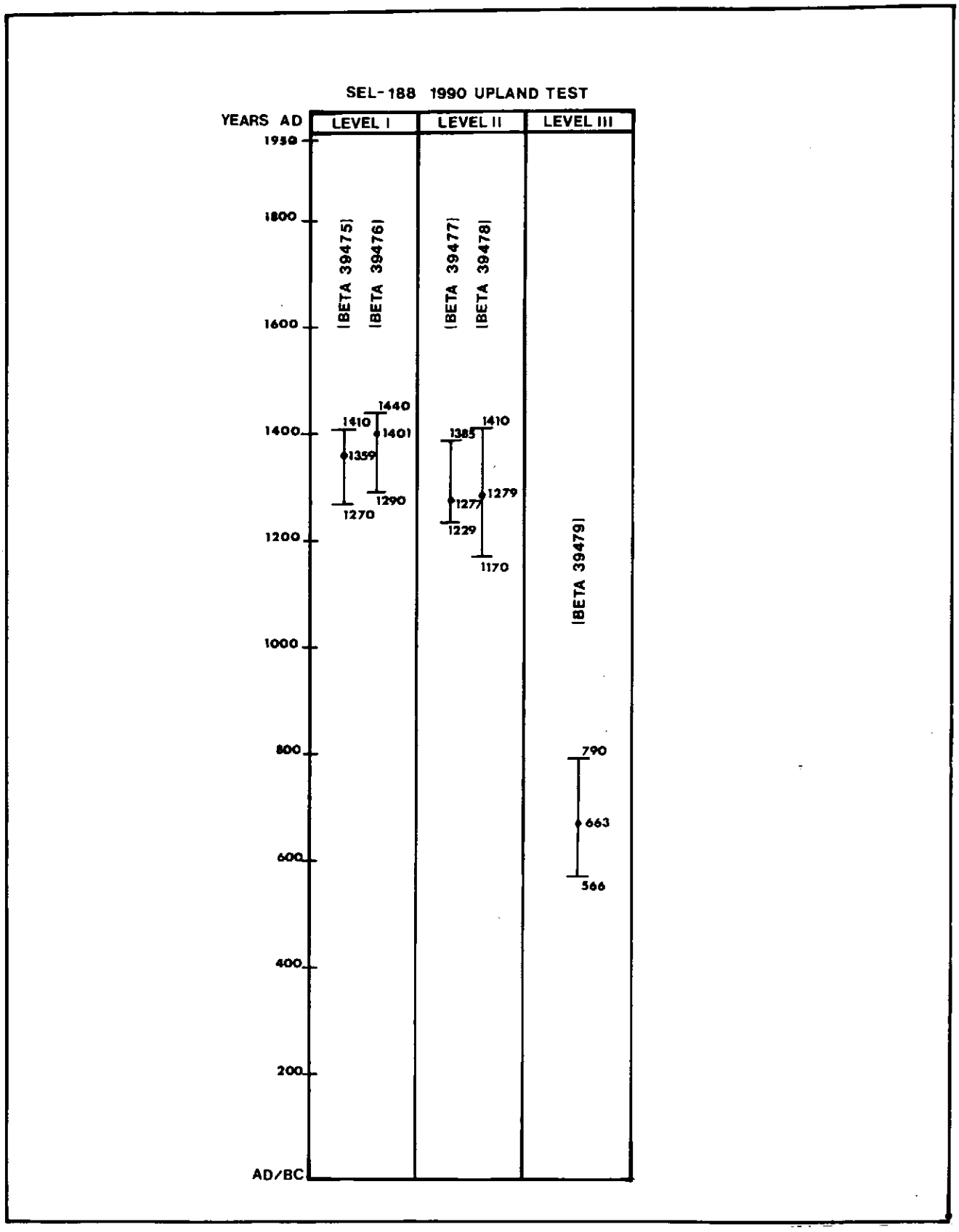


Figure 8.25 1990 NPS calibrated radiocarbon results with two sigma standard deviations reported by Schaaf and Johnson (1990:Attachment 1)

Table 8.6 Regional Distribution Summary of Selected SEL-188 Artifact Types

SEL-188	Kachemak Bay	PWS	Kodiak	Alaska Peninsula
Triangular Endblade (Level I) (A.D. 1359-1401)	Present Late Prehistoric (Post A.D. 1000) Not documented for Kachemak tradition	Present (Uqciuvit) Village (Post A.D. 1000)	Present Koniag phase (A.D. 1100-1763)	Present Kukak Mound phase (A.D. 1000-1400)
Barbed, Double-Edged Blade (Level II?) (A.D. 1277-1297)	Present Appear Kachemak II Common Kachemak III	Present Common upper levels at Palugvik (3-4)	Present Three Saints Bay phase (100 B.C. - A.D. 1100) Continue into Koniag	Present Kukak Mound phase (A.D. 1000-1400)
Ground Slate Rod	Present Late Kachemak	Present More common lower levels at Palugvik	Present	Present Appear in Kukak Beach phase (A.D. 500-1000)
Notched Pebbles	Present Late Kachemak	Absent or rare	Present Three Saints Bay phase (100 B.C. - A.D. 1000) Rare in Koniag sites Common in Kachemak III sites	Present Kukak Beach phase (A.D. 500-1000) T. Cottonwood phase (A.D. 200-500)
Splitting Adze	Present but rare in Prehistoric Period (not present in Late Kachemak tradition)	Present (Post A.D. 1000)	Present Koniag phase sites (not present in Late Kachemak tradition)	Not reported on Pacific Coast
Notched Ulu (Level II) (A.D. 1277-1279)	Present Appears Kachemak I Common in Late Kachemak tradition	Present at both Palugvik and Uqciuvit	Present Late Prehistoric (very common in Kachemak III)	Present Takli Birch (2500 B.C. - 800 B.C.)
Grooved Cobbles	Present Appears Kachemak II Common in Kachemak III	Present in Palugvik 1	Present Common Late Kachemak Three Saints Bay	Present Takli Birch (2500 B.C. - 800 B.C.)
Incised Slate Tablets	Not Reported	Present Palugvik (1-2) (before A.D. 1000)	Present Common Late Prehistoric Koniag sites (A.D. 1100 - A.D. 1763)	Not reported
Boulder Spalls (Level I/II) (common in ITZ)	Common in Kachemak tradition sites	Very rare	Present Late Prehistoric Koniag sites	Not reported

1986:191-193; Kari 1987:141). The Denai'na called Galium "wormwood's partner" because it had similar characteristics and uses as wormwood (Artemisia tilesii), one of which was use as a switch in the steambath (Kari 1987:141).

Large (ca. 3 mm), irregularly-shaped, hollow spheroids with very thin walls in cross-section and small (.5 - 1 mm) solid spheres are common in the sediments. These carbonized specimens do not exhibit any features characteristic of seeds, and have not been identified. A non-carbonized moss fragment Rhytidtia delphus lareus (Hedw.) Warnst. from level II was identified by Dr. Marilyn Barker, UAA Department of Biology. This moss is common in Pacific coastal forests.

Non-carbonized Sambucus racemosa (elderberry) seed testas were identified in levels I (N=5) and II (N=18) (Figure 7.9; UAA Herbarium specimen nos. 801, 802). Only one specimen is carbonized. Seed testas can be quite durable and are therefore not to be dismissed a priori as modern contaminants. However, the non-carbonized seeds cannot be linked to cultural activities with our limited sampling. Sambucus is sometimes a site indicator in the Prince William Sound area, and may have grown in the enriched site sediments after abandonment (See also Kari 1987:89; Moerman 1986:438-439).

Carbonized Picea cf. sitchensis (Sitka spruce) needle fragments were identified from all three cultural levels (Figure 7.10; UAA Herbarium; Schaaf, personal collection). The needles are small (1+ cm long), keeled on both surfaces and have a sharp-pointed tip. Sitka spruce entered the Prince William Sound area by about 2,000 years BP and migrated to Kodiak Island within the last 1,000 years (Heusser 1985:153). All parts of the spruce tree, including the pitch, had important medicinal and technological uses among native American groups (Moerman 1986:339-340; Kari 1987:28-35).

Insect carapaces and snail opercula (Figure 7.11) represent the only faunal remains recovered from the site. Thirteen snail opercula (probably land snail) and one insect carapace fragment were recovered from the level I samples. Four opercula and two carapace fragments were found in the level II samples.

Features

Some of the features discovered at SEL-188 were considered cultural and some were ambiguous. The only possible subsurface feature observed was the granite slab layer in the upland test pit, while recorded surface features consist of culturally modified trees, cut stumps, and a small moss-covered mound of horizontal logs. The nature of the log mound and the granite slab layer were not determined. An upright timber at the SE corner of the log mound with a UMC 40-65 cartridge casing driven into the sawn butt end is obviously cultural, but subsequent observations did not clarify its origin.

The granite slab layer encountered by NPS/CAC investigators at the bottom of Level II was not confirmed as natural or cultural. The rocks were described as ". . . angular, flat, and unmodified. . . slightly imbricate, horizontally-placed slabs, averaging 40 cm across and 8 cm thick" (Schaaf and Johnson 1990:18).

The excavators suggested that the size selection and horizontal placement of the rocks supported a cultural origin for the feature, because ". . . cobbles deposited on the beach by storm and wave processes are often imbricated, dip seaward, and commonly exhibit random shapes and sizes" (Schaaf and Johnson 1990:18). However, they also consider the possibility that the slabs were originally deposited by storm and wave action and moved to their present elevation by tectonic activity (addressed by Crossen and Banks in Appendix C), or that the perceived pattern of rocks is ". . . the product of the very small sample size" (Schaaf and Johnson 1990:18). Archaeological excavation is necessary to resolve this question.

Stumps are a type of culturally modified tree, and six sawn examples are located in the intertidal zone and along the cutbank. They may have been cut since the 1964 earthquake drowned and killed the trees, but that is uncertain. Other cut stumps are present in the uplands but were not counted.

Culturally modified trees are located in the uplands up to approximately 250 m from the shoreline.

Several bark-stripped trees were observed near the shoreline, and the example observed at an elevation of 80 m was both blazed and bark-stripped. Four CMTs located in the intertidal zone (where they were subsided by the 1964 earthquake) consist of two bark-stripped examples in the northern portion of the site, and two burned examples in the central portion of the site (Figure 8.24). The CMTs observed and mapped at SEL-188 are unlikely to be associated with the uppermost cultural deposit (Level I) found in the upland test pit, since radiocarbon dates for Level I indicate occupation at about 600 B.P., and the oldest CMTs recorded on the Pacific coast date to around 500 years ago (Hicks 1984:13; Arcas Associates 1984:93; Eldridge and Eldridge 1988:36).

Cultural History of SEL-188

Two types of data, chronometric dating and typological comparisons, help identify the succession of cultural occupations at SEL-188. A suite of five radiocarbon dates obtained from the expansion of the upland test pit in 1990 provides chronometric control for the three strata in the site. (Results of NPS-sponsored tephra analysis of samples from the uplands test pit are incomplete but should provide additional temporal data.) Typological comparisons between stone tools from SEL-188 and specimens from other sites in the region are possible, but it is difficult to evaluate the cultural significance of these comparisons based on the small artifact assemblage and limited subsurface testing at SEL-188.

Radiocarbon Dating

Five radiocarbon dates were obtained by NPS from soil samples retrieved from the upland test pit in 1990 (Figure 8.2). Pieces of charcoal submitted for radiocarbon dating, averaging 0.5 to 1.0 cm in diameter, were picked with tweezers from the soil samples prior to water flotation (Schaaf and Johnson 1990:4). The samples were analyzed by Beta Analytic, Inc., which provided uncalibrated and calibrated dates (Table 8.5) according to the statistics of Stuiver and Pearson (1986). The dates may reflect three different periods of occupation and are compatible with the late first millennium and early second millennium A.D. character of the artifact assemblage.

Level I, the uppermost cultural deposit, yielded two dates: one from a soil sample taken from the far east side of the north face of the test pit, and a second from a soil sample taken from the far south side of the west face. These samples produced dates of 620 ± 50 B.P. (Beta 39475), and 560 ± 50 B.P. (Beta 39476). Level II also yielded two dates from samples taken immediately below the sample locations in Level I:

Table 8.5 Radiocarbon Results and Calibrated Dates from the Upland Test, August 1990

Sample No.		Providence		C-14 Age Yrs BP	Mean Calibrated Age	
M-1	Beta 39475	North wall	Level I	620 +/- 50	1359 AD	(591 BP)
M-2	Beta 39476	West wall	Level I	560 +/- 50	1401 AD	(549 BP)
M-3	Beta 39477	North wall	Level II	710 +/- 50	1277 AD	(673 BP)
M-4	Beta 39478	West wall	Level II	700 +/- 90	1279 AD	(671 BP)
M-5	Beta 39479	North wall	Level III	1350 +/- 70	663 AD	(1287 BP)

Radiocarbon half-life = 5568 years; calendar conversions by Beta Analytic, Inc. following Stuiver and Pearson, 1986.

Table 8.7 Summary of All Collected and Uncollected Artifacts and Other Lithic Material by Class

Artifact Class	Collected Artifacts 1989 / 1990 ITZ and Upland	July 1989	Uncollected Artifacts NPS Tort April 1990	Mapped August 1-4, 1990	Mapped Total
Triangular endblade	1				1
Double-edged blade (barbed)	2	1?			3?
Stemmed slate point / knife	1				1
Flaked slate tool	2	1	1		4
Splitting adze	7				7
Adze (type unknown)		1		3	4
Planing adze	2				2
Pick?	1				1
Splitting wedge / chisel	3				3
Stone lamp fragment (?)			1?		1?
"Incised" slate tablet	2				2
Ground slate rod	6		3		9
Notched pebble	2		1	1	4
Notched cobble	2			1	3
Grooved cobble	4				4
Cobble biface / chopper			2		2
Battered cobble / hammerstone	8	5	10		23
Ground slate ulu	9			1	10
Abrader	1				1
Tabular slab	1		2		3
Bead (stone)	1				1
Boulder spall	8		10*	1	19
Ground slate fragment	10		20		30
Utilized flake / flake	9		1	1	11
Historic	2		1		3
Total Artifact Count:	84	8	52	8	152
Fire cracked rock	6		81		87
Other Lithic Material					
Unretouched boulder spalls	7				7
Unmodified "flakes", shatter, fragments, chips.	119	8			127

* May include unretouched boulder spalls.

710 ± 50 B.P. (Beta 39477), and 700 ± 90 B.P. (Beta 39478). Level III yielded one date from a sample taken at the far east side of the north face. The uncalibrated date from Level III was 1350 ± 70 B.P. (Beta 39479). These dates must be interpreted cautiously since they are from scattered charcoal pieces dispersed in a saturated soil, but they are the only pre-contact dates from an archaeological site on the outer Kenai Peninsula coast. The only other dates reported for the area are two contact-era dates (140 ± 60; and 320 ± 50) from XBS-020, northeast of SEL-188 (Dotter 1988a, 1988b).

Human occupation over a span of approximately 700 years is indicated, but apparently it was not continuous. The cultural level designated Level III is capped by the T2 tephra, which in turn is overlain by the granite slab layer and a sand lens (Figure 8.2). According to the radiocarbon dates, Levels III and II represent two occupations of the site, separated by an interval of approximately 600 years. Levels I and II, however, are separated by a thin, discontinuous tephra (T1). Radiocarbon dates from these levels overlap at two standard deviations (Figure 8.25) and may reflect a continuum of occupation essentially undisturbed by the ashfall.

Typological Comparisons of Artifacts

None of the artifact types present at SEL-188 are unique to the site (Table 8.6). The SEL-188 sample size and contextual information are not adequate to interpret the meaning of morphological similarities between the SEL-188 assemblage and artifacts from sites in adjacent regions, although such similarities and differences deserve mention.

Two barbed slate blades found at SEL-188 are similar to those characterizing the Kachemak II and III periods in Kachemak Bay (de Laguna 1975:129) and the cultural levels at the Palugvik Site in Prince William Sound (de Laguna 1956:270; Workman 1980b:79), where they generally increased in frequency through time. Farther west, barbed slate blades are characteristic of the Late Kachemak Three Saints Bay phase on Kodiak Island which lasted until A.D. 1100 (Workman 1980b:68), and the Kukak Mound phase (A.D. 1000 - 1400) on the Alaska Peninsula (Dumond 1971:27,Pl 9).

Splitting adzes similar to those recovered at SEL-188 date to the second millennium A.D. in the Gulf of Alaska, although they may appear slightly earlier in Prince William Sound (D. Clark 1974:92) where they are fairly numerous (de Laguna 1956:113-117). They have yet to be encountered in a Kachemak tradition context either on Kodiak or in Kachemak Bay (Workman and Workman 1990:284) although they are present but rare in Kachemak Bay in the Late Prehistoric period. Splitting adzes with a single hafting knob are known from Koniag phase contexts on Kodiak (D. Clark 1979:281).

Planing adzes similar to the two found at SEL-188 occur through all levels at the Palugvik Site in Prince William Sound, but were more common in the Older (Palugvik 1 and 2) Prehistoric period (de Laguna 1956:117-119; Workman 1980b:79). In Kachemak Bay, they occur throughout the Kachemak I-III sequence (de Laguna 1975:121-128, 239).

Table 8.8 Phosphate Analysis of Soil Samples from the Upland Test. August 1990

Sample No.	pH	NaOH-P	(ppm)	(%)	HCl-P (ppm)	(%)
M-2	Level I	4.6	1049	89%	127	11%
M-4	Level II	4.8	3161	85%	546	15%
M-5	Level III	4.8	2379	80%	582	20%

One distal fragment of a ground stone tool recovered from SEL-188 is similar to distal ends of double-pointed war picks which were hafted like splitting adzes among Northwest Coast cultures and are known as far north as Prince William Sound (de Laguna 1956:272; Workman 1980b:80).

Stone lamps, possibly represented by one fragmentary specimen at SEL-188, have been found at sites in Prince William Sound (de Laguna 1956:143), and in Kachemak Bay at sites dating to all Kachemak I-III time periods (de Laguna 1975:63, 121-129). On the outer Kenai Peninsula coast, a minimally worked lamp (or possible mortar) has been reported from Nuka Island (McMahan and Holmes 1987:24), and an undecorated Kachemak-style lamp was collected southwest of SEL-188 at SEL-195 by Exxon archaeologists in 1990 (Haggarty *et al.* 1991).

Ground slate rods similar to those observed at SEL-188 are common in Kachemak tradition sites, although they appear later in the sequence in Kachemak Bay (de Laguna 1975:130). De Laguna refers to them as "awls" (1956:159-162, 1975:79), although she suggests that ". . . they are a specialized type of lance point, probably intended to break off in the wound, and presumably used for hunting whales and large sea mammals" (de Laguna 1956:159). De Laguna (1956:161) reports slate "awls" were relatively more common in Prince William Sound and Kodiak than in Kachemak Bay.

Both notched and unnotched *ulus* are reported from Prince William Sound (de Laguna 1956:149-151; Yarborough, personal communication 1990), Kachemak Bay (de Laguna 1975:74-75), and in Late Prehistoric Koniag assemblages on Kodiak (Clark 1970:79). In Kachemak Bay, notched *ulus* appear as early as Kachemak I at Yukon Island (de Laguna 1975:121), but are more common in Late Kachemak sites (de Laguna 1975:74-76; Workman 1980b:76).

Notched pebbles identical to those from SEL-188 are typical of the later Kachemak tradition in Kachemak Bay where they decrease in size over time (de Laguna 1956:271). Over 1,000 small notched stones have been excavated at Chugachik Island, some in clusters of 20-30 specimens. Workman (1980b:74) suggests they may have been associated with fowling rather than fishing on the basis of the faunal assemblage. Notched stones are present in the Three Saints Bay phase (100 B.C. - A.D. 1100) on Kodiak (D. Clark 1974:67; Workman 1980b:68), and the Alaska Peninsula (G. Clark 1977:162,202), but are rare or absent in Prince William Sound (de Laguna 1956:271; Workman 1980b:78; Yarborough 1989).

Both notched and grooved cobbles are common in sites along the North Pacific coast (Clark 1970:84) and SEL-188 contained both types. De Laguna (1956:271) noted a decrease in size of notched stones over time in the Kachemak Bay area and stated that cobbles with a short groove over one end ". . . did not last into the last part of the third period" (de Laguna 1975:55). No cobbles with a groove over one end were identified at SEL-188. In Kachemak Bay, cobbles grooved about the long axis appear in Kachemak II and increase in frequency and variability in Kachemak III (de Laguna 1975:121-129, 1956:272). Two specimens grooved around the long axis were recovered from Palugvik I in Prince William Sound (de Laguna 1956:135-137), and similar examples occur at Kodiak in a Late Kachemak context at Three Saints Bay (Clark 1970:83). One tri-notched cobble (FS 94) was mapped but not collected at SEL-188. On Kodiak tri-notched cobbles are diagnostic of the nonceramic aspect of the Koniag phase (Clark 1970:84).

A number of hammerstones were recovered from the intertidal zone and the upland test pit at SEL-188. One (49SEL-188-094) is similar to de Laguna's pestle type encountered in the upper levels at Palugvik (Palugvik 3-4), while four are ovoid hammerstones similar to those occurring throughout the Palugvik deposits (de Laguna 1956:137-138). These two general types of hammerstones were also found in Kachemak Bay in most sites investigated (de Laguna 1975:59).

Boulder spalls are common at SEL-188 but are rare in Prince William Sound. De Laguna recovered only four "boulder chips" in all of Prince William Sound ". . . in striking contrast to the hundreds discovered in Kachemak Bay from every site and

every culture stage" (de Laguna 1956:131). Yarborough (personal communication 1990) recovered only one "possible" boulder spall from his excavations at Uqciuvit Village (SEL-056) in Prince William Sound.

The single stone bead recovered by a beach worker in the intertidal zone at SEL-188 represents an artifact type rare in the Alutiiq region. At Uqciuvit in Prince William Sound, Yarborough (1989:3) recovered one slate bead among 1655 trade beads excavated. De Laguna (1956:214) recovered only four slate beads in Prince William Sound, three from a burial in Palugvik I and one from a site on Chenega Island. On Kodiak Island, beads are more prolific in Late Kachemak tradition sites than in Koniag phase sites (Clark 1970:85). Red stone beads were present in a Late Kachemak context at Three Saints Bay and Crag Point (Clark 1970:84,85), and cylindrical beads of red baked shale have been found in Kachemak Bay (de Laguna 1975:202).

Small, stemless, ground slate endblades similar to the one found at SEL-188 are not documented for the Kachemak tradition (Workman *et. al* 1980) but are reported from second millennium A.D. sites in Kachemak Bay (Workman and Workman 1988) and on Kodiak Island (Clark 1970:83, 1974:54; Heizer 1956:pl.46N; Jordan and Knecht 1988). Yarborough (1989:3) recovered two triangular slate endblades in Prince William Sound at the Uqciuvit Site (SEL-056). Two stemless, triangular slate end blades were excavated from an undated upper component at Cottonwood Creek in Kachemak Bay, which Workman (1980b:76) considers to ". . . represent a distinct typological departure from the underlying Kachemak III deposits and doubtless are referable to a second millennium A.D. occupation, which seems more likely to be Eskimo than Athapaskan Indian." On the Alaska Peninsula, small stemless ground slate endblades are associated with the Kukak Mound phase, dated to A.D. 1000 - 1400 (Dumond 1971:26).

Site Activities

Artifact types observed at SEL-188 are compatible with radiocarbon dates indicating site occupation during the later phases of the Kachemak sequence and late prehistoric Chugach/Koniag phases. Site activities are implied by certain artifact forms although small sample sizes, limited contextual information, and lack of functional analyses reduce the degree of confidence in such interpretations. However, functional implications of certain artifact forms have been suggested by other researchers based on ethnographic, ethnohistoric, and archaeological data.

The SEL-188 artifacts (Table 8.7) probably reflect several site-based activities. Hunting weapons are represented by stone points including a triangular endblade, two double-edged barbed slate points (similar to ethnographic whaling spear or dart blades used in the Kodiak area), and possibly an unfinished stemmed slate point. The notched pebbles and cobbles and grooved cobbles are probably line or net weights, likely related to fishing and/or fowling (Workman 1980b:68). The splitting adzes, planing adzes, and wedges indicate that the SEL-188 inhabitants engaged in wood-working and perhaps bark-stripping. Food processing is suggested by the *ulu* fragments, bifacial cobble choppers, boulder spall scrapers, utilized slate flakes, and perhaps the battered and polished slabs. Tool manufacture is implied by the numerous hammerstones recovered from the beach and from the upland excavation, and by an abrader possibly used for grinding slate. Other domestic activities are suggested by a possible stone lamp fragment, a stone bead, and "incised" slate tablets.

Fire cracked rock in the intertidal zone and upper levels of the upland test pit is common in late prehistoric sites in Prince William Sound (Yarborough 1989:6; de Laguna 1956:60), Kachemak Bay, and on Kodiak Island. It may have resulted from the stone boiling technique used for cooking and/or sweatbathing, or may have been inadvertently produced by hearth fires using encircling rocks or rock reflectors. The CMTs at SEL-188 reflect bark exploita-

tion, probably post-dating the Level I occupation identified in the upland test pit.

Geological History

Regional geomorphological information and localized data help reconstruct the geological history of SEL-188. The localized data consist of observations made on artifacts and features in the intertidal zone, sediment and phosphate analysis of soil samples from the upland test pit, radiocarbon dates from those soil samples, and floral and faunal material recovered from the soil samples. These data help reveal the depositional history of the site and the local pattern of coastal subsidence.

Evidence for Subsidence

Subsidence of the outer Kenai Peninsula coast during the 1964 Alaska earthquake was discussed in Chapter 2. Isobase contours of uplift and subsidence from that earthquake (Plafker 1969:Figure 3; Mobley *et al.* 1990:Figure 8) show subsidence of about 1.8 m (6 ft) in the vicinity of SEL-188. A 25 cm (10 in) thick pocket of what appeared to be organic soil, discovered in a deep bedrock crevice (Figure 6.5) during monitoring on August 28, 1990, may reflect the 1964 subsidence. Less ambiguous evidence for the 1964 subsidence are drowned trees found in the intertidal portion of the site. Mobley (1990b) measured an elevation difference of approximately 1.5 m (5 ft) between the vegetated top of the cutbank and the root system of the standing drowned tree most distant from the cutbank. This estimate is in keeping with the regional subsidence model proposed by Plafker (1969).

The effects of the 1964 subsidence event on SEL-188 can be surmised. Rapid marine erosion of the coastline began to destroy the portion of the site nearest the water, washing away the matrix and lighter items and leaving a lag deposit of stones and stone artifacts in the intertidal zone. Subsequent wave action likely churned those items, periodically burying and uncovering them according to the direction and vigor of Pacific storms.

Mobley (1990b:8) estimated the amount of site loss since the 1964 earthquake to be between 475 m^2 (5,113 ft^2) and 656 m^2 (7,061 ft^2) by using the distribution of drowned trees. The drowned tree most distant from the cutbank is located eight meters from the cutbank at grid intersection N123/E199. Assuming the entire shore to have eroded eight meters, a figure of 656 m^2 was obtained by multiplying eight meters times 82 m - the distance along the shoreline over which artifacts were observed in April of 1990. Instead of assuming a uniform eight meters of erosion, the figure of 475 m^2 was obtained by drawing lines from one drowned tree to another and calculating the area enclosed between that irregular line and the cutbank. Later investigations determined the artifact scatter to extend slightly further along the shoreline (86 m as opposed to the earlier estimate of 82 m). This would add a few more square meters to the original minimum estimate of 475 m^2, as would a calculation of site extent based on the minimum distribution of CMTs in the immediate uplands (105 m along the shoreline). A minimum of 475 m^2 is a reasonable estimate of the site area lost to marine erosion since (and as a consequence of) the 1964 earthquake.

The amount of site area that may have been lost to marine erosion prior to the 1964 earthquake is unknown. The extent of the artifact scatter in the intertidal zone in 1990 is estimated at approximately 1200 m^2 (12,917 ft^2), because artifacts extend out into the intertidal zone much further than the estimated location of the pre-1964 cutbank. That distribution likely reflects the effects of wave action, and possibly pre-contact human activity in the intertidal zone.

The increase in artifact density with proximity to the cutbank (Figure 8.1) is likely the result of artifacts recently eroded into the upper intertidal zone having less opportunity to be moved and redeposited by wave action. Because the bedrock exposed in the upper intertidal zone and the uplands surface slope up to the west, away from the shore, it is likely that marine erosion of the site is decelerating compared to the rate immediately following the 1964

earthquake. Continuing site loss is evident from the undercutting of the front of the site.

Subsurface Sediments

Crossen and Banks (Appendix C) analyzed soil samples from the upland test pit "... to ascertain the source material and depositional environments of the inorganic grains in the site." They concluded that the severe angularity and lack of weathering of the granite particles indicated "... little or no stream or wave transport," confirmed by the presence of mica in the coarse sand fraction (because mica is too soft to withstand much movement). Granite forms the bedrock at the site. Subrounded to rounded slate particles found in each of the samples were likely ". . . rounded by beach, stream, or glacial processes," while the parent rocks for the particles "... may be clasts contained in the glacial tills that cover the area, which were formerly eroded by either streams or waves and moved downslope to the site area, or they may have been deposited in the site vicinity by wave processes."

The layer of rock slabs in the test pit is discussed earlier in this chapter. Among the interstices of the granite slabs was a soil described by Schaaf and Johnson (1990:7) in their profile as a "black sediment matrix (like Level II)." Their profile shows the underlying stratum to be the T2 volcanic ash (tephra). Most of the granite slabs are overlain by a sand lens, but one-third of the profile shows the slabs to be overlain by Level II, an artifact-bearing carbonaceous soil (Figure 8.2). Field information was insufficient to resolve whether the slab layer was natural or cultural in origin. Schaaf and Johnson (1990:18) state, "This is probably a cultural feature as it is difficult to find a natural explanation for the size selection and horizontal placement of the rocks." The nature of these slabs remains unresolved and natural deposition cannot be ruled out (Schaaf and Johnson 1990:18; Crossen and Banks Appendix C:3-4).

Three tephras were identified by Schaaf and Johnson (1990:4, 7) in the upland test pit (Figure 8.2). The T3 tephra was the lowest level reached in the excavation, but its thickness and the nature of underlying strata were not determined due to flooding of the unit. The T2 tephra was found above Level III and below the granite slab layer, while the T1 tephra separated Levels I and II. Although sample analysis is not available, the stratigraphic position of the tephras in relation to the radiocarbon dated cultural levels may further illuminate the sequence of occupations and abandonment.

Only the carbonaceous soils (Levels I-III) have been chemically analyzed through phosphate and pH measurements (Schaaf and Johnson 1990:18-19). High phosphate measurements with a high NaOH-P fraction were tentatively suggested by Schaaf and Johnson (1990:19) to indicate natural phosphate levels, based on observations in southeast Alaska by Moss (1984). The highly acidic soil, indicated by a pH range of 4.6 to 4.8 (Table 8.8), may be responsible for the lack of faunal preservation as bones would have deteriorated rapidly in such an acidic environment. The pH measurements also suggest that there was never a large volume of shell present in the midden, since decomposing shell results in much higher pH levels (Jon Erlandson, personal communication 1991)

Summary of Depositional Events

The earliest known geological event at SEL-188 was an ashfall which occurred sometime before about 1350 B.P. This was followed by human occupation sometime around 1350 B.P., represented by the artifact-bearing carbonaceous soil designated Level III. During the subsequent 500 years another ashfall occurred, represented by the T2 tephra. Following the T2 ashfall, the granite slab layer was laid down, either naturally or by humans. A discontinuous sand lens was then deposited on top of the granite slabs.

The site was reoccupied at about 700 B.P. (Level II). An ashfall (T2) sometime before about 600 B.P. may or may not have significantly interrupted human activities at the site. The site was occupied again by approximately 600 B.P., shortly after the T2 ashfall. No additional evidence of cultural activ-

ity is evident in the stratigraphy following the 600 B.P. occupation. An organic soil formed over the cultural deposit in the test area, now well-vegetated with moss and other understory vegetation amid a conifer forest. The bark and possibly the sap and wood of selected trees were used probably sometime in the post-contact period. The 1964 Alaska earthquake caused the shoreline to sink about 1.5 m, and the site began a primarily erosional regime as wave action assaulted the seaward side of the deposits and created an active cutbank.

Summary of Archaeological Data

The results of the single upland test pit and the analysis of the intertidal artifact scatter yield a fragmentary glimpse of pre-contact activity at SEL-188. Native people occupied the site between 1350 and 600 years ago, presumably to harvest and process local marine resources. Artifact types at the site indicate that the inhabitants used tools and strategies similar to those used in adjacent regions to exploit primarily marine resources. The presence of wood-working tools implies pre-contact forest use, and forest resources were also exploited during the post-contact period.

Many questions regarding the upland portion of the site remain. Neither the areal nor the vertical extent of the upland portion of the site is known, and the nature of the site occupation and use has not been firmly established. However, examination of the spatial relationship between SEL-188 and other known outer Kenai Peninsula sites and natural resource concentrations indicates that SEL-188 was one of many small midden sites on the outer Kenai coast (see Chapter 9). More intensive site excavation and faunal analysis could answer questions regarding resource exploitation and season of occupation, but this information should be collected once regional site surveys have more thoroughly defined the distribution and density of sites on the outer Kenai Peninsula coast. Once the outer Kenai Peninsula site universe is defined, decisions can be made regarding which sites to excavate to address specific questions about the Native history of the outer Kenai Peninsula coast. Questions concerning social unit size and composition, territorial boundaries, group interaction, adaptive strategies, resource exploitation patterns, and the effects of Russian and Euroamerican contact on Alutiiq culture can be pursued.

Investigations at SEL-188 have established Native use of the outer Kenai Peninsula coast between about 1350 and 600 years ago and have resulted in the collection and analysis of an artifact assemblage primarily from an intertidal context. SEL-188 and many other sites like it on the outer Kenai Peninsula coast were generated by people about whom very little is known. The reconstruction of outer Kenai Peninsula coast history is evolving, and single sites in Unegkurmiut territory such as SEL-188 can best be understood in relation to other sites and natural resources in the region.

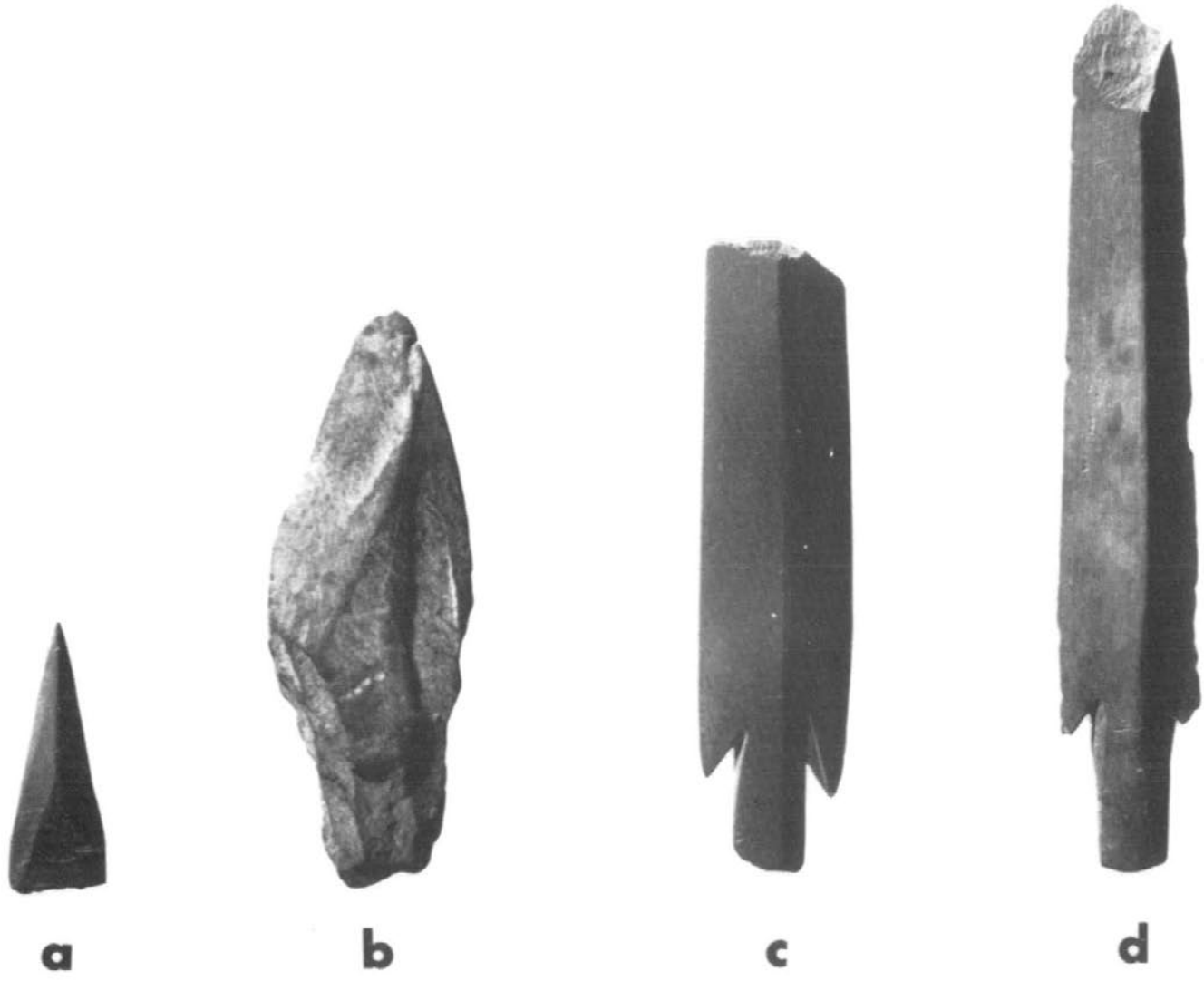


PLATE I
GROUND SLATE POINTS

a. 49SEL-188-096; triangular ground slate endblade from the 1990 upland test expansion, Level I.

b. 49SEL-188-017; flaked and ground stemmed slate point collected from the intertidal zone in 1989.

c. 49SEL-188-024; barbed, double-edged ground slate blade collected from the intertidal zone in 1989.

d. 49SEL-188-032; barbed, double-edged slate blade from the 1989 upland test (Level I/II).

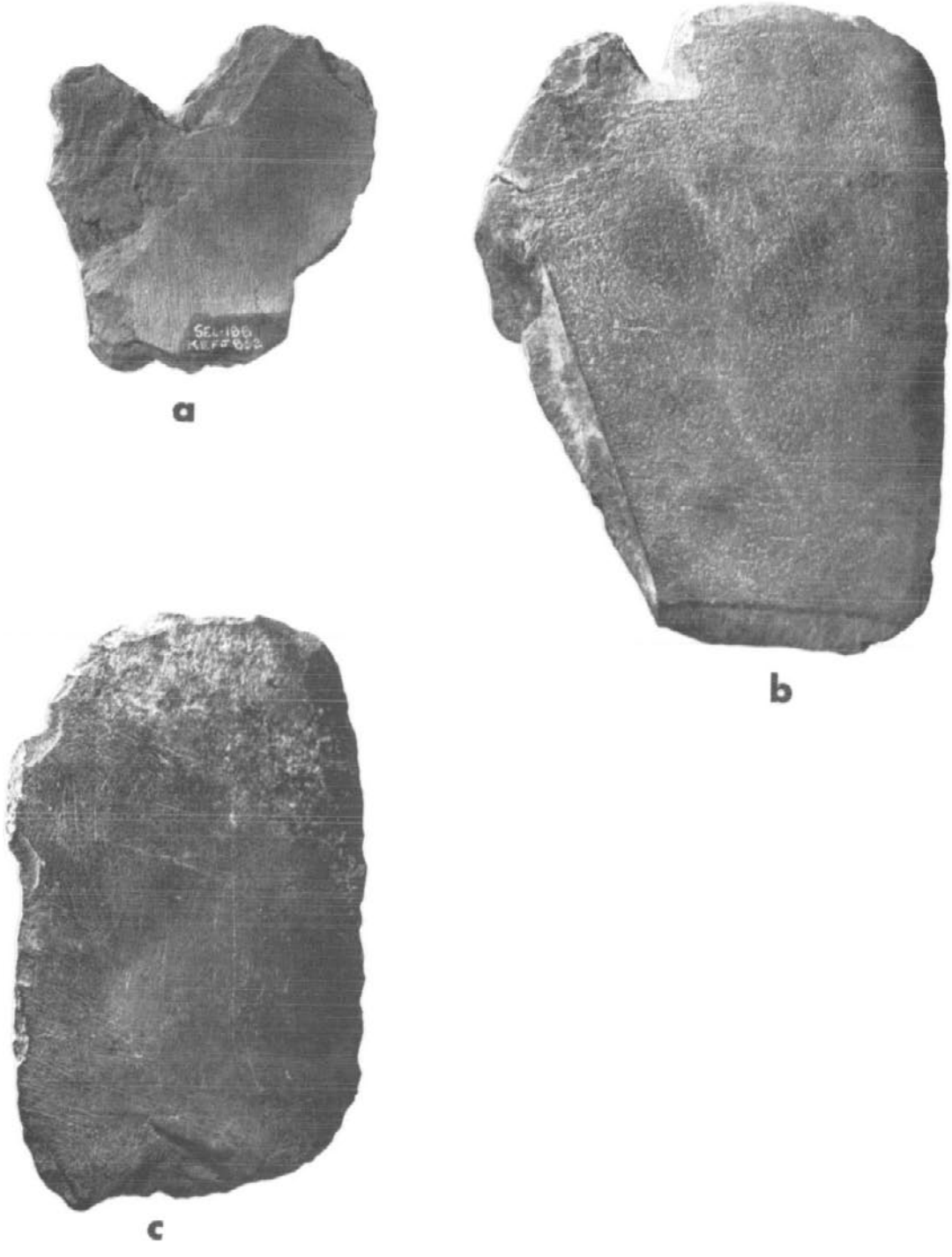


PLATE II
GROUND SLATE ULUS

a. 49SEL-188-114; notched ulu fragment recovered from the 1990 expansion of the 1989 upland test, Level II.

b. 49SEL-188-021; notched ulu fragment collected from the intertidal zone in 1989.

c. 49SEL-188-005; rectangular ulu with straight working edge, collected from the intertidal zone in 1989.

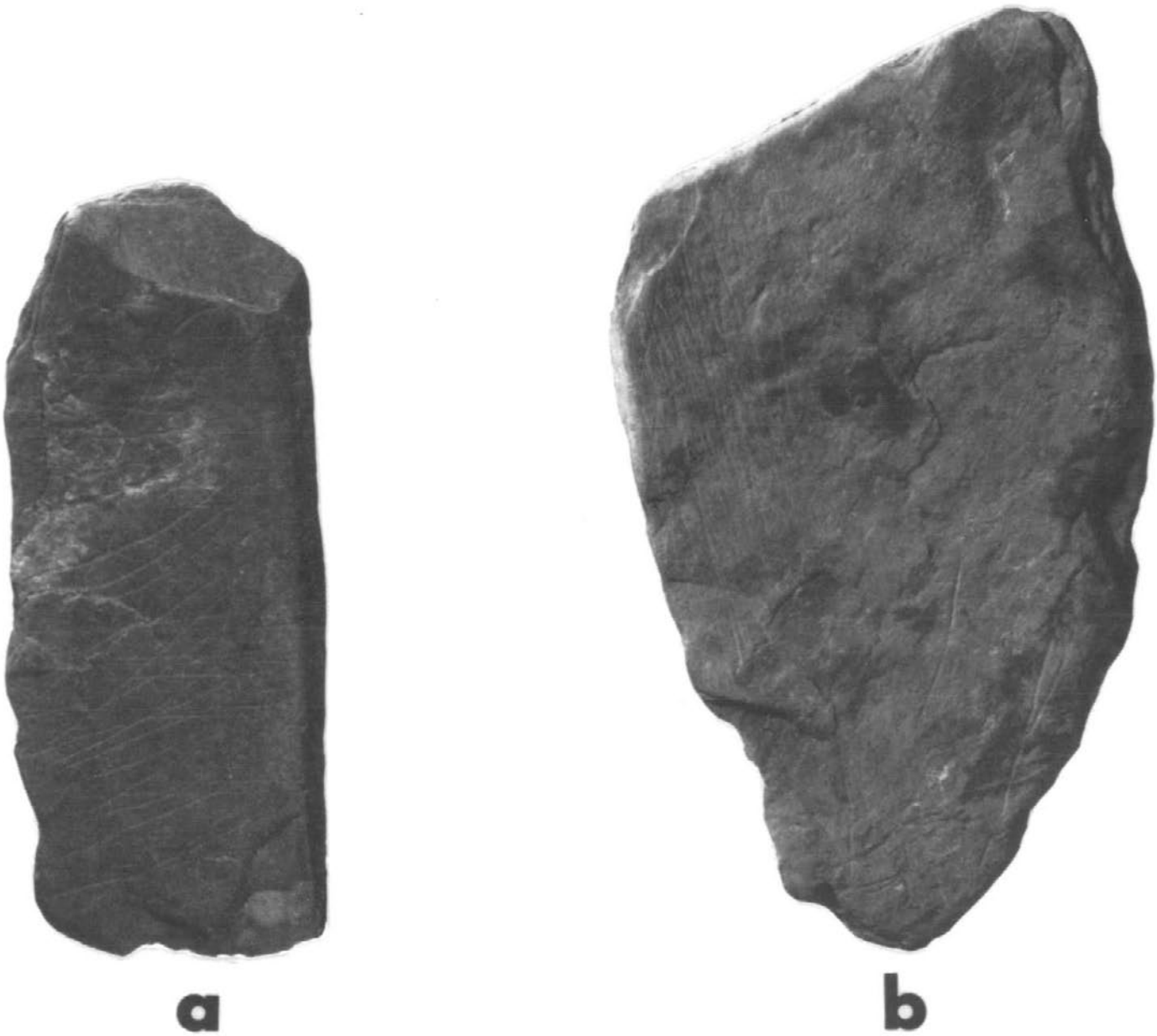


PLATE III
"INCISED" SLATE TABLETS

a. 49SEL-188-036a; "incised" slate tablet recovered from the 1989 upland test.

b. 49SEL-188-141; striated or "incised" slate tablet recovered in 1990 from backfill from the 1989 upland test.

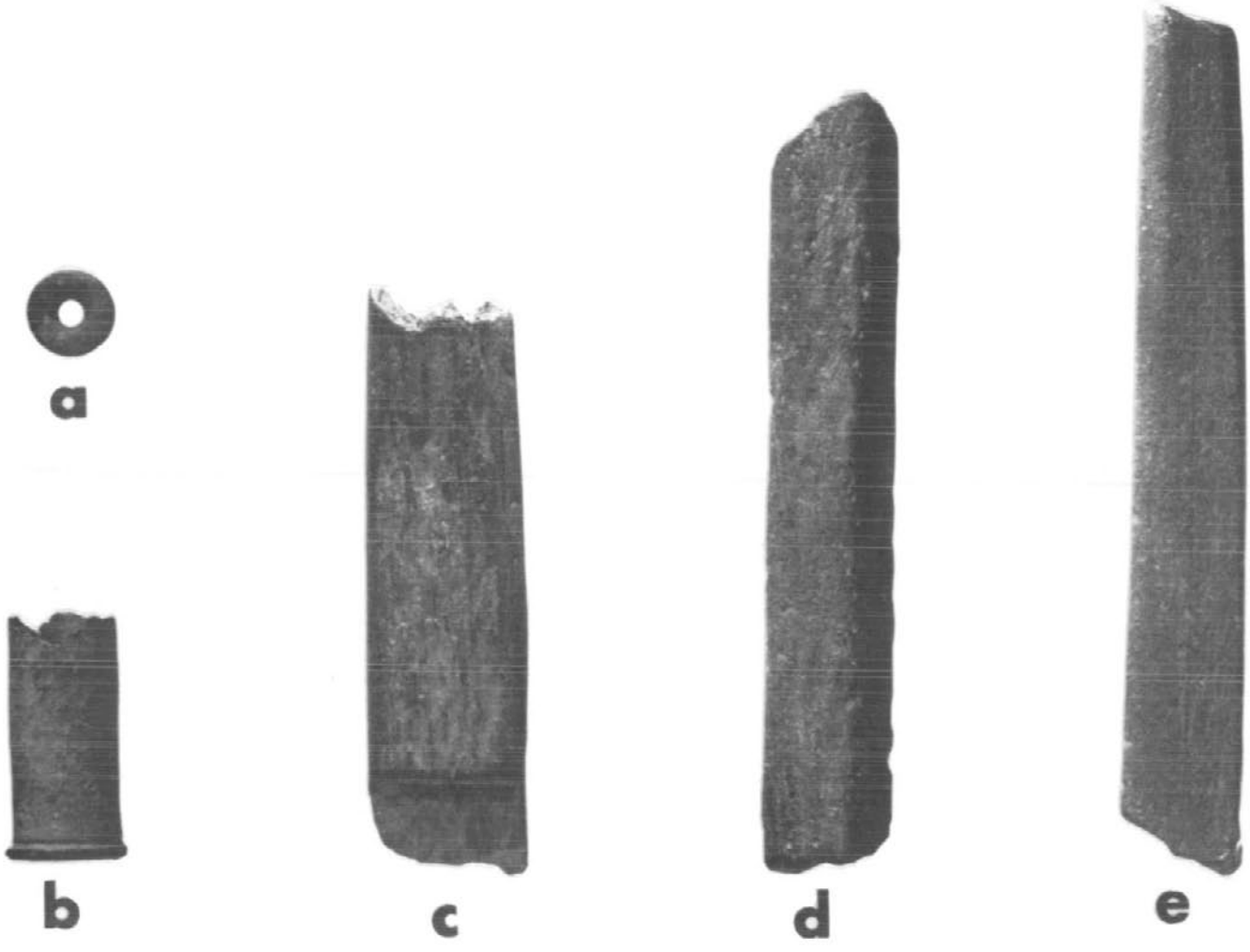


PLATE IV
MISCELLANEOUS ARTIFACTS

a. 49SEL-188-062; slate or shale bead recovered from clean sediments below asphalt pavement during the August, 1990 treatment monitoring.

b. 49SEL-188-004; Henry .44 brass shell casing collected from the intertidal zone in July, 1989.

c. 49SEL-188-068; ground slate rod midsection collected from the intertidal zone in August, 1990.

d. 49SEL-188-070; ground slate rod midsection collected from the intertidal zone in August, 1990.

e. 49SEL-188-082; ground slate rod midsection collected from the intertidal zone in August, 1990.

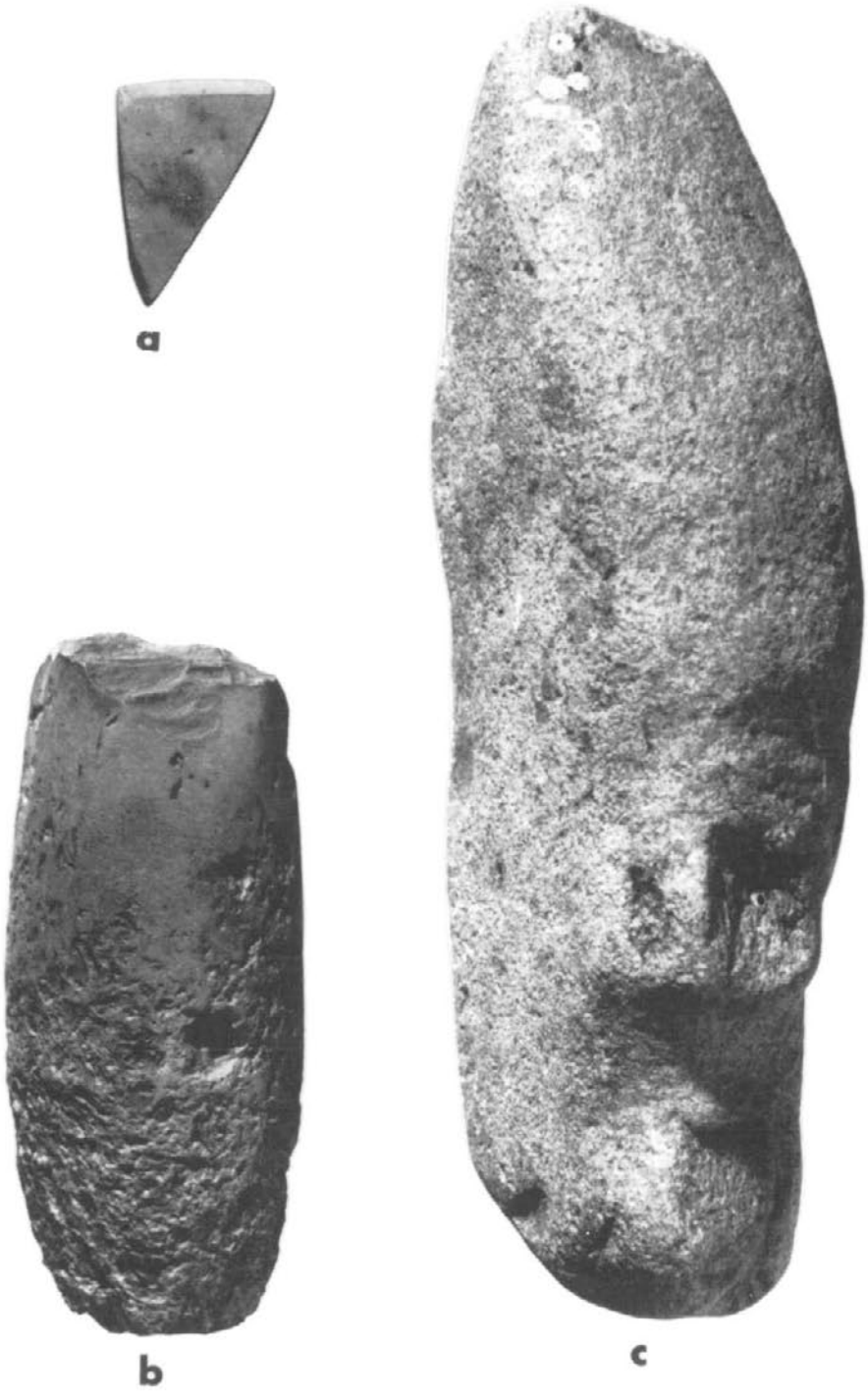


PLATE V
GROUND STONE TOOLS

a. 49SEL-188-095; greenstone planing adze fragment from the 1990 expansion of the upland test, Level I.

b. 49SEL-188-006; greenstone adze converted to a splitting wedge, collected from the intertidal zone in 1989.

c. 49SEL-188-092; graywacke splitting adze with two hafting grooves, collected from the intertidal zone during treatment monitoring in August, 1990.

PLATE VI
SPLITTING ADZES (scale 77%)

a. 49SEL-188-007; graywacke splitting adze with double grooves, collected from the intertidal zone in 1989.

b. 49SEL-188-008; graywacke splitting adze with a single hafting knob, collected from the intertidal zone in 1989.

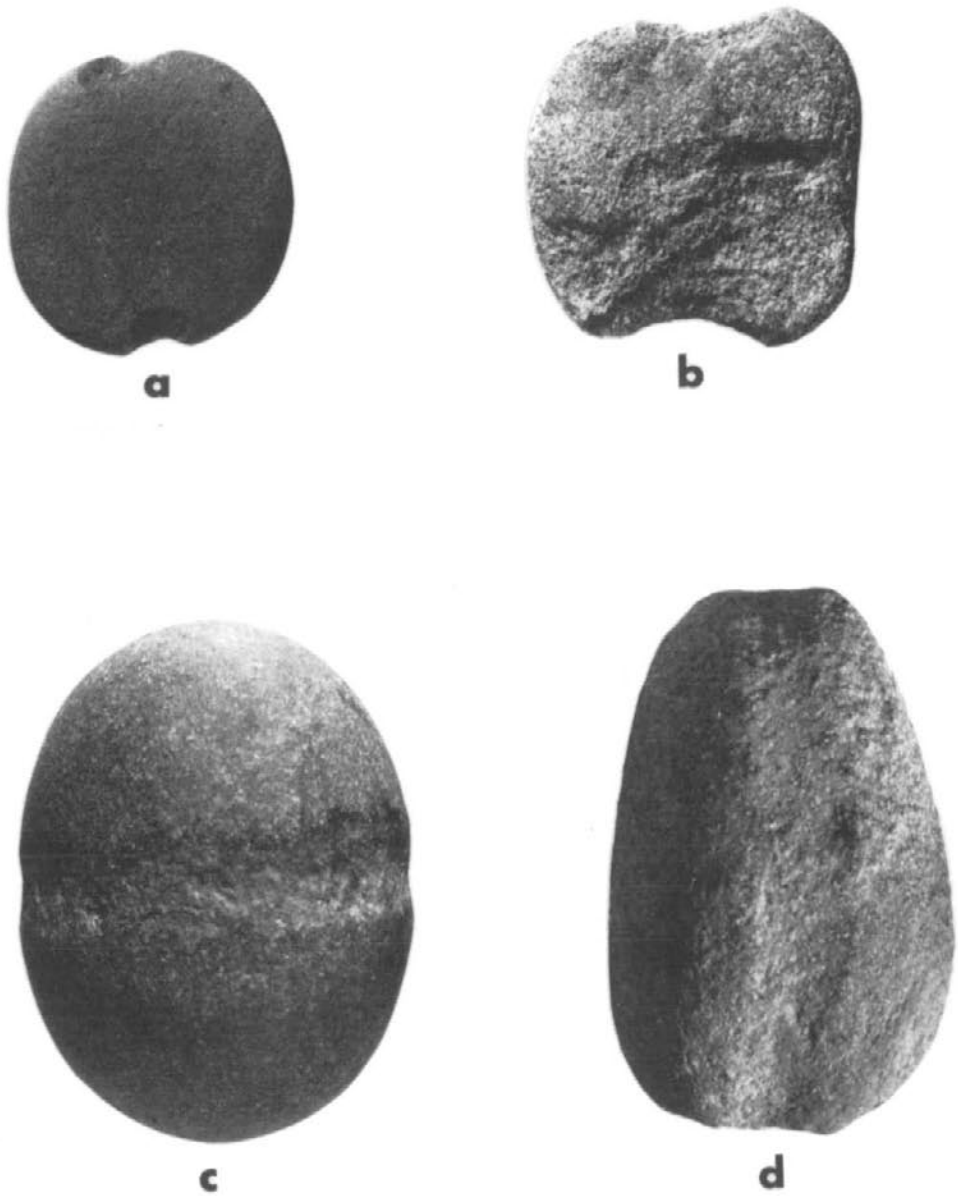


PLATE VII
NOTCHED AND GROOVED STONES

a. 49SEL-188-069; notched pebble collected from the intertidal zone in August, 1990.

b. 49SEL-188-022; notched pebble collected from the intertidal zone in 1989.

c. 49SEL-188-050; cobble grooved about the middle, collected in 1990 from intertidal Test Unit B, 20 cm below the beach surface.

d. 49SEL-188-057; cobble grooved parallel to the long axis on one surface, collected from the intertidal zone during treatment monitoring in August, 1990.

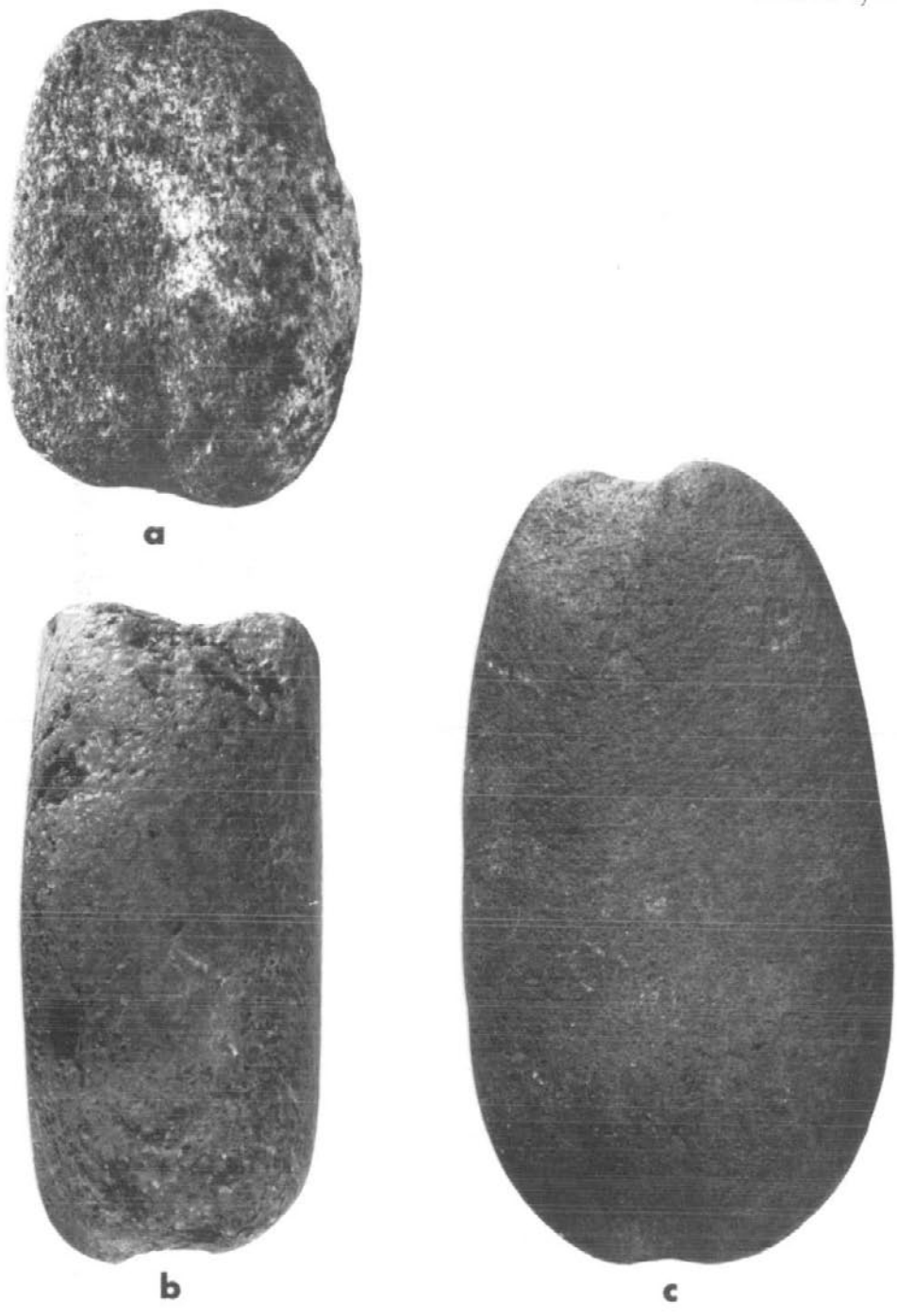


PLATE VIII
NOTCHED AND GROOVED COBBLES

a. 49SEL-188-078; cobble grooved about the long axis, collected from the intertidal zone during treatment monitoring in August, 1990.

b. 49SEL-188-064; notched, battered cobble collected from the intertidal zone during treatment monitoring in August, 1990.

c. 49SEL-188-090; elongate cobble with pecked grooves forming notches at opposite ends, collected from the intertidal zone during treatment monitoring in August, 1990.

CHAPTER 9

THE REGIONAL CONTEXT OF SEL-188

Prior to 1989 the outer Kenai Peninsula was an archaeological "sea of darkness," a phrase which Workman (1986:3) used to describe the archaeological status of many large areas of Alaska which lack cultural resource survey data. Much of the outer Kenai Peninsula coast was virtually unsurveyed prior to 1989 and 1990 Exxon and agency surveys conducted during oil spill response efforts. The site data collected during these surveys clarifies the general character of outer Kenai Peninsula cultural resources, and a preliminary overview of the nature and distribution of the region's sites is now feasible.

Archaeological field efforts in the outer Kenai Peninsula area prior to 1989 consisted of single-site investigations and limited reconnaissance surveys (see Chapter 3). The potential for past human occupation of Kenai Fjords National Park in particular was considered low due to the degree of past glaciation (NPS 1984:29-30). While the region has not been surveyed completely, recently collected data on site location and composition indicate considerable occupation and use of the outer Kenai Peninsula coast by earlier Native inhabitants.

Currently, 79 archaeological sites located within one kilometer of the outer Kenai Peninsula coast (east of the Chugach Islands and west of Resurrection Bay, including offshore islands) are listed on the AHRS. Forty-six (58%) of the 79 sites were found and recorded by Exxon Cultural Resource Program archaeologists during 1989 and 1990 surveys. Forty-four (56%) have pre-contact components, 32 (40%) have post-contact components, and three (4%) have both pre- and post-contact components based on AHRS records. This discussion focuses on sites with pre-contact components and highlights 16 pre-contact sites (25%) with evidence of permanent habitation inferred by the presence of housepits (Table 9.1, Figure 9.1), and includes 15 pre-contact small middens and artifact scatters with no surface evidence of permanent habitation (Table 9.2, Figure 9.2).

This chapter examines the relationships between the distribution, density, and diversity of natural resources and coastal archaeological sites on the outer Kenai Peninsula to establish a cultural context for SEL-188. This chapter examines the relationship between SEL-188 and other sites on the outer Kenai Peninsula coast and considers avenues for future research which may be pursued through further systematic shoreline survey. This discussion parallels investigations of spatial variation in settlement, subsistence, and demography within the larger

Table 9.1 Outer Kenai Coast Housepit Villages

AHRS #	Housepit #	Housepit Size*	Remarks	Source
XBS-020	15+	11m x 10m	30 "depressions," number of housepits unclear. C^{14} dates 140 ± 60, 320 ± 50	Dotter 1988a:8
SEL-119	15	N/A	Seventeen smaller depressions also noted	McMahan and Holmes (1987:20)
SEL-129	10	10m x 8m	10 "multi-celled" housepits; seven smaller depressions	Exxon Files, AHRS
AFG-175	10	4m x 4m	Two other depressions, lithic artifacts, midden in test pit	Exxon Files, AHRS
AFG-103	8	12m x 8m	Charcoal and FCR in test pit	Exxon Files, AHRS
XBS-015	8	3m x 3m	Three smaller depressions also reported	Exxon Files, AHRS
SEL-172	6	N/A	Field sketch indicates 6 or 7 housepits + other depressions	Shields (1983:14)
XBS-014	5	2m x 2m	Two other depressions reported near historic artifact scatter	Exxon Files, Schaaf (1988b)
AFG-087	2	4m x 4m	Additional small square pit reported	AHRS
AFG-105	3	3m dia.	Midden in test, round depressions	Exxon Files, AHRS
SEL-178	2	5m x 5m	Artifacts on beach below site, additional pit noted	Exxon Files, AHRS
SEL-211	2	6.5m x 6m	Two "smaller" depressions also reported	Exxon Files, AHRS
SEL-223	2	7.5m x 6m	Untested depressions on private land	Exxon Files, AHRS
SEL-207	1	2m x 2m	Three other pits partly obscured by fallen timber	Exxon Files, AHRS
SEL-208	1	N/A	CMTs noted, depression untested	Exxon Files, AHRS
SEL-209	1	2m x 2m	Second possible pit at edge of glacial outwash was covered by drowned spruce	Exxon Files, AHRS

(* Housepit size is estimate of largest depression)

Alutiiq culture area presented in Haggarty *et al.* (1991). In the present chapter, cultural and environmental data critical to the analysis are briefly examined, the Alutiiq settlement model described in Haggarty *et al.* (1991) is reviewed, and archaeological site and natural resource data are presented and discussed.

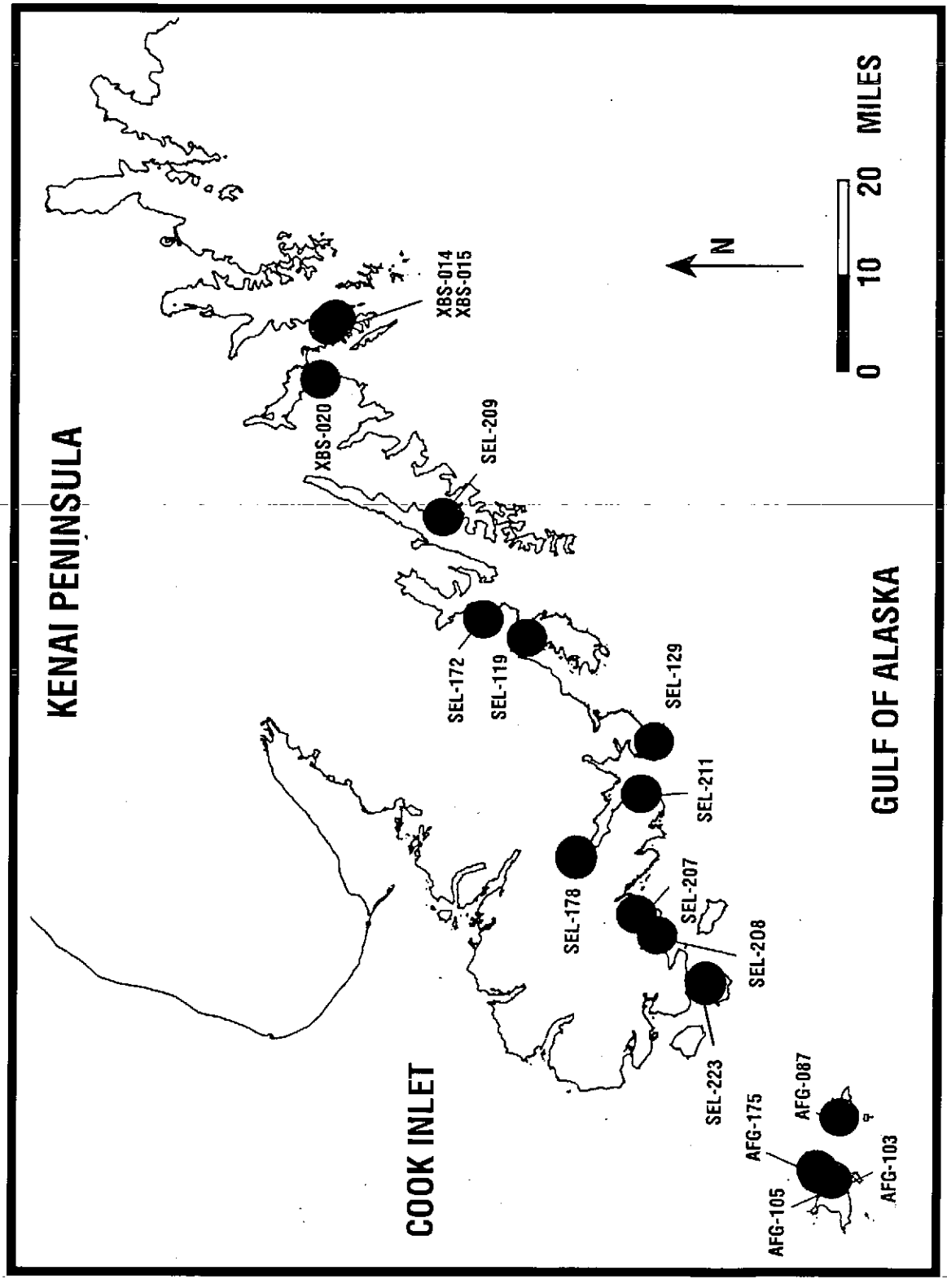


Figure 9.1 **Permanent habitation sites of the outer Kenai Peninsula**

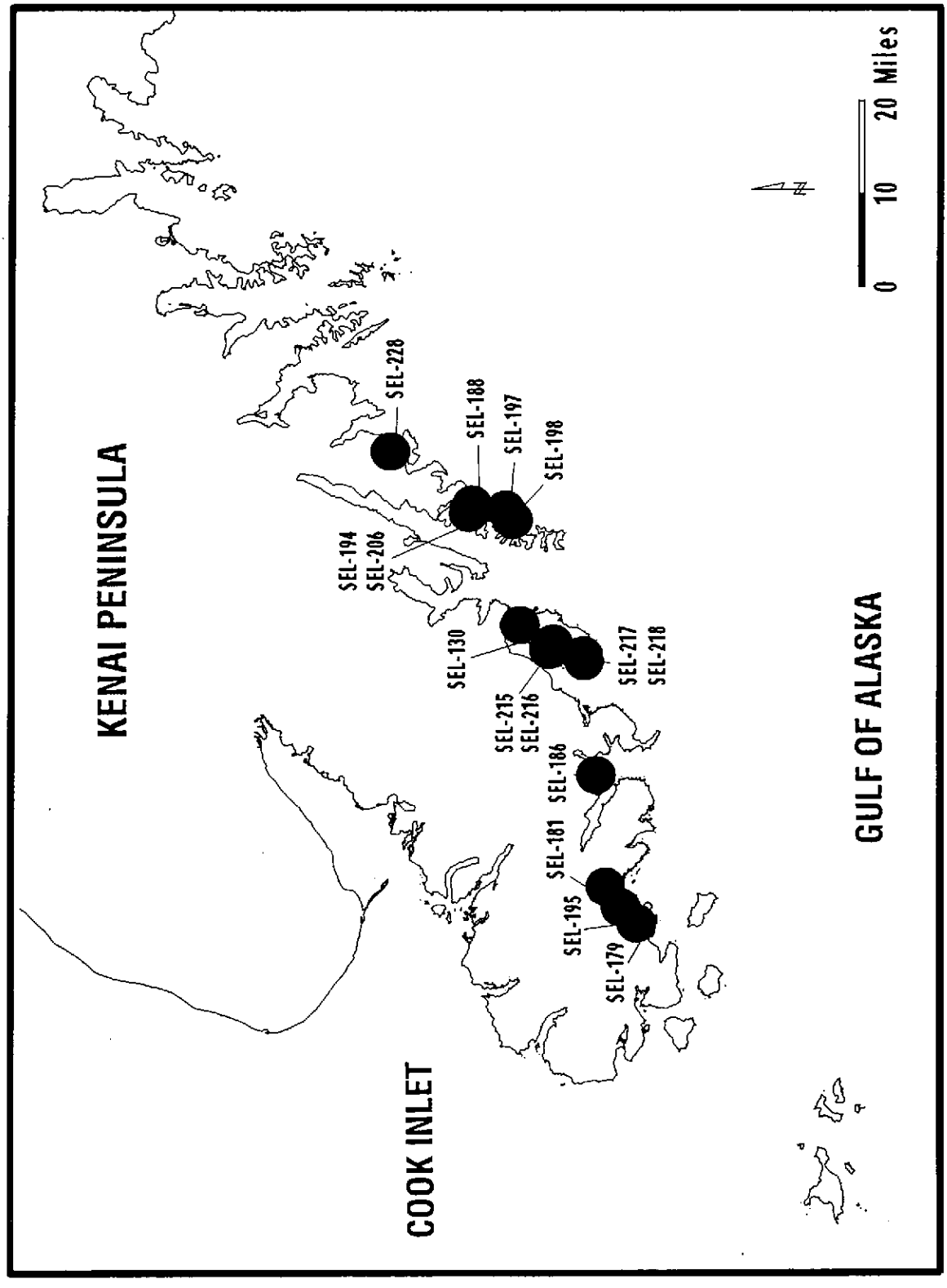


Figure 9.2 **Other middens and artifact scatters of the outer Kenai Peninsula**

Northern Maritime Adaptations

Anthropologists generally assume direct correlations exist between natural resource distribution, density, and diversity, and hunter-gatherer population levels, settlement patterns, and subsistence strategies. This assumption can be made for the Alutiiq region as a whole, and for the Unegkurmiut area in particular. A number of authors have explored relationships between resource availability and cultural adaptations among pre-contact maritime peoples of southcentral Alaska (W. Workman 1980b; Jordan and Knecht 1988; Dumond 1987; McCartney 1988; Erlandson *et al.* 1991; and others); however, no correlation of resource distribution and site location data has been attempted for the outer Kenai Peninsula.

Cultural ecological studies identify biological productivity, species diversity, and resource stability as significant cultural aspects of northern coastal environments. The abundance and predictability of maritime resources permit higher population densities among pre-contact coastal peoples than among neighboring interior groups (Fitzhugh 1972). Logistical settlement patterns which center on a residential base village from which individuals and task groups make short forays to exploit specific resource locales are well-suited to the exploitation of northern coastal ecosystems (Yesner 1980). A wide variety of high-yield locales (sea mammal haulouts and rookeries, seabird colonies, shellfish beds, etc.) can be harvested from coastal residential bases by taking advantage of both the mobility of boat travel and the close spacing of coastal ecological zones.

Relationships between resource structure and socioeconomic organization have also been explored for coastal groups. Socio-cultural complexity characterized life among coastal residents of the Pacific Rim, and presumably among the Unegkurmiut as well. As noted in Chapter 3, social rank, cooperative resource gathering and consumption, and intergroup marriage, trade, and warfare are aspects of cultural complexity in the region.

The unequal distribution of resources among local group territories has important archaeological implications. Resource variation in a region with complex socio-economic development implies both larger village size and greater occupational time depth in resource-rich zones, the former representing occupation by larger local groups.

Alutiiq Settlement Models

Two settlement models are proposed for the Alutiiq region by Haggarty *et al.* (1991): a resource or logistical model, and a demographic model. The demographic model is essentially a modification of the resource model which considers the implications of population growth during the pre-contact period and population decline after contact. The demographic model cannot be applied to the outer Kenai Peninsula coast because of the lack of chronological site data and the dearth of ethnographic data. However, as noted in Chapter 3, Russian influence during the early contact era was considerable and likely resulted in population reduction and dramatic changes in Unegkurmiut settlement and subsistence which should be evident archaeologically.

Resource Model

This discussion abstracts the analytical approach to Alutiiq settlement and subsistence described by Haggarty *et al.* (1991, Chapter 9). The resource model proposes that resource distributions are a primary factor affecting settlement locations. Annual subsistence involves harvesting resources from different environmental zones, preferably from a single residential base village situated to maximize access to a variety of diverse, abundant, and seasonally available resources. Suitable landforms for past human settlement were limited in portions of the outer Kenai Peninsula by the former reach of glaciers, the steep aspect of many sections of coastline, and inaccessibility due to wave exposure. In addition, resource distributions have changed due to commercial exploitation. As a result, current resource distributions are only general

predictors of past settlement intensity in the area, and resource abundance does not automatically indicate site presence.

It is not possible to distinguish accurately the seasonality of a particular outer Kenai Peninsula site without extensive subsurface excavations and detailed faunal analysis. However, several predictions can be offered based on available ethnographic and biological data. Residential sites should generally be situated in areas of maximum resource diversity and abundance since village sites were central bases from which individuals and subsistence task groups operated. These areas are expected to occur primarily in outer coast areas. Village sites will also occur in inner bay or even riverine locations if salmon or other resources are exceptional and population pressures dictate settlement of areas with less resource diversity and abundance. Otherwise, inner bay use should be represented by camps without semi-subterranean house remains or other evidence for more permanent occupation.

Temporary camps should be found in areas with lower resource diversity on average, since their placement would have been determined by proximity to single resources rather than by access to a diverse resource set. Such camps may be associated with areas near seasonal resource concentrations that do not offer sufficient overall diversity to attract permanent village settlement.

Resource indices should be positively correlated with settlement size (number of housepits, midden size) based on the prediction that larger local groups would have been located in resource-rich zones. Resource abundance and site density (number of sites per kilometer of shoreline) should also correlate since resource-rich areas would have attracted more settlement and supported larger human populations.

Available data on the distribution of key food resources (such as salmon, sea mammals, and sea birds) have been compiled, along with AHRS data for all known archaeological sites located within one kilometer of the coast in the Unegkurmiut region. Resource and archaeological data were mapped using Geographic Information System (GIS) mapping.

Cultural Factors

As noted in Chapter 3, little is known about the Unegkurmiut of the outer Kenai Peninsula; however, the general Alutiiq settlement pattern described in Haggarty *et al.* (1991) is assumed to apply to the Unegkurmiut. In brief, the Alutiiq settlement pattern is characterized by adaptations to the maritime environment including sea mammal hunting, fishing, and collecting of various intertidal resources. Alutiiq people generally lived in permanent dwellings (either on a year-round basis or during the winter) and harvested food surpluses sufficient to last through the winter months when resources were less abundant and weather conditions made travel and subsistence more difficult. Travel to distant fishing camps and other resource harvesting areas in the spring and summer either involved groups which did not have direct access to large concentrations of year-round resources, or groups whose territories were too large to permit harvest of spring and summer resources from their base village. Groups which had access to large concentrations of diverse resources would have been less likely to relocate seasonally.

Population growth in the Alutiiq region over time likely led to "territorial circumscription" which would have reduced the diversity of resources available within individual territories. If this occurred, seasonal movements of whole groups between winter and summer residences would have been uncommon. With extreme population density some local groups might have had access only to outer shores, while the territories of other groups might have straddled both outer coast and inner bays, while still others would have been confined to inner bays. The highest-ranking groups likely occupied areas of highest diversity and productivity. Groups would have become more sedentary and more specialized through time, with increasing reliance on trade or warfare with other groups to obtain a full complement of necessary resources.

Table 9.2 Other Middens or Artifact Scatters of the Outer Kenai Coast

AHRS #	Site Size*	Remarks	Source
SEL-130	28 m^2	Pre- and post-contact intertidal artifacts - no upland features	McMahan and Holmes 1987:22
SEL-179	30 m^2	Upland midden (extent undetermined), intertidal artifacts	Exxon Files, AHRS
SEL-181	1000 m^2	Defensive site with midden and intertidal artifacts	Exxon Files, AHRS
SEL-186	N/A	Upland midden	Exxon Files, AHRS
SEL-188	3400 m^2	Upland midden, intertidal artifacts	Exxon Files, AHRS
SEL-194	550 m^2	Charcoal lens in eroding cutbank, intertidal artifacts	Exxon Files, AHRS
SEL-195	N/A	Intertidal artifacts including Kachemak stone lamp	Exxon Files, AHRS
SEL-197	80 m^2	Intertidal artifacts	Exxon Files, AHRS
SEL-198	100 m^2	Upland midden, small rockshelter with midden, intertidal artifacts	Exxon Files, AHRS
SEL-206	500 m^2	Intertidal artifacts	Exxon Files, AHRS
SEL-215	1200 m^2	Intertidal artifacts	Exxon Files, AHRS
SEL-216	1250 m^2	Intertidal artifacts	Exxon Files, AHRS
SEL-217	100 m^2	Intertidal artifacts	Exxon Files, AHRS
SEL-218	N/A	Isolated intertidal artifact	Exxon Files, AHRS
SEL-228	N/A	Upland midden, intertidal FCR Possible historic village of Kagilik	AHRS

*** site sizes approximate**

This process appears to have occurred on parts of the Northwest Coast, where ethnohistoric and archaeological evidence presents a picture of very dense settlement during the late pre-contact period (Haggarty and Inglis 1985).

Archaeological Settlement Pattern Analysis

Several potential problems and biases must be considered when applying settlement models to an interpretation of the archaeological record. Paleoenvironmental continuity, differential site loss due to changing sea levels and erosion, extrapolation of modern resource distribution data, and weaknesses in the archaeological data base are areas of concern which affect data interpretation (Haggarty *et al.* 1991).

The present study utilized resource data on a limited set of variables: harbor seal and sea lion rookeries and haulout areas (ADFG 1985b), seabird colonies (Sowles *et al.* 1978), and salmon streams by species (ADFG n.d.). Unfortunately, data regarding other key resources such as whales, fur seals, and shellfish were unavailable for this study. This study drew upon site data from the Alaska Heritage Resource Survey, as well as from 1989 and 1990 Exxon Cultural Resource Program data. Despite the expanded coverage of the outer Kenai Peninsula region resulting from recent surveys, many gaps remain and survey intensity was admittedly variable.

Resource profiles over a simple circular catchment area 10 km in diameter were compiled for each of the 16 sites on the outer Kenai Peninsula which exhibit evidence of housepits. Resource profiles of

15 additional pre-contact sites similar to SEL-188 with no surface evidence of housepits (small middens and/or intertidal artifact scatters) were also assembled for comparative purposes. The 10 km radius was intended to include resources within relatively easy boat access. Locations of major harbor seal concentrations, sea lion haulouts and rookeries, bird colonies, and salmon streams were available on the Exxon Geographic Information System (GIS), and maps of these resource areas and AHRS sites were produced. A 10 km diameter circle was centered on each site, and all resource locales within the circle were counted.

Resource scores were computed for each resource on the basis of "species-occurrence." For example, if three sea lion haulouts occurred within 10 km of a site, a sea lion score of three was recorded for that catchment area. Salmon occurrences were recorded by species (pink, chum, sockeye, coho, chinook) when computing scores. One stream with three species would yield a salmon score of three, while two streams each with three species present would yield a score of six. Although these are rough measures of resource abundance, the number of salmon species in a stream generally correlates with two important variables: the size of the total salmon run and the length of the period that salmon would be available for exploitation.

Total resource scores were computed by totalling all resource scores for each catchment area. The total resource score is therefore a combined quantity and diversity indicator. If, for example, one seabird colony (seabird occurrences were not broken down by species), a sea lion rookery, and a stream with three species of salmon were present, a resource diversity score of five was recorded.

Sites were classified according to major environmental zone: inner bay, semi-protected (outer bay/outer coast), or exposed (offshore island or exposed outer coast). The boundaries separating the zones were drawn subjectively with the intention of separating outer areas of relatively high energy wave exposure from more protected waters.

Sites were also classified by four site types: upland sites with more than 10 house depressions, upland sites with between six and ten house depressions , upland sites with five or less house depressions, and intertidal artifacts or upland middens without house depressions. The data for each site were entered into a database and the resource totals were added, averaged, and cross-tabulated according to site type and environmental zone.

Settlement Sites

The average scores and average percentages of resources within 10 km of each of the 16 settlement sites (sites with evidence of house depressions) are listed by site type in Table 9.3. The scores for the medium settlement sites indicate high averages for sea lion and seal, but low averages for salmon. Other than the higher salmon scores for the small village sites, the resource averages between subtypes are generally comparable. The high salmon scores in the smallest settlements indicate that sites with five or less houses are situated closer to more salmon spawning streams than larger settlements, as would be expected if population expansion made habitation of areas with less resource diversity attractive. Also, bird and seal scores are relatively high in this group, which indicates some access to species other than salmon, which would make sense if these are permanent, albeit small habitation sites. An alternative explanation is that sites adjacent to salmon streams were seasonal camps; however, the fact that house depressions are present seems to indicate permanent rather than seasonal occupation. Medium village sites had the highest scores excluding salmon (total of seal, sea lion, and birds) indicating that villages with between six and ten houses are situated in areas with the highest overall resource abundance and diversity.

The two large villages (XBS-020 and SEL-129) have very low total resource scores and may be anomalies. XBS-020 is a site dated to 320 B.P. which is reportedly comprised of numerous cultural depressions. The site is situated on what appears to be the terminal moraine of a retreating glacier and could represent a late pre-contact or post-contact

Unegkurmiut site. SEL-129 is situated on one of the few peninsulas on the outer Kenai coast, and its location may be related to the site's defensive aspect and access to migratory whales and other sea mammals.

A factor which is important but which was not quantified for this study is the relation of sites to areas of high shoreline convolution. The few linear stretches of shoreline (shorelines with few indentations) in the area do not appear to have been inhabited.

Table 9.3 lists the average resource scores and average resource score percentages for the same 16 sites by environmental zone. As noted previously, these environmental zones were chosen somewhat subjectively. Sites on offshore islands were generally included in the "exposed" category.

The average resource scores and percentages indicate that sites which are situated in exposed and in semi-protected areas have greater access to a wider diversity of resources than sites which are located at the heads of inlets. Sites located in exposed and semi-protected environments have access to a greater variety of resources such as sea mammals, birds, and bottomfish which are available for longer periods of time in comparison to inner bay resources such as salmon which are seasonally available.

Salmon scores are high for inner bays and show a downward trend for outer bays and offshore islands. Seal and sea lion haulouts and rookeries as well as sea bird colonies increase somewhat away from inner bays. Although the sample size is relatively small and based on generalized modern resource information, the data indicate that a wide range of maritime resources was available within a 10 km radius of sites away from the heads of inlets. Sites appear to be concentrated in semi-protected and outer coast zones because abundant sea mammal, bird, and fish resources could have been exploited with relatively little travel. Important resources such as migratory whales, bottomfish, and shellfish (which were not measured by this analysis) also would have been readily available near many sites in these environments.

In summary, residential sites in different environmental zones appear to have contrasting resource bases. Intensive-level survey and subsurface testing are necessary before questions regarding settlement patterns can be answered for either the pre- or post-contact period. A general examination of outer Kenai Peninsula site data indicates population growth over time may have been the catalyst for establishing permanent residential sites in less resource-rich, protected environmental zones. Future analysis of subsurface faunal and artifact samples excavated within a regional research framework should address questions of permanent or seasonal site occupation and use and the role of resource specialization and trade in the Unegkurmiut economy.

Other Sites

The resource scores of other pre-contact sites on the outer Kenai Peninsula coast (small middens without evidence of surface house depressions, and intertidal artifact scatters) were calculated and are presented in Table 9.3. The general trend of the resource scores is comparable to those associated with small village sites. The "other" sites are generally located close to salmon streams and bird rookeries, but usually are further than 10 km from seal or sea lion haulouts and rookeries. While it is difficult to categorize these sites, the variety of the resource distribution scores indicates these sites likely include both resource-specific camps and the remnants of permanent habitation sites which have eroded into the intertidal zone.

SEL-188 is included in the "other" category. Its resource scores are in the lower range for sites of this type. The scores indicate limited access to salmon streams, with some access to sea lion concentrations and bird colonies. This resource pattern is compatible with the pattern of seasonal use directed at sea mammals, birds, and fish which has been postulated for SEL-188 based on the limited amount of

Table 9.3 Outer Kenai Coast Site Resource Scores and Averages

Site	Site Class	Env. Zone	Salmon	Sea Lion	Seal	Bird	TOTAL
SEL-119	large village	semi-protected	8	0	0	3	11
XBS-020	large village	semi-protected	1	0	1	3	5
AFG-103	medium village	exposed	0	5	3	5	13
AFG-175	medium village	exposed	0	5	3	5	13
SEL-003	medium village	semi-protected	5	0	0	0	5
SEL-129	medium village	semi-protected	3	1	0	4	8
XBS-015	medium village	semi-protected	4	0	2	6	12
AFG-087	small village	exposed	0	3	3	5	11
AFG-105	small village	exposed	0	5	3	5	13
SEL-172	small village	semi-protected	8	0	1	3	12
SEL-178	small village	protected	16	0	2	2	20
SEL-207	small village	protected	14	0	1	3	18
SEL-208	small village	semi-protected	14	1	2	3	20
SEL-209	small village	protected	9	0	0	5	14
SEL-211	small village	semi-protected	16	1	1	5	23
SEL-223	small village	exposed	8	3	2	3	16
XBS-014	small village	semi-protected	4	1	2	6	13
SEL-130	other site	semi-protected	9	0	1	4	14
SEL-179	other site	protected	14	0	2	2	18
SEL-181	other site	semi-protected	15	0	1	3	19
SEL-186	other site	semi-protected	21	0	1	4	26
SEL-188	other site	semi-protected	5	1	0	6	12
SEL-194	other site	semi-protected	6	0	0	6	12
SEL-195	other site	protected	14	0	2	3	19
SEL-197	other site	semi-protected	7	1	0	4	12
SEL-198	other site	exposed	0	2	0	6	8
SEL-206	other site	protected	6	0	0	6	12
SEL-215	other site	semi-protected	8	1	1	4	14
SEL-216	other site	semi-protected	8	1	1	4	14
SEL-217	other site	semi-protected	8	1	1	5	15
SEL-218	other site	semi-protected	8	1	1	5	15
SEL-228	other site	exposed	3	0	0	3	6
Large Village Resource Avg (Avg %)			4.5 (46%)	0 (0%)	.5 (10%)	3.0 (44%)	
Medium Village Resource Avg (Avg %)			1.8 (18%)	2.8 (22%)	2.0 (16%)	5.0 (44%)	
Small Village Resource Avg (Avg %)			8.9 (50%)	1.4 (10%)	1.8 (12%)	4.0 (27%)	
Other Site Resource Avg (Avg %)			8.8 (56%)	5 (05%)	.7 (04%)	4.3 (35%)	
Exposed Site Resource Avg (Avg %)			1.5 (25%)	1.0 (13%)	0 (0%)	3.0 (63%)	
Semi-protected Site Resource Avg (Avg %)			10.3 (62%)	6 (04%)	.9 (05%)	5.0 (28%)	
Protected Site Resource Avg (Avg %)			8.67 (59%)	0 (0%)	.67 (04%)	6.0 (37%)	

subsurface testing and the artifact assemblage (see Chapter 8).

The distribution of the "other" sites on the landscape indicates that the majority of these sites are in semi-protected or protected locations. The resource scores indicate that the majority of these sites may be species-specific sites since their overall resource scores are low except for salmon. It is possible that, given the long-term subsidence of the outer Kenai coast, some of these sites represent older settlement sites which have eroded into the intertidal zone (particularly those in semi-protected environments). However, if this was the case, more diverse and higher resource scores should be associated with the sites, and the sites should be more widely distributed across environmental zones. Alternatively, some of the "other" sites may represent the remains of seasonal camps. Camps consisting of boats overturned in the upper intertidal zone and small lean-to structures consisting of pole frameworks covered with bark or planks are documented in the ethnographic literature (de Laguna 1956:59).

Conclusions

This initial overview of outer Kenai Peninsula site and resource distributions indicates that the region was a transitional zone between a dispersed site and resource pattern in Prince William Sound and an extremely dense site distribution on Kodiak Island. Variation in the distribution, abundance, and productivity of resources along the outer Kenai Peninsula coast was sufficient to have affected the location of residential sites and subsistence strategies of various groups. Over time, differences in resource distribution and demographic and social factors had important implications for settlement patterns, resource exploitation, technology, and social interaction. Unfortunately, demographic and temporal site information on the outer Kenai Peninsula is lacking, but on a broad level, resource disparities likely led to variation in population density, and presumably to differences in wealth, power, and trade.

The investigations at SEL-188 have been the impetus for framing larger research issues regarding outer Kenai Peninsula history. The effect of subsidence (both recent and long-term) on archaeological sites and natural resources must be established. The glacial history of the outer Kenai coast and its effect on settlement patterns must also be established. Whether or not the Native people of this stretch of coast hunted whales is an important issue which requires resolution. Geomorphological studies identifying regional sea level changes as well as temporal information regarding major geologic events will help demarcate the vertical distribution of cultural sites along the outer Kenai Peninsula coast. Collection and analysis of C14 and tephra samples from sites in the region as part of a site survey strategy will allow dating of deposits prior to site excavation and will enable analysis of site age and distribution prior to major excavations. Pre-contact population and culture change in Kachemak Bay and throughout southcentral Alaska may have affected Unegkurmiut settlement and subsistence patterns and should be considered in future research. Analysis of outer Kenai housepit size and morphology would facilitate comparisons with Kachemak and Koniag house styles on Kodiak Island and elsewhere. Examining unpublished outer Kenai Alutiiq place names and oral traditions will likely add historical information pertinent to past habitation and camp sites.

Investigations at SEL-188 have contributed new temporal and technological data from the outer Kenai Peninsula coast. The intertidal portion of the site has contributed some information to the regional chronology, but such intertidal lithic scatters generally have "... no integrity of location and (are) therefore of limited value for interpretation. Due to the scarcity of archaeological assemblages from the area, however, the artifacts themselves are of some inportance" (McMahan and Holmes 1987:22). In a regional context, these data indicate the need for a more thorough understanding of site distribution and density on the outer Kenai Peninsula prior to intensive site excavation. The potential of archaeological survey data has been proven on Kodiak,

(Jordan and Knecht 1988), the Northwest Coast (Haggarty and Inglis 1983, 1985), and many other areas. Collection and analysis of site data through systematic shoreline survey constitutes the essential first phase in understanding the human history of the outer Kenai Peninsula. Regional site survey and sampling will provide indispensable information on the age, structure, function, and contents of sites. This, in turn, will permit more informed research and management decisions to be made about future outer Kenai Peninsula site investigations.

CHAPTER 10

SUMMARY

The primary goal of Exxon Cultural Resource Program work at SEL-188 was to protect the site's cultural resources during shoreline treatment in compliance with state and federal permits. The work plan was agreed upon by CTAG representatives and involved input from land managing agencies, Native organizations, and the SHPO. The implementation of the work plan included locating and mapping artifacts in the intertidal zone and collecting selected specimens to enable treatment to proceed. Information regarding the upland portion of the site was collected by National Park Service and Chugach Alaska Corporation archaeologists and presented in this report by agreement along with data about the cultural and environmental context of SEL-188. This chapter reviews the site inventory and evaluation results and summarizes the compliance effort which mitigated potential impacts to the site.

Site Inventory and Evaluation

The discovery of SEL-188 occurred as part of the inventory and evaluation process under terms of the Memorandum of Agreement drafted in 1989 to keep the oil spill cleanup in compliance with Section 106 of the National Historic Preservation Act. It was assumed initially by multi-agency archaeologists that intertidal artifacts at SEL-188 and their spatial relationships were potentially significant and that intact cultural deposits might be present in the intertidal zone. All parties agreed that strong protection measures were warranted to maintain the assumed integrity of cultural material in the intertidal zone because there was a lack of information about sites in the region at the time. While the lack of regional site information and the absence of information for SEL-188 made defining the cultural values potentially at risk difficult, a conservative monitoring approach was called for given the likelihood for disturbing artifacts which possibly were in a cultural context.

Potential Impacts

Potential spill-related impacts during the site protection effort were identified as either oil-related or treatment-related (Mobley et al. 1990:101-114). Oil in the mid-intertidal zone partially obscured some artifacts, so more effort was needed to identify them. Archaeological excavation of Test Unit B in the intertidal zone prior to treatment documented oil penetration 10 cm into the gravel, making identification of some subsurface artifacts difficult. Originally, there were concerns that oil would reach intact cultural deposits subsided into the intertidal zone, but no such condition was observed. Treatment activities were also a source of potential impact to SEL-188. Workers could inadvertently remove, displace, or damage artifacts in the inter-

(Robert Betts 15:3 Exxon)

Figure 10.1 View south from N180 E200 on August 1, 1990 prior to initial treatment

tidal zone, and unauthorized access to the uplands portion of the site was also possible. All sources of potential impact were recognized and protective measures were taken.

Site Protection Effectiveness

The site protection effort focused on detailed mapping of all recognizable artifacts in the intertidal zone prior to treatment, orientations to explain field procedures, treatment monitoring to minimize disturbance to surface and subsurface sediments in the intertidal zone, mapping and recovery of artifacts encountered during treatment, and documentation of the results of the site protection effort.

Three intertidal artifact mapping episodes prior to treatment helped document the exact location of individual artifacts. Mapping of additional artifacts encountered during treatment in 1990 supplemented the pre-treatment artifact distribution maps. Each map made use of the preceding map(s) to identify artifact locations resulting in an accurate cumulative representation of intertidal artifact distribution.

Orientations for cleanup workers and supervisors were conducted onboard treatment vessels and at the site prior to each treatment event. These motivated workers to operate carefully and scrutinize their areas for cultural features and objects. Familiarity with the type of artifacts present in the

(Robert Betts 18:15 Exxon)

Figure 10.2 Post-treatment view south from N180 E200 on August 4, 1990

intertidal zone enhanced the workers' ability to identify artifacts encountered during treatment.

Exxon archaeologists monitored each of the four treatment episodes. The greatest intrusion to the intertidal zone occurred during the first treatment event on August 2-3, 1990 when large rocks and boulders were moved by hand to gain access to underlying oiled sediments. During later treatment events in 1990 and 1991, only accessible oil was recovered, and movement of larger rocks was minimized. Photographs taken during the course of treatment illustrate how displacement of larger rocks and boulders was confined only to those areas explicitly identified as needing such attention (Figures 10.1,10.2,10.3).

Surface artifacts observed within the confines of the grid prior to cleanup and those encountered by workers during treatment were plotted within the grid and collected. Forty-three previously unmapped artifacts were identified during the monitoring of August 1-2 and August 28-29. Of 42 collected artifacts, 28 were collected from within the grid and 14 from oiled areas outside the grid. All 28 artifacts collected from within the treatment area were identified first by workers as possible artifacts and subsequently confirmed by archaeological monitors. Hundreds of other "possible artifacts" were called to the attention of the archaeologists by workers but none revealed cultural modification. Archaeologists conducting bucket checks of sedi-

(Robert Betts 29:28 Exxon)

Figure 10.3 View south from N180 E200 on August 29, 1990 after completion of final 1990 treatment

ment removed from the beach on August 26, 1990, and inspection of 10% of the bags of oiled sediment removed on June 11, 1991 did not identify any artifacts inadvertently leaving the beach. The beach was examined so thoroughly that a tiny stone bead was discovered by a cleanup worker during treatment. Minimal disturbance of artifacts occurred outside the treatment area during treatment. Of 87 stone artifacts mapped in the intertidal zone in April, 1990, 81 were accounted for in the August 4, 1990 post-treatment assessment and the others were likely displaced by wave action.

The site protection effort was successful in avoiding cleanup-related disturbance to the upland portion of SEL-188. No unauthorized disturbance to the uplands occurred during any of the four shoreline treatments. The protection effort successfully minimized disturbance to artifacts in the intertidal zone, and information about their distribution was collected and analyzed. The intertidal portion of the site was scrutinized intently by archaeologists. The site was not adversely affected by the oil spill treatment. The protection effort was documented with maps, notes, photographs, and videotape, all of which will be curated at the University of Alaska Fairbanks. This report constitutes the final documentation of the effort.

Contributions

The site protection effort constituted a detailed and systematic investigation of a Gulf of Alaska intertidal artifact scatter. The uplands testing by NPS and CAC established SEL-188 as the oldest radiocarbon-dated site on the outer Kenai Peninsula coast and is an initial step in establishing a chronological framework for what was previously a regional void in Alaskan archaeology. The three stratigraphic levels, dated approximately 600, 700 and 1300 years ago, span the regional transition from the Kachemak to Late Prehistoric periods.

The artifact sample observed at the site contains boulder spalls and notched pebbles (considered rare in Prince William Sound archaeological sites), as well as splitting adzes (considered rare in Kachemak Bay archaeological sites), suggesting that the inhabitants of SEL-188 drew on the traditions of neighboring groups to the northwest and the southeast. An archaeological site/resource distribution assessment of the outer Kenai Peninsula indicates SEL-188 is located near sea mammal haulouts and bird colonies and has a resource profile indicative of a seasonal campsite. The regional site analysis addresses future regional site survey and sampling issues based on the results of the SEL-188 investigations. Other site and artifact details from SEL-188 provide useful comparative data for future archaeological investigations on the outer Kenai Peninsula coast.

Conclusions

SEL-188 was subject to potential impact from treatment to remove oil from its intertidal component. In 1990 and 1991, oil remained in intertidal areas where artifacts were located, causing concern that treatment could damage or remove them. Exxon Cultural Resource Program archaeologists devised and implemented a protection strategy through the Section 106 process after identifying the site in 1989. Disturbance to the upland portion of the site was avoided, and impact to the intertidal artifact scatter was minimized.

This report described and analyzed the cultural resources at SEL-188 and along the outer Kenai Peninsula in the context of the region's cultural and environmental history. The heritage values of SEL-188 were simultaneously documented and preserved during Exxon's work at SEL-188. The work resulted in no adverse impact to the site, and the shoreline was successfully treated.

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Appendix A

Scope of Work
for
Mitigation of Adverse Effects of Cleanup Operations for Spilled Oil at Archeological Site SEL-188 Kenai Fjords National Park

Prepared by

J. Schaaf

Division of Cultural Resources

National Park Service, Alaska Region

30 April 1990[1]

[1]NOTE: References to specific site locations have been edited from these appendices.

Scope of Work for
Mitigation of Adverse Effects of Cleanup Operations for
Spilled Oil at Archeological Site SEL-188
Kenai Fjords National Park

Introduction

The purpose of this scope of work is to guide data recovery to be conducted at archeological site SEL-188 for mitigation of impacts from oil cleanup activities in compliance with Section 106 of the National Historic Preservation Act (NHPA, as amended 1980). It has been prepared by the National Park Service (NPS) in consultation with the State Historic Preservation Officer (SHPO), the English Bay Village Corporation (EBVC) and the Chugach Alaska Corporation (CAC). The work to be conducted within the scope of this document does not cover mitigation of any injury or correlated damage under CERCLA.

The site is within the boundaries of Kenai Fjords National Park. The State manages the portion of the site below Mean High Tide (MHT). The portion of the site above MHT is managed by the NPS and is withn an unconveyed EBVC selection under ANCSA section 12. CAC has rights to the mineral subsurface estate on the village-selected land.

SEL-188 has been determined eligible for inclusion in the National Register of Historic Places (Appendix 1). The lower, middle and upper intertidal zone, the supralittoral zone (above MHT) and the adjacent upland portions (beyond the spray zone) of the site all retain eligibility. Site significance is dependent on interrelated information from all physiographic portions of the site. Therefore, data recovery must accordingly address all three physiographic subdivisions of the site, although to varying degress of intensity.

SEL-188 occurs on a heavily oiled beach which is the park's and the Seward Resource Multi-agency Coordinating Group's (RMAC) first priority for cleanup during the coming summer season. The level of work required by this document represents a minimum effort needed to mitigate impacts resulting from planned cleanup activities.

The Exxon cultural resource assessment for SEL-188 and an interagency site documentation effort led by NPS concluded that any oil cleanup operations would have adverse effects on the site. Pursuant to the 7th draft of the Exxon Valdez Oil Spill Cleanup in Prince William Sound, Gulf of Alaska, and Beyond Memorandum of Agreement (No. 89-412, hereafter referred to as the 7th draft MOA), adverse effects of shoreline contamination treatments will be minimized through data recovery executed by the Exxon Valdez Cultural Resource Program. The data recovery will conform to the Secretary of the Interior's Standards and Guidelines for Archeological Documentation (48 FR 44734-37).

The data recovery will be conducted under the aegis of an Archeological Resources Protection Act (ARPA) permit issued by the National Park Service and an archeological excavation permit issued by the Division of Land and Water Management for state tideland. These permits will be prepared in consultation with the EBVC and CAC.

Background

SEL-188 is located on the southeastern side of the Kenai Peninsula, at the north end of the Pye Islands. As a result of the March 24, 1989 grounding of the Exxon Valdez tanker, an extensive portion of the subsided site, now in the intertidal zone, was oiled.

SEL-188, a site with at least one prehistoric component and one historic component, was discovered by Exxon archeologist Mike Yarborough during a SCAT assessment of the oiled beach on July 31, 1989. Yarborough reported an extensive surface artifact scatter (about 70 meters long) and dead culturally modified trees (CMT) in the active beach zone. In the forest above the beach, sawn stumps, CMTs and a collapsed wooden structure (or pile of hewn lumber) were noted. Artifacts collected included a ground slate fragment, fragments of three ulus, two adzes, a fragment of a planing adze, and a cartridge case. Most of the collected artifacts were oiled. It was noted that a 3 to 4 meter wide section of the beach had a heavy coating of fresh tar and weathered mousse with penetration to 60 cm into the underlying pebble matrix. Yarborough's cultural resource assessment report recommended that the site be

monitored during cleanup and that a systematic collection of artifacts in the oiled intertidal zone be conducted prior to treatment.

An interagency team of archeologists, led by Anne Worthington of NPS, returned to SEL-188 on August 10, 1989, to collect data for site documentation purposes and for determination of effect of the oiling and subsequent cleanup operations (Appendix 2). The team included Peter Zollars (consulting archeologist for Chugach Alaska), R. Joan Dale (SHPO staff) and Exxon archeologist Mike Yarborough. A permanent site datum was set and a detailed site map was made showing the relative locations of selected artifacts, CMTs, fire-cracked rock concentrations and subsurface tests along the 112-meter length of the site (Site map in Appendix 2). Eighteen artifacts were collected for analysis and are presently curated at the NPS Alaska Regional Office. An additional eight oiled artifacts, a radiocarbon sample and soil sample were collected as evidenciary material. Most of the artifacts exposed on the beach were found below the eroding cutbank. A small test excavated on the upper beach exposed a 5-7 cm thick dark sediment layer associated with slate flakes at 9 cm below the beach surface. This sediment layer may be an intact paleosol or a redeposited soil, eroded from the cutbank above. A test excavated in the vegetated area behind the beach yielded cultural material to a depth of 44 cm below the surface and an 8-10 cm thick "paleosol." Based on the findings of this preliminary documentation effort, Worthington concluded that the site is National Register quality and that any cleanup operations will have adverse impacts on the site unless specific steps are taken to negate or mitigate these impacts.

Site Significance

The culture history for the coastal area within Kenai Fjords National Park is virtually unknown. Even at the time of European contact, "hardly anything more than the name is known" of the Eskimo occupants of this area, called the "Unizkugmiut" by the neighboring Chugach Eskimos (Oswalt 1967:9). There are 22 cultural sites along the coast of KEFJ recorded on the State Alaska Heritage Resources Survey file. Nine of them (including SEL-188) were recently discovered by Exxon SCAT surveys conducted after the oil spill. The list includes 5 prehistoric settlements of unknown cultural affiliation, 2 prehistoric camps (buried hearths with no associated artifacts), 7 prehistoric artifact scatters, 2 cache sites, 2 historic artifact scatters, 1 historic cabin and 3 historic mining sites dating from the 1920's and 1930's. None of these sites have had archeological documentation beyond the initial reconnaissance-level surveys conducted by various agencies including NPS, the Bureau of Indian Affairs, Exxon SCAT teams, and SHPO personnel. A number of historic cabins are known to be present but have not been inventoried.

Perhaps substantial portions of the archeological record along the coast of Kenai Fjords have been lost in this geologically active environment, most dramatically impacted by glaciation and by subsidence following the 1964 earthquake. The land behind the narrow beaches rises steeply toward massive alpine ice fields, affording few habitable locations and supporting a relatively impoverished terrestrial fauna. However, the outer coastal area, where SEL-188 is located, has abundant and diverse marine resources. SEL-188 demonstrates the presence and survival of an extensive prehistoric and historic site, indicating repeated use of the area possibly as early as 2000 years ago.

SEL-188 has been determined eligible for inclusion in the National Register of Historic Places under criterion d, the ability to yield new information regarding the aboriginal occupation of this area. The site is significant because it is the largest known site along the outer coast of Kenai Fjords of its kind, representing an important segment of the area's cultural history that is currently unknown.

SEL-188 is important because of its location at the interface between two culture areas: halfway between Kachemak Bay in outer Cook Inlet and Prince William Sound. A notched pebble found at SEL-188 suggests an affinity to the Kachemak tradition. Based on artifacts collected during the preliminary documentation effort at SEL-188, Worthington suggests that the site contains a Kachemak III component (ca. 0 - 1000 AD). However, an incised slate flake recovered in the test at SEL-188 may indicate a connection with the older prehistoric periods (Palugvik I and II) in Prince William Sound.

The site's significance also lies in the fact that it has the potential to yield information about the nature of resource utilization and environmental adaptation of the prehistoric occupants of the area. The site is located just west of a known whale migration route. The intact subsurface cultural layer in the vegetated area adjacent to the beach provides the opportunity to recover the remains of subsistence resources, particularly faunal remains (shellfish and bone),

which will help understand past seasonal lifeways. This undisturbed portion of the site also provides a chance to link the artifacts on the beach to a datable cultural context.

SEL-188, because of its large size and separate localities of artifact clusters (possibly distinct activity areas), may contain more than one prehistoric component. The significance of the historic component is unknown.

Research Objectives

One of the main research objectives is to determine the culture history of the site: to identify and characterize the nature of the cultural components at SEL-188, including identification and correlation of the components in the beach area and the adjacent upland. This will require data recovery, through subsurface testing and other appropriate means, from all of the three physiographic subdivisions of the site in order to link the cultural material in the intertidal zone to an intact cultural context contained in the uplands and possibly in the supralittoral zone. The scientific value of the artifacts on the beach lies largely in the ability to make this correlation. Mitigation of adverse effects of cleanup on the beach deposits must therefore include data recovery from the supralittoral zone and the uplands as well as from the intertidal zone. This information is essential in order to place the results of the data recovery effort in a meaningful archeological perspective. However, the majority of the work will be concentrated in the intertidal and supralittoral zones, and within these zones, be specifically focused on the archeological remains and data categories that are under greatest threat from cleanup operations. Testing in the uplands will be kept to the minimum necessary to provide a holistic understanding of the site. As envisioned, the uplands researach should constitute less than 10% of the total mitigative effort.

In addition to identification of the prehistoric cultural components present, the historic component should be identified and its significance evaluated.

A second objective is to demonstrate the presence or absence of patterning of cultural remains on the beach and to determine the degree of any identified patterning. Clusters of fire-cracked rocks and artifacts mapped by Worthington suggest that discrete activity areas are discernable. Systemmatic collection of artifacts is required, particularly diagnostic artifacts, however total collection is not recommended. It is estimated that there could be in excess of 7,000 artifacts, mostly slate flakes, on the cobble beach. Collection of all of these would not benefit the research effort in a significant way. Proveniencing of artifacts and application of spatial and quantitative analyses with selective collection of representative samples could be used to demonstrate degree of randomness in the artifact distribution.

Another objective is the need to determine whether the supralittoral zone of the site survived the marine transgression intact. Subsurface testing is needed in this upper beach zone in order to determine if the buried sediment in this area is a primary deposit or if it is redeposited sediment eroded from the cutbank. In addition, the beachward extent of this buried cultural layer must be determined. It is possible that this layer underlies the boulder/cobble beach in the intertidal zone.

A major objective is to determine what subsistence activities were conducted at the site; to identify resources procured or processed at the site for as many identified activity areas and components as possible. All faunal remains encountered during the data recovery should be collected in order to address this objective.

Description of Work

A research design will be developed by Exxon in consultation with the SHPO, NPS, EBVC and CAC for the recovery of archeological data from SEL-188. The design will be consistent with the Secretary of the Interior's Standards and Guidelines for Archeological Documentation (48 FR 44734-37) and take into account the Council's publication, Treatment of Archeological Properties (Advisory Council on Historic Preservation 1980). It should specify, at a minimum:

- the property, properties, or portions of properties where data recovery is to be carried out taking into account the proposed methods for cleanup to be applied in various beach areas;

- any portions of the property where data recovery will not be conducted, that will be disturbed by cleanup activities; the design should specify that an archeologist will be present during cleanup to deal with discovery of any significant or sensitive cultural material not dealt with by the data recovery;

- the significance of the property to be studied;

- prior research on the topic and property type;

- the research questions and objectives to be addressed through the data recovery, with an explanation of their relevance and importance; to include but not limited to the objectives listed above;

- the methods to be used in analysis, data management, and dissemination of data, including a schedule; methods should include but are not limited to:

  a) sufficient subsurface testing in the intertidal zone, supralittoral zone and adjacent upland in order to address objectives,

  b) proveniencing all collected material in relation to the permanent site datum so that legal jurisdiction will be clear when MHT line is established,

  c) collection of sufficient radiocarbon samples, soil samples and collection of all faunal remains to address objectives, and

  d) systemmatic collection of significant or sensitive surface data that would be under threat from the proposed treatment;

- proposed methods for involving the interested public in the data recovery, particularly the villagers of English Bay and the members of the CAC;

- proposed methods for disseminating results of the work to the interested public and managing this dissemination so as to restrict locational information and other sensitive data to protect the site from looting;

- proposed methods by which the consulting parties will be kept informed of the work and afforded the opportunity to participate; and

- a proposed schedule for the submission of progress reports to the consulting parties.

Recovered materials and records will be curated according to the Secretary of the Interior's Guidelines for Archeological Documentation (48 FR 44737) at the University of Alaska Museum, Fairbanks pursuant to the 7th draft MOA.

In the unlikely event that human burials will be discovered during the data recovery project, they will be dealt with according to NPS Burial Policy (Attachment 3). No decisions will be made without close consultation with the EBVC and CAC.

Field investigations will be initiated upon review and acceptance of the research design by the NPS and SHPO. Consultation will be conducted with interested parties as required by Section 106 of NHPA. EBVC and CAC will be given full participation in the review process and the views of both Corporations will be given thorough consideration before any final decision is made to approve the research design.

The level of data recovery presented in the research design should be reflective of and commensurate with the level and intensity of the proposed treatment. There is no expectation that all of the above-mentioned objectives demand equal or exhaustive investigation in the data recovery effort. The central and overall goal of the research is to recover the significant archeological information that is contained in the areas of the site that are most vulnerable to adverse impacts as a result of the planned cleanup activities. The objectives are presented in order to orient the data recovery program toward research domains that would be both relevant and important to a site of this type. The attention devoted to each objective will necessarily vary in direct relationship to the degree to which they can be reasonably addressed in view of the geographical emphasis of the cleanup treatment and the actual data sets contained in the threatened portions of the site. In no way should this Scope-of-Work be construed as a call for an intensive and exhaustive program of site-wide excavation that seeks definitive answers to all research questions that could be legitimately pursued at the site. The primary management goal is to preserve as much of the site as is possible and still meet the mitigative requirements.

Upon completion of data recovery, cleanup activities at SEL-188 will commence only after consultation with the SHPO, NPS, EBVC and CAC has been accomplished. Also at completion, Exxon will provide written recommendations for any additional preservation/protection measures that should be taken prior to or during cleanup.

Schedule

The research design will be submitted by Exxon to the Council, NPS, SHPO, EBVC and CAC for review by May 30, 1990. Unless the SHPO or NPS object, after consultation with EBVC and CAC, within 15 days after receipt of the design, the design will be implemented by Exxon in advance of any cleanup activities at SEL-188.

If any corrections or revisions of the research design are requested by the SHPO or NPS, Exxon's Principal Investigator will be given a reasonable opportunity to comment on the recommended changes and an attempt will be made to resolve any differences of opinion through negotiation. However, once a final decision to revise the research design has been reached by the land managers in consultation with EBVC and CAC, Exxon will be responsible for making the requested changes and executing the mitigation program in accordance with the revised research design.

Reports

Bimonthly progress reports will be submitted to the SHPO and NPS; the first report will be due 2 months after the completion of field work.

A draft report should be submitted to SHPO and NPS no later than 8 months after completion of the field work. The draft report will be kept confidential and will be distributed to the other consulting parties by NPS. The report should meet minimally the standards and contents set forth in the Secretary of the Interior's Standards and Guidelines for Archeological Documentation. Style and editorial policy should follow the journal American Antiquity.

The final, camera ready report should be submitted no later than 12 months after completion of the field work. This report will not be published without prior consultation with the EBVC and CAC.

Contacts

National Park Service:	Ted Birkedal, Regional Archeologist (907) 257-2657 Jeanne Schaaf, Archeologist (907) 257-2663
SHPO:	Judith Bittner, SHPO (907) 762-2626 Bob Shaw, State Archeologist (907) 762-2630
Chugach Alaska Corp.	John Johnson, Cultural Resource Manager (907) 563-8866 Lora Johnson, Archeologist (907) 563-8863
English Bay Village Corporation	Don Emmal, President (907) 562-4571, 281-2228

Appendix B

WORK PLAN
FOR INVESTIGATIONS AT SEL-188,
TO ALLOW OIL SPILL CLEANUP

developed by the

EXXON VALDEZ Cultural Resource Program

July 20, 1990

SEL-188, in Kenai Fjords National Park, contains an intertidal manifestation. Portions of the intertidal area are oiled, with pooled oil in bedrock and boulder crevices, and a tarmat of 28 square meters. Jurisdiction of the site is shared among: 1) the State of Alaska, which claims the intertidal zone; 2) the National Park Service, which owns the uplands and also claims the intertidal zone; 3) English Bay (Native) Corporation, which has a pending ANCSA selection including all the uplands; and 4) Chugach Alaska Corporation, which will acquire title to the subsurface of the uplands if the uplands are conveyed to English Bay Corporation.

After treatment was recommended by TAG on April 19, an archaeological evaluation was conducted at SEL-188. At the request of NPS, a research plan (dated April 23) was prepared and circulated to CTAG, responding to a Scope of Work drafted by NPS. The Exxon work plan was reviewed by CTAG, and evaluation occurred on April 24-25. However, within hours of beginning the field work, part of the planned work effort was aborted when word was received that English Bay Corporation was threatening an injunction against NPS to terminate the investigation. Evaluation of the intertidal zone continued, resulting in a report (Mobley 1990) listing four options for resolving the conflict between the needs of the natural resources and the needs of the cultural resources at the site. The report was presented to CTAG for review on May 2.

On July 2, NPS replied with a proposal for alternative actions, recommending that: 1) bioremediation work be monitored; 2) pooled oil cleanup be monitored so that artifacts could be discovered and mapped; and 3) archaeologists conduct archaeological excavation in the tarmat to recover both artifacts and oil. NPS indicated the intent to complete, with CAC, the upland evaluation tasks that were halted on April 24.

The overall mitigative strategy proposed for the treatment activity planned at SEL-188 will serve to: 1) protect cultural resources potentially impacted by the treatment, and 2) recover and analyze site information and data in accordance with the Secretary of Interior's Standards for archaeological documentation and report preparation.

Proposed Treatment and Field Investigations

The treatment activity recommended by TAG for the subdivision is limited to manual recovery (trowling) of pooled mousse located in bedrock and boulder crevices, bioremediation of pooled oil, cover, and coat areas, and removal of the asphalt tarmat, pending resolution of cultural resource conflicts. Taking into consideration the natural and cultural resources at the site, Exxon proposed to conduct bioremediation, manually recover pooled oil in bedrock and boulder crevices, and leave the tarmat in place.

Prior to initiating treatment in the intertidal zone at SEL-188, a formal briefing will be held for all personnel directly involved in the treament phase. Information will be presented regarding the fragile nature of the cultural resources, the level of care that must be exercised throughout the treatment program, the methods of treatment, and the direction to be provided by on-site archaeological monitors. The briefing will prepare treatment personnel for the sensitive nature of the undertaking prior to arriving on the beach.

Upon arrival at the site, a more detailed briefing session will be conducted. Included in this session will be information on site-specific sensitivities such as the exact limits of the site in the intertidal zone, the exact location of known or suspected cultural remains, and ways to move within the site area so that cultural resources are not unduly impacted. Detailed information on the actual sequence of treatment and on the specific treatment methods to be employed will be presented on-site.

The first treatment task will be to manually recover the pooled oil trapped in bedrock crevices and between boulders. Trowels and large spoons will be used to scoop the pooled oil into containers. Lithic materials inadvertently scooped up in the manual removal of pooled oil will be examined prior to disposal. If artifacts are recovered during this process, they will be cleaned, mapped, and bagged. Both the process of manual removal of pooled oil and the movement of treatment workers in the intertidal zone will be closely monitored.

The tarmat encompasses 32 square meters, four of which were removed as part of the archaeological investigation conducted in April. The tarmat is not mobile or visible from the water, nor does it pose an environmental threat in its present condition. The oiled portion of the four-square-meter test unit placed in the tarmat yielded only two cobble spalls and two pieces of fire-cracked rock, suggesting a low artifact density in the tarmat (a five cm thick cobble/boulder stratum). Removal of the tarmat would appear to directly impact few cultural remains at the site. On the other hand, leaving the patch of tarmat in place would ensure that the potentially small number of artifacts associated with it remain undisturbed. Weighing both the environmental and archaeological consequences of tarmat removal, Exxon recommends that the remaining 28 square meters be left in place. From an archaeological standpoint there is very little to be gained by removing it, while from an environmental perspective there may in fact be a negative, short-term impact to the local intertidal ecology.

If bioremediation is permitted at the site, specific direction will be given to treatment workers as they apply fertilizer where appropriate. All treatment personnel working in the intertidal area will be briefed in much the same way as personnel employed in the manual removal of pooled mousse. Treatment personnel, wherever feasible, will confine their movements to large boulders and bedrock outcroppings.

Effective monitoring will be conducted by staff of the Exxon Cultural Resource Program. A major part of their task will be to ensure that the treatment program recommended by TAG, and approved by CTAG, is carried out in a manner that ensures that the cultural remains present in the intertidal zone receive adequate protection. The general mitigative strategy recommended for SEL-188 is consistent with the level of treatment planned at this location.

Data Recovery

Data recovery at SEL-188 will be consistent with the treatment activity planned for the site area. Exxon will assume responsibility only for the recovery of data associated directly with the oiled area in the intertidal zone. As the area of impact occurs exclusively below the mean high tide line, on tidelands controlled by the Alaska Department of Natural Resources, data recovery will be restricted to the intertidal zone. A minimum of two archaeologists will supervise the work. One will be assigned to a senior capacity, with the authority to direct cleanup crews while at SEL-188. Exxon believes that the uplands investigations proposed by NPS are unnecessary to protect the cultural resources during treatment.

To standardize recording and facilitate comparison of artifacts recovered during treatment with those recovered during the April 1990 investigations, the April 1990 baseline will be re-established. This baseline will be used to plot the distribution of artifacts recovered by Exxon archaeologists below the mean high tide line.

Data Analysis

Given the nature and distribution of artifacts noted during the evaluation in April, it is anticipated that less than 50 artifacts will be recovered below the mean high tide line, of which most will consist of fire-cracked rock. Maps showing the specimen number of recovered artifacts, and the nature of those left in place, will be prepared. Descriptions and illustrations of diagnostic artifacts will be developed for reporting purposes. These will be tied into geomorphic characterizations of the shore as it relates to surf dynamics, stream dynamics, subsidence, and erosion, insofar as they can be inferred from scrutiny below the mean high tide line.

Artifacts and other specimens will be properly cataloged and curated as per the MOA.

Report Preparation and Content

The report discussing the methods and results of the investigations will be prepared according to the Secretary of the Interior's Standards and Guidelines. Further guidance will be taken from specifications in ARPA Permit 89-Kenai Fjords/ARO-001, as renewed for 1990-1991, although it is recognized that the work at SEL-188 is not covered by that permit.

Schedule

Fieldwork will be initiated within a reasonable period of time following approval of the work plan, within operational constraints imposed by weather and other factors. It is suggested that all parties understand and sanction the work plan before fieldwork is attempted.

Summary

Implementation of this work plan will allow treatment of the oiled shoreline at SEL-188, while minimizing disturbance to cultural resources. Uplands research planned by NPS and CAC is not deemed by Exxon to be necessary for execution of the work plan, and is not addressed in this document.

To summarize, the proposed steps of the treatment program are as follows:

1. Brief cleanup personnel before arriving at SEL-188.
2. Brief cleanup personnel at SEL-188.
3. Manually recover pooled oil, under supervision of archaeological monitors, with mapping and recovery of endangered artifacts as appropriate.
4. Bioremediation, under supervision of archaeological monitors, with mapping and recovery of endangered artifacts as appropriate.
5. Analyze and write up cultural resource results in a comprehensive report.

EXXON VALDEZ CULTURAL RESOURCE PROGRAM

WORK PLAN OUTLINE
FOR OIL SPILL CLEANUP AT SEL-188
July 27, 1990

The proposed steps of the treatment program are as follows:

1) Archaeological monitors to brief cleanup personnel prior to the cleanup crew's arrival at SEL-188. Cleanup personnel will be briefed regarding the significance of the site, and on artifact types which may be encountered.

2) Archaeological monitors to orient cleanup personnel on site at SEL-188 prior to the commencement of work.

3) Cleanup personnel manually recover pooled oil in SEL-188 with trowels, spoons and other manual devices under the close supervision of archaeological monitors. Archaeological monitors to map, record and either replace or collect artifacts encountered during manual removal depending upon the artifact type and its susceptibility to illicit collection.

4) Cleanup personnel manually remove tarmat with shovels and spades. The broken-up asphalt and attached rocks and sediments will be inspected for artifacts by archaeological monitors prior to the removal of asphalt, rocks and sediments. Any artifacts observed in the tarmat debris will be collected and curated in accordance with the MOA.

5) Bioremediation crew will spray the beach under the close supervision of the archaeological monitors.

6) Concurrent with, or immediately after Exxon's work in the intertidal zone, Chugach Alaska Corporation and the NPS will be responsible for attempting a limited amount of surface and subsurface work in the site uplands. The key element of this work will be the re-excavation of the 1989 test pit and the recording of its stratigraphy. The purpose of this work is to aid interpretation of the data obtained in the intertidal zone in order to contextualize that data. As a result of this work, NPS will provide Exxon with pertinent information on the number of components present and comment on the nature of these components. Logistics will be coordinated through Exxon.

7) The principal archaeological monitor will describe the cleanup and monitoring processes and analyze the pertinent intertidal and uplands cultural resource findings in a comprehensive report.

Appendix C

Sediment Analysis of Archaeological Samples from SEL-188

compiled from a report by

Kristine J. Crossen and Annette E. Banks
Geology Department, University of Alaska Anchorage
December 6, 1990

INTRODUCTION

Five samples were collected by Jean Schaaf of the Cultural Resources Division, National Park Service, Anchorage, Alaska, from the SEL-188 site on the Kenai Peninsula during the summer of 1990. These samples were analyzed at the sediment lab of the Geology Department, University of Alaska, Anchorage, during October and November, 1990. The analysis was undertaken to determine the grain sizes, lithology, roundness, and weathering of the sediment in order to ascertain the source material and depositional environments of the inorganic grains in the site.

METHODOLOGY

Standard grain size analyses were performed on each of the samples (Folk, 1974). Prior to receiving the samples, they had been washed and the charcoal removed by flotation in the Parks Service laboratory. Some fines may have been lost in this pretreatment process.

Each sample was weighed, then mechanically sieved using the Ro-Tap machine. Sieve sizes (mesh 10, 35, 120, and 325) were chosen to separate the gravel, coarse sand, medium and fine sand, very fine sand and coarse silt, and fine silt and clay (pan) fractions. After sieving, each fraction was weighed and examined macroscopically to determine roundness and lithology of grains.

RESULTS

Table A contains the results for each sample analyzed.

Grain Sizes - Each sample contains a considerable amount of gravel-sized particles (27-60%). The bulk of the samples contains sand-sized material. Coarse sand predominates, comprising from 26-46% of each sample. Medium and fine sands are also common, comprising 12-24% of the different samples. Very fine sand and coarse silt-sized particles are less common, comprising only 1-2% of the sample weight. Fine silts and clays comprise very little of the total weight, under 1% of each sample.

Lithology - Lithologic determinations could be made for the larger grain sizes. A very large percent of the gravel and coarse sand-sized particles are composed of granite fragments (80-98% depending on the sample). A small amount of slate fragments are also present in the gravel and coarse sand fractions (1-13% depending on the sample). Higher percents of slate are present in the coarse sand than in the gravel fractions.

Although the samples were floated for charcoal extraction, charcoal fragments could be identified in the sand, silt, and clay fractions by smearing of the grains. Up to 8% charcoal was present in some coarse sand fractions.

In the materials finer than coarse sand, only colors could be determined. No microscopic analyses were undertaken. It was assumed that the lithologies present in the larger grains are also represented in the smaller sizes. Thus white fragments represent granite particles, while black fragments represent a mixture of slate and charcoal particles. Sixty to eighty percent of each sample contained white particles (granite), while the remaining 20-40% dark grains represent slate and charcoal pieces.

Only a gray color could be determined for the pan (fine silt and clay) fraction. Although earlier pretreatment for charcoal removal extracted most of the charcoal and some of the fines, some of the finer inorganic materials remained in the sample and were processed here.

Roundness - Roundness measures the angularity of the corners of grains. Roundness categories vary from angular to subangular to subrounded to rounded (Folk, 1974). Roundness is considered a measure of the amount of abrasion undergone by a particle between the time it is weathered from its bedrock source and the time it is deposited. Rounding of grains may be produced by stream transport, wave motion, or other processes.

The granite particles are all angular in shape and appear only slightly weathered. It is likely that they exfoliated off granite slabs that underlie and overlie the samples, and that little or no stream or wave transport affected the grains. Alternatively, they could have derived from local bedrock sources, and moved a short distance downhill to be included in the site deposits. The presence of mica grains in the coarse sand fraction of all samples also agrees with the interpretation of unweathered or closely derived material, because micas rarely withstand long transport and abrasion.

The slate particles are commonly subrounded to rounded. Because no local bedrock source exists for the slate, it must have been transported to the site by some mechanism. The rounding of the particles also agrees with a transport hypothesis. These could have been rounded by beach, stream, or glacial processes. They may be clasts contained in the glacial tills that cover the area, which were formerly eroded by either streams or waves and moved downslope to the site area, or they may have been deposited in the site vicinity by wave processes.

SLABS

The layer(s) of slabs found in the site include angular and flattened stones with horizontal orientation. These slabs could have originated from local jointed bedrock or from broken beach rocks. If these slabs had been transported to the site by storm waves, the waves must have deposited them 4-4.5 m above modern sea level. Considering the age of the site, and approximately 2 m of subsidence associated with the 1964 earthquake, prior to 1964 the slabs must have been located 6-6.5 m above sea level.

Cobbles deposited on the beach by storm and wave processes are often imbricated and dip seaward. Beach rocks commonly exhibit random shapes and sizes, so it would be less likely to find only flattened slabs on the beach.

The slabs located in the site may have been transported there by humans, because they appear to have been selected for size and thickness and are all more or less horizontally placed.

RECOMMENDATIONS FOR FUTURE RESEARCH

To determine whether the granite slabs found in the site are deposited by large storm events or may have been placed there by human inhabitants, the stones on the beach and in the site must be compared for size, shape, and imbrication. Measurements of the size, shape, thickness, and imbrication (dip angles) of the materials on the beach and comparison to those in the site should be able to determine the origins of the slabs.

Additional survey and/or testing may be needed to ascertain if any of the site is located below sea level. Additional portions of the site may have been partially eroded and buried below beach materials in the intertidal zone. Additionally, it is possible that portions of the site could be behind the modern beach, but still reaching down to depths below modern sea level. Other sites on the Kenai Peninsula, particularly those in Kachemak Bay, show multiple subsidence events which have resulted in sites now located below high tide levels (Crossen, et al., 1988).

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Folk, R.L., 1974, Petrology of Sedimentary Rocks, Hemphill Publ., Austin.

TABLE A

Sample 1

Level I North Wall
SEL-188
Initial Weight = 95.67g

Loss = 0.83g

Gravel	mesh 10 = 33.42g	35.0%
Coarse Sand	mesh 35 = 39.72g	42.0%
Medium & Fine Sand	mesh 120 = 19.93g	21.0%
Very Fine Sand & Coarse Silt	mesh 325 = 1.76g	1.9%
Fine Silt & Clay	Pan = 0.11g	0.1%
	Total = 94.94g	100%

mesh 10 - 95%	granite fragments, unweathered, angular
5%	slate fragments, weathered, subangular to subrounded
mesh 35 - 80%	granite fragments, unweathered, angular
?	quartz grains, micas present
mesh 120 - 75%	white fragments
25%	black fragments
mesh 325 - 70%	white fragments
30%	black fragments
Pan - 100%	gray

Sample 2

Level I West Wall
SEL - 188
Initial Weight = 133.02g

Loss = 0.96g

Gravel	mesh 10 = 80.05g	60.6%
Coarse Sand	mesh 35 = 34.43g	26.1%
Medium & Coarse Sand	mesh 120 = 15.97g	12.1%
Very Fine Sand & Coarse Silt	mesh 325 = 1.33g	1.0%
Fine Silt & Clay	Pan = 0.28g	0.2%
	Total = 132.06g	100%

mesh 10 - 99%	granite fragments, unweathered, angular
1%	slate fragments, weathered, subrounded
mesh 35 - 90%	granite fragments, unweathered, angular
	quartz grains, micas present
mesh 120 - 80%	white fragments
20%	black fragments
mesh 325 - 70%	white fragments
30%	black fragments
Pan - 100%	gray

Sample 3

Level II North Wall
SEL - 188
Initial Weight = 97.16g

Loss = 0.85g

Gravel	mesh 10 = 44.88g	46.6%
Coarse Sand	mesh 35 = 35.89g	37.3%
Medium & Fine Sand	mesh 120 = 13.80g	14.3%
Very Fine Sand & Coarse Silt	mesh 325 = 1.44g	1.5%
Fine Silt & Clay	Pan = .30g	0.3%
	Total = 96.31g	100%

mesh 10 - 99%	granite fragments, unweathered, angular
1%	slate fragments, weathered, subangular to subrounded
mesh 35 - 96%	granite fragments, unweathered, angular quartz grains, micas present
2%	slate grains, weathered, rounded
1%	charcoal fragments
mesh 120 - 80%	white fragments
20%	black fragments
mesh 325 - 60%	black fragmens
40%	white fragments
Pan - 100%	gray material

Sample 4

Level II West Wall
SEL - 188
Initial Weight = 107.15g

Loss = 0.26g

Gravel	mesh 10 = 48.09g	45.0%
Coarse Sand	mesh 35 = 37.80g	35.4%
Medium & Fine Sand	mesh 120 = 18.49g	17.3%
Very Fine Sand & Coarse Silt	mesh 325 = 2.19g	2.0%
Fine Silt & Clay	Pan = 0.32g	0.3%
	Total = 106.89g	100%

mesh 10 - 98%	granite fragments, unweathered, angular
2%	slate fragments, weathered, subangular to subrounded
mesh 35 - 95%	granite fragments, unweathered, angular quartz grains, micas present
3%	slate grains, weathered, rounded
2%	charcoal fragments
mesh 120 - 80%	white fragments
20%	black fragments
mesh 325 - 60%	black fragments
40%	white fragments
Pan - 100%	gray material

Sample 5

Level III North Wall
SEL - 188
Initial Weight = 125.24g

Loss = 0.98g

Gravel	mesh 10 =	33.85g	27.0%
Coarse Sand	mesh 35 =	57.91g	46.6%
Medium & Fine Sand	mesh 120 =	29.64g	24.0%
Very Fine Sand & Coarse Silt	mesh 325 =	2.33g	2.0%
Fine Silt & Clay	Pan =	0.53g	0.4%
	Total =	24.26g	100%

mesh 10 -	96%	granite fragments, unweathered, angular
	4%	slate fragments, weathered, subangular to subrounded
mesh 35 -	80%	granite fragments, unweathered, angular
	12%	slate grains, weathered, rounded
	8%	charcoal fragments
mesh 120 -	70%	white fragments
	30%	black fragments
mesh 325 -	60%	white fragments
	40%	black fragments
Pan -	100%	gray

Appendix D

SEL-188 Master Catalog of All Accessioned Exxon / NPS Collections1989 / 1990

Catalog #	Agency / Field #	Collector / Agency	Date	Description	Provenience
49SEL-188-001	1	Yarborough / Exxon	7/31/89	Ground slate scrap	ITZ Surface
49SEL-188-002	2	Yarborough / Exxon	7/31/89	Ulu, straight-edged end fragment	ITZ Surface
49SEL-188-003	3	Yarborough / Exxon	7/31/89	Ulu, midsection	ITZ Surface
49SEL-188-004	4	Yarborough / Exxon	7/31/89	Henry .44 center fire cartridge case	ITZ Surface
49SEL-188-005	5	Yarborough / Exxon	7/31/89	Ulu, simple rectangular	ITZ Surface
49SEL-188-006	6	Yarborough / Exxon	7/31/89	Adze fragment / converted to splitting wedge	ITZ Surface
49SEL-188-007	7	Yarborough / Exxon	7/31/89	Adze, splitting, double groove	ITZ Surface
49SEL-188-008	8	Yarborough / Exxon	7/31/89	Adze, splitting, single hafting knob	ITZ Surface
49SEL-188-009	KEFJ 249	Leach / NPS	8/12/89	Adze, splitting	ITZ Surface
49SEL-188-010	KEFJ 250	Leach / NPS	8/12/89	Large flake tool	ITZ Surface
49SEL-188-011	KEFJ 251	Leach / NPS	8/12/89	Hammerstone	ITZ Surface
49SEL-188-012	KEFJ 252	Leach / NPS	8/12/89	Hammerstone	ITZ Surface
49SEL-188-013	KEFJ 253	Leach / NPS	8/12/89	Hammerstone	ITZ Surface
49SEL-188-014	KEFJ 254	Leach / NPS	8/12/89	Hammerstone	ITZ Surface
49SEL-188-015	KEFJ 255	Leach / NPS	8/12/89	Hammerstone	ITZ Surface
49SEL-188-016	KEFJ 256	Leach / NPS	8/12/89	Blade midsection (?)	ITZ Surface
49SEL-188-017	KEFJ 257	Worthington / NPS	8/12/89	Point, stemmed, ground slate	ITZ Surface
49SEL-188-018	KEFJ 258	Worthington / NPS	8/12/89	Irregular chunk	ITZ Surface
49SEL-188-019	KEFJ 259	Worthington / NPS	8/12/89	Rod fragment, ground slate	ITZ Surface
49SEL-188-020	KEFJ 260	Worthington / NPS	8/12/89	Ulu, notched, ground slate	ITZ Surface
49SEL-188-021	KEFJ 261	Worthington / NPS	8/12/89	Ulu, notched, ground slate	ITZ Surface
49SEL-188-022	KEFJ 262	Worthington / NPS	8/12/89	Notched pebble	ITZ Surface
49SEL-188-023	KEFJ 263	Worthington / NPS	8/12/89	Rod fragment, ground slate	ITZ Surface
49SEL-188-024	KEFJ 264	Worthington / NPS	8/12/89	Double-edged blade, stemmed, ground slate	ITZ Surface
49SEL-188-025	KEFJ 265	Worthington / NPS	8/12/89	Unmodified lithic shatter (13)	ITZ Surface
49SEL-188-026	KEFJ 266	Worthington / NPS	8/12/89	Rod fragment, ground slate	ITZ Surface
49SEL-188-027	KEFJ 267	Worthington / NPS	8/12/89	Adze, planing, greenstone	ITZ Surface
49SEL-188-028	KEFJ 268	Leach / NPS	8/12/89	Charcoal sample	ITZ Test Pit

Catalog #	Agency / Field #	Collector / Agency	Date	Description	Provenience
49SEL-188-029	KEFJ 269	Leach / NPS	8/12/89	Soil sample	ITZ Test Pit
49SEL-188-030	KEFJ 270	Worthington / NPS	8/12/89	Pecked, grooved cobble	ITZ Surface
49SEL-188-031	KEFJ 271	Worthington / NPS	8/12/89	Slate fragments (11), Sandstone slab (1)	ITZ Test Pit
49SEL-188-032	KEFJ 272	Worthington / NPS	8/12/89	Double-edged blade, stemmed, ground slate	Upland Test (36 cmbs)
49SEL-188-033	KEFJ 273	Worthington / NPS	8/12/89	Boulder spall, retouched	Upland Test (33 cmbs)
49SEL-188-034	KEFJ 274	Worthington / NPS	8/12/89	Abrader	Upland Test
49SEL-188-035	KEFJ 275	Worthington / NPS	8/12/89	Unmodified cobble	Upland Test
49-SEI-188-036	KEFJ 276	Worthington / NPS	8/12/89	Incised slate table, Ground slate fragment, Unmodified slate fragments (10	Upland Test
49SEL-188-037		PEB / Exxon	4/26/90	Glass fragment, clear (modern)	ITZ Test B/Stratum 1
49SEL-188-038		PEB / Exxon	4/26/90	Glass fragment, clear (modern)	ITZ Test B/Stratum 1
49SEL-188-039		PEB / Exxon	4/26/90	Glass fragment, green	ITZ Test B/Stratum 1
49SEL-188-040		PEB / Exxon	4/26/90	Glass fragment, clear (modern)	ITZ Test B/Stratum 1
49SEL-188-041		PEB / Exxon	4/26/90	Glass fragment, clear (modern)	ITZ Test B/Stratum 1
49SEL-188-042		PEB / Exxon	4/26/90	Glass fragment, clear (modern)	ITZ Test B/Stratum 1
49SEL-188-043		PEB / Exxon	4/26/90	Glass fragment, clear (modern)	ITZ Test B/Stratum 1
49SEL-188-044		PEB / Exxon	4/26/90	Glass fragment, clear (modern)	ITZ Test B/Stratum 1
49SEL-188-045		PEB / Exxon	4/26/90	FCR	ITZ Test B/Stratum 2
49SEL-188-046		PEB / Exxon	4/26/90	Cobble with missing cortex	ITZ Test B/Stratum 2
49SEL-188-047		PEB / Exxon	4/26/90	Boulder spall, unretouched	ITZ Test B/Stratum 2
49SEL-188-048		PEB / Exxon	4/26/90	Flake, basalt	ITZ Test B/Stratum 2
49SEL-188-049		PEB / Exxon	4/26/90	Edge-battered cobble (Hammerstone)	ITZ Test B/Stratum 2
49SEL-188-050		PEB / Exxon	4/26/90	Split, grooved cobble	ITZ Test B/Stratum 3
49SEL-188-051	17	RCB & ALC / Exxon	8/02/90	Adze, splitting, midsection	ITZ Surface
49SEL-188-052	18	RCB & ALC / Exxon	8/02/90	Adze, splitting, bit end	ITZ Surface
49SEL-188-053	34	RCB & ALC / Exxon	8/02/90	Boulder spall, retouched	ITZ Surface
49SEL-188-054	35	RCB & ALC / Exxon	8/02/90	End-battered cobble (Hammerstone)	ITZ Surface
49SEL-188-055	39	RCB & ALC / Exxon	8/02/90	Boulder spall, retouched	ITZ Surface
49SEL-188-056	40	RCB & ALC / Exxon	8/02/90	Boulder spall, unretouched	ITZ Surface
49SEL-188-057	53	RCB & ALC / Exxon	8/02/90	Notched, grooved cobble	ITZ Surface
49SEL-188-058	78	RCB & ALC / Exxon	8/02/90	End-battered cobble core (hammerstone)	N162.05 E193.36
49SEL-188-059	79	RCB & ALC / Exxon	8/02/90	Ulu, notched, ground slate	N163.00 E192.70

Catalog #	Agency / Field #	Collector / Agency	Date	Description	Provenience
49SEL-188-060	80	RCB & ALC / Exxon	8/02/90	Boulder spall, retouched	N166.40 E192.26
49SEL-188-061	82	RCB & ALC / Exxon	8/02/90	Boulder spall, retouched	N167.04 E192.38
49SEL-188-062	83	RCB & ALC / Exxon	8/02/90	Bead, slate	N171.55 E192.55
49SEL-188-063	84	RCB & ALC / Exxon	8/02/90	Pick fragment	N158.40 E190.20
49SEL-188-064	85	RCB & ALC / Exxon	8/02/90	Notched, battered cobble	N165.30 E194.85
49SEL-188-065	86	RCB & ALC / Exxon	8/02/90	Lightly end-battered cobble	N161.92 E195.24
49SEL-188-066	87	RCB & ALC / Exxon	8/02/90	Sub-rounded pebble	N156.92 E191.36
49SEL-188-067	88	RCB & ALC / Exxon	8/02/90	Sub-rounded pebble	N170.40 E192.55
49SEL-188-068	89	RCB & ALC / Exxon	8/02/90	Rod midsection, ground slate	Quadrat N156/E192
49SEL-188-069	98	RCB & ALC / Exxon	8/02/90	Notched pebble	ITZ Surface
49SEL-188-070	99	RCB & PEB / Exxon	8/28/90	Rod midsection, ground slate	N157.20 E190.80
49SEL-188-071	100	RCB & PEB / Exxon	8/28/90	Flake midsection, retouched, green slate	N177.60 E194.40
49SEL-188-072	101	RCB & PEB / Exxon	8/28/90	Ulu fragment, single-bevel	N179.38 E192.90
49SEL-188-073	102	RCB & PEB / Exxon	8/28/90	Flake fragment, greenstone	N177.35 E192.45
49SEL-188-074	103	RCB & PEB / Exxon	8/28/90	Wedge fragment (bit), greenstone	N176.90 E193.50
49SEL-188-075	104	RCB & PEB / Exxon	8/28/90	Wedge (?) fragment, greenstone	N174.05 E193.35
49SEL-188-076	105	RCB & PEB / Exxon	8/28/90	Boulder spall, retouched	N175.60 E194.00
49SEL-188-077	106	RCB & PEB / Exxon	8/29/90	Adze midsection	N172.60 E192.23
49SEL-188-078	107	RCB & PEB / Exxon	8/29/90	Grooved cobble	N168.97 E191.72
49SEL-188-079	108	RCB & PEB / Exxon	8/28/90	Boulder spall, unretouched	N174.45 E196.30
49SEL-188-080	109	RCB & PEB / Exxon	8/28/90	Ulu fragment, double bevel, ground slate	N172.10 E197.85
49SEL-188-081	110	RCB & PEB / Exxon	8/28/90	Boulder spall, light retouch	N174.60 E196.40
49SEL-188-082	111	RCB & PEB / Exxon	8/29/90	Rod fragment, ground slate	N165.65 E195.60
49SEL-188-083	112	RCB & PEB / Exxon	8/29/90	Ground slate flake	N191.10 E168.80
49SEL-188-084	113	RCB & PEB / Exxon	8/29/90	Ground slate, double-bevel	N167.32 E192.17
49SEL-188-085	114	RCB & PEB / Exxon	8/29/90	Boulder spall, unretouched	ITZ Surface
49SEL-188-086	115	RCB & PEB / Exxon	8/29/90	Boulder spall, retouched	ITZ Surface
49SEL-188-087	116	RCB & PEB / Exxon	8/29/90	Ground slate flake, bifacial retouch	ITZ Surface
49SEL-188-088	117	RCB & PEB / Exxon	8/29/90	Slate scrap	ITZ Surface
49SEL-188-089	118	RCB & PEB / Exxon	8/29/90	Greenstone shatter	ITZ Surface
49SEL-188-090	119	RCB & PEB / Exxon	8/29/90	Notched cobble, pecked	N157.05 E194.55
49SEL-188-091	120	RCB & PEB / Exxon	8/29/90	Ground slate fragment	N157.05 E193.92
49SEL-188-092	121	RCB & PEB / Exxon	8/29/90	Adze, splitting, two hafting grooves	N156.45 E197.10

Catalog #	Agency / Field #	Collector / Agency	Date	Description	Provenience
49SEL-188-093	122	RCB & PEB / Exxon	8/29/90	Adze fragment, splitting	N158.50 E197.35
49SEL-188-094	123	RCB & PEB / Exxon	8/29/90	Battered cobble (Hammerstone)	N158.00 E196.70
49SEL-188-095	KEFJ-843	JS & LJ NPS/CAC	8/02/90	Adze fragment, planing, single-bevel	Upland test, west wall, Level I
49SEL-188-096	KEFJ-844	JS & LJ NPS/CAC	8/02/90	Point, ground slate, triangular	Upland test, west wall, Level I
49SEL-188-097	KEFJ-845	JS & LJ NPS/CAC	8/02/90	Flake, ground slate	Upland test, west wall, Level I
49SEL-188-098	KEFJ-846	JS & LJ NPS/CAC	8/02/90	Boulder spall, unretouched	Upland test, west wall, Level I
49SEL-188-099	KEFJ-847	JS & LJ NPS/CAC	8/02/90	Bifacially flaked slate (Knife preform?)	Upland test, west wall, Level I
49SEL-188-100	KEFJ-848	JS & LJ NPS/CAC	8/02/90	Flake, slate, light unifacial retouch	Upland test, west wall, Level I
49SEL-188-101	KEFJ-849	JS & LJ NPS/CAC	8/02/90	Slate flakes / shatter (19)	Upland test, west wall, Level I
49SEL-188-102	KEFJ-850	JS & LJ NPS/CAC	8/02/90	Slate chips / shatter (3)	Upland test, west wall, Level I
49SEL-188-103	KEFJ-851	JS & LJ NPS/CAC	8/02/90	Unmodified split cobble	Upland test, west wall, Level I
49SEL-188-104	KEFJ-852	JS & LJ NPS/CAC	8/02/90	Unmodified shatter (2)	Upland test, west wall, Level I
49SEL-188-105	KEFJ-853	JS & LJ NPS/CAC	8/02/90	Unmodified shatter (4)	Upland test, west wall, Level I
49SEL-188-106	KEFJ-854	JS & LJ NPS/CAC	8/02/90	Unmodified pebble	Upland test, north wall, Level I
49SEL-188-107	KEFJ-855	JS & LJ NPS/CAC	8/02/90	Flake, ground slate	Upland test, north wall, Level I
49SEL-188-108	KEFJ-856	JS & LJ NPS/CAC	8/02/90	Slate fragment, light bifacial retouch	Upland test, north wall, Level I
49SEL-188-109	KEFJ-857	JS & LJ NPS/CAC	8/02/90	Unmodified slate shatter (5)	Upland test, north wall, Level I
49SEL-188-110	KEFJ-858	JS & LJ NPS/CAC	8/02/90	Unmodified lithic shatter (16)	Upland test, north wall, Level I
49SEL-188-111	KEFJ-859	JS & LJ NPS/CAC	8/02/90	FCR	Upland test, north wall, Level I
49SEL-188-112	KEFJ-860	JS & LJ NPS/CAC	8/02/90	Unmodified pebble	Upland test, north wall, Level I

Catalog #	Agency / Field #	Collector / Agency	Date	Description	Provenience
49SEL-188-113	KEFJ-861	JS & LJ NPS/CAC	8/02/90	Unmodified slate shatter (3)	Upland test, north wall, Level II
49SEL-188-114	KEFJ-862	JS & LJ NPS/CAC	8/02/90	Ulu fragment, ground slate, notched	Upland test, north wall, Level II
49SEL-188-115	KEFJ-863	JS & LJ NPS/CAC	8/02/90	Unmodified slate flake	Upland test, north wall, Level II
49SEL-188-116	KEFJ-864	JS & LJ NPS/CAC	8/02/90	End-battered cobble (Hammerstone)	Upland test, north wall, Level II
49SEL-188-117	KEFJ-865	JS & LJ NPS/CAC	8/02/90	Battered cobble (Hammerstone)	Upland test, north wall, Level II
49SEL-188-118	KEFJ-866	JS & LJ NPS/CAC	8/02/90	Ground slate fragment	Upland test, north wall, Level II
49SEL-188-119	KEFJ-867	JS & LJ NPS/CAC	8/02/90	Unmodified cobble	Upland test, north wall, Level II
49SEL-188-120	KEFJ-868	JS & LJ NPS/CAC	8/02/90	Unmodified slate shatter (2)	Upland test, north wall, Level II
49SEL-188-121	KEFJ-869	JS & LJ NPS/CAC	8/02/90	FCR	Upland test, north wall, Level II
49SEL-188-122	KEFJ-870	JS & LJ NPS/CAC	8/02/90	Unmodified shale (3)	Upland test, northwest corner, sand layer, Level II
49SEL-188-123	KEFJ-871	JS & LJ NPS/CAC	8/02/90	Slate fragment, light unifacial retouch	Upland test, north wall, Level II
49SEL-188-124	KEFJ-872	JS & LJ NPS/CAC	8/02/90	Unmodified lithic shatter (7)	Upland test, north wall, Level II
49SEL-188-125	KEFJ-873	JS & LJ NPS/CAC	8/02/90	Unmodified lithic shatter (10)	Upland test, north wall, Level II
49SEL-188-126	KEFJ-874	JS & LJ NPS/CAC	8/02/90	Tabular slate slab, bificial retouch	Upland test, northeast corner, Level II
49SEL-188-127	KEFJ-875	JS & LJ NPS/CAC	8/02/90	Boulder spall, unretouched	Upland test, northeast corner, Level II
49SEL-188-128	KEFJ-876	JS & LJ NPS/CAC	8/02/90	Unmodified slate fragment	Upland test, northeast corner, Level II
49SEL-188-129	KEFJ-877	JS & LJ NPS/CAC	8/02/90	Slate fragment, retouched	Upland test, northeast corner, Level II
49SEL-188-130	KEFJ-878	JS & LJ NPS/CAC	8/02/90	FCR	Upland test, center, top of granite slabs, 1989 backfill (?)

Catalog #	Agency / Field #	Collector / Agency	Date	Description	Provenience
49SEL-188-131	KEFJ-879	JS & LJ NPS/CAC	8/02/90	Slate fragment, light unifacial retouch	Upland test, center, top of granite slabs, 1989 backfill (?)
49SEL-188-132	KEFJ-880	JS & LJ. NPS/CAC	8/02/90	Unmodified slate fragment	Upland test, center, top of granite slabs, 1989 backfill (?)
49SEL-188-133	KEFJ-881	JS & LJ NPS/CAC	8/02/90	Flake, light unifacial retouch	Upland test, north wall, Level III
49SEL-188-134	KEFJ-882	JS & LJ NPS/CAC	8/02/90	Ground slate fragment	Upland test, north wall, Level III
49SEL-188-135	KEFJ-883	JS & LJ NPS/CAC	8/02/90	Ground slate fragment	Upland test, north wall, Level III
49SEL-188-136	KEFJ-884	JS & LJ NPS/CAC	8/02/90	Unmodified slate shatter (7)	Upland test, north wall, Level III
49SEL-188-137	KEFJ-885	JS & LJ NPS/CAC	8/02/90	Unmodified slate shatter (4)_	Upland test, west wall, Ash 2 (T2)
49SEL-188-138	KEFJ-886	JS & LJ NPS/CAC	8/02/90	Rounded rock, light end-battering (natural?)	Upland test, west wall, Ash 2 (T2)
49SEL-188-139	KEFJ-887	JS & LJ NPS/CAC	8/02/90	Unmodified shatter	Upland test, 1989 backfill, Levels I/II
49SEL-188-140	KEFJ-888	JS & LJ NPS/CAC	8/02/90	End-battered cobble (Hammerstone)	Upland test, 1989 backfill, Levels I/II
49SEL-188-141	KEFJ-889	JS & LJ NPS/CAC	8/02/90	Incised slate tablet	Upland test, 1989 backfill, Levels I/II
49SEL-188-142	KEFJ-890	JS & LJ NPS/CAC	8/02/90	Boulder spall, retouched	Upland test, 1989 backfill, Levels I/II
49SEL-188-143	KEFJ-891	JS & LJ NPS/CAC	8/02/90	Unmodified cobble fragment	Upland test, 1989 backfill, Levels I/II
49SEL-188-144	KEFJ-892	JS & LJ NPS/CAC	8/02/90	FCR	Upland test, 1989 backfill, Levels I/II
49SEL-188-145	KEFJ-893	JS & LJ NPS/CAC	8/02/90	Slate fragment (unidentified red stain)	Upland test, 1989 backfill, Levels I/II
49SEL-188-146	KEFJ-894	JS & LJ NPS/CAC	8/02/90	Unmodified lithic shatter (9)	Upland test, 1989 backfill, Levels I/II
49SEL-188-147	KEFJ-895	JS & LJ NPS/CAC	8/02/90	Unmodified pebble	Upland test, 1989 backfill, Levels I/II
49SEL-188-148	KEFJ-896	JS & LJ NPS/CAC	8/02/90	Unmodified slate fragment	Upland test, center, uncertain provenience, top of Ash 2 (?)

Catalog #	Agency / Field #	Collector / Agency	Date	Description	Provenience
49SEL-188-149	KEFJ-897	JS & LJ NPS/CAC	8/02/90	FCR	Upland test, center, uncertain provenience, top of Ash 2 (?)

APPENDIX E

Description of 1989 / 1990 SEL-188 Accessions

This appendix presents detailed descriptions for all artifacts and non-artifactual material collected by Exxon and the National Park Service during site investigations and treatment monitoring at SEL-188 in 1989 and 1990. Two hundred and sixty-one collected specimens have been cataloged under 149 Exxon accession numbers. Accessioned material is presently held in Anchorage by the Exxon Cultural Resource Program and by the National Park Service. For the most part, specimens collected from the intertidal zone are temporarily curated by Exxon pending final curation arrangements for both artifacts and supporting documentation which are expected to be curated with the University of Alaska Museum, Fairbanks. An exception are 44 specimens collected from the intertidal zone by the NPS in August 1989 (Accession No. KEFJ-00033, ARCC-00091). Eight specimens from the intertidal zone cataloged under the above accession numbers are held separately by the NPS tort investigation office and were unavailable for description or analysis. Subsurface specimens collected from the upland test unit by the National Park Service and Chugach Alaska Corporation in 1989 and 1990 are currently held by the National Park Service in Anchorage (Accession No. KEFJ-00076, ARCC-00134).

With the exception of eight specimens surface collected by Exxon in 1989 and the eight NPS tort specimens, all Exxon and NPS cataloged specimens were examined and described by Bob Betts (Exxon) on December 10-14, 1990 at the NPS Regional Office in Anchorage. Descriptions of the 1989 Exxon intertidal surface collections by W. Workman and K. Workman (1990:284-285) have been included in the present appendix. Schaaf and Johnson (1990) have separately cataloged NPS 1990 upland collections and have described and illustrated selected artifacts recovered during subsurface testing. NPS artifact descriptions and supplemental information have been incorporated into this appendix.

An "artifact" is usually defined as any portable object which has been produced, modified, or used by humans. The difficulty inherent in differentiating minimally modified or fragmentary stone tools, or debris from slate flaking, from naturally produced "naturefacts" in the intertidal zone has resulted in a conservative approach to artifact recognition on the part of Exxon archaeologists. For the purpose of the present report the term "artifact" is restricted to objects for which cultural modification is evident. Where natural production or modification cannot be ruled out, the object is not considered an artifact. The two classes of artifacts most affected by this conservative approach to the use of the term "artifact" are slate "flakes" and boulder spalls. The term "flake" normally implies chipping debris from stone tool manufacture. Unlike fine grained or cryptocrystalline igneous rock, debitage from slate flaking does not exhibit typical flake morphology characteristic of rocks that fracture conchoidally. The tendency of slate to weather naturally along bedding planes results in thin "flake-like" fragments. Consequently, except for direct stratigraphic association with other artifacts and sharp, unweathered edges, there is little to differentiate a culturally produced slate flake from a "flake" produced by natural processes. For this reason slate "flakes" without evidence of grinding, polish, retouch or other cultural modification are not included in the site artifact count (Table 8.3). The term flake is placed in quotes where retouch or other evidence of utilization is not clearly evident. In addition to unmodified "flakes", boulder spalls without sufficient retouch along the working edge to rule out natural chipping have been considered separately from the artifact count (Table 8.2). While it is recognized that many of the unmodified sharp-edged slate "flakes" and unretouched boulder spalls collected from cultural levels in the upland test unit are likely to be cultural, it is not certain that they all are. Fire cracked rock (FCR) and modern debris less than fifty years old are also considered separately from artifacts.

Ninety-two of 261 specimens collected from SEL-188 are considered to be clearly culturally produced or modified. Eighty-four of these are discussed in the artifact analysis section of Chapter 8 (Table 8.3). Of 65 artifacts collected from

the intertidal zone, 57 were available for description and analysis. The upland testpit produced an additional 27 artifacts. An additional 169 collected specimens, largely unmodified slate "flakes" and shatter, are summarized in Chapter 8 (Table 8.2).

For the most part, artifact classes and terminology follow de Laguna (1956, 1975) to facilitate comparison of the SEL-188 artifact assemblage with Kachemak Bay and Prince William Sound assemblages. The term "rod" rather than "awl" is used to describe cylindrical ground slate objects, the function of which is unclear (de Laguna 1956:159). Use of the term "boulder spall" rather than "cobble spall" has been made to stay consistent with de Laguna although "cobble spall" is perhaps a more accurate term. Morphological rather than functional terms are used to describe artifacts except in instances where a functional term is well established in the literature (ie. splitting adze).

Raw material used in stone tool manufacture at SEL-188 was predominately slate, but included the use of graywacke, basalt, and greenstone. The use of argillite, granite, quartzite and schist is also evident, although rare. Definitions of the following geological terms used to describe raw material types have been drawn from the Dictionary of Geological Terms (American Geological Institute 1976).

Slate
A fine-grained metamorphic rock possessing a well-developed fissility (slaty cleavage or foliation typical of slates). Most tools are made from dark gray slate but a few examples of green slate are present as are some unmodified green slate "flakes."

Graywacky (Greywacky)
A type of sandstone marked by large detrital quartz and feldspars (phenocysts) set in a prominent to dominate "clay" matrix which may on low-grade metamorphism be converted to chlorite and sericite and partially replaced by carbonate. This is a fairly broad term referring to dark colored metamorphic rocks with certain macroscopic structures such as graded bedding and intraformational conglomerates of shale or slate chips.

Basalt
An igneous extrusive rock composed primarily of calcic plagioclase and pryoxene, with or without olivine. Generally used in the field to denote any fine-grained dark-colored igneous rock. Individual crystals cannot be seen with the naked eye unless in phenocrysts form.

Greenstone
A broad term applied to metamorphosed basic igneous rocks - altered diabase and gabbro - which owe their color to the presence of chlorite, hornblende, and epidote.

Argillite
A sedimentary rock that is much harder and more dense than shale, which it resembles. Although some argillites grade into slates and other shaly quartzites, they preserve sedimentary rock structures. In general usage the term is applied to all rock composed of clay minerals. Argillaceous rocks are readily distinguished by the peculiar, "earthy" odor when breathed on.

Granite
A plutonic rock consisting essentially of alkali feldspar and quartz. The term is loosely used for any light-colored, coarse-grained igneous rock.

Quartzite
A granulose metamorphic rock consisting essentially of quartz. Individual grains in quartzites are deformed, interlocked, and are fused together so the rock breaks across the grains. Pure quartzite is metamorphosed from quartz sandstone, but some quartzites may contain as much as 40% other minerals, mica being one of the most abundant.

Schist

A medium or coarse-grained metamorphic rock with subparallel orientation of the micaceous minerals which dominate its composition.

The following collections are described by Exxon accession number. All specimens, both artifacts and non-artifacts, collected from the ITZ and the uplands at SEL-188 have been assigned accession numbers using the conventional Smithsonian system (49 = Alaska, SEL = 1:250,000 quadrangle, 188 = 188th site recorded in the Alaska Heritage Resources Survey (AHRS) system for that quadrangle, with specimen numbers identified in consecutive order.) Collections made by the National Park Service have NPS accession numbers in addition to the Smithsonian system numbers. National Park Service accession numbers and Field Specimen (FS) numbers are included where appropriate. Provenience information is provided for each specimen and additional comments or supplemental information for selected specimens and artifacts is included in a remarks section. Additional information on the collector, date of collection, and surface mapping information is available in the Master Accessions Catalog (Appendix D). The format of this appendix follows W. Workman and K. Workman (1990). Linear measurements are in centimeters and weights are in grams. The following abbreviations are used: L = length; W = width; T = thickness; H = height (substituted for thickness for splitting adzes); Wt = weight. Brackets [ ] around a measurement indicate the measurement is affected by breakage.

1989 COLLECTIONS FROM SEL-188

Exxon Catalog Number: **49SEL-188-001**
Field Number: FS # 89-1
Provenience: ITZ surface
Slender, Coarsely Ground Slate Scrap
Description: Rectangular outline. Edges damaged but intentional flaking not documented. Straighter of two long edges appears blunted by light grinding. Numerous coarse striations oriented at an oblique angle to long axis on both faces.
Material: Slate.
Measurements: L 8.58; W 2.37; T 0.34; Wt. 11.5

Exxon Catalog Number: **49SEL-188-002**
Field Number: FS # 89-2
Provenience: ITZ surface
Straight-Edged Ulu End Fragment
Description: Straight, double-bevel working edge. Irregular back opposite (on break?). Sinuous, unifacially flaked end blunted by light grinding. Coarse shaping striations parallel working edge on both faces. One end broken (apparently recently).
Material: Slate.
Measurements: L [5.61];W [6.04]; T [0.39];Wt. [21.9]

Exxon Catalog Number: **49SEL-188-003**
Field Number: FS # 89-3
Provenience: ITZ surface
Ulu Midsection
Description: Subconvex, double-bevel working edge. Straight back on natural break. Both ends broken, (apparently recently). Well finished on both faces. Visible striations parallel long axis.
Material: Slate.
Measurements: L [5.13]; W [6.50]; T [0.45]; Wt. [22.5]

Exxon Catalog Number: **49SEL-188-004**
Field Number: FS # 89-4
Provenience: ITZ surface
Henry .44 Center-Fire Cartridge Case
Description: Corroded; distal edges fragmented in scalloped fashion. No evidence for intentional modification.
Material: Brass.
Measurements: L 3.01; W 1.17; T 1.04; Wt. -
Remarks: Unlikely to be in meaningful association with other artifacts from site.

Exxon Catalog Number: **49SEL-188-005**
Field Number: FS # 89-5
Provenience: ITZ surface
Simple Rectangular Ulu
Description: Rectangular outline, sub-convex working edge with double-bevel grinding; however, edge is flaked. Unfinished? Being re-sharpened? Straight back unifacially flaked and lightly ground. One sub-convex end flaked; opposite, sub-convex end also flaked and blunted by light grinding. Coarse shaping striations parallel long axis on both faces.
Material: Slate.
Measurements: L 8.80; W 5.38; T 0.53; chord of working edge 7.89; Wt. 42.2

Exxon Catalog Number: **49SEL-188-006**
Field Number: FS # 89-6
Provenience: ITZ surface
Large Adze Fragment Converted into Splitting Wedge
Description: Pecked and ground adze fragment with originally rounded cross section, split longitudinally. Plano-convex cross section at present. Former bit area (as indicated by extensive grinding of convex surface) converted to poll with original edge destroyed by heavy bifacial battering. New working end convex and unifacially beveled by flaking onto flat face. Extensive battering of both edges on flat face as well. Extensive pecking of convex face over half of nearest, most recent, working edge.
Material: Greenstone.
Measurements: L 10.18; W 4.48; T 2.55; Wt. 180.8
Remarks: Present form strongly suggests splitting wedge function.

Exxon Catalog Number: **49SEL-188-007**
Field Number: FS # 89-7
Provenience: ITZ surface
Splitting Adze with Double Groove
Description: Narrow sub-convex bit, double-beveled though more steeply from top (grooved) surface. Bit edge ground smooth rather than sharp. Some damage at corners. Rounded-rectangular cross section. Bottom flat, top rounded. Two broad, shallow, pecked grooves set off central knob. Suggestion of knob forward of distal groove. Poll is irregular, flattish break, unshaped. Pecked over most surfaces. Grinding largely confined within four centimeters of bit, some on bottom as well.
Material: Graywacke.
Measurements: L 23.22;W 4.10; knob H 5.90; H near poll 5.37; groove W 2.40 & 1.95; knob L 2.84 & 2.1; chord of bit 2.13; Wt. 812.5
Remarks: Splitting adzes date from the second millennium in the Gulf of Alaska, although they appear slightly earlier in Prince William Sound (D. Clark 1974b:92). They have yet to be encountered in a Kachemak tradition context either on Kodiak or in Kachemak Bay (Workman In Mobley et al. 1990:289). Splitting adzes suggest a post A.D. 1000 date and/or cultural affiliation with Prince William Sound
(D. Clark 1974:92, Workman In Mobley et al. 1990:284).

Exxon Catalog Number: **49SEL-188-008**
Field Number: FS # 89-8
Provenience: ITZ surface
Splitting Adze with Single Hafting Knob
Description: Long slender, high adze bit with narrow, convex, single-bevel working end; bifacially battered. Single hafting knob, without associated grooves, in approximate center. Pecked extensively over rounded top and on irregular, flat bottom and one side. Grinding largely confined to bit area and one flat side. Slightly trapezoidal cross section. Thin poll bifacially battered.
Material: Graywacke.
Measurements: L 27.70W 3.68; knob H 6.15; body H 5.17; chord of bit 2.16; knob diameter 1.97; Wt .872.5
Remarks: Very narrow bit (pick?). Splitting adzes with a single knob for hafting are known from Koniag phase contexts on Kodiak (D. Clark 1979:281, Pl. 3-B, 1974:73, Pl. 6-a), in Prince William Sound (de Laguna 1956:113-117, Pl. 11-6), and are present but rare in Kachemak Bay (de Laguna 1975: Pl. 18-3). See 49SEL-188-063.

Exxon Catalog Number: **49SEL-188-009**
NPS Catalog Number (s): KEFJ-249 / Tort # KEFJ-4001
Field Number: FS # 1
Provenience: ITZ Surface
Adze
Description:
Remarks: Unavailable. NPS Tort Investigation

Exxon Catalog Number: **49SEL-188-010**
NPS Number (s): KEFJ-250 / Tort # KEFJ-4002
Field Number: FS # 2
Provenience: ITZ Surface
Large Flake Tool
Description:
Remarks: Unavailable. NPS Tort Investigation

Exxon Catalog Number: **49SEL-188-011**
NPS Catalog Number (s): KEFJ-251 / Tort # KEFJ-4003
Field Number: FS # 3
Provenience: ITZ Surface
Hammerstone
Description:
Remarks: Unavailable. NPS Tort Investigation

Exxon Catalog Number: **49SEL-188-012**
NPS Catalog Number (s): KEFJ-252 / Tort # KEFJ-4004
Field Number: FS # 4
Provenience: ITZ Surface
Hammerstone
Description:
Remarks: Unavailable. NPS Tort Investigation

Exxon Catalog Number: **49SEL-188-013**
NPS Catalog Number: KEFJ-253 / Tort # KEFJ-4005
Field Number: FS # 5
Provenience: ITZ Surface
Hammerstone
Description:
Remarks: Unavailable. NPS Tort Investigation

Exxon Catalog Number: **49SEL-188-014**
NPS Catalog Number: KEFJ-254 / Tort # 4007
Field Number: FS # 6
Provenience: ITZ Surface
Hammerstone
Description:
Remarks: Unavailable. NPS Tort Investigation

Exxon Catalog Number: **49SEL-188-015**
NPS Catalog Number (s): KEFJ-255 / Tort # KEFJ-4008
Field Number: FS # 7
Provenience: ITZ Surface
Hammerstone
Description:
Remarks: Unavailable. NPS Tort Investigation

Exxon Catalog Number: **49SEL-188-016**
NPS Catalog Number (s): KEFJ-256 / Tort # 9
Field Number FS # 8
Provenience: ITZ Surface
Blade Midsection
Description:
Remarks: Unavailable. NPS Tort Investigation

Exxon Catalog Number: **49SEL-188-017**
NPS Catalog Number: KEFJ-257
Field Number: FS # 9
Provenience: Surface ITZ

Stemmed Ground Slate Point

Description: Thick asymmetrical blade. Convex lateral edges without prominent shoulders converging to rounded tip. Thick, parallel-sided stem shaped by flaking, straight base. Coarse shaping striations at oblique angle to blade edge on one face. All edges water worn.

Material: Slate.

Measurements: L 6.19, L of stem 1.59; W at shoulder 2.27, W of stem at base 1.34; T at shoulder 0.71; Wt. 10.8

Remarks: Appears unfinished, may be a point or knife preform. Edges of stem dull, probably from wave abrasion (perhaps ground?). Contracting stemmed ground slate points dating the second half of the first millennium A. D. are reported at the Yukon Island Fox Farm site in Kachemak Bay (Workman 1980b:76). An unpolished chipped slate blade or knife is reported from Level III at Yukon Island (de Laguna 1975:78).

Exxon Catalog Number: **49SEL-188-018**
NPS Catalog Number: KEFJ-258
Field Number: FS # 10
Provenience: Surface ITZ

Irregular Chunk

Description: Thick irregular chunk. Tapers to thin, lateral, unworked edge. Irregular plano-convex cross section. Snap fracture on one (distal?) margin. Thick margin has some damage from light battering (not intentional retouch). Water rolled.

Material: Argillite.

Measurements: L 3.06; W 2.01; T 0.92; Wt. 8.3

Remarks: Material is exotic to locally derived rock. Cultural modification not evident.

Exxon Catalog Number: **49SEL-188-019**
NPS Catalog Number: KEFJ-259
Field Number: FS # 11
Provenience: Surface ITZ

Ground Slate Rod Fragment

Description: Thin, rounded-rectangular cross section. Split longitudinally. Parallel sides. Flat proximal break, thin to slightly rounded distal termination. Dorsal surface is ground with striations parallel to long axis, lateral edges rounded by grinding. Ventral surface is unmodified (natural break).

Material: Slate.

Measurements: L 8.11; W 1.04; T [0.21]; Wt. 3.4

Remarks: Ground slate rods are characteristic of Kachemak III in outer Cook Inlet and of the Three Saints Bay phase on Kodiak (Clark 1970,Fig. 6; de Laguna 1975:126-129; Workman 1980b:74). De Laguna (1975:79,Pl 36) reports 18 slate "awls" varying in diameter from 0.4 to 2.0 cm from Kachemak Bay sites. Numerous "awls" are reported by de Laguna (1956:159-162,Pl 30,31) in Prince William Sound where they were recovered from all levels at Palugvik. On the Alaska Peninsula ground slate rods appear (as do small notched stones) during the Kukak Beach phase (500--1000 A.D.) (Workman 1980b:61).

Exxon Catalog Number: **49SEL-188-020**
NPS Catalog Number: KEFJ-260
Field Number: FS # 12
Provenience: Surface ITZ

Chipped, Ground Slate Fragment (Notched Ulu?)

Description: Thin, irregular outline, shaped by unifacial flaking. Straight flaked back opposite convex flaked edge with deep notch flaked at approximate midpoint. End of notch doesn't appear to be abraded (sawn or drilled). Coarse, cross cutting striations on both faces. Light polishing back 1.17 cm from convex working edge. Not obviously beveled.
Material: Slate.
Measurements: L [7.91]; W [5.80]; T 0.51; Notch Depth 1.21, W at edge 1.36; Wt. 36.7
Remarks: Possibly a chipped ulu modified by a deep notch flaked (partly sawn?) into the convex working edge. See 49SEL-188-114 remarks.

Exxon Catalog Number: **49SEL-188-021**
NPS Catalog Number: KEFJ-261
Field Number: FS # 13
Provenience: Surface ITZ

Straight Double-Bevel, Notched Ulu

Description: Almost complete double-bevel ulu. Straight working edge, rounded at corners. Complete specimen would have rectangular blade and convex back. Most of back is shaped by flaking. Part of one lateral margin missing. Deeply flaked (not sawn, ground or drilled) notch where working edge joins handle on preserved lateral side. Break on lateral edge opposite notch is at point where corresponding notch would likely be. Slightly dulled edge of break at position of notch seems to confirm a notch at this location. Bevels extend to 0.47 cm from working edge. Striations parallel to working edge on both faces. Sharp edges, little or no wave abrasion.
Material: Slate.
Measurements: L 9.74, L of working edge 8.68; W 7.21; T 0.31; Wt. 40.6
Remarks: Well-made ulu, almost complete specimen. Hafting notches are characteristic of late Kachemak tradition (Workman 1980b:76). See 49SEL-188-114 remarks.

Exxon Catalog Number: **49SEL-188-022**
NPS Catalog Number: KEFJ-262
Field Number: FS # 14
Provenience: Surface ITZ

Notched Pebble

Description: Flat, rounded sub-rectangular outline. Wide, shallow flaked notches on opposing lateral edges. Grooves not present. Sharp edges on notches indicate little wave abrasion.
Material: Graywacke.
Measurements: L 4.67, L of notches respectively 2.54,2.02; W 4.76, W at center of notches 4.03; T 1.03; Wt. 33.2
Remarks: Notched pebbles are typical of the Kachemak tradition in Kachemak Bay and Kodiak (D. Clark 1974:67) though they apparently lasted somewhat later on the Alaska Peninsula (G. Clark 1977:162,202). They are absent or rare in Prince William Sound (Workman 1980b:78)

Exxon Catalog Number: **49SEL-188-023**
NPS Catalog Number: KEFJ-263
Field Number: FS # 15
Provenience: Surface ITZ

Ground Slate Rod Fragment

Description: Rounded-rectangular outline. Parallel sides taper slightly. Concave, unworked base with rounded dorsal surface shaped by grinding. Coarse linear striations parallel to long axis on dorsal surface. Striations at one straight end suggest sawing, natural break at opposite end.
Material: Slate.
Measurements: L 9.42; W 1.68 tapers to 1.37; T 0.78; Wt. 23.9
Remarks: May be almost complete. See comments for 49SEL-188-019.

Exxon Catalog Number: **49SEL-188-024**
NPS Catalog Number: KEFJ-264
Field Number: FS # 16
Provenience: Surface ITZ

Stemmed, Barbed, Ground Slate Point (Double-edged blade)

Description: Diamond-shaped cross section, tip missing. Symmetrical, smoothly ground point with sharply incised (sawn) barbs. Parallel, slightly contracting blade edges terminating in short, sharp barbs. Medial arris runs full length of blade and stem on both faces. Coarse short striations oblique to arris on one side of blade, extending to stem. Parallel sides on stem. Stem is broken on one side but base appears to have been flat.
Material: Slate.
Measurements: L [6.90]; W 1.76; T 0.54; Wt. 8.6
Remarks: See comments for 49SEL-188-032.

Exxon Catalog Number: **49SEL-188-025**
NPS Catalog Number: KEFJ-265
Field Number: FS # 17
Provenience: Surface ITZ

Unmodified Lithic Shatter (13)

Description: Angular lithic fragments with light brown weathering rind (patination). Originally collected as single rock.
Material: Sedimentary rock (siltstone or sandstone).
Measurements: L - W - T - Wt. 21.8
Remarks: Originally found out of context in ITZ and reported as possible sea mammal (whale) tooth (Joan Dale, personal communication 1990). Examination of specimen at NPS archaeology lab in Anchorage and at Anchorage Federal Minerals Management Service indicates the fragments are probably a concretionary sedimentary rock (Jeanne Schaaf, personal communication).

Exxon Catalog Number: **49SEL-188-026**
NPS Catalog Number: KEFJ-266
Field Number: FS # 18
Provenience: Surface ITZ
Ground Slate Rod Fragment
Description: Rounded rectangular cross section. Nearly parallel sides taper slightly towards distal end. Tip missing. Broken proximally. Striations on lateral edges parallel to long axis. Slightly water worn at breaks.
Material: Slate.
Measurements: L [6.16]; W 1.08; T 0.79; Wt. 9.2
Remarks: Tip almost complete. Appears that it would have been fairly blunt. Slight polish at tip but also along other edges (wave abrasion?). Doesn't appear to have enough polish to have been utilized as a drill or awl. See comments for 49SEL-188-019.

Exxon Catalog Number: **49SEL-188-027**
NPS Catalog Number: KEFJ-267
Field Number: FS # 19
Provenience: Surface ITZ
Planing Adze
Description: Rounded-rectangular outline. Base ground flat, sub-convex dorsal surface. Relatively flat, rounded-rectangular poll at slight angle to long axis. Light battering at poll resulting in flake facets on dorsal and ventral surfaces. Tapers symmetrically to sharp, finely ground, straight, single-bevel bit. Low angle bevel is on ventral surface and extends approximately 6.2 cm back from bit (difficult to tell due to heavy oiling). Bit is slightly battered. Well-formed complete specimen. Wider than high. No indication of knobs or grooves.
Material: Greenstone.
Measurements: L 17.53; W 6.71, W at bit 3.78; T 3.64; Wt. 754.2
Remarks: Heavy petroleum coating. Artifact was on temporary exhibit at Kenai Fjords Park Headquarters, Kenai and left uncleaned. Planing adzes are present in Prince William Sound where they were more common in the older Prehistoric Period (Palugvik 1 and 2) but occur through all levels at Palugvik (de Laguna 1956:117-119,Pl 12; Workman 1980b:79). In Kachemak Bay they occur throughout the Kachemak I-III sequence (de Laguna 1975:121-128).

Exxon Catalog Number: **49SEL-188-028**
NPS Catalog Number: KEFJ-268 / Tort # KEFJ-4011
Field Number: FS # 20
Provenience: 1989 ITZ Worthington Test Pit
Charcoal Sample
Remarks: Retained by NPS Tort Investigation

Exxon Catalog Number: **49SEL-188-029**
NPS Catalog Number: KEFJ-269 / Tort # KEFJ-4010
Field Number: FS # 21
Provenience: 1989 ITZ Worthington Test Pit
Soil Sample
Remarks: Retained by NPS Tort Investigation

Exxon Catalog Number: **49SEL-188-030**
NPS Catalog Number: KEFJ-270
Field Number: FS # 22
Provenience: Surface ITZ

Pecked, Grooved Cobble

Description: Cobble spall, split longitudinally. Plano-convex cross section. Natural spall fracture on dorsal surface but not yet detached. Shallow, pecked groove 0.95 cm wide runs across middle of dorsal surface, parallel to long axis of cobble. Shallow, pecked notches at both ends of cobble where groove intersects ends. Groove does not extend to ventral surface.

Material: Schist (?).

Measurements: L 7.75; W 5.32, W of notches 1.82; T 1.92; Wt. 84.4

Remarks: Excellent example of natural (non-cultural) thermal spalling process demonstrating that not all boulder spalls in ITZ at SEL-188 are cultural. Trace of petroleum staining.

Exxon Catalog Number: **49SEL-188-031**
NPS Catalog Number: KEFJ-271
Field Number: FS # 23
Provenience: 1989 Worthington ITZ test

Slate Fragments (11), Tabular Sandstone Fragment (1)

Description: Rounded-rectangular flat sandstone fragment shows no evidence of striations, polish or other cultural modification. Slate fragments show no polish, striations, grinding, beveling, worked edges or flake scars indicating cultural modification. Most edges of slate fragments are sharp suggesting little wave abrasion.

Material: Slate and sandstone.

Measurements: L - W - T - Wt. (11)slate 54.9, (1) sandstone 31.7

Remarks: Cultural modification not evident on any of these fragments.

Exxon Catalog Number: **49SEL-188-032**
NPS Catalog Number: KEFJ-272
Field Number: FS # 24
Provenience: 1989 Upland Test Pit / 36 cmbs (1990 Level II)

Stemmed, Barbed, Ground Slate Point (Double-edged blade)

Description: Diamond-shaped cross section to blade. Biconvex cross section to stem. Distinct medial arris extends full length of blade and part way onto stem on both sides. The blade (tip missing) is 7.9 cm long. Shallow diagonal corner notches (.45 cm deep) with short, sharp barbs. Sawn incisions do not extend beyond barb on to blade. Tip and point of one barb missing. Slightly contracting stem ends in slightly convex blunt base with biconvex cross section. Fine striations on both sides of blade, parallel to medial ridge. Striations from sawing on both sides of stem. Shallow incised (dashed) lines at right angle to stem (both faces) level with tip of barbs (ownership marks?). Well-made, finished point.

Material: Slate.

Measurements: L [9.86], L of blade [7.90], L of stem 1.70; W 1.82, W of stem at base 0.89; T 0.86, T of stem .37; Wt. 14.0

Remarks: Very similar to stemmed, barbed ground point from ITZ at SEL-188 (49SEL-188-024). Barbed ground slate points or blades (double edged) are common in the Pacific Eskimo area, appearing about 2000 years ago (Clark 1970:80,82, 1974; de Laguna 1956:153-159, 1975:71; Heizer 1956; Jordan and Knecht 1988).

Exxon Catalog Number: **49SEL-188-033**
NPS Catalog Number: KEFJ-273
Field Number: FS # 25
Provenience: 1989 Upland Test Pit (30 cmbs)
Retouched Boulder Spall
Description: Classic oval boulder spall. Plano-convex cross section. Sporadic unifacial retouch on dorsal surface. One flake facet terminating in step fracture on ventral surface.
Material: Graywacke.
Measurements: L 8.77; W 7.58; T 1.87; Wt. 108.6

Exxon Catalog Number: **49SEL-188-034**
NPS Catalog Number: KEFJ-274
Field Number: FS # 26
Provenience: 1989 Upland Test
Abrader
Description: Cylindrical cobble. One flat edge worn by grinding. No evidence of battering on ends or sides.
Material: Schist (?).
Measurements: L 9.69; W 4.01; T 2.87; Wt. 195.6

Exxon Catalog Number: **49SEL-188-035**
NPS Catalog Number: KEFJ-275
Field Number: FS # 27
Provenience: 1989 Upland Test Pit
Unmodified Cobble
Description: Smooth cylindrical cobble, biconvex cross section. Very slight battering and scratch on one end appear fresh.
Material: Basalt.
Measurements: L 8.77; W 3.50; T 2.81; Wt. 133.8
Remarks: Originally described as hammerstone. Cultural modification not evident.

Exxon Catalog Number: **49SEL-188-036a-c**
NPS Catalog Number: KEFJ-276
Field Number: FS # 28 (Lot)
Provenience: 1989 Upland Test Pit

Incised Slate Tablet (036a)

Ground Slate Fragment (036b)

10 Unmodified Slate Fragments (036c)

Description: Thin, rounded-rectangular slate fragment with widely spaced, coarse cross-cutting striations (incisions) on one surface. Pattern appears to be intentional (or at least not a result of grinding). Striations do not parallel each other (were made individually). Some striations are fairly straight, most are curved. All but one run at either a right angle or an oblique angle to long axis of fragment. One curving line running semi-parallel to long axis cross-cuts other striations. Edges appear slightly water worn.

One slate fragment is ground with parallel striations on a single-beveled edge. Flake morphology or cultural modification (retouch, grinding, striations)is not evident on the other 10 associated slate fragments. One fragment has naturally spalled since collection (creating slate fragment #13). Edges generally appear sharp.

Material: Slate.

Measurements: L 6.25; W 2.70; T 0.50; Wt. 14.7 (of incised slate tablet), Wt. slate frags. (11) 31.6

Remarks: Incised slate tablets are reported from Palugvik 1 and 2 levels in Prince William Sound (de Laguna 1956:201-204) dating to before A.D. 1000 (Clark 1988:215) and from the Uqciuvit Site (Yarborough 1989:3). On Kodiak they are known only from the late prehistoric Koniag phase where they are common, and for the most part appear to have been hastily made and discarded in great numbers (Clark 1964:123, Fig. 4-R; Workman In Mobley et al. 1990:259).

Exxon Catalog Number: **49SEL-188-037**
Field Number:
Provenience: 1990 ITZ Test B / Stratum 1
Clear Glass Fragment
Description: Convex, thin, clear glass fragment. Sharp edges on all breaks indicate little time in ITZ. Large enough fragment to estimate diameter of tube as 3.35 cm.
Material: Modern glass.
Measurements: L 3.59; W [3.55 dia.]; T 0.28; Wt. -
Remarks: Largest of six pieces of clear glass which are all probably part of a fluorescent light tube. Unrelated to other artifacts at site.

Catalog Number: **49SEL-188-038, 40-44**
Field Number:
Provenience: 1990 ITZ Test B / Stratum 1
Clear Glass Fragments (6)
Description: Convex, thin, clear glass fragment. Sharp edges on all breaks indicate little time in ITZ.
Material: Modern glass.
Measurements: L - W - T 0.28; Wt. -
Remarks: Probably all part of a single fluorescent light tube.

Exxon Catalog Number: **49SEL-188-039**
Field Number:
Provenience: 1990 ITZ Test B / Stratum 1
Green Glass Fragment
Description: Slightly convex green bottle glass fragment. Rounded, abraded edges. Slightly chipped from wave action indicating fairly long period in ITZ. Numerous bubbles in glass.
Material: Glass (probably pre-1940).
Measurements: L 2.38; W 2.13; T 0.3; Wt. 2.9
Remarks: Dulled edges and bubbles in glass suggest this glass fragment has been in ITZ longer than clear glass fragments and may be related to the historic site component.

Exxon Catalog Number: **49SEL-188-045**
Field Number:
Provenience: 1990 Test B / Stratum 2
Fire Cracked Rock
Description: Burned (oxidized) reddish cortex. Angular edge breaks. Very little edge abrasion from wave action.
Material: Basalt with inclusions.
Measurements: L - W - T - Wt. 25.0
Remarks: Doesn't appear to have been in ITZ for very long.

Exxon Catalog Number: **49SEL-188-046**
Field Number:
Provenience: 1990 ITZ Test B / Stratum 2
Battered Cobble
Description: Cobble end fragment. Oval cross section. Small area (4.71 by 2.1 cm) of missing cortex (battering?) (potlid?) on one lateral margin. Straight fracture opposite missing cortex. Thermal discoloration not evident.
Material: Basalt.
Measurements: L 6.90; W 3.98; T 3.41; Wt. 93.4
Remarks: Missing cortex possibly due to thermal spalling, although lack of oxidization suggests light battering from possible utilization as hammerstone.

Exxon Catalog Number: **49SEL-188-047**
Field Number:
Provenience: 1990 ITZ Test B / Stratum 3
Unretouched Boulder Spall
Description: Sub-triangular boulder spall. Plano-convex in cross section. Straight thin distal edge not retouched. Striking platform not evident. Slight polishing along all edges probably due to wave abrasion in ITZ.
Material: Basalt.
Measurements: L 5.48; W 3.29; T 0.79; Wt. 8.4
Remarks: Cultural modification not evident.

Exxon Catalog Number: **49SEL-188-048**
Field Number:
Provenience: 1990 ITZ Test B / Stratum 2
Primary Flake
Description: Primary flake. Rounded-rectangular, flat striking platform at proximal end. A 1.34 cm long, 1.04 cm wide flake facet originates at striking platform and terminates as a step fracture on the dorsal surface. Not retouched. Slight polishing evident along most of edge probably result of wave abrasion in ITZ.
Material: Basalt.
Measurements: L 6.57; W 3.68; T 1.01; Wt. 4.4

Exxon Catalog Number: **49SEL-188-049**
Field Number:
Provenience: 1990 ITZ Test B / Stratum 2
Edge-Battered Cobble (Hammerstone)
Description: Thick, rounded cobble. Oval in cross section. 3.37 x 1.14 cm area at distal end flattened from extensive pecking. Minor battering at proximal end and on both lateral edges.
Material: Fine-grained basalt.
Measurements: L 7.76; W 6.26; T 3.53; Wt. 267.6

Catalog Number: **49SEL-188-050**
Field Number:
Provenience: 1990 Test B / Stratum 3 (20 cmbs)
Split, Grooved Cobble
Description: Oval cobble. Split longitudinally with rounded dorsal surface. Plano-convex cross section. Shallow, pecked groove at right angle to long axis of cobble midway from ends. 1 cm wide, .03 cm deep groove. Almost no polish on split edges.
Material: Fine-grained basalt with inclusions.
Measurements: L 7.29; W 5.26; T 2.92; Wt. 163.8
Remarks: Very little evidence of wave abrasion. Recovered from 20 cm below the surface of the ITZ in clean sand.

Exxon Catalog Number: **49SEL-188-051**
Field Number: FS # 17
Provenience: ITZ surface
Splitting Adze Midsection, Single Hafting Ridge
Description: Adze midsection. Dorsal fragment. Irregular, sharp, angular break proximal end. Poll missing. Flat, straight, oblique break at distal end forming a sharp acute angle. Dorsal surface is rounded with a 17.2 cm wide prominent ridge 40.1 cm proximal to the distal break. Shallow pecked groove (0.71 wide) extends over the top of the dorsal surface and across one lateral side. Extensive pecking occurs over the entire dorsal surface. Rounded-rectangular cross section with rounded dorsal surface (when articulated with distal bit end).
Material: Graywacke.
Measurements: L [10.4]; W 49.4; H [4.7], H at ridge [6.2]; Wt. 383.6
Remarks: Articulates with bit fragment (49SEL-188-052) found 17 m away. Sharp edges at breaks indicate minimal wave abrasion. Found in supratidal zone.

Exxon Catalog Number: **49SEL-188-052**
Field Number: FS # 18
Provenience: ITZ surface
Splitting Adze Fragment, Bit End
Description: Distal fragment of splitting adze. Rounded-rectangular cross section, slightly rounded base (when articulated with 49SEL-188-051). Extensive pecking over original surface. Blunt, sub-convex, slightly battered asymmetric single-bevel bit. Ventral bevel extends 34.8 cm back from bit edge. Polishing not evident on pecked bit facet. Broken proximally. Battering at ventral edge of proximal break.
Material: Graywacke.
Measurements: L [12.9]; W 5.2; H [5.0]; cord of bit 4.37; Wt. 549.
Remarks: Articulates with adze midsection (49SEL-188-051). Found in mid-intertidal. Slightly more abraded edges along break than exhibited by the articulating midsection suggest more time exposed to wave abrasion.

Exxon Catalog Number: **49SEL-188-053**
Field Number: FS # 34
Provenience: ITZ surface
Retouched Boulder Spall
Description: Classic oval outline, plano-convex cross section. Sporadic, primarily unifacial retouch on thinner, convex working edge. Two dorsal facets from flake removal (possibly from use). Striking platform not evident.
Material: Graywacke.
Measurements: L 10.76; W 8.31; T 1.25; Wt. 170.4
Remarks: Petroleum staining.

Exxon Catalog Number: **49SEL-188-054**
Field Number: FS #35
Provenience: ITZ surface
End-Battered, Cylindrical Cobble (Hammerstone)

Description: Rounded-rectangular outline and cross section. Extensive battering on both ends and along one lateral margin.
Material: Basalt.
Measurements: L 9.79; W 5.88; T 6.95; Wt. 596.9
Remarks: Trace of petroleum present.

Exxon Catalog Number: **49SEL-188-055**
Field Number: FS # 39
Provenience: ITZ surface
Retouched Boulder Spall
Description: Classic oval outline. Plano-convex cross section. Irregular ventral surface. Bifacial retouch along most of thin convex working edge. Thick, massive back. No evidence of striking platform.
Material: Graywacke.
Measurements: L 13.42; W 9.83; T 2.79; Wt. 423.3
Remarks: Some step fractures on dorsal surface appear recent. Slight petroleum staining.

Exxon Catalog Number: **49SEL-188-056**
Field Number: FS # 40
Provenience: ITZ surface
Unretouched Boulder Spall
Description: Small side-struck boulder spall. Classic oval outline, sub-convex distal edge. Plano-convex cross section. Relatively thick distal working edge with minor bifacial damage (wave abrasion?) confined to 2.5 cm at one end of working edge.
Material: Greenstone.
Measurements: L 8.27; W 6.27; T 1.12; Wt. 79.0
Remarks: Petroleum staining on ventral surface.

Exxon Catalog Number: **49SEL-188-057**
Field Number: FS # 53
Provenience: ITZ subsurface (grid)

Notched Grooved Cobble

Description: Elongated cobble tapering slightly at one end. Relatively flat bottom with opposite rounded side. Shallow, .10 - .14 cm deep pecked groove along middle of rounded side, parallel to length of cobble. Groove continues around cobble forming shallow pecked notches at both ends. Bottom of cobble slightly concave (naturally), pecking appears to terminate at ends.

Material: Graywacke (?).

Measurements: L 7.24; W 4.57; W of groove 1.34; T 2.96; Wt. 165.1

Remarks: Both notched and grooved cobbles are common along the North Pacific Coast (Clark 1970:84). In Kachemak Bay cobbles grooved around the long diameter appear in Kachemak II and continue in Kachemak III (de Laguna 1975:121-129,Pl 17-3). During Kachemak III in Kachemak Bay grooved stones increase in frequency and variety (de Laguna 1956:272). They are also present in Prince William Sound where two specimens grooved around the long diameter were recovered from Palugvik I (de Laguna 1956:135-137,Pl 20-7). They occur at Kodiak in a late Kachemak context at Three Saints Bay (Clark 1970:83).

Exxon Catalog Number: **49SEL-188-058**
Field Number: FS # 78
Provenience: ITZ subsurface (grid)

End-Battered Cobble Core with Negative Spall Removal Facet

Description: Elongate cobble. Oval cross section except for flat facet from natural fracture. Minor battering at both ends. Mid point on lateral edge of flat side has been used as a striking platform to remove a large spall, leaving a single negative facet. Little evidence of wave abrasion since spall removal.

Material: Fine grained igneous rock (granite?).

Measurements: L 14.28; W [6.18]; T 6.66; Wt. 868.1

Remarks: Good example of technique of boulder spall production.

Exxon Catalog Number: **49SEL-188-059**
Field Number: FS # 79
Provenience: ITZ subsurface (grid)

Notched Ulu Fragment, Convex Blade

Description: Ulu fragment, convex, flaked blade. Polish on both faces oblique to working edge. No shaping striations apparent and no polish parallel to working edge. Straight back on break. Approximately a third of tool is missing. Shallow flaked 0.30 cm deep notch, dulled by grinding, on preserved lateral edge.

Material: Slate.

Measurements: L [9.39];W 7.99, W of notch 2.21; T 0.73; Wt. 47.7

Remarks: See 49SEL-188-114 comments.

Exxon Catalog Number: **49SEL-188-060**
Field Number: FS # 80
Provenience: ITZ subsurface (grid)
Retouched Boulder Spall
Description: End-struck elongate boulder spall. Plano-convex cross section. Narrow proximal end expands to relatively straight sinuous working edge. Working edge is at one end of spall rather than on side as in side-struck spalls. Light bifacial use retouch along working edge.
Material: Fine-grained igneous rock (granite?).
Measurements: L 11.21; W 6.98; T 1.69; Wt. 170.5
Remarks: Light petroleum staining.

Exxon Catalog Number: **49SEL-188-061**
Field Number: FS # 82
Provenience: ITZ subsurface (grid)
Retouched Boulder Spall
Description: Rectangular boulder spall. Plano-triangular cross section. Thick, lateral, naturally flat edge tapers abruptly to working edge. Natural flat facet used as striking platform to detach spall. Fine unifacial use retouch along most of working edge on dorsal surface. Sharp working edge exhibits little evidence of wave abrasion.
Material: Basalt.
Measurements: L 8.42; W 4.90; T 2.17; Wt. 114.6
Remarks: Slight petroleum staining.

Exxon Catalog Number: **49SEL-188-062**
Field Number: FS # 83
Provenience: ITZ subsurface (grid)
Slate Bead
Description: Round, thin, bead with straight drilled hole at center. Both surfaces relatively flat. Smooth, polished circumference. Light scoring evident on inside wall of drilled hole. Very symmetrical, well-made ornament.
Material: Slate or possibly shale.
Measurements: Outside diameter 0.81, hole diameter 0.28; T 0.36; Wt. 0.4
Remarks: Beads were common at Palugvik in Prince William Sound although stone beads were rare. Four slate beads were recovered in Prince William Sound; three from a burial in Palugvik I and one from a site on Chenega Island (de Laguna 1956:214). On Kodiak beads are more prolific in Late Kachemak tradition sites than in Koniag phase sites (Clark 1970:85). Red stone beads were present in a late Kachemak context at Three Saints Bay and Crag Point (Clark 1970:84,85). Cylindrical beads of red baked shale are found in Kachemak Bay (de Laguna 1975:202).

Exxon Catalog Number: **49SEL-188-063**
Field Number: FS #84
Provenience: ITZ subsurface (grid)
Pick (?) Fragment
Description: Rounded-rectangular cross section. Long narrow (poll?) fragment tapering to battered (proximal?) end. Extensive pecking to shape symmetrical preserved end. Rounded top broken longitudinally 9.03 cm from preserved end. Slightly rounded bottom extends full length of fragment. Flat parallel sides are lightly polished. Striations not evident. No evidence of grooves or knobs. Opposite end and top portion of midsection missing. Rounded edges of breaks suggest wave abrasion.
Material: Graywacke.
Measurements: L [22.74]; W 3.53; H 4.60; Wt. 596.5
Remarks: Slight petroleum staining. Does not appear to be a classic splitting adze. Double-pointed war picks (hafted like splitting adzes) reach their northern limit in Prince William Sound (de Laguna 1956:272; Workman 1980b:80). A pick with conical points and a hafting groove was found in Palugvik 4 (de Laguna 1956:130,Pl 13,1).

Exxon Catalog Number: **49SEL-188-064**
Field Number: FS # 85
Provenience: ITZ subsurface (grid)
Notched, Battered Cobble
Description: Rounded-rectangular cobble, slight parallelogram cross section with relatively flat bottom and rounded top. Shallow pecked notches at both ends. Slight polishing along rounded top between notches. Battering at both ends suggests subsequent use as hammerstone.
Material: Graywacke.
Measurements: L 11.12; W 5.29, Respective W of notches 1.97, 1.55; T 4.42; Wt. 432.9
Remarks: Petroleum stained.

Exxon Catalog Number: **49SEL-188-065**
Field Number: FS # 86
Provenience: ITZ subsurface (grid)
Battered Cobble
Description: Oval cobble with biconvex cross section. Very slight flattening of both ends from battering (pecking?) suggests use as hammerstone but may be result of wave abrasion. Not definitely cultural.
Material: Fine-grained igneous rock.
Measurements: L 7.13; W 5.34; T 2.85; Wt. 168.7

Exxon Catalog Number: **49SEL-188-066**
Field Number: FS # 87
Provenience: ITZ surface (grid)
Sub-Rounded Pebble
Description: Sub-rounded in outline and cross section. Grinding or polish not evident.
Material: Granite with mica inclusions.
Measurements: L 3.49; W 2.78; T 2.56; Wt. 34.1
Remarks: Collected as exotic to predominately angular granitic rocks in ITZ. Cultural modification not evident. Petroleum stained.

Exxon Catalog Number: **49SEL-188-067**
Field Number: FS # 88
Provenience: ITZ surface (grid)
Sub-Rounded Pebble
Description: Sub-rounded in outline, oval in cross section. No grinding or polish evident.
Material: Fine-grained igneous rock with mica inclusions.
Measurements: L 47.5; W 45.6; T 3.42; Wt. 93.0
Remarks: Collected as exotic to predominately angular granitic rocks in ITZ. No evidence of cultural modification. Heavily oil stained.

Exxon Catalog Number: **49SEL-188-068**
Field Number: FS # 89
Provenience: ITZ subsurface (grid)
Ground Slate Rod Fragment
Description: Rectangular slate midsection. Rounded-rectangular cross section. Abrupt, angular breaks at both ends. Grinding striations on both lateral rounded sides and perhaps on parts of relatively flat dorsal and ventral surfaces (weathering makes this difficult to determine). Too fragmentary to determine function.
Material: Slate.
Measurements: L [5.48]; W 1.59; T 1.02; Wt. 16.0

Exxon Catalog Number: **49SEL-188-069**
Field Number: FS # 98
Provenience: ITZ surface
Notched Pebble
Description: Flat, oval pebble. Bifacial notching battered (not pecked) on both ends.
Material: Basalt.
Measurements: L 3.97; W 3.85, W of notches 0.95; T 1.14; Wt. 26.9
Remarks: See comments for 49SEL-188-022

Exxon Catalog Number: **49SEL-188-070**
Field Number: FS #99
Provenience: ITZ subsurface (grid)
Ground Slate Rod Fragment
Description: Split longitudinally. Complete artifact would have had a rounded-rectangular cross section. Sharp breaks at both ends. Split longitudinally. Dorsal surface flattened by grinding. Extensive grinding and shaping of preserved portion of dorsal service. Very faint striations. Sharp edges on longitudinal fracture indicate little wave abrasion. Not enough left to determine function.
Material: Slate.
Measurements: L [6.92]; W 1.16; T .04; Wt. 6.2
Remarks: Trace of petroleum staining.

Exxon Catalog Number: **49SEL-188-071**
Field Number: FS # 100
Provenience: ITZ subsurface (grid)
Incomplete Retouched Flake
Description: Irregular, flat secondary flake. Snap fractures at both ends. Light unifacial retouch along preserved edges. Part of previous flake facet and pressure ridges from previous flake removal on dorsal surface. Sharp lateral edges indicate little time in ITZ.
Material: Green slate.
Measurements: L 3.72; W 1.93; T 0.47; Wt. 4.2

Exxon Catalog Number: **49SEL-188-072**
Field Number: FS # 101
Provenience: ITZ subsurface (grid)
Single-Bevel Ulu Fragment
Description: Irregular outline. Fragment of distal straight edge of thin single-bevel ulu. One lateral edge terminates in snap fracture. Back and most of working edge missing. Grinding parallel to working edge to 0.55 cm from edge. Coarse shaping striations at oblique angle to working edge cover most of remaining dorsal surface.
Material: Slate.
Measurements: L 6.0; W 5.09; T 0.27; Wt. 10.2

Exxon Catalog Number: **49SEL-188-073**
Field Number: FS # 102
Provenience: ITZ subsurface (grid)
Distal Flake Fragment
Description: Distal end of large secondary flake. Proximal end terminates in hinge fracture. Medial ridge from previous flake removals on dorsal surface. Sporadic light unifacial retouch on both edges and distal end (wave abrasion?).
Material: Greenstone.
Measurements: L 5.87; W 4.59; T 0.70; Wt. 22.1
Remarks: Intentional retouch not evident.

Exxon Catalog Number: **49SEL-188-074**
Field Number: FS # 103
Provenience: ITZ Subsurface (grid)
Wedge Fragment (Bit)
Description: Irregular outline, rounded-rectangular cross section. Thick, narrow symmetrical double-bevel wedge. Distal fragment with water worn proximal break. Battering on distal edge has destroyed most of ventral bevel and one side of dorsal bevel. Both bevels extend 1.68 cm back from convex working edge. Extremely polished over all surfaces. Highly water worn.
Material: Greenstone.
Measurements: L 5.34; W cord of bit 2.97, W at break 2.40; T 1.70; Wt. 43.7
Remarks: May be a small planing adze. Small planing adzes and chisels are reported from Prince William Sound (de Laguna 1956:117-122) and from Kachemak Bay (de Laguna 1975:57).

Exxon Catalog Number: **49SEL-188-075**
Field Number: FS # 104
Provenience: ITZ subsurface (grid)
Battered Core Fragment (Wedge?)
Description: Rounded-rectangular outline and cross section. Possible double-bevel at thin distal end but battering and flake removal have destroyed most of distal end. Both lateral edges extensively battered. Flakes have been removed from two directions on one face. Thick proximal end terminates in natural break. Water worn.
Material: Highly siliceous greenstone.
Measurements: L 7.32; W 3.59, cord of bit (?) 2.40 at distal end; T 1.24; Wt. 44.8
Remarks: See comments for 49SEL-188-074.

Exxon Catalog Number: **49SEL-188-076**
Field Number: FS # 105
Provenience: ITZ subsurface (grid)
Retouched Boulder Spall
Description: Classic oval boulder spall. Side-struck spall with convex working edge. Plano-convex cross section. Sporadic light unifacial retouch on distal edge.
Material: Graywacke.
Measurements: L 8.31; W 10.71; T 1.73; Wt. 205.4
Remarks: Slight petroleum staining.

Exxon Catalog Number: **49SEL-188-077**
Field Number: FS # 106
Provenience: ITZ subsurface (grid)
Adze Midsection
Description: Irregular adze midsection fragment. Rounded-rectangular cross section, flat parallel sides. Fragment is probably from slightly proximal to bit. No bevelling, grooves or knob evident. Rounded top and bottom shaped by extensive pecking.
Material: Graywacke.
Measurements: L - ; W 3.33; H - Wt. 186.8
Remarks: Too fragmentary for length and height measurements. Probably fragment of splitting adze but too little remains to tell. Trace of petroleum staining.

Exxon Catalog Number: **49SEL-188-078**
Field Number: FS # 107
Provenience: ITZ subsurface (grid)
Grooved Cobble
Description: Rounded-rectangular outline and cross section. Shallow pecked groove runs longitudinally around midpoint of entire cobble forming slight notching at both ends. Very light battering on one margin.
Material: Granite (?).
Measurements: L 8.20; W 6.06, W of groove 1.50; T 4.12; Wt. 316.7
Remarks: Heavy petroleum staining over most of surface. See comments for 49SEL-188-057.

Exxon Catalog Number: **49SEL-188-079**
Field Number: FS # 108
Provenience: ITZ subsurface (grid)
Unretouched Boulder Spall
Description: Thick end-struck boulder spall. Rounded-rectangular outline, plano-convex cross section. Blunt distal end and lateral edges. Striking platform evident at proximal end.
Material: Graywacke.
Measurements: L 10.3; W 8.17; T 2.13; Wt. 258.4
Remarks: Use retouch not evident. Probably rejected as a tool because of thick, high angle edges. Light petroleum staining.

Exxon Catalog Number: **49SEL-188-080**
Field Number: FS # 109
Provenience: ITZ subsurface (grid)
Ground Slate Ulu Fragment
Description: Convex double-bevel ulu fragment. Snap fractures intersect forming triangular outline. Steep bevels to 0.04 cm from working edge. Striations parallel to working edge on both faces. Coarser striations at oblique angle to working edge on one side.
Material: Slate.
Measurements: L [4.08]; W cord of remaining working edge 4.52; T 0.31; Wt. 7.7
Remarks: Petroleum stained.

Exxon Catalog Number: **49SEL-188-081**
Field Number: FS # 110
Provenience: ITZ subsurface (grid)
Irregular Boulder Spall
Description: Thin, irregular, end-struck boulder spall terminating in a thick distal end. Sporadic light unifacial retouch on edges.
Material: Graywacke.
Measurements: L 8.45; W 6.08; T 0.83; Wt. 58.5
Remarks: Retouch may be result of wave abrasion rather than cultural modification. Petroleum stained.

Exxon Catalog Number: **49SEL-188-082**
Field Number: FS # 111
Provenience: ITZ subsurface (grid)
Ground Slate Rod Fragment
Description: Rectangular cross section, rounded edges from grinding. Broken distally. Proximal end natural fracture plane at oblique angle to long axis. Coarse striations parallel to long axis on all facets. Tapers slightly toward distal break. Edges of distal break slightly rounded from wave abrasion.
Material: Slate.
Measurements: L 7.87; W proximal end 1.13, W distal break 0.67; T 0.73; Wt. 14.4

Exxon Catalog Number: **49SEL-188-083**
Field Number: FS # 112
Provenience: ITZ subsurface (grid)
Ground Slate Flake
Description: Side-struck secondary slate flake. Previous flake scars on dorsal surface. Striations parallel to long axis cover all of ventral surface. Slight edge nicking probably from wave abrasion.
Material: Slate.
Measurements: L 4.75; W 7.28; T 6.2; Wt. 32.0

Exxon Catalog Number: **49SEL-188-084**
Field Number: FS # 113
Provenience: ITZ subsurface (grid)
Coarsely Ground Double-Bevel Slate Fragment
Description: Irregular outline. Convex asymmetrical double-bevel on one edge. Coarse striations parallel and at right angles to bevels on both faces. Right angle striations cross cut parallel striations on most pronounced bevel. Striations extend along edge beyond bevels. Most pronounced bevel ground to 1.16 cm from edge. Other edges thick and unworked. Sharp edges on some breaks indicate little wave abrasion.
Material: Slate.
Measurements: L 4.35; W 4.99; T 0.96; Wt. 31.1
Remarks: Appears to be an unfinished tool (wedge?).

Exxon Catalog Number: **49SEL-188-085**
Field Number: FS # 114
Provenience: ITZ surface
Unretouched Boulder Spall
Description: Thick (side-struck?) oval boulder spall. Irregular ventral surface, rounded cortex. Unretouched.
Material: Graywacke.
Measurements: L 6.66; W 10.07; T 2.30; Wt. 167.6
Remarks: Not convincingly cultural. Trace of petroleum staining.

Exxon Catalog Number: **49SEL-188-086**
Field Number: FS # 115
Provenience: ITZ surface
Retouched Boulder Spall
Description: End-struck oval boulder spall. Plano-convex cross section. Light bifacial retouch on narrow distal end (wave abrasion?).
Material: Graywacke.
Measurements: L 10.05; W 6.76; T 1.50; Wt. 148.3
Remarks: Blow to end could have occurred naturally in ITZ. Retouch may be natural from wave abrasion.

Exxon Catalog Number: **49SEL-188-087**
Field Number: FS # 116
Provenience: ITZ surface
Ground Slate, Bifacially Flaked
Description: Massive rounded-rectangular slate flake. One lateral edge straight, other sub-convex. Extensive battering and bifacial flake removal from along straight edge. Lighter unifacial retouch along opposite sub-convex edge and sinuous broader end. Distal end mostly missing. Step fractures from flake removal and striations on both dorsal and ventral surfaces. Relatively sharp edges indicate little wave abrasion.
Material: Slate.
Measurements: L 16.59; W 8.23; T 1.81; Wt. 307.5
Remarks: Light petroleum staining.

Exxon Catalog Number: **49SEL-188-088**
Field Number: FS # 118
Provenience: ITZ surface
Slate Scrap
Description: Irregular, oval outline with straight break. Facets from flake removal (one terminating in step fracture) on dorsal side. No apparent striking platform, retouch, striations or grinding.
Material: Slate.
Measurements: L 6.05; W 3.17; T 0.70; Wt. 18.0
Remarks: Wave abrasion in ITZ could be responsible for dorsal facets. Trace of petroleum staining.

Exxon Catalog Number: **49SEL-188-089**
Field Number: FS # 117
Provenience: ITZ surface
Greenstone Shatter
Description: Irregular amorphous flake (2 articulating fragments). No striking platform, bulb of percussion or other indication of cultural origin. Light unifacial nicking along 0.08 cm of one edge may be from wave abrasion.
Material: Highly siliceous greenstone.
Measurements: L 3.43; W 1.51; T 0.03; Wt. 1.7
Remarks: Cultural modification not evident.

Exxon Catalog Number: **49SEL-188-090**
Field Number: FS # 119
Provenience: ITZ subsurface (grid)
Pecked, Notched Cobble
Description: Elongate cobble, biconvex cross section. Pecked grooves on both ends, 1.64 cm, 1.25 cm wide respectively, form shallow notches. Pecking and grooves confined to ends. Pecked grooves extend up to 1.82 cm from ends. Some fresh scratches apparent.
Material: Graywacke.
Measurements: L 13.19; W 7.40; T 4.21; Wt. 716.2
Remarks: Petroleum stained.

Exxon Catalog Number: **49SEL-188-091**
Field Number: FS # 120
Provenience: ITZ subsurface (grid)
Ground Slate Fragment
Description: Thin, triangular slate fragment (spall). Natural breaks on all sides. Parallel striations cover all of one surface. Appears to be a spall (not struck). Sharp edges indicate little wave abrasion.
Material: Slate.
Measurements: L 2.41; W 2.22; T 0.22; Wt. 1.8

Exxon Catalog Number: **49SEL-188-092**
Field Number: FS # 121
Provenience: ITZ subsurface (grid)
Splitting Adze, Two Hafting Grooves
Description: Narrow, high, asymmetrical double-bevel splitting adze. Rounded-rectangular cross section. Extensively shaped by pecking. Flat bottom, rounded top. Flat parallel sides. Steeper upper bevel not ground. Lower bevel ground back 3.40 cm from straight bit. Massive, rounded-rectangular, slightly battered flat poll. Dorsal portion of poll extends into proximal halfting knob. Proximal knob separated from second distal knob (partly destroyed by battering) by 1.86 cm wide pecked groove. Very shallow, 0.98 cm wide pecked groove distal to front knob.
Material: Graywacke.
Measurements: L 18.86; W 4.94; H 7.78, H at proximal knob 6.88; Wt. 1311.2
Remarks: See comments for 49SEL-188-007.

Exxon Catalog Number: **49SEL-188-093**
Field Number: FS # 122
Provenience: ITZ subsurface (grid)
Dorsal Knob Fragment from Splitting Adze
Description: Irregular dorsal section of splitting adze with single knob. Broken proximally and distally, base missing. Fragment has pecked rounded top and straight parallel sides. Slight indication of pecked groove distal to knob at edge of break.
Material: Graywacke.
Measurements: L [11.62]; W 3.07; H [3.15]; Wt. 176.4

Exxon Catalog Number: **49SEL-188-094**
Field Number: FS # 123
Provenience: ITZ subsurface (grid)
Battered Cobble, Hammerstone
Description: Elongate cobble tapering towards distal end. Oval cross section. Flattened distal end resulting from extensive battering (pecking). No evidence of battering on proximal end or lateral margins.
Material: Basalt.
Measurements: L 14.94; W proximal end 7.0, W distal end 3.34; T 4.20; Wt. 755.8

Exxon Catalog Number: **49SEL-188-095**
NPS Catalog Number: KEFJ-843
Provenience: Upland Test (1990) West Wall, Level I
Single-Bevel Planing Adze Fragment
Description: Broken fragment with preserved very slightly convex, single-bevel ground working edge. Snap fracture oblique to bevel on one edge, other edge finely ground. Dorsal bevel extends to 0.32 cm from working edge. Striations parallel to working edge on dorsal surface. Preserved corner of bevel forms right angle to ground edge. Not water worn.
Material: Greenstone.
Measurements: L [3.2]; W [2.3]; T 0.6; Wt. 4.8
Remarks: Thin, tabular greenstone planing adzes are reported from Kachemak Bay, Kodiak Island and Prince William Sound (Clark 1970:77, 1974; de Laguna 1956:117-119, 1975:57,Pl. 19-7; Heizer 1956:44).

Exxon Catalog Number: **49SEL-188-096**
NPS Catalog Number: KEFJ-844
Provenience: Upland Test (1990) West Wall, Level I
Triangular Ground Slate Point (Endblade)
Description: Small triangular endblade. One face is butt faceted with striations parallel to base extending 1.3 cm up the blade from a thin straight base. On the opposite face, two flake scars extending 2.25 cm up the blade have removed the arris. Fine grinding striations (both oblique and parallel) to sharp edges on both sides. Striations parallel to base on one side. Diamond-shaped cross section at sharp tip. Symmetrical, delicate well-made point.
Material: Slate.
Measurements: L 3.0; W 1.1; T 0.3; Wt. 0.8
Remarks: Small, ground slate stemless endblades are reported from late prehistoric sites in Kachemak Bay (Workman and Workman 1988), Kodiak Island (Clark 1970:83, 1974; Heizer 1956:pl.46N; Jordan and Knecht 1988) and Prince William Sound (Mobley et al. 1989:287; Yarborough 1989:3).

Exxon Catalog Number: **49SEL-188-097**
NPS Catalog Number: KEFJ-845
Provenience: Upland Test (1990) West Wall, Level I
Ground Slate Flake
Description: Irregular slate flake. Parallel striations on dorsal surface. Sharp edges. Very light bifacial damage on lateral edges.
Material: Slate.
Measurements: L 2.3; W 1.7; T 0.2; Wt. 1.0

Exxon Catalog Number: **49SEL-188-098**
NPS Catalog Number: KEFJ-846
Provenience: Upland Test (1990) West Wall, Level I
Unretouched Boulder Spall
Description: End-struck boulder spall. Distal end missing. Plano-convex cross section. Very light sporadic unifacial nicking present.
Material: Fine-grained igneous rock (basalt?).
Measurements: L 7.8; W 4.6; T 1.1; Wt. 43.4
Remarks: Light unifacial nicking may be natural.

Exxon Catalog Number: **49SEL-188-099**
NPS Catalog Number: KEFJ-847
Provenience: Upland Test (1990) West Wall, Level I
Flaked Slate
Description: Irregular slate fragment. Thicker lateral edge appears to have been backed by bifacial flaking along its entire length. Opposite thin sharp edge may have been unifacially flaked but does not appear to have been utilized. Striations or polish not evident. One long thin natural spall has detached from the dorsal surface since collection.
Material: Slate.
Measurements: L 7.8; W 4.1; T 1.25; Wt. 33.4
Remarks: Thin edge opposite backed edge could not have remained sharp and unpolished with use. Possible knife preform.

Exxon Catalog Number: **49SEL-188-100**
NPS Catalog Number: KEFJ-848
Provenience: Upland Test (1990) West Wall, Level I
Retouched Slate Flake
Description: Blade-like slate flake, snapped at one end. Slight (spokeshave-like) unifacially flaked notch middle of one lateral side. Polish not evident in notch. No other striations, polish or cultural modification evident on fragment.
Material: Slate.
Measurements: L 3.5; W 1.3 , notch W 0.95, depth 0.23; T 0.25; Wt. 2.0

Exxon Catalog Number: **49SEL-188-101**
NPS Catalog Number: KEFJ-849
Provenience: Upland Test (1990) West Wall, Level I
Slate Flakes / Shatter (19)
Description: Irregular shatter, some possible flakes. Sharp edges.
Material: Slate.
Measurements: L 0.9 - 4.6; W - T - Wt. (19) 18.7

Exxon Catalog Number: **49SEL-188-102**
NPS Catalog Number: KEFJ-851
Provenience: Upland Test (1990) West Wall, Level I
Slate Chips / Shatter (3)
Description: Very small shatter. Cultural modification not evident.
Material: Slate.
Measurements: L 0.5 - 0.7; W - T - Wt. (3) 0.1

Exxon Catalog Number: **49SEL-188-103**
NPS Catalog Number: KENJ-851
Provenience: Upland Test (1990) West Wall, Level I
Unmodified Split Cobble
Description: Elongate boulder spall. Rounded-rectangular, plano-convex cross section. Grinding, polish or other cultural modification not evident.
Material: Schist (?).
Measurements: L 7.2; W 2.2; T 0.5; Wt. 15.7
Remarks: Appears to have been produced by natural exfoliation.

Exxon Catalog Number: **49SEL-188-104**
NPS Catalog Number: KEFJ-852
Provenience: Upland Test (1990) West Wall, Level I
Unmodified Shatter (2)
Description: One fragment of granitic rock and one fragment of (schist?) from which a thin fragment has exfoliated. Sharp angular edges on all fragments.
Material: Granite (1), Schist? (2).
Measurements: L - W - T - Wt. 29.4 (3)

Exxon Catalog Number: **49SEL-188-105**
NPS Catalog Number: KEFJ-853
Provenience: Upland Test (1990) West Wall, Level I
Unmodified Shatter (4)
Description: Irregular small shatter. Cultural modification not evident.
Material: Shale (?).
Measurements: L - W - T - Wt. 0.9

Exxon Catalog Number: **49SEL-188-106**
NPS Catalog Number: KEFJ-854
Provenience: Upland Test (1990) North Wall, Level I
Unmodified Flat Pebble with Flat Facet
Description: Oblong flat pebble, water worn except for longitudinal flat facet along full length of one lateral margin. Striations, polish not present.
Material: Siltstone.
Measurements: L 7.0; W 2.2; T 0.6; Wt. 15.8
Remarks: Break appears to be natural snap. Acute edge sharp. Polish not evident on either edge of flat facet. Cultural modification not evident.

Exxon Catalog Number: **49SEL-188-107**
NPS Catalog Number: KEFJ-855
Provenience: Upland Test (1990) North Wall, Level I
Ground Slate Flake
Description: Irregular outline, distal end of slate flake, proximal end terminates in snap fracture. Distal end and one lateral edge sharp. Fine striations and polish evident at distal end on two sides.
Material: Slate.
Measurements: L 7.1; W 2.4; T 0.5; Wt. 10.6

Exxon Catalog Number: **49SEL-188-108**
NPS Catalog Number: KEFJ-856
Provenience: Upland Test (1990) North Wall, Level I
Retouched Slate Fragment
Description: Irregular fragment. Light bifacial retouch evident along two edges.
Material: Slate.
Measurements: L 3.3; W 2.7; T 0.3; Wt. 4.5

Exxon Catalog Number: **49SEL-188-109**
NPS Catalog Number: KEFJ-858
Provenience: Upland Test (1990) North Wall, Level I
Unmodified Slate Shatter (5)
Description: Five small fragments. Sharp edges.
Material: Slate.
Measurements: L 1.0 - 2.8 ;W - T - Wt. 1.4
Remarks: Cultural modification not evident.

Exxon Catalog Number: **49SEL-188-110**
NPS Catalog Number: KEFJ-859
Provenience: Upland Test (1990) North Wall, Level I
Unmodified Lithic Shatter (16)
Description: Small lithic shatter, mostly slate. Cultural modification not evident.
Material: Shale, slate (?), schist (?).
Measurements: L - W - T - Wt. 2.0

Exxon Catalog Number: **49SEL-188-111**
NPS Catalog Number: KEFJ-859
Provenience: Upland Test (1990), North Wall, Level I
Fire Cracked Rock
Description: Irregular, flat, angular rock fragment with reddish (oxidized) area on one side.
Material: Schist (?).
Measurements: L - W - T - Wt. 12.7

Exxon Catalog Number: **49SEL-188-112**
NPS Catalog Number: KEFJ-860
Provenience: Upland Test (1990) North Wall, Level I
Unmodified Sandstone Pebble
Description: Irregular fragment with some convex cortex remaining. Irregular hole at one edge opposite cortex appears natural. Hole is not straight, not drilled.
Material: Sandstone.
Measurements: L - W - T - Wt. 8.3
Remarks: Cultural modification not evident.

Exxon Catalog Number: **49SEL-188-113**
NPS Catalog Number: KEFJ-861
Provenience: Upland Test (1990) North Wall, Level II
Unmodified Slate Shatter (3)
Description: Small thin fragments.
Material: Slate.
Measurements: L (largest) 1.3; W - T - Wt. 0.3
Remarks: Cultural modification not evident.

Exxon Catalog Number: **49SEL-188-114**
NPS Catalog Number: KEFJ-862
Provenience: Upland Test (1990) North Wall, Level II

Notched Ground Slate Ulu Fragment

Description: Corner fragment of notched ulu. Portion of sinuously straight back with deep V-shaped unifacially flaked notch preserved. Working edge not preserved. Striations present over all of ground surface on one side. Striations parallel with back cross cut those parallel with missing working edge.

Material: Slate.

Measurements: L 5.9; W 4.9, W of notch 2.32, Depth of Notch 0.97; T 0.4; Wt. 12.7

Remarks: Notched ulus appear in Kachemak Bay as early as Kachemak I at Yukon Island (de Laguna 1975:121) but are characteristic of late Kachemak where they are much more common (de Laguna 1975:74-76; Workman 1980b:76, 1988). They are also present in Prince William Sound (de Laguna 1956:148-151; Yarborough, personal communication) and in late prehistoric Koniag assemblages (Clark 1970:79, 1974; Heizer 1956:48; Jorden and Knecht 1988).

Exxon Catalog Number: **49SEL-188-115**
NPS Catalog Number: KEFJ-863
Provenience: Upland Test (1990) North Wall, Level II

Unmodified Slate Fragment

Description: Irregular fragment.

Material: Slate.

Measurements: L 3.9; W 1.7; T 0.15; Wt. 2.0

Remarks: Cultural modification not evident.

Exxon Catalog Number: **49SEL-188-116**
NPS Catalog Number: KEFJ-864
Provenience: Upland Test (1990) North Wall, Level II

End-Battered Cobble, Hammerstone

Description: Oval, slightly flat, beach cobble. Very lightly battered on both ends and mid-point of one (thinner) edge.

Material: Graywacke.

Measurements: L 9.5; W 6.5; T 3.6; Wt. 304.2

Exxon Catalog Number: **49SEL-188-117**
NPS Catalog Number: KEFJ-865
Provenience: Upland Test (1990) North Wall, Level II

Battered Cobble, Hammerstone

Description: Smooth, irregular, slightly flat cobble. Very light battering on both ends. Highly water worn.

Material: Quartzite.

Measurements: L 8.8; W 5.0; T 2.1; Wt. 128.8

Exxon Catalog Number: **49SEL-188-118**
NPS Catalog Number: KEFJ-866
Provenience: Upland Test (1990) North Wall, Level II
Ground Slate Fragment
Description: Blocky irregular shatter. Flat cortex on one side is ground (polished) with a few light striations evident.
Material: Slate.
Measurements: L 4.3; W 4.0; T 1.1; Wt. 32.4

Exxon Catalog Number: **49SEL-188-119**
NPS Catalog Number: KEFJ-867
Provenience: Upland Test (1990) North Wall, Level II
Unmodified Elongate Cobble
Description: Elongate cobble. Coarse, irregular surface.
Material: Unknown.
Measurements: L 11.0; W 4.4; T 2.6; Wt. 196.8
Remarks: Cultural modification not evident.

Exxon Catalog Number: **49SEL-188-120**
NPS Catalog Number: KEFJ-868
Provenience: Upland Test (1990) North Wall, Level II
Unmodified Slate Shatter (2)
Description: Irregular shatter.
Material: Slate.
Measurements: L 2.2, 2.0; W - T - Wt. 3.5
Remarks: Cultural modification not evident.

Exxon Catalog Number: **49SEL-188-121**
NPS Catalog Number: KEFJ-869
Provenience: Upland Test (1990) North Wall, Level II
Fire Cracked Rock
Description: Irregular angular fragment. Reddish (oxidized) discoloration probably result of thermal alteration.
Material: Metamorphic rock.
Measurements: L - W - T - Wt. 7.5

Exxon Catalog Number: **49SEL-188-122**
NPS Catalog Number: KEFJ-870
Provenience: Upland Test (1990) Northwest corner, sand layer, Level II
Unmodified Exfoliating Rock Fragments (3+)
Description: Exfoliating along bedded planes. Thermal alteration not evident.
Material: Shale (?).
Measurements: L - W - T - Wt. 74.5
Remarks: Does not appear fire-altered

Exxon Catalog Number: **49SEL-188-123**
NPS Catalog Number: KEFJ-871
Provenience: Upland Test (1990) North Wall, Level II
Retouched Slate Fragment
Description: Large irregular slate fragment with natural bevel along one lateral margin. Very light sporadic unifacial retouch along edge of natural bevel.
Material: Slate.
Measurements: L 10.2; W 3.3; T 0.4; Wt. 26.1
Remarks: Intentional cultural retouch not certain.

Exxon Catalog Number: **49SEL-188-124**
NPS Catalog Number: KEFJ-872
Provenience: Upland Test (1990) North Wall, Level II
Unmodified Lithic Shatter (7)
Description: Irregular lithic shatter. Sharp edges. Cultural modification not evident.
Material: Slate (6), Greenstone (1).
Measurements: L 0.7 - 3.3; W - T - Wt. 5.1

Exxon Catalog Number: **49SEL-188-125**
NPS Catalog Number: KEFJ-873
Provenience: Upland Test (1990) North Wall, Level II
Unmodified Lithic Shatter (10)
Description: Very small shatter. Cultural modification not evident. Various lithologies.
Material: Slate, Greenstone (?).
Measurements: L - W - T - Wt. 1.5

Exxon Catalog Number: **49SEL-188-126**
NPS Catalog Number: KEFJ-874
Provenience: Upland Test (1990) Northeast Corner, Level II
Bifacially Retouched Tabular Slate Slab
Description: Irregular, rectangular outline. Tabular slate slab. Natural breaks on three sides. Heavy bifacial retouch on fourth side, formed by natural bedding plane.
Material: Slate.
Measurements: L 11.9; W 9.2; T 1.0; Wt. 178.0

Exxon Catalog Number: **49SEL-188-127**
NPS Catalog Number: KEFJ-875
Provenience: Upland Test (1990) Northeast Corner, Level II
Unretouched Boulder Spall
Description: Irregular spall. Plano-convex cross section. Striking platform or retouch not evident.
Material: Fine-grained igneous rock, (Graywacke?).
Measurements: L 8.2; W 7.5; T - Wt. 126.3
Remarks: Cultural modification not evident. May be natural spall.

Exxon Catalog Number: **49SEL-188-128**
NPS Catalog Number: KEFJ-876
Provenience: Upland Test (1990) Northeast Corner, Level II
Unmodified Slate Fragment
Description: Irregular fragment. Sub-rounded edges. Water worn.
Material: Slate.
Measurements: L 5.6; W 3.7; T 0.8; Wt. 24.1
Remarks: Cultural modification not evident.

Exxon Catalog Number: **49SEL-188-129**
NPS Catalog Number: KEFJ-877
Provenience: Upland Test (1990) Northeast Corner, Level II
Retouched Slate fragment
Description: Irregular fragment, sub-rounded edges. Light unifacial retouch to one edge. Also very light damage (crushing) to one edge, possibly cultural but may be natural. Appears recent. Recent scratch on flat face near edge of damaged area.
Material: Slate.
Measurements: L 6.9; W 4.9; T 0.9; Wt. 38.5

Exxon Catalog Number: **49SEL-188-130**
NPS Catalog Number: KEFJ-878
Provenience: Upland Test (1990) Test Center, top of granite slabs, poss. from 1989 backfill
Fire Cracked Rock
Description: Irregular cortex fragment. Sharp angular fractures. Slight thermal discoloration (oxidation) on side opposite cortex.
Material: Unknown, sedimentary rock.
Measurements: L - W - T - Wt. 75.5

Exxon Catalog Number: **49SEL-188-131**
NPS Catalog Number: KEFJ-879
Provenience: Upland Test (1990) Test Center, top of granite slabs, poss. from 1989 backfill.
Retouched Slate Fragment
Description: Irregular fragment. Sharp edges. Light unifacial retouch.
Material: Slate.
Measurements: L 5.6; W 4.3; T 0.8; Wt. 19.6

Exxon Catalog Number: **49SEL-188-132**
NPS Catalog Number: KEFJ-880
Provenience: Upland Test (1990) Test Center, top of granite slabs, poss. from 1989 backfill.
Unmodified Slate Fragment
Description: Narrow fragment.
Material: Slate.
Measurements: L 5.17; W 0.86; T 0.40; Wt. 2.7
Remarks: Cultural modification not evident.

Exxon Catalog Number: **49SEL-188-133**
NPS Catalog Number: KEFJ-881
Provenience: Upland Test (1990) North Wall, Level III
Retouched Flake
Description: Irregular flake with striking platform. Light unifacial retouch (use retouch?) near proximal end. Sharp edges, not water worn.
Material: Igneous (Quartzite?).
Measurements: L 6.3; W 6.6; T 0.75; Wt. 27.7

Exxon Catalog Number: **49SEL-188-134**
NPS Catalog Number: KEFJ-882
Provenience: Upland Test (1990) North Wall, Level III
Ground Slate Fragment
Description: Small, thin fragment with parallel striations on one surface.
Material: Slate.
Measurements: L 2.5; W 1.1; T 0.15; Wt. 0.5
Remarks: Appears to be an exfoliated spall off a larger piece of ground slate.

Exxon Catalog Number: **49SEL-188-135**
NPS Catalog Number: KEFJ-883
Provenience: Upland Test (1990) North Wall, Level III
Ground Slate Fragment
Description: Small, thin fragment with parallel striations on lightly ground edge terminating at break. Grinding extends for 0.99 cm to maximum of 0.22 cm from edge.
Material: Slate.
Measurements: L 2.5; W 1.6; T 0.2; Wt. 1.2

Exxon Catalog Number: **49SEL-188-136**
NPS Catalog Number: KEFJ-884
Provenience: Upland Test (1990) North Wall, Level III
Unmodified Slate Shatter (7)
Description: Misc. slate fragments. Sharp edges.
Material: Slate.
Measurements: L - W - T - Wt. 1.2
Remarks: Cultural modification not evident.

Exxon Catalog Number: **49SEL-188-137**
NPS Catalog Number: KEFJ-885
Provenience: Upland Test (1990) West Wall, Ash 2 (T2)
Unmodified Slate Shatter (4)
Description: Misc. slate fragments. Sharp edges. Cultural modification not evident.
Material: Slate.
Measurements: L - W - T - Wt. 1.4

Exxon Catalog Number: **49SEL-188-138**
NPS Catalog Number: KEFJ-886
Provenience: Upland Test (1990) West Wall, Ash 2 (T2)
Rounded Rock, Light End-Battering
Description: Elongate rounded rock, one end rounded, one angular. One flat side. Light battering at rounded end.
Material: Igneous rock.
Measurements: L 7.6; W 2.3; T 2.2; Wt. 44.3
Remarks: Possibly cultural but may be natural. No other cultural modification evident.

Exxon Catalog Number: **49SEL-188-139**
NPS Catalog Number: KEFJ-887
Provenience: Upland Test (1990) 1989 Backfill, Levels I/II
Unmodified Angular Shatter
Description: Angular chunk of rock. Thermal discoloration not evident. Sharp edges.
Material: Metamorphic rock.
Measurements: L - W - T - Wt. 20.1
Remarks: Cultural modification not evident. Does not appear fire cracked.

Exxon Catalog Number: **49SEL-188-140**
NPS Catalog Number: KEFJ-888
Provenience: Upland Test (1990) 1989 Backfill, Levels I/II
End-Battered Cobble, Hammerstone
Description: Elongate cobble, moderate battering on one end. No other cultural modification evident.
Material: Metamorphic rock.
Measurements: L 12.5; W 3.8; T 3.1; Wt. 284.0

Exxon Catalog Number: **49SEL-188-141**
NPS Catalog Number: KEFJ-889
Provenience: Upland Test (1990) 1989 Backfill, Levels I/II
"Incised" Slate Tablet
Description: Flat slate fragment, slightly rounded edges (water worn?). Medium to coarse striations primarily on one side but occur on both sides. Most striations (non-parallel) concentrated along one edge but cross cutting striations occur elsewhere. No evident pattern.
Material: Slate.
Measurements: L 7.5; W 4.4; T 0.36; Wt. 17.8
Remarks: See 49SEL-188-036 for discussion.

Exxon Catalog Number: **49SEL-188-142**
NPS Catalog Number: KEFJ-890
Provenience: Upland Test (1990) 1989 Backfill,Levels I/II
Retouched Boulder Spall
Description: End-struck boulder spall. Plano-convex cross section. Unifacial retouch along all of thin lateral edge to distal end.
Material: Igneous rock.
Measurements: L 14.5; W 8.7; T 2.2; Wt. 381.8

Exxon Catalog Number: **49SEL-188-143**
NPS Catalog Number: KEFJ-891
Provenience: Upland Test (1990) 1989 Backfill, Levels I/II
Unmodified Cobble Fragment
Description: Cobble cortex fragment. Sharp edges.
Material: Shale (?).
Measurements: L 7.6; W 6.5; T 1.2; Wt. 60.4
Remarks: Cultural modification not evident.

Exxon Catalog Number: **49SEL-188-144**
NPS Catalog Number: KEFJ-892
Provenience: Upland Test (1990) 1989 Backfill, Levels I/II
Fire Cracked Rock
Description: Cobble cortex with angular fractures. Reddish (oxidized) discoloration on fractured surface.
Material: Sandstone.
Measurements: L - W - T - Wt. 49.4

Exxon Catalog Number: **49SEL-188-145**
NPS Catalog Number: KEFJ-893
Provenience: Upland Test (1990) 1989 Backfill, Levels I/II
Slate Fragment with Red Stain (?)
Description: Irregular fragment with unidentified glossy red stain at one end. Stain appears recent, flakes off easily.
Material: Slate.
Measurements: L 5.2; W 2.6; T 0.9; Wt. 15.3
Remarks: Unidentified red stain.

Exxon Catalog Number: **49SEL-188-146**
NPS Catalog Number: KEFJ-894
Provenience: Upland Test (1990) 1989 Backfill, Levels I/II
Unmodified Lithic Shatter (9)
Description: Misc. lithic shatter.
Material: Slate (8), Greenstone (1).
Measurements: L 1.4 - 3.2; W - T - Wt. 13.0
Remarks: Cultural modification not evident.

Exxon Catalog Number: **49SEL-188-147**
NPS Catalog Number: KEFJ-895
Provenience: Upland Test (1990) 1989 Backfill, Levels I/II
Unmodified Elongate pebble
Description: Elongate, flat pebble. Highly water worn.
Material: Sedimentary rock.
Measurements: L - W - T - Wt. 3.3
Remarks: Cultural modification not evident.

Exxon Catalog Number: **49SEL-188-148**
NPS Catalog Number: KEFJ-896
Provenience: Upland Test (1990) Test Center, uncertain provenience, top of Ash 2?
Unmodified Slate fragment
Description: Small, thin fragment. Sharp edges.
Material: Slate.
Measurements: L 2.4; W 1.55; T 0.17; Wt. 0.8
Remarks: Cultural modification not evident.

Exxon Catalog Number: **49SEL-188-149**
NPS Catalog Number: KEFJ-897
Provenience: Upland Test (1990) Test Center, uncertain provenience, top of Ash 2?
Fire Cracked Rock
Description: Cobble cortex fragment. Reddish (oxidized) cortex. Does not have irregular angular fractures but appears thermally discolored.
Material: Sandstone.
Measurements: L - W - T - Wt. 42.9