MUKILTEO MULTIMODAL PROJECT

DRAFT

ENVIRONMENTAL IMPACT STATEMENT

CULTURAL RESOURCES DISCIPLINE REPORT

MUKILTEO, SNOHOMISH COUNTY, WASHINGTON

October 2, 2012
Revised April 1, 2013

Northwest Archaeological Associates

SWCA ENVIRONMENTAL CONSULTANTS

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CULTURAL RESOURCES DISCIPLINE REPORT
MUKILTEO, SNOHOMISH COUNTY, WASHINGTON

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and
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CONTAINS CONFIDENTAL INFORMATION – NOT FOR GENERAL DISTRIBUTION

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The Cultural Resources Discipline Report contains some sensitive cultural resources information that is exempt from public disclosure. This information has been redacted to protect the resources in accordance with provisions of the Public Records Act (RCW 42.56.300).

EXECUTIVE SUMMARY

Washington State Ferries (WSF) plans to renovate, rebuild, or relocate the existing Mukilteo Ferry Terminal in Mukilteo, Snohomish County, Washington—a project referred to as the Mukilteo Multimodal Project (MMP). The consideration of alternatives through the various drafts of this EIS have resulted in the selection of the Preferred Alternative (Elliot Point 2). This alternative proposes construction of new facilities on the currently United States Air Force (USAF)-owned Tank Farm property east of the existing ferry terminal.

This document is prepared in compliance with the National Historic Preservation Act (NHPA) and its implementing regulations (36CFR800) with the Federal Transit Administration (FTA) as the lead federal agency. The assessment identifies five cultural resources within the MMP area of potential effects (APE), listed in, determined eligible, or recommended eligible for listing in the National Register of Historic Places (NRHP). These properties are:

- Mukilteo Shoreline Site (45SN393), stratified pre-contact shell midden deposits;
- Old Mukilteo Townsite (45SN404), archaeological remains of the early Mukilteo business district;
- Japanese Gulch Site (45SN398), archaeological deposits associated with early twentieth century Japanese mill workers;
- Point Elliott Treaty Site (45SN108), the site where the 1855 treaty between the U.S. government and Puget Sound Native American tribes was signed; and the
- Mukilteo Light Station (45SN123), a NRHP listed early twentieth century lighthouse complex.

In addition, Native American tribes have identified the project vicinity as a significant traditional cultural property. Consultation regarding traditional cultural properties within the project area is on-going.

Nine cultural resources within the APE are recommended not eligible for NRHP listing: the Mukilteo Explosive Loading Terminal (MELT) Barracks (MM-04), MELT Pier (MM-02), MELT Firehouse (MM-01), MELT Superintendent's Office (MM-06), Defense Fuel Supply Point (DFSP) Tank Farm (MM-03), SR 525 Overpass, Diamond Knot Ale House, Ivar's at Mukilteo, and the existing Mukilteo Ferry Terminal (31-339). One resource adjacent to the APE, the Japanese Gulch Community Site (45SN575), remains unevaluated.

The Mukilteo vicinity, with a Salish name meaning "a good place to camp," was well known historically as a gathering place for local Native American people. The importance of the area to Native American groups is reflected in its selection as the site for the signing of the Point Elliott Treaty in 1855. Earlier, pre-contact use of the area as a base for hunting, fishing, and gathering activities is demonstrated by discovery of the Mukilteo Shoreline Site (45SN393). Euroamerican settlement of the site vicinity began soon after signing of the treaty, with J. D. Fowler and Morris Frost filing the first land claims. By 1858 Fowler and Frost had established a post for trading with local Native American residents, and a store, saloon, hotel, and a post office soon followed. In 1903 the Mukilteo Lumber Company established a mill on the Mukilteo waterfront, within the project APE, which was acquired in 1909 by the Crown Lumber Company. This mill, which employed both Euroamerican and Japanese workers, operated until 1930. The last of its buildings were destroyed by fire in 1938. The mill site was subsequently acquired by the U.S. Army and an ammunition shipping facility was built in the early 1940s. Ownership of this facility was transferred to the U.S. Air Force in 1951 for construction of a fuel supply depot and tank farm.

The first cultural resources study completed for an earlier iteration of the MMP assessed the potential for both pre-contact and historic cultural resources within the APE and reviewed the regional and local environment, prehistory, and history (Kaehler et al. 2006). In 2006 WSDOT contracted with the Northwest Archaeological Associates, Inc./Environmental History Company (NWAA/EHC) team to conduct further archaeological and historical investigations in the project APE (Miss et al. 2008). These additional investigations had three goals: to determine eligibility of the Mukilteo Shoreline Site (45SN393) for listing in the National Register of Historic Places, to determine if additional NRHP eligible resources existed in the APE, and to assess the potential for the various project alternatives to adversely affect these historic properties. In 2007, additional subsurface exploration was conducted related to design changes then under study, as well as archival research and oral history interviews to provide Native American perspectives on the historic events of the Point Elliott Treaty signing.

The presence of deep fill, placed in the APE prior to the 1960s, required the team to test the area with four-inch diameter solid cores, mud rotary bores, and backhoe trenches to acquire information about the original landform configuration and the archaeological deposits. A total of 16 trenches and 135 boreholes were excavated across the study area during 2006-2007 studies. The three types of excavation provided stratigraphic profiles with exposures from the ground surface down to pre-occupation basal sediments as well as information about the condition and physical parameters of the archaeological sites.

Following the 2006-2007 investigations, the boundary of the Mukilteo Shoreline Site (45SN393) was enlarged to encompass newly discovered portions of the site. The shell midden, covered by one to six feet of fill, was found to vary from an inch to well over three feet in thickness. Although the midden has been disturbed in places by historic and modern construction, most trench and core profiles within the site indicate intact stratigraphy. Eight radiocarbon dates on charcoal obtained from the trench profiles suggest that the site was initially occupied about 1,000 years ago and more widespread human activity commenced around 600 years ago. The radiocarbon dates indicate human use of the site continuing into effectively historic times.

Screened backhoe spoils yielded numerous artifacts and faunal and botanical remains. These specimens provide information about the culture history and lifeways of the Native Americans who occupied Point Elliott prior to Euroamerican settlement of Mukilteo. Several technological strategies were used at the site to make stone and bone implements for a variety of functions. Other artifacts show fine workmanship applied to more exotic materials, including a projectile point made of petrified wood and a ground nephrite adze blade. Ground bone and tooth artifacts reflect sea mammal hunting, fishing, and tool- or implement-making activities. Faunal and botanical remains are evidence of diverse subsistence pursuits that occurred at the site throughout the year. Shellfish found in the midden are locally available and were collected in large numbers. Fish remains are primarily salmon, although other near-shore and deeper-water species are also represented. Bird bones reflect a focus on marine species, including ducks, loons and grebes, while mammal bones are evidence of a hunting effort balanced between terrestrial game and sea mammals. Charcoal and seeds recovered from botanical samples are primarily of locally common coniferous and hardwood tree species, grasses, and fruit-bearing plants such as blackberry and elderberry.

The 2006-2007 test excavations also explored historical remains associated with early Euroamerican settlement of Mukilteo, the later town, and the lumber mills. These tests provided information that enlarged the boundaries of previously identified archaeological site 45SN404, and expanded its

characterization from the Crown Lumber Company store to a portion of early Mukilteo's commercial district. Several of the test trenches and boreholes yielded structural remains of buildings, wooden decking from the mill, and artifacts from domestic and commercial contexts including ceramics, glassware, metal and leather items, and butchered meat bones. Diagnostic artifacts within the assemblage and the context of some artifacts above and below the mill decking allowed division of the site into two components: pre- and post-mill Old Mukilteo.

The 2006-2007 assessment also included in-depth historical research regarding the Point Elliott Treaty of 1855 and treaty-related activities. The nature of the landform of Point Elliott, its ethnographic stature as an important camping and gathering place, and the historic record all suggest that a broader geographic definition of site 45SN108, which was initially created as a surrogate for the actual treaty-signing location, is warranted. The 45SN108 site boundary was consequently expanded to reflect this new information.

All three sites were recommended eligible for listing in the National Register of Historic Places. Site 45SN393 was shown to contain data useful in addressing important research questions regarding pre-contact and proto-historic Native American settlement, subsistence, and technology, and was recommended eligible under NRHP Criterion D. Site 45SN404 was also recommended eligible, under Criterion D, for its ability to answer research questions regarding the economic and social development of early Mukilteo. The Washington State Historic Preservation Office (Department of Archaeology and Historic Preservation) concurred with the NRHP eligibility recommendations for both 45SN393 and 45SN404 in January 2011. The Point Elliott treaty site, 45SN108, is also recommended NRHP eligible, under Criterion A, for its association with the treaty-era and patterns of settlement in the Pacific Northwest and with the history of Indian-white relations both regionally and nationally. The treaty site is also recommended eligible under National Register Criterion B, for its association with the first governor of Washington Territory, Isaac Ingalls Stevens, and with the prominent Native American leaders Seattle, Patkanim, Goliah, and Chowitshoot. Potential for archaeological deposits associated with the treaty suggests significance under Criterion D as well.

Studies undertaken in 2007 for non-WSF projects investigated a fourth cultural resource bisected by the MMP APE boundary, the Japanese Gulch Site (45SN398). Testing and data recovery excavations at the site yielded a great variety of cultural materials, shedding light on the early twentieth-century Mukilteo Japanese community. This site, also, was shown to contain information valuable in addressing important historical research questions, and was recommended eligible for listing in the NRHP under Criterion D. The State Historic Preservation Officer concurred with the eligibility recommendation for 45SN398 in January 2011. The Mukilteo Light Station (45SN123), a property already listed in the NRHP under Criteria A and C, was reassessed in 2008 during City of Mukilteo development projects and its NRHP status reaffirmed. The Japanese Gulch Community Site (45SN575), a cultural resource adjacent to the MMP APE, was identified in 2010 during archaeological monitoring of another non-WSF project; the NRHP status of this site currently remains unevaluated.

Based on construction information available at this time direct adverse effects are expected to the Old Mukilteo Townsite (45SN404) from the construction of retaining walls on the First Street extension, installation of stormwater ponds and other facilities, and installation of utilities and foundation footings for retaining walls. WSF intends to avoid adverse effects to the Mukilteo Shoreline Site (45SN393) by avoiding ground disturbance within the known horizontal and vertical limits of the site and by placing engineered fill to further separate construction elements from the site deposits. No adverse effects

have been identified to the Point Elliott Treaty Site (45SN108), the Japanese Gulch Site (45SN398), or the Mukilteo Light Station (45SN123). Placement of the engineered fill would also help avoid any damage to archaeological resources related to the Treaty signing.

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Cover: Oblique air photo of Mukilteo, 1946. Museum of History and Industry, *Seattle Post-Intelligencer* Collection, Image No. 1986.5.5836.2

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1 INTRODUCTION

Washington State Ferries (WSF), a division of the Washington State Department of Transportation (WSDOT), and the Federal Transit Administration (FTA) propose to upgrade, expand, and perhaps relocate the existing Mukilteo Ferry Terminal. The Mukilteo-Clinton ferry link is part of State Route (SR) 525, a major transportation corridor between the Puget Sound mainland and Whidbey Island. The route is currently one of the busiest in the state and usage is expected to increase 73 percent over the next 20 years. The proposed Mukilteo Multimodal Project (MMP) would allow WSF to replace the aging and inadequate terminal buildings and loading structures, increase the facility's vehicle holding capacity, and improve safety and security. The project is designed to link the ferry with Sound Transit's Mukilteo Commuter Rail Station, providing multimodal transit capabilities. Preliminary environmental studies were initiated more than six years ago for a similar undertaking in the same area, but in 2007 the project was placed on hold due to funding and feasibility issues. WSF and FTA recently reinstated environmental review and planning for the MMP (Washington State Department of Transportation [WSDOT] and Federal Transit Administration [FTA] 2011). Four alternatives are currently being considered: a No-Build alternative and three Build alternatives. Under two of the Build alternatives, the Mukilteo Ferry Terminal would be moved to the Department of Defense (DOD), United States Air Force (USAF) Tank Farm property immediately east of the existing ferry terminal.

A draft cultural resources discipline report was prepared in 2006 for the proposed ferry terminal project, documenting efforts undertaken to complete the identification and evaluation component of Section 106 of the NHPA and to determine if construction or operation of the facility would adversely affect any historic property (Kaehler et al. 2006). This study identified the Mukilteo Shoreline Site (45SN393), a pre-contact period shell midden; the Mukilteo Explosive Loading Terminal (MELT) Barracks (Field Number MM-04), a residential facility in a 1942 Army installation; and the previously recorded Mukilteo Light Station (45SN123), a 1906 lighthouse complex, as historic properties, eligible or potentially eligible for listing in the NRHP. Ten additional historical buildings and structures were deemed not eligible for listing in the NRHP. (The MELT Barracks was later altered, leading to the current not eligible recommendation.)

Subsequent to this assessment, archaeological monitoring of utility line trenching on the Tank Farm, unrelated to the ferry terminal project, identified two historical archaeological sites in the MMP APE, the Japanese Gulch Site (45SN398) and the Old Mukilteo Townsite (45SN404) (Shong 2006a, 2006b). In addition, consulting Native American tribes raised concerns regarding the historic significance of the MMP area, based on its association with signing of the 1855 Point Elliott Treaty. Additional investigations by the NWAA/EHC team in 2006 and 2007 were directed at assessing the extent and significance of archaeological sites 45SN393 and 45SN404 within the MMP APE, as well as the historical significance of the location in relation to the 1855 Treaty. During these investigations, the boundaries of archaeological sites 45SN393 and 45SN404 were enlarged to encompass newly discovered cultural material, and site 45SN108, originally one of the Point Elliott Treaty markers, was expanded to include the entire Point Elliott landform (Miss et al. 2008; White et al. 2009).

Cultural resource investigations for the City of Mukilteo in 2007, 2008, and 2009, for Reid Middleton/Buzz Inn Landing, Inc. in 2009, and for WSF in 2010 provided additional information regarding previously identified cultural sites 45SN123 and 45SN108 and again expanded the boundaries of 45SN393 and 45SN404 (Ferland et al. 2010; Gillis 2007; Rinck 2009, 2010; Rinck and Heideman 2008).

Another archaeological site, the Japanese Gulch Community Site (45SN575), was identified adjacent to the APE in 2010 during archaeological monitoring for construction of a City of Mukilteo fish ladder (Valentino 2011). In 2011 the Mukilteo Ferry Terminal (31-339) was formally recorded and evaluated. All of these studies and sites will be further addressed in the present report.

This document revises the 2008 Northwest Archaeological Associates, Inc./ Environmental History Company (NWAA/EHC) draft cultural resources technical report, which detailed additional investigations of 45SN393, 45SN404, and 45SN108 within the MMP (Miss et al. 2008). In addition to reporting those 2006-2007 investigations, the present document updates cultural resource conditions, adds the results of other cultural resource investigations in the area, and assesses possible adverse effects from construction of each of the alternatives, to create a comprehensive cultural resources discipline report. The report proceeds from the introductory material, through pertinent regulatory, environmental, and historical background information, to the methods and results of the research projects, and their management implications. In this report, the spelling of Point Elliott follows the original designation given by the Wilkes Exploring Expedition of 1841 and the subsequent Point Elliott Treaty, except when referring to the Elliot Point 1 and Preferred (Elliot Point 2) project alternatives.

1.1 Project Location and Description

The MMP is in Snohomish County in Section 4 of Township 28 North, Range 4 East and Sections 33 and 34 of Township 29 North, Range 4 East, Willamette Meridian (Figure 1). The project extends east from Point Elliott along the shores of Possession Sound and includes the existing Mukilteo ferry terminal and a former Tank Farm owned by the USAF. Although a large pier remains at the Tank Farm site, the fuel tanks, numbered 1 to 10 from west to east, have been removed leaving only the concrete pads. The Burlington Northern Santa Fe (BNSF) railroad borders the MMP on the south, separating the low lying industrial/commercial shorelands from the sloping residential areas above. The greater part of the project APE, including areas of proposed construction, is within the Mukilteo city limits. The City of Mukilteo-City of Everett boundary passes between the former locations of tanks 9 and 10 near the eastern edge of the USAF Tank Farm.

The project alternatives have been narrowed to the No-Build alternative, the Preferred Alternative (Elliot Point 2), the Existing Site Improvements Alternative, and the Elliot Point 1 Alternative.

1.2 Alternatives

This chapter describes the alternatives being evaluated in this EIS, and summarizes how they were developed. It discusses each alternative's permanent facilities and operations, as well as temporary construction activities. It also reviews alternatives that are no longer being considered. The chapter concludes with a discussion of separate projects that are in this project's vicinity, and the next steps in the project's development.

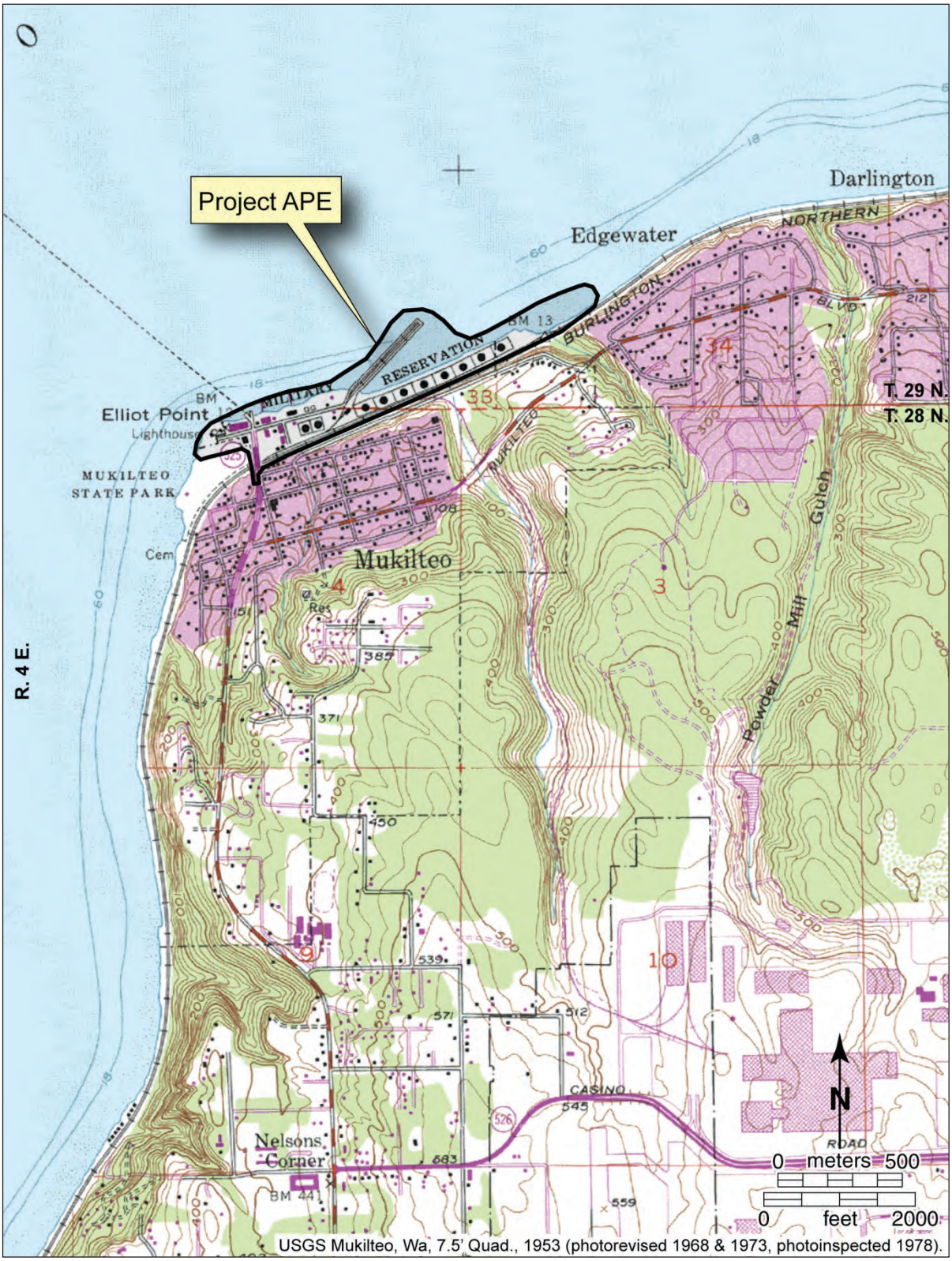


Figure 1. Project APE.

Proposed Alternatives

The project is considering four alternatives, as shown on Figure 2:

- The No-Build Alternative, which maintains the existing facility but does not improve it; this alternative provides a basis against which to compare the effects of the "Build" alternatives.
- The Preferred Alternative (a modified Elliot Point 2 Alternative), which would relocate the terminal to the western portion of the Mukilteo Tank Farm as part of an integrated multimodal center and remove the existing terminal.
- The Existing Site Improvements Alternative, which would construct an improved multimodal facility by replacing the existing Mukilteo ferry terminal with an expanded terminal and multimodal center at the current site.
- The Elliot Point 1 Alternative, which would relocate the terminal to the eastern portion of the Mukilteo Tank Farm as part of an integrated multimodal center and remove the existing terminal.

No-Build Alternative

The No-Build Alternative provides a baseline against which to compare the effects of the Build alternatives. It includes what would be needed to maintain the existing ferry terminal at a functional level. Figure 3 shows the key parts of a typical ferry terminal. Maintenance and structure replacements would occur in accordance with legislative direction to maintain and preserve ferry facilities, but WSDOT would make no major investments for improvements. Figure 4 illustrates the elements replaced as part of planned maintenance activities.

Nearly all of the ferry docking, loading, and unloading facilities would need to be replaced because they will have reached the end of their lifespan by 2040. The existing vehicle holding area would remain at its current location. The terminal supervisor's building, passenger and maintenance building, and the three existing toll booths would be replaced at their current locations. This alternative would not improve conditions related to congestion, vehicular and pedestrian conflicts, poor sight distance, and security.

Preferred Alternative (Elliot Point 2)

The Preferred Alternative is a slightly modified version of the Elliot Point 2 Alternative that was studied in the Draft EIS. This alternative would develop the project on the western portion of the Mukilteo Tank Farm. It would have a more compact footprint than the Elliot Point 1 Alternative due to the deeper water near the shore where the ferry would berth. Its key features are shown on Figure 5.

The Preferred Alternative would construct in-water facilities that include the features needed for the ferry berth, including wingwalls and fixed dolphins. A floating dolphin would be relocated from the existing ferry terminal. The alternative will construct a new transfer span, including hydraulic-lifting mechanisms and structures and a bridge seat foundation, as well as a new concrete trestle and bulkhead. Because there is no beach and the water is deeper at this location, the ferry slip is near to the shore, which allows the trestle to be shorter than other alternatives, including fewer piles to support the trestle. The Tank Farm Pier, which includes approximately 3,900 piles, would be removed. A channel about 500 feet wide by 100 feet long would be dredged through part of the area currently occupied by

Figure 2. Project vicinity.

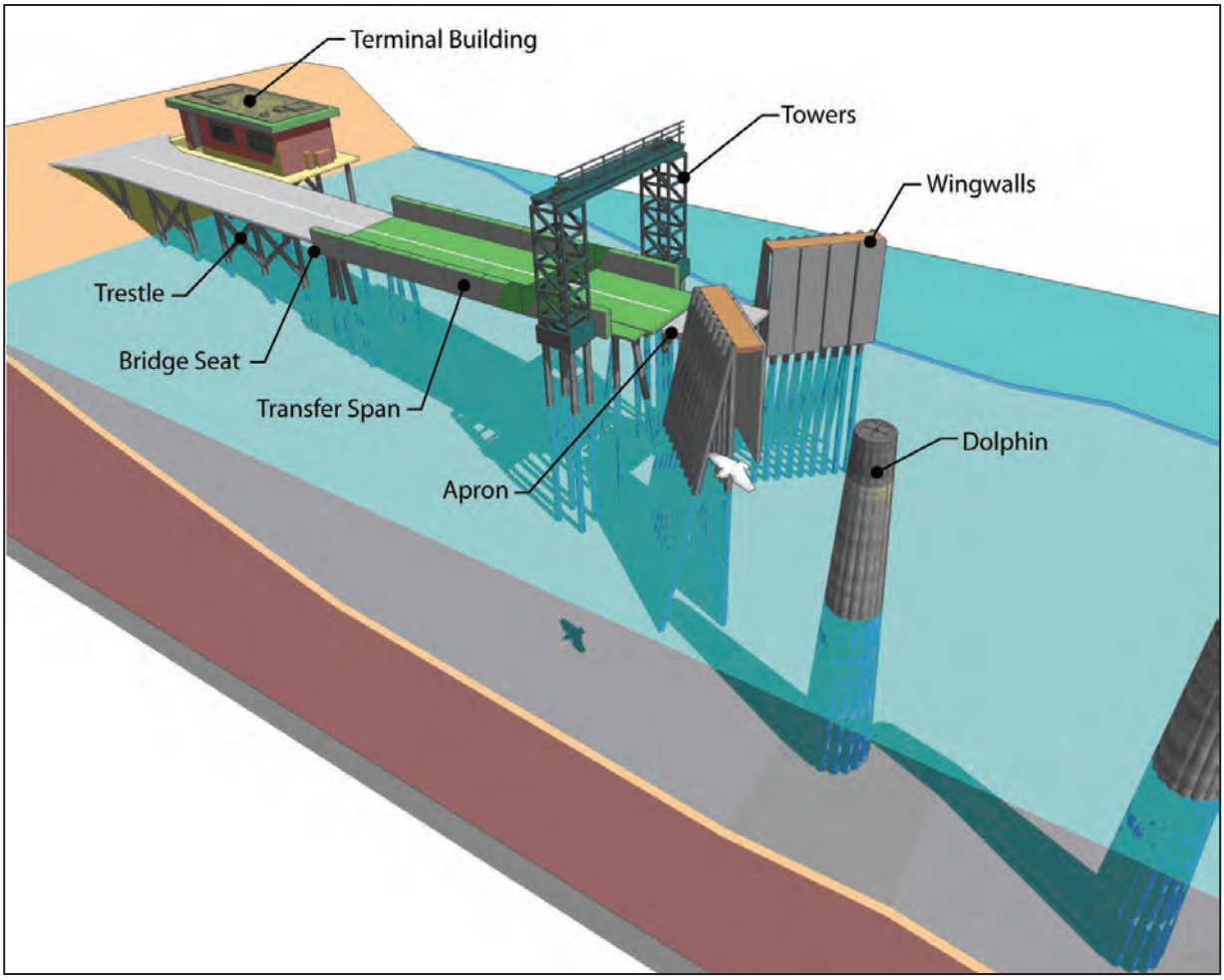


Figure 3. Key Parts of a Typical Ferry Terminal.

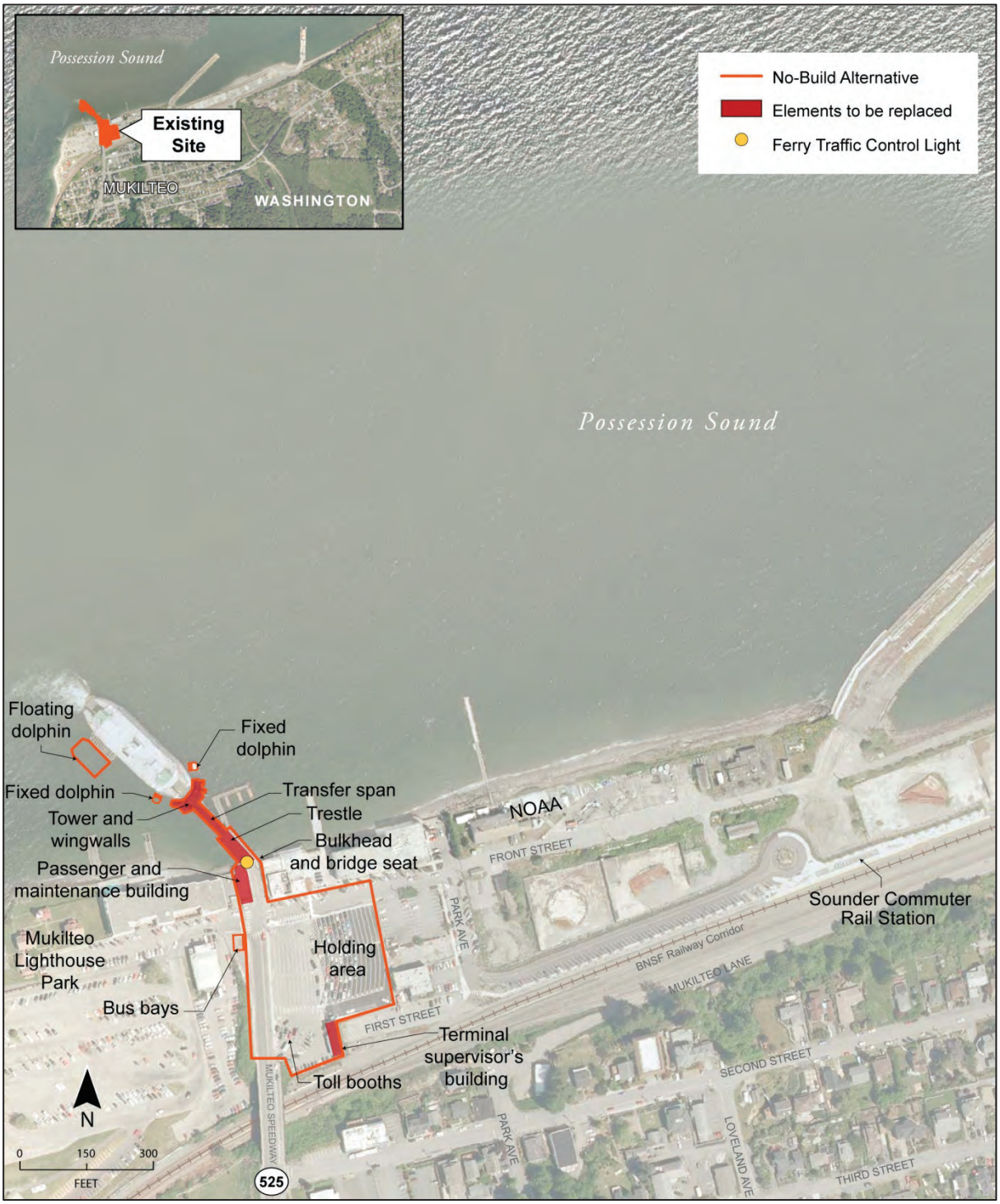


Figure 4. No-Build Alternative.

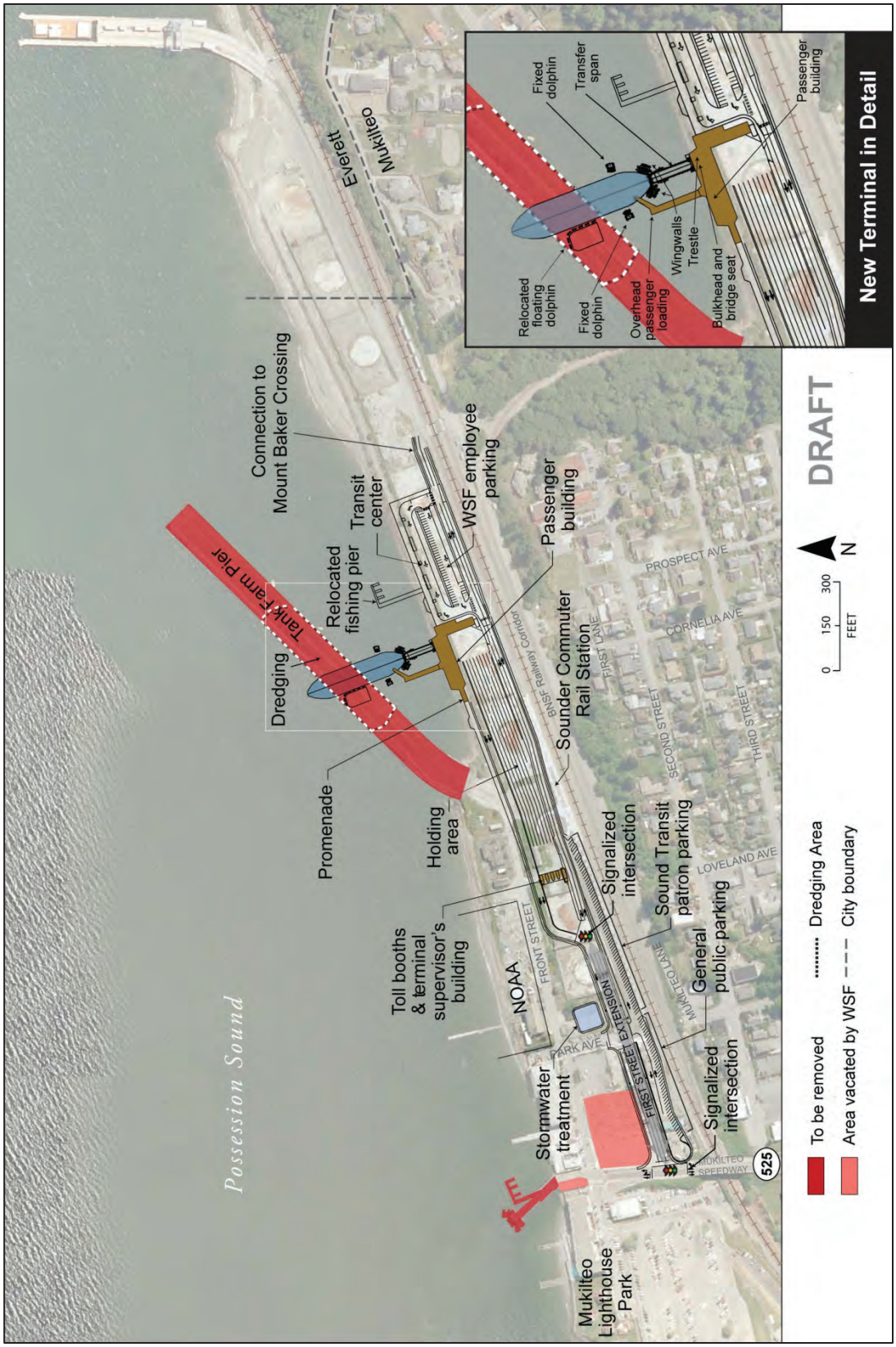


Figure 5. Preferred Alternative (Elliot Point 2)

the pier to provide a navigation depth of -28 feet at an average lowest tide, which would require dredging to a depth of -30 feet. Under the pier, current depths are -15 to -35 feet. Approximately 19,500 cubic yards of material would be dredged for the channel.

The existing ferry berth and all of its marine structures would be removed, including the Port of Everett fishing pier and day moorage. The Preferred Alternative would reconstruct the fishing pier and day moorage as part of the new multimodal facility.

A new passenger building and a maintenance building would be combined as a two-story structure and aligned parallel to the shoreline. The building would bridge over the vehicle driveway to the ferry trestle, and an overhead loading ramp would connect to the second story of the building.

The vehicle holding area would have a 266-vehicle capacity. The terminal supervisor's building would be west of the vehicle holding area, as the second floor of a building that would also house the new toll booths. A new transit center with six new bus bays and a transit passenger area would be on the eastern part of the site, and it would have an area for ferry employee parking.

First Street would be realigned and extended as a four-lane roadway, beginning on a retained fill structure from the new signalized intersection with SR 525, descending to near the existing grade at Front Street, and continuing to a signalized entrance to the new ferry terminal. First Street would continue as a two-lane road to a new bus transit and paratransit center. This alternative also develops a public parking area between the BNSF railroad and the new First Street extension, near SR 525, to replace some displaced street parking. It also would modify the access road and the parking for the Mukilteo Station. A stormwater treatment facility would be located between Front Street and the First Street extension east of Park Avenue.

The First Street improvements also would include a reconstructed intersection with Park Avenue. The extended roadway would generally be along the southern portion of the Mukilteo Tank Farm. First Street would feature sidewalks and bicycle lanes.

A pedestrian pathway from First Street would connect to a waterfront promenade and on to the passenger building, which would include a passage allowing continuous pedestrian access along the waterfront. Other sidewalks and crosswalks would link the Mukilteo Station and the transit center. This alternative would include new security fences and gates surrounding the holding area and terminal.

Existing Site Improvements Alternative

The Existing Site Improvements Alternative would construct an improved multimodal facility by replacing the existing Mukilteo ferry terminal with an expanded terminal on and around the current site. Its key features are shown on Figure 6.

All of the existing ferry facility marine and upland features would be replaced. The ferry dock and trestle would be rebuilt facing due north to provide a straighter alignment with SR 525. The Port of Everett existing fishing pier and seasonal day moorage would be removed and need to be relocated.

The existing vehicle holding area would remain at the same general location and would still store approximately 216 vehicles, the equivalent of one-and-one-half 144-vehicle vessels. Toll booths and a

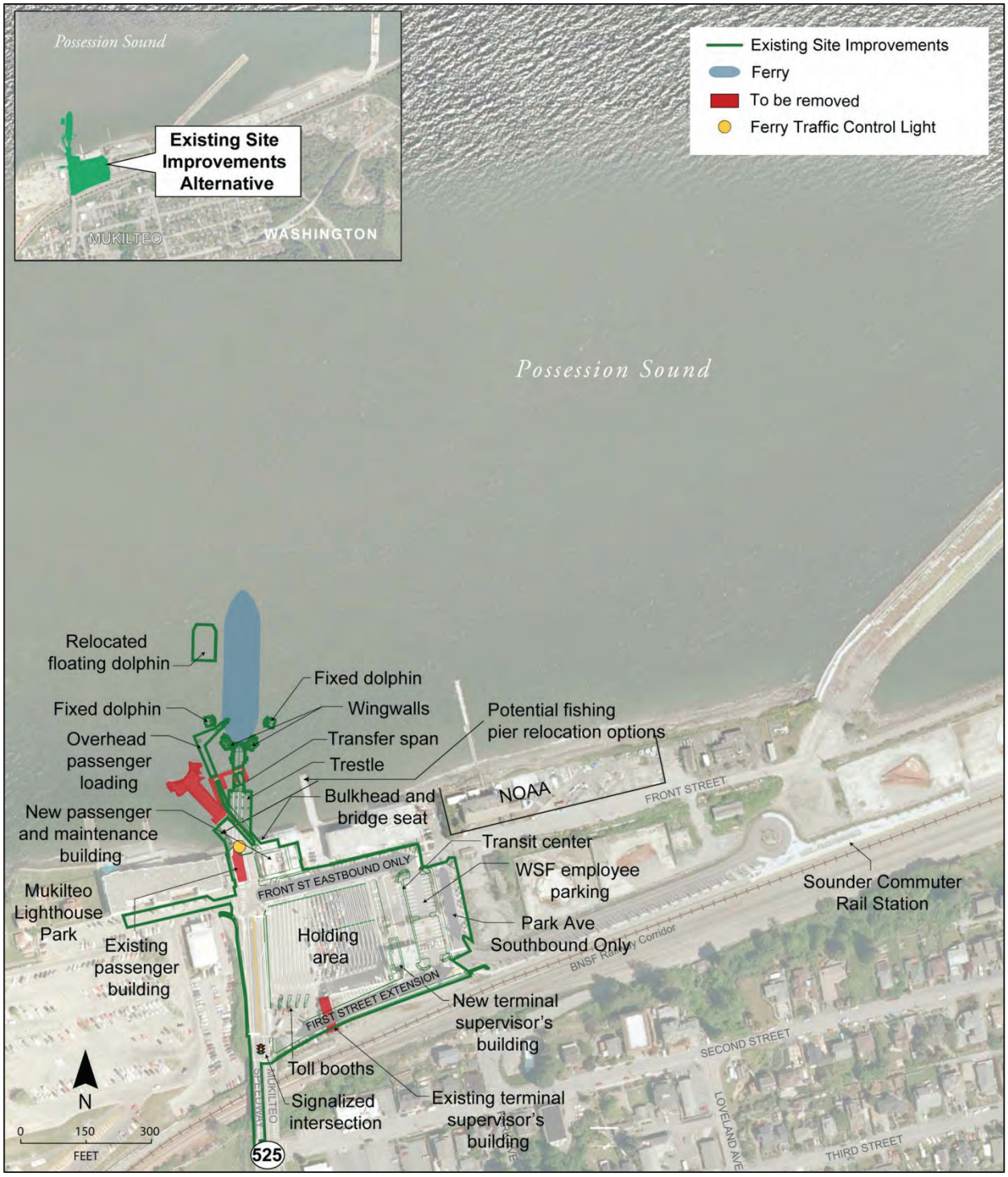


Figure 6. Existing Site Improvements Alternative.

supervisor's building would be constructed nearby. A new passenger and maintenance building would be constructed east of the ferry access driveway expanding into areas currently occupied by other uses. Overhead passenger loading ramps would connect to the second story of the new passenger building.

Front Street and Park Avenue would become one-way streets, and First Street would be extended west to a new signalized intersection with SR 525. A new transit center would be constructed east of the vehicle holding lanes, combined with a parking area for ferry employees.

Elliot Point 1 Alternative

The Elliot Point 1 Alternative would develop the Mukilteo Multimodal Project on the eastern portion of the Mukilteo Tank Farm. Its key features are shown on Figure 7.

Because the shoreline slopes more gradually in this location, the ferry slip would need to be located about 250 feet offshore, which would require a longer pier and trestle. A new passenger building and a maintenance building would be located over water on the new concrete trestle; this shortens walk distances and allows the nearby shoreline area to be developed for open space and stream restoration purposes. An overhead passenger loading ramp would connect to a second story of the new passenger building. A stormwater treatment facility would be located between Front Street and the First Street extension east of Park Avenue.

As with the Preferred Alternative, this alternative would remove the Tank Farm Pier and its piles, and would dredge a navigation channel approximately 500 feet wide under where the pier is now located.

WSDOT would remove the existing ferry terminal, including buildings and marine structures, and the Port of Everett fishing pier and day moorage would be relocated. The current vehicle holding area would be vacated.

The Elliot Point 1 Alternative would also provide parking for commuter rail, the Mount Baker Terminal shoreline access area, and ferry employees. The alternative includes toll booths, ferry vehicle holding areas, and shoreline promenades on each side of the new ferry dock. Japanese Creek, which currently runs in a pipe culvert below the Mukilteo Tank Farm, would be restored to an open stream north of the extended First Street, with a 50-foot buffer on either side. The stream would be crossed by a pedestrian bridge near the shoreline. New lighting would illuminate First Street and the terminal facilities, including the vehicle holding areas.

The vehicle holding areas would hold about 216 vehicles. A terminal supervisor's building would be constructed above four new toll booths east of the holding area. This 35-foot-high structure would be oriented north-south. New lighting would illuminate First Street and the terminal facilities, including the vehicle holding areas.

First Street would be realigned and extended as a four-lane roadway from SR 525 to the Port of Everett's Mount Baker Terminal, with sidewalks and bicycle lanes. A new signalized intersection with SR 525 would be constructed. A rebuilt First Street/Park Avenue intersection would provide access to a reconfigured parking and access area for Mukilteo Station.

Figure 7. Elliot Point 1 Alternative.

A new transit center with six bus bays would be built west of the new terminal. Access and parking for Mukilteo Station would be configured to connect to the First Street extension. New security fences and gates would secure the holding and terminal area during periods of heightened security, as required by the U.S. Coast Guard.

Construction Approach and Activities

The construction of any of the project alternatives would be a major activity that could last several years.

Despite its name, the No-Build Alternative would still involve construction activities for the replacement of the terminal's aging infrastructure, as discussed above in *Section No Build Alternative*. All of the Build alternatives would remove the existing terminal, and would construct an improved terminal and supporting facilities with either a different layout (Existing Site Improvements Alternative) or at a new site (Elliot Point 1 and Preferred Alternatives). The Build alternatives would have more construction activities and the longest uninterrupted construction duration (up to 2 years), while the No-Build Alternative would have intermittent construction over a longer period, potentially decades. The length of construction could be either longer or shorter depending on design, permit conditions, phasing, and the contractor's construction approach. Other site development and site preparation activities such as property acquisition, demolition, and utility relocations could occur after completion of the environmental process, which is expected by 2013. Construction would also depend on the availability of funding and other approvals, but major activities could begin by 2016, and a terminal could begin operation in 2019.

All of the alternatives were designed to avoid or limit excavation in areas known to contain archaeological resources. In many areas, the approach emphasizes using fill rather than excavating. Excavation is needed for some types of construction, such as foundations or utilities, but features requiring excavation have been located outside of sensitive areas as much as possible.

Typical Construction Activities and Staging

Except for the No-Build Alternative, the major activities such as demolition of existing buildings and the construction of new buildings, roadways, and other facilities would occur for up to 2 years. In order to minimize disruption to the natural environment, transportation, businesses, and residences, construction that would affect access would be planned, staged, and completed in a manner that would minimize disruption. The duration of heavy civil construction in front of any particular property is not anticipated to exceed 6 to 12 months.

The most complex structures being removed and constructed for the project are the in-water facilities. Structures to be removed (varying by alternative) include the existing pile-supported trestle and bulkhead, as well as the Tank Farm Pier (Preferred Alternative and Elliot Point 1), and the Port of Everett fishing pier and day moorage. A variety of techniques could be used to remove the existing marine structural components, depending on their condition, permitting requirements, and environmental conditions. The piles could be removed using vibratory methods, direct pulling of the piles, or cut at the mudline. The deteriorating condition of some of the piles may also require capping or other methods for full or partial removal.

The alternatives involving the Mukilteo Tank Farm would require dredging or other sediment removal for navigation.

Other major construction activities include:

- Demolition and disposal of Mukilteo Tank Farm facilities (pavement and structures, including buildings and foundations, concrete slabs and paving, light poles, power poles, tank containment walls and footings, utility lines and structures, and steel tank bottoms)—Preferred Alternative and Elliot Point 1 Alternative
- Trenching for relocation or replacement of utilities, including power, gas, sewer, water, stormwater, and communications
- Clearing, grubbing, excavation, fill, grading, and disposal of materials
- Construction of temporary in-water structures
- Construction or reconstruction of structures, including retaining walls, bulkheads, and the terminal buildings (including associated footings)
- Pile driving
- Drilled shaft or stone column installation (could require temporary roads or fill in shoreline/beach areas)
- Concrete casting
- Roadway construction, including intersections, signal systems, sidewalks, bicycle facilities, and trails
- Landscaping
- Transport of workers, equipment, materials, and debris
- Storage of equipment, including heavy trucks, cranes, and bulldozers, as well as storage of construction materials and debris

1.3 Applicable Regulations and Guidelines

The National Historic Preservation Act (NHPA), as amended, requires federal agencies, in this case the FTA, to identify and assess the effects of federally assisted undertakings on historic properties and to consult with others to find acceptable ways to avoid or mitigate adverse effects. Properties protected under Section 106 of the NHPA are those that are listed in or are eligible for listing in the National Register of Historic Places (NRHP). Eligible properties generally must be at least 50 years old, possess integrity, and meet at least one of four criteria of significance.

Historic properties may include archaeological sites, buildings, structures, districts, and objects. A 1992 amendment to Section 101 of the NHPA also explicitly allows properties of traditional religious and cultural importance to be eligible for inclusion in the NRHP. Such properties are referred to as traditional cultural properties (TCPs), properties eligible for inclusion in the National Register of Historic Places because of their association with the cultural practices or beliefs of a living community that (1)

are rooted in that community's past and (2) are important in maintaining the community's continuing cultural identity (National Park Service 1998:1).

The NHPA Section 106 review process consists of four steps. The first is initiation of the process, which involves determining if the action meets the definition of an undertaking, determining whether that action has the potential to affect historic properties, and identifying consulting parties. The second step is identifying historic properties. In order to complete this step, the project Area of Potential Effects (APE) must be identified, the scope and results of previous identification efforts must be reviewed, and appropriate studies to identify and evaluate historic properties must be completed. The third step is application of the criteria of adverse effect to determine if such effects are likely to occur. An adverse effect is found when an undertaking alters any of the characteristics that qualify the historic property for inclusion in the National Register of Historic Places in a manner that would diminish the integrity of the property's location, design, setting, materials, workmanship, feeling, or association. The fourth step, implemented if historic properties will be adversely affected, is resolution of adverse effects, including consideration, through consultation with the state historic preservation officer (SHPO), tribal historic preservation officers (THPOs), concerned tribes or other consulting parties, of measures to avoid, minimize, or mitigate such effects. Regulations implementing Section 106 (36 CFR Part 800) encourage maximum coordination with the National Environmental Policy Act (NEPA) review process and with other statutes.

1.4 Area of Potential Effects

FTA determined the project Area of Potential Effects for archaeological resources and historic buildings and structures, in consultation with the SHPO at the Washington State Department of Archaeology and Historic Preservation (DAHP). The APE encompasses an area beginning west of SR 525 at Point Elliott and extending 0.75 miles (1.2 kilometers) east along the shoreline, well beyond the end of the Tank Farm property. The BNSF railroad and the SR 525 BNSF overpass mark the southern boundary of the APE (Figure 1). Although the project's direct, physical impacts will be limited to a smaller area, the APE was drawn large to accommodate potential indirect effects to cultural resources, such as visual and auditory changes and vibration. The vertical APE for archaeological resources extends from the ground surface to a maximum of 5 feet (1.5 meters) below surface in land and shore portions of the project, while off-shore structures (pilings) may extend to depths of 150 feet (46 meters) below the sea floor.

1.5 Tribal Coordination

According to the NHPA implementing regulations, certain people or groups are automatically entitled to consulting party status, including appropriate federally recognized Indian tribes (36CFR800.2). The FTA initiated consultation for the MMP with a number of groups, including all tribes signatory to the Point Elliott Treaty and other potentially interested federally recognized tribes. Formal consultation with those tribes was initiated in 2004. From the period of 2005 through 2007, the project focused on conducting cultural resources assessment efforts, with draft reports completed in 2006 and 2007. Based upon tribal and other comments regarding the 2007 cultural resources report, additional heritage studies were undertaken to address the Point Elliott Treaty signing and other significant aspects of the Mukilteo project area. The results of that effort were added to the draft report and distributed in 2008 as the Results of Additional Heritage Resources Investigations at the Mukilteo Multimodal Ferry

Terminal Project Site, prepared by Northwest Archaeological Associates and The Environmental History Company (Miss et al. 2008).

In 2010, the FTA, working with the Mukilteo Multimodal Tribal Liaison, formally contacted potentially affected tribes to determine whether they continued to have interest in the Mukilteo Multimodal Project. Through this outreach, the following tribes were contacted: Lummi Tribe of the Lummi Reservation, Muckleshoot Indian Tribe of the Muckleshoot Reservation, Nooksack Indian Tribe of Washington, Samish Indian Tribe, Sauk-Suiattle Indian Tribe of Washington, Snoqualmie Tribe, Stillaguamish Tribe of Washington, Suquamish Indian Tribe of the Port Madison, Swinomish Indians of the Swinomish Reservation, Tulalip Tribes of the Tulalip Reservation, and Upper Skagit Indian Tribe of Washington; Two non-federally recognized tribes were also contacted**:** Duwamish Tribe, and Snohomish Tribe of Indians.

In addition to being invited to the NEPA/SEPA Reinitiation Meeting on February 10th, the Workshop on June 10th, and the Scoping Meeting on September 29th, FTA offered to meet individually with all potentially affected tribes. The Suquamish, Swinomish, Stillaguamish, Lummi, and Samish Tribes met with FTA and the project team between February 10th and June 10th. The Snoqualmie and Tulalip Tribes met with FTA and the project team in September prior to the September 29th Scoping Meeting. On December 10th, FTA reviewed the alternatives that would be analyzed in the EIS with the tribes. The Nooksack Tribal Chair indicated that they are not interested in the Mukilteo Multimodal Project as it is outside of the Usual and Accustomed (U&A) area.

FTA and WSF have also invited all potentially interested tribes to act as participating agencies throughout the development of the Environmental Impact Statement (EIS) (WSDOT and FTA 2011).

The effort to identify and record existing or possible traditional cultural properties (TCPs) within the area of potential effects is in its early stages (the definition of traditional cultural property is given in section 1.2 of this report.) FTA and WSF have been involved with formal cultural resources consultation for this project for a number of years. The results of that consultation in regard to traditional cultural properties are summarized below.

In 2007, FTA received a letter from the Tulalip Tribes, describing substantial traditional cultural significance placed upon the project area. The Tulalip Tribes stated:

> The project site at Point Elliott is culturally and spiritually significant to the Tulalip Tribes. Both the pre-treaty site, which was extensively used by our ancestors for at least a thousand years, and the site of the treaty signing are important cultural, spiritual and historic sites of our people. They should be treated not only as historic sites, but as sites eligible for inclusion on the register as traditional cultural properties. See 16USC§470a(d)(6), National Register Bulletin 38, *Guidelines for Traditional Cultural Properties*.
>
> To the Tulalip people, this is not an archaeological site, and its value is not in scientific analysis. This is a living site of our ancestors, and it has immeasurable cultural and spiritual values. Many, if not most, of our important off-reservation cultural and historic sites have been decimated or destroyed by non-Indian development. The investigation done at the site reveals a good portion of this site, although impacted by prior development, remains intact under previously placed fill. Places where the remains of our villages and gathering places remain intact must be preserved, in order to preserve the living culture of the Tulalip Tribes.

In 2010, during a formal consultation meeting between the Suquamish Tribe, FTA, and WSF, a Suquamish representative stated, “The site is a traditional cultural property...” although additional details outlining the importance of the area to the Suquamish have not yet been disclosed. More recently, FTA met with the Tulalip Tribes and were advised that additional work was necessary to assess cultural resources within the Tank Farm property.

FTA and WSF will continue to consult with interested and affected Tribes regarding any additional archaeological investigations for the project. Consultation is also ongoing regarding any possible effects upon properties of religious and cultural significance by the project.

2 SETTING

The following sections review environmental factors that influenced pre-contact and historical period people in their selection of habitation and activity sites, as well as factors that affected subsequent preservation of the resulting archaeological deposits. The sections also provide discussions of patterns, themes, and trends in regional prehistory and history through which a property's meaning and significance can be understood.

2.1 NATURAL SETTING

The structure of the natural environment largely determines human use of any landscape, conditioning the availability of food and shelter. Locations and kinds of resources are dependent on geologic substrates, topography, geographic relationships among landscape features, solar exposure, rainfall, and a host of other factors. Environmental changes have consequences for the archaeological record in terms of the numbers of sites and their type, distribution, visibility, and preservation.

Geologic and Geomorphological Setting

The study area is on Point Elliott along the shore of Puget Sound. Puget Sound lies within a large north-south elongated structural trough between the Olympic Mountains to the west and the Cascade Range to the east. This trough, known as the Puget Lowland, extends from southwestern British Columbia to the interior valleys of western Oregon. The Puget Lowland was subjected to multiple glaciations during the 1.8 million years of the Pleistocene Epoch. The last glaciation, known in the Pacific Northwest as the Vashon Stade of the Fraser Glaciation, originated as glaciers in the mountains of British Columbia coalesced and spread southward into the Puget Lowland as a broad, continental sheet called the Cordilleran ice sheet (Easterbrook 2003). At the Olympic Peninsula the ice sheet separated into the Puget lobe, which continued south into the Puget Lowland, and the Juan de Fuca lobe, which extended west into the Strait of Juan de Fuca north of the Olympic Mountains. The Puget lobe reached its maximum southern extent near the town of Centralia, south of Seattle, about 14,500 years before present (BP) (Kovanen and Slaymaker 2004; Porter and Swanson 1998). The Juan de Fuca lobe terminated about 60 miles (100 kilometers) west of Washington's present coast.

Retreat of the Juan de Fuca and the Puget ice lobes at the end of the Vashon Stade was rapid. The Puget lobe reached Whidbey Island by about 13,400 years ago while the Juan de Fuca lobe probably began recession earlier and retreated more rapidly than the Puget lobe due to a combination of rising global sea level and isostatic depression of the land (Dethier et al. 1995; Easterbrook 2003; Mosher and Hewitt 2004). As the ice sheet thinned and retreated north of Seattle, marine water entered from the Strait of Juan de Fuca to flood the lowland now containing Puget Sound. The remaining ice, floating on sea water, rapidly disintegrated northward to Canada except for a narrow band along the eastern margin of the lowland (Easterbrook 2003).

When the ice sheets began their retreat, global sea level, which had lowered considerably during the glacial maximum because of the tremendous amounts of water locked up in the ice sheets, began to rise. Initial rates of sea level rise were rapid; between 13,000 and 6,000 years ago, sea level rose from

about 390 feet below present sea level (bpsl) to about 30 feet bpsl. After 6,000 years ago the rate of sea level rise slowed so that by 5,700 years ago sea level was about 16 feet bpsl (Dragovich et al. 1994).

Local sea level change, that is, change in relative sea level as experienced at local shorelines, varied from the overall trend exhibited by the global rise in sea level during the postglacial period. The changing relationships of sea level and shoreline in Puget Sound during the early Holocene was a function of land rebounding after the weight of the ice sheet was removed; and the amount and rate of rebound, in turn, was a function of the thickness of the overlying ice sheet. For example, the amount of rebound was less at the outer, thinner limits of the ice sheet relative to the thicker more northerly sections in the central and northern Puget Sound basin. There is an overall trend of increasing rebound going north under the thicker portions of the Puget lobe, and in the north-central and northern Puget Lowland differences in the amount of rebound range between 197 and 262 feet. Rebound appears to have halted by 9,000 years ago, at which time global sea-level rise began to overtake the uplift created by isostatic rebound and marine waters drowned the early Holocene shorelines (Dragovich et al. 1994).

Point Elliott is a triangular-shaped shoreline landform in the northern Puget Lowland on the east shore of Possession Sound. These landforms, known as cuspate forelands, are accretionary shore features typically bounded by a barrier berm enclosing a small wetlands or lagoon. Cuspate forelands are formed, and subsequently maintained, by longshore transport and angle outward from the generalized plane of the shoreline directional trend (Collins and Sheikh 2005).

Puget Sound shorelines are low-energy environments composed of mixed sand and gravel beaches. A two-part beach profile is typical, characterized by a steep foreshore often composed of coarse sand or gravel and a lower-gradient sand or mud low-tide terrace. Most of the sediment on the upper foreshore of a typical beach is too large to be moved by suspension in wave or tidal currents, and instead is transported as bedload in the swash zone, making its way along the beach a little bit with each successive wave. The major source of sediment coming to the shore is probably derived from erosion of coastal bluffs, and as a result, the erosion and reworking of coastal exposures of till, outwash sediments, and glaciomarine and glaciolacustrine deposits leads to large variation in beach sediments.

Recent geological research has shown the project is in a tectonically active area of the northern Puget Lowland and lies adjacent to and just north of the active Southern Whidbey Island fault zone. Other faults in the region include the Utsalady Point, Strawberry Point, and Devils Mountain fault zones. There is evidence for movement on the Southern Whidbey Island fault during Quaternary times, but Holocene activity seems subdued (Johnson et al. 1994). Because of the lack of damaging historic earthquakes in this region, less is known about the location, number, and magnitude of Holocene earthquakes than for the Seattle and Tacoma fault zones farther south, but recent coring in two salt marshes on Whidbey Island indicate that the last major known rupture along the Southern Whidbey Island fault was about 2,800-3,200 years ago (Kelsey et al. 2004). Trenching on the Utsalady fault, on the northern tip of Camano Island, showed that one, and possibly two, ground-rupturing earthquakes occurred along this fault (Johnson et al. 2003) about 100-400 calibrated years before present (cal BP) and between 1100-2200 cal BP.

The Snohomish delta just north of the town of Everett preserves evidence for a number of earthquake events (Bourgeois and Johnson 2001). Radiocarbon ages from buried contexts show the delta was affected by a tsunami and portions of the delta experienced liquefaction dating from around A.D. 800 to 980, close to the time that a large earthquake occurred on the Seattle fault, 30 miles (50 kilometers) to

the south. Bourgeois and her colleagues also recorded evidence for at least three episodes of liquefaction, at least one episode of abrupt subsidence, and at least one tsunami that have affected the delta since A.D. 800. Localized subsidence, accompanied by abrupt surface lowering, was generated by earthquake-induced compaction and liquefaction, with variable changes in elevation across the delta ranging between 20-30 inches (50-75 centimeters).

Just north of the project, a newly discovered fault may underlie the coastal plain between Mukilteo and Everett. Though research is ongoing, linear features visible on the postglacial surface suggest the fault has been active during the Holocene (Molinari and Burk 2003).

Point Elliott is also in the Whidbey Island sub-basin in northern Puget Sound, which has one of the greatest concentrations of tidal wetlands in Puget Sound (Collins and Sheikh 2005). The river estuaries feeding into this portion of Puget Sound are larger and more diverse than elsewhere in the Sound, and recent research has shown tidal wetlands associated with accretionary landforms such as spits, cuspate forelands, tombolos, and barrier wetlands account for about 25% of the total wetlands complexes in northern Puget Sound (Collins and Sheikh 2005). The accretionary and barrier shore landforms support more than half the wetlands outside of the river valleys in Puget Sound as a whole, and account for considerably more in the northern region (Collins and Sheikh 2005).

The delta of the Snohomish River lies about five miles (eight kilometers) north-northeast of Point Elliott. Maps from the period 1884-85 show that almost the entire Snohomish delta plain was wetland, totaling 15 square miles (39 square kilometers), making it the largest of the delta areas in the Whidbey sub-basin (Bortleson et al. 1980). Most of the wetland has now been converted to other land uses through diking, drainage ditches, or landfill, with the result that only about 3.8 square miles (10 square kilometers) of the delta remains in wetlands. The lower margin of the intertidal wetlands along the delta front formerly extended southward along Port Gardner Bay to the vicinity of the Naval Reservation about four miles (seven kilometers) north of the present project (Bortleson et al. 1980).

A small fan delta formed at the mouth of Japanese Gulch partially within the present APE. Fan deltas are unique environments where the fluvial processes typical of alluvial fans interact with shoreline processes, and are characterized by active, frequently high-energy, sedimentation. The subaerial (above-ground) portion of a fan delta is an alluvial fan, and in humid environments the dominant sedimentary processes appear to be debris-flows and other types of mass wasting events triggered by intense rainfall, which results in depositional sequences dominated by poorly-sorted, mud-supported gravels (Wescott et al. 1990).

Point Elliott is backed on the south by an inactive coastal bluff and to the east and southwest by actively eroding bluffs. The coastal bluffs of Puget Sound are relatively recent, and probably have only developed after sea level stabilized about 5,000 years ago (Downing 1983; Shipman 2004). Bluff retreat is typically a cyclic process in which wave action removes material accumulated at the toe of the slope creating an unstable bluff profile that eventually leads to renewed erosion and accumulation of new material at the base of the slope. Because of the large amounts and variety of glacial sediments on Puget Sound, this process is complex (Downing 1983; Komar 1998; Shipman 2004). Wave-induced erosion directly attacks the toe of the bluff and is controlled by the width and height of the beach and berm in front of the bluff. Berm width depends primarily on sediment availability, whereas berm height depends on tide range, wave exposure, and sediment type. For waves to directly attack the base of the

bluff, water levels must either exceed the height of the berm, which requires storm waves to coincide with unusually high tides, or the berm itself must be eroded away (Shipman 2004).

Faunal and Floral Resources

Point Elliott is ideally situated for access to a wide variety of animals and plants. Prior to extensive Euroamerican settlement and development, the wooded uplands to the south and east of the point hosted elk, deer, black bear, coyote, bobcat, and mountain lion. Small mammals, including rabbit, squirrel, chipmunk, raccoon, weasel, beaver, and river otter were also resident (Ingles 1965). Species of ducks, geese, swans, loons, and other migratory waterfowl are seasonally abundant in saltwater bays, lakes, sloughs, and river deltas. Other birds found in the vicinity of Point Elliott include cormorants, owls, and raptors such as eagles and ospreys, and woodland birds such as ruffed grouse (Angell and Balcomb 1982; Larrison and Sonnenberg 1968).

The protected bays, inlets, and open waters of Puget Sound and Possession Sound provide ideal habitats for resident and migratory marine mammals (Angell and Balcomb 1982). Large cetaceans observed near Point Elliott in modern times include minke whales and occasional wayward gray whales. Orcas, or killer whales, are found in both resident and migratory pods that prey on salmon, birds, and smaller marine mammals. Other cetaceans more commonly found in Puget Sound are harbor and Dall's porpoises and Pacific white-sided dolphins, which are most abundant while rearing their young in the summer months. Harbor seals are resident and ubiquitous throughout Puget Sound, and spend July through September pupping and rearing their young. Elephant seals and northern California sea lions are migratory and more commonly observed in the winter and spring months. The closest modern haul-out sites to Point Elliott are Gedney Island to the north for harbor seals, Possession Point on Whidbey Island to the southwest for California sea lions, and Everett Harbor to the northeast and Edmonds to the south for both harbor seals and California sea lions (Jeffries et al. 2000).

The variety of shellfish and fish found near Point Elliott is a reflection of diverse local habitats in Possession Sound (Kozloff 1996; Miller and Borton 1980). Substrates in the intertidal and subtidal zones range from fine silty sand to gravel, brought to shore by moderate wave energy and providing an ideal environment for bivalves, gastropods, and other invertebrates such as crabs and sea urchins (Anchor 2005; Kozloff 1983). The abundant eelgrass beds in the narrow sandy sub-tidal margin along the shore of Possession Sound near Point Elliott quickly give way to much deeper water just a few hundred feet from the shore. Species of small flatfish, sculpin, surfperch, and other kinds of fish that prefer the protected eelgrass beds are abundant along the shores of Possession Sound. Other fish taxa can be found near-shore and in deeper water off the subtidal shelf, including rockfish, dogfish, skate, and greenling (Anchor 2005). Herring congregate in many near-shore shallows throughout Puget Sound in the spring to spawn. Several runs of salmon pass Point Elliott on their way to the Snohomish, Stillaguamish, and Skagit Rivers and smaller nearby streams to spawn. Returning Chinook salmon can be caught near Point Elliott usually between late April and early June (FTA and WSDOT 2006:10-7; Haring 2002; Smith 2003; Washington State Conservation Commission 1999). In September and October, Coho salmon enter Japanese Gulch Creek which is one of the few mainland streams within several miles of Point Elliott that currently supports an anadromous fish population (Haring 2002).

Native vegetation across most of the Puget lowlands consists of forests of the *Tsuga heterophylla* (western hemlock) zone, which is characterized by western hemlock, western red cedar, and Douglas fir with a dense shrub and herbaceous understory (Franklin and Dyrness 1988). These plants include

bracken fern, salmonberry, oceanspray and red and evergreen huckleberry. Parklands and prairies were common into the early historic period. Many of these were created or maintained by Native Americans who used controlled burning to enhance the productivity of certain plant foods and forage that would attract animals such as deer (Norton 1979; White 1980). Along stream courses red alder, black cottonwood, bigleaf and vine maple, and other riparian taxa predominate. Wetlands supported taxa such as cattail, reeds, and wapato. Plants useful for food found near the site include blackberry, serviceberry, cranberry, thimbleberry, huckleberry, ferns (bracken, wood, and sword), wild carrots, rose hips, tiger lilies, hazelnuts, camas, wapato, acorns, and crab apple (Gunther 1945). Numerous other plants, shrubs, and trees provided fuel, medicines, and materials for making tools, shelter and transportation. Ravines leading to the bluff-tops south of Point Elliott host typical *Tsuga heterophylla* zone vegetation.

2.2 CULTURAL SETTING

The cultural history of the Mukilteo vicinity covers thousands of years representing primarily Native American occupation and only about 200 years of Anglo-American presence. This history is one of changing economic strategies, residence patterns, and population growth for each entity.

Pre-Contact Record

Human occupation of the Puget lowlands began sometime after glacial retreat, possibly as early as 12,000 years before present (Carlson 1990; Nelson 1990). The earliest well-established cultural period in North America, designated the Paleoindian period, is poorly defined and poorly dated based on the few archaeological sites found across the region. Distinctive fluted projectile points characterize this time period, and have been recovered as isolated finds in upland settings as close as Whidbey Island and the Kitsap Peninsula (Avey n.d.; Meltzer and Dunnell 1987; Stein et al. 2004). Lacking anything more than isolated finds of stone implements and their rare association with large mammal remains, explanations about Paleoindian lifeways are highly speculative. Given the rapid region-wide rise in relative sea-level after the retreat of Pleistocene glaciation, coastal Paleoindian settlements were likely inundated.

During the early and middle Holocene, when rising relative sea-level began to stabilize, occupation of the region is understood in terms of several archaeological sites found mainly in upland settings in the Puget basin and Strait of Juan de Fuca. Although this culture-historical period is given different names under different prehistoric sequences that have been constructed over the past several decades, it is generally referred to as the Early period, a span from about 8000 BP to about 5000 BP. Artifacts found in the region attributed to this period were originally called "Old Cordilleran" (Butler 1961) but are now usually termed "Olcott" when found in the Puget lowlands, named after the type site along the Stillaguamish River approximately 35 miles (56 kilometers) northeast of Mukilteo (Kidd 1964). Olcott assemblages may include large leaf-shaped and stemmed points, scrapers, and flake tools, often of heavily weathered volcanic rock such as basalt or dacite (Carlson 1990). Olcott sites have usually been found on older fan-delta settings or on river or lake terraces (e.g., Mattson 1985; Morgan 1999). Features such as hearths or structural remnants, or plant and animal remains that would offer a better picture of subsistence economy or settlement patterns, are absent from Olcott sites investigated to date.

During the Middle period, from approximately 5000 BP to 2500 BP, the human population across western Washington grew and socio-economic organization of communities became more complex (Ames and Maschner 1999). Social groups utilized a wider range of marine resources, including sea mammals, fish, and shellfish, and the kinds of archaeological sites that date to this period are more diversified with respect to setting and inferred function, suggesting an established seasonal round of economic pursuits. Intensified use of specific local environments such as prairies and salmon streams is apparent from site distributions and artifact types. Ground stone implements appear in both coastal and inland sites after 5000 BP. Bone and antler tools, including toggling harpoons, found in shell midden sites suggests marine mammal hunting.

By the Late prehistoric period, from about 2500 BP until widespread Euroamerican contact in the early nineteenth century, three distinct cultural patterns were found in the region: marine-oriented cultures on the Pacific coast, a mixed marine and terrestrial economy along the shores of Puget Sound, and inland terrestrial mammal hunting and riverine fishing traditions (Ames and Maschner 1999). More populous communities apparently congregated at river confluences and along tidewater shorelines in permanent or semi-permanent winter villages, while seasonal use of upland and lowland camps that could focus on harvesting of particular resources, such as salmon, shellfish, and camas, increased as well. Archaeological evidence for these settlement and subsistence patterns can be seen in greater diversity of hunting, fishing, plant processing, and woodworking tools found in Late period sites. Cedar plank houses occupied by a large semi-sedentary population are well-represented in this period (Blukis Onat 1987), in which Matson and Coupland (1995) view the final development of the broad cultural patterns observed at the time of initial Euroamerican contact. This contact in the late 18th century led to drastic changes in Native American populations and community structures, primarily caused by disease pandemics (Boyd 1998).

Ethnohistory

Point Elliott and 45SN393 lie within the area that was traditionally known as *beka'ltiu*. The lifeways of the Native American peoples in the area were oriented primarily towards the sea and the Snohomish River, which served as means of transport and sources for food and raw material. The prominence of Point Elliott as a landmark would have made it an area that likely witnessed interaction between Native American peoples in the region. These groups included the Snohomish who lived in the area surrounding the nearby delta of the Snohomish River; the Snoqualmie who lived inland and upstream along the Snohomish and Snoqualmie Rivers and their tributaries; the Suquamish, who traditionally occupied northern Kitsap peninsula; the Duwamish, who lived further south near present-day Seattle and the Duwamish River valley; and the Swinomish, Lummi, Skagit, and other tribal communities living on the islands and mainland to the north (Figure 7). Although dependence on a marine economy varied somewhat among these people, Puget Sound was a fundamentally important means of transportation, communication, and subsistence for all of them (Tweddell 1974:25).

During the ethnohistoric period, the Snohomish lived along the Snohomish River, from present-day Monroe to the mouth of the river near Everett, and along the shoreline of Possession Sound northward to the Stillaguamish River, along much of Camano Island, and on the southern half of Whidbey Island (Ruby and Brown 1992:212). Four major Snohomish winter villages, several camp sites, and other geographic place names are known from this period. The villages were at *He'bolb* near Everett, at Priest Point, at Sandy Point on Whidbey Island opposite Tulalip Bay, and on the southern tip of Whidbey Island

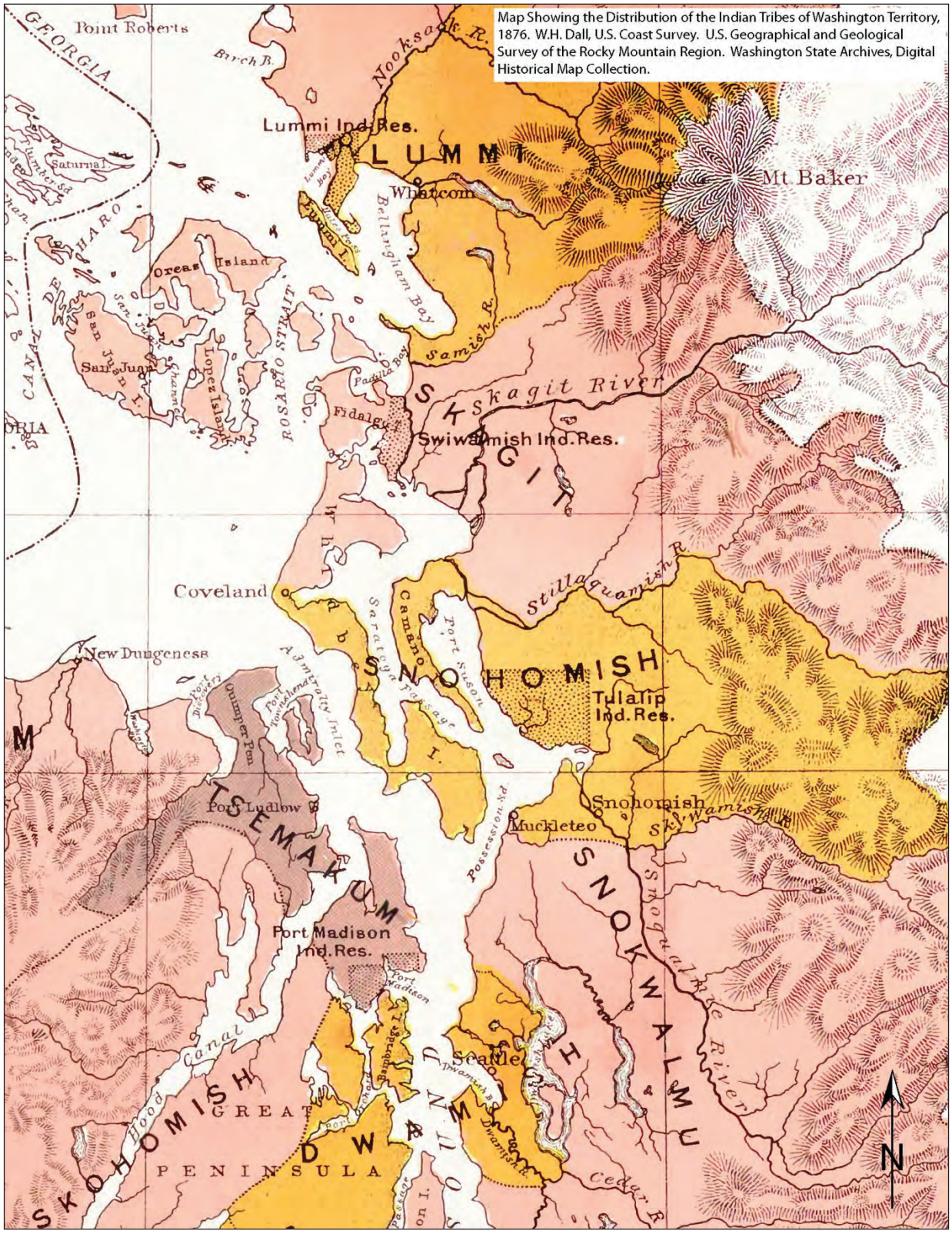


Figure 8. Distribution of Native American tribes and reservations, 1876.

(Haeberlin and Gunther 1930:7). Waterman noted three traditional place names near Point Elliott: 1) *Beka'ltiu* corresponds with Point Elliott and was anglicized as Mukilteo when the town site was named in 1862 (Phillips 1971:94). Waterman noted it was an excellent fishing locale and frequently used as a camp site (Waterman 2001:344). Tweddell recorded the meaning of the name as "to swallow" or "narrow passage" (Tweddell 1974:622). 2) *Sklels*, or "dirty rocks," was the name used to describe a part of the shoreline very close to Point Elliott where the beach cobbles looked dirty and muddy. 3) *HuxuktL!a^{3}al* (*hwEtL* meaning "broken") was the name used to describe the shoreline between Everett and Point Elliott where the tops of the trees had broken off (Waterman 2001:343-344).

Subsistence of Puget Sound Native Americans focused heavily on marine resources, including salmon, herring and other fish, shellfish, birds, and marine mammals. Shellfish were both eaten as food and used for bait to catch fish (Lane 1975a:28). Plant foods, including berries and camas, along with terrestrial animals and birds supplemented the diet (Tweddell 1974:56). At the time of Euroamerican contact, the Snohomish, like other Puget Sound Salish-speaking groups, lived in permanent villages of cedar plank houses during the winter and traveled to seasonal camps in the spring, summer, and fall to fish, hunt, and gather shellfish and plants.

Spanish and English explorers were the earliest known Europeans to visit the Puget Sound region. Among them was Captain George Vancouver, who led an expedition that surveyed the area, mapping and naming a number of its land and water features in 1792. The seamen who first sailed throughout Puget Sound were part of a broader worldwide competition to claim new territories that could enhance the influence of major European nations. Maritime traders soon followed these explorers as worldwide attention began to focus on the economic potential of the Northwest's vast natural resources. Initially, the valuable pelts of the sea otter were the most sought-after commodity, and British merchantmen vied with their American counterparts, known as Boston men, to trade with coastal tribes. In the early nineteenth century the high prices paid for other fur-bearing animals like the beaver also drew overland explorers, who were generally representatives of large trading companies in both Canada and the United States. Most dominant along the Northwest coast was the Hudson's Bay Company, which established forts at strategic locations and set up far-reaching networks of exchange with Indian people throughout the region. These trade relationships brought changes to Native American socio-economic patterns without significant loss of autonomy. More damaging was the role Europeans played in the spread of disease throughout the area, and a number of major epidemics, including smallpox and malaria, had a devastating effect on Native populations by the early nineteenth century (Scott and DeLorme 1988:15; Whitebrook 1959:65-67; 76-78; Carpenter 1986:25, 26, 30, 35-38; 64-66; Crooks 2001:12; Cole and Darling 1990:128-133; Boyd 1999:4-5, 262-263).

American interest in the Pacific Northwest grew substantially following the publication of information gathered by the 1804-1806 Lewis and Clark expedition. Congress authorized naval exploration of the Pacific in 1828, but another decade elapsed before the United States Exploring Expedition under the command of Lieutenant Charles Wilkes began its four-year voyage along the West Coast. As Wilkes and his men sailed throughout Puget Sound in 1841, they mapped and named many of the geographic features of the area. The flood of American settlers who headed to the Pacific Coast soon after the Wilkes expedition caused tensions with the indigenous residents as well as with the Hudson's Bay Company traders. In 1850 the U.S. Congress passed a measure called the Donation Land Law, which provided very generous land grants to current residents of the territory and encouraged even more migration to the region. Settlers quickly moved onto land that was important for the subsistence patterns of Native peoples. When Washington Territory was created out of the northern portion of

Oregon in March of 1853, Isaac Ingalls Stevens was appointed as the first territorial governor and also named *ex officio* Superintendent of Indian Affairs. Stevens had a mandate to make treaties with the Indian peoples of Washington and extinguish their title to lands American settlers had claimed (Richards 1993: 194-195).

Stevens held a series of treaty-making sessions with various tribal groups throughout Western Washington in the winter of 1854-1855. Point Elliott, the jutting piece of land named for the Wilkes expedition crew member, Samuel Elliott, was chosen as the site for one of these meetings. On January 22 and 23, 1855, Governor Stevens and his aides met with over 2,000 Indians of the northeast Puget Sound region, including representatives of the Snohomish as well as the Snoqualmie, Skopahmish (Muckleshoot), Stillaguamish, Kikiallus, Skagit, Lummi, Suquamish, Sauk-Suiattle, Duwamish, and other tribes (Appendix A). This treaty promised payment to the tribes, retention of hunting, fishing, and shellfish gathering rights, and services in exchange for aboriginal lands. The treaty also proposed several reservations. The Snohomish were to join the Snoqualmie, Stillaguamish, and Skykomish on the new Tulalip Reservation, while the Sammamish were to move either to the Port Madison Reservation or the Tulalip Reservation. Smaller reservations were established for the Swinomish and Lummi on the Skagit and Nooksack Rivers (Figure 7) (Haskett 1974:1-3; Hitchman 1985:233; Records of the Proceedings of the Commission to Hold Treaties with Indian Tribes in Washington Territory, microfilm, UW, Seattle; Lane 1975b:3-4).

The combined tribes, who became known as the Tulalip Tribes of Washington, were assigned to a mainland reservation with Tulalip Bay, west of the town of Marysville, as its geographical center. In recent times, the Snoqualmie and Stillaguamish have split from the Tulalip Tribes and have gained federal recognition. The remnants of Native American occupation of Point Elliott are no longer visible, having been covered in successive layers by late nineteenth century historic development of the Mukilteo waterfront, early twentieth century construction and expansion of the Mukilteo Lumber Company/Crown Lumber Mill, and mid-twentieth century military use.

History

Anglo-American settlement at Mukilteo began soon after the Point Elliott Treaty council. Morris Frost, who held the position of customs collector at Port Townsend and was active in territorial politics, made the first claim, in 1857 according to some sources (Phipps 1965; Whitfield 1926). Frost had traveled throughout the region and noted that Point Elliott was a prime site for trading because of its location on the Sound between Bellingham and Seattle, and its proximity to the mouth of the Snohomish River and large Indian populations in the area (Cameron et al. 2005:62).

Frost encouraged Jacob Fowler, a fellow New York native who was running a store and hotel on Whidbey Island, to move to Point Elliott. Fowler filed a claim to the north of Frost's along the waterfront and the partners established their own store and saloon, primarily under Fowler's management. In 1862 Fowler also applied for a permit to establish a post office at the site, which he called Mukilteo. Mukilteo was the only trading post between Seattle and Penn's Cove on Whidbey Island at this time, and initially Indians of the region were probably their primary customers (Figure 8). Most additional activity in the area was limited to small-scale agricultural enterprises that sustained the few homesteaders who had settled there.

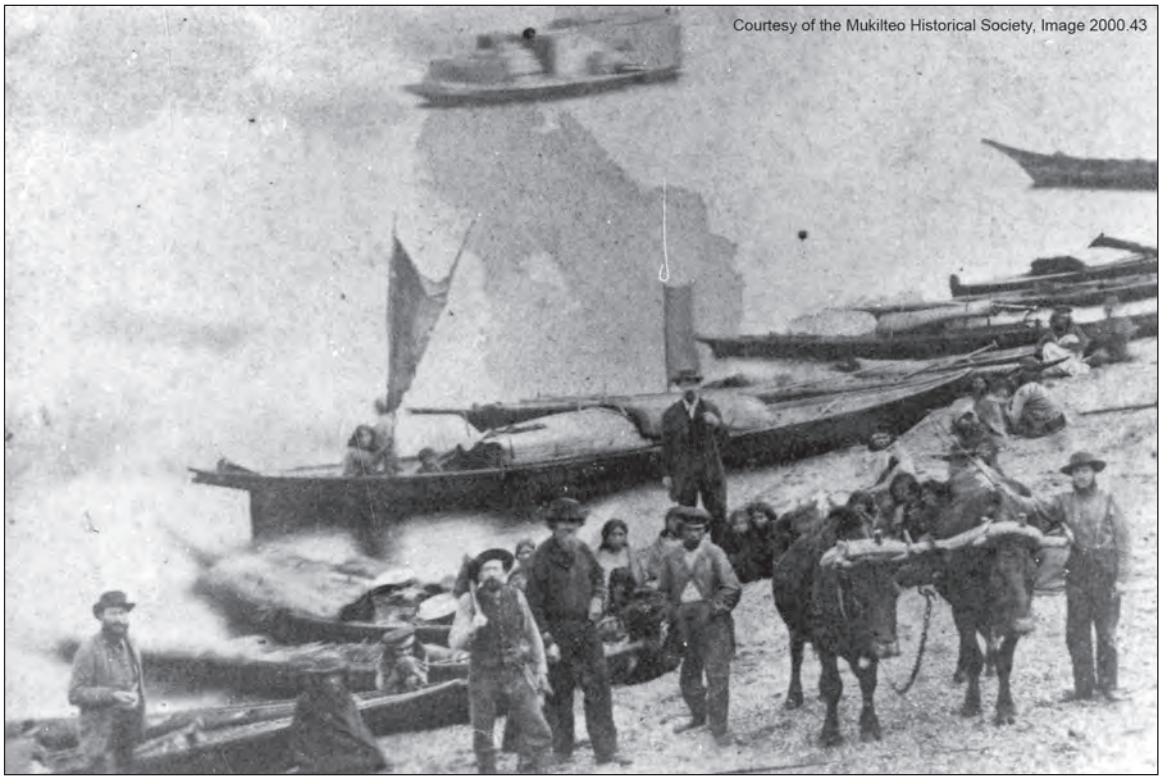


Figure 9. Photo showing Indians, canoes, early settlers, and J.D. Fowler with his oxen at Mukilteo.

Sources apparently based on Fowler's early diaries indicate that the very first commercial and residential buildings of the Mukilteo settlement were located on the southwest side of Point Elliott on land that would later become part of the state park (Figure 9). This exposed location was subject to bad weather and tides and thus the partners quickly moved their buildings to a more protected area along a rough trail that eventually became Front Street. As logging developed in importance, newcomers began to have sufficient interest in the region for Frost and Fowler to develop a hotel as well as their store and saloon at the intersection of Park Avenue and Front Street and to plan for other ventures to build a more substantial community. Mukilteo was the first town of any size in what became Snohomish County and later historians noted that it also established many other "firsts," including first county seat, first manufacturing center, first post office, first telegraph station, and the first real estate partnership (Interstate Publishing 1906:369; McConnell 1977:4-8; Whitfield 1926:I-584-587). For a short period after its founding, Mukilteo was the major trading point in Snohomish County. Fowler and Frost developed several businesses that involved harvesting, manufacturing, and shipping local products. A diary kept by Fowler evidently indicated that the pair started a saltery sometime prior to September 1867 and sold barrels of salted salmon to individuals and businesses around the Sound. They also were involved in shipping other local products, including berries, flour and ice, on several sailing vessels they had purchased: the Tibbals, the Pigeon, and the Gazelle (Interstate Publishing Company 1906: 258, 369; Phipps 1965: 2-4; McConnell 1977:8).

The area's rich forests also provided logs that could be sold to large sawmills operating around Puget Sound at Port Ludlow, Port Gamble, and Utsalady. The first sawmill near the mouth of the Snohomish River was built in 1853 on land along Tulalip Bay. Closer to Mukilteo, a small sawmill began operations

Figure 10. The original Frost and Fowler store location on the south side of the point, no date.

in the mid-1860s on the Livingston claim, a short distance from the settlement. It lasted only a few years because it was unable to compete with the bigger mills across the Sound. The valleys of the Snohomish and Stillaguamish rivers were logged most intensively during these early years, and Frost and Fowler's Mukilteo hotel quickly became a home for woodsmen during the winter months. A few individuals also ran logging operations in the immediate vicinity of Mukilteo, including Morris Frost, who employed a crew of ten men with eight oxen in 1876 (Whitfield 1926:I-678; Dilgard 2007:1; Interstate Publishing 1906: 256, 258, 259, 261, 586).

Fowler's and Frost's enterprises sustained Mukilteo, but the partners hoped that new transportation access to a transcontinental rail link would enhance its growth. The Northern Pacific Railroad evidently sent a surveyor, General James Tilton, to stake out a potential terminus at Mukilteo in 1871, setting off speculative activity in the buying and selling of town lots. One of the earliest maps of the Mukilteo area, drafted in 1872 for the US Coast Survey, shows a structure and fenced yard at the southeast corner of the intersection of Front Street, Park Avenue and the city dock, corresponding to the location of Bay View Hotel, owned by Frost and Fowler (Figure 10). An early photograph includes the hotel and a few other buildings along Front Street with only an empty field to the south, bordered by Park Avenue and a picket fence (Figure 11). When in 1873 Tacoma was selected as the terminus and a financial panic gripped the nation as a result of the default of Northern Pacific financier Jay Cooke, area businesses soon felt serious financial constraints. The partnership of Mukilteo's founders, Frost and Fowler, went into receivership in 1876, and V. B. Stacy of Seattle began to handle the company's land holdings and other affairs (Armbruster 1999:30, 36, 37; Whitfield 1926: 587; Interstate Publishing 1906:370).

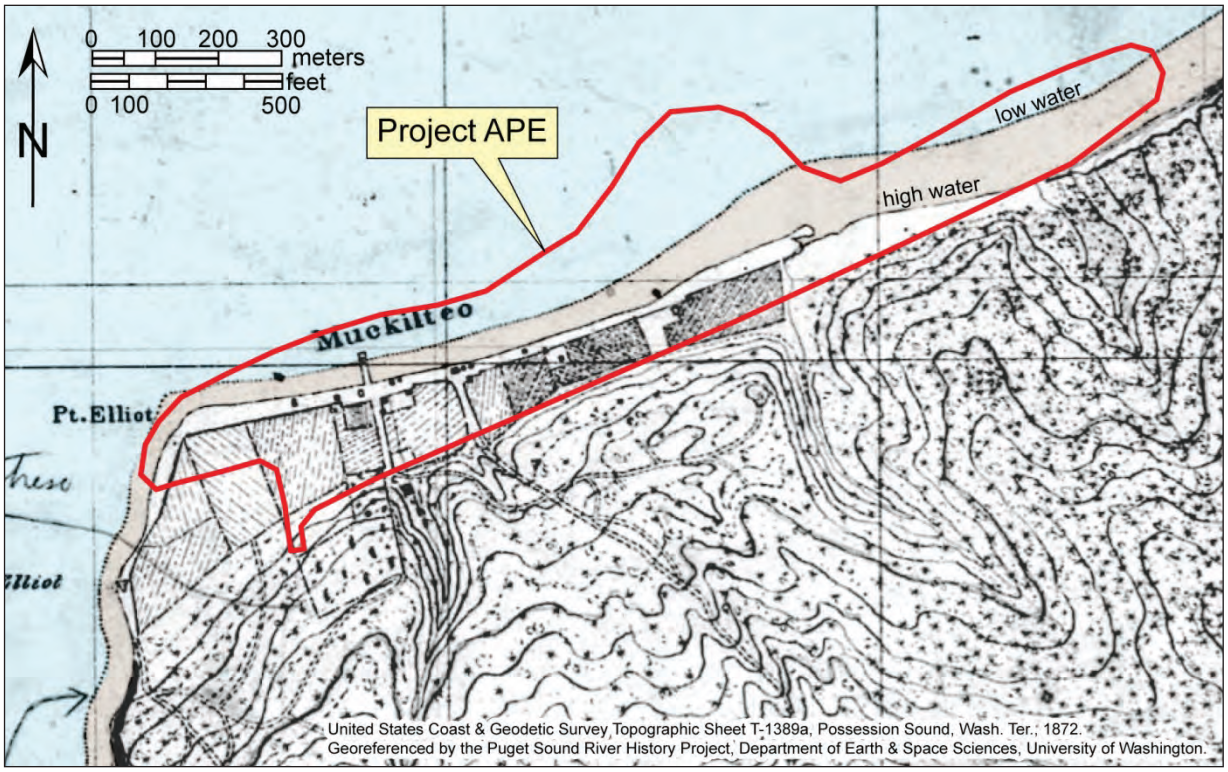


Figure 11. Map showing early Mukilteo, 1872.

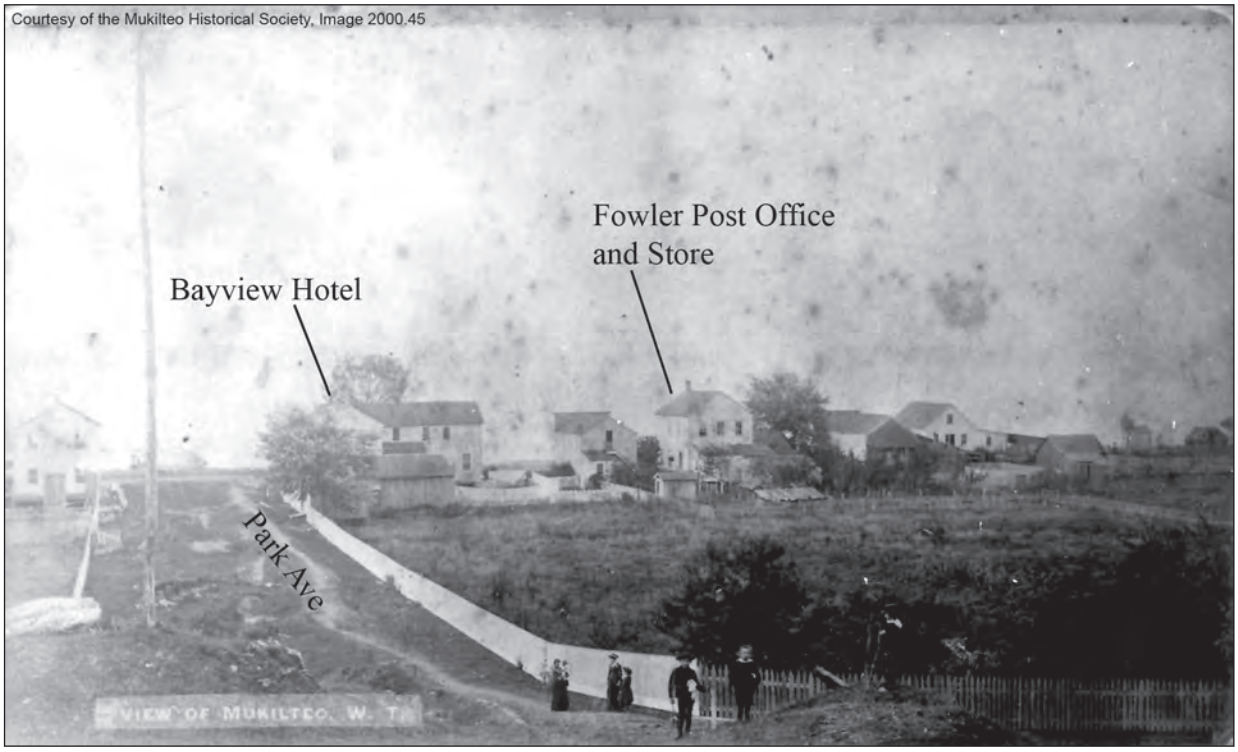


Figure 12. Early Mukilteo looking north from approximately Park Avenue and Second Street, c. 1878.

As a result of these financial difficulties, the Bay View Hotel closed for a short period of time, but was soon purchased by P. Trana and continued to be the focus of the Mukilteo townsite. A photograph from 1878 shows that in addition to the hotel, several other businesses had been added along the south side of Front Street during this period (Figure 12). The town also became the site of a brewery as early as 1875, although sources differ on who was involved in these early efforts. According to some historians, Joseph Butterfield founded the Eagle Brewery in that year, selling it a year later to Frost and Fowler. Another source indicates that George Cantrini built the town's first brewery in 1878, selling 240 barrels his initial year of operation and nearly doubling his production the following year. S. N. Snyder was said to have rebuilt the brewery in 1882 after it had burned down, and he operated it until 1884 (Phipps 1965: 4; Interstate Publishing 1906:370; Whitfield 1926:588; Meier 1991:90).

Along the waterfront, fish processing also became an important industry in Mukilteo during this period. The partnership of Rheinbrunner and H. C. Vining picked up the salting business that Frost and Fowler had begun and shipped barrels of their product to the East Coast in 1875. Vining evidently continued the business on his own for several years, primarily hiring Indians to bring in the salmon. The first cannery on Puget Sound was established at Mukilteo in July 1877 by George Myers and Company (sometimes called Jackson, Myers, and Company), which also operated another cannery on the Columbia River. The Mukilteo facility, according to newspaper accounts, was built on the wharf, and boats drew up underneath and unloaded their catch, which was processed there. H. C. Vining, who was one of the townspeople who evidently encouraged the company to develop a cannery at the site, directed a crew that provided some of the fish for the enterprise. Another crew, which was primarily composed of Chinese fishermen, was run by a Mr. Tull. Any fish that were not used by the cannery were

Figure 13. Looking east down Front Street from Park Avenue, showing the Bay View Hotel, 1878.

salted by the two men. Although newspapers suggested that the company might also can fruits and vegetables grown by area farmers, there is no information that any other kind of canning actually occurred (*Northern Star*, July 28, 1877:4; Sept. 8, 1877:4; Whitfield 1926:I-588; *Northern Star*, September 22, 1877:4).

Myers was said to have taken a ten-year lease on his cannery site in 1879. In 1887 a new cannery and wharf were built by a man named Coleman, who used Chinese labor despite strong anti-Chinese sentiment in the region. In the following year, Frank L. Tuttle ran this cannery and evidently made a number of improvements to the plant, built some fish traps and added to the fishing fleet. Sources vary but evidently Tuttle remained there for at least two seasons and possibly until the mid-1890s, when an economic downturn led to the closure of Mukilteo's canneries (Whitfield 1926:590).

Aside from its canning industry, Mukilteo experienced little economic growth during the 1880s, and its population evidently peaked at about 75 residents. The town did have regular steamboat service during this period, so its waterfront location made it a possible tourist destination. In the late 1880s entrepreneurs attempted to establish vacation resorts in the area. Walter Keyes and his wife brought property at Mukilteo to build what he called the "Long Branch of Puget Sound," a resort community probably patterned after Long Branch, New Jersey, which was a popular celebrity vacation spot in the nineteenth century. Keyes dedicated the facility in May 1887 with picnics and music by a National Guard band and encouraged excursions from Snohomish, Seattle, and other Puget Sound towns. The Long Branch did not appear in city directories by 1893, so it is likely that it was a short-lived venture. In contrast, the Bay View Hotel, which was remodeled in 1888 and initially boasted a dance pavilion, croquet court and other amenities, remained a Mukilteo landmark for many years. Located at the center of community activity on the corner of Front and Park Avenue, the Bay View eventually served as a boarding house for local workers (Whitfield 1926:I-589; Polk 1893:281-283).

When Washington achieved statehood in 1889, the economy of the region experienced a brief revival and Mukilteo followed suit. The town's renewed prospects were based on the possibility of a long-awaited transcontinental rail link. Mukilteo, like most other towns on the Sound, was eager to welcome James J. Hill of the Great Northern Railroad. Hill and his associates secured a foothold on the Seattle waterfront in 1890 and oversaw construction of a railroad, called the Seattle and Montana, which ran northward to Bellingham and provided a link with lines running south from the Canadian Pacific. The 78 miles of track constructed in 1891 primarily followed the shoreline of the Sound and passed through Mukilteo, which became one of its stops (Hidy et al. 1988:78; Cameron et al. 2005:106-108).

In anticipation of growth because of its railroad connection, Mukilteo was platted in 1890 and another flurry of sales in town lots began. In addition to the construction of several buildings that housed real estate offices, stores, restaurants and another hotel, a new telegraph office also opened in the town. Lower Park Avenue was the site of a railroad depot, transfer station, drugstore, restaurant, barber shop, confectionary, butcher shop and a general store. Residents expected even more growth and bonded themselves for $10,000 to build an elaborate new school. The building was completed in 1893, but initially served only 29 students (Whitfield 1926:I-589-590; McConnell 1977:144).

Several other towns along the Seattle and Montana were platted at the same time, but it was Everett that experienced the greatest growth at the end of the nineteenth century. The prospect that the Great Northern's transcontinental line, which crossed the Cascade Mountains to the coast over Stevens Pass, would use Everett as its terminus fueled even more speculative interest. When the line was completed

in 1893, James J. Hill chose Seattle instead, but Everett continued to expand as the center of the burgeoning lumber industry. Demand for wood products from the Puget Sound area was also boosted by the rush to the Klondike gold fields beginning in 1897. Investments by the Rockefeller interests and later the Weyerhaeuser Company helped to continue this growth so that soon after the turn of the century Everett had nine sawmills and thirteen shingle mills (Cameron et al. 2005: 11-112, 119, 135-136; Interstate Publishing 1906:283-284).

Mukilteo was initially overshadowed by this phenomenal development, and by 1899, steamer service even bypassed the declining town. Eventually, however, some of Everett's success spilled over into other towns on the railroad and helped to revive Mukilteo. Sawmilling became the primary source of jobs and income for the town after 1903 with the construction of the Mukilteo Lumber Company. Investors in this enterprise included several former Midwest lumbermen who also owned a couple of Everett mills. As soon as the new mill's foundation was in place, the company also began work on a dock to replace the deteriorating structure that had long been Mukilteo's main shipping access. When completed, the plant included both a shingle and a lumber mill, which was said to include "a double band, with resaw, edgers, slashers and trimmers" (*Pacific Lumber Trade Journal* April 1903:52). These new facilities once more made Mukilteo a desirable port, and the Seattle-Everett steamship line reinstated regular service along with other transportation companies (*Everett Daily Herald*, April 17, 1903:4; April 24,1903:3; May 28, 1903:7; Sept. 4, 1903:2; September 24, 1903:5; Nov. 11, 1903:1).

As many as 100 construction workers helped to build the mill and most evidently came to Mukilteo from Everett by ferry and returned home by train. On November 1, 1903, the Great Northern added a new Mukilteo station, which provided better access to the mill. By that time much of the machinery was in place and crews had erected a new burner as well as a smokestack 100 feet in height and eight feet in diameter. In addition, five dry kilns were built from concrete blocks manufactured on the site. The company had also begun construction of a company store near the wharf and company housing on the bluff above the tracks (Everett Herald, Sept. 28, 1903).

The 1904 city directory lists only 34 residents living in Mukilteo in addition to the mill owners and supervisors, most of whom made their homes in Everett or out of state. By 1907, however, the population of Mukilteo was 350 and it had grown to a reported 600 by 1909. Of the residents enumerated in 1907, at least 53 worked directly for the Mukilteo Lumber Company, while others were employed by the small Ira Heath mill, the Doucette and Sons and Mukilteo Shingle Company operations, and the Elliott Bay Logging Company. A number of longshoremen who loaded and unloaded the lumber vessels were also involved in the industry and lived in Mukilteo. In addition, the town had four hotels and two general stores as well as a saloon, meat market, real estate company and boat building concern. Other residents included a few fishermen and Great Northern Railway workers, ranchers, and a chicken producer (Polk 1904:392-394; 1907:445-450; 1909: 597-603; 1912:537).

The early city directories did not include the Japanese workers, who were evidently employed by the Mukilteo Lumber Company from the beginning of its operation. Newspaper accounts indicate that the mill had hired at least 30 laborers of Japanese ancestry to work in the yard by February of 1904, and reported that other Japanese crews were planned. Caucasian workers initially threatened to leave the company if the Japanese workers were not dismissed, but their protest had little effect. The numbers of Japanese employed at Mukilteo Lumber Company continued to rise and later historical accounts suggest that the number had increased to 150 by 1905 (Everett Herald, Feb. 15, 1904:8; March 1, 1904:1; March 28, 1904:1; Interstate Publishing 1906:370).

The Mukilteo mill's entire workforce grew to well over 200 after 1909, when California investors purchased the facility and renamed it the Crown Lumber Company. The new ownership group, which included A. A. Baxter and James Tyson of San Francisco and H. W. Jackson of Eureka, California, had long experience in the industry. Primary control appeared to be in the hands of Tyson, who was the nephew of Charles Nelson, a Danish ship captain who built the Nelson Steamship Company and the Nelson Lumber Company into some of the most successful corporations on the West Coast. The sale included the Mukilteo mill property and employee housing as well as interests in three boats, a lumber yard in San Francisco and approximately 2,400 acres of the company's timber lands. Newspapers of the period reported that the mill machinery included "three large bandsaws, one roller band, two edgers and a gang, besides automatic trimmer, slab slasher and a lath mill" with a capacity of over 200,000 board feet of lumber and 40,000 board feet of lath per day (*Pacific Lumber Trade Journal* Sept. 1909:36; Everett Herald, Aug. 26, 1909:1; Kaiser 1990:3-4).

The Crown Mill was classified as a cargo facility, and its main products included untreated lumber and timbers, which were primarily in demand for export (Figure 13). The mill also had dry kilns and planers, which gave the company flexibility to produce specialty products like railroad ties and flume stock as well as finished lumber for domestic markets. Statistics recorded by timber industry publications suggest that in the first decade after its purchase, the Crown Lumber Company expanded its foreign exports, shipping to markets in Mexico, the West Indies, the Cook Islands, Hawaii, and Australia. Later in the 1920s it also sent lumber to South American and East Coast destinations (*The Timberman* Jan. 1912:29; May 1913:55; May 1913:63; Nov. 1929:202).

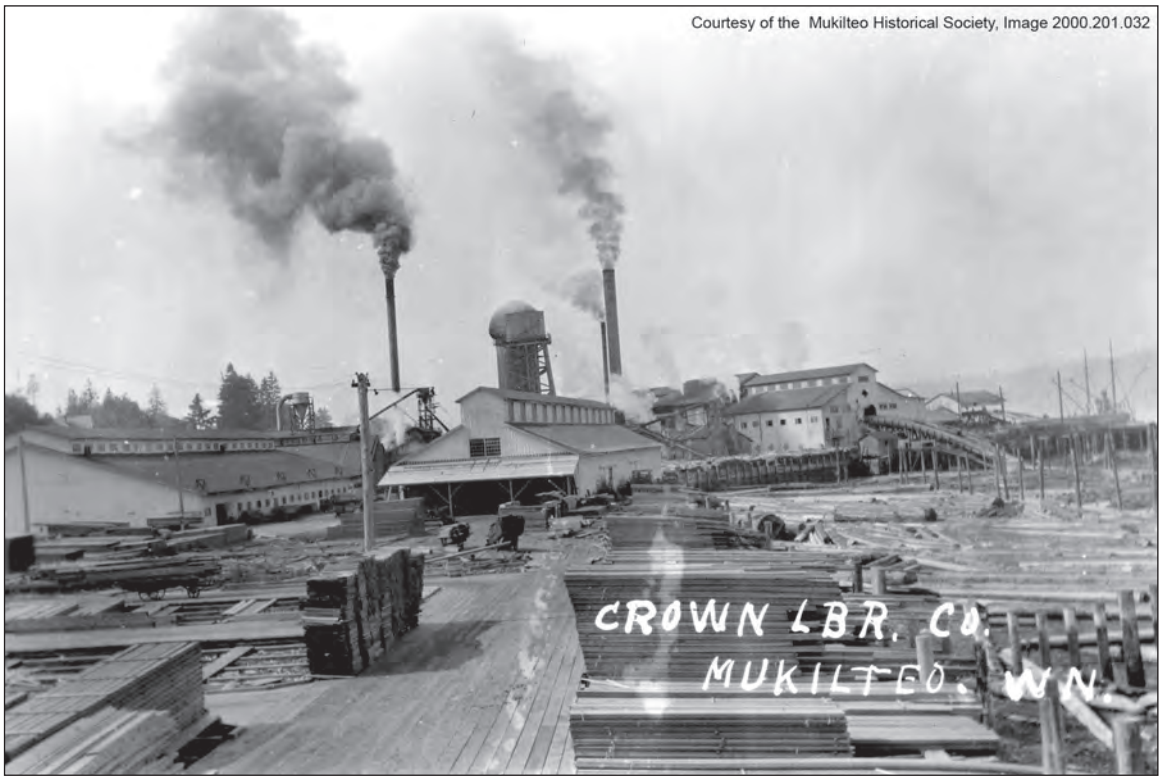


Figure 14. The Crown Mill during operations, no date.

Most of the mill's foreign shipments were carried by large steamship lines or tramp steamers that could pick up partial loads. During the early years, much of its lumber production bound for Pacific ports was also carried on sailing schooners. The company eventually operated its own small fleet of steam vessels that transported lumber to California. After World War I, several steel-hulled ships that had been owned by the government were purchased for use as lumber carriers (Kaiser 1990:14-17).

During peak periods of operation, Crown Lumber employed between 200 and 240 mill workers. Most skilled jobs were held by Caucasians, but the company continued the Mukilteo Lumber Company's policy of hiring Japanese workers for most of the other positions at the plant. The 1910 census figures for Mukilteo precinct indicate that there were at least 86 men of Japanese descent listed as sawmill employees and ten years later the number was only slightly higher at 94. Many of these men were single while working at the mill, although the number of families living in the mill's Japanese community had grown considerably by 1920. Crown's Japanese workers had their own settlement, which included single-family residences, boarding houses, a community hall, boy's club, and a small store (Kaiser 1990:4; Thirteenth Census 1910; Fourteenth Census 1920). The Crown Mill continued to operate in Mukilteo and was its primary employer for more than twenty years (Kaiser 1990:4, 27-30; McConnell 1977:29).

In addition to the Crown plant, several other timber-related businesses were also important employers in Mukilteo during this period. Shingle-making in Snohomish County had begun as a small cottage industry for local ranchers who need extra income, but the introduction of more sophisticated machinery totally changed the business. With new demand in the Midwest after good rail connections were established, Snohomish County had 97 shingle mills on its tax rolls by 1903, with a third of those built after 1900. Mukilteo accounted for several shingle mills during this era, including one operated by the Doucette brothers, the Mukilteo Lumber Company's shingle-making facility, and the Mukilteo Shingle Company, incorporated in 1907 and run by G. A. Bergstrom and E. A. Haynes. At least one or two shingle mills continued to operate along the Mukilteo waterfront during the next few decades, including Haynes Floyd shingle manufacturers, the Yukon Lumber and Shingle Company, and later the Superior Lumber Company, which was incorporated in 1915, but does not appear in city directories until the late 1920s (Figure 14) (Whitfield 1926: I-687 Ficken 1987:105; *Everett Daily Herald*, April 20, 1903:1; Polk 1906:326-328; Polk 1908:646; Polk 1910:764; Polk 1928-29: 697; Secretary of State, Domestic Corporations For-Profit History Cards, Washington State Archives, Olympia).

Another local enterprise that had ties to the timber industry was the Puget Sound and Alaska Powder Company. The plant, which was organized in 1909 by Peter David, produced dynamite and other types of explosives for use in railroad logging and land clearing as well as railroad construction and mining . Puget Sound and Alaska Powder employed about 30 men, many of whom lived in a nearby boarding house owned by the company (Kaiser 1990:3; McConnell 1977:111).

The growth of new industries also led to increased shipping traffic both to Mukilteo and to Everett and the need for construction of a lighthouse and fog signal at Point Elliott by the federal government. The land was surveyed and then plans and specifications prepared in 1904-1905. The station was completed in 1906 and became an important landmark for Mukilteo (US Army Corps to Engineers to Lighthouse Board, March 29, 1904; Coast Guard chronology of Mukilteo Point lighthouse in Lighthouse File, Mukilteo Historical Society, Mukilteo).

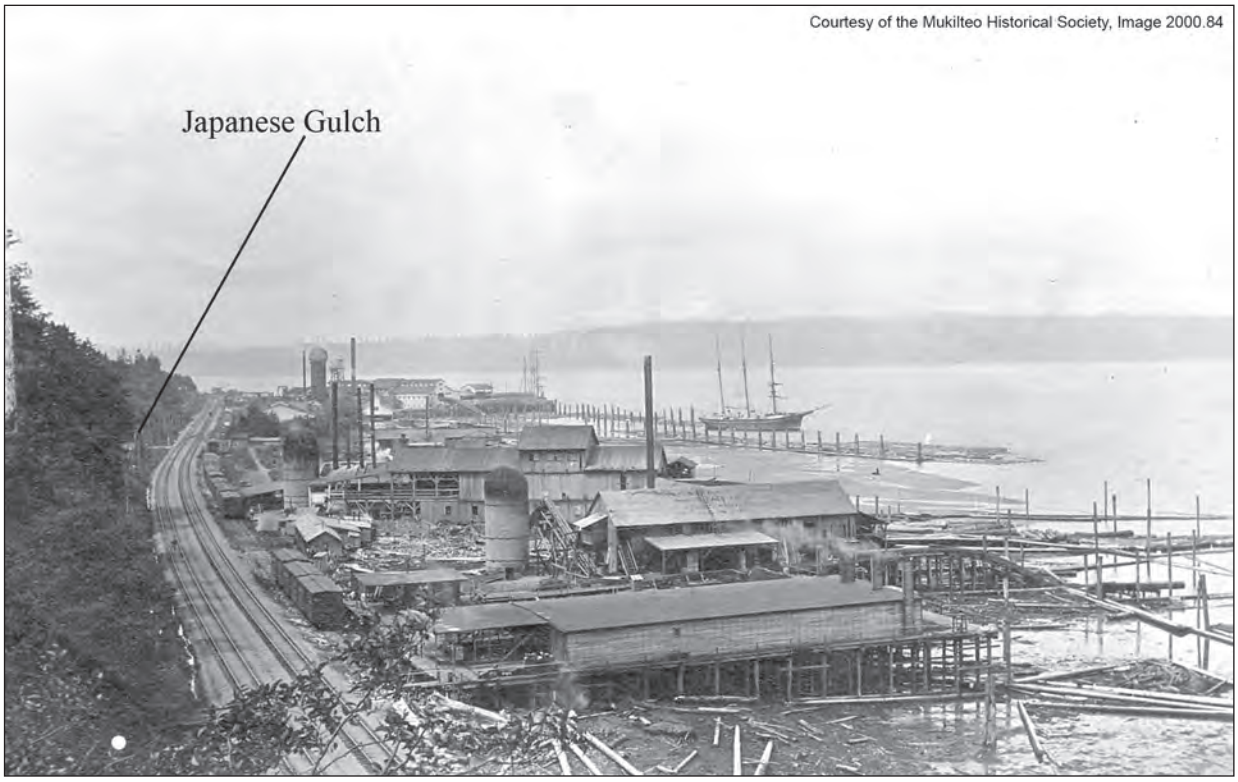


Figure 15. Mills along the beach at Mukilteo, c. 1915, looking west.

As a result of continuing development, the town's population had expanded to approximately 800 by 1910. An Anderson map of this year indicates the Bay View hotel was vacant, but the 1912 Sanborn Fire Insurance Company map shows the hotel in greater detail and thus possibly in use once again. The hotel was later converted to a barracks for soldiers during World War I, and then evidently served as temporary accommodations and the site of occasional boxing matches. Other business in the downtown core along Park during this period included a general store, meat market, and warehouse at the south end of the block; and a small vacant building between the hotel and store (Kaiser 1990:12-13).

By 1920, Mukilteo was home to over 1,100 people, most of whom were employees of Crown Lumber Company. The Crown Lumber Company supported a working community centered on housing along Second Avenue, south of the mill and railroad tracks. A second community of company housing for Japanese mill workers existed near the mouth and lower portion of Japanese Gulch, southeast of the mill (Figure 15). The company store and butcher shop supplied mill workers of various socioeconomic and ethnic backgrounds with groceries, meat, and other necessities (Kaiser 1990:27-30).

Business in Mukilteo remained fairly steady until the end of the decade. Then the effects of the Great Depression and a declining lumber market led to the closure of the Crown Lumber Company plant on September 10, 1930. Problems for Mukilteo were compounded when just a few days after later, an explosion heavily damaged the powder company. Over time, most of the lumber mill machinery was sold or removed, but in August 1938 the remaining mill buildings burned down (McConnell 1977: 93, 111; Kaiser 1990:4)

Figure 16. Aerial view of Mukilteo, looking west, c. 1935.

Sometime after 1940, Park Avenue and the surrounding vicinity (former tidal marsh) were filled with local sand and gravel to its current elevation. During World War II, the mill property was sold to the United States Army, which established the Mukilteo Explosive Loading Terminal (MELT) (Figure 16). The United States Air Force acquired the Army property in 1951 and constructed the Tank Farm for jet fuel storage as well as facilities for fuel transport and experimentation. The Tank Farm ceased operations in the late 1980s and the tanks have since been removed.

In the late 1960s Boeing constructed its manufacturing center for assembling jetliners three miles from Mukilteo at Paine Field. A railroad spur was built from the Mukilteo waterfront to the Boeing plant up through Japanese Gulch to transport parts shipped by water and rail. The current Port of Everett Rail-Barge project at the extreme east end of the Tank Farm is intended to update and continue this supply function (McConnell 1977:72).

2.3 Status of Cultural Resources Research in the Puget Sound Region

Despite a relatively high Native American population density in the Puget Sound region at the time of Euroamerican contact and an abundance of pre-contact archaeological sites found over the past 100 years, very few sites have been investigated in any detail. Most investigations have been limited to identification, boundary definition, and occasionally further testing to determine content and chronology. Pre-contact patterns of Native American settlement have been reasonably well-defined based on these investigations and the somewhat biased data from the few shoreline sites which were excavated because of their susceptibility to damage from development. Extrapolation from the

Figure 17. Overview of project area, 2006, showing Rail-Barge pier, pads from fuel tanks, and the MELT Pier.

archaeological record of neighboring areas, particularly the Gulf of Georgia, is a third contributor to formulations about the Puget Sound region's past. Many broad culture-historical schemes have benefited from this data set with respect to placing the pre-contact archaeology of Puget Sound within the larger context of the Pacific Northwest (e.g., Ames and Maschner 1999; Carlson 1990; Matson and Coupland 1995).

The first archaeological investigations in the Puget Sound were those by Harlan I. Smith and his colleagues with the Jesup North Pacific Expedition led by Franz Boas in the 1890s (Smith 1907). Although the surveyors did not mention any "shell-heaps" in the vicinity of Point Elliott, they were the first to characterize Puget Sound shell middens in the region in terms of their dimensions, matrix, and cultural contents. The descriptive paradigm was the main focus of archaeological research in central Puget Sound through much of the twentieth century, in both systematic surveys (e.g., Bryan 1963; Mattson 1971) and more intensive site-level investigations (e.g., Gaston and Jermann 1975). The increasing volume of archaeological data generated from cultural resource management contexts has been applied, however, to more lines of inquiry as culture-historical frameworks become more refined.

Over the past several decades, archaeological data from Puget Sound have been increasingly directed toward questions regarding cultural and natural processes, both from a broader geographic scale such as subsistence and resource depression throughout the Northwest (e.g., Butler and Campbell 2004), and on local scales such as the interplay of tectonic processes and cultural adaptation in particular locations along Puget Sound (e.g., Troost and Stein 1995). Adequate treatment of these questions requires

sufficiently large samples of archaeological material and intact exposures of archaeological deposits. To date these data have come from just a few sites.

The West Point site (45KI428/429) has provided one of the largest archaeological samples in Puget Sound, spanning over 5,000 years (Larson and Lewarch 1995), and has consequently been used as an interpretive guide for much regional archaeological research over the past 10 years. Data recovery excavations at the Duwamish No. 1 site (45KI23) have also yielded a large amount of information, pertaining to settlement in a more estuarine setting than West Point (Campbell 1981). Further upstream, a complex of sites in the Renton area provides data on Native American settlement in a riverine setting in the Puget lowland (Lewarch 2006).

Cama Beach Shell Midden (45IS2), located 15 miles northwest of Mukilteo on the west shore of Camano Island, represents intensive Native American use of a landform comparable to the Mukilteo Point Elliott spit. Between 2004 and 2006, data recovery excavations were conducted at the Cama Beach site, one of the most extensive shell middens in the Puget Sound-Gulf of Georgia region (Schalk and Nelson 2010). These investigations documented the complex evolution of the landform and changing human use of the area's resources. Native American occupation of the beach berm and foreshore and backshore sides of the spit began around 1600 radiocarbon years BP, as soon as the landform was above the reach of the tides. The extensive artifact assemblage from the site as well as 47 radiocarbon dates indicates that, prior to approximately 1100 rcybp, the site served as a spring/summer fishing and shellfish gathering camp, probably used by people resident along mainland rivers. After that date, a more permanent settlement apparently developed on the spit, which had, by that time, expanded to the north enclosing a sheltered lagoon. According to authors of the excavation report, evidence suggests that this settlement was associated with a saltwater-based winter village somewhere in the vicinity (Schalk and Nelson 2010). The change in settlement pattern from riverine-based villages to saltwater-based villages is believed to have accompanied population growth in the region and the resulting trend toward resource intensification that occurred in the 2,000 years preceding European contact. Counter to the current view of that period as a time of cultural stability, however, the Cama Beach assemblage shows evidence of ongoing culture and subsistence change. Faunal remains indicate increasing dependence on marine resources over time, including exploitation of greater numbers of fish species, and decreasing dependence on terrestrial fauna. Additional evidence of subsistence and culture change is the lithic assemblage, which shifts from hunting tools such as projectile points, large utilized flakes, and choppers to woodworking tools such as adze blades (Schalk and Nelson 2010).

Recent decades have seen an increasing use of archaeological field methods in historical period (post-contact) Puget Sound research. Excavations conducted at historical archaeological sites have provided valuable information regarding the lifestyles of little-known segments of historical period populations, including Euroamerican, Native American, and other ethnic groups.

Knowledge of human use of the Puget Sound region increased following passage of the National Historic Preservation Act of 1966. This legislation requires cultural resource studies prior to implementation of federally assisted undertakings, and has resulted in identification and documentation of thousands of pre-contact and historical period sites.

3 INVESTIGATIONS AND RESULTS

The goal of the cultural resource investigations undertaken for the MMP was to determine whether significant historic properties are present within the APE and, if present, whether they would be damaged by construction or subsequent operation of the ferry terminal. In the context of a federal undertaking, such as this project, significance is measured against the National Register of Historic Places evaluation criteria (36 CFR 60.4).

The quality of significance in American history, architecture, archeology, engineering, and culture is present in districts, sites, buildings, structures, and objects that possess integrity of location, design, setting, materials, workmanship, feeling, and association and meet one or more of four criteria of significance (National Park Service [NPS] 1997:2):

A. The property is associated with events that have made a significant contribution to the broad patterns of our history.

B. The property is associated with the lives of persons significant in our past.

C. The property embodies the distinctive characteristics of a type, period, or method of construction, or represents the work of a master, or possesses high artistic values, or represents a significant and distinguishable entity whose components lack individual distinction.

D. The property has yielded, or is likely to yield, information important in prehistory or history.

During previous cultural resources assessments within the MMP APE, six cultural sites were identified as significant or potentially significant historic properties, that is, resources eligible or potentially eligible for listing in the National Register of Historic Places. These properties are the Mukilteo Shoreline Site (45SN393), Point Elliott Treaty Site (45SN108), Old Mukilteo Townsite (45SN404), Japanese Gulch Site (45SN398), Mukilteo Light Station (45SN123), and Mukilteo Explosive Loading Terminal (MELT) Barracks (Field No. MM-04). Ten cultural sites in this area were recommended not eligible for the NRHP—the MELT Pier (Field No. MM-02), MELT Firehouse (Field No. MM-01), MELT Superintendent's Office (Field No. MM-06), DFSP Tank Farm (Field No. MM-03), SR 525 Overpass, Diamond Knot Ale House, Buzz Inn, the Seahorse Owner's House, Multi-family Dwelling, and Ivar's at Mukilteo, while one property—the Mukilteo Ferry Terminal (31-339)—remained unevaluated. One recorded property, McConnell's Boat House (31-244), was demolished prior to the 2003 survey.

During the present phase of the project updated information was obtained for five buildings/building complexes in the MMP APE. The MELT Barracks one of the properties originally identified as potentially significant, has been altered and is no longer recommended eligible for the NRHP. The Mukilteo Ferry Terminal was determined to be over 50 years old. The complex is documented in this report and recommended not eligible for NRHP listing. Three buildings have been demolished since the 2003 cultural resources survey: Buzz Inn, the Seahorse Owner's House, and the Multi-family Dwelling.

All of these cultural resources are addressed below. The properties are arranged by type—the pre-contact archaeological site first, followed by historical period archaeological sites, the historical event location, and historical period buildings and structures. The Mukilteo Shoreline Site (45SN393), Old

Mukilteo Townsite (45SN404), and Point Elliott Treaty Site (45SN108) are described in greater detail than the other resources since this document revises the earlier report (Miss et al. 2008).

3.1 MUKILTEO SHORELINE SITE (45SN393)

Site 45SN393, the Mukilteo Shoreline Site, was identified in 2005 during initial cultural resource studies for the Mukilteo ferry terminal project (Kaehler et al. 2006). The project area is an urbanized environment, with most original landforms obscured by pavement and buildings or buried beneath deep fill. Due to lack of ground visibility, archaeological monitoring of geotechnical boreholes was used to supplement traditional visual surveys of the APE. [redacted] the archaeological monitor observed intact, stratified shell midden deposits in two bore holes. The positive bores were about 575 feet (175 meters) apart, in areas corresponding to the beach berm that, prior to historic in-filling, separated a tidal marsh from the open waters of Possession Sound. The midden was found beneath historic fill ranging from 2.9 feet (0.9 meters) to 13.1 feet (4.0 meters) in depth, suggesting substantial variability in the original topography and/or historic ground surface modification. The archaeological midden deposit in one borehole was 2 feet (0.6 meters) thick, and in the other 8 feet (2.4 meters) thick. Because the archaeological deposits are buried beneath deep fill, the site could only be characterized in preliminary terms. The horizontal site dimensions, 575 feet (175 meters) by 100 feet (30 meters), were based on the distance between the two positive boreholes and the negative evidence of a series of bores across what had been the tidal marsh. Following these initial studies, the extent of the site remained unknown (Kaehler et al. 2006).

In 2006 WSDOT, on behalf of WSF, commissioned additional studies of the Mukilteo Shoreline Site (45SN393) in an effort to determine the site's extent and eligibility for listing in the National Register of Historic Places. Significance, that is, National Register eligibility, of archaeological properties is generally judged under NRHP Criterion D, the property's potential to provide information important in understanding history or prehistory. Importance of the information is measured by relevance to identified research questions that can be addressed through analysis of particular data types. A property, therefore, is judged on the basis of the availability or potential availability of specific data classes necessary to address particular research questions and domains. Five research domains, each with supporting research questions, were formulated during the initial phase of the investigations. These research questions guided the subsequent archaeological and geoarchaeological fieldwork and served as the basis for the National Register eligibility recommendations. These domains and questions are summarized below.

Research Domains and Questions

Site Structure - the Lithostratigraphic Framework: The geoarchaeological component of investigations concentrates on establishing the presence of adequate data to provide a preliminary lithostratigraphic sequence for understanding the physical sequence of geomorphic events in the site and its immediate area. The specific questions and goals of the research include:

- Determination of the range of lithofacies types for both archaeological and sedimentary deposits;
- Construction of lithofacies assemblages;
- Definition and description of environments of deposition;

- Establishment of a chronostratigraphic framework based on relative or absolute chronometric data;
- Relation of the sedimentary bodies to the archaeological deposits;
- Description of the internal structure and character of the archaeological deposits.

Data classes from the site that may be applied to these questions include the stratigraphy of deposits, datable materials, and the character of the archaeological deposits.

Landform History: Reconstruction of the landscape is carried out on several scales and relates site microenvironmental interpretations to local environmental characteristics, and ultimately, to broad landscape changes. At this higher scale, analysis focuses on topographic setting and landforms used directly for subsistence and makes use of bioarchaeological evidence to examine the relationship of the site to the surrounding landscape mosaic. The specific questions and goals of the research include:

- When did the modern cuspate foreland begin to emerge above the tidal limit?
- After supratidal emergence, what was the rate and character of lateral growth and vertical accumulation of the spit?
- Are there periodicities in spit growth and stability?
- Are there related in-tandem changes in the character of archaeological deposits?
- Is there evidence for earthquake-induced changes to the configuration of the landform?
- Is there evidence for buried paleo-shoreline features and associated archaeological deposits?

Data classes from the site that may be applied to these questions include the stratigraphy of deposits, character of the archaeological deposits, datable material, artifacts, and faunal and botanical remains.

Site Formation: The study of site formation is critical for understanding the context of archaeological materials (Stein and Farrand 2001; Wood and Johnson 1978), and is used to generate formation histories for archaeological sites based on the physical sequence of sediments and archaeological deposits. Since site formation processes operate in both the natural and cultural realms (Schiffer 1987), a site formation history includes identifying and interpreting archaeological materials in terms of 1) transport and transformation by human activities; 2) the effects of post-occupation, pre-burial taphonomic processes; and 3) changes imposed by post-depositional alterations.

Considerable variability exists in size, internal composition, function, and occupational history of shoreline archaeological sites. Since the specific history and function of shoreline archaeological sites may vary across both space (function of location) and time (function of landform evolution), this facet of the geoarchaeological analysis will use aspects of site structure, internal constituents, and spatial distribution to address the following issues:

- What are the horizontal and vertical boundaries of the site within the Air Force property?
- What is the range of internal stratification expressed within the archaeological deposit?
- How much place-to-place variability is exhibited by the archaeological deposits, and can this be related to micro-habitat substrates on the cuspate foreland?
- Are potential habitat substrate changes represented through time in the archaeological record?
- How old is the site and for how long was it occupied?
- What post-depositional processes have occurred at the site?

Data classes from the site that may be applied to these questions include physical site parameters, the stratigraphy of deposits, the character and content of the archaeological deposits, datable materials, and the historic record.

Cultural Processes: Aspects of the site occupants' lifeways include such parameters as demography and cultural processes such as economy, subsistence, and cultural continuity. Answers to questions about the people who lived at the site require adequate samples of the implements they made and used, the remains of food they ate, and evidence of their dwellings or other structure or features they built. Additional information about the times of the year that the site was occupied can be found in seasonally diagnostic animal and plant remains and microscopic analysis of seasonal indicators on shells. How the lifeways of the pre-contact occupants of 45SN393 compared to the Indian communities living in the vicinity of Mukilteo after contact can be investigated by comparison of archaeological data with ethnohistoric and ethnographic observations, Native American oral tradition, and information from contemporary tribal members. The specific questions and goals of the research include:

- How many people lived at the site? Is there evidence of the intensity of human occupation at the site, or that it changed over time?
- Is there evidence for dwellings or other structures at the site?
- Is there evidence for particular seasons of occupation?
- Can specific site activity areas be differentiated at the site?
- What were the economy and subsistence of the occupants, and did they change over time?
- Is there evidence for continuity in occupation from pre-contact occupants, to the Native American communities recorded by ethnographers, to modern Tribal communities?

Data classes from the site that may be applied to these questions include structural remains, activity areas, features, faunal and botanical remains, artifacts, artifact residues, oral testimony, and data from previous investigations.

Regional Syntheses: Site 45SN393 is part of a larger settlement pattern that was used by its occupants, and also part of the larger network of settlements in which different Native American communities interacted. Placing this site into a larger temporal-spatial framework involves addressing questions of culture history and exchange. Quantitative and qualitative comparison of data from other sites in the region provides information on how 45SN393 relates chronologically and culturally to the rest of Puget Sound.

- Do the data collected from this site allow it to be placed within larger patterns of Native American occupation of the Puget Sound region, including existing culture-historical frameworks?
- Is there evidence of exchange or other external relationships?

Data classes from the site that may be applied to these questions include structural remains, activity areas, features, faunal and botanical remains, artifacts, artifact residues, oral testimony, and data from previous investigations.

Geoarchaeological and Archaeological Field Studies

Geoarchaeological investigations in 2006-2007 focused on retrieving data pertinent to establishing the physical framework of the site deposits, identifying the extent and context of the archaeological deposits, and constructing a preliminary landform history. Goals of the archaeological studies overlapped the geoarchaeological goals, and included finding archaeological material beneath historic fill; establishing site boundaries, content, and integrity; and evaluating research potential. The study area for these investigations was the portion of the APE extending from approximately Tank Pad 1 to Tank Pad 4 and from the shoreline to First Street (Figure 17).

Archaeological Testing Methods – Trenching and Coring

Initial archaeological field methods were designed to accomplish the goal of testing archaeological deposits within the project APE for eligibility to the National Register of Historic Places. Testing involved defining the site boundaries and assessing the data potential and integrity of the deposits. The field methods were somewhat unconventional for archaeological testing given that, 1) much of the ground surface across the APE is impermeable (e.g., concrete tank pads and the pavement of Front Street), 2) the archaeological deposits are under one to four meters (three to 13 feet) of modern and earlier historic fill in most places, 3) the likelihood of encountering sediments contaminated with petroleum and other hazardous materials during the investigation was considered high, and 4) the effects of tides on ground water elevations was difficult to predict. The impermeability of the ground surface and inaccessibility of the underlying archaeological deposits precluded hand-excavation techniques, and the presence of contaminated sediments required close monitoring of all field activity and samples taken.

Field work was scheduled to coincide with the lowest possible tides. A combination of backhoe trenches and solid four-inch diameter cores were excavated throughout the APE to accomplish the goals of testing. Data from eight previously excavated geotechnical boreholes reported by Anchor Environmental, L.L.C. (2006) in the study area and off-shore immediately north were also reviewed. The trench profiles provided quantitatively comparable midden samples, radiocarbon dates, and an indication of the integrity of the site deposits. The spoils from archaeological layers in the trenches provided a source of archaeological material that would possibly have been missed in small midden bulk samples, such as artifacts and larger mammal bone. Stratigraphic sequences from solid cores provided geological information about the landform on which the site is situated and presence-absence data on the spatial extent of site deposits.

Fieldwork was conducted by WSDOT backhoe and mud-rotary drill operators and sub-contracted sonic core operators, supervised by NWAA archaeologists. Prior to the commencement of fieldwork and several times during the project, a representative from Herrera Environmental Consultants, Inc. oriented the field crew to potential on-site hazards and monitored all of the trenches and many of the cores with a Photo Ionization Detector (PID), a portable vapor and gas detector that can sense organic compounds. All WSDOT safety protocols were followed. Standard daily work record forms were completed by NWAA archaeologists, along with photograph logs and artifact and sample bag catalogs. Mapping of features and test units was completed using a Trimble GeoExplorer hand-held global positioning system (GPS) receiver.

Figure 18. Location of boreholes, trenches, and cross sections contains sensitive cultural resources information that is exempt from public disclosure pursuant to provisions of the Public Records Act (RCW 42.56.300).

Figure 18. Location of boreholes, trenches, and cross sections (see Appendix B for core and trench numbers).

Trench Excavation

Sixteen trenches were excavated between July 20 and July 26, 2006, timed to minimize the effect of tidal inundation on stratigraphic profile exposures (Figure 17). Trenches were dug with a backhoe using a four foot-wide bucket initially equipped with teeth but later replaced with a straight blade to provide cleaner exposures of the trench wall and base. The trenches were excavated 4.5 feet (1.4 meters) deep before metal shoring boxes were inserted. NWAA archaeologists periodically halted excavation to examine the exposure of the trench profile. Excavation of each trench ceased when at least several feet of sterile beach deposits were encountered or the water table was reached. A schematic of the stratigraphy for the roughly three-foot wide profile at the head of each trench was recorded on a standard Trench Description Form, which included a graphical representation of the deposits to vertical scale, narrative descriptions of the deposits, and a list of samples and artifacts taken from the profile. Depths of profile strata below ground surface were based on a datum spike or point placed as close to the head of the trench as possible, and recorded with the GPS unit.

Trenches 1, 2, 5, 6, 8, 11, 13, and 14 were placed along [redacted] corresponding with the predicted location of the barrier berm and shell midden, [redacted] Trenches 7 and 12 were placed [redacted] to characterize what were assumed to be beach deposits seaward of 45SN393. The remaining trenches were placed to the south of 45SN393 in what was predicted to be the former tidal lagoon. Trenches 3 and 4 were placed in an alignment south of Trenches 1 and 2; Trenches 9 and 10 were placed south of Trench 8; and Trenches 15 and 16 were placed south of Trench 14 (Figure 17; Appendix B). Table 1 summarizes the trench locations, dimensions, and sediments encountered during their excavation.

Spoils from the trenches in which Native American midden deposits were encountered were screened, including those from Trenches 5, 6, 8, 11, 13, and 14. Sediment from the archaeological layers, identified by their dark, charcoal-rich staining and association with fire-modified rock, shell, and bone, were stockpiled separately from the overburden and deeper sterile beach sediments. The archaeological sediments were passed through ¼-inch mesh screens by NWAA archaeologists supervised by an osteology specialist who examined each bone fragment to determine whether or not it was from a human. All artifacts and unmodified mammal bone fragments from the spoils were bagged with the general provenience of trench number, and brought to the NWAA lab for cataloguing and further analysis. Spoils from Trench 3, which encountered a concentration of early historic artifacts and faunal remains below plank decking of the Crown Lumber Company mill, were stockpiled and examined by hand. Diagnostic historic artifacts and faunal remains were collected from this pile.

Supervising NWAA archaeologists examined each trench profile and took samples from cultural strata. Constant-volume samples of one liter were obtained. CVS samples either came from a column at regular 10-centimeter intervals to obtain a continuous sedimentary sequence, or from within a specific layer to characterize the midden stratigraphy. Botanical samples were also taken from some profiles, either as isolated charcoal fragments or as bulk samples of charcoal-stained sediments.

Archaeological Borehole Sampling Program - 2006

The borehole sampling program drilled 85 boreholes throughout the Tank Farm between August 7 and September 9, 2006 (Figure 17). Forty-five boreholes were drilled using mud rotary methods; the

remaining 40 were excavated using a truck-mounted sonic drill. Total depths of the boreholes ranged from 6.7 feet to 40 feet deep for a total of 1469.7 drilled linear feet (Appendix B).

The mud rotary drilling system drove a four-inch-diameter sampler in two-foot or five-foot increments using a 140-pound hammer (Figure 18). Because of difficulties with retaining samples in the core barrel and due to percolation of groundwater and drilling mud through the sample, which removed the fine fraction sediments, use of the mud rotary drilling system was limited to the areas of the project where archaeological deposits were likely to be absent.

The sonic drilling method (also called vibracoring) used a rapidly oscillating drill head to advance a 20-foot-long core barrel (Figure 19). Coring started at two feet below the surface, the barrel was advanced to 15 fbs, and the resulting core sample was extruded directly from the core barrel in two to five-foot increments into plastic sleeves. The sleeves were then laid out in order, cut open, logged, and if midden was present, sampled (Figure 20).

For both mud rotary and vibracore drilling methods, sections of core samples in which midden was found were photographed and bulk samples were collected in 4-inch (10 cm) long increments through the length of the midden. Radiocarbon dating samples were retrieved and bagged separately.

The borehole sampling program followed a drill plan drawn up before fieldwork began. As drilling proceeded, locations of selected individual boreholes were modified depending on the field results showing the spatial extent of deposits. Each borehole was numbered in the field with an AH or other letter designation

Figure 19. The mud rotary drilling rig.

Figure 20. The sonic drilling or vibracore rig.

Figure 21. Inspection of vibracore samples.

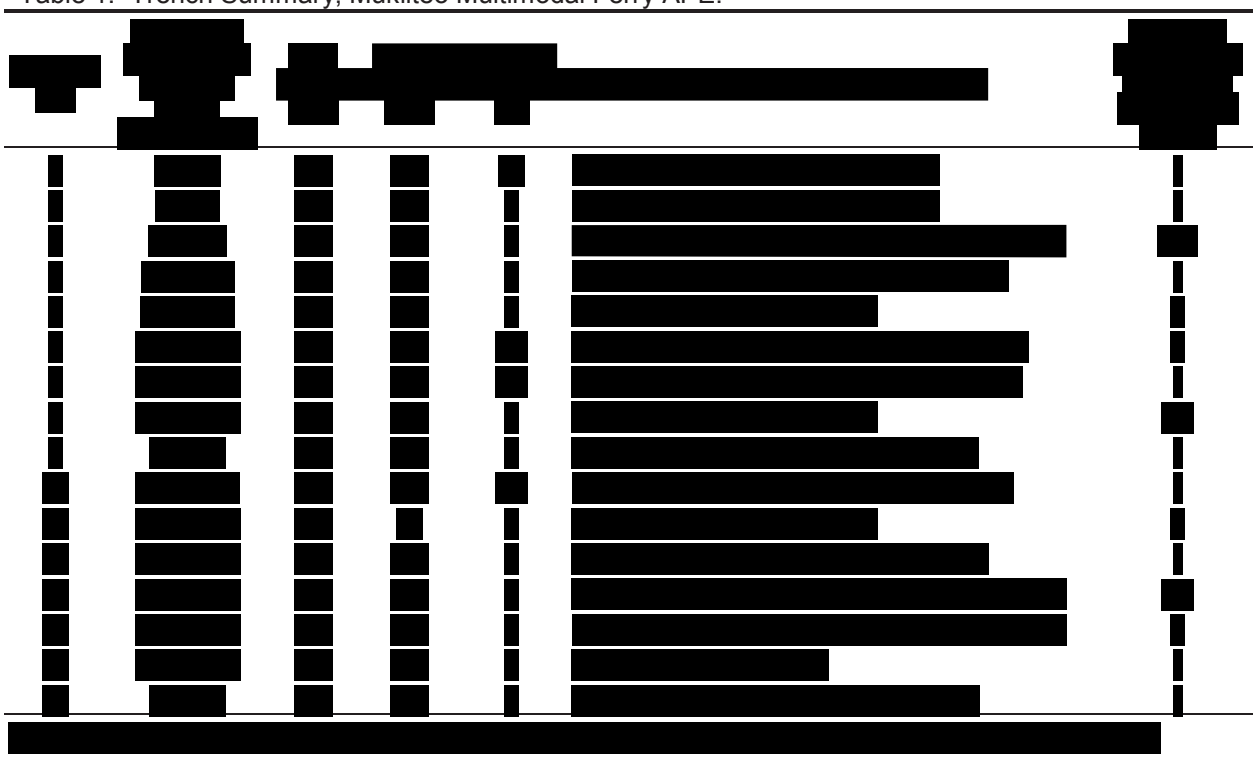
followed by an Arabic number, but for purposes of reporting the results, the AH/letter designations were dropped in favor of using a way to refer to the drilling method at each borehole. Boreholes preceded by MR were drilled using the mud rotary method, and those preceded by VC were drilled using the vibracore method.

The borehole drill plan extended from the entrance to the Tank Farm at the corner of Park Avenue and Front Street east to Tank Pad 4. Cores obtained by mud-rotary excavation were primarily limited to the former tidal wetlands located south of Front Street [redacted]. Since the cores obtained by the sonic drill (vibracore method) provided complete stratigraphic sequences, these cores were taken in the vicinity of the midden as well as in other portions of the study area (Figure 17; Appendix B). No boreholes were drilled in Tank Pad 1 or in the northwestern half of Tank Pad 2 during the 2006 investigations because there was about one foot of standing water on the tank pads.

Geotechnical Explorations – 2007

Additional archaeological borehole sampling was conducted in conjunction with geotechnical explorations completed by WSDOT in 2007 to assess load-bearing stability for proposed structures in the study area. During two phases of field work between March and October 2007, archaeologists logged 22 archaeological cores and monitored 28 geotechnical boreholes in the study area (Figure 17). Archaeological cores were drilled using the vibracore method described above, while the monitored

Table 1. Trench Summary, Mukilteo Multimodal Ferry APE.



geotechnical boreholes used mud rotary or hollow-stem auger drilling methods. All boreholes were recorded by archaeologists in the field using the methodology devised for the 2006 borehole sampling program; however, bulk samples were not retrieved from the boreholes during geotechnical explorations in 2007.

Between March 6 and April 22, 2007, three archaeological boreholes were logged and seven geotechnical boreholes were monitored on the Tank Farm Property, and 11 geotechnical bores were monitored off-shore immediately north of the property. Between October 9 and 24, 2007, a total of 19 archaeological boreholes were logged and 10 geotechnical boreholes were monitored at the Tank Farm Property and in the vicinity of the existing ferry terminal on Front Street. Boreholes were logged or monitored to total depths between 12 and 110 fbs (Table 2).

Table 2. Summary of Archaeological and Monitored Geotechnical Boreholes.*

TYPE OF BOREHOLE	NO. OF BOREHOLES	NO. OF MONITORED LINEAR FEET
2006 Boreholes		
Archaeological Mud Rotary	45	869.7
Archaeological Vibracore	28	600.0
	73	1469.7
2007 Boreholes		
Archaeological Boreholes	22	333.0
Geotechnical Boreholes	28	2497.9
Sub Total	50	2830.9
TOTAL	123	4300.6

*Archaeological boreholes are dug for archaeological purposes, while geotechnical boreholes are dug for geotechnical exploration. Geotechnical boreholes, however, like those noted here, may be monitored (examined) 1by archaeologists.

Archaeological borehole sampling completed during 2007 WSDOT geotechnical explorations included 17 cores in the Tank Farm property (Figure 17). Three cores were excavated in Tank Pads 1 and 2 [redacted], since cores had not been drilled in this area during the initial borehole sampling project. The remaining 14 cores extended the drill plan east to the eastern wall of Tank Pad 6 [redacted]

Due to proposed alterations to the existing ferry terminal, geotechnical explorations in October 2007 expanded the study area westward to include the vicinity of the existing terminal. At this time five additional archaeological cores were excavated on Front Street, at the Ferry Terminal Building site, and along SR 525 (Figure 17) [redacted] in the expanded study area.

The geotechnical boreholes were archaeologically monitored to further examine site stratigraphy near the site boundaries. Boreholes were monitored along Front Street just north of the tank pads and at the ferry boat loading ramp near the existing ferry terminal. In order to provide additional context for developing a landform history, boreholes off-shore immediately north of the study area were also monitored.

Classification of the Deposits

The trenching and coring programs revealed a complex array of individual depositional layers (lithofacies or facies) representing single depositional events. The facies are lateral changes in the lithologic

characteristics of deposits within a stratigraphic unit and are defined using physical properties of the sediments, hence the term lithofacies (Boggs 1995; Reading 1986). Facies analysis derives environmental interpretations from depositional sequences based on the principle that lateral shifts through time in the boundaries of adjacent depositional environments are represented vertically in the stratigraphic record by corresponding shifts in facies boundaries.

The facies type is the fundamental depositional unit in a spatial hierarchy that locates the individual facies type relative to the surrounding deposits, thus providing a way to determine the environment of deposition for an individual layer. The concept of facies association or assemblage provides the organizing principle for analysis at the next higher level in the depositional hierarchy. The facies types grouped into assemblages are considered to have been deposited adjacent to each other or in vertical succession in the same environmental setting. The lithofacies can be formed into assemblages because they represent the range of depositional events that frequently occur together in the same overall depositional environment. Lithofacies become stacked into stratigraphic units because the environments shift through time, permitting different lithofacies to accumulate along a vertical axis (Miall 2000:150).

Facies assemblages are the basic unit of analysis for this project and are defined by facies that share distinctive lithologic features or by stratigraphic relationships (that is, by the nature of their vertical or lateral boundaries). The advantage of this level of analysis is that it allows one to see more clearly associations between sediments and landforms (Bennett and Glasser 1996; Miall 2000). These larger, more inclusive units share common attributes such as gross geometry, shape of the units, and structure. Like the concept of facies, a facies assemblage is descriptive and is used to represent various types of depositional events that frequently occur together in the same overall depositional environment (Miall 2000). For the analysis of 45SN393 these facies assemblages are called strata, and each is composed of any number of individual lithofacies.

Table 3 shows how the classification system has been organized, and shows both the strata designations and the lithofacies nomenclature. Lithofacies are designated by a capital letter that indicates the dominant or primary grain size of the deposit. This capital letter is followed, in most cases, to its right side by a small letter describing a distinct secondary property of the same deposit. Secondary properties can be added indefinitely. For example, a gravelly sand would be designated Sg, and gravelly sands may be found as a component in a number of strata. Stratum II and Stratum IV, for example, both contain gravelly sands, but Stratum II is distinguished from Stratum IV by having archaeological facies such as sandy midden (Sae) or shell-rich sandy midden [S(ae, sh)], whereas Stratum IV does not contain archaeological layers but does have a few thin layers of detrital wood (Wd) or thin peat (Pw or Pf).

The system's purpose is to provide adequate descriptive data at small scales while sustaining geomorphic and landscape analyses at larger scales. Analogous to landscape elements in ecology, facies assemblages can be thought of as elements, or minimal homogenous parcels of land (Forman and Godron 1986; Stafford 1995), that are often arranged in patterns and exhibit varying degrees of connectivity and heterogeneity (Forman 1995). The geomorphic expression of facies assemblages at a larger scale are often referred to as geomorphic units, for example beaches, fans, and spits, which actually consist of smaller, well-defined, elements.

Table 3. Naming System Used to Classify the Depositional Sequence at 45SN393.

STRATUM DESIGNATIONS	LITHOFACIES	
	Modal Grain Size	**Modifiers**
I – Fill **II** - Midden **III** - Sandy barrier/berm deposit **IV** - Beach sediments **V** - Submerged sandy barrier/berm?	**G** = Gravel (> 2 mm) **S** = Sand (0.62 mm - 2 mm) **Z** = Silt (< 0.62 mm) **P** = Peat **W** = Wood	**Midden facies modifiers:** **Ah** = humic A horizon (may be charcoal-enriched as well) **ae** = generalized, or undifferentiated, midden; also used to designate archaeological layers in Stratum III. **f** = highly fragmented shell ("hash"). **sh** = high amount of shell **Secondary Lithologic Properties** **g** = gravelly **s** = sandy **z** = silty **m** = massive **sh** = shell or shelly **o** = organic-rich **p** = peaty **w** = woody peat **f** = f brous peat **d** = detrital wood (sea wrack, driftwood) **h** = historical wood **om** = organic layer, but not a peat **tr** = trace amount

The geomorphic concept of elements fits in nicely with the archaeological concept of place, defined as a set of landscape elements configured in a way that offers a higher probability of serving as a stopping point within a group's given settlement and economic system (Binford 1982; Wandsnider and Sullivan 1998). A landform may exhibit many elements but only a subset of the elements may actually possess the requisite characteristics to serve as attractive places for human hunters and gatherers. Furthermore, over time, different human mobility strategies in a region may share the same configuration of elements, creating localized high-density accumulations of artifacts at places due to re-use over long periods of time (Dewar et al. 1992; Stafford et al. 1992). By describing the geomorphic elements of a landform, the facies system provides a framework for relating cultural deposits to a geomorphic context.

Borehole Data Analysis

After completion of the initial fieldwork in 2006, the borehole data was compiled using Rockworks 2006 software. The lithostratigraphic classification of the deposits was used to create profiles of the archaeological deposits and to model site stratigraphy. The configuration of the boundary of the pre-contact archaeological site was determined based on the location of boreholes in which midden deposits were identified. Archaeological work completed during geotechnical explorations in 2007 extended the site boundary and further clarified the structure of the site deposits. Once a comprehensive model of site stratigraphy had been created, the borehole lithologic sequences were reevaluated based on expectations of the stratigraphic positioning of the midden deposits at the base of Stratum I, within Stratum II, and at the top of Stratum III.

Artifact and Sample Processing Methods

Artifacts and samples were brought to the NWAA lab from the field, and after being screened or sorted, were catalogued with unique numbers for artifacts and separate sample constituents (Appendix C). Artifacts were dry-brushed to remove dirt, and all samples were placed on trays and dried using a low

power drying oven. Constant-volume samples were passed through nested ¼-inch, ⅛-inch, and 1/16-inch sieves. In most cases, the 1/16-inch fraction was bagged without further sorting, and the ⅛-inch fraction was sorted into major constituents (shell, bone, charcoal, lithics, unmodified pebbles) and the artifacts and bone fragments analyzed further. The ¼-inch fraction was sorted into major constituents, and all faunal remains and cultural materials were analyzed. Bulk samples, primarily obtained for charcoal and other macrobotanical remains, were also placed on trays, dried, re-bagged and then sent to a paleoethnobotanist for further analysis.

All artifacts were analyzed at the NWAA laboratory, including lithic and bone artifacts and historic artifacts. The bulk samples for botanical analysis were split into two equal volumes. One half of each of 13 samples, plus one charcoal sample, were sent to Demeter Research, who separated and identified charcoal from the samples and assessed their suitability for radiocarbon dating. Later, the remainder of each sample was recombined with the other half of the original sample for a more comprehensive botanical analysis. Eight charcoal samples from the top and bottom of midden deposits exposed in four of the test trenches were submitted to Beta Analytic, Inc. for radiocarbon assay. These samples were of charcoal separated from the bulk samples and judged moderately suited or well-suited for dating.

Shell from the ¼-inch fraction and animal bone from the ¼-inch and ⅛-inch fractions of each trench CVS were analyzed, along with all bone collected from the trench spoils screening. Borehole bulk samples were screened in the laboratory and raw shell counts were obtained from the ¼-inch fraction. Shell and fish bone analysis was completed using NWAA comparative collections, which contain modern specimens of most representative taxa of these classes found throughout Puget Sound. Mammal bones were sorted in the NWAA laboratory and then taken to the Mammalogy skeletal collection at the Burke Museum of Natural History and Culture for further analysis by the NWAA zooarchaeologist. Bird remains were analyzed by Dr. Kristine Bovy (University of Rhode Island) using comparative material at Department of Ornithology of the Harvard Museum of Comparative Zoology. Analytical methods specific to material type are described in the individual results sections below or accompanying appendices.

Stratigraphy

The physical structure of the site was resolved into six strata with each stratum consisting of one or more facies. Stratum I, representing deposits associated with historic and modern land use, was not subdivided into individual facies. Strata II, III, IV, and V consisted of several distinct facies types related in complex ways. Stratum VI, the deepest deposit identified at the site, was observed in a limited number of boreholes and consisted of only a few facies types. Table 4 summarizes the composition of each stratum and the inferred environmental conditions under which each stratum was formed.

Table 4. Composition of Site Strata and Inferred Environments of Deposition.

STRATUM	DESCRIPTION	LITHOFACIES	INFERRED ENVIRONMENT OF DEPOSITION
I	Deposited since the beginning of historical occupation of the landform; includes early historical debris.	Not formally subdivided	Fill
II	The culture-bearing facies assemblage representing archaeological deposits created by pre-contact cultural activities on the landform.	**S** - sand; **Sg** - gravelly sand; pebble-sized gravel; **Aae** and **ae** - Undifferentiated midden matrix; **Ah** - A thin A horizon formed between occupations; **cs** - charcoal-stained; **sh** - shell/shelly	Archaeological midden on emergent portion of spit.
III	Moderately well-sorted sand containing few pebbles and fragmented natural shell; upper portion occasionally contains isolated archaeological deposits.	**S** (**ae**) - Culture-bearing sand **S** (**cs**) - Charcoal-stained sand **S** (**sh**) - Sand with crushed shell layer **Sg** - Gravelly sand **Zs** - Sandy silt	Beach barrier/berm cap overlying Stratum IV.
IV	Loosely consolidated pebbly sand and sandy pebble-gravel with detrital wood fragments (driftwood) and sea wrack; in places, submerged wetlands deposits.	**Sg** - Gravelly sand **Gs** - Sandy gravel **Wd** - Detrital wood (driftwood) **P** with **f** or **w** - Fibrous (f) or woody (w) peat.	Beach and spit
V	Moderately well-sorted medium sand containing fragmented natural shell.	**S** - Sand	Too few exposures to determine; may represent a submerged older barrier/berm.

Stratum I

Stratum I consists of all sediments deposited on the landform resulting from land use activities associated with the historic era and later by the Air Force (Figure 21). Formally, the deposits associated with the early town of Mukilteo and the operation of the Crown Lumber Company are included with this stratum, since this represents land use activities that have affected the archaeological deposits associated with pre-contact land use activities. In most places on the landform it is presumed that the top of Stratum II has been truncated, to an unknown depth, by activities associated with deposition of Stratum I.

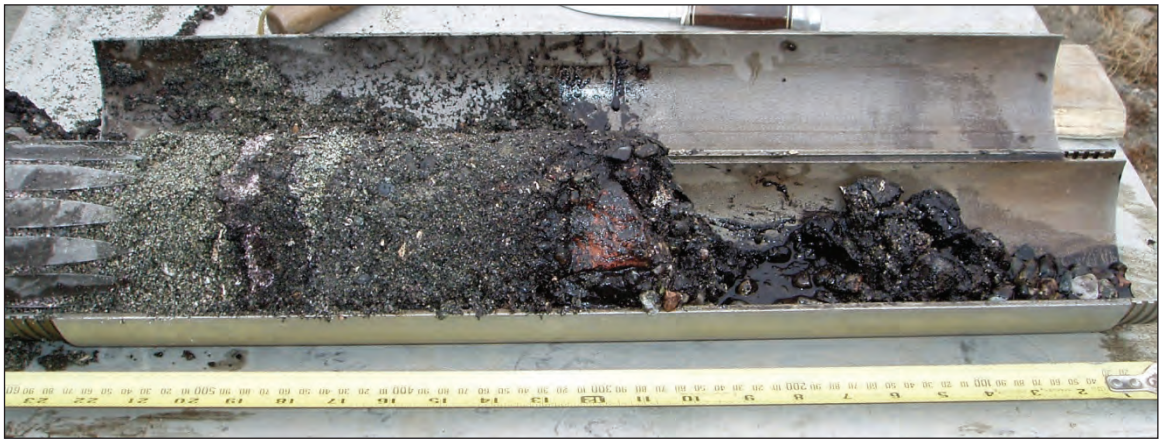


Figure 22. Typical expression of Stratum I, note the brick fragment at center.

Stratum II

Stratum II is the well-stratified archaeological midden depositional sequence [redacted] (Figure 22). This stratum includes archaeological facies (see Table 4) representing human-induced deposits associated with shifting locations of cultural activities during occupations of the spit. Figure 23 compares the stratigraphic sequences with the lithology from selected boreholes to show the internal structure of the midden and the high degree of place-to-place variability in the local depositional sequences; Figure 24 shows detailed profiles from selected backhoe trenches. Both figures show the archaeological deposits are periodically interbedded with a distinct moderately to well-sorted yellowish brown sand. Based on the lithology and the fact that they interbed with the archaeological deposits, the sand layers are interpreted to represent sandy overwash deposits created by waves breaking over the spit during storm events.

Figure 23. Typical expression of Stratum II, showing well-stratified midden deposits.

Stratum III

This is a thin layer of sand [redacted] extending laterally beyond the boundaries of the overlying Stratum II (Figure 25). Sediments comprising this stratum are predominantly moderately well-sorted to well-sorted medium to fine sand, with few pebble-sized gravels. Although the overlying Stratum II is composed of archaeological deposits associated with development of the midden, culture-bearing deposits are also found in the upper portion of the Stratum III sand underlying Stratum II. The shell content of these layers is considerably lower than those associated with Stratum II, and the facies tend to be thin charcoal-stained layers, or if shell is present, it is expressed as an isolated thin layer of finely crushed shell. In general, the lower contact of Stratum II with Stratum III is defined by a rapid decrease in cultural shell content and by a decline in the overall amount of pebble-gravel. Figures 26 and 27 show a series of north-south cross sections [redacted] see Figure 17). As can be seen from these cross sections, in almost every case where the Stratum II midden was found in the backhoe trenches or boreholes, the midden is found resting directly on Stratum III.

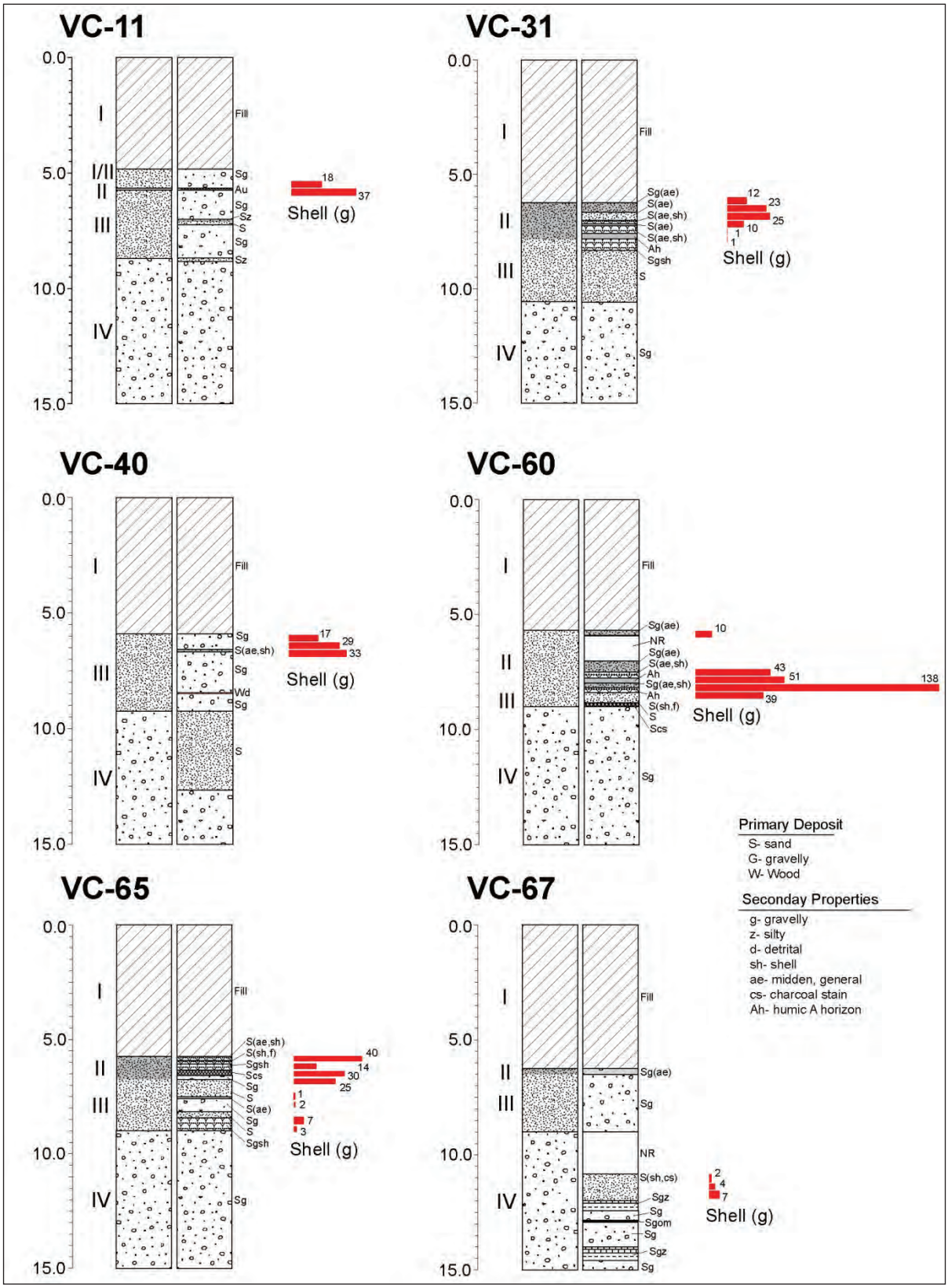


Figure 24. Stratigraphic sequences from selected boreholes showing the internal structure of the midden.

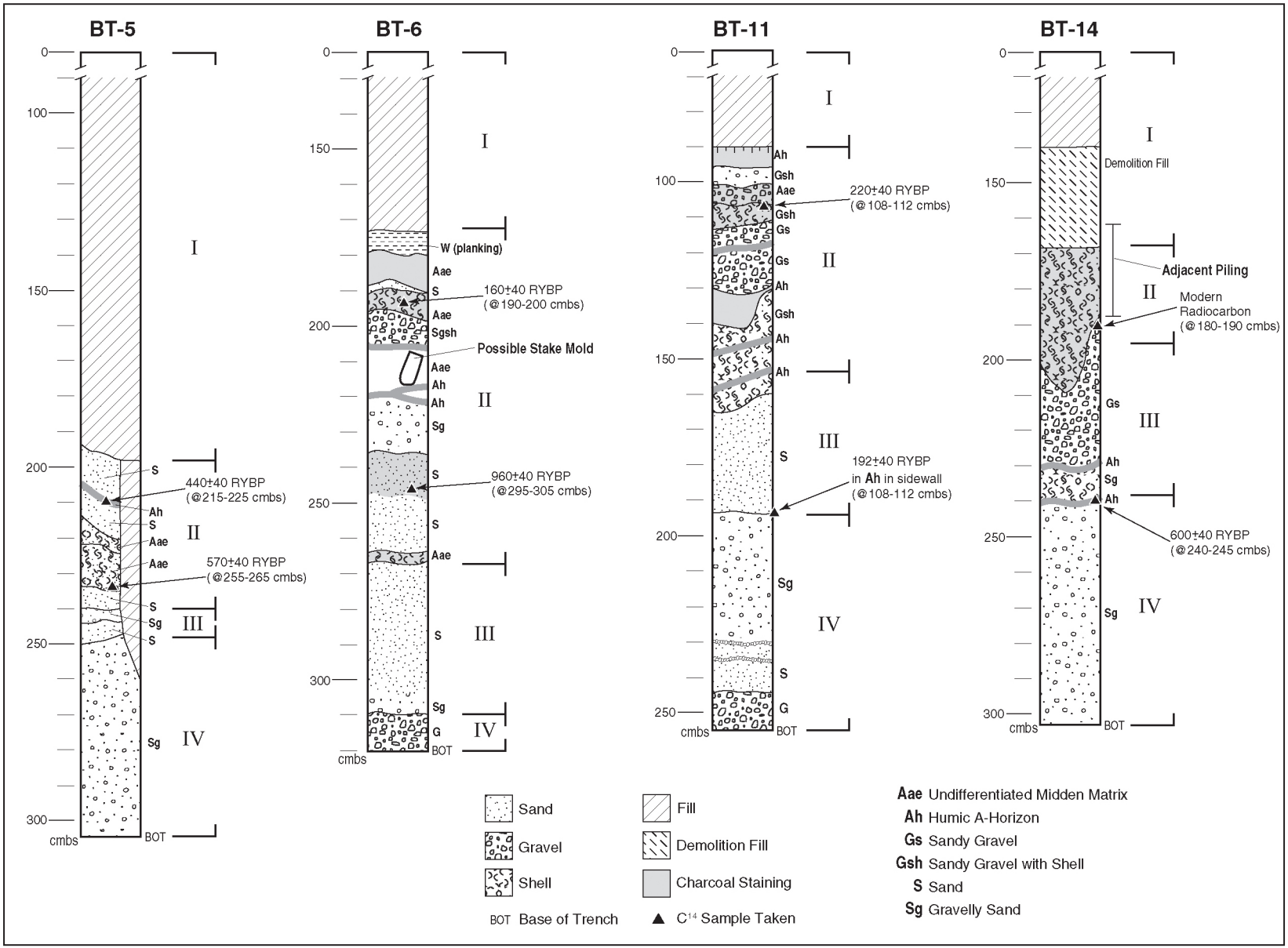


Figure 25. Detailed profiles from selected backhoe trenches.

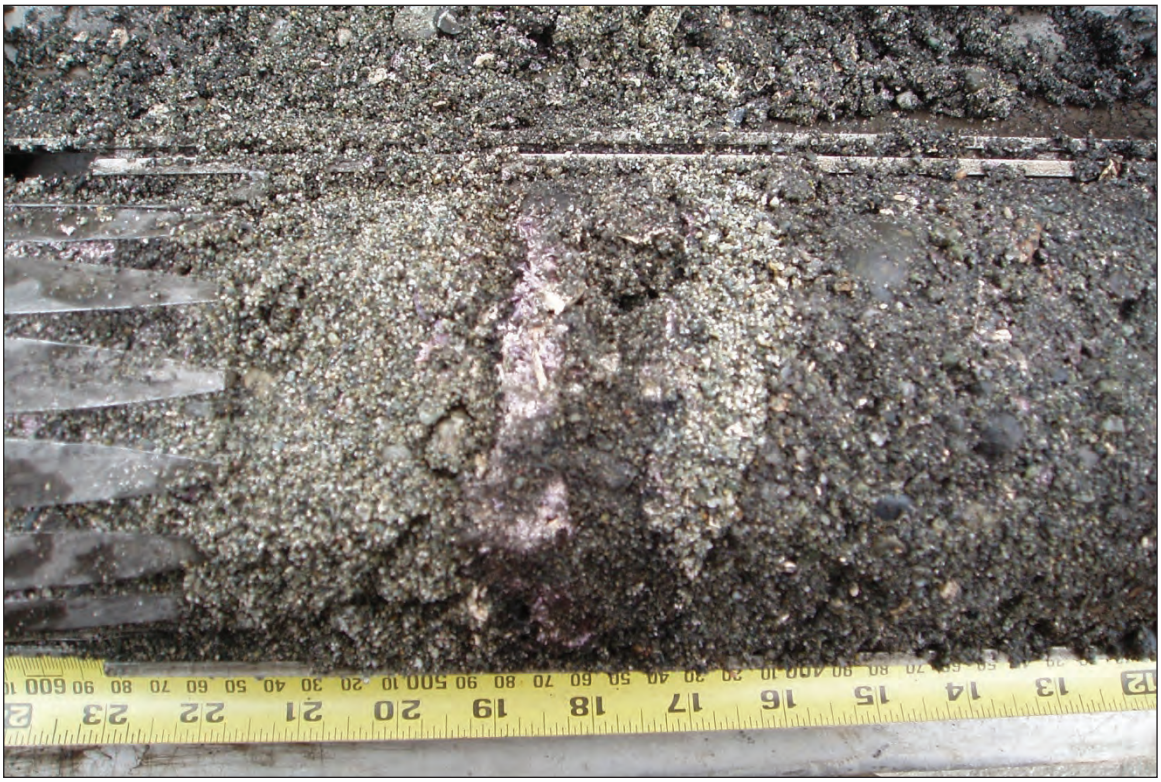


Figure 26. Typical expression of Stratum II (right) overlying Stratum III (left).

Stratum IV

By volume, Stratum IV is the most extensive stratum, occurring throughout the study area. The lithology is dominated by loosely consolidated sediments ranging between coarse sandy pebble-gravel and gravelly coarse sand (Figure 28). The vertical sequence, however, exhibits subtle bedding characterized by shifts in facies from woody debris to thin ephemeral fibrous and woody peats to muddy sand and gravel layers. Occasionally, a rip-up clast composed of weakly consolidated mud with dispersed granules (very fine pebbles) was retrieved, and in the eastern portion of the project area closer to the mouth of Japanese Gulch, there appeared to be a slight increase in the number of naturally fractured angular gravel.

These variations in the basic Stratum IV depositional sequence are thought to represent the formation of ephemeral driftwood zones or thin fringing wetlands during pauses in the accumulation of the stratum. The muddy rip-up clasts may be reworked glacial till introduced into the depositional sequence by erosion of the bluff to the south prior to emergence of the spit, or by debris flows coming out of Brewery Gulch and Japanese Gulch.

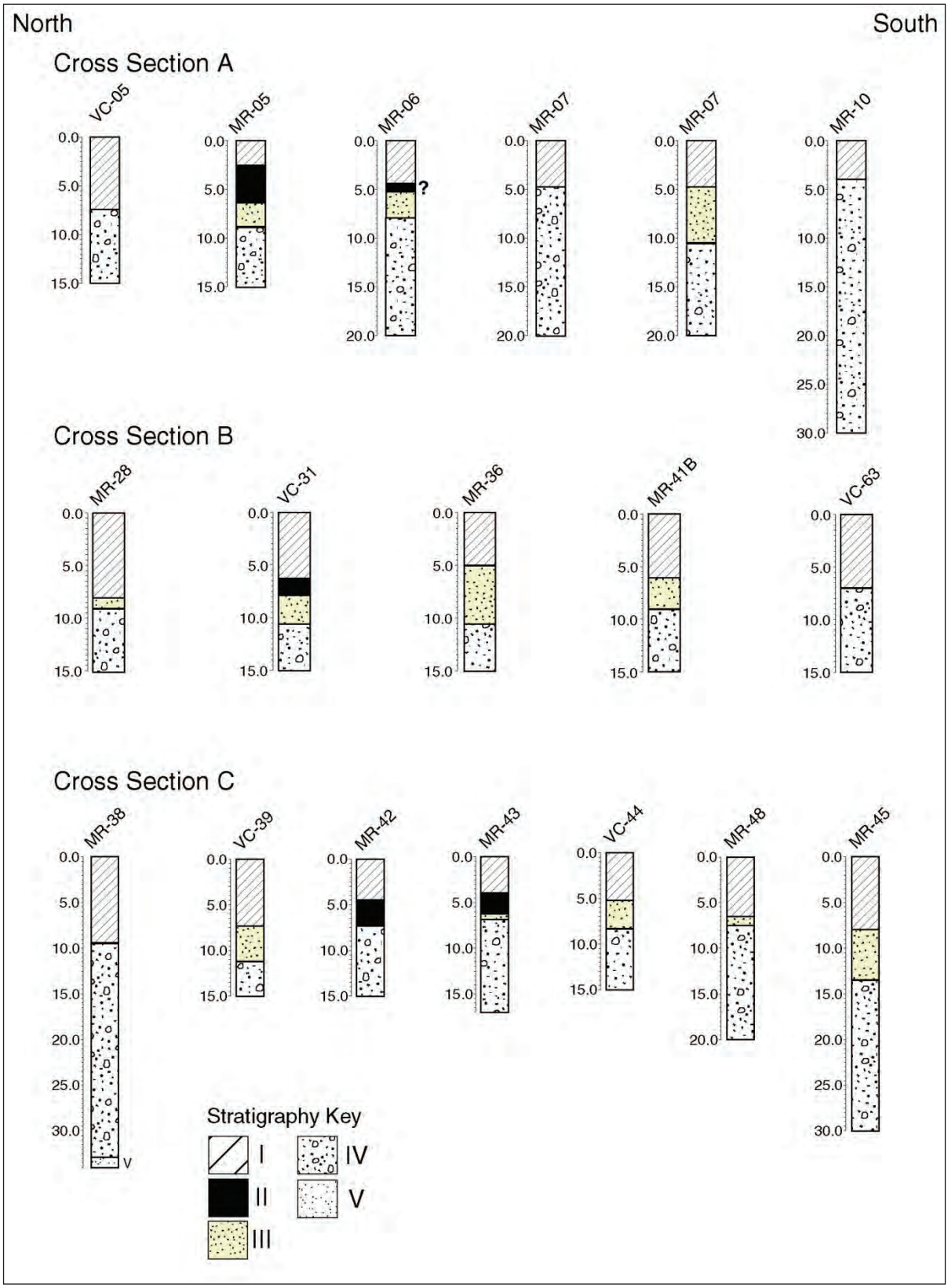


Figure 27. Cross Sections A through C (see Figure 16 for cross section locations).

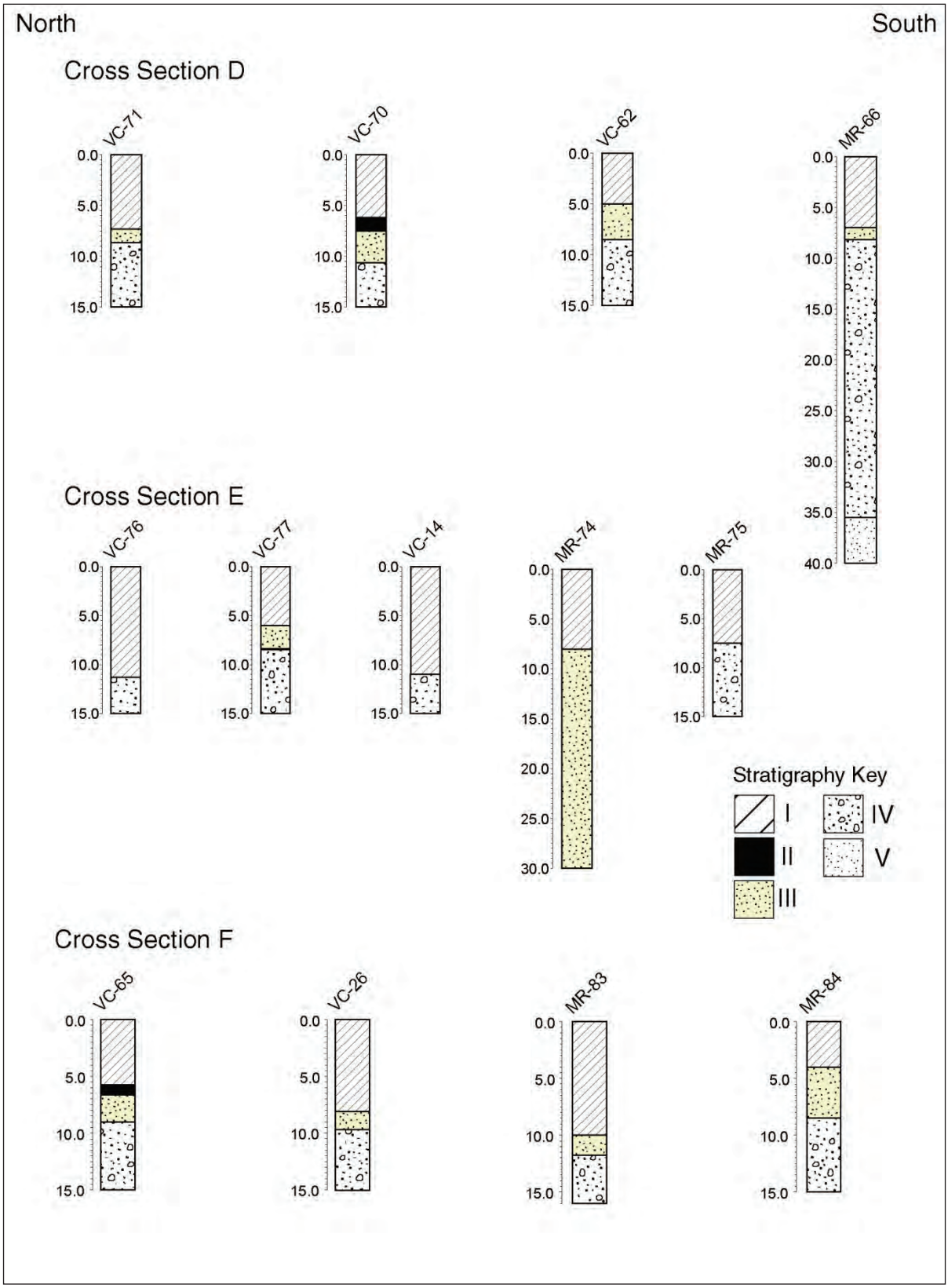


Figure 28. Cross Sections D through F (see Figure 16 for cross section locations).

Figure 29. Typical expression of Stratum IV.

The isolated branches and twigs scattered throughout Stratum IV are interpreted to represent pieces of driftwood caught on the exposed beach through time as Stratum IV accumulated. A zone of fibrous peat, sea wrack, and driftwood was consistently found at depths ranging between about 12 and 17 feet below surface (fbs), and was best-expressed in a group of boreholes in an area centered on MR-59 [redacted] (MR-45, MR-48, MR-51, MR-52, VC-53, VC-57, MR-59, MR-66, MR-68, and MR-79). Figure 29 shows the stratigraphy and lithology for selected boreholes [redacted]; the peat and detrital wood layers appear in the Stratum IV deposits in the boreholes [redacted]. The peat gradually thinned eastward and was replaced by branches and twigs probably representing driftwood accumulated around the edge of a small shallow lagoon. To the west, the peat was found in MR 10, [redacted] and in MR-6, [redacted] A radiocarbon sample retrieved from a layer of organic matter, twigs, and fibrous peat in MR-6 at 16.8 fbs (Figure 26), returned an age of 1640 ± 40 radiocarbon years before present (rcybp) (the 2-sigma calibrated calendrical age is AD 1420 to 1500). This represents a relatively rapid accumulation rate of about 5.8 centimeters (2.3 inches) per year for the upper portion of Stratum IV.

In several boreholes [redacted] the top of Stratum IV (or Stratum III when present) is characterized by distinct bedding capped by silt or interbedded organic matter and silt, underlying the fill deposits (Figure 29). This upper sequence is interpreted to represent the emergence of the modern cuspate foreland, and the shift from an open beach to the formation of tidal wetlands.

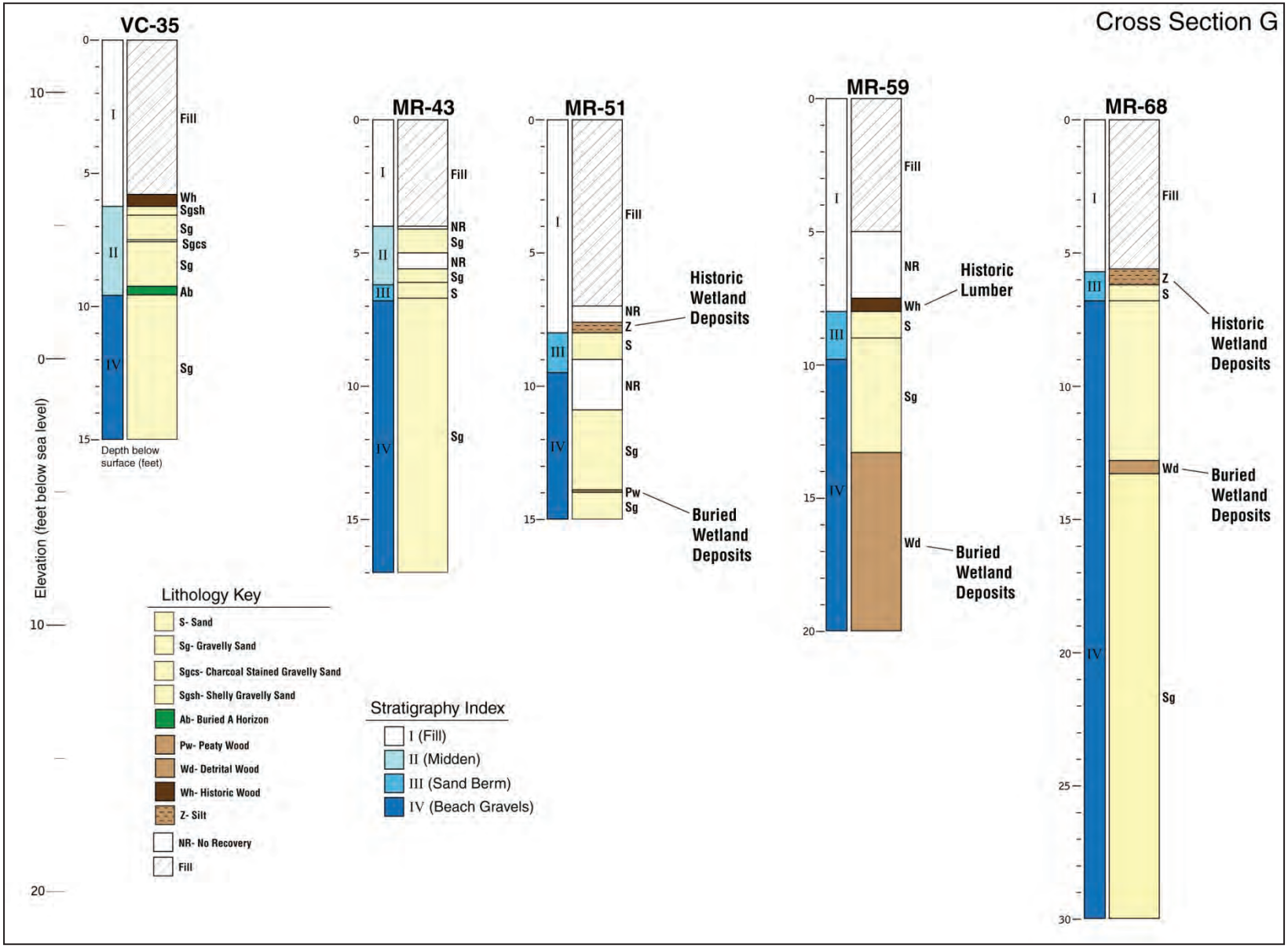


Figure 30. Cross Section G (see Figure 16 for cross section locations).

Stratum V

Stratum V was found in three archaeological boreholes at the deepest depths sampled by the archaeological borehole program, and in nine geotechnical boreholes [redacted] Stratum V is a "clean" sand similar in composition to Stratum III, but with a greater amount of dispersed natural shell fragments. No archaeological materials were found at the upper contact of this stratum, and given the lithologic similarity to Stratum III, it is presumed the clean sand represents a former sandy barrier ridge or berm on a now-submerged spit. In some of the deeper boreholes, the clean sand was found overlying relatively poorly-sorted sequences of gravelly sand marked by an increase in pebble-gravels and higher lithologic heterogeneity. This lower gravelly sand may represent older deposits from the pre-Vashon or Vashon periods; however, the limited number of deep exposures of Stratum V was not sufficient to define the lower sand as a separate facies or stratum.

A facies sequence of fine sand interbedded with lenses of peat and peaty silt between 27 and 60 fbs was found [redacted]. The peat-sand sequences were thickest in A-11, A-12, A-13, and A-14 and thinned eastward to a single peat layer at 45-46.5 fbs in A-15. The thickest peat layers appear as individual facies in the lithologic sequence (Figure 30). The fine sand interbedded with the peat sequences is similar to the clean sand that occurs at a similar depth at the top of Stratum V, and the peat-and-sand sequences may represent an intermittent low-energy environment occurring during the formation of the now-submerged barrier or berm.

Stratum VI

The top of Stratum VI, identified in nine geotechnical boreholes [redacted] between 79 and 110 fbs, is very dense, compact, silt and clay, often poorly sorted with varying small amounts of sand or scattered rounded pebble-gravels. The stratum represents glacial till sediments dating to the Vashon or pre-Vashon periods. Only 10 boreholes within the study area were drilled to the depth necessary to reach the contact with Stratum VI; however, it is presumed the till is laterally extensive throughout the study area [redacted] In the two boreholes drilled to 100 fbs in the vicinity of the existing ferry terminal (B-3 and B-4) [redacted] the contact with Stratum VI was not encountered, suggesting the upper surface of the till exhibits topographic relief.

Figure 31 illustrates stratigraphic relationships among the major geomorphic units. Stratum VI is comprised of glaciogenic till from the Vashon or pre-Vashon periods and represents the oldest deposits identified by archaeological explorations at the site. In its few exposures, Stratum V consistently overlies the till [redacted] As noted above, Stratum IV is ubiquitously distributed across the project area overlying Stratum V. Strata II and III are much more confined in their areal distribution, and are limited to a slight barrier ridge or berm [redacted] with Stratum III extending slightly laterally to the south. [redacted] Stratum II extends laterally southward.

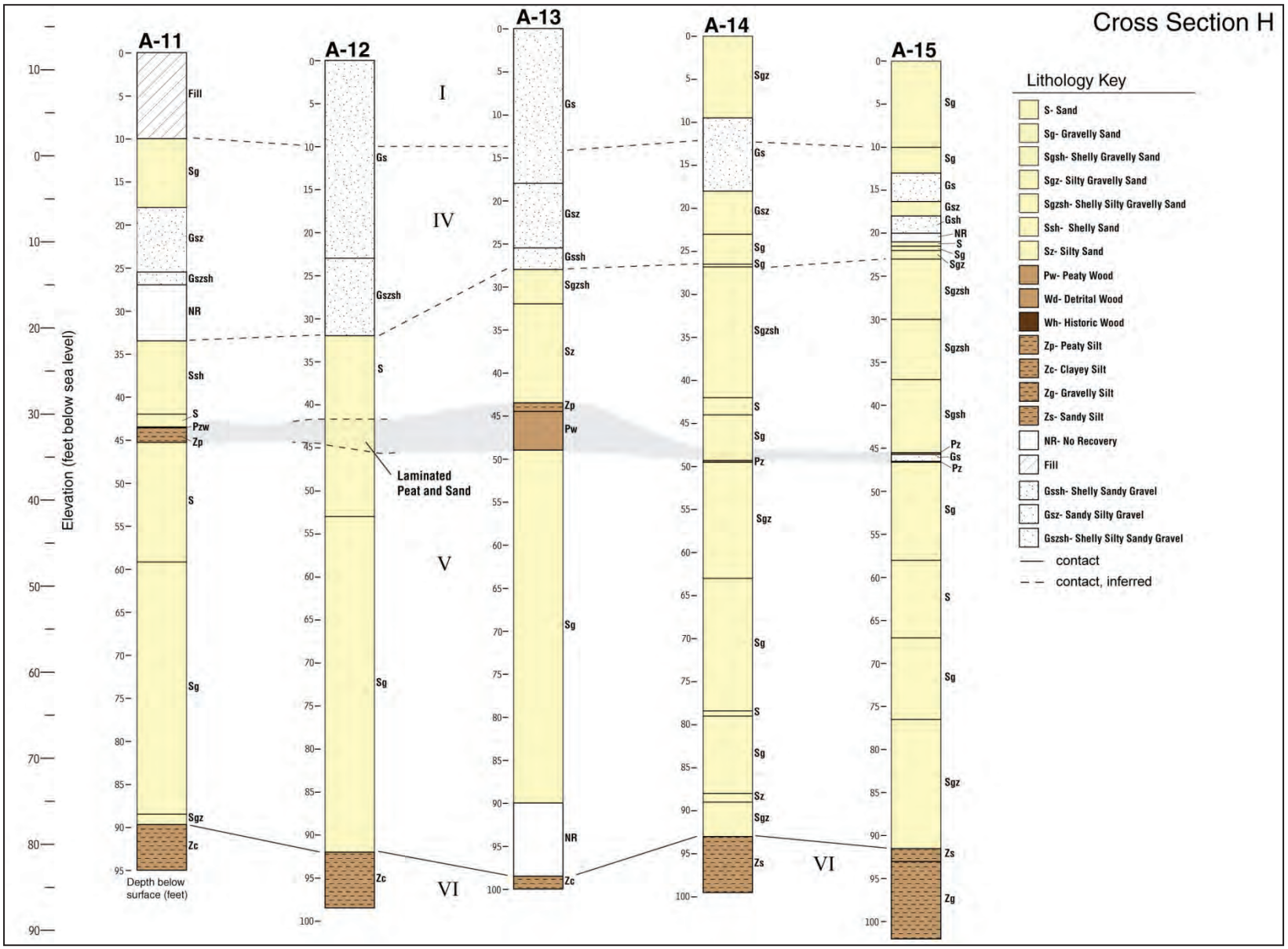


Figure 31. Cross Section H (see Figure 16 for cross section locations).

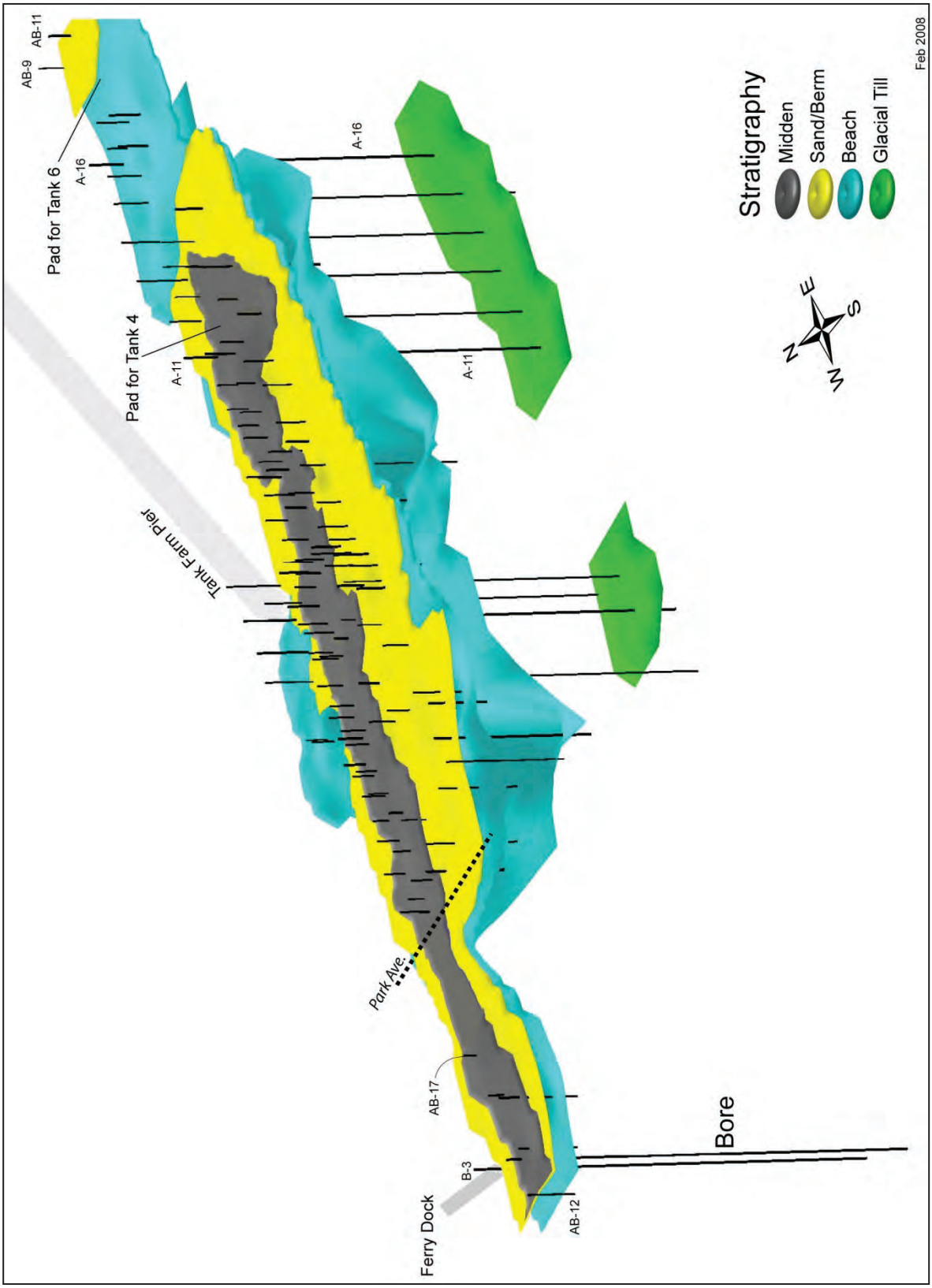


Figure 32. Stratigraphic model showing the relationship of the midden to the major site strata.

Historical Debris

Out of the total 107 archaeological boreholes drilled, 54 found historic debris at the contact between the fill and underlying intact deposits. The bulk of this debris consisted of wood of various kinds (Figure 32), often occurring in conjunction with burnt or charcoal-stained sediments. Wood debris most consistently appeared [redacted] but boreholes [redacted] encountered demolition debris, including concrete, brick, and metal, resulting from dismantling of Crown Lumber Company facilities (Figure 13). Thick planking or decking was found between Trench 4 and Trench 10 (MR-22, MR-27, and VC-63), and two boreholes encountered pilings (MR-2 and MR-41). Borehole CPT-24-07, [redacted] encountered planking overlying wood debris and sawdust.

A thin layer of black organic-rich pebbly sand containing small-sized historic debris such as wood and glass was observed at the base of the fill [redacted] (AB-3, AB-20, AB-16, AB-17). This layer directly overlies the midden deposits and in some cases the sediments appear to be mixed with the upper midden lithology. Stratum I likely truncates Stratum II in these areas, indicating disturbance to the upper portion of the archaeological deposits by early historic activity.

Figure 33. Wood from borehole sample.

Site Formation History

Based on the vertical depositional sequences revealed in all exposures created during archaeological testing of the project area, a preliminary model of landform development can be offered. Stratum VI, the basement stratum identified at the site, represents glacially deposited till dating to the Vashon or pre-Vashon period. The absence of Stratum VI in the boreholes [redacted] may evidence tectonic activity along the northern boundary of the Southern Whidbey Island fault zone, which has resulted in north side up vertical offsets of near-shore deposits in Possession Sound during the Holocene (that is, the north side of the fault rose due to earthquake activity) (Kelsey et al. 2004). However, the number of exposures of Stratum VI is too small to determine the true horizontal and vertical extent of the till.

Overlying the till, Stratum V gravelly sands are presumed to represent Vashon or pre-Vashon deposits, such as glacial outwash, while the upper clean sand with shell may represent a submerged spit formed during the Holocene.

The bulk of Stratum IV is believed to represent a thick accretionary deposit of loose beach sediments that accumulated along this section of shoreline due to alongshore drift during the late Holocene. The source of these sediments is from winnowing and reworking of the alluvial fan margin at the mouth of Japanese Gulch and from reworking of eroded bluff deposits east and south of the project area. During the period of time represented by Stratum IV, morphologically the shoreline was probably much more open to Puget Sound and characterized by a relatively narrow expanse of backshore area at the base of the southern bluff.

The presence of buried peat and a zone of fringing driftwood centered around a depth of 15 fbs within Stratum IV suggests that the area experienced at least one major increase in sediment influx, possibly in conjunction with a temporary reduction in the rate of sea level rise, that resulted in the temporary emergence of a paleospit above tide limit and enclosure of a small wetlands or shallow lagoon. After a brief period of subaerial exposure, the lagoon was buried about 1640 rcybp by additional loosely consolidated coarse-grained beach sediments. With renewed accumulation of sediments, the beach profile may have shifted southward toward the base of the southern bluff until the formation of the present spit isolated the bluff from direct wave attack. It is not known if the earlier spit formation was part of a larger paleo cuspate foreland like the modern landform.

Over the last 1,600 years, enough sediment accumulated that the eastern arm of the cuspate foreland forming Elliot Point emerged from the tidal limit and became a relatively stable landscape feature. Radiocarbon ages from the base of the Stratum II midden indicate the spit was fully emergent by at least 1,000 years ago. By the time human occupation of the spit began, sediment accumulation rates had slowed considerably, indicating the base of the southern bluff was now shielded by the spit from direct wave attack; reduction in sediment influx also may have been also due to decreasing frequency of debris flows in Japanese Gulch. The deposition of the Stratum III sand suggests that once the spit emerged, most of the coarser-grained sediment transported by alongshore drift passed along the front of the spit. The low amounts of shell in both Strata IV and III, but the high amounts in the archaeological deposits of Stratum II, further suggest that a sub tidal terrace, offering a suitable substrate for shellfish, also began to form in front of the spit shortly after emergence. Fine-grained sediments, such as silty peat, peaty silt, and organic streaks, at the top of Stratum IV in the southern portion of the study area indicate the

creation of a low-energy depositional environment, presumably in conjunction with the formation of the cuspate foreland. The bedding also preserved in places at the top of Stratum IV suggests the spit was periodically breached and opened to the Sound, and that closure of the cuspate foreland to form a tidal lagoon and wetland was a gradual process.

The distribution of lithofacies within Stratum II indicates a high degree of place-to-place variability (that is, the composition of the archaeological midden is not constant across the landform). The matrices of the shell-rich lithofacies include high amounts of sediment (sand and fine pebbles) mixed in with the archaeological materials. The well-stratified nature of the depositional sequence indicates little to no erosion along the spit, but periodic deposits of sand or fine gravel lacking archaeological materials show the landform was occasionally subject to overwash, probably by storm waves. The underlying Stratum III was probably also deposited in a similar manner. The preservation of thin humic soil A horizons (Ah), which represent brief periods of soil formation on the calcium-rich shell-bearing deposits, is another indicator the site experienced little or no erosion until the beginning of the historic period.

[redacted] Stratum II deposits are relatively thin and the configuration of the boundary of the midden indicates some variance in site formation history in this portion of the site. Former distributary channels on the alluvial fan at the mouth of Japanese Gulch [redacted] may have reached westward towards the base of the spit, reworking the beach deposits near the edge of the fan. Periodic avulsion of these channels during flood episodes in Japanese Gulch during the historic period could have eroded sediments deposited near the base of the spit where it attached to the fan. Interaction between beach sediments and the alluvial fan may account for the less well-defined boundary at the east end of the midden deposit.

Several recorded sites in the Puget Sound and the greater Puget lowland occupy accretionary shoreline features analogous to the cuspate foreland at 45SN393 (Table 5; Figure 33). Shell midden sites [redacted] to the north and [redacted] to the south provide comparative data from occupations of beach barrier berms associated with spits within the last 2,000 years. Hunter-fisher-gatherer use of changing sandspit landforms with berm and lagoon features in the Bellingham area share similar landform histories with the West Point site to the south of 45SN393 in Puget Sound (Lewarch et al. 1995:1.4). Locally, two historic village sites occupying spits are located west of 45SN393 [redacted] on Whidbey Island, and a third is situated at [redacted] Camano Island. Commonalities between spit sites in the region include well-stratified midden deposits deposited on or behind a beach berm, sometimes with evidence of occupation or utilization of protected wetland environments enclosed by the spits. Midden facies interbedded with sand layers deposited during inundation due to wave action along the landform are evidence of geomorphic processes at several spit sites. Further exploration of the midden deposits at 45SN393 would shed light on site formation in terms of the human occupation of an evolving landform.

Table 5. Radiocarbon Dates from Shell Middens in the Puget Sound Basin (selected numbers key to Figure 33).

MAP REF	SITE #	NAME	LOCATION	LANDFORM	EARLY DATE	REFERENCE
	45IS97	[redacted]	Whidbey Island	Bluff-Top	310 ± 60 BP	Luttrell et al. 2003
	45KP204	[redacted]	Bainbridge Island	Bay Beach	320 ± 40 BP	Shong 2011 Pers. Comm.
	45IS119	[redacted]	Whidbey Island	Bluff-Top	610 ± 50 BP	Nelson et al. 2010
	45IS263	[redacted]	Whidbey Island	Bay Beach	640 ± 40 BP	Smith et al. In Preparation
	45IS71	[redacted]	Whidbey Island	Bluff-Top	680 ± 70 BP	Wessen 2004
1	45TN240	[redacted]	Mud Bay	Bay Beach	ca 700 BP	Croes et al. 2005
2	45KP115	[redacted]	Port Orchard	Bay Beach	810 ± 60 BP	Lewarch et al. 2002
3	45WH9	[redacted]	Birch Bay	Spit	848 ± 108	Gaston and Grabert 1975
	45SJ507				880 ± 40 BP	Taylor et al. In Press
	45SJ120				900 ± 40 BP	Taylor et al. In Press
	45SJ277				930 ± 40 BP	Taylor et al. In Press
4	45WH67	[redacted]	Birch Bay	Bay Beach	940 ± 40 BP	Shantry et al. In Preparation
	45SJ26				950 ± 40 BP	Taylor et al. In Press
	45SJ481				990 ± 40 BP	Taylor et al. In Press
5	45JE16	[redacted]	Indian Island	Spit	ca 1000 BP	Blukis Onat 1976
	45SJ95				1010 ± 40 BP	Taylor et al. In Press
6	45SN39	--	Snohomish Delta	Estuarine	1020 ± 110	Dunnell and Fuller 1975
7	45IS13	[redacted]	Whidbey Island	Spit	1030 ± 60 BP	Luttrell 2005
	45SJ124				1040 ± 40 BP	Taylor et al. In Press
	45SJ47				1090 ± 40 BP	Taylor et al. In Press
	45SJ461				1090 ± 50 BP	Taylor et al. In Press
	45PI974				1110 ± 40 BP	Shantry et al. 2010
	45SJ150				1100 ± 50 BP	Taylor et al. In Press
	45SJ483				1120 ± 40 BP	Taylor et al. In Press
	45SJ60				1120 ± 40 BP	Taylor et al. In Press
	45SJ225				1120 ± 40 BP	Taylor et al. In Press
	45IS60	[redacted]	Whidbey Island	Bay Beach	1130 ± 40 BP	Luttrell et al. 2003
	45IS55	[redacted]	Whidbey Island	Bay Beach	1140 ± 40 BP	Luttrell et al. 2003
	45SJ61				1140 ± 40 BP	Taylor et al. In Press
	45SJ453				1160 ± 40 BP	Taylor et al. In Press
	45SJ6				1170 ± 40 BP	Taylor et al. In Press
	45SJ89				1170 ± 40 BP	Taylor et al. In Press
	45SJ202				1200 ± 40 BP	Taylor et al. In Press
8	45KI23	[redacted]	Seattle	Estuarine	1200 ± 60 BP	URS and BOAS 1987
	45SJ451				1210 ± 40 BP	Taylor et al. In Press
9	45KI437	[redacted]	Vashon Island	Spit	1230 ± 40 BP	Stein and Phillips 2002
	45SJ9				1300 ± 40 BP	Taylor et al. In Press
	45SJ460				1310 ± 40 BP	Taylor et al. In Press
	45SJ364				1340 ± 40 BP	Taylor et al. In Press
	45SJ147				1350 ±60 BP	Taylor et al. In Press
	45SJ509				1360 ± 40 BP	Taylor et al. In Press
10	45IS7	[redacted]	Camano Island	Bay Beach	1360 ± 60 BP	Kopperl In Preparation
	45SJ71				1380 ± 40 BP	Taylor et al. In Press
	45SJ72				1420 ± 40 BP	Taylor et al. In Press

Table 5. Radiocarbon Dates from Shell Middens in the Puget Sound Basin (selected numbers key to Figure 33).

MAP REF	SITE #	NAME	LOCATION	LANDFORM	EARLY DATE	REFERENCE
	45SJ307				1520 ± 40 BP	Taylor et al. In Press
	45SJ27				1540 ± 40 BP	Taylor et al. In Press
	45SJ251				1540 ± 40 BP	Taylor et al. In Press
	45SJ201				1570 ± 60 BP	Taylor et al. In Press
11	45IS2	[redacted]	Camano Island	Spit	1630 ± 50 BP	Schalk and Nelson 2010
12	45KP47	[redacted]	Port Madison Res	Spit	ca 1690 BP	Schalk and Rhode 1985
13	45KP2	[redacted]	Port Madison Res	Spit	ca 1700 BP	Schalk and Rhode 1985
	45SJ274				1860 ± 40 BP	Taylor et al. In Press
	45SJ421				1880 ± 40 BP	Taylor et al. In Press
14	45SN35	--	Snohomish Delta	Estuarine	1910 ± 120	Dunnell and Fuller 1975
15	45WH11	[redacted]	Birch Bay	Spit	1945 ± 98	Gaston and Grabert 1975
	45SJ23				1950 ±40 BP	Taylor et al. In Press
16	45WH100	[redacted]	Lummi Res	Spit	ca 2410 BP	Grabert and Griffin 1983
17	45SN41	--	Snohomish Delta	Estuarine	2040 ± 120	Dunnell and Fuller 1975
18	45WH114	[redacted]	Lummi Res	Spit	ca 2040 BP	Grabert and Griffin 1983
	45SJ279				2100 ± 40 BP	Taylor et al. In Press
	45SJ239				2340 ± 40 BP	Taylor et al. In Press
	45SJ282				2400 ± 50 BP	Taylor et al. In Press
	45WH564	[redacted]	Point Roberts	Bay Beach / Spit	2520 ± 60 BP	Baldwin and Arthur 2010
	45SJ450				2520 ± 40 BP	Taylor et al. In Press
	45SJ70				2550 ± 40 BP	Taylor et al. In Press
	45SJ2				2640 ± 40 BP	Taylor et al. In Press
	45SJ3				2670 ± 40 BP	Taylor et al. In Press
45S	J169		Decatur Island	Spit	2700 ± 120	Walker 2003
	45SJ407				3060 ± 40 BP	Taylor et al. In Press
	45SJ 165		Decatur Island	Bay Beach	3440 ± 40 BP	Bard and Ballantyne 2007
19	45SN93	[redacted]	Mukilteo	Bluff-Top	3600 ± 70 BP	Kopperl 2005
	45SK46	[redacted]	Fidalgo Island	Bluff-Top	3650 ± 70 BP	Mather 2009
20	45WH17	[redacted]	Boundary Bay	Spit	ca 4100 BP	Grabert et al. 1978
21	45KI428/429	[redacted]	Seattle	Spit	ca 4000 BP	Larson and Lewarch 1995
22	45PI72	[redacted]	Steilacoom	Bluff-Top	5260 ± 70 BP	Wessen 1989

Figure 34. Selected shell middens with radiocarbon dates coded by landform contains sensitive cultural resources information that is exempt from public disclosure pursuant to provisions of the Public Records Act (RCW 42.56.300).

Figure 34. Selected shell middens with radiocarbon dates coded by landform (numbers code to Table 5).

Features

One cultural feature was distinguished from the remainder of the strata within the shell midden deposit in the south profile of Trench 6. A depression or pit with poorly defined boundaries was observed in the lower right (western) portion of the profile (Figure 34), mostly exposed around the bottom corner of the trench shoring box, which prevented investigation beyond characterization of the profile and bulk sampling of a portion of the deposits within the feature. The upper boundary of the feature is about 240 centimeters (94 inches) below ground surface, and about 70 centimeters (28 inches) below the top of the general shell midden stratum. The deepest portion of the feature that was exposed was about 300 centimeters (118 inches) below ground surface and 130 centimeters (51 inches) below the top of the shell midden stratum. A layer of poorly sorted coarse sand and fragmented shell overlies the feature, which appears to have been dug into beach sand and truncates one thin (3-4 centimeter/1.2-1.6 inch) black possibly cultural stratum at about 265 centimeters (104 inches) below ground surface.

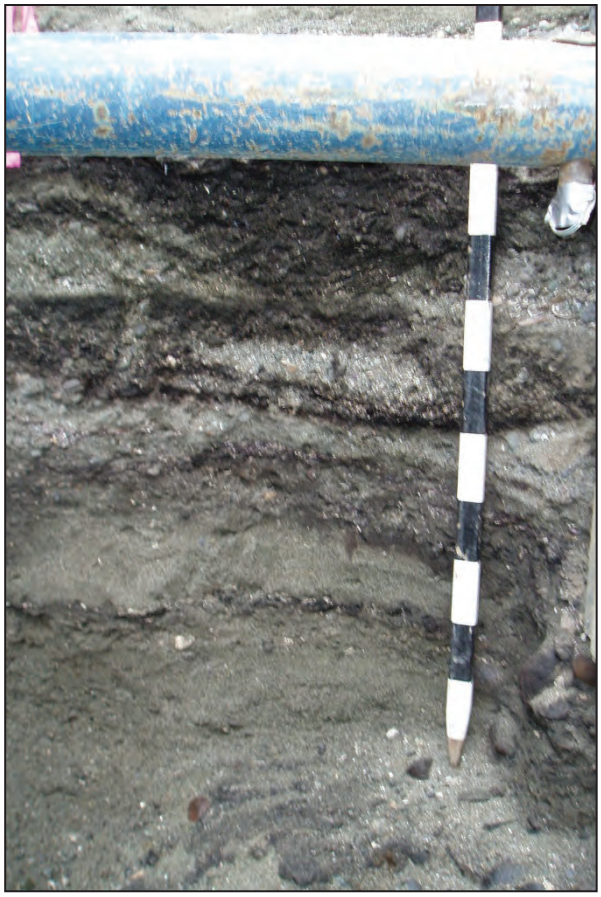


Figure 35. Depression or pit observed in the south wall of Trench 6.

The sediments within the feature are primarily lightly charcoal-stained sand and gravel, fragmented shell, fire-modified cobbles and cobble fragments, and crushed charcoal. The inaccessibility of the majority of the feature and inability to obtain a plan view, better cross-sections, or additional samples preclude much further interpretation. A bulk sample of about 1.6 liters was obtained from sediments near the base of the feature, and was submitted for botanical and radiocarbon analysis. The sample contained charcoal from maple, alder, Douglas fir, yew, and western red cedar, as well as starchy edible plant tissue and one goosefoot seed. An accelerator mass spectrometry (AMS) radiocarbon date was obtained from one of the fragments of charcoal from alder, a short-lived species, and yielded the oldest age associated with cultural deposits at the site, 960±40 radiocarbon years BP (see below). Although the age of the thin, deeper cultural stratum into which the feature is cut was not determined, it is likely older than the feature.

Radiocarbon Chronology

Charcoal samples from the top and bottom of the shell midden deposit in Trenches 5, 6, 11, and 14 were submitted to Beta Analytic, Inc. for AMS dating (Table 6; Appendix D; Figure 24). Samples from shorter-lived hardwood taxa and from younger branch portions of woody plants were isolated when possible to minimize the possibility of radiocarbon ages being affected by old wood. These samples provided bracketing dates of the shell midden deposit and information about the horizontal development of the

shell midden across much of its length, between Trenches 5 and 14 (207 meters/679 feet). Table 6 summarizes the radiocarbon dates. Calibration of radiocarbon ages to calendar years was done using the INTCAL98 program and database (Stuiver et al. 1998). The original radiocarbon analysis report from Beta Analytic, Inc. is given in Appendix D. The one anomalous date, Beta-219893, was taken on a charcoal sample that contained more radiocarbon than the modern (AD 1950) reference standard at the Beta laboratory, which resulted in an effectively modern date. The sample came from what appeared to be the uppermost intact shell midden stratum in Trench 14, immediately beneath historic fill. A wooden piling had been punched through that stratum, which may have introduced modern charcoal into that layer.

Table 6. Summary of AMS Radiocarbon Dates Obtained from 45SN393 Charcoal Samples.

BETA NO.	TRENCH NO.	DEPTH (cm bs)	CONVENTIONAL RADIOCARBON AGE	RADIOCARBON AGE AND CALIBRATION INTERCEPT	2Σ (95%) CALIBRATED CALENDRICAL AGE RANGE	SHELL MIDDEN ACCUMULATION RATE*
219887	5	215-225	440±40 BP	510 BP	530 - 450 BP (AD 1420 - 1500)	0.38 cm/year
219888	5	255-265	570±40 BP	550 BP	650 - 520 BP (AD 1300 - 1430)	
219889	6	190-200	160±40 BP	270, 200, 150, 20, 0 BP	290 - 0 BP (AD 1660 - 1950)	0.14 cm/year
219890	6	295-305	960±40 BP	920 BP	950-780 BP (AD 1000 - 1180)	
219891	11	108-112	220±40 BP	290 BP	310 - 260, 220 - 140, 20 - 0 BP (AD 1640 - 1680, 1730 - 1810, 1930 - 1950)	0.25 cm/year
219892	11	192-200	590±40 BP	550 BP	650 - 530 BP (AD 1300 - 1420)	
219893	14	180-190	Modern	modern	0 BP (AD 1950)	0.12 cm/year
219894	14	240-245	600±40	630, 600, 560 BP	660 - 530 BP (AD 1290 - 1420)	

* Based on difference between top and bottom radiocarbon ages of shell midden, divided by maximum thickness between charcoal samples (Stein et al. 2003).

The radiocarbon chronology from the trench samples suggests that human occupation of 45SN393 took place over the past 1,000 years. The radiocarbon ages from the base of the shell midden deposit in Trenches 5, 11, and 14 are within one standard deviation of each other, between 570±40 and 600±40 rcybp, while a substantially older date of 960±40 rcybp was obtained from the base of Trench 6 in a depression or pit feature. The terminal dates in each trench are more variable, ranging from 440±40 rcybp in Trench 5 to essentially modern (and possibly contaminated) charcoal at the top of the shell midden in Trench 14.

The chronology suggests that initial deposition of the shell midden occurred across much of the Point Elliott [redacted] at about the same time, between approximately AD 1290 and AD 1430. Thickness of the midden [redacted] varies, as do the estimated midden accumulation rates in each trench. The midden profile exposed in Trench 6 is the thickest of the four trenches considered here (about 115 centimeters/45 inches) and, based on the radiocarbon dates, accumulated at a slow rate (0.14 centimeter/0.06 inch per year) relative to two of the three other dated midden exposures. The shell midden in Trench 5, [redacted] has the earliest terminal date and the most rapid

estimate of depositional accumulation. Trenches 6 and 11, [redacted] have slower accumulation rates and terminal date ranges that encompass the earliest Euroamerican contact. Trench 14, [redacted] has a modern but anomalous date and consequently a slow accumulation rate.

Sample and Artifact Summary

Sample Analyses

A total of 41 one-liter constant volume samples (CVS) was taken from the six trench profiles within 45SN393. Their weight varied between 920.1 grams and 1658.9 grams, averaging 1332.3 grams. The general constituents of each CVS included pebbles, shell, bone, and other objects such as isolated modern debris intrusive to the shell midden. Fluctuations in the proportion of each constituent, primarily between the shell and pebble fractions, characterize the shell midden matrix. The table in Appendix C summarizes the constituents in the ≥¼-inch fraction and the ⅛-inch fractions of each trench CVS.

Artifact Analyses

A total of 175 lithic artifacts and 8 modified bone artifacts were found at 45SN393 during testing. The majority of these artifacts were from the screened spoils of the trenches. Although artifacts such as small lithic flakes, beads, and other items that would fall through ¼-inch mesh screens are most likely present at the site, no such material was found in any ⅛-inch CVS fraction. Table 7 summarizes the lithic and bone artifacts by provenience.

Although the sample size of the lithic and bone artifact assemblage found during testing at 45SN393 was small, recovery of artifact types was noticeably different between units. As expected, most of the artifacts were found in the trench spoils, which provided a greater volume of archaeological deposits for screening than the core samples. Lithic artifacts were found in each trench with shell midden deposits, however the number of artifacts within each trench varies greatly. Lithic counts from the trenches have a roughly unimodal distribution [redacted] Trench 5 contained the fewest lithics (n=5), while Trench 8 [redacted] contained the most (n=96), and the two [redacted] trenches contained relatively few lithic artifacts (nTrench 13 = 11; nTrench 14 = 21). The unimodal distribution of lithic artifacts remains the same when adjusted for volume of screened shell midden in each trench (Table 7). Four cores, VC-31, MR-33, MR-59, and MR-85, each contained one lithic artifact recovered from a CVS. All modified bone artifacts (with the exception of the beaver tooth fragments from Trench 6) were found in Trench 14.

Lithic Artifacts

The lithic artifacts found at 45SN393 represent a variety of expedient and more carefully formed tools and tool-making debris. Analysis of the lithic artifacts provides information on the ways in which the occupants of 45SN393 made, used, maintained, and discarded their stone tools.

The lithic assemblage included flakes and shatter, cores, split or edge flaked pebbles/cobbles, projectile points, a ground stone adze blade and hammerstones (Table 7). The majority of lithic artifacts were found in Trench 8, including one of the projectile points and the adze blade. Raw material at the site is

Table 7. Artifacts from 45SN393 by Provenience.

OBJECT	TRENCH NUMBER						CORE NUMBER				TOTAL
	5	6	8	11	13	14	31	33	59	85	
LITHIC ARTIFACTS											
Technological Byproduct											
Debitage	4	24	61	6	8	12	1	1			117
Core			4	1							5
Specialized Debitage											
Linear Flake			2								2
Pebble/Cobble-Derived											
Split Pebble			4			1					5
Split Cobble									1		1
Modified Objects											
Edge Modified Flake		3	18	3	2	3					29
Edge Modified Linear Flake			1								1
Edge Modified Core	1		3		1	2					7
Modified Split Pebble			1								1
Modified Split Cobble						1					1
Edge Altered Cobble										1	1
Hammerstone						2					2
Projectile Point		1	1								2
Adze Blade			1								1
Total Lithic Count	5	28	96	10	11	21	1	1	1	1	175
Total Lithic %											100
BONE ARTIFACTS											
Beaver Tooth Fragment		4									4
Toggling Harpoon Valve						1					1
Bone Point						1					1
Ground Bone Fragment						1					1
Bone Chisel						1					1
Total Bone Artifact Count	--	4	--	--	--	4	--	--	--	--	8
Total Bone Artifact %	--	50	--	--	--	50	--	--	--	--	100
TOTAL ARTIFACT COUNT	5	32	96	10	11	25	1	1	1	1	183
TOTAL ARTIFACT %											100

dominated by locally available igneous rocks including basalt, dacite, andesite, and rhyolite (combined in this analysis as volcanic rock), followed by metasediment, cryptocrystalline stone (CCS), siltstone, quartzite, petrified wood, volcanic breccia, and a single occurrence of nephrite (Table 8).

The lithic assemblage is dominated by debitage including flakes, flake fragments and shatter which comprise 85.1% of the 175 objects recovered. The majority of the flakes (n=107) and all of the shatter (n=12) are unmodified and encompass 68% of the assemblage. Two unmodified and one modified flake are categorized as specialized linear flakes. Microblades are defined as flakes that have approximately parallel sides, are less than 5 cm long and 1 cm wide (Kooyman 2000:74-75). The linear flakes were not considered microblades because they fail to meet these criteria, although they are similar in appearance. Of the 137 flakes, 30 (21.8% of the flakes and 17.1% of the assemblage) have been edge

Table 8. Lithic Assemblage by Material Type.

OBJECT	MATERIAL TYPE								TOTAL
	Vol.	CCS	Qzt.	Pet. Wd.	Metased.	Siltstone	Breccia	Neph.	
TECHNOLOGICAL BY-PRODUCT									
Debitage	65	7	5	2	30	8	--	--	117
Core	--	2	1	--	1	1	--	--	5
Subtotal #	65	9	6	2	31	9	--	--	122
Subtotal %	53.3	7.4	4.9	1.6	25.4	7.4	--	--	
SPECIALIZED DEBITAGE									
Linear Flake	1	--	--	--	1	--	--	--	2
Subtotal #	1	--	--	--	1	--	--	--	
Subtotal %	50	--	--	--	50	--	--	--	
PEBBLE/COBBLE DERIVED									
Split Pebble	3	--	--	--	2	--	--	--	5
Split Cobble	--	--	--	--	--	--	1	--	1
Subtotal #	3	--	--	--	2	--	1	--	6
Subtotal %	50	--	--	--	33.3	--	16.7	--	
MODIFIED OBJECTS									
Edge Modified Flake	24	--	--	--	4	1	--	--	29
Edge Modified Linear Flake	--	--	--	--	1	--	--	--	1
Edge Modified Core	5	1	--	--	1	--	--	--	7
Modified Split Pebble	--	1	--	--	--	--	--	--	1
Modified Split Cobble	1	--	--	--	--	--	--	--	1
Edge Altered Cobble	--	--	--	--	1	--	--	--	1
Hammerstone	--	--	--	--	--	--	2	--	2
Projectile Point	--	1	--	1	--	--	--	--	2
Groundstone	--	--	--	--	--	--	--	1	1
Subtotal #	30	3	--	1	7	1	2	1	45
Subtotal %	66.7	6.7	--	2.2	15.6	2.2	4.4	2.2	
TOTAL #	99	12	6	3	41	10	3	1	175
TOTAL %	56.6	6.9	3.4	1.7	23.4	5.7	1.7	0.6	100

modified either through use or secondary retouch. The remainder of the modified assemblage includes cores, a split pebble, a split cobble, one edge altered cobble (removed flakes would have been a useable size), hammerstones, projectile points, and the groundstone adze blade. A selection of lithic artifacts is shown in Figure 35. The lithic analysis data sheets and code sheets are given in Appendix E.

The lithic artifacts found at 45SN393 are a diverse assemblage with a few specialized tool types. The specialized tools include two projectile points, an adze blade, a wedge tool, and two hammerstones. Locally available raw materials, in the form of sub-rounded pebbles and cobbles, were reduced on-site via bipolar and/or freehand reduction primarily for the production of expedient flake stone tools. The majority of the debitage is indicative of early to middle-stage reduction and roughly two-thirds of the debitage retains some amount of cortex regardless of reduction technique. The two freehand reduction cores retain no cortex and exhibit multiple platforms. One of the bipolar cores exhibits flake scars indicative of microblade production. Two other bipolar cores exhibit linear flake scars that extend the length of the core and a split pebble displays a linear flake scar on the ventral surface suggesting the production of small linear flakes, quite similar to microblades, was an important activity. The bipolar cores are the result of sub-rounded pebble/cobble reduction. Minimal reduction effort was expended in tool production, as evidenced by the paucity of late stage reduction flakes and the scarcity of tools displaying bifacial or unifacial surface modification. In fact very few flake tools display evidence of secondary retouch edge modification, suggesting edge alteration of flakes was not required for the

Figure 36. Selection of formed lithic tools from site 45SN393 (site number - catalog number).

majority of the tasks undertaken. The types of wear modification observed on the tools are indicative of a variety of cutting, sawing, and scraping activities that would be expected with occupation, such as processing plant and animal food and working wood or other plant material to make shelters, watercraft, or personal objects.

Several nearby shell midden sites occupied during the same time period as 45SN393 have analyzed lithic assemblages. The two most recent cultural components defined at the West Point site temporally overlap with 45SN393 (Lewarch and Bangs 1995). At West Point, both bipolar and freehand reduction technologies were employed to reduce locally available raw materials for expedient tool use, but only during the earlier components prior to 1500 BP. By 1500 BP, the area was no longer a year-round occupation but a small specialized activity camp, and tools manufactured from non-local CCS were brought into the area (Lewarch and Bangs 1995:7-176). In comparison, at 45SN393, reduction of local raw materials produced the majority of the assemblage.

A lithic assemblage more similar to that of 45SN393 was recovered from the English Camp shell midden (45SJ24). Although a smaller sample, the 45SN393 lithic assemblage has several commonalities with the post-1000 BP component recovered English Camp (Close 2006; Kornbacher 1992). Both contain similar types of formed tools, evidence of microblade production, evidence of both freehand and bipolar reduction, and an emphasis on non-retouched expedient tools primarily manufactured through bipolar reduction. Kornbacher (1992:181-183) describes a decrease in chipped stone tools at English Camp including small bifaces over time between the pre-1000 BP and post-1000 BP components. The paucity of bifacial tools and lack of bifacial thinning flakes in the 45SN393 assemblage is also similar to the more recent (post-1000 BP) portion of the English Camp assemblage. Unlike 45SN393, however, the raw crystalline volcanic rock used in tool production at English Camp was transported to the site from other locations (Close 2006:160-161). In this case, English Camp and West Point are similar in that stone considered most desirable for tool manufacture was transported into the area either in raw material form, or as finished tools. On the other hand, at 45SN393 tool manufacture was primarily accomplished through reduction of raw materials readily available on-site.

The lithic assemblage collected from the Duwamish No. 1 Site (45KI23), [redacted] is very extensive with a wide variety of artifact types not found in the 45SN393 assemblage. However, bipolar and freehand reduction of locally available raw materials was still a common occurrence and all manufacturing stages are represented including finished formed tools. The majority of the local basalt debitage does not exhibit cortex and is unmodified. Within the modified basalt flake group, those with cortex exhibit more occurrences of use without retouch while those without cortex exhibit more occurrence of retouch shaping than use (Campbell 1981:317-378). This is in contrast to the 45SN393 assemblage in which the majority of the debitage exhibits cortex, late-stage manufacturing flakes are rare, the majority of the tools regardless of cortex presence are not shaped, and the only two formed chipped stone tools are of CCS. Campbell (1981:464) also reports increasing diversity of lithic materials in the more recent components of Duwamish No. 1, and it is possible that the CCS artifacts from site 45SN393 are indicative of such a change as well.

A common thread among the West Point, English Camp, Duwamish No. 1, and 45SN393 assemblages is one of freehand and bipolar reduction of raw material sources primarily for the production of expedient tools. However, the West Point, English Camp, and Duwamish No. 1 assemblages all show diachronic change in terms of tool manufacture and/or the use of raw material resources. Functionally discrete areas within each of the sites have been demonstrated based on stratigraphically controlled excavation.

This is not currently possible for the present 45SN393 lithic assemblage. It is intriguing that shoreline occupation sites in Western Washington, while exhibiting much in common, also exhibit variation in terms of the raw materials chosen, the distribution of living, work, and refuse areas within the site and the tools manufactured and used in daily life. Additional, controlled investigation of 45SN393 could provide more information regarding regional and local variations for shoreline locations occupied during roughly the same time period.

Modified Faunal Remains

Sophisticated bone tool technology is a hallmark of Northwest Coast Native Americans. A wide variety of implements have been found preserved in shell midden deposits that span the past several millennia, including the Mukilteo Shoreline site. Eight fragments of modified mammal bone and teeth were found during test excavation at 45SN393, all in spoils screened from Trenches 6 and 14. Because of the very small sample size a formal classification system was not developed for this assemblage, however the descriptions of each artifact are based on attributes of modified faunal remains given by Larson (1995a) for the West Point site, following Matson's (1976; Matson et al. 1991) classification developed for the Glenrose Cannery Site near Vancouver, BC. The modified faunal assemblage is shown in Figure 36, and includes four beaver tooth fragments, a bone chisel fragment, a bone point, a toggling harpoon valve fragment, and one fragment of partially ground bone. Each artifact is fully described in Appendix E.

Four fragments of the lower incisor of a beaver (*Castor canadensis*) were found in the screened spoils of Trench 6 (Figure 36, a). Beaver incisors, when found in archaeological sites, are often presumed to have been used as graving tools (e.g., Matson 1976:173) and ethnographic observations and modern use of hafted beaver incisors support these inferences (e.g., Stewart 1996). Suttles (1951:96) also noted beaver teeth used to make dice by the Strait of Georgia-area Saanich tribe (see also Smith 1940:218-219).

The bone chisel fragment was found in the spoils of Trench 14 and is the pointed end of a chisel, ground from the shaft portion of a bone from a medium to large-sized mammal, probably a cervid (Figure 36, b). Following the criteria used for the West Point assemblage (Larson 1995a:10-3, 10-6 following Matson et al. 1991:41), it is categorized as a chisel based on use-wear polish on the single bevel of the bilaterally tapering end but little or no evidence of more forceful battering. The bevel has been ground to a tip on the interior, marrow cavity side of the shaft fragment. The artifact is 5 centimeters (2 inches) long, and 1.5 centimeters (0.6 inch) wide at the distal end. Chisels and similar wedge-shaped bone tools have been found at West Point, Duwamish No. 1, and are not uncommon in assemblages from other Puget Sound sites. Northwest Native Americans have used tools such as bone chisels and wedges for working wood and other material, and description of the tools and finished products of their work abound in ethnographic sources for the region (e.g., Smith 1940:320-321; Stewart 1996).

One bone point fragment was found at 45SN393, in screened spoils from Trench 14. It is 3.5 centimeters (1.4 inches) long from tip to broken end (Figure 36, c). Points with one or both ends ground to a sharp tip are relatively common in bone artifact assemblages recovered from shell middens across Puget Sound. Similar artifacts from the West Point site were categorized as small or large bone unipoints, bipoints, point tips, and point mid-sections. Although bipoints have been frequently associated with fishing activities by Puget Sound Native Americans (e.g., Chatters 1981, 1988; Schalk and

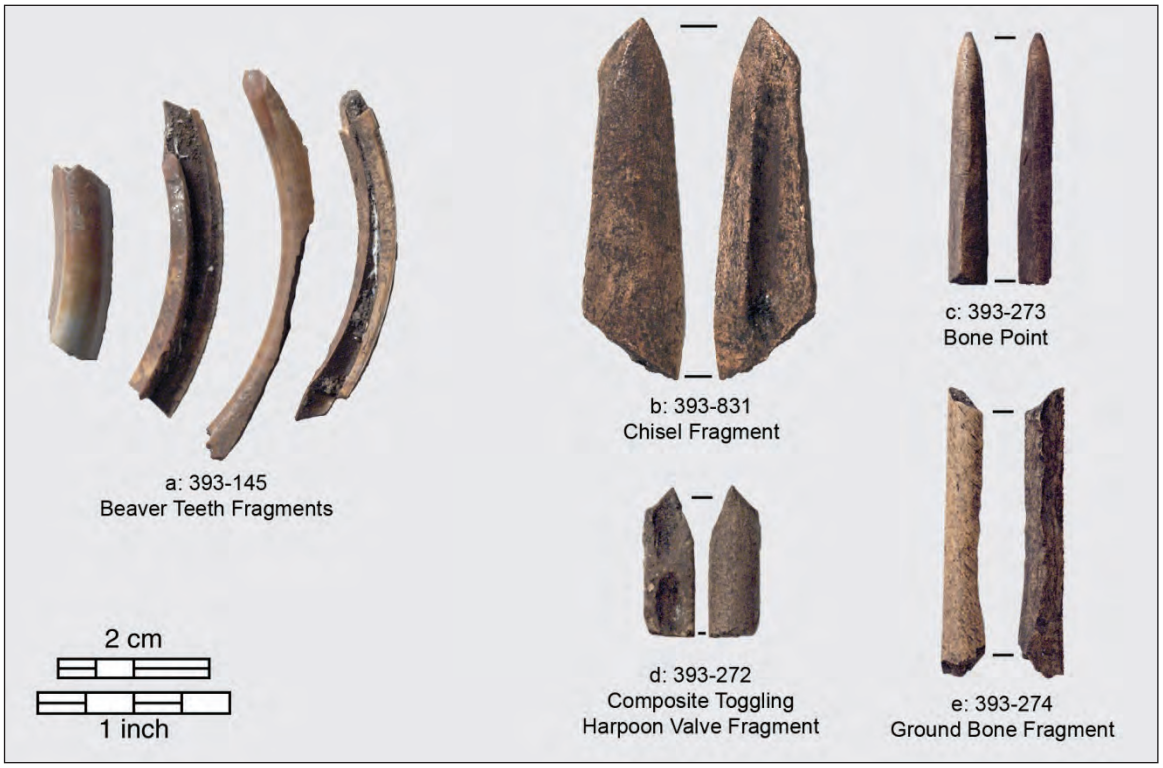


Figure 37. The modified faunal assemblage (site number - catalog number).

Rhode 1985), unipoints have been ethnographically observed used to arm small composite toggling harpoons and arrows, and were also placed along the edge of wooden paddles to make herring rakes (Roll 1974; Stewart 1996).

The toggling harpoon valve fragment (Figure 36, d) was found in the screened spoils of Trench 14. Although composite toggling harpoon valves are absent in the large bone tool assemblage at West Point, similar artifacts have been found in shell middens in other parts of Puget Sound, such as at Old Man House (Gaston and Jermann 1975:40), along Quartermaster Harbor in Vashon Island (Phillips 2002), and on Utsalady Bay on the north end of Camano Island (Bryan 1963). Descriptions of Native American use of toggling harpoons for spearing fish are given by Smith (1940:266) for the Puyallup and Nisqually, and for sea mammal hunting by Suttles (1951:106) for the Straits Salish. A fragment of partially ground mammal bone was found in the spoils of Trench 14 (Figure 36, e). Because it is incomplete, placing the artifact within a particular class of ground bone tool or estimating where it is situated along a hypothetical manufacturing sequence is not possible.

Despite being a small assemblage from the testing fieldwork, the modified faunal remains reflect a variety of activities at the site and a well-developed ground bone tool technology. Functions usually ascribed to the harpoon valve fragment and bone point are hunting and fishing, and those ascribed to the beaver teeth and chisel are inscribing and working raw material such as bone or wood (e.g., Stewart 1996). This range of artifacts is expected in assemblages that date to the last 1,000 years, when it is often surmised that the cultural patterns seen in the ethnographic record become more widely adopted throughout the Pacific Northwest (e.g., Matson and Coupland 1995).

Large terrestrial mammal bone was an important raw material for tool manufacture as well as subsistence on the Northwest Coast (Hodgetts and Rahemtulla 2001), and is shown to be so in the 45SN393 assemblage. Hypothetical manufacturing sequences were developed for the large modified bone and antler assemblage at the Duwamish No. 1 site (Campbell 1981:379-403). Here, a dimensional classification of modified faunal fragments allows placement of bone, antler, or shell artifacts into these models along the use-life of the object. Only one bone artifact at the Mukilteo Shoreline site, Cat # 45SN393-274, appears to have been deposited into the shell midden at a point prior to completion along the manufacturing sequence. A lack of modified but unshaped bone fragments in the assemblage may suggest that bone tool technology was limited at the site to maintenance, use, and discard of tools, however the presence of unmodified bone shaft fragments of cervids (see below) may indicate otherwise.

Unmodified Faunal Remains

The shell midden deposit of 45SN393 contains abundant remains of shellfish, fish, birds, and mammals. Data from the analysis of these remains that can answer questions about Native American subsistence highlight the research potential of the site and hence its significance. A sample of the faunal remains collected from excavations at 45SN393 was analyzed in an attempt to answer such questions. For each major faunal type, summary tables of the various animal taxa identified from the sample are followed by discussions providing additional information about taxonomic and body part representation for each faunal class. Full descriptive summaries and analysis data sheets are given in Appendix E.

Shellfish

For this analysis, the shellfish remains from the trench constant volume samples were compared quantitatively for an indication of changes in shellfish consumption at 45SN393 over time. This comparison examines shell weight in grams in the ¼-inch fraction because taxonomic identification of smaller specimens may skew measures of abundance and weight towards certain taxa. Shell weight provides a consistent measure of a particular shellfish taxon and a means of quantifying relative change in taxa across space and through time. Table 9 lists the weight of taxa identified from each trench CVS but does not include two taxa, geoduck (*P. Abrupta*) represented by two specimens found in the trench spoils and moon snail (*Polinicies* sp.) represented by one specimen found in a core sample. The descriptive summary in Appendix E includes all taxa found during analysis.

The analyzed shellfish assemblage represents a broad but typical array of shellfish species for central Puget Sound shell middens. The assemblage is weighted toward cockle (*Clinocardium* sp.) and littleneck (*P. staminea*) clams, which is not surprising given the present substrate of the intertidal zone near the site. Based on the analyzed assemblage, almost all of the shellfish deposited at 45SN393 could have been gathered in the immediate vicinity of the Point Elliott [redacted] Geoduck is the only unusual taxon, and to date has only been identified elsewhere in central Puget Sound at the Duwamish No. 1 site (Campbell 1981). Geoduck have been identified near 45SN393 in modern shellfish surveys in very low numbers, but in greater abundances to the east and south along the mainland shore and along the south shore of Whidbey Island across Possession Sound from Point Elliott (Anchor 2005; Goodwin 1973:51). During occupation of 45SN393 prior to historic filling, the tidal lagoon south of the berm may have provided an adequate habitat for geoduck, or this taxon may have been transported from some distance to the site.

Table 9. Shellfish Taxonomic Abundance in Weight (g) by 1-Liter Constant-Volume Sample.

		GASTROPODS		BIVALVES							BARNACLES			
TRENCH NO	DEPTH (cmbs)	Lottidae	*Nucella* sp.	Mytilidae	*Clinocardium* sp.	*Tresus* sp.	*Macoma* sp.	c.f. *Protothaca staminea*	*Saxidomus giganteus*	Unidentified Bivalve	cf *Semibalanus cariosus*	Balanidae	Unidentified Shell	TOTAL
5	190-200			0.2	0.2			3.9	1.6	10.1	0.9	0.5		17.4
	200-210			1.5	0.8			4.5	3.0	4.9	1.3	0.2		16.2
	210-220		9.1	3.5	0.4	3.9		0.3	4.5	22.5		0.8	0.2	12.4
	220-230		3.6	0.2	2.3			4.2		8.0				18.3
	230-240		50.1	0.3	27.7			91.9	3.7	33.7				207.4
	240-250		29.9	0.2	0.2			63.0		22.6		0.1	0.9	116.9
6	175-185		0.9					0.7		3.1				4.7
	185-195			0.3				0.1		6.8	1.4			8.6
	195-205		0.4	0.8						12.8		2.2		16.2
	205-215		0.3	3.5	0.5			0.4		33.1		0.4	1.2	39.4
	215-225		0.7	10.3	0.8			2.2		17.8	8.2	1.8		41.4
	225-235		0.3	18.8	0.6			1.1		5.5		1.8		29.0
	235-245	0.1	1.2	5.5	0.2			2.7		4.5		0.1		43.1
	245-255		30.0	2.6	0.1			16.6		7.0		0.6		37.0
	255-265		9.9	0.2	0.1			1.5		2.3				4.1
	38978							30.9						30.9
8	215-220									1.9		0.1	0.1	2.1
	235-245	0.1	6.9	1.0	1.2	11.8		2.4		35.3	1.5	0.3		60.5
11	90-95				0.5					5.7	0.6		0.7	7.5
	105-110			0.7	0.2			0.1		4.0		0.1		5.1
	132-135			12.1				0.8		24.1		2.3		39.3
	150-152		0.1	4.6	44.1			5.9	26.9	47.2		1.6	0.6	131.0
	155-158		1.1	3.6	55.3			0.1		20.7	0.4			81.2
	160-162		5.0	3.2	8.8			16.1		32.1		0.3		65.0
	160-165		1.9	14.3	36.7			10.1		28.2		1.1		92.3
13	240-250			7.2	7.3	2.5		11.6		10.2		2.1		46.4
	38816			1.4	3.1			3.8	0.9	20.0	1.0	0.1		48.9
	270-278			3.2	0.4			51.2	21.7	32.1		0.1		113.5
	278-280			1.5	2.6	0.4		12.8	44.5	18.2				90.1
14	170-180			0.3				1.0		4.7				6.0
	180-190			2.0	1.0			0.5		6.1				9.6
	190-200			0.5	0.3			1.6		3.8	2.7	0.1		9.0
	200-210		0.5		0.8	2.0		4.2		8.2				15.7
	205-208			0.1	0.8			9.5		2.5				12.9
	210-220		1.8	0.1	1.7		0.6	2.2		14.3				20.7
	220-230		9.5	1.3	2.7			9.3		22.6		0.3	0.7	46.4
	230–235		10.9	2.6	13.6	37.1		11.3	15.2	17.5	1.1	0.1		107.8
	230–240		1.1	6.8	7.4		0.1	9.9	35.0	50.2		0.1		95.6
	240-245		1.5	0.6	0.2			2.4		16.3			0.1	21.1
	240-250		0.8	1.4	0.3			2.4		21.0		0.1		16.0
	250-255			0.8	0.5			3.5		9.4	0.2	0.3		14.7
	Total	0.2	177.5	117.2	223.4	57.7	0.7	396.7	157.0	651.0	19.3	17.6	4.5	1822.8

Changes over time in relative taxonomic abundance of shell can be investigated using broader taxonomic categories than the range identified during the analysis. Taxa such as macoma (*Macoma* sp.), horse clams (*Tresus* sp.), and geoduck were found in small numbers and omitted, while other classes such as limpets and whelks were combined into larger units. Figure 37 shows overall variability in shell composition within the four trenches with bracketing radiocarbon dates. The total percentage of gastropods (Lottidae and *Nucella* sp.), mussels (Mytilidae), cockles, and Venus clams (including littleneck and butter [*Saxidomus* sp.] clams) varies from trench to trench, with the greatest relative abundance of gastropods in Trenches 5 and 6, mussels in Trench 6, cockles in Trench 11, and Venus clams in Trench 14. Despite the overall abundance of gastropods in Trench 5, the uppermost midden layers are predominantly Venus clam and lack gastropods, while gastropods make up between about 30% and 50% of the assemblages from the deeper layers. Trench 6 provided a thicker midden deposit than Trench 5 and more individually defined strata within the midden, some characterized by thin layers of crushed mussel shell. The analyzed CVS assemblages reflect this, with proportion of mussel fluctuating throughout the sequence and being absent in a few samples but comprising between 50% and 90% of the assemblages by weight between 185 and 245 centimeters below surface (cmbs). The Trench 11 profile also contained several thin, dense crushed mussel shell layers in the upper portion of the midden, and had very high proportions of mussel shell in the two samples between 105 and 135 cmbs. One sample from above these layers and the samples from deeper within the midden, however, show greater proportions of cockle. Venus clams are the predominant shellfish in Trench 14, with samples from 170-180, 205-208, 230-240, and 250-255 cmbs (this last sample being below the shell midden deposit) containing greater proportions of littleneck and butter clams than samples from the intervening layers.

Analysis of the material recovered during testing suggests a generalized pattern of harvest of locally available shellfish species, but there is variability in the spatial patterning of specific relative shellfish abundance, both horizontally between trenches and vertically between stratigraphically sequential CVS. Because of the difficulty of associating the CVS shellfish remains with artifacts primarily found in the spoils, or features that could not readily be defined in the trench profiles, further inferences from the testing data are limited. Broad-scale shifts in taxonomic abundance and inferred changes in harvest intensity of particular shellfish types, such as the shift from mussels to Venus clams between temporal components at the West Point site (Larson 1995b:13/25-26), are not apparent in the 45SN393 assemblage. Unidirectional changes, including an abrupt decrease in gastropods between the lower and upper layers of Trench 5 and a dramatic increase in mussel shell in the upper layers of Trench 11, may reflect shifts in particular shellfish harvesting strategies over time or changes in the concurrent use of particular portions of the site. Such inferences, however, require more detailed information on spatial associations of specific deposits within the general shell midden stratum.

The shell assemblage is highly fragmented, which may be attributed to shellfish processing or post-depositional processes such as high-energy wave action from storms striking the beach berm and/or historic or modern human-induced processes that likely aided in fragmentation. Although only the ¼-inch fraction was examined for relative taxonomic abundance, comparison of screen size proportions in overall shell amounts in each CVS suggests that, by weight, the finer fraction comprises a substantial part of the midden matrix. The CVS sequence in most trenches shows fluctuation in the proportion of ⅛-inch shell weight to ¼-inch shell weight with depth, while Trenches 5 and 8 show directional trends of decreasing finer shell fractions with depth (Appendix F).

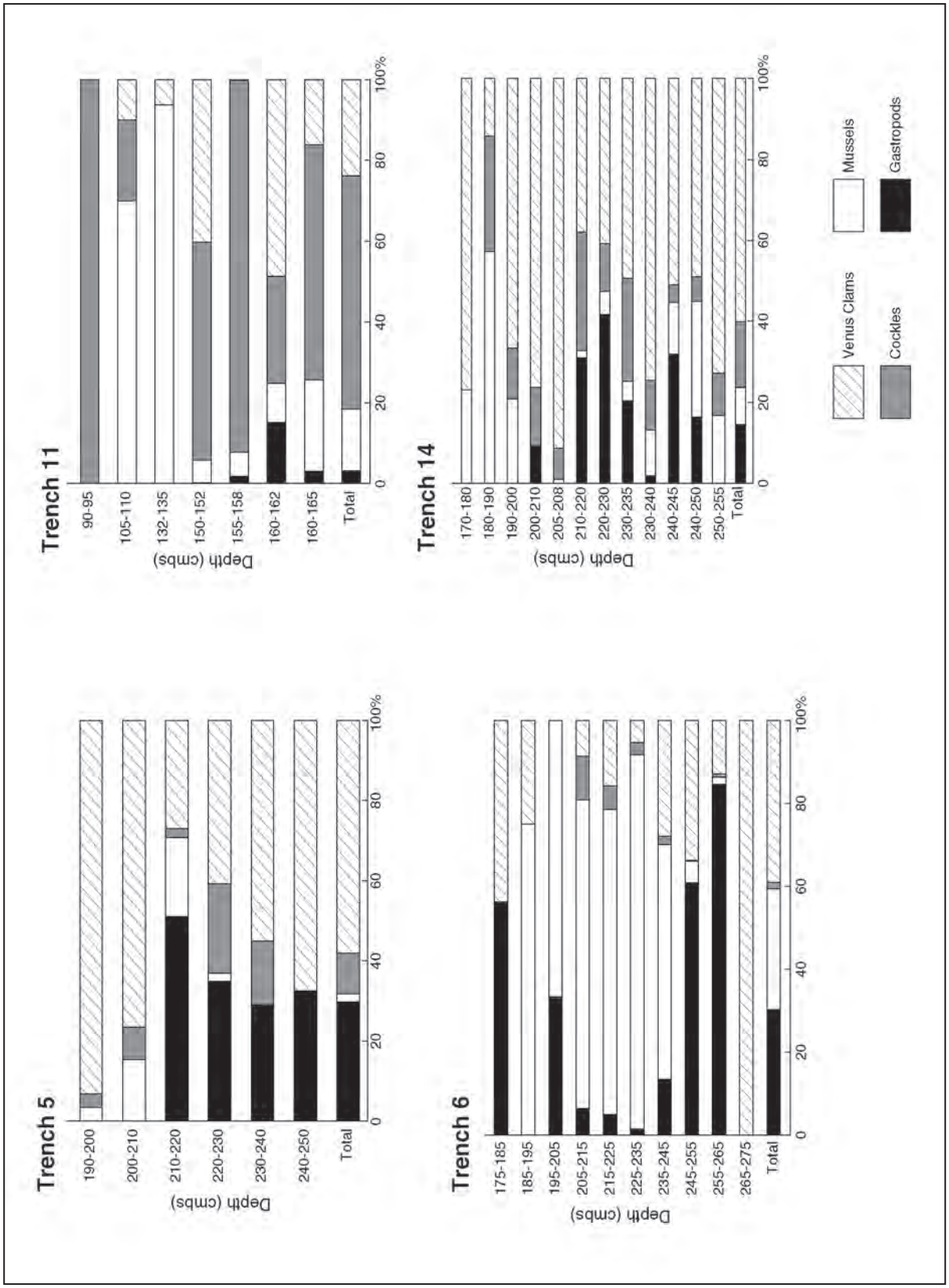


Figure 38. Graphs of relative taxonomic abundance of major shellfish between trenches.

Burned shell fragments in the assemblage may represent cooking, post-consumption disposal, or post-depositional processes within the shell midden, any of which would change shell color and texture and increase fragmentation (Claassen 1998). Burned shell was identified as such in the analyzed assemblage based on color if they were blackened, were gray throughout, or from exposed breaks showing white on the exterior surface of the shell and gray in the interior. A total of 152 shell fragments out of 5,299 analyzed (2.8%) were burned, or 67.8 grams of a total of 2,360.1 grams (also about 2.8%). These burned specimens were of most of the identified taxa and distributed throughout most of the trenches and several of the core CVS.

Fish

Fish bones were sorted in the trench CVS samples from 45SN393, and the ¼-inch and ⅛-inch fractions analyzed. A total of 705 specimens were analyzed, 330 (46.8%) of which were identified to at least the taxonomic level of Order. Quantification is by the number of identified specimens for a particular taxon (NISP). Other methods of quantification were not used, such as Minimum Number of Individuals (MNI), which is the minimum number of individuals of a particular taxon represented by an aggregate of specimens. This method is not as likely to be biased from differential fragmentation of specimens, however it has been shown in several studies that NISP and MNI are highly correlated (e.g., Grayson 1984). Because of this correlation, the dependence of MNI calculations on aggregation methods, and the small sample size of specimens from paired fish elements, fish were quantified by NISP. MNI can be calculated, however, from the raw data in this analysis found in Appendix E. Table 10 lists NISP of particular fish taxa by trench and by screen size, in standard phylogenetic order following Hart (1973).

Table 10. Fish NISP from 45SN393 Trench CVS

TRENCH NO. / SCREEN SIZE	*S. acanthias*	*H. colliei*	*C. harengus pallasi*	*Oncorhynchus sp.*	Embiotocidae	*R. vacca*	Scorpaenidae	Cottidae	*L. armatus*	Pleuronectiformes	Pleuronectidae	*L. bilineata*	*P. stellatus*	Unid. Fish	TOTAL
5 / ¼	1	1	-	1	-	-	1	1	-	-	-	-	-	2	**7**
5 / ⅛	-	-	-	19	-	-	-	-	1	-	-	1	-	13	**34**
6 / ¼	-	-	-	6	-	-	-	-	-	1	-	1	-	2	**10**
6 / ⅛	-	-	1	19	1	-	-	4	1	1	1	-	-	52	**80**
8 / ¼	-	-	-	1	-	-	-	-	-	-	-	-	-	-	**1**
8 / ⅛	-	-	-	1	-	-	-	-	-	-	-	-	-	-	**1**
11 / ¼	-	-	-	15	1	1	-	2	-	2	-	-	1	6	**28**
11 / ⅛	3	-	1	94	-	-	-	3	1	5	2	-	-	210	**319**
13 / ¼	-	-	-	1	-	-	-	1	-	1	-	-	-	-	**3**
13 / ⅛	-	2	-	7	1	-	-	9	-	4	-	-	1	30	**54**
14 / ¼	-	1	-	13	1	2	-	1	-	2	-	-	1	-	**21**
14 / ⅛	-	-	-	77	1	-	-	2	1	4	2	-	-	60	**147**
Total ¼	1	1	-	37	2	3	1	5	-	6	-	1	2	10	**70**
Total ⅛	3	2	2	217	3	-	-	18	4	14	5	1	1	365	**635**
Grand Total	**4**	**4**	**2**	**254**	**5**	**3**	**1**	**23**	**4**	**20**	**5**	**2**	**3**	**375**	**705**

The remains of eight taxonomic fish families and several more specific genera and species within those families were identified in the 45SN393 assemblage. These taxa represent fish commonly found in the vicinity of Point Elliott today (Miller and Borton 1980), and would likely have been available nearby over the past 1,000 years as well. The richness of this assemblage, 13 identified taxa, is not as large as other analyzed fish bone assemblages from similar extensive shell middens, such as West Point (Wigen 1995), or from smaller shell middens with more specialized fish bone assemblages, such as the herring processing site of Burton Acres on Vashon Island (Kopperl 2001). In terms of evenness, this assemblage reflects a focus on salmonids (*Oncorhynchus* sp.), with much smaller numbers of sculpins (Cottidae, including *L. armatus*) and flatfish (Pleuronectiformes, including Pleuronectidae, *L. bilineata*, and *P. stellatus*) and isolated specimens of dogfish (*S. acanthias*), ratfish (*H. colliei*), herring (*Cl. harengus pallasi*), surfperch (Embiotocidae, including *R. vacca*), and rockfish (Scorpaenidae). This may in part be due to sample size and the ease of identifying salmonid vertebra fragments in fine-fraction samples relative to other taxa, resulting in inflated salmonid NISP values (Wigen and Stucki 1988). Small body size of most of the fish taxa present in the 45SN393 assemblage, coupled with the generally fragmented condition of the midden fauna, has resulted in the majority of fish remains being found in the ⅛-inch fraction of each CVS. Herring, Pacific staghorn sculpin, and right-eyed flounder remains were identified in this fraction and not the ¼-inch fraction, while remains of pile surfperch and rockfish may have been present in the finer fraction but were only identifiable in specimens recovered in ¼-inch screen.

Of the 714 analyzed fish remains, 336 or 47% were identified to a specific skeletal element or element group. The majority are vertebrae or vertebra fragments, which is not surprising given the previously mentioned ease of identifying small fragments of salmonid vertebrae. Of the skeletally identified specimens, only 55 or 16% of the specimens came from fish heads, including the cranium, jaws and teeth, and branchial (gill) region. A total of 281 or 84% came were post-cranial specimens including elements of the vertebral column, interhaemel spines, and the epural element of the tail. Herring, sculpin, surfperch, flatfish, and salmon are all represented by both cranial and post-cranial elements, indicating that entire fish were processed at 45SN393. Factors such as bone density, degree of burning, and ground-water saturated depositional environments are known to structure the survivorship of fish remains (Butler and Chatters 1994; Lubinski 1996; Pegg 1999), however the sample size from this assemblage is too small to quantify these effects.

Skeletal elements of varying density are represented, from relatively dense vertebrae and teeth of larger fish such as salmonids to very delicate cranial elements of smaller fish such as herring, suggesting good overall preservation. Burned fish bones are present in small numbers in the assemblage, recorded during analysis as being either charred or calcined. Color is the most commonly used characteristic for identifying thermal alteration of bone, although numerous chemical processes unrelated to burning can have a similar effect on the structure of bone (Lyman 1994; Shipman et al. 1984). The most effective means of identification of burned bone and the temperature range in which a specimen has been burned is by scanning-electron microscopic examination of the specimen's crystalline structure (e.g., McCutcheon 1992). Because the procedure was not practical for this analysis, it was assumed that specimens exhibiting blackening, whitening, or a combination of the two underwent some form of thermal alteration. Blackened specimens were identified as "charred", and are assumed to have been carbonized at a relatively low temperature. Whitened specimens that also exhibited a brittle, chalky texture were identified as "calcined", and are assumed to have been heated to higher temperatures in which much of the organic material within the mineral structure of the bone has been removed. A total of 20 specimens, 2.8% of the entire analyzed assemblage (the same proportion as shellfish remains), were either charred or calcined. Of these burned bones, 10 were charred and 10 were calcined. The

specimens are distributed throughout CVS from Trenches 6, 11, 13, and 14 in proportion to the total numbers of fish bones in those samples. By identified taxon, the burned specimens are from ratfish, salmonid, surfperch, and sculpin. Most of these specimens are found by taxon in the same proportion as that of burned specimens overall with the exception of the very small number of ratfish teeth, of which half (n=2) of the specimens were burned. Burned fish bones within the 45SN393 assemblage suggest either cooking, heat smoking or drying, or disposal of fish in fire, although their small numbers and random distribution throughout the assemblage preclude more detailed inferences.

Birds

Bird remains from four taxonomic families (ducks, loons, grebes, and alcids) and several genera and species within those families were identified for this analysis. A total of 57 bird specimens were found distributed throughout all of the trenches with shell midden deposits except Trench 13, in addition to one bird specimen from a CVS from Core MR-12. Most of the bird remains from the trenches were found in the screened spoils, however several specimens were found in both CVS ¼-inch and ⅛-inch fractions.

The taxonomic names of birds used here follow the Seventh Edition of the American Ornithologists' Union check-list (1998), as well as recent changes to this check-list (e.g., Banks et al. 2003). The avian osteological terms used follow Howard (1929). The modern range distributions of the birds are discussed, using information primarily from Wahl et al. (2005). Table 11 lists the bird remains identified for this analysis. A complete descriptive summary and the raw data are included in Appendix E. Because of the small overall sample size of bird remains and the paucity of specimens recovered from the ⅛-inch fraction, the table lists taxa by Trench or Core number only.

Table 11. Bird Remains from 45SN393.

	DUCKS				LOONS		GREBES				ALCIDS				
TRENCH NO	Anatinae	*Anas* sp.	*Mergini*	*Melanitta* sp.	*Gavia* sp.	*G. stellata*	Podicipedidae	Large Podicipedidae	Small Podicipedidae	*Podiceps* sp.	c.f. Alcidae, small	Alcidae, medium	Alcidae, large	Unid. Aves	**TOTAL**
Trench 5														4	**4**
Trench 6					3		2					1		3	**9**
Trench 8														2	**2**
Trench 11					1	1							1	3	**6**
Trench 14	4	1	2	1			1	1	1	2	1			22	**36**
Core MR12														1	**1**
Total	**4**	**1**	**2**	**1**	**4**	**1**	**3**	**1**	**1**	**2**	**1**	**1**	**1**	**35**	**58**

Bird remains were found in small numbers in most of the test trenches and one core at 45SN393. Trench 14 contained the greatest number of bird bones representing the greatest number of taxa, all except those of loons which were found in Trenches 6 and 11. Only one specimen, a thoracic vertebra from Trench 5 of an unidentified bird, was noted as possibly burnt on one edge. The small sample size

precludes further inference regarding distribution of bird bones throughout the site or generalizations about taphonomic processes specific to bird remains in the shell midden. The taxonomic richness of the bird bone assemblage is high relative to some bird bone assemblages analyzed from other large shell midden sites, such as West Point, and considering its small sample size (e.g., Lyman 1995). Large bird bone assemblages from Old Man House, Duwamish No. 1, Tualdad Altu, and *He'bolb* suggest the taxonomic richness that may be present at 45SN393 and obtainable with large enough samples.

Mammals

Because mammal bones are a much rarer class of faunal remains than shellfish and fish at 45SN393, they were collected from the trench spoils which provided the majority of this data. The spoils collection provides mammalian taxonomic presence/absence information and some indication of distribution across space, but not stratigraphically within each trench. The very small sample size from each trench and core CVS that contained mammal remains highlights a need for larger collection units that have the same stratigraphic precision as the CVS to obtain an adequate sample of rarer classes of fauna as well as artifacts if this site is further investigated.

Taxonomic names and phylogenetic ordering are based on the classification in Wilson and Cole (2000). Quantification is by NISP. Because of the correlation between NISP and MNI, the dependence of MNI calculations on aggregation methods (in the case of mammals, by trench in most cases), and the small overall sample size of mammal remains, this analysis uses NISP. MNI can be calculated, however, from the raw data in this analysis.

A total of 85 specimens were identified to mammalian taxa finer than Class level, from three Orders and six Families. Most of these specimens were of porpoise (Phocoenidae), harbor seal (*P. vitulina*) and deer (*Odocoileus* sp.) with lesser amounts of sea lion (Otariidae), elk (*C. elaphus*), black bear (*U. americanus*), and cow (*Bos* sp.). Another 211 specimens were identifiable only as having come from a mammal. Table 12 lists the mammalian remains identified at 45SN393.

Table 12. Mammalian Remains Identified (NISP) at 45SN393.

UNIT	Otariidae	c.f. Otariidae	*P. Vitulina*	*U. Americanus*	Phocoenidae	*C. Elaphus*	*Odocoileus* sp.	Cervidae	*Bos* sp.	Unid. Large Mammal	Unid. Mammal	TOTAL
Trench 5, Spoils			2		1		2	2			13	20
Trench 6, Spoils			2		17	5	3		1		42	70
Trench 6, 175-185 cmbs											1	1
Trench 6, 215-225 cmbs											4	4
Trench 8, Spoils			3	1	1		8	3			21	37
Trench 11, Spoils		1	10				1				58	70
Trench 13, Spoils					7		2				3	12
Trench 14, Spoils	3		3				3		1	1	64	75
Core MR-5, 122 cmbs			3								4	7
TOTAL	3	1	23	1	26	5	19	5	2	1	210	296

Mammal remains were primarily identifiable in the larger fragments recovered in ¼-inch screens, mostly from the trench spoils but also in the larger fraction of the CVS samples. Eight mammalian taxa were identified, representing both terrestrial (black bear, elk, deer) and marine (sea lion, harbor seal, porpoise) animals found in the Puget Sound lowlands and Possession Sound near Point Elliott today, and are well known archaeologically and ethnographically as having been hunted by Native Americans. The remains of domestic cow, however, are considered intrusive to the shell midden deposit. The sample sizes of mammal remains identifiable to specific taxa are small, none show signs of burning, and very few exhibit cutmarks. Inferences about butchery and carcass transport decisions and post-depositional density-mediated preservation of mammalian remains are therefore not made from this assemblage, but could be made if a larger sample is obtained from 45SN393.

Botanical Remains

Carbonized plant remains from thirteen sediment samples and one charcoal sample were initially submitted to Demeter Research for selection of charcoal best-suited for radiocarbon dating, followed by a more general analysis of macrobotanical remains from those samples and interpretation of the paleoethnobotany at 45SN393. Data from the analysis provides an indication of the kinds and parts of plants used at the site as well as information on the suitability of specimens for radiocarbon dating. The complete botanical analysis report is given in Appendix G.

From a total of 26.5 liters of botanical sample sediments, 174.7 grams of carbonized wood and bark fragments (n=9,429) were separated. Of this amount, 51.1 grams (n=728) of charcoal were further identified. By weight, the majority of the identified charcoal was from Douglas fir (*P. Menziesii*), closely followed by charcoal from the birch family (Betulaceae). Identified in smaller amounts were alder (*Alnus* sp.), hemlock (*T. heterophylla*), western red cedar (*T. plicata*), pine (*Pinus* sp.), maple (*Acer* sp.) and bigleaf maple (*A. macrophyllum*), yew (c.f. *Taxus* sp.), and hawthorn (c.f. *Crataegus* sp.).

The wood taxa in the archaeological deposits are reflective of wood available in the nearby forests and as driftwood along beaches. The dominance of the conifers Douglas fir, western red cedar, hemlock (three types common in other Puget Sound archaeological sites), together with the hardwoods maple and alder, and broad-leafed shrubs, are similar to the major constituents of the Puget Sound area forests. The archaeological charcoal appears for the most part to be the generalized remains of fuel-wood, gathered from the forests and/or beaches without much preference for particular species. Yew (appearing in a few of the archaeological samples) also grows in the Puget Sound forests, but usually as isolated individuals, and its inclusion may be from its technological use rather than as fuel. The heavy durable wood was considered by all coastal groups to be valuable for carving (Gunther 1945:16; Pojar and MacKinnon 2004; Suttles 1951:83). Yew has not been previously identified archaeologically in central Puget Sound sites. Madrone, a conspicuous element of the Puget Sound forests, was not identified from this site, and it also seems to be absent from other Northwest coast archaeological wood assemblages. It is a puzzling omission, since madrone is an excellent fuel wood. Pojar and MacKinnon (2004:49) cite a traditional Straits Salish story in which madrone played an important role, and is therefore not used as fuel even up to the present.

The seed types recovered with some regularity for the site include goosefoot (*Chenopodium* sp.), bedstraw or cleavers (*Galium* sp.), a long grooved grass type probably belonging to the barley taxon (Hordeae), seeds of cress or mustard, seeds of sedge or bulrush, and of a probable knotweed species (*Polygonum* sp.). Small fruits are represented by a blackberry/raspberry seed (*Rubus* sp.) and four elderberry seeds (*Sambucus* sp.).

The goosefoot, bedstraw, grass, mustard, sedge/bulrush, and knotweed are all weedy annuals that thrive in open, disturbed and/or wet habitats. All would probably have grown in the vicinity of the site. Representatives of these taxa are all known to have economic uses by North American peoples (although Gunther 1945 lists neither a Chenopodium nor a Polygonum use in her Ethnobotany of Western Washington), and their presence due to deliberate gathering and economic use by the inhabitants of the site is plausible. For example, bedstraw often grows abundantly along the driftwood zones of beaches, and Pojar and MacKinnon (2004:330) record use of the dried plants to start fires. Because the same few seed types are found repeatedly in a number of contexts at the site, they may have been used as part of established cultural practice. However, there is no strong evidence as to whether the seeds were from gathered plants or adventitious inclusion in the cooking fires. The same is true for the fruit seeds - *Rubus* berries and elderberries are well-known food sources of the northwest people, and the seeds may have been from gathered fruits. But the sparse occurrence in the samples is not strong evidence as to whether their inclusion was economic or accidental.

All but one of the analyzed botanical samples came from relatively thin, charcoal-stained or charcoal-rich strata exposed in the profiles of Trenches 5, 6, 11, and 14. The exception is a sample from the base of a vaguely discernable depression or pit feature filled with black sediment, fire-modified rock, and crushed shell observed in the profile of Trench 6. The thin, level strata from which the other samples came are inferred as occupation surfaces, while the feature in Trench 6 may represent a different, more specialized function or activity. Although testing at 45SN393 has not yielded features in the same number or diversity as sites such as West Point and Duwamish No. 1 which are amenable to exploration of feature variability and inference of function through dimensional classification, a basic expectation that may be used here is that the botanical contents will differ between the strata interpreted as generalized occupation surfaces and the stratum interpreted as a specialized feature. A lower diversity of plant taxa and parts may be expected in a sample from a specialized feature than a sample from a surface in which a variety of activities took places. An exception would be a pit or depression that was purposely filled with refuse from a combination of other activities and may include a diverse set of plant remains (e.g., Lewarch et al. 1995:12/30). The feature contains wood charcoal from six taxa, a greater diversity than most of the other samples, along with a greater amount of starchy plant tissue by weight than any of the other samples, and one goosefoot seed. Conversely, there is also a sample (Trench 6, 218-223 cmbs) from what appears to be a specialized context within the thin strata above the feature; rather than mixed wood types the sample consisted of only Douglas fir in an organic matrix that also included abundant shell, fragments of burnt bone, and fairly abundant seeds.

The plant remains from 45SN393 establish a tentative and preliminary pattern of plant use by the coastal inhabitants of this site. This pattern includes: generally non-selective use of the local environment for fuel-wood (except for the apparent exclusion of madrone), and the economic use of certain small-seeded weedy annuals as well as berries. Systematic flotation analysis of other coastal sites and synthesis of regional data will clarify this pattern.

Summary of Animal and Plant Utilization at 45SN393

From analysis of the assemblage of faunal and botanical remains from 45SN393, it is clear that a wide variety of locally available animals and plants were used by the Native American occupants of the site. The animals that were brought to the site not only provided meat in both large packages (e.g. elk, sea lion) and small (e.g., clams, sculpins) but were also a source of raw material such as hide, sinew, bone,

antler, feathers, shell, and oil to manufacture clothing, tools, ornaments, and other goods for use or trade.

The plants identified for this analysis are limited to carbonized fragments and are primarily of various tree species. Starchy tissue fragments that may have been from edible parts of plants were found in very small amounts, and are likely under-represented in this assemblage relative to the wood charcoal. The volume of wood burned as fuel for hearths or food smoking, or as signal fires at the site, is probably much greater than that of seeds, berries, nuts, and other edible portions of plants that must have been deposited, burned and unburned, at the site. Less common wood taxa such as yew were found as charcoal and may have been burned for fuel, but may also represent burned fragments of objects from which yew was commonly carved such as arrow or spear shafts.

The faunal assemblage provides an indication of how the site was used throughout the year. Some resources such as shellfish would have been available as a general class of food year-round. Seasonal indicators, on the other hand, include species that are only available at particular times of the year, such as salmon, herring, and migratory waterfowl, and also specimens from individual animals that were harvested at a particular age that occurs at a regular time during the annual cycle, such as newborn harbor seals. Table 13 lists the seasonally-restricted taxa found (aggregated into larger taxonomic units in some cases) and their availability near Point Elliott throughout the year. Although the presence of certain taxa at the site may be attributed to stored food obtained at a different time or place than when consumed, such as dried salmon, the taxonomic and demographic composition of the faunal assemblage suggests utilization of a suite of animal resources available near the site at different times throughout the entire year. Microscopic study of seasonal markers of shellfish was beyond the scope of this analysis, but may provide more fine-grained seasonality data in the future.

Table 13. Availability of Seasonally Restricted Animal Taxa Found at 45SN393.

RESOURCE	MONTH											
	J	F	M	A	M	JN	JY	A	S	O	N	D
Spotted Ratfish	*	*	*	X	X	X	*	*	*	*	*	*
Pacific Herring		**X**	**X**									
Salmonids	**X**				**X**	**X**	**X**	**X**	**X**	**X**	**X**	**X**
Pacific Staghorn Sculpin	•	**X**	•	•	•	•	•	•	•	•	•	•
Ducks	X	X	X	*	*	*	*	*	*	*	X	X
Loons	*	•	•	*	*	*	*	*	*	*	*	*
Grebes	•	•	•								•	•
Sea Lions	X	X	X	X							X	X
Harbor Seals (newborn)							**X**	**X**	**X**			
Elk	•	•	•	•	•	•	•	X	X	X	X	•
Deer (fawn)					•	**X**	•					

* Uncommon in the region during this period
• Available in the region during this period
X Abundant or primarily hunted or fished ethnographically in the region during this period
X Breeding or bearing young during this period

Although unmodified faunal remains found in shell midden sites are usually associated with subsistence practices, the presence of some faunal constituents may be due to natural or non-subsistence cultural processes. Erlandson and Moss (2001) and Lyman (2002) note a wide variety of terrestrial and marine animals that feed on aquatic prey and may bring their remains into the shell midden, which is often interpreted in terms of its anthropogenesis. Animals such as raccoons (present in the 45SN404 faunal assemblage; see below), mustelids, dogs and foxes, seals and sea lions, and a variety of birds are some of the animals that may deposit bone, shell, or other parts of animals into a shell midden. Some of these animals may introduce these remains as stomach contents when they are caught and brought to the site by the human occupants. Lyman (1994; 2002) encourages taphonomic analysis of faunal assemblages to identify agents that may have incorporated particular remains into a deposit and agents that may have affected faunal remains after initial deposition. Non-tool modification observed on the analyzed faunal specimens is limited to a few cutmarks, limited burning on one bird bone and some fish and shell specimens, and erosion of some bone surfaces that were more likely caused by physical or chemical weathering than corrosion from passing through a digestive tract, and none of the mammal or bird bones exhibit gnawing or puncture marks. Additionally, no rodent bones were identified in the screen spoils or the small screen size fractions of any CVS. Although the lack of these indicators in the faunal assemblage and the clear archaeological context of the shell midden in general suggest that most of the bones and shells in the midden represent human hunting, fishing, and gathering efforts, other agents should not be dismissed and any further faunal samples from the site should be examined for such taphonomic agents.

Faunal remains may also be deposited into a shell midden because of non-subsistence cultural reasons such as tool manufacturing. Several bone tools and modified beaver teeth found at 45SN393 attest to the need for faunal raw materials to make a variety of implements. The faunal remains analyzed here are included in this analysis because they are not modified, however they may represent portions of animals brought to the site not for food but for their value as tools. Hodgetts and Rahemtulla (2001) note the value of cervid bones to Northwest Coast Native Americans for tool manufacture reflected in ethnographic documentation and the archaeological record. The small samples of modified faunal remains and unmodified mammal remains preclude attempts to connect any hypothesized bone tool manufacturing strategy that took place at the site with the particular taxonomic and skeletal representation of the unmodified fauna at the site. There is no reason not to assume, however, that the remains of cervids, black bear, sea mammals, birds, fish, and molluscs at 45SN393 represent not only a broad range of subsistence pursuits by Native Americans but also the need for other parts of these animals to help build the implements and ornaments essential to their culture.

Site Synthesis

The north-facing shoreline of Point Elliott has been occupied by Native Americans for approximately 1,000 years. The cuspate foreland and vicinity provided a variety of resources that would have drawn Native communities to the berm throughout the annual subsistence cycle. The Mukilteo Shoreline site (45SN393) contains the remnants of this occupation, including a thick, horizontally extensive shell midden over 500 meters (0.3 mile) in length. The midden is characterized by intact, bedded layers of crushed shell, charcoal and charcoal-stained sediments, and fire-modified rock deposited on top of the clean sand and gravel of the beach berm that formed at Point Elliott prior to human occupation. The alkaline depositional environment of the shell midden has created ideal preservation conditions for bone, in the form of both unmodified faunal remains and fragments of mammal bone and beaver teeth modified into tools. Within the shell midden strata are the remains of animals that were hunted, fished,

and gathered by the Native occupants of the site, the plants that they ate and the wood that they used for fuel and implements. Stone tools and tool-making debris reflect the kinds of stone implements they used, how they used them, and the various ways in which the tools were made. Test excavations and sampling of 45SN393 indicate that these important data classes are present with intact archaeological integrity. The data classes have the demonstrated potential to address important questions about a variety of research domains representative of the pre-contact Native American occupation of Point Elliott and central Puget Sound over the last 1,000 years.

Despite the horizontal breadth of the shell midden, radiocarbon dates from three test trenches point to initial occupation about 600 years before present along much of the midden. A date from near the base of one trench, from charcoal in a shallow depression or pit feature, of about 1000 BP represents earliest use of the site before more widespread occupation. The terminal radiocarbon dates from the four trenches range between about 440 BP and modern times, [redacted] have somewhat obscured the archaeological details of the final years of Native American occupation. The kinds of artifacts found and the character of the shell midden support the radiocarbon chronology of occupation over roughly the last 1,000 years, and place the site within the Late Period of Puget Sound culture history. Corresponding with the San Juan phase of the more refined Strait of Georgia sequence to the north, the last thousand years prior to Euroamerican contact were marked by large populations that settled in permanent or semi-permanent winter villages. These communities, however, were usually mobile throughout much of the year for economic reasons and because of important social and ceremonial obligations. No evidence of the kinds of structures people may have lived in was found during testing at 45SN393. However the diverse suite of animal remains found at the site reflects an environment that drew people to Point Elliott throughout the year.

The occupants of 45SN393 utilized several technological strategies to make stone and bone implements for a variety of functions. Hammerstones and the flakes and cores that result from chipped-stone tool manufacture were found at the site, and reflect both free-hand and bipolar methods of flaking stone tools. Bipolar techniques, fracturing stone between a hammer and anvil, were used to expediently make many simple flake tools from locally-available volcanic rocks. Other artifacts show fine workmanship applied to more exotic materials, including a projectile point made of petrified wood and a ground nephrite adze blade.

Although very few by-products of a ground bone tool-making industry were found during testing, some modified faunal remains were recovered, along with unmodified mammal long bone shaft fragments that may have been intended for future manufacture. A ground bone toggling harpoon valve, bone point, bone chisel, and ground beaver tooth reflect sea mammal hunting, fishing, and tool- or implement-making activities, perhaps including incising of art objects of bone or stone.

A very large proportion of the archaeological deposit by volume is the remains of shellfish that were discarded at the site. These shells are from gastropods such as whelks, limpets, and moonsnail; mussels; clams such as cockle, littleneck, butter, and horse clam; geoduck; and barnacles. The samples analyzed during testing suggest that the majority of shellfish, by weight, are the Venus clams (littleneck and butter clams), followed by cockles, gastropods, and then mussels. Geoduck are notable; although found in very small amounts at 45SN393, they have only been identified in one other archaeological site in central Puget Sound despite their natural abundance in the region. Although the shellfish assemblage reflects generalized gathering of species locally available in the sandy and gravelly intertidal zone

mantling Point Elliott or nearby beaches, the proportions of particular kinds of shellfish within individually analyzed samples fluctuate across the site among trenches, and vertically through time within the stratigraphic sequences of individual trenches. This may reflect specialized activity areas within the site, individual dumping episodes of the shells of particular kinds of molluscs, or changes through time, seasonally or more long-term, in shellfish abundance or gathering strategies.

The bones of fish, birds, and mammals were found at the site in much smaller numbers than shells, but provide a stronger indication of the year-round draw of this environment to the occupants of the site. Native Americans fished the near-shore eel-grass beds as well as the open waters of Possession Sound and nearby rivers and streams. The bones of salmon, flatfish, sculpins, surfperch, dogfish, ratfish, herring, and rockfish were found in samples obtained from testing. Harvesting these fish would require different fishing techniques at various times of the year. Analyzed bird bones suggest a marine-oriented focus on diving ducks, loons, grebes, and alcids such as murres, murrelets, and auklets. Mammal bones reflect hunting both on land and at sea, most likely by boat. Harbor seal, deer, and porpoise remains were found in roughly equal number, with lesser amounts of sea lion and elk. A molar from a black bear is the only specimen from this species. Bones from newborn harbor seal and deer, along with bones from migratory birds, reflect different times of year that hunting likely occurred. Although specific butchering and processing strategies cannot be inferred from the small sample obtained from testing, the occupants of 45SN393 likely hunted and fished farther afield to obtain some of their subsistence resources than they did to gather shellfish and catch some near-shore fish species in the open waters [redacted] or the more protected tidal lagoon [redacted]

No human remains were found during test excavations. While this could be related to the small volume excavated during testing, Ames and Maschner (1999:137, 181) suggest—based on rather limited data—that the Northwest Coast practice of interring the dead in middens drops off sharply after approximately AD 1000, the time period when humans are believed to have first occupied the Mukilteo spit. Human remains could still be encountered in the midden deposits or in the site vicinity.

The charcoal fragments and seeds found in botanical samples taken from 45SN393 are as informative as the shells and animal bones. Charcoal from both conifers (Douglas fir, hemlock, pine, and cedar) and hardwoods (maple and alder) were found in moderate to large amounts in the samples. These species are common as standing trees in nearby forests and as driftwood along the beach, and would be appropriate fuel for hearth fires, earth ovens, or for smoking and drying shellfish, fish, and meat. Charcoal from yew was found in small amounts, yet it is significant in its value for making bows and arrow shafts and has not been identified in other central Puget Sound archaeological sites. Seeds from a variety of grasses, sedges, and fruit-bearing plants that grow in disturbed or wetland environments were found. Given the evolving tidal marsh behind the Point Elliott barrier berm and continual occupation of the growing barrier berm itself, such plant species are expected. Although obvious indicators of plant processing such as earth ovens or other well-defined features were not found in the test excavations, small dispersed amounts of amorphous, bubbly fragments of charred starchy plant tissue, perhaps from camas or similar bulbs, were found that suggest such processing did occur at the site.

Results of testing at the Mukilteo Shoreline Site suggest that it was an important year-round occupation that played a prominent role in the settlement systems of Native American communities that inhabited other contemporaneous sites as well. More extensively excavated sites, such as West Point, Duwamish No. 1, Old Man House, and Cama Beach, contain archaeological deposits from the last 1,000 years and have been interpreted as major winter villages or seasonal processing camps in centralized locations

along or near the shoreline of central Puget Sound, with similar artifact and faunal assemblages as 45SN393. Point Elliott would have been a valuable place not only for the year-round availability of certain subsistence resources, but also as a strategic landform near the intersection of south Puget Sound, the protected tidewaters east of Whidbey Island, the entrance to Hood Canal, and the exit to the Strait of Juan de Fuca through Admiralty Inlet. The site is also near the mouth of the Snohomish River, which provides a transportation route east to foothills, the Cascade crest, and beyond.

The archaeological investigation had the desired results of establishing preliminary boundaries and content for the Mukilteo Shoreline Site, 45SN393. Geoarchaeological investigations were able to construct the physical framework of the site, establish the depositional context for the shell midden, and construct a preliminary landform history. Information contained within the site has the potential to answer scholarly research questions, and the site was recommended eligible for National Register of Historic Places listing under Criterion D.

Supplemental Studies

Additional geotechnical studies, conducted between 2007 and 2010 for City of Mukilteo parks and road improvement projects, further refined the boundaries of the Mukilteo Shoreline Site (45SN393). Review of data from 11 geotechnical test pits and six boreholes in 2007 documented deep historical period fill overlying lagoon sediments [redacted] No archaeological deposits were encountered (Gillis 2007). The following year, during a second phase of the Lighthouse Park project, data from two additional boreholes were reviewed. Both of these boreholes, [redacted], contained archaeological midden deposits (Rinck and Heideman 2008). Archaeological monitoring of ten additional boreholes followed in 2009 in an attempt to trace the extent of the Mukilteo Shoreline Site (45SN393) [redacted] Midden deposits were identified in seven of the ten boreholes, [redacted] (Rinck 2009, 2010). Archaeological monitoring of utility trench excavation during implementation of the Lighthouse Park project documented both intact and disturbed sections of site 45SN393 [redacted] (Shong et al. 2010).

Data from archaeologically monitored boreholes, drilled in 2006-2007 for the WSF ferry terminal project, established the [redacted] boundary of the Mukilteo Shoreline Site (45SN393), as presently understood. [redacted] Ten archaeologically monitored boreholes were drilled [redacted] No evidence of midden deposits or other pre-contact cultural material was found in any of the 10 bores. Although the Japanese Gulch Creek delta has been identified as a relatively high probability area for pre-contact Native American resources, periodic flooding or other disturbance may have dispersed any cultural material that was present. No pre-contact cultural material was identified during excavations at the Japanese Gulch Site (45SN398) higher on the delta fan, although evidence for occupation and use of this landform may be closer to the shoreline. The amount of testing on the delta fan, however, related to the borehole and Japanese Gulch Site efforts was very limited and pre-contact cultural material could still be encountered in the area.

3.2 OLD MUKILTEO TOWNSITE (45SN404)

A portion of the [redacted] property was assessed for cultural resources in 2005 as part of environmental studies for the Port of Everett's Satellite Rail/Barge Transfer Facility (Schumacher 2005). No cultural resources were identified during the survey and, because of previous disturbance and depth of fill in the area, none were expected to be encountered during construction. The U.S. Army Corps of Engineers (USACE), however, the lead federal agency for the project, recommended archaeological monitoring of construction excavation [redacted] due to sensitivity of the underlying landforms for pre-contact Native American sites and early historical period activity. Monitoring occurred in 2006, and two buried historical archaeological sites, 45SN404 and 45SN398, were identified in the area (Shong 2006a, 2006b).

Site 45SN404 was encountered [redacted] during utility line trenching for the Port of Everett/USACE project. Observed historical materials included deteriorated lumber, burned brick, and historical artifacts, remains identified through historical research as the Crown Lumber Company store and butcher shop (Miss et al. 2008; Sanborn Fire Insurance Map 1912; Shong 2006b).

Later in 2006, archaeological test excavations were conducted at the site, also part of the Port of Everett/USACE project, to evaluate the property's historical significance. During these investigations historical period fill overlying the site was mechanically removed and a 20-inch-wide L-shaped trench, 32 feet in length, was hand excavated in the location of the former store. Below the undifferentiated fill was a discrete charcoal-rich layer that included abundant artifacts consistent in style and date with operation of the store between about 1900 and 1938. A layer of brick and mortar was found beneath the burned layer, and below that a layer of deteriorated dimensional lumber, identified as remains of a wooden deck that supported the building over the marsh (Shong 2006b). A site form and a determination of eligibility form, recommending the property eligible for listing in the National Register of Historic Places, were completed and submitted to the Washington Department of Archaeology and Historic Preservation and the USACE (Shong 2006b; Miss and Shong 2006b).

More extensive investigations—further testing and data recovery—were conducted at the site between 2006 and 2009, part of environmental studies for WSF [redacted] (Ferland et al. 2010; Miss et al. 2006, 2008; Rinck and White 2008). These studies recovered valuable information regarding the early Mukilteo commercial district and expanded site 45SN404—by then characterized as the Old Mukilteo Townsite rather than the Crown Lumber Company Store—[redacted] Figure 38).

Research Domains and Questions

To be eligible for listing in the NRHP, historical cultural resources must demonstrate integrity and relevance to questions posed by historical archaeologists. Data from archaeologically identified features and artifacts are integrated with historical records to address current historical archaeological research questions. Four research domains and associated questions were identified for site 45SN404 prior to the 2006-2007 studies. These are summarized below.

Figure 39. Sanborn map contains sensitive cultural resources information that is exempt from public disclosure pursuant to provisions of the Public Records Act (RCW 42.56.300).

Figure 39. Sanborn map, 1912, showing the Old Mukilteo Townsite (45SN404).

Chronology and Site Formation: Euroamericans may have made occasional use of the Mukilteo berm before Frost and Fowler filed claims in 1858, and it is possible that some evidence of such activity may be found. More likely, however, is evidence of the Bay View Hotel and other later nineteenth century buildings. The original and later buildings were built on pilings over, or on the shore of, the tidal marsh. Specific questions and goals of the research include:

- Are there structural remains and other artifacts that pre-date 1900?
- Is there evidence of building removal that pre-dates the Crown Lumber Mill?
- Is there evidence of the Crown Lumber Mill?
- What are the effects from mid-twentieth century fill placement on artifacts and structural remains?
- Is there evidence of any natural or human-induced disaster, e.g. floods, fires, or earthquakes?

Data classes that may be applied to these questions include site foundations and structural features, time-sensitive artifacts and assemblages, historic maps, photographs, and written and oral testimony.

Trade and Commodity Flow: When first settled, British presence in the region was strong and was supplied through Victoria or Ft. Vancouver. Dependence on American goods shipped through Portland and Seattle probably increased through time, especially after the settlement of the US-Canadian border in 1846, although the British did not leave the San Juan Islands until 1872. Logging in the 1860s centered on the Snohomish River and brought more prosperity to Mukilteo. With its deep-water harbor, Mukilteo became a stopping place for ships traveling up and down Puget Sound and for travelers intent on catching a river steamer inland to Snohomish City. Mukilteo was a fuel station, a freight transfer point, and by 1877 the home of the first salmon cannery on Puget Sound and an important center for loggers and settlers. Specific questions and goals of the research include:

- Is there evidence amongst the artifact assemblage for British or American origin?
- Is there evidence of the fluctuating population in Mukilteo before the lumber mill arrived?
- Is there evidence of early trade with Indians?

Data classes from the site that may be applied to these questions include artifacts with identifiable trademarks, features such as dumps and privies, and historical records.

Foodways: Composition of meals, methods of preparation, menus, and ways of serving are expected to change through time as Mukilteo became increasingly linked to a regional social and economic network. Use of local foods, for example the abundant salmon of Possession Sound, may have gradually tapered off, but never ended from the mid-nineteenth to mid-twentieth century. More direct participation in a market economy characterized by increase in more prepared foods may be evident with the arrival of railroad links to Seattle. Such changes may be particularly evident in remains associated with hotels where meals were served. An international cosmopolitanism may even have been present. Specific questions and goals of the research include:

- Is there evidence of changing use of local game, fish, or plant food?
- What use was made of preserved foods, condiments, and other commodities?
- Is there evidence of ethnically or culturally distinctive meals, meal preparation, or serving, e.g. Chinese, Japanese, Scandinavian?

Data classes from the site that may be applied to these questions include identifiable food containers, faunal and botanical remains, features such as dumps and privies, and historical records.

Social and Economic Status: Earliest assemblages are expected to reflect a more egalitarian social structure than later ones when the town was well established and supported by the lumber mill. Settlement that included families appears to have been relatively early, with the Fowler family settling at Mukilteo in the 1860s, but many of the occupants of the region were men who logged or fished and came to town to visit the saloons. The Mukilteo vicinity also has a long history of Asian settlement. The first cannery on Puget Sound was established here in 1877 and in 1887 a new cannery and wharf were installed that employed Chinese labor. The Mukilteo Lumber Company mill attracted many Japanese workers so that by 1905 the population of Mukilteo numbered approximately 200 Euroamericans and 150 Japanese (Whitfield 1926:590). The Crown Lumber Company constructed a small housing complex for its Japanese workers along lower Japanese Gulch. Specific questions and goals of this research include:

- Are women and/or children represented in the artifact assemblage?
- Do styles of construction or artifact assemblages change with shifting community prosperity?
- Are there artifacts or food remains that can be used to characterize economic status and used to compare Old Mukilteo with other working and rural communities of the period?
- Is there cultural material that reflects the presence of Asian individuals or an Asian community?

Data classes that may be applied to these questions include artifact assemblages with status-diagnostic materials (e.g., ceramics, personal adornments, intra-site comparative collections), faunal remains suggesting relative economic differences (e.g., more or less desirable portions of meat, from the perspective of different ethnic groups), and historical records.

Geoarchaeological and Archaeological Field Studies

Test trenches and mechanical borings completed as part of the 2006-2007 investigations identified historic remains in an area [redacted] (Figure 17, Appendix B). Archaeological methods were identical to those described for 45SN393. The historic debris, as a whole, represents a portion of Mukilteo's business district dating from at least 1880 to 1940, although a date as early as the 1860s is possible based on the settlement history of Mukilteo and the manufacturing dates for some of the recovered artifacts (McConnell 1977).

Vertical and Horizontal Distribution

Historical cultural material was noted in four backhoe trenches and several of the cores (see 45SN393 stratigraphic discussion above). Artifacts were collected from two of the trenches and combined with the previously collected material to characterize the site. With the majority of the material coming from the original discovery and Trench 3, the most basic partition of the artifacts is by position above or below the Crown Lumber Company decking.

In Trench 1, a historical debris layer was noted between 6.2 feet below the surface (fbs) (1.9 meters below surface [mbs]) and 7.2 fbs (2.2 mbs). The debris layer was inundated by the water table soon

after exposure, although brick and dimensional lumber were observed. In Trench 2, a historical debris layer was noted between 4.6 fbs and 5.2 fbs (1.4 mbs and 1.6 mbs). The debris consisted of partially burned dimensional lumber and a small amount of vessel glass and earthenware ceramics. The associated matrix was heavily disturbed suggesting the deposit represents demolition debris. Persistence of buildings in photographs at this location suggests the demolition was part of the U.S. Army's World War II-era site preparation. In Trench 3, the Crown Lumber Company decking, piles, and possibly other structural debris were found 4.3 fbs and 5.9 fbs (1.30 mbs and 1.80 mbs) capping approximately 8 inches (20 centimeters) of charcoal-stained silt intermixed with historical debris. The underlying historical debris consisted primarily of whole and fragmented bottles, vessel glass, earthenware, porcelain, and sawed mammal bones. In Trench 4, a thin layer of burned structural debris, dominated by tar paper, cardboard, a cluster of several hundred 16-penny wire nails and several ¾-inch-thick shiplap boards, ceramic tube insulators, white glass (melted), and red brick fragments, was found between 3.3 fbs and 3.6 fbs (1.0 mbs and 1.1 mbs). This material may represent the south wall of the Crown Lumber Company store.

Analyses

Artifacts

Artifacts were classified by material and form (Table 14). Historical materials were examined to identify details of manufacture, function, and age. Faunal materials were subjected to a separate analysis.

Ceramics

Ceramics are divided into three distinct categories based on material: earthenware, porcelain, and stoneware. Earthenware is a large category including a variety of different ware body types ranging from porous,

Table 14. Artifact Summary for 45SN404.

OBJECT/ MATERIAL	N=	% OF ASSEMBLAGE
Faunal		
Mammal	37	7.9
Other Bone	5	1.1
Ceramic		
Earthenware		
Cup	1	0.6
Decorative	10	5.9
Figurine	1	0.6
Pipestem	2	1.2
Plate/ Platter	58	34.3
Chamber Pot	5	3.0
Other Tableware	22	13.0
Unknown	33	19.5
Porcelain		
Cup	1	0.6
Decorative	8	4.7
Figurine	1	0.6
Plate	6	3.6
Other Tableware	4	2.4
Unknown	5	3.0
Stoneware	12	2.6
Crock/ Jar	8	4.73
Other/ Unknown	4	2.37
Glass		
Automatic Machine Bottle	22	4.7
Hand Manufacture Bottle	36	7.6
Unknown Process Bottle	58	12.3
Auto and Semi-Automatic Jar	4	0.9
Jar Lid Liner	8	1.7
Decorative Vessel	7	1.5
Flat Glass	8	1.7
Button	2	0.4
Unknown	58	12.3
Metal		
Ammunition	1	0.2
Clothing Clasp	2	0.4
Nails and Hardware	11	2.3
Other/ Unknown	8	1.7
Leather		
Footwear	12	2.6
Other		
Milled Lumber	3	0.6
Other	18	3.8
Total	**469**	**100**

unrefined earthenwares to vitrified ironstone (Mullins 1988). The majority of these wares were glazed to prevent the absorption of liquids into the vessel and also for decoration. The earthenware class is dominated by white-bodied, refined wares, mostly whiteware and ironstone. The porcelain class is comprised of extremely dense, white-bodied, non-porous wares and does not differentiate between hard or soft-paste types (Mullins 1988:14). Porcelain artifacts are the second largest category of ceramics at this site. Stoneware items are dense completely vitrified wares, often made from unrefined pastes. Stoneware artifacts are the least common ceramic category at this site and are associated with slip or salt-glazed utilitarian vessels like storage pots, jugs, or crocks (Mullins 1988:45).

Earthenware at this site mostly consists of tableware items. Decorated plates and saucers in this collection incorporate a variety of techniques including transfer-print, gilding, and decals, all of which were common at the end of the turn of the twentieth-century (Mullins 1988) (Figure 39, d). Gilded vessels in this collection are items with one or two bands of gold that were applied via a liquid mixture of gold and other precipitates. The result after precipitation is a delicate ring of gold that appears around the rim of previously glazed vessels (Mullins 1989:11) (38, b). Gilded ceramic sets had a mid-ranged retail price when compared to other ceramic tableware sets (Montgomery Ward Company 1969:531). Decalcomania is a printing method that involves placing a color decal on a glazed vessel and was first introduced in 1892 (Mullins 1988:34). This technique can produce very detailed designs and appears on virtually every vessel form manufactured during the twentieth-century.

Identified maker's marks indicate that most ceramics here were manufactured in England at the turn of the twentieth century (Table 15). The trend away from European ceramics did not occur in the United States until the early twentieth century (Wegars 1982:2-3). The only identified domestic ceramic artifact was manufactured by the W.S. George Pottery Company (Figure 39, a). This company was founded by William Shaw George, a producer of semi-porcelain tablewares, who also owned other potteries throughout Pennsylvania and Ohio in the twentieth century (Lehner 1988:162). This mark was used between the 1930s and 1940s.

Table 15. Identified Ceramic Maker's Marks.

MANUFACTURER	LOCATION	PRODUCTION DATES
W.S. George Pottery Company	East Palestine, Ohio	late 1930s to 1940s
Arthur J. Wilkinson, Ltd.	Burslem, England	from 1896
J. & G. Meakin, Ltd.	Hanley, England	from 1890
John Edwards	Staffordshire, England	c. 1880-1900
R.H. & S.L. Plant, Ltd.	Staffordshire, England	from c. 1898

European "bone china" and hard-paste Chinese and Japanese porcelains are primarily blue, transfer-print items and are a mixture of tablewares and decorative items. None of the decorative motifs on these artifacts has been identified. Porcelains are a small portion of this assemblage, perhaps because they cost more in the United States than English imports. Porcelains have historically been considered more desirable and exotic than other ceramics (Mullins 1988; Herbert and Schiffer 1975).

Figure 40. Selected ceramic artifacts from site 45SN404.

Unrefined stoneware fragments primarily represent utilitarian storage vessels and were affordable because they were manufactured locally. Stoneware at this site is rare and represents a small number of crocks or food jars. As glass and metal manufacturing techniques improved during the nineteenth century, stoneware vessels were largely replaced (Greer 1999). By the twentieth century, stoneware jars were all but extinct in large-scale food manufacturing.

Glass

Glass artifacts represent the largest portion of this assemblage and can provide valuable information about product consumption, manufacturing techniques, and trade networks. Most of the glass (57.1%) is from various bottles, mostly medicines, beverages, and extracts. The largest percentage of glass fragments (60.1%) are colorless or aqua-colored vessels, including storage jars, soda bottles, extracts, medicines, and unknown vessels. Green, olive, and brown vessel glass, typical of alcoholic beverages, comprise 25.6% of the glass assemblage. The remainder of the glass assemblage (14.3%) is a collection of canning jar lids, decorative items, buttons, or unidentified items.

Because glass artifacts were widely used in product packaging, they have the potential to provide valuable information on available manufacturing technology at the time of their deposition. Market forces also motivated the proliferation of glass vessels through a combination of demand for cheap bottles for products and development of the technological capability to fulfill this demand. Developments in glass manufacturing technology at the end of the nineteenth century eventually culminated in the automation of the industry in the early twentieth century (Miller and Sullivan 2000). Despite proliferation, bottles still retained enough value to be recycled by businesses and citizens alike and the bottle reuse industry was a thriving business in the United States into the twentieth century (Busch 2000).

Identifiable maker's marks on vessel glass were analyzed in order to determine origins of these vessels and the date ranges of their manufacture (Table 16). All of the identified vessels from this site were produced domestically during the early twentieth century and many of these products were made locally. Most of the bottles have marks characteristics of fully automatic bottle-making machines, which became prevalent after the development of the Owens bottle-blowing machine in 1903 (Miller and Sullivan 2000:163).

Table 16. Identified Glass Vessel Maker's Marks (Toulouse 1972).

MAKER'S MARK	MANUFACTURER	LOCATION	DATES OF USE
"IO" in a diamond	Owens-Illinois Glass Company	Clarksburg, West Virginia	1930-1963
"I" in diamond	Illinois Glass Company	Alton, Illinois	1916-1929
Anchor and "H"	Anchor Hocking	Lancaster, Ohio	since 1938
"H" and "A"	Hazel-Atlas Glass Company	Wheeling, West Virginia	1923-1964
S.G.Co.	Possibly Seattle Glass Company	Renton, Washington	1905-1907
"NW"	Northwestern Glass Company	Seattle, Washington	since 1931
"J.A.F.& Co."	J.A. Folgers & Company	San Francisco, California	1900/ 1910- 1929
A.L. Van Valley	A.L. Van Valley Bottling Works	Everett, Washington	1895-1941
Everett Bottling	Everett Bottling Works	Everett, Washington	since 1902

Two artifacts (404-9 and 404-141) made for local soda bottling companies have been identified. One complete, colorless soda bottle (404-9) is from a vessel made for the Everett Bottling Works (Figure 40, c). This bottling facility was founded in 1902 by Peter Edward Misgen and Alexander E. Kick, who also founded the Sedro-Woolley Bottling Works in 1903 (Hensrud and Halford 1998:11). In 1906, Kick bought out the Everett Bottling Works, which also bottled the Angeles Brewing Company's beer. It is unknown when this company stopped operation. Another fragment (404-141) is from a bottle made for the A.L. Van Valley Bottling Works of Everett. This company was founded by A.L. Van Valley in 1895 and operated until his death in 1941 (Hensrud and Halford 1998:18).

Two other artifacts were made by nearby glassworks. A complete, brown bottle (404-22) bearing the mark "S.G.Co." was possibly made by the Seattle Glass Company of Renton, Washington, although other glass companies also used this mark (Whitten 2004). This glass factory operated between 1905 and 1907 and was known to produce brown beer bottles. Another complete, brown bottle (404-21) was made by the Northwestern Glass Company of Seattle (Figure 40, a). This manufacturer has been in operation since 1931 (Toulouse 1972:390-391).

By the twentieth-century, glass manufacturing was becoming increasingly dominated by large, national conglomerates. The Owens-Illinois Glass Company was founded in 1929 and is an example of conglomeration of the glass industry during the early twentieth-century. Through consolidation and incorporation of smaller glass companies, the Owens-Illinois Company operated twenty plants in the United States by the 1930s (Lockhart 2006:23). A complete glass vessel from this site (404-15) was manufactured by Owens-Illinois and bears a coded maker's mark that can be traced to the specific factory within the Owens-Illinois group (Figure 41, a). Based on its maker's mark, this vessel was made at a plant in Clarksburg, West Virginia in 1936 by bottle mold number 4 (Lockhart 2006:23; Toulouse 1972:403). A brown half-pint liquor bottle (404-23) was manufactured by the Anchor-Hocking Glass Corporation (Figure 40, b). This company was formed through a merger between the Anchor Cap Corporation and Hocking Glass Company during the 1930s and has continued consolidation of other glass manufacturers throughout the twentieth century (Toulouse 1972:46-49). The mark on this vessel has been used since 1938.

A colorless extract bottle embossed "J.A.F&CO." (404-36) contained product made by the J.A. Folger Company of San Francisco (Figure 42, b). The Folger Company was founded in 1850 and was known for its spices, extracts, and flavorings prior to 1929 (Toulouse 1972:274). This particular mark was used between 1900 and 1929. Today, this company is best known for its coffee. Another colorless bottle is embossed "3 in One Oil Co." (404-10) (Figure 42, c). The date of this vessel is unknown, but the manufacturer is known for its lubricant oil and is still in operation today.

Metal

Few metal artifacts were collected. The ten nails in this assemblage were collected as representative of the many observed. Of these three are square, cut nails and five are round, wire nails. Steel cut nails, which are generally square-shaped, came to replace wrought iron cut nails during the 1880s and 1890s as steel manufacturing technologies improved. Steel wire nails were invented in the 1860s but did not come to dominate the market until the 1920s (Wells 1998:87). A pocket watch of unknown origin (404-105) is also among recovered metal artifacts (Figure 43, b). Pocket watches of similar size and shape are advertised in the 1895 Montgomery Ward catalog and were widely available by the end of the nineteenth-century (Montgomery Ward Co. 1969).

Figure 41. Selected large bottles from site 45SN404.

Figure 42. Selected other glass artifacts from site 45SN404.

Figure 43. Selected small bottles from site 45SN404.

Figure 44. Selected leather and metal artifacts from site 45SN404.

Leather

A total of twelve leather fragments was recovered, all of which are from decayed shoe soles. The pegging of these shoes was done by machine based on the symmetrical distribution of metal shoe nails or screws, also called pegs (Anderson 1968:59). One shoe sole has visible cupric alloy screws along its exterior margin where the sole was attached to the upper (Figure 43, a). This manufacturing technique was first patented in 1862, but was not perfected until the 1880s and remained popular into the early twentieth-century (Anderson 1968:59).

Other Artifacts

The remaining 21 artifacts include various items that did not readily fall into other categories. Five lightbulb bases with glass cathodes were recovered along with a lead fishing weight and, possibly, a small grinding stone. The light bulb was first invented by Edison in 1878 and was improved throughout the end of the nineteenth-century. While the date of this style of light bulb is not known, electricity for Mukilteo was provided by the lumber mill and these bulb fragments indicate that electricity was available in this area of town.

Brick

Bricks found within the burned layer were traced by their trademarks to brick manufacturers that were in operation at the time that these stores were constructed (Gurcke 1987:74) (Table 17). Most were probably brought to Mukilteo as ballast on sea-going ships.

Table 17. Origin of Identified Bricks.

MAKER'S MARK	MANUFACTURER	LOCATION	DATES OF OPERATION
Snowball	Derwenthaugh Fire Brick Works	Swalwell, County Durham, England	ca. 1854-1935
T. Carr	Thomas Carr & Sons	Newcastle-on-Tyne, England	ca. 1827-1965
M.T. & Co.	Unknown	California	Noted in 1902

From Gurcke 1987:73-74

Faunal Remains

Faunal remains found in Trench 3 near and below the wooden decking provide some indication of animal utilization along this historic commercial block of Mukilteo. A total of 42 bone fragments was recovered from the trench spoils pile amidst wooden planks and beams and historic artifacts dating primarily between the 1880s and 1930s. Of the 42 specimens collected, four were of fish, one of bird, and 37 of mammal. The mammal remains were primarily of domestic cow and sheep; fish were not identifiable to specific taxon. Full descriptive summaries and analysis data sheets are given in Appendix E.

The faunal assemblage from Trench 3 primarily contains the remains of domestic cow and sheep, from both finished retail cuts of meat and carcass portions of less utility. Also present in small numbers are deer bones and fish bones. The proximity of the Crown Lumber Company store and meat market and several hotels and restaurants, including the Bay View Hotel, to Trench 3 may account for the mixture of domestic animal parts. Deer bones suggest that hunting for subsistence or recreation persisted at the site.

Site Synthesis

The opportunistic collection of artifacts makes interpretation difficult; however, the property has discreet artifact assemblages above and below the Crown Lumber Mill decking. In addition, remains from the Bay View hotel, although not collected, were visible in the excavated trench. Other debris in boreholes and trenches suggests that additional historic cultural deposits associated with the older berm buildings are present. Material above the decking and associated with the original discovery appears to represent diverse activities ranging from possible store stock to use of the buildings after abandonment. Datable bottles suggest that the material from beneath the decking, where primarily hand blown artifacts were found, is older than that from above where bottles are machine made. Bottles and other glass vessels come from both national and local sources. Ceramics are both utilitarian and of higher quality, including a fragment of Asian porcelain. Most of the earthenware trademarks are English and date to the late nineteenth century. Preservation of the leather is encouraging for future recovery of this material class. The faunal material represents primarily domestic animals and restaurant and retail cuts that could be associated with either the butcher shop associated with the store or disposal from the berm buildings.

These archaeological excavations also provided information that revised the characterization of 45SN404 from representing only the Crown Lumber Company store to representing a portion of early Mukilteo's commercial area. Boundaries of the site were enlarged to include remains associated with other commercial enterprises along Park Avenue, and the Bay View Hotel and other early buildings built along the berm before the first Mukilteo lumber mill was established (Miss et al. 2008). The expanded site was also recommended eligible for the National Register of Historic Places under Criterion D because it contained suitable data classes and artifacts in sufficient quantities to address important research questions about the economic and social development of historic Mukilteo (Miss et al. 2008).

Additional 45SN404 Studies

Following 2006-2007 field studies, planning for the WSF Mukilteo ferry terminal project was put on hold. However, in the interim, an enlarged vehicle holding area was proposed for the existing terminal. [redacted] A cultural resources assessment was undertaken to determine the effects of building demolition and pond construction on cultural resources (Rinck and White 2008). The study included archival research and review of geotechnical data previously collected for other projects along Front Street and Park Avenue. The investigation concluded that excavation to a depth of six feet for the proposed infiltration pond would likely intersect historical archaeological deposits associated with nearby site 45SN404, the Old Mukilteo Townsite. Subsequent backhoe excavation of two test pits verified artifact-rich deposits [redacted] (Rinck and White 2008).

Based on the results of these studies, the boundary of site 45SN404 was expanded again to include known and probable historical archaeological deposits [redacted]. An updated site form was submitted to DAHP with this new boundary (White 2008). Information about the content and integrity of these deposits, however, was limited to observations in the test pits. Because relocation of the infiltration pond was not feasible, further archaeological test excavation was recommended to acquire sufficient information to evaluate the pond location as contributing or non-contributing to the significance of 45SN404 (Ferland et al. 2010).

Test excavations were undertaken in February 2009. The proposed pond area was stripped of most of its overburden and eight 1x0.5 meter test units were excavated. The test units established the presence of wood, metal and glass artifacts associated with a distinct layer that extended across the study area. The archaeological deposits could be correlated with features on early maps and the information used to address the early history of Mukilteo, prompting a recommendation for additional data recovery prior to project implementation. Data recovery was designed to include additional archival research, excavation of randomly and non-randomly selected 1x1 meter units, and combined analysis of the testing and data recovery results. Data recovery excavations at the proposed stormwater pond were conducted in July 2009, with 32 1x1 meter units, one 1x0.5 meter unit, and one 0.5x0.5 meter unit excavated. Monitoring of pond construction followed in August of that year.

The archaeological investigations provided physical evidence of the community's history, supplementing and verifying existing written records. Results of the Old Mukilteo Townsite (45SN404) studies offer unique insights into the town's early community structure, commercial systems, demographics, and lifeways, while recovery of a few clay tobacco pipe fragments and a bead may be evidence of the

treaty/trading post period. A report detailing the results of the 2009 45SN404 archaeological investigations is currently in draft (Ferland et al. 2010) with the final report forthcoming.

3.3 JAPANESE GULCH SITE (45SN398)

The Japanese Gulch Site (45SN398) was identified in 2006 during archaeological monitoring of utility trench excavation for the Port of Everett/USACE Satellite Rail/Barge Transfer Facility project. The site is evidence of early twentieth century Japanese mill workers who resided in the racially segregated Mukilteo Japanese Gulch settlement (Shong 2006a; White et al. 2009). [redacted]

In March 2007 Sound Transit, in preparation for relocation of railroad tracks and sub-surface utilities prior to construction of the new commuter rail station, sponsored archaeological testing at 45SN398A. The goal of the investigation was evaluation of the site's significance, that is, its eligibility for listing in the NRHP. Following removal of the overburden, twelve 0.5x0.5 meter test units were excavated. The test units yielded a variety of cultural material, including ceramic, glass, metal, and leather artifacts, structural remains, marine shell, and mammal bone. Testing results indicated that 45SN398A is a subsurface concentration of both Western and Japanese domestic material and architectural debris dating to the early twentieth century. The 45SN398A portion of the site was recommended eligible for listing in the NRHP under Criterion D, based on its potential to contribute important information about local and regional history.

Data recovery excavations at 45SN398A followed in June 2007, as mitigation for the adverse effect utility relocation would have on that portion of the site. Test excavations were conducted concurrently at 45SN398B to determine whether that part of the site contributed to eligibility of 45SN398 as a whole, a study related to the Port of Everett/USACE Rail/Barge Facility project. The 0.5x0.5 meter test units at 45SN398A were expanded into 1x1 meter units and additional units were excavated, for a total of 24 1x1 meter units and four 1x0.5 meter units. Thirty 1x1 meter units were excavated in 45SN398B. Archival research and interviews with knowledgeable informants were also completed, supplementing the archaeological studies. Additional information, including research domains and questions and project methods, are detailed in the project report (White et al. 2009).

The excavations yielded a wealth of information about the material culture of the early twentieth century Mukilteo Japanese community. The recovered artifacts indicate Japanese Gulch residents selectively adopted Western products out of convenience or necessity, but continued to buy available Japanese goods. Artifact data used in conjunction with historical records and ethnographic interviews provide insight into the everyday lives of Gulch residents, documenting a working-class community that turned its segregation and disadvantaged position into a source of social cohesion. Research questions focusing on the social and cultural aspects of information collected at the Japanese Gulch site were successfully addressed, laying the groundwork for further inquiries into the lives of Japanese immigrants prior to World War II. As a result of the archaeological investigations, 45SN398B was also shown to contain important historical information and was recommended as contributing to National Register eligibility of site 45SN398 under Criterion D (White et al. 2009).

3.4 POINT ELLIOTT TREATY SITE (45SN108)

Research was undertaken in 2007 to search for better descriptions of the precise locations and events associated with the signing of the Point Elliott Treaty at Mukilteo (Miss et al. 2008). The Treaty caused extreme changes for Indian people by divesting them of their lands and establishing the reservation system. At the same time, the Treaty is a legal document that establishes the sovereignty of independent tribal governments, and it is a symbol of survival. Work associated with the Point Elliott Treaty included archival research, coordination with the signatory Tribes, and oral history interviews with knowledgeable tribal members. The following sections detail these investigations and the research results.

Historical Research

Archival research for the historical portions of this report, including the Point Elliott Treaty negotiations and the development of the Mukilteo townsite, was conducted in libraries and other repositories primarily in the region. Additional archival facilities in other parts of the country were also consulted for pertinent materials. Among the institutions visited in the region were the University of Washington Libraries, the Museum of History and Industry and the National Archives, Puget Sound Branch, in Seattle; the Western Washington University Libraries and the Washington State Archives, Bellingham; the Washington State Historical Society in Tacoma; the Washington State Archives and the Washington State Archives in Olympia, as well as the Washington State Archives branch in Bellevue. Other local or regional repositories with important collections included the Everett Public Library, the Mukilteo Historical Society, the Snohomish County Historical Society, the Snohomish County Clerk of Court, Assessor and Auditor's offices, the Bellevue branch of the King County Library, and the Seattle Public Library. Repositories contacted outside the area with important collections included the Oregon Historical Society, Duke University Special Collections, Minnesota Historical Society, the New York Public Library, the Library of Congress, the Smithsonian Institution, and the National Archives and Records Administration in Washington, D.C. and Suitland, Maryland.

Initial research focused on original government records and reports of treaty negotiations as well as contextual information about the period. Government records included reports and other documents from the Bureau of Indian Affairs, Washington Superintendency and the Tulalip Agency, as well as additional documents from the Department of Interior, the Secretary of War, the Surveyor General and the Department of Interior, and the Adjutant General of the U.S. Army. Hearings conducted at local agencies as well as before Congressional Committees were also reviewed. The papers of individuals involved in the negotiations for the government, including Isaac Ingalls Stevens, Charles Mason, George Gibbs, and Frank Shaw, were also reviewed. Biographical information and correspondence of other participants in the treaty negotiations was also sought as well as census, probate, and civil court files.

Additional research focused on the perspectives of those tribes directly involved in the treaty process, i.e. the Indian tribes of central and northern Puget Sound, and their descendants. Information was found in court hearings and depositions for land claims cases and other legal proceedings as well as interviews conducted by anthropologists, historians, and other researchers interested in ethnography, ethnohistory, and linguistics. Each tribe signatory to the Point Elliott Treaty was contacted about archival resources and the availability of individuals willing to contribute oral interviews to the project.

The work of Vi Hilbert in transcribing and translating early interviews with tribal elders was of particular value. Other helpful material, including some additional interviews and legal documents, were found at the Suquamish Tribal Archives. Individual oral history interviews were recorded with Hank Gobin, Tulalip Tribes and Lora Pennington, Stillaguamish Tribe and unrecorded interviews conducted with Pat Brown, Stillaguamish Tribe and Leonard Forsman, Suquamish Tribe. Opal McConnell was interviewed about the history of Mukilteo. A more complete guide to the sources consulted for this project is found in Appendix A.

Previous Documentation and Commemoration

The Point Elliott Treaty has been commemorated at least three times in the City of Mukilteo. In 1930 the Daughters of the American Revolution (DAR) erected a bronze plaque on a slab of granite to commemorate the Treaty at the corner of Lincoln Avenue and Third Street in Mukilteo. The monument, designated 45SN372 in the DAHP records, was listed on the Washington Heritage Register and National Register of Historic Places in 2004 for its association with the DAR and their Everett chapter. In 1953 the local post of the Veterans of Foreign Wars erected a concrete slab and wooden bench in the then Mukilteo State Park to commemorate the Washington Territorial Centennial and the Treaty. The plaque is now at the Mukilteo Lighthouse where a small museum is operated by the Mukilteo Historical Society. In 1973 another marker was placed in the park by the Governor's Advisory Council on Historic Preservation, Washington State Parks and Recreation Commission to commemorate the location's listing on the Washington Heritage Register. This marker was designated 45SN108 and a National Register nomination was submitted for the Point Elliott Treaty Site based on this arbitrary location. The nomination was returned reportedly due to lack of integrity and lack of verification that the park location was the actual place the Treaty was signed (Kessler 2003). This plaque is also now at the Mukilteo Lighthouse.

Point Elliott Treaty and Site 45SN108

Furs and other potential trade goods first brought outsiders to the Puget Sound region, but it was the prospect of claiming land that lured those who planned to stay. Soon after the Wilkes expedition explored the coastal Northwest for the United States in 1841, increasing numbers of American settlers began to cross the continent on routes first blazed by the fur traders. The Oregon Trail originally brought pioneers to the mouth of the Columbia River, where most then turned south toward fertile lands of the Willamette Valley. Transportation up and down the coast, whether by land or sea, was difficult, but by 1846 when a treaty between the United States and Great Britain established the 49th parallel as the boundary between their claims in the Northwest, settlement had already begun to expand into other areas. A group of landseekers had already moved northward all the way to the southern tip of Puget Sound, where they established a small community that later became the town of Olympia. With the settlement of the international boundary dispute others quickly followed, including a group that came north in 1850 on the brig Orbit, the first American merchant vessel to sail to Puget Sound. Soon additional early settlements developed at Steilacoom, Port Townsend, and on Whidbey Island (Evans 1899:299; Newell 1960:6-10; Bancroft 1890:2-3; 5-6, 15, 18-21).

Oregon had officially become a territory of the United States in 1848, but the Organic Act that created the territorial government nullified all provisional land laws. In 1850 Congress passed the Donation Land Act, which provided very generous land grants to current residents of the territory and encouraged even more migration to the region. When Congress created Washington Territory out of Oregon in 1853, it

also applied the provisions of the Donation Land Act to the new territory and extended it to settlers arriving as late as 1855. When the measure expired in that year, the government had granted about 1,018 patents in Washington territory representing approximately 300,000 acres of land (Johansen and Gates 1967: 231, 234, 249).

The growth of American settlement and the political changes brought about by territorial status also had a significant impact on the Native people of the region. Not only was there increased interaction with outsiders, but the Donation Land Act was put into effect so quickly that Indian titles to the land were rarely extinguished before land distribution began. When Washington Territory was created in March of 1853, Isaac Ingalls Stevens was appointed as the first territorial governor and also named *ex officio* Superintendent of Indian Affairs. Stevens had a mandate to make treaties with the indigenous inhabitants of Washington and extinguish their title to lands that American settlers had claimed. It was this duty that eventually brought him to the treaty grounds at Point Elliott in January of 1855 (Richards 1993:194-195).

Background of American Treaty Policy

Stevens was following a treaty-making process that had been part of the Indian policy of the United States for most of its existence. Americans had treated Indian tribes as sovereign nations existing within the boundaries of the country ever since their help was needed in the Revolutionary War. The Northwest Ordinance of 1787, passed by the Continental Congress, recognized that land would be a future source of conflict and promised that a fair policy would be followed and property never taken from Native peoples without their consent (White 1991:85-86).

This policy was tested in the 1830s when expansionists advocated removal of Indians living east of the Mississippi River to western lands, which were designated as Indian Territory. President Andrew Jackson sided with the expansionist views and allowed states to undermine tribal sovereignty by ordering forced removal. In two Supreme Court cases brought by the Cherokee, Chief Justice John Marshall ruled that Indian tribes were “domestic dependent nations” but still exempt from state laws. The decisions affirmed Indian sovereignty but also recognized that a protective relationship existed between the government and Native peoples. Removal was justified as the alternative to disappearance of these people (Prucha 1986:64-77).

The government’s idea that a separate and defined Indian country could serve as a protective mechanism quickly faded, however, as the United States acquired more territory in the West with more Indians to “protect.” Eager settlers heading to these new lands could not be easily controlled. By the late 1840s and early 1850s a new policy was evolving that attempted to use treaties as a means of setting aside a number of smaller “Indian territories” or “reservations”—lands reserved or carved out of the original holdings of an Indian group (Prucha 1994:235). As Western historian Richard White characterized the process: “American officials, in attempting to halt conflict between Indians and whites, prevent expensive wars, and open up land to white settlement, created reservations the way the survivors of a shipwreck might fashion a raft from the debris of a sunken vessel. Reservations evolved on an *ad hoc* basis as a way to prevent conflict and enforce separation of the races” (White 1991:90-91).

The Treaty of Fort Laramie in 1851 is usually cited as the starting point for the acceptance of the reservation system as an integral part of United States Indian policy. Commissioner of Indian Affairs George W. Manypenny, who came into office in 1853, was committed to the reservation concept as the

best means to civilize the Western tribes. He believed that the practice of removal could not continue and that the best policy for the United States was to establish smaller, but permanent, homes for Native groups on reservations. As a result, by early 1856 nearly 52 treaties had been negotiated, although a number awaited ratification by Congress (Prucha 1986:113).

Isaac Ingalls Stevens and the Washington Treaties

President Franklin Pierce selected Isaac Ingalls Stevens as territorial governor, which also made him the *ex officio* superintendent of federal Indian policy in Washington Territory, despite his lack of prior experience with Indians. Stevens, born in Maine, was a West Point graduate who had designed fortifications as a member of the Army engineering corps before serving in the Mexican War. After the war, Stevens became the assistant head of the Coast Survey Office with the opportunity to cultivate friendships among administration leaders in Washington, D.C. Excited by the prospects of international business and trade in the Pacific Northwest, Stevens, at the age of 34, applied for appointment as Washington's territorial governor and received confirmation in March 1853. Along with that position he also lobbied for a position as the head of the Pacific Railroad Survey, which Congress had authorized to study the feasibility of a northern route for the nation's first transcontinental line (Richards 1993:13, 27-30, 96-98; Stevens 1900:280-282, 285).

Stevens saw the railroad survey as a boon to his work in territorial government, calling attention to “the great influence which this exploration will exercise over the Indian tribes, the exceeding efficiency which it will give to me in discharge of my duties as Superintendent of Indian Affairs, and the interesting information which it will enable me to collect in regard to their numbers, customs, locations, history and traditions” (Stevens 1900:285). Indians were also one potential obstacle to the completion of the railroad, and once he began the survey, Stevens’ meetings with tribes along the route evidently gave him confidence in his own abilities to handle Indian negotiations. According to his biographer, "To the extent that Stevens had a philosophy of Indian-white relations, he assumed the superiority of European civilization and the necessity of moving the Indian from its path. He hoped the removal could be accomplished peacefully and that, during a period of benevolent care, the Indians could be educated to cultivate the soil and become productive, valued members of white society" (Richards 1993:191).

Yet Stevens was also aware of the discrepancies between the interests of settlers moving into the region and federal Indian policy, and the possible trouble that could result. At the time that Washington became a territory, the Commissioner of Indian Affairs George C. Manypenny had delivered a clear mandate to move Northwest Indian peoples as far away as possible from white settlement. As Manypenny argued: "With many of the tribes in Oregon and Washington territories, it appears to be absolutely necessary to speedily conclude treaties for the extinguishment of their claims to the lands now or recently occupied by them" (Richards 1993:196).

From the time of Stevens' arrival in Olympia, November 25, 1853, he made Indian affairs one of his highest priorities. One of his first official acts was to establish a court system, which was immediately overwhelmed by cases dealing with conflicts between Indians and settlers. Stevens also quickly made appointments of Indian agents, sending them out to impress upon their charges "the advantages of living at peace with the white man, of adopting his better mode of livelihood, and of securing the aid and protection of the Great Father in Washington" (Stevens 1900:450). Among the first agents was Michael Simmons, who was assigned to the Puget Sound tribes with two other early Washington pioneers, B.F. Shaw and Orrington Cushman, to assist with translation. Attempts to suppress the liquor

trade and to stop Hudson's Bay Company's trade with Native Americans were also parts of Stevens' agenda in the first months of his term (Stevens 1900:415).

Stevens was convinced that the reservation model represented the best alternative for Indians of Washington Territory, even though Congress had turned down treaties authorizing reservations in California and Oregon just prior to Stevens' arrival in the Northwest. Congress had rejected treaties made in 1851 and 1852 by Anson Dart, Stevens' counterpart in Oregon, for example, because they provided for many reservations lying close to Euroamerican settlements. After less than a month in the territory, Stevens wrote Commissioner Manypenny that he considered the need for treaties to purchase Indian land of supreme importance, believing that grouping of Indians on government-supervised reserves would help to quicken the pace of settlement in the region. Many of his efforts were hampered by problems of funding, and memorials made to Congress about the lack of money initially failed to garner any support. Stevens made a trip back to Washington, D.C. in the spring of 1854 to deliver his railroad survey report and to gather his family to return with him to Washington. During this visit he also lobbied influential officials for additional money to carry on Indian negotiations (Richards 1993:195; White 1972:55-57; Stevens 1900:430-432).

Manypenny had already paved the way for these appropriations, arguing that Congress had encouraged settlement in the region and yet had not extinguished Indian title, thus resulting in "the murder of white settlers, and in hindering the general growth and prosperity of the civil communities of these territories" (Manypenny to Secretary of the Interior, February 6, 1854, in Richards 1993:197). Congress authorized the expenditure of $45,000 for treaty negotiations west of the Cascades as well as another $100,000 for treaties with tribes east of the mountains. Stevens was appointed as the treaty commissioner for these negotiations (Coan 1922:12-13; Stevens 1900:431-432).

As commissioner, Stevens received instructions that treaties should concentrate Indians on "a limited number of reservations or on contiguous reservations, in a limited number of districts of the country apart from the settlement of the whites" (Washington Superintendency, Mix to Stevens, August 30, 1854). The Indian office also ordered Stevens to begin his negotiations with groups who had the greatest contact with whites or who might present the most problems. In a letter dated September 16, 1854, Stevens assented to this plan, but argued that the new reserves should have room to accommodate agriculture, individual land ownership, and the particular needs of each tribal group:

> It is obviously necessary that a few reservations of good lands should be set apart as permanent abodes for the tribes. These reservations should be large enough to give each Indian a homestead, and land sufficient to pasture their animals, of which land they should have sufficient occupation. The location and extent of these reservations should be adapted to the peculiar wants and habits of the different tribes. Farms should be attached to each reservation, under the charge of a farmer competent fully to instruct the Indians in agriculture, and the use of tools. I would express the hope that the administration of Indian affairs in this new and interesting field may illustrate, not so much the power as the beneficence and paternal care of the government.
>
> (Records of the Washington Superintendency [WA Superintendency], Stevens to Mix, Sept. 16, 1854, microfilm University of Washington, Seattle).

Preparation for Negotiations

When Stevens returned to Washington Territory he immediately began to set in motion the treaty-making process. He organized a commission to develop treaty plans, calling its first meeting in early December 1854. Members of the group included Puget Sound Indian agent Michael Simmons, George Gibbs as surveyor, James Doty, who was named secretary, B. Frank Shaw, interpreter, and Hugh Goldsborough as commissary. Simmons was one of Washington's earliest pioneers, having settled near modern-day Olympia, Washington, in 1845 after crossing the Oregon Trail the previous year. Gibbs, who was educated at Harvard, had made a study of Indian groups as part of the Pacific Railroad survey and according to the *Pioneer and Democrat*, the region's early newspaper, he and Simmons "understand the Indian character and can do more with them than any two other persons in the Territory..." (*Pioneer and Democrat*, March 10, 1854). Frank Shaw, as described by Stevens' son, Hazard, was the primary translator, "the only man who could make or translate a speech in Chinook jargon offhand, as fast as a man could talk in his own vernacular" (Stevens 1900:453). Goldsborough, an educated pioneer and brother of a well-known naval commander had lived in Washington long enough to understand Indian relations as did Doty, the son of a former governor of Wisconsin, who had studied the Blackfeet at Fort Benton as part of the railroad survey (Stevens 1900:453).

During their initial meeting, the group discussed the treaties already concluded with the Omaha, Otos, and Missouri. The Indian Office had supplied copies of the drafts of these documents as models for the Washington treaties. Of particular significance was the provision for future allotment of the land within these reservations in individual plots to Indians who were "willing to avail of the privilege." Gibbs, who was charged with drawing up a preliminary format for the treaties, incorporated this provision into a draft document. He also included elements of the group's lengthy discussion of reservation fishing stations, schools, and farms (Records of the Proceedings of the Commission to Hold Treaties with Indian Tribes in Washington Territory [Records of the Proceedings], December 10, 1854, Microfilm, University of Washington, Seattle).

Three days later Gibbs presented a proposal to the commission that contained fourteen articles, many of which would become key provisions in the upcoming treaty negotiations:

1. To cede all lands but to reserve for the tribes specified tracts;
2. To preserve the right of fishing at common and accustomed places;
3. To remove to reserves within a year of ratification or less;
4. To provide annuities in payment for cessions based on a dollar amount per Indian but presented in a lump sum;
5. To pay a bonus equal to the first year's annuity to enable them to move, build houses, etc.
6. To allow division of land and assignment of lots to heads of families;
7. To forbid annuities to be used to pay individual debt;
8. To agree to friendly relations with whites and with other Indians and to pay indemnities for depredations;
9. To allow no white men to live on the reservation and to give Superintendent power to force Indians to stay there;
10. To exclude liquor from the reservation;
11. To allow Indians to punish offenders according to their own law;

12. To free all slaves and end the slavery system;
13. To introduce an apprenticeship system and
14. To end trade on Vancouver Island and allow no foreign Indians on reservations.

(Record of the Proceedings, December 10, 1854, University of Washington, Seattle)

First Treaty Proceedings

With this preliminary work completed, the commission decided to hold the initial treaty conference in late December with south Puget Sound groups, including the Puyallup, Nisqually, and Squaxin. The governor then instituted the process that was used to organize the rest of the treaty counsels around Puget Sound. Simmons and Shaw left Olympia to meet with the Indians, explain the purpose of the treaty and make arrangements for the gathering, which was to be held on the Nisqually Flats near the mouth of Medicine Creek. The government chartered a schooner owned by Captain E.S. Fowler to carry members of the negotiating team as well as treaty goods and supplies to various meeting points on the Sound. The commission was organized much like a military company and three well-known area residents, Sidney Ford, Jr., Orrington Cushman, and Henry Cock served as quartermasters. Among their tasks was preparation of the sites for camps and counsels as well as surveying for future reservations (Stevens 1900:454-455).

Stevens arrived at Medicine Creek on December 24, 1854, and on the following day explained the schedule and read a draft of the proposed treaty. On December 26th the council held discussions on the provisions of the treaty and the signing took place. Stevens was pleased with the outcome of the Treaty of Medicine Creek, which gave the United States title to 2,500,000 acres in return for three widely separated reservations consisting of a total of 3,840 acres. Some of the Indians had asked for more land, but the governor had remained firm, and discontent soon arose (Richards 1993: 210; Records of the Proceedings, Stevens to Manypenny, Dec. 30, 1854; Marino 1990:169, 171).

At the end of the council, Stevens met with the other treaty commissioners to determine their future course. Governor Stevens wanted to bring all of the Indians around the rest of Puget Sound together in one treaty session, and possibly locate them on a single reserve. Simmons, Goldsborough, and Gibbs disagreed, and after discussion, Stevens decided to hold one council for all the groups on the east side of the Sound. The date chosen was January 22, 1855, and the place at "the mouth of the Sno-ho-mish River." A second council with the tribes on the west side of the Sound would be held at a yet-to-be-determined location a week later. Simmons, Gibbs, Goldsborough, and Shaw were designated to prepare for the treaty sessions and notify the Indians of the gatherings, while James Doty was sent east of the Cascades to make preliminary arrangements for councils in the spring with the inland tribes (Records of the Proceedings, Dec. 26, 1854, University of Washington, Seattle).

In all of the preliminary documentation, the location of the next council was referred to as the mouth of the Snohomish River. In a letter reporting on the first council, which Stevens sent to the Commissioner of Indian Affairs, George Manypenny, he also wrote, "The next treaty will be held at the mouth of the Sno-ho-mish River, where will be brought together the Indians of the Islands and the Eastern shore of the Sound... Every effort will be made to establish them on a single reservation and on that reservation near the mouth of the Sno-ho-mish to provide for the agency (Records of Proceedings, Stevens to Manypenny, Dec. 30, 1854, University of Washington, Seattle)."

Point Elliott Treaty Events

Stevens returned to Olympia after the Medicine Creek council, but the other treaty commissioners made some preliminary surveys of reservations proposed in that agreement before heading further north to prepare for the next round of treaty negotiations. The following chronology of events related to the Point Elliott Treaty council is based on the Records of the Proceedings of the Commission to Hold Treaties with Indian Tribes in Washington Territory, which is a microfilm series of treaty documents compiled by the National Archives, and also from a transcript of the proceedings certified by the National Archivist in 1949. The description is drawn from these documents unless otherwise noted. Additional accounts of this period come from the manuscript journals of George Gibbs dated 1854 to 1855, the records of the Washington Superintendency, testimony in later court cases, and a few newspaper accounts.

Location and Preparation

Simmons and Shaw left the Medicine Creek site to notify the Indians of the North Sound about the next treaty negotiations. Shaw spent nearly two weeks, according to his own account, spreading the word about the next treaty council to the Lummi and other tribes (Shaw Affidavit, US, Hillaire Crockett and Captain Jack v. Alaska Packing Association, June 19, 1895, US District Court, Northern Division, at NARA, Seattle, WA). On January 5, 1855, Major Goldsborough traveled from Olympia to Seattle by steamer. On the following day Goldsborough proceeded to Skagit Head to pick up agent Simmons, but the wind was too strong to land and the ship "went round and anchored at Point Elliott." Simmons came onboard on January 7th and he and Goldsborough sailed to Port Gamble, where they made arrangements for the Point No Point conference the following week. On January 8th they returned to Point Elliott, where they anchored. In his journal Gibbs notes on that date: "In afternoon left again for Skagit Head. Wind baffling & did not arrive till late in night off mouth of Sno-homish where we anchored behind point Elliott" (Journal of George Gibbs 1854-1855 (Gibbs Journal), Microfilm Z75, NARA, Seattle).

On Tuesday, January 9, 1855, Goldsborough selected a site for the camp and treaty grounds and erected tents there. Reports indicate that Patkanim and the Snoqualmie were already at the council site. On the following day, the goods were brought from the schooner anchored offshore and the party "went into camp" while Simmons and Goldsborough returned to Seattle by schooner to secure more goods and talk to the Duwamish, who wanted to meet in their own territory rather than on the treaty grounds. Gibbs in his journals mentions the evening of January 10th, he "went to see a doctor to ??/ tamahnous" (Gibbs Journal, Z75, NARA, Seattle). On January 11th, Benjamin Shaw arrived from Bellingham Bay, where he had contacted the Lummi and reported they were on their way to the council.

Despite early references to the treaty grounds as the mouth of the Snohomish River, evidence from treaty minutes and other letters and reports indicates that the location selected for the treaty council was, in fact, on or around Point Elliott. In a letter sent by George Gibbs to Governor Stevens, dated January 12, 1855, he places his location as "Camp on Snohomish Pt Elliott" (Washington Superintendency, UW, Seattle). The word Snohomish appears to be crossed out. In the letter he advises Stevens to come to the council grounds as quickly as possible since the Skagit and Snoqualmie had already arrived, the Lummi were expected within a day or two, and most tribes would be there by the following Sunday. Gibbs also indicates that he has surveyed the shore and not been satisfied with it as a potential reservation site. "I have been along the Sound shore from Point Elliott up. I don't like the

country – tomorrow I go up the river side…" (Gibbs to Stevens, Jan. 12, 1855, Washington Superintendency, UW, Seattle).

In the official reports of the negotiations for Friday, January 12, 1855, acting secretary George Gibbs describes reconnaissance of the shoreline to the south and later north of Point Elliott. His accounts seem to suggest that he was using Point Elliott as his base of operations.

> Jany 12th Friday: Mr. Gibbs with a party of Indians examined the shore of Admiralty Inlet from Point Elliott southward for some mile with a view to its fitness for a central reserve. The banks were found to be bluff with the exception of one of two small points and unfit for landing in canoes, an absolute requisite in choosing ground for the Indians. The country too was broken and very heavily timbered. In consequence it was deemed proper to turn the examination in another direction.

His journal provides additional detail:

> …went up the main shore for some distance to examine the country. It is unfit for an Indian reserve with the exception of two or three small bottoms, as the bank is too bluff to land on & the country very high. The bottoms are narrow & filled with dense underbrush, rich ?? but dark from the steepness of the bluffs. Went down as far as where the old Indian trail leaves for the forks of the Snohomish & returned (Gibbs Journal, Z175, NARA, Seattle).

His excursions on the next day indicate that he went by canoe to survey the mouth of the Snohomish and land to the north:

> Saturday Jany, 13th. The surveyor started in a canoe with Indians to examine the shore of Port Gardner and the mouth of the Snohomish. With the exception of the low flat at Point Elliott, which though very well suited for a single village, is not of sufficient extent for a general reserve, this shore does not afford a suitable location until reaching the mouth of the Snohomish, where a low valley extends to the river nor is this large enough for the purpose contemplated.

The transcription of the account may be in error here as the Gibbs journal entry for the same day appears to read:

> Left in canoe to examine the mouth of the Snohomish river. The shore from point Elliott to the mouth is bluff with the exception of the flats on the two points which however do not afford any scope of ground for large settlements of Indians. From?? that part where the river turns northward from the bight it is but a short distance across to the Snohomish, and the Indians particularly called our attention to it. There is a marshy flat on the point where we saw one lodge… (Gibbs Journal, Z175, NARA, Seattle).

Gibbs also talks about the height of the river, indicating that the area around the mouth of the Snohomish was flooded, thus making it an unlikely site for the treaty sessions. "The river was at this time very high…its banks which are low and covered with a forest of spruce and cypress were flooded." The anchorage at this site was also too exposed to the northerly winds at this time of year to be practical. On the following day, as the weather was better, Gibbs explored "the country on the creek entering this bay from the North East." He believed that this area would make an "admirable situation" for a future reserve. On January 18th he also explored inland along the coast between Point Elliott and

the Snohomish "by penetrating some distance into the woods, the broken character of the country rendering the unfitness of the place certain."

Later newspaper accounts of the treaty proceedings, based on reports conveyed to Olympia by Major Tompkins soon after the event, possibly indicate that during that period the two locations were considered virtually the same or that the Snohomish River may have been a more widely known landmark:

> The first treaty was commenced and concluded on Monday, Jan, 22d, at Point Elliott, near the mouth of the Snohomish river.... (*Pioneer and Democrat*, Feb. 3, 1855).

Proceedings

While Gibbs was surveying, several other tribes had reached the treaty grounds. The Skagits under Goliah had arrived on January 12th and were greeted with great ceremony by the Snoqulamie: "Each party drew up on the beach in a single file and marched past the other saluting with the sign of the cross and taking off their hats. They then counter marched, and broke into knots to exchange news. The whole was done with much ceremony and appearance of respect." In his January 12th letter to Stevens, Gibbs also observes "We are awfully pious and have divine voice every night, Patkanim and Goliah preaching." The description in his journal further elaborates: "In the evening a large body of the Skagits arrived. After dark they had "divine service" in their camp singing and preaching. They sing very well as regards time and in the open air their songs or rather canticles have quite a good effect. The Indians are all at present in an exceedingly pious frame of mind and are evidently brushing up their religion for a grand display on the governor's arrival" (Gibbs Journal, Z175, NARA, Seattle).

The Lummi and the Duwamish began to reach the treaty grounds on Wednesday, January 17th, and by Sunday January 21st when Governor Stevens arrived on the steamer Major Tompkins, all the expected tribes had settled in. Gibbs in his earlier letter to Stevens had mentioned the need for plenty of trade goods as "there will be a million Indians here" (Gibbs to Stevens, Jan. 12, 1855, Washington Superintendency, UW, Seattle). Estimates made in the official reports indicate that the number at the council reached 2,300 with another 700 women, children, and the elderly unable to attend. A contemporary newspaper account provides a slightly higher estimate of 2,500 Indians in attendance and lists those present as "the Snohomish, Skokomish, Duwamish, Queelewamish, Scawamish, Snoqualmie, Sakaquells, Scagets, Squinamish, Keekeallis, Sdoquachams, Swinimish, Nooksacks, and Lummy tribes" (*Pioneer and Democrat*, Feb. 3, 1855).

The minutes of the council suggest that the speeches, negotiations, distribution of presents and treaty signings lasted from Monday, January 22nd, to Tuesday, January 23rd, when Stevens struck camp. On Monday, Stevens addressed the assembled Indians as did Territorial Secretary Charles Mason, who accompanied him, as well as Michael Simmons. Treaty minutes suggest that the grounds were arranged with "the four head chiefs, Seattle, Patkanam, Goliah and Chowitshoot being seated in front, the sub chiefs in a second line, and the various tribes in separate groups." Seattle, Patkanim, and Chowitshoot were the only recorded Indian speakers. The treaty was read, but the report indicates that Simmons and Shaw had already discussed its provisions with the chiefs and headmen. Shaw translated the English words into Chinook and a Snohomish man, John Taylor, translated to the Indians and then repeated their comments in Chinook to Shaw.

Treaty Promises

In his speech at the Point Elliott council, Governor Stevens addressed some of his goals for the treaty. As he told the assembled Indians: "We want to place you in homes where you can cultivate the soil raising potatoes and other articles of food and where you may be able to pass in canoes over the waters of the sound and catch fish, and back to the mountains to get roots and berries." (Records of the Proceedings, January 22, 1855, UW microfilm, Seattle). The Point Elliott Treaty, much like the Medicine Creek Treaty negotiated with the south Sound tribes, included provisions that the negotiators felt would accelerate the "civilizing" process as they envisioned it. The treaty encouraged farming, provided farmers and teachers to assist in the process, and offered annuities in goods rather than cash. The treaty also provided that the Indians could fish, hunt, and gather at usual places and mandated that the signatories end slavery, cease wars with other tribes, and prohibit alcohol on the reservations.

Unlike the Medicine Creek document, the Point Elliott Treaty included a provision for temporary reservations and called for the eventual removal of all Indians west of the Cascades to the Tulalip Reservation. This main reserve was to include thirty-six sections of land, and the document also established smaller reserves for the Lummi and Swinomish to the north and the Port Madison reserve across Puget Sound to the south. A specific monetary amount of $150,000 was promised in return for the cessions, and the Indians were also to be given remuneration for improvements they had to abandon as well as expenses for removal to their new homes. Notes on the proceedings indicate that these provisions were explained to those gathered at Point Elliott and that the treaty was signed on the same day (Richards 1993: 202-204; Marino 1980:169-171; Records of the Proceedings, January 22, 1855, UW microfilm, Seattle).

Newspaper articles from the period also provide general—and sometimes erroneous—information about the treaty location and proceedings. The *Pioneer and Democrat*, published in Olympia, mentioned the treaty process in an article of January 27, 1855:

> Gov. Stevens took his departure from this place. On Saturday morning last, on board the Major Tompkins, for the purpose of concluding a treaty with various tribes who have been rendezvoused at the mouth of the Sawamish, emptying into Possession Sound about ten miles from Skadget Head—Through the energy of Col. M.T. Simmons, sub-Indian agent, nearly the entire body of the Snohomish, Dawamish, Steilguamish, Skadget, Snoqualmie, Keekcallis, Swinomish, Samish, and Lummy tribes have been collected at the place referred to…The Indian department, under the direction of the Superintendent of Indian Affairs, is active and vigorous in its operations.

A later description of the council, published on February 3, 1855 in the same newspaper, further described the event and lauded the conduct of the proceedings:

> The canoes, filled with the natives, as they approached the treat ground, was said to be imposing, and their inimitable and frail crafts, as having been manned with an order and precision that would have been creditable to a military evolution. They advanced along the quiet waters of the Sound in regular platoons, with the most perfect 'dress' and order, and weeled into line, fronting the treaty ground, in admirable style.
>
> Presents of blankets, clothing, &etc, we are informed, were make [sic] to the chiefs, for distribution amongst all present, as well as for some 500 absent members of the tribes above

> enumerated. At the conclusion of the treaty, a salute of 31 guns was fired by the 'Tompkins,' and the business transacted to the satisfaction of all interested (*Pioneer and Democrat*, Feb. 3, 1855).

Native Perspectives

Indian accounts of the proceedings at Point Elliott present a different picture of the conduct of treaty negotiations as well as both the immediate and long-term effects. The perspectives of the region's Indian people are gleaned from oral traditions within the tribes and interviews recorded after the event. Sources include depositions for court of claims and other legal proceedings as well as field notes recorded by anthropologists and other researchers and interviews more recently conducted with tribal elders and historians.

Location and Preparation

First-person testimony on the location of the Point Elliott Treaty provides only very general information on the site and the preparations for the negotiations. These accounts provide additional information on the way Native groups prepared for the meetings with Governor Stevens and the other negotiators. Some of the earliest testimony on this subject was recorded in the court case of State of Washington v. Charles Alexis (1914), when Alexis, a Lummi fisherman, was arrested for salmon fishing during a closed season. Several members of the Lummi tribe who had attended the Point Elliott treaty council provided evidence about the background of the proceedings and the promises made. In response to the lawyer's questions, Lummi elder Henry Kwina's responses were translated as follows:

> Q. How long were you at Muckl-teoh at the time the treaty was made?
>
> A. He said the Indians had gathered there, gathered a long time before he got there. They had been a week or so gathered there when he got there, and he was there only four days until Governor Stevens came along...
>
> Q. How long were you there after the Governor came?
>
> A. They came away the next day after Governor Stevens was gone.
>
> Q. How long did Governor Stevens stay there?
>
> A. Two days.
>
> Q. How did Governor Stevens come?
> A. He came in a steamboat.
>
> Q. When Governor Stevens landed from the steamboat what was the first that was said with reference to the purpose for which they were gathered?
>
> A. The Indians they had gathered there, and we counted the number of tribes, and there were about twelve or fifteen different tribes. The Lummi tribes among them. Before Governor Stevens had come there they had all talked and planned as to what they were going to do, and what they were going to say to Governor Stevens when he arrived. The chiefs and the leading men all agreed they must hold on to their claims on every stream, each tribe would have a

> stream of their own for fishing purposes, and their fishing locations, and that they must do their very best to make the Governor understand that when he comes to that point.
>
> Q. What was done and what was said?
>
> A. Governor Stevens was away up on an elevated place where everybody could see him....
> (Testimony of Henry Kwina, State of Washington v. Charles Alexis, Superior Court #1720 May 27, 1915:12-13).

The U.S. Court of Claims case of Duwamish et al. v. United States also contains testimony from Indians who had attended the Point Elliott conference. Several of those depositions, which were primarily recorded in 1927, referred to the experience of the narrators while attending the treaty council. Some mentioned that their people remained as long as ten days at the treaty grounds, and most provided very general location information, primarily referring to the treaty-signing site as Mukilteo. Almost all of those questioned remembered that the white people arrived at the site by boat (Deposition of William Hicks, March 2, 1927; Deposition of William Edwards, March 5, 1927). Charley Blowl of Swinomish, for example, who attended the conference as a "good-sized boy," described seeing the ship come into anchor for the treaty council:

> Question: How did the white men come there to Mukilteo?
>
> Answer: When I came in to the point, I saw a boat anchored there.
>
> Question: And you think the white man came on that boat?
>
> Answer: I know that they must have come on that boat, because they used to go out to the boat and back to the shore when they were going to carry on their councils—coming from the boat to carry on their council.
>
> Question: How many white men took part in the councils with your tribe?
>
> Answer: I seen five white men at these councils, and I seen several white men out on the boat
> (Deposition of Charley Blowl, Duwamish et al. v. US:346-347).

Another description of the preparation for and location of the treaty council was included in a series of interviews with Ruth Sehome Shelton recorded by Leon Metcalf in the 1950s. Mrs. Shelton, who was born just a year or two after the treaty council took place, was of Klallam and Samish ancestry and in 1878 married William Shelton, later head of the Tulalip Tribes. In relating traditions about the treaty learned from her family, she first indicated that before the treaty negotiations took place at Mukilteo, the Indians already had many trade goods, primarily received from the "King George Hudson Bay Company" in exchange for furs. "It wasn't because of the Americans that things were good in the beginning," she said, "that people first got blankets, clothing, potatoes and this food" (Shelton 1995:17, 19).

According to Ruth Shelton, the treaty process began when the Bostons, as the Americans were known, came from across the sea:

> The people gathered at Mukilteo.
>
> My inlaw (named) *xalb* was sent to invite all tribes.
>
> This one river belonging to the Skagits, they arrived at Mukilteo, and the Lummi, Swinomish, Skagits, *skwədabš* and the people upriver (and) the Samish. They all gathered there at Mukilteo and the Suquamish. They were there for a long time.
>
> My inlaw used to say that they gathered there for fifteen days at Mukilteo.
> (Shelton 1995:18-19).

The Mukilteo location was said by many to be a common camping and gathering location for people of the area. As Ruth Shelton remembered: "We picked berries there at Mukilteo, there were lots of berries there" (Ruth Sampson in Vi Hilbert Collection, Acc 5401-001, Box 9, Notebook 3:30 UW, SC, Seattle, WA). Others like Louise Fowler Sinclair, the daughter of storekeeper Jacob Fowler and his Skagit wife, Mary, heard many stories about the treaty from other Indians, who continued to camp at the site on Point Elliott where her family settled a few years after the council. William Shelton, who later became a leader at Tulalip, also camped on the Mukilteo beach with his family as a young boy and remembered his first encounter with a pig, which was owned by the Fowlers ("Aged Indian Woman Recalls When Seattle Was a Village," *Seattle Times*, Jan. 22, 1946; Shelton 1923:3-4).

In an account which may describe the treaty ceremony site at Mukilteo, Mrs. Shelton related the following:

> ...There at the water's edge there was a nondescript sort of place (sort of house) with a temporary roof covering it. For VIPs to be while they spoke. There were lots of VIPs who arrived to speak.
>
> They then named off those they said were the only chiefs. But this was not so.
>
> They just were the speakers these three, *Patqidb*, *skwə layəʔ*, *ččwicut*. They were just the speakers of the treaty.
>
> They just wanted to be sure that everyone took away correctly what Governor Stevens said. They called him *Dukwibə*.
> (Ruth Sampson in Vi Hilbert Collection, Acc 5401-001, Box 9, Notebook 3:32-33, UW, SC, Seattle, WA).

Although there was little other specificity about the exact location of the treaty proceedings, Mrs. Shelton described where the Snohomish went to mull over the proposals made by Stevens. This interview was recorded in 1954 as the centennial of the Point Elliott council approached and thus the locations she mentions were related to new uses of the site by that time:

> Next year it is said will be 100 years since the treaty, one hundred years from then next year.
>
> They say they have made a park at the other end of Mukilteo.
>
> That's where the Snohomish went, where they camped. Where *łəbšíltəd* went.
> We were there last year.
>
> (Vi Hilbert Collection, Acc. 5401-001, Box 9,
> Notebook :26 in UW, SC, Seattle, WA).

Proceedings

Other accounts recorded by Native American informants include more general descriptions of the treaty council and perspectives on the atmosphere and conduct of the proceedings. Many of these perspectives differed rather significantly from those presented in official government accounts. Unlike the treaty minutes, which do not record any disagreements or discontent, the first-person memories of those Indians who attended the conference or the stories they passed on to succeeding generations include some indications of intimidation and threats. These accounts suggest that the mood of the proceedings was not always friendly and that among the attendees there were dissenters as well as others who were fearful or felt pressured to sign away their land.

The treaty commission included interpreters who could translate the proceedings into various languages. For the negotiations, Ruth Shelton believed that Governor Stevens brought Michael Simmons of Olympia to interpret for him and that John Taylor, who was the only one of the Indians to speak Chinook jargon, translated the treaty into Lushootseed. Once Taylor had made his translations, he was assisted by Patkanim, Chowitshoot, Goliah, and *sdáplq* in interpreting the words to the rest of the Indians at the council. Henry Kwina also mentioned the role that "the white man named Shaw" played in translation, but said that he and a few other Indians understood some Chinook that they had learned from traders and settlers. Shaw later maintained that he could speak the Indian language, but a number of members of the Lummi tribe who had attended the Point Elliott council were adamant that Shaw only spoke Chinook and that John Taylor was the primary translator for the tribes (Shelton 1995:21; Wright 1991:261; Testimony of Henry Kwina, State of Washington v. Charles Alexis, Superior Court #1720 May 27, 1915:14, 19-20; Affidavits of Frank Shaw, General Gaines, John Kwinooks, George Sknoughton in US, Hillaire Crockett and Captain Jack v. Alaska Packing Association, June 19-21, 1895, US District Court, Northern Division, at NARA, Seattle, WA).

Among the treaty attendees was Susan Dorsey, who was interviewed by Esther Ross on March 4, 1927 (sometimes cited as March 14), for the Stillaguamish as part of the early Indian claims cases (Ruby and Brown 2001:16, 255). Dorsey, who was of Stillaguamish and Skagit ancestry, recalled an atmosphere of intimidation as the Indians present were encouraged to join Stevens in voicing their approbation of the treaty. As she remembered:

> I was just a girl of 13 years of age and was there at Mukilteo 1855 when the treaty was signed. I saw Governor Stevens and John Taylor was interpreter. There were lots of people there from all tribes, and lots of chiefs and sub chiefs. Governor Stevens told the Indians he would give them lots of money for their land. He told them to take off their hats and told them to call the same as he did "Hip Hip Hurrah," while he waved their arms with their hats.

> I saw large poles, several of them around in the ground. Hung on them were ropes and loops as if to hang people. So Indians were scared, they thought that if they didn't do what Governor Stevens wanted he would hang them. (Cameron et al. 2005:37)

Aside from these visible reminders, other types of intimidation may also have been used. Oral traditions, which have been passed down to modern-day tribal historians and linguists, also suggest that extreme pressure may have been applied to bring some Indians to the negotiations or force them to sign the treaty. According to Lora Pennington:

> I did hear that there was some kidnappings associated with this time, but only as accounts like that. There were some that had to sign because of threat to their families. But I've heard it in that sense, that it was not necessarily a voluntary process, and it was because of threats to the family.
>
> But I have not heard 'This family was threatened' and 'This family was cajoled,' but that it was an atmosphere. There was an undercurrent of 'There will be more bloodshed, and you have to sign if you're going to protect your family.'
>
> (Lora Pennington Interview, April 23, 2007:8).

The often vivid language that Governor Stevens used to reinforce his arguments for the treaty may also have contributed to that undercurrent. As one example, Bill Kanim, the nephew of one of the major headmen at the council, recounted: "Governor Stevens got a handful of sand and brought it and said, "That is the way white men will come and crowd the country here. And he said that you will reserve Tulalip and that will be your land" (Deposition of Bill Kanim, June 4, 1923, in RG 75, Tulalip Agency, Correspondence with Commissioner of Indian Affairs, Box 96, folder 60:5).

Despite these possibly threatening or intimidating symbols of the government's power, there were some attendees who resisted the terms laid out by Stevens. Ruth Shelton described the reluctance of many of the Snohomish, in particular, to be removed to a reservation that was a great distance from their homes. Whereas the official reports of the treaty conference mentioned nothing about dissent, Indian accounts suggest that there were many who were skeptical of Stevens' promises or who rejected them entirely:

> The leaders signed their names.
>
> Thus their names are written in that Treaty Book (as) it's called.
>
> And while the people were talking, łəbšíltəd said, "Oh, my people, I disagree with selling our lands. Let those who wish, choose wherever they want to live" (because if we sign away our lands without reserving our own, we would have no recourse because it would now belong to them for whom Governor Stevens acted).
>
> During the discussion of the treaty signing the Snohomish went to the point over there at Mukilteo.
>
> They camped there.
>
> The Snohomish who disagreed left.
>
> They didn't want to sell their lands.

> łəbšíltəd did not sign his name, he said, No!
>
> There they were, thus there were only two Snohomish from here who signed their names.
>
> John Taylor and the one called Jackson...
>
> The people finished talking. They stopped. It was done.
>
> (Shelton 1995:24).

Jack Wheeler, whose father was Snohomish and his mother Kikiallis, attended the treaty proceedings with them as a teen-aged boy, and remembered dissent that split apart certain bands:

> Q: Did all of the Indians agree at that time to the conditions of the Treaty?
>
> A. Some of them got mad and just went home and some of them just stayed there.
>
> Q. From your recollection what bands or tribes agreed to the treaty and what bands or tribe withdrew?
>
> A. They all agreed because they were caught by lies of Washington.
>
> Q. Did any of the Indians withdraw and not sign the Treaty?
>
> A. There was an Indian by the name of Slababucad, he withdrew.
>
> Q. Was he an influential member of the tribe?
>
> A. He was a Big Man-Chief.
>
> Q. Did his people go with him?
>
> A. Lots of his people were there.
>
> Q. Did his people approve of his action?
>
> A. No, his people did not agree with him.
>
> (Deposition of Jack Wheeler: June 7, 1923, in RG 75, Tulalip Agency, Correspondence with Commissioner of Indian Affairs, Box 96, folder 60:9)

Other head men remained at the treaty grounds throughout the council, but evidently did not sign the treaty for their people. According to a statement made by Charles Alexis, representing the Suquamish at a 1924 Indian affairs hearing in the House, three influential Duwamish headmen, Charles Setiacum (also Satiacum), James Moses, and William Rogers, attended the proceedings but did not sign the treaty (Statement of Charles Alexis, US, Congress 1924:51). Others like *sλabbtikd*, the chosen head of the Skagit when he attended the Point Elliott council (Collins 1974: 35), may not have signed because they believed that the promises of Stevens would still be in force whether the Indians actually signed the paper or not. Joseph Campbell, the grandson of sλabbtikd, talked about this situation in an Indian Affairs hearing of 1924:

> Mr. Campbell: My grandfather was there during the treaty…My grandfather was there and present at the treaty with Governor Stevens and stayed there until the treaty was over and then went home.
>
> The Chairman: Who told you the action of your grandfather at that time?
>
> Mr. Campbell: My grandmother. She was there at the time and gave me the whole history of what took place at the treaty….The understanding I have from my grandmother at the time the treaty was made in Point Elliott is, that Governor Stevens told the people in general, all who were there present and promised to give them a reservation, and also the Skagits were to have a reservation as well as the rest of them. When the time came my grandfather was not asked to sign the treaty at the time, so he went home without signing any part of the treaty. That is my grandmother's statement to me.
>
> The Chairman: Your grandmother told you that your grandfather did not sign the treaty because Governor Stevens promised to do the same thing for those who did not sign as he had agreed to do for those that did sign? Is that right?
>
> Mr. Campbell: Yes…That was the idea, because he understood Governor Stevens said he was to have certain things.
>
> The Chairman: Whether he signed the treaty or not?
>
> Mr. Campbell: Yes, they were to have a reservation of their own.
>
> (Statement of Joseph Campbell, U.S. Congress 1924:44-45).

Among those who did sign the treaty, there was also a feeling of discontent. Some felt pressure to sign and then quickly regretted their decision. As Lawrence Webster of the Suquamish recalled:

> But they talked about that treaty quite a lot. And many of them were dissatisfied. They even said they should have taken Kitsap's word when he didn't want them to sign, but they didn't have any other way to go. Talked about Leschi and the way he was treated because he didn't sign or approve the treaty. Oh, there was quite a bit of hard feeling among the old timers about what went on. There just wasn't a thing they could do.
>
> (Lawrence Webster, Interview No. W.1.1:121 in Suquamish Tribal Archives, Suquamish, WA)

Treaty Promises

According to Indian accounts, Stevens made many promises to the Indians assembled at Point Elliott and also provided them with presents, food and trade goods to encourage further their acceptance of the treaty provisions. Among the gifts purportedly distributed at the council were "straw hats, a few yards of calico, blackstrap molasses and Jew's-harps" (Trafzer 1986:29). Susan Dorsey remembered other very specific items presented to the women of the tribes: "I know that at time of treaty each woman was to receive 20 threads, one thimble, one needle, ½ yard of each for shirt and leggings of calico, piece of blanket for shoulder and package of pins…" (Cameron et al. 2005:37). According to Bill Kanim, attendees were also told they would be given "flour, sugar, mattox and tools" for twenty years

(Deposition of Bill Kanim, Feb. 2, 1923, in RG 75, Tulalip Agency, Correspondence with Commissioner of Indian Affairs, Box 96, folder 60:1).

Others remembered that Stevens also made much broader promises that the government would build schools and hospitals and would provide teachers so that the Indians could learn to write and build their own homes. As Jack Wheeler recalled, "The Government promised to build a house and when the house was complete it was going to give them a cow and a horse..." (Deposition of Jack Wheeler, June 7, 1923 in RG 75, Tulalip Agency, Correspondence with Commissioner of Indian Affairs, Box 96, folder 60:13). Dora Solomon of the Lummi also remembered being told of similar promises made to the Indians by Stevens: "And he was supposed to teach the Indian children as long as there is any Indian anywheres. He was supposed to build houses for Indians...Oh, there was quite a few things they promised they were going to do for the Indians. They never got it" (Nugent 1982:116).

A constant focus of the negotiators in making available many of these gifts and services was that they would allow the Indians to live as the white people did. According to Ruth Shelton, many of the elders and head men believed that having some of the resources of the white people would be a way of protecting future generations and giving them the means to deal with these newcomers:

> Then there was one thing which the honorable ones really believed in; it would be indeed good for our progeny to become like white people...
>
> John Taylor interpreted (to the effect) that future generations would be as white people.
>
> They will be taught to become like white people...
>
> It is repeated, repeated. That was gone over, again and again.
>
> (Shelton 1995:20)

Among the honorable ones who reinforced this notion was Seattle or *siʔal*, who spoke about the transitions that would take place after the treaty was signed. Agnes Sneatlum, a Suquamish elder respected for her historical knowledge, recounted the words used by Seattle at the treaty ceremony in a taped interview recorded by anthropologist Warren Snyder in 1955 and later translated by Vi Hilbert:

> This is what Seahth said
> when they were having the treaty at Mukilteo,
> what is said (here)
> 'You folks observe the changers who come here to this land
> And our progeny will watch and learn from them now, those who will come after us, our children.
>
> And they will become like/just the same
> as the changers who have come here to us on this land.
> You folks observe them well'
>
> (Wright, ed 1991:262; earlier translation in Chief Seattle power song and advice in Vi Hilbert Collection, 5401-001, Box 13, University of Washington Libraries (UW), Special Collections (SC), Seattle, Washington).

At the same time, most of the Native people at Point Elliott realized that they also needed access to traditional resources to survive. Many of the tribes, like the Snohomish, were most concerned about the promises the government made to protect their means of subsistence. According to Bill Kanim, his uncle, Pat Kanim made a strong plea, which Stevens pledged to support:

> In the Treaty my uncle Pat Kanim reserved the salmon, he reserved the deer, he reserved the elk, he reserved the bear, he reserved the beaver, he reserved the clams, he reserved the dry tree, and he reserved the cedar. That is what he claimed and said would be his and that Governor Stevens agree to let him have all he asked. Governor Stevens said what you will be given today your children will be all right and your son will have land, and your grandchildren will have land and all those will be all right. Washington will give them money. So you must not steal from the white men that come; you must not kill the white men that will come; be just the same as you are, shake hands with the white men that come...
>
> Governor Stevens said that if you are good you can go outside and the white man will not drive you away. Pat Kanim's old home was out there by Tolt. Salmon used to be good up there. The Indians have houses up there. That is the place where they drive salmons. Pat Kanim claimed that place. He didn't want to let it go. Said his home was right there and it was the house of all those people. Governor Stevens said to him, 'all right, and when you get through driving your salmon you can come home to Tulalip, that Washington shall have a writing, a strong letter on the door of your house that nobody can tear it down.' That is all I know, just what my father told me.
>
> (Deposition of Bill Kanim, February 22, 1923 in RG 75, Tulalip Agency, Correspondence with Commissioner of Indian Affairs, Box 96, folder 60:4-5)

Others who were also concerned with the preservation of subsistence resources had similar impressions that Stevens had agreed to their demands. According to traditions remembered by Martin Sampson, a Swinomish leader:

> Then we come to the making of the treaty.
> Governor Stevens arrived.
> Then he said, 'We shall take your land!
> We shall buy it from you!'
>
> The Indians said.
> 'You will take our lands but we want enough to live on.
> But our food, the animals. Deer. Bear, other things that are our food.
> The salmon will be ours.
> We will not sell that.
> That will always be ours.'
>
> Then Governor Stevens said,' That is what we have in mind,
> That is what the leader from afar has in mind, that Washington, that is his thought.
> These are yours.'
>
> (Martin Sampson Video Talk to Lushootseed Class, May 16, 1977 in Vi Hilbert Collection, Acc. 5401-001, Box 11, F77, UW, SC, Seattle, WA).

General Gaines, John Kwinooks, and other Lummi who attended the treaty proceedings also were very definite that Stevens had promised their tribe access to their accustomed and best fishing and hunting sites. General Gaines described his remembrances in the following way:

> I was at Muckleteoh when Gov. Stevens made the treaty with our people in 1855...Gov. Stevens told the Indians that they could go anywhere on the salt water where they were accustomed to go to catch salmon, or dig clams or hunt deer or ducks; that the treaty would not confine us to the reservation when we wanted to hunt or fish and that we could fish where we used to; our headmen told Gov. Stevens that Chiltenum was their best fishing grounds and they wanted to know whether if they signed the paper they could go to Chiltenum (Point Roberts) just as they always had done.'
>
> (Affidavit of General Gaines in US, Hillaire Crockett and Captain Jack v. Alaska Packing Association, June 21, 1895, US District Court, Northern Division, at NARA, Seattle, WA)

Many accounts particularly focused on the promise made by Stevens that these resources would remain with the tribes in perpetuity. Henry Kwina of the Lummi quoted Governor Stevens as saying that "your fishing will be free to you as long as Indians exist" (Testimony of Henry Kwina, State of Washington v. Charles Alexis, Superior Court #1720 May 27, 1915:14, 17). Ruth Shelton related that when the Snohomish finally overcame their reluctance and agreed to move to the reservation, the governor assured them that the land they chose for their own would always be theirs:

> Then, Governor Stevens said this to them:
>
> 'You folks will say, which part of the land, which part of what used to be your land, shall be yours forever!'
>
> *čədátalq*, son of *wədəpaʔ* stood up right away, and he said this:
>
> 'Will it be for as long as the water flows in the rivers, will it be for that long that it will be ours, and will it be for as long as the sun travels from whence it comes until it returns to the west?
>
> Will it be for that long?'
>
> This was interpreted to Governor Stevens.
>
> He then stood up and he nodded his head (up and down in the affirmative), because there were lots of people, they couldn't hear him if he spoke.
>
> He just nodded his head, sat down.
>
> This is what the leaders did when they did this.
>
> They then were told:
>
> 'It is finished.'
>
> They listened.
>
> (Shelton 1995:21-22)

Dorothy Solomon, a Lummi elder, also repeated her understanding that Stevens offered treaty rights and protection of Indian access to resources forever: "This Governor had three witnesses. Mt. Baker is one. Sunrise is one. The Columbia River is one. His word is going to last as long as the mountain lasts, as long as the sun rises, as long as the river flows. His word will never die. That's the treaty right" (Nugent 1983:116). Others believed that Stevens used these symbolic words to make promises of ongoing assistance by the government, including monetary payments, if they agreed to the terms of the treaty. An elder of the Stillaguamish interviewed by Esther Ross in the 1920s remembered that the Governor had said: "As long as the sun rises in the East and sets in the West, as long as the grass grows green in the spring, as long as the river flows to the sea, we will give you a bushel of gold every new moon" (Ruby and Brown 2001:16).

For those who remained at Point Elliott and believed the words of Governor Stevens, the promises were impressive. Several sources suggest that at Stevens's prompting, many of the Indians were encouraged to wave their arms and join in a cheer. In fact, in some accounts, the treaty at Mukilteo became known as *tuʔuhulaʔd* or the "hooraying" (Shelton 1995:17). As Agnes Sneatlum, a Suquamish elder, explained, "... and the promises they heard were so wonderful that people were saying "Hip, hip, hooray, Hip, hip, hooray" (Lummi Indian College Project, 5/19/1992 in Vi Hilbert Papers, Acc. 5401-001, Box 13, UW, SC, Seattle, WA)

Later Negotiations

Once Governor Stevens concluded negotiations at Point Elliott on January 23rd and distributed presents to the assembled tribes, he and the other negotiators struck camp. The party went on board the steamer, Major Tompkins, but as a result of bad weather, the boat remained at anchor until the next morning. The group then headed to the next council at Point No Point with tribes from the west side of Hood Canal. After meeting with as many as 1,200 of the Clallam, Skokomish, and other Native groups of that area, Governor Stevens and his party moved on to Neah Bay to hold a similar council with the Makah. Once he had obtained more land cessions Stevens returned to Olympia where he remained until late February. At that time he tried to conclude an agreement with the tribes of the south Sound, including the Chehalis, Cowlitz, Quinault, Chinook, and Satsop. Despite week-long negotiations beginning on February 25, 1855, no agreement was reached (Records of the Proceedings, UW Microfilm, Seattle; Swan 1989:327; Prucha 1984:I-405-207).

Stevens then turned his attention to a new round of treaty talks set to begin in the late spring with tribes east of the Cascade Mountains. The Walla Walla Council, held from May 29 through June 11, 1855, brought together over 5,000 representatives from the Walla Walla, Cayuse, Nez Perce, Umatilla, and Yakama peoples. Discussions were occasionally contentious but the negotiations ultimately led to the three separate treaties that included the cession of 45,000 square miles of territory. Stevens then went on to negotiate two more treaties at the Hell Gate Council in the Bitterroot Valley of the Flatheads, and at the Blackfoot Council on the Upper Missouri. News of warfare with the Yakama reached Stevens in late October of 1855, and a final council held with the Spokane and neighboring groups in December failed to reach a treaty agreement. Stevens left to return to Olympia and face additional resistance to the treaties he had concluded (Nicandri 1986:13-26; Ficken 2002:46-47).

Comparisons of Point Elliott to Other Treaty Negotiations

Without additional descriptions or drawings of the Point Elliott treaty site, an analysis of the treaty arrangements and site location of other negotiations conducted by Stevens in the Northwest provides patterns that may have originated with Medicine Creek and Point Elliott. Testimony of his son and others indicates that Stevens and his negotiating team developed a process that was repeated for most of the treaty counsels. On Puget Sound, Stevens used several men he called quartermasters to prepare for the treaties at each location. Hugh Goldsborough, as commissary, was in charge of these preparations, but S.S. Ford, Jr., H.D. Cock and Orrington Cushman did much of the background work for each of the gatherings and attended all of the Puget Sound treaty councils. Michael Simmons and Frank Shaw were the main contacts with the Puget Sound tribes and also participated in all of the negotiations (Records of the Proceedings of the Commission to Hold Treaties with Indian Tribes in Washington Territory, 1854-1955, Microfilm, UW, Seattle; Hazard 1952:123).

Reminiscences from Stevens and his son also show that the governor followed certain standard protocols during the actual treaty councils. According to Stevens, he had developed some of these procedures when he first began to meet with tribes during the railroad survey: "It was my invariable custom whenever I assembled a tribe in council, to procure from them their own rude sketches of the country, and a map was invariably prepared on a large scale and shown to them, exhibiting not only the region occupied by them, but the reservations that were proposed to be procured by them" (Stevens 1900:455). His son Hazard, who attended the Medicine Creek Treaty as a boy of twelve, maintained that his father also followed similar negotiation procedures in all of his councils. In his highly laudatory biography of his father he maintained that Stevens usually had several interpreters to check for mistakes in the translation of treaty provisions, encouraged the Indians to speak their minds, provided explanations of the benefits of the treaty between sessions of the negotiations, and invited "well-known citizens to talk with and satisfy the Indians" at each meeting (Stevens 1900:456).

The men who represented Stevens quite possibly also looked for similar locations when they arranged the councils with different tribes. Typical settings for treaty negotiations were on several acres of slightly elevated land, easily accessible by water and near a creek or other water source. The Medicine Creek Treaty of December 1854, for example, was held along Medicine Creek, later called McAllister Creek "a mile above its mouth on the right bank, just below the house of Hartman, on a rising and wooded spot a few acres in extent, like an island with the creek on one side (south) and the tide-marsh on the other" (Stevens 1900:456). The Chehalis council site, described by James Swan who attended the negotiations, "was situated on a bluff bank of the river, on its south side... A space of two or three acres had been cleared from logs and brushwood, which had been filled up so as to form an oblong square...In the centre of the square and next the river was the governor's tent, and between it and the south side of the ground were the commissary's and other tents, all arranged in proper order...Around the sides of the square were ranged the tents and wigwams of the Indians, each tribe having a space allotted to it" (Swan 1989:337).

Descriptions and drawings of the treaty sites around Puget Sound and also east of the Cascade Mountains illustrate the similarities of the settings, but also that there appeared to be a common layout for the council meetings. Stevens and other treaty negotiators generally sat on a knoll or rise, often under some kind of an awning or open-sided tent, perhaps dictated by the weather. Individuals designated as chiefs or primary representatives of the Indians were generally arrayed in semi-circular

fashion around the negotiators with the rest of their people behind them. According to Swan's description of the Chehalis council:

> The Indians were all drawn up in a large circle in front of the governor's tent and around a table on which were placed the articles of treaty and other papers. The governor, General Gibbs, and Colonel Shaw sat at the table, and the rest of the whites were honored with camp-stools, to sit around as a sort of guard, or as a small cloud of witnesses. (Swan 1989:341).

Drawings of the Walla Walla, Blackfoot, and Bitterroot councils seem to illustrate a similar pattern, as does the description by Lieutenant Lawrence Kip of the Walla Walla Council:

> It was a striking scene. Directly in front of Governor Stevens' tent, a small arbor had been erected, in which, at a table, sat several of his party taking notes of everything said. In front of the arbor on a bench sat Governor Steven and General Palmer, and before them, in the open air, in concentric semi-circles, were ranged the Indians, the chiefs in the front ranks, in order of their dignity, while the background was filled with women and children. The Indians sat on the ground, (in their own words) 'reposing on the bosom of their Great Mother.' (Kip 1859).

The camp sites of the governor's party was generally apart from the places designated for the Indians to camp and there was also evidently a separation of major tribes or bands. At the Chehalis council, Swan described the layout as follows: "In the centre of the square and next the river was the governor's tent, and between it and the south side of the ground were the commissary's and other tents, all arranged in proper order...Around the sides of the square were ranged the tents and wigwams of the Indians, each tribe having a space allotted to it" (Swan 1989:337). In later councils in the eastern part of the territory, the governor's party had a military escort to protect them, but around Puget Sound, the governor evidently had little to fear from the council attendees and was camped in close proximity to them.

Aftermath of the Point Elliott Treaty Negotiations

Congress ratified the Medicine Creek Treaty, the first of Isaac Stevens's agreements with the Puget Sound tribes, within two months of the negotiations, but the Point Elliott treaty and those that followed were not signed into law for four more years. During this period, disillusionment grew among the tribes over the failure of the government to acknowledge the treaty and fulfill its promises. Throughout the territory, the treaty-making process caused anger as the Native inhabitants continued to lose land to the growing number of white settlers. A few people along the coast were warned about troubles brewing among Indian tribes in the eastern part of the territory as early as the winter of 1855. Discontent with the terms of the treaties and continuing incursions on reservation lands led to warfare between the Yakama and the United States military in the fall of that same year. Hostilities also escalated in the Puget Sound region, resulting in the deaths of some settlers and a military officer as well as a short-lived attack on Seattle. These uprisings became known collectively as the Treaty Wars (Bancroft 1890:108-113; Eckrom 1989:90-95).

Hazard Stevens, the governor's son, blamed the delays in ratifying the treaties on these hostilities with the tribes as well as "misrepresentations and charges originally started by the hostile Indians and taken by prejudiced army officers and political and personal enemies...." From his perspective, the treaties were finally ratified in March 1859 because Isaac Stevens was elected to Congress and thus able to make a personal appeal for their passage (Stevens 1900:469). This view was supported by Charles Buchanan, later the Indian agent at Tulalip. According to Buchanan, Stevens had "personal differences" with

Jefferson Davis, then the Secretary of War, who may not have liked Stevens' recommendations for a northern railroad in a time of growing sectional conflict and thus held up his treaties. From his perspective, once Stevens was elected to Congress, "he personally pushed the treaties to the end" (Buchanan 1914:236).

Others less sympathetic to Stevens have argued that many of these problems, including the Treaty Wars that so quickly followed the treaty negotiations, resulted from the actions of the governor. Stevens's failure to recognize the significance of subsistence sites or to understand tensions among various groups were, in part, responsible for troubles that followed. Also criticized was his reliance on the Chinook jargon, which was insufficient, with only about 500 words, to deal with the intricacies of such important legal negotiations. News of the increasingly negative reactions of the tribes to the treaties must have reached the seat of government fairly quickly, causing hesitation over the issue of ratification and plans for the future (Miles 2003:18; White 1972:62-63).

Still others have blamed federal Indian policy for hostilities in the Pacific Northwest and for the slow pace of treaty ratification. James Swan, who attended some of the treaty negotiations with Stevens around Puget Sound, and was considered sympathetic both to the governor and the Indians, criticized the process set up by the government:

> Our whole system of treating-making is wrong with these frontier Indians. They can not be made to understand why the agents sent to them to make treaties are not empowered to close the bargain at once, instead of referring the matter back to Washington, and waiting the tardy action of government... (Swan 1989: 348-249).

Native Perspectives

For the Indians of the Puget Sound, there were many points of issue over the Point Elliott Treaty, but as Swan suggested, misunderstandings and, particularly, disappointment with the failure of the government to follow through with promises made at Point Elliott were a major point of contention. As Ruth Shelton remembered it:

> I have thought about it. Possibly it was ten dollars that the old people got for their land. Because they said it wasn't many years, maybe five years after the treaty. They are told by the white people there was a treaty at Mukilteo and the people thought they had heard it. It seems they hadn't.
>
> They waited for their payments and nothing ever happened. It was five years after the treaty that Washington talked about buying the land from the people. Then it was how long after that, maybe two years when the first payment came.
>
> (Transcription of Ruth Shelton Interview with Leon Metcalf, Tape 70, in Vi Hilbert Collection, Acc 5401-001, Box 9, UW, SC, Seattle, WA).

Three years after the signing of the treaty, Chief Seattle also articulated his impatience at the government's lack of faith in fulfilling the terms of the agreement. At an 1858 meeting with Michael Simmons, who remained the Indian agent for the Puget Sound tribes, Seattle was said to have complained:

> Why don't our papers come back to us? You always say they will come back, but they do not come. I fear that we are forgotten or that we are to be cheated out of our land. I have been very poor and hungry all winter and am very sick now. In a little while I will die. I should like to be paid for my lands before I die. Many of my people died during the cold winter without getting their pay. When I die my people will be very poor. They will have no property, no chief, and no one to talk for them. You must not forget them, Mr. Simmons, when I am gone. We have been very friendly to the whites and when we get our pay we want it in money. The Indians are not bad. It is the mean white men that are bad to them. Mr. Simmons, I want you to write quickly to the Great Chief at Washington what I say.
>
> (Statement of Charles Alexis, U.S Congress 1924:49).

Even the man who had translated at the Point Elliott council became severely disillusioned. John Taylor's reaction in a later confrontation with federal agents over the treaty provisions was recorded by Skookum George in a 1923 deposition. According to him:

> John Taylor was living at that time and people was asking who was there and who was doing the interpreting at the Treaty and John Taylor was answering for a long time; he got mad and after a long time came out and said, "I was there and I was doing the interpreting when the white men fooled us."
>
> (Deposition of Skookum George, Feb. 2, 1923, in RG 75, Tulalip Agency, Correspondence with Commissioner of Indian Affairs, Box 96, folder 60:11).

Traditions about the treaty and promises not kept continue to be passed down within the tribes. Hank Gobin, the long-time cultural resource manager of the Tulalip Tribes, tells of one elder's perspective:

> He talked about the Point Elliott Treaty as he sat in his chair in his living room, when he was seventy, eighty years old. He'd smile and he'd say, 'I'm still waiting for my pot of gold.' And he'd laugh and he'd say, 'Our people were waiting for their pot of gold and they never got it' from the signing of the Point Elliott Treaty.
>
> So in his mind, he was under the assumption that it wasn't a pot of gold, but there was a series of things that this treaty was supposed to fulfill on behalf of the tribes if they signed it. And that never happened in his mind.
>
> (Interview with Hank Gobin, April 23, 2007:5-6).

Changing Meanings

Over time, the provisions and promises of the Point Elliott Treaty have continued to be both revered and reviled, debated and litigated. Through successive generations, Indians and non-Indians alike have attempted to understand the impact of the treaty from changing historical vantage points. In various types of commemorations, celebrations and observances, they have drawn new and sometimes contradictory meanings from the document that was signed at Point Elliott in 1855. Some of these commemorative events have taken place near the site of the negotiations, while others have been held in different venues that have gained significance from their association with the Point Elliott Treaty.

Treaty Day

It is not known whether the anniversary of the Point Elliott Treaty was widely recognized in the decades immediately following the treaty signing, but soon after the turn of the century the commemoration of what became known as Treaty Day began. Charles Buchanan, who began his career as the physician on the Tulalip Reservation in 1894, had assumed the role of superintendent of the reservation as well as the Indian school by 1900 ("Indians' Friend Taken By Death," unidentified article in RG 75, BIA, Tulalip Agency, Box 310, NARA, Seattle, WA).

The diary that Buchanan kept as superintendent from 1909 to1912 included regular references to Treaty Day observances. His 1910 notes on the event included the following:

> Jan.23 Sunday–Services at mission church in forenoon as usual. Large number of Indians, about 120, upon invitation of Superintendent came in and partook of a big dinner prepared for them in honor of the 55th anniversary of the signing of the treaty which was made January 22, 1855. After the dinner speeches were made by the old men; old time songs and dances were given and general good old time reunion was held.
>
> (Superintendent's Diary, July 1, 1909-Nov. 30,1912 in RG 75, BIA, Tulalip Agency, Box 310, NARA, Seattle, WA).

In subsequent years Indians from the Swinomish Reservation as well as others who were parties to the Point Elliott Treaty came to the Tulalip Reservation to sing, dance, and share customs (Figure 44). The 1913 observance was a holiday for tribal members and was described by a local newspaper reporter, who mentioned that it was the first time that tribal elders had overcome their negative feelings about the treaty to attend:

> Indians gathered from all directions this morning on the Tulalip reservation to hold their annual potlatch and celebration of the anniversary of the signing of the Mukilteo treaty, which declared peace between the whites and aborigines on Puget Sound. Many of the older Indians are in attendance at this celebration for the first time, for they at first opposed a feast on this date, being dissatisfied with the outcome of the peace conference. (*Seattle Times*, Jan. 22, 1913:2).

Native Perspectives

The Indian perspective on the goal of Treaty Day differed significantly from Buchanan's view, and a number of individuals repeated a similar story of the origins and meaning of the commemoration. According to Indian accounts, most tribal members, although ostensibly celebrating the signing of the treaty, were also using the day as a means of circumventing restrictions put on Native American spiritual practices and passing on the old ways to younger generations. Treaty Day offered an occasion to share songs and dances, often in the smokehouse, without the restrictions that were usually in force (Figure 45).

Figure 45. Treaty Day celebration meal in the newly built Tulalip Smokehouse, 1914.

Figure 46. Men gambling in the Tulalip smoke house, Treaty Day 1914.

Charley Anderson, interviewed in 1956, emphasized the ways in which Treaty Days gave people from all tribes an excuse to gather during a time of religious repression:

> On that reservation it was pretty strict. You know the priest wouldn't let anybody sing in the smoke house. You'd be put in jail in every reservation. Until some of these younger people said, Why not have the treaty day for our big day so that we can get together and sing songs. Different tribes got together. Well, everybody agreed to that and that is why this treaty day on the 22nd of January.
>
> (Charley Anderson Interview with Virginia Mohling, Aug 1956 in Vi Hilbert Collection, Acc. 5410-001, Box 9, UW, SC, Seattle, WA).

Other accounts that have been passed down through the generations have also focused on the linkage between Treaty Days observances and attempts by the tribes to preserve traditional ceremonies. Stories like the one related by Vi Hilbert, a Skagit elder who has transcribed and translated many interviews with older tribal elders, reference both the personal persuasion and powerful symbols that convinced government agents to allow the observance of Treaty Day:

> In the late nineteenth century our ancient Longhouse Religion was forbidden. The priest felt threatened by the strong doctrines and practice of our people and forbid it as 'heathen.' The Bureau of Indian Affairs jailed those who practiced it. It was in 1903 and 1904, right around there when the people decided they were going to argue to get their religion back, and were not going to jail. There's a story some of the elders tell that the BIA agent came to the old smokehouse at Tulalip to talk the people into accepting the controversial 1855 treaty. Tribal leader William Shelton said, through an interpreter: "If you let us do our ceremonies, we'll call it Treaty Day." Then the old medicine man, Elzie Andrews sang his spirit power song, and at that moment a cougar appeared in the smokehouse. The agent was so taken aback he said, "Go on, practice your religion." (Hilbert 1996:23)

William Shelton is often credited with suggesting Indian participation in Treaty Day and attaching a broader meaning to the commemoration. Shelton, who was of Snohomish origin, attended the Tulalip School for a short time as a teenager and for a number of years also served as an employee of Indian Agent Charles Buchanan at Tulalip. He later became a leader on the reservation ("Chief Shelton, Last of Totem Pole Carvers, Dies in Everett," *Seattle Times*, Feb. 11, 1938). Hank Gobin of the Tulalip Tribes tells of family stories told to him by Wayne Williams, grandson of Shelton:

> William Shelton, his grandfather, went to Buchanan and said, 'Let's hold a gathering to commemorate the treaty.'
>
> But I think in William Shelton's thinking, it wasn't to commemorate the treaty. It was to share with the young people at the Tulalip Indian Boarding School, the songs and dances of the Tulalip people and a way to continue the spiritual life ways of our people under the guise of celebrating a treaty.
>
> The real intention of the "Treaty Celebration" was to share and teach the spiritual life ways to the children at the Tulalip Indian Boarding School. That was the bottom line to the building of that smokehouse in 1914, 1915 or whatever the case may be, is that he saw the importance of carrying on the spiritual life ways, and went to Buchanan, as Wayne tells me, and convinced him by saying: 'Let's have a gathering on January 22 to commemorate the treaty.'

> And it would also give us a means to educate our children about the history of our people.
> (Gobin Interview, Apr. 23, 2007:18)

Gatherings on Treaty Day have continued to the present day with a variety of different types of observances on reservations around Puget Sound. Lora Pennington provides one modern view of the continuing significance of the Point Elliott Treaty and the complexity of tribal responses to its meaning and to its commemoration on Treaty Day:

> It is a mixed history. But now, as a tribal person, I know that the treaty is critically important. It may not be the ideal. It's not what I would want for my future generations.
>
> But I know that those that came before me have protected me, through this ragged document and their sacrifice...
>
> As tribal people, we celebrate the treaty every year. And I've been asked several times "Why do you have Treaty Day?"
>
> Well, one, these are important protections. An important passage. An important trust that exists between our people.
>
> .. . You can't separate our culture, our traditions, from us. No matter what, where we are, no matter how we come to this, it always comes to you and is always a part of you.
>
> So the treaties – you know, they are part of us, too. They are part of our culture and our tradition now. And although they have been used as a rod against us, it is also now part of our culture. And part of something that we will pass on to our children, and to our children's children and those that come after us.
> (Pennington Interview, Apr. 23 2007:27).

Later Commemorations

Over time, non-Indian groups have also commemorated the Point Elliott Treaty council with special celebrations as well as plaques and historic markers. Often, tribal members have participated in these events. One of the earlier projects was initiated by historian Edmond Meany in 1919 to place four plaques of noted Indian leaders around the Puget Sound area. Meany worked with artist James Wehn and even contacted the Great Northern Railroad with the hope of obtaining monetary support for the project. Later articles suggest that Meany planned to erect a marker at the Point Elliott site, but research into his correspondence indicates that he originally hoped to place a likeness of Patkanim at his gravesite rather than at the Point Elliott treaty-signing location. It was also suggested that historian Clarence Bagley was involved in this project, although there was no indication of his participation found in his personal papers (Widrig 1954:4; Meany to Louis Hill, Nov. 22, 1919 in Edmond Meany Collection, 106-70-12, Box 35, Folder 15, UW Special Collections, Seattle; Seattle Post-Intelligencer, Dec. 7, 1919).

In 1930, the Marcus Whitman Chapter of the Daughters of the American Revolution (DAR), located in Everett, installed a large piece of granite with a bronze marker on the Rosehill School grounds in Mukilteo to commemorate the Point Elliott Treaty. The monument was carved by Thornton A. "Jack" Sullivan, an Everett resident and president of the Everett Marble and Granite Works. The dedication ceremony was held on May 2, 1931, with an estimated 3,000 people in attendance, including as many as

800 Native Americans. An area was set aside on the school grounds where participants could camp and hold ceremonies and dances. Among the speakers was historian Edmond Meany, who brought a copy of the original treaty, and guests included three individuals who had attended the treaty proceedings: John Davis, Bill Kanim and Charley Jules. Jules spoke about the treaty and, according to a newspaper account, declared that if Governor Stevens had not been killed in the Civil War, he would have "fixed things up nice" (Kessler 2004:2-8, 3-8; *Everett Daily Herald*, May 2, 1931; May 1, 1931).

Representatives of the DAR presented the monument to Governor Roland Hartley, representing the State of Washington, and the Mukilteo School Board agreed to provide care for the marker. The inscription on the plaque included the following: "At this place on January 22, 55, Governor Isaac Ingalls Stevens concluded the treaty by which the Indians ceded the lands from Point Pully to the British boundary." These words were evidently written by Edmond Meany, who had consulted with DAR members about the event. In preparation for the construction of the monument, Professor Meany wrote to one of the committee members: "As near as can be ascertained, the Mukilteo (or Point Elliott) Lighthouse stands on the ground where Governor Stevens negotiated the treaty with the Indians led by Chiefs Seattle, Patkanim, Goliah and Chow-its hoot, affecting lands at least from Elliott Bay to the British boundary" (Dootson to Meany, May 8, 1931 in Meany Collection, Acc. 106-2-75-10, Box 24, Folder 4, UW, SC, Seattle, WA; Meany to Miller, Jan. 7, 1930, in Meany Collection, Acc. 106-2-75-10, Box 24, F. 4, UW, SC, Seattle; also cited in Kessler 2003).

Other historians of the period also had an interest in the location of the treaty council site. Notes compiled by Clarence Bagley, possibly for his History of King County, published in 1929, provide a more general indication of the location: "On January 22, 1855, Governor Stevens concluded another treaty at Point Elliott near the mouth of the Snohomish River about ten miles from Scadget Head on Possession Sound" (Clarence Bagley Collection, Acc. 36-001, Box 18, F. 17, UW, SC, Seattle; also cited in Kessler 2003). Both historians likely had the opportunity to talk to a few individuals who had attended the treaty ceremony and were still alive in the early 1930s, but no evidence was located in their papers to suggest that they obtained or recorded any information from first-hand informants.

Decades later in the 1950s, Lucile McDonald, a *Seattle Times* columnist who focused frequently on historical topics, wrote an article on Mukilteo for the paper. In her hand-written notes, probably taken during an interview, McDonald records the following: "Treaty signing was at 11 acre oval at Pt. Elliott s. of ferry ldg. Stevens and 82 Indian leaders Jan. 22, 1855." No record of the source of this information accompanies these notations (McDonald Collection, Acc. 2234-3, Box 16; "Mukilteo Was an Early Trading Post" McDonald Collection, Acc. 2234-3, F. 7, 1852-1859, UW, SC, Seattle, WA).

A National Register nomination for the historical monument was submitted in 2004 and indicates the current view, which is that the monument stood for "the place of the Point Elliott Treaty signing and not the exact site." The nomination also states that the marker commemorates the 1855 document, described as "a pivotal treaty, which legally opened the Puget Sound area to Euro-American settlement." In the words of the nomination, the DAR marker continues to serve as "evidence of a later generation's assessment of the past and its significance is derived from the value of the monument as a cultural expression of the 1930s" (Kessler 2004:7-1; 8-1).

An additional recognition of the Point Elliott treaty was made by the Veterans of Foreign Wars, Guard Post 2100, on August 15, 1953, as part of the Washington Territorial Centennial celebrations. At the dedication of a concrete monument and wooden bench, which were located near the beach on State

Park land in Mukilteo, a re-enactment of the treaty signing ceremony was held. At the time, it was believed that the council grounds were located near the site of the lighthouse, and the land around the site was made a state park. The area where the bench and marker were located was on filled land, however, and the bench was subsequently removed and the plaque later encased in a concrete pylon east of the lighthouse (Widrig 1954: 4; Kessler 2004:8-7).

In 1973 the Washington State Parks and Recreation Commission also erected a marker at the State Park to commemorate the listing of the Point Elliott Treaty council site on the state's Historic Register. A nomination of the site to the National Register of Historic Places was first made at that time, but was rejected because of inadequate documentation. This 1973 marker was later added to the same concrete pylon where the VFW memorial was placed (Warner 1968; Kessler 2004:8-7).

Point Elliott Re-Enactment Pageant

Other Point Elliott commemorations did not occur near the Point Elliott site. These observances usually included area tribes and offered the means to showcase Native culture in a more public setting while at the same time re-interpreting the meaning of the Point Elliott Treaty. In 1933 members of the Warren O. Grimm post of the American Legion, located in Kirkland, Washington, initiated a re-enactment of the Point Elliott Treaty council as part of a larger celebration that involved representatives of many of the signatory tribes as well as others from around Washington State (Figure 46). According to newspaper articles of the period, the Legion invited the Indians to hold a re-enactment and pow-wow that would demonstrate the "early life, customs, and beliefs of the Indians ...thru pageants, war dances, tribal dances, games and primitive magic"("Juanita Beaches Lend Ideal Surroundings for Big Redskin Pow-

Figure 47. Re-enactment of the Point Elliott Treaty at Juanita Beach, 1933.

wow," *Eastside Journal*, April 6, 1933). Organizers believed that the event, which was to be held at Juanita Beach on Lake Washington near Kirkland, would draw thousands over a two-day period and benefit both the tribes and the post (Stein 2002).

Among those participating in the planning were Jerry Kanim of the Snoqualmie, Black Thunder of the Skykomish, Joseph Hillaire of the Lummi as well as a delegation of women from the Muckleshoot reservation. In addition to a variety of canoe and boat races, dances, singing, and cooking demonstrations, planning for the celebration included the presentation of a pageant that would depict the events surrounding the Point Elliott Treaty council of 1855. Joe Hillaire evidently took the responsibility of developing the pageant and according to local newspapers, gathered "first hand data for months on just what happened prior to and at the signing of the treaty...." It was proposed that Washington Governor Clarence Martin play Governor Stevens in the presentation, and descendants of other treaty signers, including Jerry Kanim, the son of Patkanim, assume the Indian roles ("Gov. Martin Asked to Assume the Role of Territorial Governor" *Eastside Journal*, April 27, 1933; "Races and Colorful Pageant Declared Best Ever presented," *Eastside Journal*, June 1, 1933; "War Canoes to Vie Tomorrow," *Seattle Times*, May 27, 1933).

A typescript that is identified as "written by R.O. Bishop from recollections of early Seattle days as recounted by Joe Hillaire" is likely the script for the 1933 pageant. The document, which is held at the University of Washington libraries, includes a narrative as well as stage directions that provide background on the life and culture of Puget Sound Indian groups before the treaty and a dramatization of the treaty proceedings and its impact on the tribes. Hillaire primarily uses the perspective of Chief Seattle to illustrate the changes the Indians experienced once the treaty was signed. Stevens, "the little man who talked so tall for the Great White Father" is portrayed as in a hurry: "His demeanor is kind until the chiefs put their marks on the paper and then he becomes brusk and in a hurry. He hurried away while blanket squares and ribbons are passed out." When Seattle and others are forced to move to their reservations, the government provides no money and Dr. Maynard pays for the expenses. "Then came the dark times and through an interpretation of the treaty the tribes were no longer allowed to sing their tribal songs; not allowed to do their ancient dances: denied the Indian custom of bewailing their dead. What they here to for had been proud of they now had to do in secret or not at all. <u>It was a bad time to be an Indian</u>." As years passed, the government, which was supposed to send money, more often provided useless items. "Perhaps a man would receive a saddle, complete with bridle. He, who had never owned a horse. Would it fit his wife?" (Recollections of Joe Hillaire nd:12-13, in Pamphlet Files, Indians of North America, Washington, Suquamish, UW, SC, Seattle, WA).

The Hillaire script suggested that the aftermath of the Point Elliott Treaty was a lonely and bitter time for Chief Seattle as "Gov. Stevens now looked through him instead of at him" and when he died he was unsure if he had made the right decision to support the treaty. It was not until 1911, according to the script, that "the veil of silence that hid the Indian culture was broken...The damper was lifted by Chief William Shelton of the Snohomish, who managed to get Congressional consent for the elders of the tribes under the Point Elliott Treaty to celebrate the anniversary by the singing of the ancient songs and performance of the tribal dances." As dramatized in the pageant, the result of Shelton's appeal was what became known as Treaty Day: "The tribes began to recount the promises that had been made. They began again to be proud of being Indians. The original signers were gone but the children remembered what father had said and what grandfather had said. The treaty would do this and the treaty would do that. But we the children do not see it done" (Recollections of Joe Hillaire nd:14-16, in Pamphlet Files, Indians of North America, Washington, Suquamish, UW, SC, Seattle, WA).

Another less ambitious re-enactment of the treaty-signing took place on May 3, 1961, at the dedication ceremonies that initiated the construction of Tillicum Village, a tourist development on a portion of Blake Island State Park. Plans were unveiled to build a "replica of a Salish-type pre-white man village" which would also include a museum, a longhouse, a 300-seat auditorium and various food service and sales buildings. In an unusual departure, participants were ferried to Blake Island on a World War II landing craft. In addition to the developers and representatives of the state parks, the descendants of Chow-Its-Hoot, Patkanim, Goliah, and Seattle took part in the ceremony, representing the signers of the Point Elliott Treaty of 1855 ("Signing of Indian Treaty Re-enacted on Blake Island," *Seattle Times*, May 3, 1961; "Ground Broken for Replica of Blake Island Indian Village, *Seattle P-I*, May 4, 1961).

Potential Archaeological Expression

Although archaeological evidence of the Point Elliott Treaty signing event has not been conclusively identified, such evidence could be found in the Mukilteo area. A gathering of over 2,000 people, most of whom were camping, would almost certainly have left archaeological remains. Numerous small hearths [redacted], particularly if associated with thin scatters of animal bone, shell, chipped stone, and exotic trade goods, could be an indicator of the Treaty event. According to Native American informants, Governor Stevens distributed gifts at the Point Elliott gathering to encourage acceptance of the Treaty, including straw hats, calico cloth, blanket fabric, blackstrap molasses, mouth harps, pins, needles, thread, and thimbles (Cameron et al. 2005:37; Trafzer 1986:29). Mattocks and other tools may also have been distributed (Deposition of Bill Kanim, Feb. 2, 1923, in RG 75, Tulalip Agency, Correspondence with Commissioner of Indian Affairs, Box 96, Folder 60:1). Since a trading post was present at Mukilteo by 1862 and trade goods had been widely available in the area since the 1830s, the density and location of short-term campsites may differentiate residential activity associated with the Treaty from that dating to earlier and later events. Although the Euroamericans present at the Treaty reportedly retired to an off-shore ship at the conclusion of each day, artifacts associated with that contingent could also occur. Such artifacts might include hand-blown glass bottles, tableware sherds, sawed animal bone, period buttons, and other portable goods, probably scattered over a relatively limited area. Remains of temporary shelters, such as poles or stakes driven into the ground, could be present in both Native American and Euroamerican portions of the site.

As previously noted, a few clay tobacco pipe fragments and a glass bead were recovered in 2009 from a lagoon context during test excavations at the Old Mukilteo Townsite (45SN404), [redacted] (Ferland et al. 2010). These finds may be evidence of the treaty/trading post period in the area, supporting the possibility that 45SN108 could contain an archaeological component. For a summary of nineteenth and early twentieth century artifacts useful as temporal markers, see Appendix B of *The Alaskan Way Viaduct & Seawall Replacement Project Research Design for Identification of Archaeological Properties, Part II: Historical Properties* (Northwest Archaeological Associates, Inc./Environmental History Company 2007).

Site Synthesis

The Point Elliott Treaty Site (45SN108) is the location where the 1855 treaty between the U.S. government and the Indian tribes of northern Puget Sound was signed, an important historical event. Historical research completed in 2007 adds detail and information sufficient to revise the 45SN108 site form and initiate evaluation of a better defined property. Although exact locations where 1855 Point Elliott Treaty events occurred remain uncertain, the size of the treaty gathering, nature of the landform,

and other factors support expansion of the site boundary to encompass the entire point. Based on the results of the 2007 research, the Point Elliott Treaty Site (45SN108) is recommended eligible for listing on the National Register of Historic Places under Criterion A for its association with the history of Indian-white relations and the development of Federal Indian policy during the last half of the nineteenth century. The site is also recommended significant under NRHP Criterion B for its association with prominent political leaders of the day, Governor Isaac Stevens and a number of Indian leaders including Seattle, Patkanim, Goliah, and Chowitshoot. Previous finds of period artifacts, as well as the history of the event, suggest that an archaeological component may be present at the site, perhaps qualifying the site for NRHP eligibility under Criterion D.

As noted in the Tribal Coordination section (section 1.4), the site or portions of the site vicinity may also be eligible for the NRHP under Criterion A or other criteria as a traditional cultural property, significant in maintaining the living culture of one or more Native American groups. Consultation between WSF and FTA and interested Native American tribes regarding TCPs in the project area is in its early stages.

3.5 Mukilteo Light Station (45SN123)

This lighthouse complex, consisting of 11 buildings and structures, is listed in the NRHP and Washington Heritage Register. An update was recently submitted to the Washington Department of Archeology and Historic Preservation to include buildings and structures not mentioned in the original 1977 nomination form (Williamson 1977, Andrews 2008). The lighthouse, two keepers' residences, and a coal storage building were constructed in 1906. A two-bay garage, concrete fence posts, sidewalks, a seawall, ladder storage, water basin, and triangle alarm were added before 1935 and are contributing elements (Andrews 2008).

The Mukilteo Light Station (45SN123) is significant under Criterion C as a well-preserved complex of buildings and structures typical of those produced in the Pacific Northwest by the federal Light House Board during the late nineteenth and early twentieth centuries. The Mukilteo Light Station is also historically significant under Criterion A for its association with the maritime history of Puget Sound (Andrews 2008; Rinck and Heideman 2008).

3.6 Buildings and Structures Recommended Not Eligible for the NRHP

Mukilteo Explosive Loading Terminal

The Mukilteo Explosive Loading Terminal Barracks (Field No. MM-04) was recorded and evaluated in 2003 during the initial cultural resources assessment of the Mukilteo ferry terminal project (Kaehler et al. 2006). The building, described as a simple rectangular two-story wood frame barracks with a front-gabled roof, numerous wood sash windows, and a gabled rear extension, was built in 1942 as part of the U.S. Army Mukilteo Explosive Loading Terminal (MELT) complex. The MELT facility served as a shipping point for munitions sent to the western Pacific during World War II, and the barracks continued to house servicemen stationed at the Terminal into the late 1940s. In the early 1950s the U.S. Air Force acquired the MELT facility as a fuel supply point, constructed ten fuel tanks on the property, and converted the barracks building to the headquarters for a maritime rescue unit. During the initial Mukilteo ferry terminal project cultural resources assessment, the MELT Barracks was recommended eligible for listing

in the National Register of Historic Places, the Washington Heritage Register (WHR), and the Snohomish County Cultural Resources Inventory (SCCRI) for its association with "an essential element of the military supply system established on Puget Sound during World War II" (Forsman 2003a:2).

Today most of the original eight-over-eight wood sash double-hung windows on the front (west side) and highly visible south and east sides of the building have been replaced with incompatible modern one-over-one vinyl sash units. Porches have been rebuilt and reconfigured and most doors are modern metal or fiberglass replacements. These repairs have significantly altered the appearance of the building. To be eligible for listing in the National Register of Historic Places a property must possess both historical significance and an acceptable degree of integrity. Compromised integrity—of design, materials, workmanship, and feeling—prevent the MELT Barracks from conveying its historical association with the World War II military supply system. The building is therefore recommended not eligible for listing in the NRHP, the WHR, the SCCRI, and the Mukilteo Historic Buildings Register (MHBR).

Three additional buildings and structures in the MELT complex—the Pier (Field No. MM-02), Firehouse (Field No. MM-01), and Superintendent's Office (Field No. MM-06)—were also recorded and evaluated in 2003. All were recommended not eligible for NRHP, WHR, SCCRI, or MHBR listing due to loss of integrity (Forsman 2003b, 2003c, 2003d; Kaehler et al. 2006:54).

Defense Fuel Supply Point - Tank Farm

The Defense Fuel Supply Point Tank Farm was also recorded and evaluated during the 2003 assessment (Kaehler et al. 2006). This complex consists of 10 concrete fuel tank pads (the tanks were removed prior to 2003) and small associated service buildings and structures. The DFSP Tank Farm was recommended not eligible for NRHP, WHR, SCCRI, or MHBR listing due to loss of integrity (Forsman 2003e; Kaehler et al. 2006:54).

Diamond Knot Ale House (Cheers Too, Bus Barn)

This building was constructed in 1942 as a bus barn for the Mukilteo-Everett Stageline. Subsequent uses included restaurants and other commercial ventures, and the building was repeatedly remodeled. The building was recorded in 2003 and recommended not eligible for listing in the NRHP or the WHR due to loss of integrity resulting from extensive alteration (Kaehler 2006; Koler 2003c).

Ivar's at Mukilteo (Taylor's Landing)

This building, originally a 1925 commercial building and an adjacent residence, was remodeled into its present form in 1991, 1993, and 2003. Today the building has been altered to the point that it is unrecognizable as an historical structure—no historical fabric is visible on the interior or exterior of the building. Ivar's was recorded in 2003 and recommended not eligible for listing in the NRHP due to loss of integrity (Kaehler 2006; Koler 2003f).

SR 525 Overpass (Bridge #525-10)

SR 525 crosses the BNSF railroad on this large timber and concrete bridge. The structure was built in 1941 as a 24-foot-wide timber trestle bridge. In 1967 the structure was widened to 48 feet and massive

concrete supports were added. The bridge was recorded in 2003 and recommended not eligible for the NRHP or WHR due to its unexceptional character and loss of integrity (Kaehler 2006; Koler 2003a).

Mukilteo Ferry Terminal (31-339)

The Mukilteo Ferry Terminal was minimally recorded in 1994 and assigned a construction date of 1970 (Historical Research Associates, Inc. and Anderson Koch & Smith 1994; Niederhofer and Schneid 1994). The property, believed to be less than 50 years old, was revisited during the initial Mukilteo ferry terminal project cultural resources assessment to determine if it qualified for listing in the NRHP under Criteria Consideration G, properties of exceptional importance that have achieved significance within the last fifty years. The property did not qualify for exceptional status (Kaehler et al. 2006:17, 32). Subsequently, however, references have surfaced, providing a construction date of 1952 for the ferry terminal and trestle (Jacobson 2010; Krochalis 2006; Onweiler 2011; Michelle Paxson, MMP Project Manager, WSF, personal telephone communication with Eileen Heideman, March 31, 2011). The property was therefore revisited in 2011 and a Historic Property Inventory form completed (Appendix H). Architectural descriptions of the terminal features and recommendations regarding NRHP eligibility of the property follow.

Passenger Terminal Building

This single-story flat-roofed building has a roughly rectangular plan divided into three primary spaces. An office for Washington State Ferries employees is located at the southeast end of the building, public restrooms accessible from the northeast side are located in the center, and an indoor waiting area for ferry passengers is at the northwest end of the building. The building is roughly rectangular in form, but has recessed entrance areas located on the northeast side for each of the three sections. The building is capped with a flat roof with broad eaves supported by slightly tapered rafters. The building is clad with vertical board siding and the interior is lit with fixed and sliding windows. These materials are replacements that date to a 1984 remodel of the building. With the exception of the rafters, very little of the original building remains intact.

Dock

The dock consists of several components that include a riveted steel pony truss, a timber trestle, two towers with a connecting support brace and catwalk, two wing walls, bulkheads, and three dolphins. The dock extends to the northwest from the shoreline and stands at the foot of SR 525, just past its intersection with Front Street. The portion of the dock closest to shore is a timber trestle segment consisting of six-pile bents with milled pile caps supporting a wood deck and asphalt wearing surface. This portion of the dock is connected to the pony truss transfer span, which is a Warren truss design with verticals and polygonal top chords. The end of the dock consists of two creosoted timber pile towers reinforced with steel bracing and capped with concrete and an overhead connecting beam that extends between the two towers. This overhead system supports a cable and pulley system that raises and lowers the dock apron to the appropriate height for the ferry. Two wing walls, two timber pile dolphins and a floating outer dolphin form the outer extent of the ferry dock system. According to Michelle Paxson, WSF MMP Project Manager (personal telephone communication with Eileen Heideman, March 31, 2011), the trestle was built in 1952.

Toll Booths

Three toll booths are located at the south end of the Mukilteo ferry terminal facility, two of which were probably built in 1952; the third booth was added at a later date. The two original booths are small rectangular buildings with a single entrance located on the northwest side of each booth. The lower walls are clad with vertical pressed chipboard siding and the upper walls consist of modern vinyl and aluminum fixed and sliding sash windows. The low-pitched hipped roof of each building has box-framed eaves and both are clad with standing seam metal roofing. Gate arms are attached to the northeast end of each building for lowering across vehicle lanes, and large poured concrete safety barriers are located on the southwest side of each booth.

NRHP Evaluation

The Mukilteo ferry terminal consists of several components: three toll booths and an automobile holding area, a passenger terminal building, and a dock for the ferry. With the exception of one toll booth and the transfer span, the date of construction for these buildings and structures is 1952, and all have undergone extensive alterations since that time with at least one major remodel taking place in 1984 (Jacobson 2010; Krochalis 2006; Onweiler 2011; Michelle Paxson, MMP Project Manager, WSF, personal telephone communication with Eileen Heideman, March 31, 2011; Snohomish County 2011). Further research would be necessary to determine the exact dates and full extent of the alterations, but the amount of modern material on these buildings and structures indicates that little of the original material remains. These changes have caused loss of integrity of design, materials, and workmanship to the passenger terminal building, the toll booths, and the dock. These buildings and structures are therefore recommended not eligible for the NRHP, the WHR, the SCCRI, and the MHBR.

Buildings No Longer Extant

McConnell's Boat House (31-244) was demolished sometime prior to the 2003 cultural resources assessment (Kaehler 2006). Buzz Inn (Seahorse Restaurant) and the adjacent Multi-family Residence and Seahorse Owner's House were recorded during the 2003 inventory and recommended not eligible for the NRHP; the three buildings were torn down around 2008 (Kaehler et al. 2006; Koler 2003b, 2003d, 2003e; Rinck and White 2008).

3.7 Off-Shore Resources

In 1981, during planning for an earlier expansion project at the Mukilteo Ferry Terminal, underwater archaeologists examined the area around the present western wingwall and floating dolphin, and immediately north of the fishing pier for cultural resources (Green 1981; Kaehler et al. 2006). The divers reported a large ship anchor, partially buried in the seafloor, in 30-40 feet of water near the floating dolphin. Just beyond the anchor the seafloor dropped precipitously to the north. A large chain attached to the anchor extended, taut, in a north-northeasterly direction over the underwater precipice into the deep water below. Although the anchor and chain suggested a possible shipwreck, the divers were unable to explore the deep water area. The anchor and chain were not mapped or formally recorded (Green 1981). These remains may be evidence of the *S.S. Glide*, an 1883 steamship that reportedly sank in the Point Elliott vicinity in 1902 (Kaehler et al. 2005). The ship, however, burned before sinking, and Kaehler et al. (2005) recommended the anchor and any possible ship remains as not eligible for the NRHP.

4 SUMMARY AND MANAGEMENT IMPLICATIONS

Fifteen cultural resources were identified within or adjacent to the MMP APE. This chapter summarizes these sites' eligibility for listing in the NRHP, evaluates potential project effects on properties eligible or recommended eligible for the NRHP, and discusses possible mitigation measures should adverse effects to NRHP-eligible sites be unavoidable. As in previous sections of this document, the three sites reported in the 2008 draft Mukilteo ferry terminal project cultural resources report (Miss et al. 2008)—Mukilteo Shoreline Site (45SN393), Old Mukilteo Townsite (45SN404), and Point Elliott Treaty Site (45SN108)—are addressed in greater detail than the other properties.

4.1 National Register of Historic Places Evaluation

Mukilteo Shoreline Site (45SN393)

Archaeological testing of 45SN393 (Figure 47) has provided a substantial amount of data that can be used to address some of the research questions previously described. In some cases, test sample sizes of data classes are too small to be adequately applied to those questions but may be obtained in greater quantity with the larger samples that data recovery excavation may yield. The ways in which data from 45SN393 may be applied to established research domains are described in turn here.

Site Structure - the Lithostratigraphic Framework

Lithostratigraphic data collected during site testing showed the presence of well-stratified shell midden deposits [redacted]. Testing also revealed intact stratigraphy preserved among the sedimentary bodies [redacted] Small-scale individual lithofacies revealed fine-grained data on details of the depositional framework, and the presence of well-delineated contacts between the strata (groups of lithofacies) showed the distribution and overall geometry of the major strata comprising the landform.

The detailed depositional framework of the Stratum II shell midden was exceptionally well-preserved below the fill, and showed multiple occupations separated by deposits associated with geomorphic events such as washover deposits due to storm waves. Since the physical framework of the archaeological site and its landform exhibit a high degree of integrity, archaeological sampling strategies can be fine-tuned to address spatial and temporal changes in site use as well as collect information on the ecological setting of the landform.

The highest amount of the remaining estimated data potential of the site lies in closer examination of the shell midden. Though the borehole data provided sufficient lithostratigraphic data to support construction of the overall physical framework, the backhoe trench exposures showed the limitations of cores for detailed examination of shell midden sites. Such examination requires larger exposures to trace out lateral changes in the character of the midden deposits; find and define evidence for structural features such as stakemolds and fire features (for example, ovens and hearths); and to provide suitable sampling contexts for faunal, botanical, and other environmental analyses.

Figure 48. Overview of project APE and recorded site boundaries contains sensitive cultural resources information that is exempt from public disclosure pursuant to provisions of the Public Records Act (RCW 42.56.300).

Figure 48. Overview of project APE and recorded site boundaries.

Landform History

The data classes used to develop the site structure also inform on the landform history at 45SN393, including intact stratigraphic relationships within and between cultural and natural deposits and associated firmly dated chronological markers. The well-defined contacts among lithofacies and strata in conjunction with the numerous fragments of driftwood and wrack from short-lived woody species allowed construction of a preliminary landform history. A radiocarbon sample from borehole MR-6 showed an earlier spit, possibly part of a cuspate foreland, had formed about 1600 rcybp and was subsequently rapidly buried under about 15 feet of accumulated Stratum IV beach sediments. Radiocarbon ages from the archaeological deposits of Stratum II show that the spit emerged again and was available for occupation by at least 1000 years ago.

The site has the potential to yield additional data that can be used to refine this preliminary reconstruction of the paleolandscape. The lithostratigraphic boundaries throughout the project area offer a framework for interpreting chronological data and estimating time of major depositional events and the stability of landscape features. Given the excellent preservation of the stratigraphy in Stratum II, and if larger exposures of stratigraphy were available, the further archaeological data potential of 45SN393 rests in retrieving large-enough samples to draw possible correlations among occupation ages, pre-contact human activities, and environmental change.

Site Formation

Data classes pertaining to the research domain of site formation are present at 45SN393, including basic site parameters, stratigraphy, and content of the archaeological deposit. Test excavations have refined the boundary of the site since its initial discovery, [redacted] The midden varies in thickness, between 2.4 and 115.8 centimeters (0.9 and 45.6 inches) in the test trench exposures. The shell midden deposit exposures are not homogenous from trench to trench, most exhibiting complex internal stratification, including thin crushed shell midden lenses, black charcoal-rich strata, and clean sand and naturally deposited shell layers between cultural layers. The radiocarbon dates associated with the shell midden obtained during testing range between about 1000 BP to contact, a range supported by the composition of the artifact assemblage. Midden accumulation rates vary between the trench exposures, suggesting that different portions of the site were used at different times and with different intensities.

The test excavations illuminated several major post-depositional processes that have affected 45SN393, including construction and demolition of the Crown Lumber Company facility that may have removed portions of the top of the shell midden and driven intrusive elements such as pilings through some of the deposits; construction of the fuel tank facility that capped the shell midden with additional fill; installation of buried utilities for at least the past 50 years throughout the Air Force property that have removed the deposit in places; saturation of a portion of the midden with petroleum products that has affected portions of the deposit to an unknown extent; and periodic tidal inundation of at least the lower portion of the shell midden.

The presence of data classes associated with the site formation research domain have been demonstrated at 45SN393. Although test excavations have refined the horizontal and vertical boundaries of the site and given some indication of formation processes concurrent with Native American occupation and later post-depositional processes, our knowledge of stratigraphic variability

within the site deposits is limited to relatively few large exposures within the trenches and more numerous but narrow exposures within the core samples. The remainder of the site has the potential to inform about a greater extent of variability and to provide a clearer picture of site formation processes.

Cultural Processes

Testing at 45SN393 has yielded lithic and bone artifacts, abundant faunal remains, botanical remains, and spatial and stratigraphic data that inform us of the lifeways of the pre-contact Native American occupants of Point Elliott. The preliminary radiocarbon chronology, based on samples from trenches some distance from each other, suggests that human occupation of the barrier berm began on at least a portion of the site around 1,000 years ago and more widespread use of the berm commenced about 600 years ago. The boundary between the pre-contact shell midden deposit and overlying historic fill deposits is indistinct in most exposures; similar to the Duwamish No. 1 site, contact-era items such as trade beads have not yet been found that would directly suggest continuity of occupation of the beach berm by Native Americans from the pre-contact period through the ethnographic period. The decision to use this landform as the venue for the signing of the Point Elliott Treaty in 1855, along with oral accounts that the beach was still used regularly as a camp site, however, does suggest such continuity.

Intensity of occupation substantially varied from place to place throughout the site based on midden accumulation rates estimated from the test trench profiles. Features such as structural remnants or hearths found in other large shell midden sites (e.g., Duwamish No. 1 and Old Man House) were not apparent in the test units, precluding inferences about paleodemography or activity areas at the site; the dimensions and stratigraphic complexity of the midden, however, suggests that such features may be found and inferences made if more extensive excavation units are dug at the site.

The artifacts found during testing reflect a variety of activities by the Native American occupants of the site, including tool manufacturing and maintenance, hunting and fishing, food processing, and wood- or bone-working. Lithic artifacts found during testing include both expedient and more finely made stone tools and tool-making debris representing several different tool manufacture and maintenance techniques. Most of the lithic raw material was from locally available coarse-grained volcanic stone; however some artifacts were made of cryptocrystalline stone and petrified wood. These rarer lithic raw materials may have been accessible in local glacial deposits or traded or transported to the site from some distance. Nephrite, from which an adze blade found at the site was made, may have likewise been transported to the vicinity of the site by Pleistocene glaciers, although *in situ* sources are known in Snohomish County and interior river valleys in the north Puget Sound lowlands and Cascade foothills (Cannon 1975; Lewarch and Bangs 1975). Finished adze blades were also traded great distances throughout the Northwest Coast and Plateau, and valued for their time-intensive manufacture, durability for important woodworking activities, and symbolic value of wealth attached to them (Darwent 1998). Projectile points suggest hunting at or near the site, and the complete adze blade was probably used to work wood, of which burned fragments of Douglas fir, alder, maple, pine, hemlock, cedar, and yew were also found. Bone tool technology was apparently well-developed by the occupants of the site as well, and included implements for fishing, hunting, and working wood or bone. Larger samples recovered from contexts with more secure provenience are still needed, however, to define spatially discrete activity areas and changes in the kinds and intensity of activities at the site through time.

Animal remains found at the site include a variety of shellfish both common (e.g. mussels, clams) and uncommon (e.g., geoduck) in regional archaeological contexts. Fish remains reflect a focus on salmon

and less intensive pursuit of nearshore marine fish including dogfish, ratfish, herring, surfperch, sculpin, rockfish, and flatfish. The bird bone assemblage contains the remains of ducks, loons, grebes, and alcids, suggesting a focus on waterfowl and other marine birds instead of terrestrial bird hunting. Mammal remains include sea lion, harbor seal, black bear, porpoise, elk, and deer. This suite of animal resources would provide meat for subsistence and raw material for manufacture of tools, clothing, and other items in a complementary manner year-round. Changes over time in site seasonality, the kinds of animals pursued nearby, and the intensity of their harvest, however, are not apparent from analysis of this assemblage given its small sample size. A larger sample is also required to make such inferences about subsistence strategies as butchery and carcass transport decisions and a more complete picture of Native American hunting, fishing, and gathering throughout the annual cycle.

Regional Syntheses

The archaeological deposits at 45SN393 contain data that complement ethnographic, ethnohistoric, and historic documentation of the importance of the site and Point Elliott to larger settlement patterns used by Native American communities of central Puget Sound. The preliminary site chronology, based on radiocarbon dated charcoal samples within the site and geological and radiocarbon data from the surrounding landform, suggests that 45SN393 was first occupied about 1,000 years ago, shortly after the barrier berm at Point Elliott began to form. The site was occupied continuously, that is, without substantial breaks, until Euroamerican contact and settlement in the mid-1800s, and may be placed exclusively within the late period of the general Northwest Coast culture-historical framework and the Gulf of Georgia phase established for the Straits and North Puget Sound. The last roughly 1,000 years has been asserted in most regional culture-historical sequences to be a time of dramatic population growth, of labor reorganization that takes advantage of specialized economic pursuits such as intensive salmon fishing, and of an increasing complexity of social structures (e.g., Ames and Maschner 1999; Matson and Coupland 1995).

The composition and character of the artifact assemblage and shell midden deposit at 45SN393 are consistent with other sites in the region attributed to this phase, including the two most recent components at the West Point site, the Duwamish No. 1 site, and Old Man House. This period of time at West Point was marked by continuity of many hunting, fishing, and gathering pursuits from the previous approximately 3,000 years but also a shift towards more seasonally restricted use of the site during the spring and summer, and an almost complete cessation of on-site stone tool manufacturing (Larson and Lewarch 1995). At the Duwamish No. 1 site, people were engaged in similar broad economic pursuits as at West Point, however there is no indication of seasonally restricted use of the site and lithic and bone tool manufacturing via several different raw material reduction techniques was apparent over the last 1,000 years (Campbell 1981). Even though the longhouse that was standing during the early historic period at the Old Man House site is inferred to have been constructed after about AD 1800-1850, the Late period component of the site dating within the last 1,000 years is an extensive shell midden deposit that contains features and artifactual and faunal evidence for a large settlement or village prior to Euroamerican contact (Schalk and Rhode 1985:43-44).

The cuspate foreland on which 45SN393 is situated provides an ideal base camp for hunting, fishing, and gathering. It is also advantageously situated near the intersection of Possession Sound, Admiralty Inlet, and southern Puget Sound, and is near the mouth of the Snohomish River whose basin provides several routes into the interior and the Cascade crest. Although the data collected to date do not indicate whether Point Elliott hosted a Native American winter village at any point or was primarily a smaller camp site, it was probably occupied at least intermittently year-round and saw interaction with the

Native communities that made use of the other major coastal sites in central Puget Sound as well as inland sites in the Puget Sound lowlands. A few finished lithic tools made of potentially exotic raw materials such as petrified wood and nephrite were found at site 45SN393, indicating trade or travel further abroad. Data collected so far firmly places the site within the culture-historical framework of the region. Larger samples of artifacts from 45SN393, however, including both tools and tool-making debris, would allow a more thorough comparison of the material culture and activities of the occupants of this site with that of others.

The Mukilteo Shoreline site has been shown to contain data classes useful for addressing important questions about the late prehistoric period in the central Puget Sound Region. The site also retains integrity of association and has been determined eligible by the Washington Department of Archaeology and Historic Preservation for listing in the National Register of Historic Places under Criterion D (Sterner 2011). While additional testing of the type already conducted would provide additional information, it would not alter assumptions of site potential or change the site's NRHP eligibility.

Old Mukilteo Townsite (45SN404)

Chronology and Site Formation

Historic material from excavated trenches and test units in the Old Mukilteo Townsite (45SN404) (Figure 47) appears to be separable by age and location and attributable to buildings that functioned as hotel, restaurant, saloon, butcher shop and general store. Materials recovered from above the wooden decking of the Crown Lumber Company dates from the early twentieth century into the 1930s, and that below generally dates to the late nineteenth century. The Crown Lumber Company mill closed in 1930; however, the Bay View Hotel continued to operate through World War I and adjacent buildings still stood into the early 1920s. The butcher shop and company store stood vacant for a number of years after the mill closed and probably burned in 1938 along with the remaining mill buildings.

Site formation at Old Mukilteo can be further analyzed by the vertical and horizontal distribution of artifacts. Temporal markers suggest some of the assemblage from below wooden decking that supported stores operational prior to the closing of the Crown Lumber Company predate 1900. This material may have been directly deposited on surfaces at higher elevations like the berm location of the Bay View Hotel. Some may be from the enterprises built on piles and decking above the tideland, falling between cracks or discarded beneath buildings. A third source is the tides themselves, which may have moved floatable objects around the lagoon behind the berm at high tide or during storms. The artifact sample is relatively small; however, these artifacts provide valuable information regarding human activity during the various time periods the site was occupied.

Trade and Commodity Flow

Data classes found in the 45SN404 deposits are informative about both commerce and the preferences of Mukilteo residents for goods. Based on ceramic decorative techniques, residents of this site had a preference for tablewares of various decorative motifs and purchased some of the most popular wares of this time. Materials from European countries show ties between markets in these countries and those in the United States. Potteries in the United Kingdom dominated the tableware market in the United States into the twentieth century (Wegars 1982:3); the Old Mukilteo Townsite assemblage reflects this trend.

Embossing on glass artifacts found at the site suggests that foodstuffs were primarily packaged in the United States. Bottled products at this site were largely manufactured domestically, including many products made locally. Additional samples would likely provide more time depth to this discussion and illuminate the provisioning of a remote frontier settlement as it grew over 50 years and achieved integration into a national economic network fueled more by railroads than the sea transport that yielded British ballast bricks.

Foodways

The remains of foods consumed at Old Mukilteo and food containers were found during testing at 45SN404. These data classes answer questions about what people ate and how they prepared and served it. Faunal material included both domestic cow and sheep of a variety of wholesale cuts, as well as portions of less utility that were probably directly disposed of by the butcher. The presence of deer and fish bones in small numbers suggests the persistence of hunting and fishing for subsistence or recreation. Although plant remains were not found in the assemblage, jar parts indicate canning and food preservation. Fragments of tableware and serving pieces reflect service under both utilitarian and perhaps more elegant circumstances. Discerning between assemblages of food remains and containers that originated from the hotels, restaurants, and the store on the commercial block of Old Mukilteo, and between these contexts and the domestic households nearby, however, would require additional samples with good provenience.

Social and Economic Status

The artifact assemblage found at 45SN404 reflects a population comprised of several different ethnic and socioeconomic groups. The site was occupied as improved manufacturing techniques increased the variety of material culture available in the United States and as advertisement popularized products. The community was subject to great swings in prosperity and population size over the years and is one of a few locations in northwestern Washington that can provide a continuous record of availability of goods and their selection and use over time. Residents of Old Mukilteo purchased new, popular, and stylish products that replaced older ones. Artifacts from this site are a reflection of purchasing power and consumption by local residents.

The material culture recovered from 45SN404 can be used to answer questions about local and regional history. Controlled samples targeted to specific locations would allow additional comparison among temporally and spatially separated assemblages. The cultural material is in good condition and its distribution retains integrity of association. Based on the site's potential to yield important historical information, the site has been determined eligible by FTA for listing in the National Register of Historic Places under Criterion D. The Washington Department of Archaeology and Historic Preservation has concurred with that determination (Sterner 2011). While additional testing of the type already conducted would provide additional information, it would not alter assumptions of site potential or change the site's NRHP eligibility.

Japanese Gulch Site (45SN398)

Testing and data recovery excavations in the Japanese Gulch Site (45SN398) (Figure 47) yielded a wealth of information about the material culture of the early twentieth century Mukilteo Japanese community. The recovered artifacts indicate Japanese Gulch residents selectively adopted Western products out of convenience or necessity, but continued to buy available Japanese goods. Artifact data used in conjunction with historical records and ethnographic interviews provide insight into the everyday lives of Japanese Gulch residents, documenting a working-class community that turned its segregation and disadvantaged position into a source of social cohesion. Research questions focusing on the social and cultural aspects of information collected at the Japanese Gulch Site were successfully addressed, laying the groundwork for further inquiries into the lives of Japanese immigrants prior to World War II. As a result of the archaeological investigations, both 45SN398A and 45SN398B were shown to contain important historical information and both were recommended as contributing to National Register eligibility of site 45SN398. Japanese Gulch Site (45SN398) was subsequently determined eligible by the FTA for listing in the National Register of Historic Places under Criterion D for the valuable information it has contributed, and could potentially contribute, regarding a previously little-known segment of early Mukilteo society. The Washington Department of Archaeology and Historic Preservation has concurred with that determination (Sterner 2011; White et al. 2009). While additional testing of the type already conducted would provide additional information, it would not alter assumptions of site potential or change the site's NRHP eligibility.

Point Elliott Treaty Site (45SN108)

Commemoration of the Point Elliott Treaty has been undertaken several times because of the importance of this event to local, state, and national history. Linking the event to a physical location, however, has always been difficult, although most ceremonial events, including the placement of commemorative monuments, have taken place on public land at the Mukilteo State Park (now Mukilteo Lighthouse Park). The nature of the landform, its ethnographic stature as an important camping and gathering place, and the historic record all suggest that a broader geographic definition of site 45SN108 (Figure 48), which was created essentially as a surrogate for the actual location, is warranted. The arcing berm that existed prior to placement of extensive fill has been identified on maps, in photographs, and through geotechnical probes. This landform had to accommodate an estimated 2,300 people divided into numerous bands for the treaty meetings. Given that January tides are high, the tidal lagoon behind the berm was unlikely to be used for campsites. Canoes were pulled up onto the berm and camps made there on the lee slope – as they had been in centuries past on the evidence from 45SN393 – or along the more sheltered areas at the toe of the slope south of the tidal lagoon. The exact location where Stevens and Indian leaders made speeches and the treaty was signed remains uncertain. Yet the choice of Mukilteo as the gathering place was clearly a strategic one based on centrality for the many bands and tribes who had to travel there and accessibility to the government negotiators who traveled by steamer and had to anchor and repeatedly unload treaty goods and other supplies.

The Point Elliott treaty site is recommended significant, that is eligible, under National Register Criterion A for its association, both nationally and regionally, with the history of Indian-white relations and development of Federal Indian policy during the last half of the nineteenth century. The treaty, signed at Point Elliott on January 22, 1855, was one of a series that represented a major change in relations with the Indian nations in the northwestern United States. The treaty brought Indian groups into

Figure 49. Extent of Site 45SN108 in relation to historic high water levels contains sensitive cultural resources information that is exempt from public disclosure pursuant to provisions of the Public Records Act (RCW 42.56.300).

Figure 49. Extent of Site 45SN108 in relation to historic high water levels.

complex legal relationships with the United States government, which recognized tribal sovereignty and certain basic cultural needs, including fishing rights, but also increased federal control and limited the Indian land base to specific reservations. The treaty also cleared title to Puget Sound lands, easing Anglo-American settlement. At the same time it was one of the causes of the warfare between Indians and whites that swept the state in the 1850s.

The treaty site is also recommended significant under National Register Criterion B for its association with Governor Isaac Ingalls Stevens of Washington Territory, who was also head of the northern railroad survey and superintendent of Indian affairs for the territory. Stevens was one of the most aggressive treaty negotiators in the country, concluding ten treaties with representatives of the majority of tribes in the Pacific Northwest. The Treaty of Point Elliott was the second of the treaties concluded with tribes west of the Cascades and included land that was to become the most populous area of the entire Pacific Northwest. Equally important is the site's association with a number of major Indian leaders of the Puget Sound region including Seattle, Patkanim, Goliah, and Chowitshoot, who were recognized by the Stevens party as the main chiefs representing the tribes during the Point Elliott treaty-making process.

As noted under the Old Mukilteo Townsite (45SN404) discussion above, a few clay tobacco pipe fragments and a bead were recovered in 2009 during test excavations at the proposed site of a stormwater pond, just west of Park Avenue between Front and First streets (Ferland et al. 2010). These finds may be evidence of the treaty/trading post period in the area, suggesting the potential for 45SN108 to contain archaeological information that could qualify the site for National Register listing under Criterion D.

As discussed in the Tribal Coordination section of the report, portions of the 45SN108 site vicinity may also be eligible for the NRHP under Criterion A or other criteria as a traditional cultural property, significant in maintaining the living culture of one or more modern Native American groups. Consultation between WSF and FTA and interested Native American tribes regarding the possibility of TCPs in the project area is ongoing.

The broader 45SN108 property boundaries shown in Figure 48 encompass the original landforms of cuspate foreland, toe of slope, and alluvial fan at the mouth of Japanese Gulch Creek. The site retains integrity of location, association, and setting, although, much like an historic battlefield, its physical appearance has changed since 1855. The land is now covered with fill and buildings dot the north facing shore. Significant open space, however, is retained at the park south of the Mukilteo Lighthouse. In some ways the location of the property is more important than its appearance. The events at Mukilteo required centrality and accommodation, characteristics represented by the elements of location and setting. Site 45SN108 retains integrity of location between the territories of the Lummi and Duwamish people. It will always be near Skagit Head, the Snohomish River mouth, Possession Sound and other important historic geographic landmarks and within the traditional territory of the Tulalip Tribes. Mukilteo is still level land next to the sea where gatherings can be hosted, some beaches remain accessible to canoes, and integrity of setting and feeling is reflected in the expansive view of the sea (Figure 49). Site 45SN108 has been determined eligible for listing in the National Register of Historic Places under Criterion A, B, and D by FTA. The Washington Department of Archaeology and Historic Preservation has concurred with that determination (Sterner 2011).

Figure 50. Annual Canoe Journey stop at Mukilteo, July 2007.

Mukilteo Light Station (45SN123)

The Mukilteo Light Station (45SN123) (Figure 47) was listed in the National Register is Historic Places on October 21, 1977; the complex has also been placed on the Washington Heritage Register (Washington Department of Archaeology and Historic Preservation 2011). The Light Station is significant under NRHP Criterion C as a well-preserved and typical example of late nineteenth/early twentieth century Pacific Northwest lighthouse complexes produced by the federal Light House Board. The Mukilteo Light Station is also historically significant under Criterion A for its association with the maritime history of Puget Sound (Andrews 2008; Rinck and Heideman 2008).

Off-Shore Resources

A ship's anchor and chain were identified in 1981 near the Mukilteo floating dolphin (Green 1981). These remains may be evidence of the *S.S. Glide*, an 1883 steamship that reportedly sank in the Point Elliott vicinity; the presence of a shipwreck, however, has not been confirmed. As a single anchor, without confirmed association with a NRHP-eligible property, the anchor does not appear to meet the criteria for NRHP eligibility. The *S.S. Glide* burned before sinking and Kaehler et al. (2005:16) recommended any possible ship remains not eligible for listing in the National Register of Historic Places due to loss of integrity from foundering and burning prior to sinking.

Buildings and Structures Recommended Not Eligible for the NRHP

As noted in Chapter 3, nine cultural resources within the APE are recommended not eligible for NRHP listing: the Mukilteo Explosive Loading Terminal (MELT) Barracks (MM-04), MELT Pier (MM-02), MELT Firehouse (MM-01), MELT Superintendent's Office (MM-06), DFSP Tank Farm (MM-03), SR 525 Overpass, Diamond Knot Ale House, Ivar's at Mukilteo, and the existing Mukilteo Ferry Terminal (31-339). Alteration of these nine resources, including demolition, will have no effect on significant cultural resources. Avoidance of impact to these nine resources is unnecessary.

4.2 Assessment of Effects

An adverse effect is found when an undertaking may alter, directly or indirectly, any of the characteristics of a historic property that qualify the property for inclusion in the National Register in a manner that would diminish the integrity of the property's location, design, setting, materials, workmanship, feeling, or association. Examples of adverse effects include physical destruction or damage; certain restoration, rehabilitation, repair, or other alteration; relocation of a property from its historic location; change in the character of a property's use or of the physical features of the setting; introduction of visual, atmospheric, or audible elements that diminish the property's integrity; neglect that causes deterioration; and transfer, lease, or sale of property out of federal ownership or control without adequate preservation controls (36 CFR 800.5).

For archaeological sites, such as the Mukilteo Shoreline Site (45SN393), Old Mukilteo Townsite (45SN404), and Japanese Gulch Site (45SN398), adverse effects result from damage to artifacts and to integrity of association among artifacts and cultural and natural sediments. Disruption of these relationships severely limits the ability to interpret a property in a meaningful manner. Since the three archaeological sites identified in the APE lie beneath historical period fill, such disruption is most likely to occur through excavation deep enough to penetrate the protective fill layer.

Construction of the MMP, under any alternative, would not change the characteristics that qualify the Point Elliott Treaty Site (45SN108) or the Mukilteo Light Station (45SN123) for the National Register. The Treaty Site's location, association, and setting would remain unchanged, while the Light Station's location, association, setting, design, materials, and workmanship would remain unaltered.

There is limited potential for project activities to encounter additional buried archaeological material, separate from what has already been recorded. In general, much of modern Point Elliott consists of filled lagoon or wetland, a landform that would not have been conducive to pre-contact Native American residential activities. The discovery of lagoon or wetland deposits is a good indicator that concentrated pre-contact cultural material, like a shell midden, will not occur. Delta deposits at the mouth of Japanese Gulch have been judged to have relatively high potential to host Native American cultural material (Kaehler et al. 2006); however, borehole data shows the Mukilteo Shoreline Site midden to thin and to deepen at the east end where delta deposits should occur. The limited excavations at the Japanese Gulch site, located on delta deposits, did not identify any pre-contact cultural material or deposits.

The consideration of alternatives through the various drafts of this EIS have resulted in the selection of the Preferred Alternative (Elliot Point 2). FTA has requested concurrence from the Washington SHPO for adverse effects from the Preferred Alternative (Elliot Point 2) (Appendix I). Direct adverse effects are expected to the Old Mukilteo Townsite (45SN404) from the construction of retaining walls on the First Street extension, installation of stormwater ponds and other facilities, and installation of utilities and foundation footings for retaining walls. WSF intends to avoid adverse effects to the Mukilteo Shoreline Site (45SN393) by avoiding ground disturbance within the known horizontal and vertical limits of the site and by placing engineered fill to further separate construction elements from the site deposits. No adverse effects have been identified to the Point Elliott Treaty Site. Placement of the engineered fill would also help avoid any damage to archaeological resources related to the Treaty signing.

Adverse effects within each alternative are reviewed in the following sections. The Preferred Alternative (Elliot Point 2) has more detail available about design to avoid damage to the archaeological properties, construction, and remaining potential adverse effects.

Preferred Alternative (Elliot Point 2)

The Preferred Alternative moves the terminal and its facilities to the Mukilteo Tank Farm parcel, [redacted] (Figure 50). The designs for the Preferred Alternative (Elliot Point 2) have reached an approximate 15 to 20 percent completion and do not yet include details for building and structure designs, or for exact placement of final grading, final utility locations, or final storm water systems. Areas where excavation may occur are known and the designs show how fill would be used to avoid intersecting archaeological boundaries. The following construction elements will be undertaken in the manner described.

Construction Elements

First Street. First Street will be realigned and extended to SR 525 to the west and to Mt. Baker Avenue to the east. The asphalt roadway will have concrete curbs, gutters and sidewalks. First Street will be the primary way utilities will enter the MMP from SR 525, connecting to other existing utilities crossing under the BNSF right of way at Park Avenue and Mt. Baker Avenue. [redacted] This area will be built over new fill on First Street closest to SR 525 tapering down to near existing grade at Park Avenue. The fill will be contained between mechanically stabilized earth (MSE) walls. The length of First Street between Park Avenue and the east side of the Sounder Commuter Rail Station will be near existing grade to match the grade of the existing train terminal. [redacted] Fill will raise this area from near existing grade at the Sounder Commuter Rail Station to about 4 feet above existing grade at the end of the holding area. The length of First Street between the end of the holding area and Mt. Baker Avenue tapers from about 4 feet of fill to near existing grade.

Buildings. Four *toll booths* are spaced across the entry to the terminal and the start of the holding lanes. The structures will be on shallow spread footings located in fill or just below existing grade. The *Supervisor's Building* will be located above the 4 toll booths. This facility will be supported by the toll booths and a stairwell/elevator building on the south side of the toll booths. The elevator will require a pit about 5 feet deep. The *Passenger Building* will be located at the east end of the holding

Figure 51. The Preferred Alternative contains sensitive cultural resources information that is exempt from public disclosure pursuant to provisions of the Public Records Act (RCW 42.56.300).

Figure 51. The Preferred Alternative (Elliot Point 2) in relation to nearby cultural resources.

lanes near the transit center. The vehicle trestle will be offshore from the building and vehicles will need to drive under the passenger building to load/unload from the ferry. [redacted] The building will be pile supported and stone columns will be used to strengthen the ground against liquefaction in the event of an earthquake.

Ferry Landing and Near-shore Structures. The *Trestle* will be north and offshore of the passenger building. It will be constructed of concrete piles and have a concrete deck. The transfer span is supported on the end of the Trestle. Stone columns will be used to strengthen the ground against liquefaction in the event of an earthquake. A short steel or concrete cut off wall, like a bulkhead, will be at the upland edge of the Trestle. A small portable building with the mechanical/electrical equipment to run the Transfer Span will be on the end of the structure. The *Transfer Span* is a moveable bridge supported at a fixed elevation at the end of the trestle operated by hydraulic actuators at the offshore end. The actuators raise and lower the transfer span. At the furthest offshore end is the apron structure which also raises and lowers and is the portion of the bridge structure which will meet the ferry when it is in the slip. This structure will be prefabricated off site of steel and set in place. The *Actuator Support Structures* are two auger drilled shaft structures about 6 feet in diameter which support the hydraulic actuators which support the offshore end of the transfer span. Stone columns will be used to strengthen the ground against liquefaction in the event of an earthquake. *Wingwalls* are the two shoreward most berthing structures that the ferry will land against and moor against when in the ferry slip. They are located at the offshore end of the transfer span and the apron will pass between the two structures. *Fixed Dolphins* are two steel pipe pile berthing structures just offshore of the wingwalls. *Floating Dolphins* will be existing floating dolphins relocated from the existing terminal. The dolphins will be supported by chains and secured with concrete anchors. *Pedestrian Overhead Loading* is a walkway between the second story of the pedestrian building and the ferry vessel. It extends offshore just beyond the wingwall structures. The first section closest to the building is a fixed structure supported on an offshore column which is a drilled shaft similar to the actuator support structure, only it will be larger in diameter at about 8 feet. The second section is a moveable section whose offshore end will move up and down on a hydraulic actuator. The third section is the apron which is also a moveable structure. Stone columns will be used to strengthen the ground against liquefaction in the event of an earthquake.

Lanes and Parking. The *Holding Area* is located between the toll booths and the transit center west to east and the exit lanes and First Street north to south. The holding area will be constructed of asphalt pavement with fill thicknesses increasing from just above existing grade near the toll booths to about 7 or 8 feet of fill at the highest point. A retaining wall along a portion of First Street will be required because of the elevation of the Sound Transit Platform. The holding area is a secure area and will require surrounding fencing and traffic barriers. The *Entry Apron* is the area between Front Street, the exit lanes, and the toll booths. It will be constructed with asphalt paving. At First Street it will be near existing grade and will taper upward on fill by the toll booth structures. The *Promenade* is a concrete sidewalk running along the seaward edge of the project site connecting the east and west ends of the pedestrian building. A widened promenade will pass along the transit center and be the location of bus loading. [redacted] The promenade will be near existing grade except where it needs to ramp up to meet the passenger building and where it extends from the shoreline toward First Street. Here the promenade will be at the grade of the exit lanes. A retaining wall will be constructed where the exit lanes are higher in elevation than the promenade. *Exit lanes* will be asphalt pavement and are between the holding lanes and the promenade. [redacted]

[redacted] The *Transit Center and Employee Parking* is east of the holding lanes and the pedestrian building. Two landscape areas in this vicinity may also be used for stormwater infiltration and/or treatment. Permeable concrete is proposed to allow for infiltration as well. *Public Parking* will be an extension of the Sound Transit parking along First Street. It will be bounded by BNSF to the south, SR 525 to the west, and the MSE wall supporting First Street to the north. [redacted]. MSE, rockeries, or cantilevered concrete retaining walls will be required at the north and west sides, and part of the south side of the parking area.

Relocated Fishing Pier. Demolition of the existing terminal will remove the support structure for the existing creosote timber fishing pier owned/maintained by the Port of Everett. The pier will be relocated north of the Transit Center. This pier will be constructed of concrete piles and will have a concrete deck. Three small float structures (material not determined) will also be installed.

Government Pier. The 1000 feet long by 100 feet wide creosote treated timber structure will be removed. There is a mound of sediment under this pier. A portion of this sediment will be dredged.

Utilities. All utilities passing through existing grade will be along the First Street corridor. [redacted] Some shallow utilities (likely electrical) may be placed in the public parking area between SR 525, BNSF, and the existing Sound Transit parking. Required utility depths are below finished (fill) grade. Filterra unit outlets are at a depth of 3.5 feet below top of curb and require a total excavation of approximately 4.5 feet to 5 feet from finished grade. Storm pipe must be installed with a minimum of 2.5 feet of cover and requires a minimum excavation depth of 3.5 feet for a 12-inch diameter pipe. Storm structures must have 2 feet deep sumps in addition to the 3 feet minimum depth required for a 12-inch diameter pipe and an additional 8-inch concrete bottom depth with 6 inches of bedding. The maximum depth of excavation for a storm structure would be approximately 7 feet from finished grade.

Luminaries, Signals, Other Traffic Control and Associated Features. Lighting, poles, and other traffic features will extend into fill and occasionally below existing grade.

Stormwater Features. A retention pond is planned adjacent to the intersection of First Street and Park Avenue and will be a source of infiltration [redacted]. [redacted] infiltration would be to groundwater which extends beyond the borders of the pond [redacted] The transit center and employee parking area may use infiltration and permeable pavement. The employee parking area also has landscape areas which may be used as swales or other treatment/infiltration features. The pond area and the transit center/employee parking area are the only proposed infiltration areas for stormwater.

Potential Effects on Recorded Properties

Excavation. Within the known limits of Old Mukilteo Townsite (45SN404) an area of approximately 4,088 sq. m (44,000 sq ft) of area with a maximum 6-foot fill and minimum 1-foot depth of excavation for the roadway will occur. Maximum depth of excavation will be approximately 7 feet below finished grade for the installation of utilities. The MSE walls along the First Street Extension (future SR 525) [redacted] will require 2 to 3 feet of excavation, and approximate maximum width of 11

feet at each footing. [redacted] Adverse effects to the Old Mukilteo Townsite (45SN404) will occur from this excavation.

Within the known limits of the Mukilteo Shoreline Site (45SN393) an area of approximately 9,848 sq m (106,000 sq ft) will have a maximum fill depth of 7 feet and a minimum 1-foot excavation depth. Maximum excavation depth will be 5 feet to 7 feet from finished grade as required to install utilities. Adverse effects to the Mukilteo Shoreline Site (45SN393) are unlikely.

Treatment of Existing Tank Farm Elements. [redacted] the concrete paving will remain in place and the containment walls will be removed at grade to the top of their footing, existing footings will stay in place, and new construction/fill will be placed on top (Figures 51 and 52). The fill will be compacted using vibratory rollers. [redacted] the concrete paving, walls, and footings will be removed. At First Street, the concrete paving, walls and footings will be removed. In areas where infiltration of stormwater is planned, whether it be pond, swale or permeable pavement, the existing impermeable surface must be removed or otherwise broken up so that movement of infiltrating storm water through the soil matrix is not inhibited. Adverse effects are unlikely for either the Mukilteo Shoreline Site (45SN393) or the Old Mukilteo Townsite (45SN404) from treatment of existing tank farm elements.

Water Infiltration. Water infiltration will occur for stormwater management at the pond, landscape features, and through permeable surfaces. Effects of additional freshwater on archaeological deposits is estimated to be minimal given that all are currently affected by extreme tides and storm surges. No adverse effect is expected from water infiltration.

Bearing Effects. Calculations for compression from placement of new fill have taken into account past fill placement beginning with construction of the World War II ammunition loading facility as well as the characteristics of the native, anthropogenic, and historic fill sediments (Allen and Chadbourne 2012). In areas where there has been no historic loading of the soils and the maximum amount of future fill (7 feet) is placed, the maximum amount of new compression of the Mukilteo Shoreline Site (45SN393) would be 0.1 inch per foot of midden thickness. Since the Mukilteo Shoreline Site (45SN393) is currently capped with historic fill and thickness of site deposits ranges from less than 1 foot to nearly 4 feet, new compression with maximum new fill is expected to be less than 0.4 inch. Where historic fill is thick and previous facilities were substantial, [redacted] new compression would be even less. The Old Mukilteo Townsite (45SN404) is also capped with fill of variable depth and is of variable thickness. These site deposits also would be minimally affected by compression and the durability of historic artifacts like glass and ceramic, leather, and metal suggests that virtually no information would be lost. In sum, the likelihood of additional weight causing damage to fragile artifacts or faunal remains at either site is extremely low, and minimal, if any, adverse effects are expected.

Existing Terminal Decommission Process. The existing offshore terminal elements will be removed after the new terminal is in operation. This will include the POE owned and maintained fishing pier. The existing bulkheads will remain. Pile removal will be by vibratory hammer. Broken piles will either be

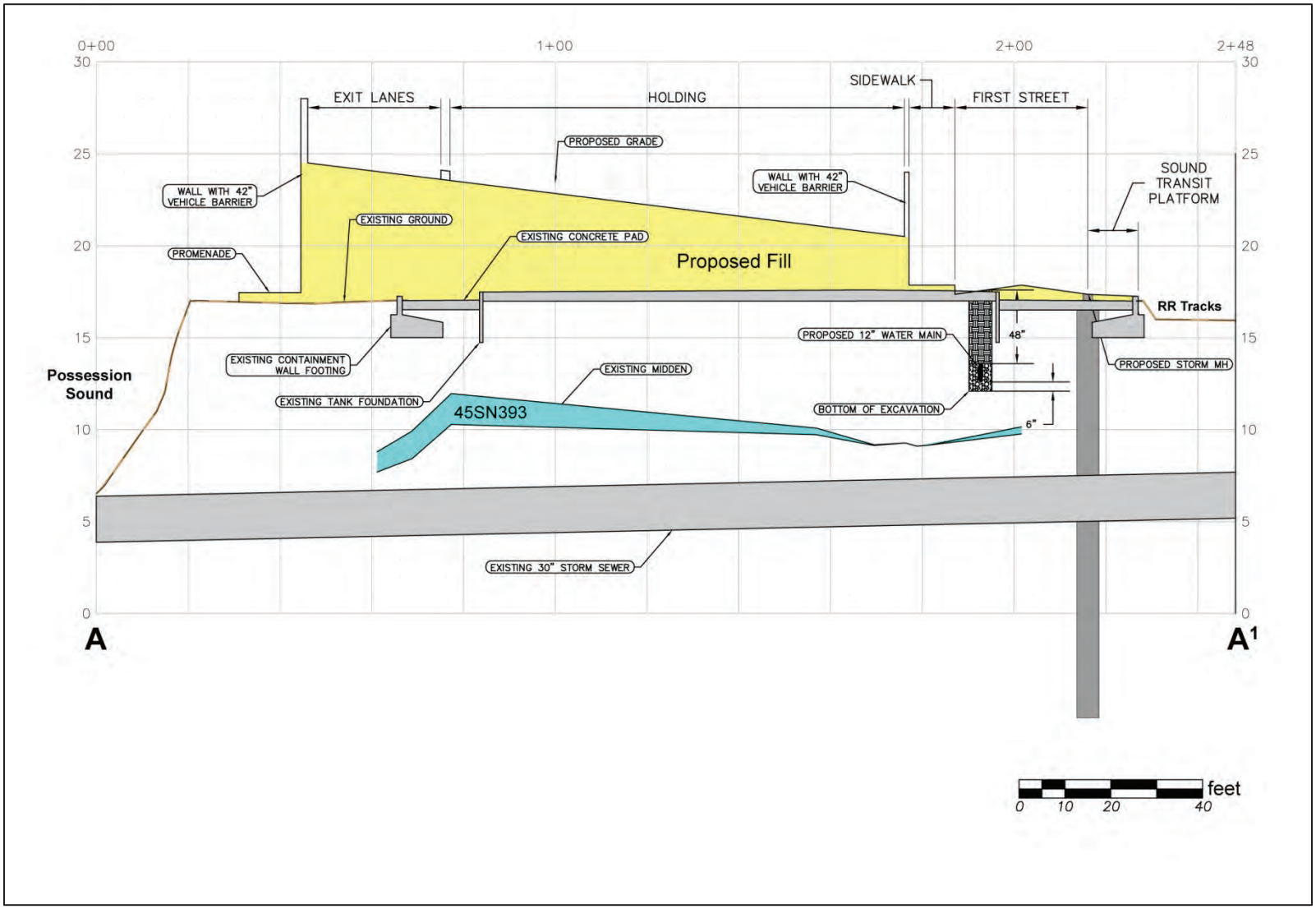


Figure 52. Cross-section 1 showing proposed fill under the holding area in relation to site 45SN393.

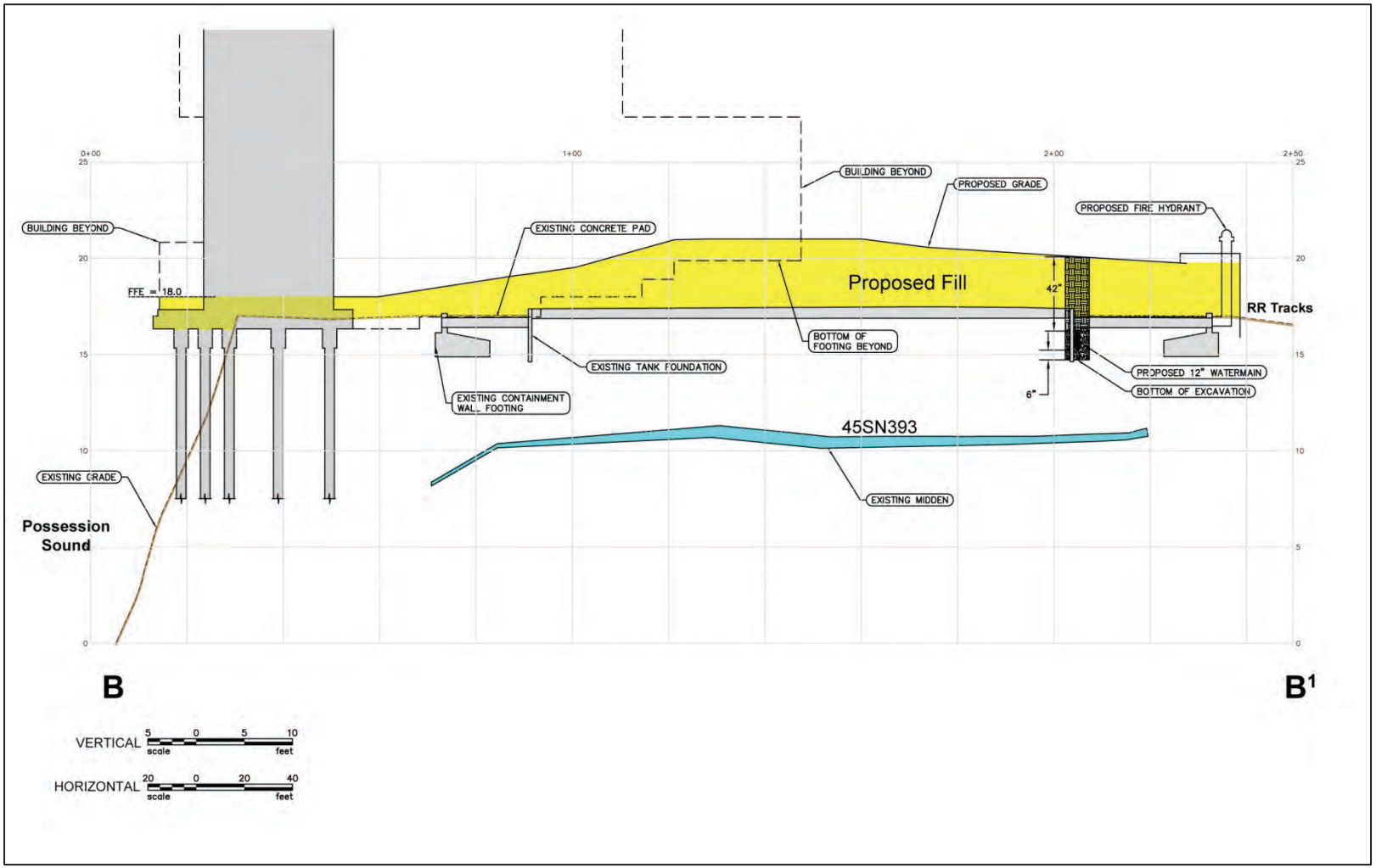


Figure 53. Cross-section 2 showing proposed fill near the ferry terminal in relation to site 45SN393.

removed by clam shell or abandoned in place, depending on the environmental permitting requirement. The existing restroom/passenger building is currently proposed for demolition. The existing terminal supervisors building will be removed. The southernmost part of the terminal will be modified in grade height for the new extension of First Street and the public parking along the BNSF right of way including the construction of new walls. Existing utilities to the trestle will be capped at the bulkhead. No adverse effects are expected from terminal decommissioning.

Effects from Environmental Mitigation Measures. Potential mitigation measures will be removal of the existing tank farm pier and existing terminal, reducing the current net overwater coverage. This will also remove a large amount of creosote treated timber piling, caps, stringers, and decking from the environment. The placement of permeable paving in locations where this will be allowed, and possible "park-like" areas, will decrease the current impermeable surface area. Together these actions are likely to decrease the total site impermeable surfaces. This will increase the amount of water infiltrating into the groundwater and decrease the amount of water being conveyed into storm drains. No adverse effects are expected from environmental mitigation measures.

No Build

[redacted] Extent of existing disturbance from the construction of the original foundation and installation of nearby utilities is unknown. The replacement building will be constructed within the footprint of the removed building. [redacted] Roadway and holding lanes over sites are not expected to adversely affect subsurface material. Replacement of the existing in-water terminal facilities has low potential to encounter significant cultural material.

Existing Site Improvements

[redacted]. Extent of existing disturbance from the construction of the original foundations and installation of nearby utilities is unknown. The replacement building will be constructed within the footprint of the two buildings removed. [redacted] The Old Mukilteo Townsite (45SN404) may be affected by the installation of the MSE wall and of additional storm water system elements, depending in both cases on depth of excavation. Roadway and holding lanes over sites are not expected to adversely affect subsurface material. Removal of the existing in-water terminal facilities has low potential to encounter significant cultural material.

Figure 55. The Existing Site Improvements alternative in relation to nearby cultural resources contains sensitive cultural resources information that is exempt from public disclosure pursuant to provisions of the Public Records Act (RCW 42.56.300).

Figure 55. The Existing Site Improvements alternative in relation to nearby cultural resources.

Elliot Point 1

The Elliot Point 1 Alternative moves the terminal [redacted] with several of the associated facilities built over water (Figure 55). Installation of a storm sewer system around the Sound Transit rail platform will for the most part [redacted] Three of four underground structures to capture and treat runoff are planned along the north side of First Street where the graded crown of the road raises the surface elevation enabling installation above the elevation [redacted] Removal of the MELT pier would not disturb significant historic or pre-contact cultural material.

[redacted]

This page contains sensitive cultural resources information that is exempt from public disclosure pursuant to provisions of the Public Records Act (RCW 42.56.300).

Figure 56. The Elliot Point 1 alternative in relation to nearby cultural resources.

4.3 Recommended Avoidance and Mitigation Measures

Intersection of construction with buried archaeological sites can be avoided by raising the existing ground surface and hence the depth of excavation relative to known site location. Monitoring of excavations by a qualified archaeologist would ensure proper treatment of any cultural material outside of known boundaries or in a disturbed context. Work would proceed under the guidance of a Monitoring and Discovery plan that includes protocols for action in case of the discovery of cultural material when the monitor is present and inadvertent discovery in the absence of the monitor. Discovery of intact archaeological deposits would cause a halt in the construction and negotiation on appropriate treatment before work could proceed. Disturbed archaeological site spoils, wherever encountered, would be screened to recover cultural materials and to ensure that any human remains that might be present are properly treated.

If construction of an element would adversely affect a NRHP-eligible property and the element cannot be redesigned to avoid the adverse effect, mitigation measures must be developed, in consultation with the Washington Department of Archaeology and Historic Preservation and appropriate consulting parties, prior to project implementation. Because archaeological sites are important in large part for the information they contain, salvaging such information may be a way to minimize adverse effects. Therefore data recovery often constitutes mitigation for anticipated adverse impacts to significant archaeological sites. Appropriate mitigation for adverse effects to NRHP-eligible traditional cultural properties, significant to Native American groups, would be determined in consultation with DAHP and affected tribes.

4.4 Conclusion

This discipline report has reviewed the history of the Mukilteo vicinity, the work conducted to date to identify significant historic properties, and the nature of cultural resources recorded. Construction as currently understood has the potential to intersect significant historic site remains under all four of the alternatives, including the No-Build alternative. If project activities penetrate through existing or newly deposited fill, archaeological sites beneath the fill may be damaged. If, however, construction is limited to the fill, the project will not adversely affect archaeological resources. FTA, WSDOT, DAHP and the ACHP, in coordination with affected tribes and other interested parties, will develop a Memorandum of Agreement that seeks to resolve adverse effects to historic properties by detailing adverse effect resolution, stipulating measures to avoid adverse effects, and preparing a treatment plan to guide actions during future design and construction activities.

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APPENDIX A: The Point Elliott Treaty and Research Information

Guide to Research Sources

This annotated guide offers an overview of the types of archival resources consulted during the historic research portion of this study. The primary goal was to document more fully the history of the Point Elliott Treaty Council, its location and impact, although an effort was also made to explore in more depth the early history of the Mukilteo town site. To address these topics, historians researched known sources in more depth, but placed additional emphasis on developing new avenues of investigation and seeking out additional repositories or individual informants both inside and outside the region. The listings below are not exhaustive, but do provide an idea of the types of materials located. Generally, secondary sources cited in the report are not repeated in this appendix.

A major component of the historic research was to include the Indian perspective on the treaty council and its aftermath, with a focus on first-person reminiscences and oral tradition. Historians reviewed court cases, and particularly land claim litigation, as well as other legal proceedings and government hearings to find the testimony of Point Elliott attendees. They also examined the papers of anthropologists studying Native peoples of the regions and attempted to locate field notes or taped interviews, often made to document linguistic or spiritual practices, but which might also include historical data. Philip Narte, the tribal liaison for the Washington State Ferries, proved invaluable in helping project personnel to locate contemporary tribal sources. He contacted the Point Elliott Treaty tribes about access to tribal archives and oral history collections and helped to schedule interviews with elders who could discuss traditions about the treaty council. Several interviews were recorded, while notes were made with other narrators, and NWAA particularly appreciates the time and assistance of Hank Gobin, Leonard Forsman, Lora Pennington, Pat Brown and Opal McConnell. The work of Vi Hilbert in transcribing and translating many early field recordings and interviews was also extremely helpful.

In addition, historians tried to locate personal papers, correspondence or other writings of members of the Stevens party and other early Puget Sound area residents who might have knowledge of the Point Elliott Treaty events. In additional to regional repositories, some collections were also located in archives in the Midwest and on the East Coast as well as government repositories. Project personnel could not visit these sites, but were able to request copies of some pertinent documents.

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Papers, University of Washington, Special Collections, Seattle, Washington. Part II, Accession No. 36-1.

Clarence Bagley held positions in newspapers, city government and other professions, but remains best-known for his interest in the history of the Northwest. His papers contain correspondence, notes and other materials gathered to write his histories of Seattle and King County as well as other works. He was also said to have an interest in documenting the Point Elliott Treaty site.

Correspondence: Box 5, 10, 18, 21, 22 1903-1932

Manuscript, "Chief Seattle was of the Nisqually Nation." Misc. Selections, Vol. 4, 1873-1932.

Balch, Lafayette

Balch Papers. Collection 90, Boxes 10/5, 10/10, 10/11, 10/14. Mystic Seaport: The Museum of America and the Sea, Mystic, Connecticut.

Letters written by Lafayette Balch to his family, 1856-1862. Balch came from a seafaring family based on the East Coast. He was a founder of Steilacoom and owned a store as well as several different sailing vessels. He was present at the Point Elliott Treaty. Letters include discussion of affairs in Steilacoom and Washington Territory but no treaty mentions.

Bancroft, Hubert Howe

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For his history of *Washington, Idaho and Montana*, historian Hubert Howe Bancroft interviewed or corresponded with pioneers in the 1870s. A selected groups of these documents were microfilmed at the bancroft library and given to the University of Washington Library.

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Hanford, Abby, Indian Attack on Seattle
Plummer, A.A., Washington Territorial Sketches
Rabbeson, A.B., Growth of Towns
Sayward, W.T., Pioneer Reminiscences
Strong, William, 1878, Judge William Strong's Narrative and Comments
Swan, James, 1878. The Colonizations Around Puget Sound
Thomas, Mercer, 1878. Washington Territory Sketches

Bertelson, Ernie

Papers, 1940-1951. University of Washington, Special Collections, Seattle, Washington. Accession No. 946-001.

Journalist who wrote articles and stories on Indian lore and history, natural history, Washington scenes, and history of Suquamish Indians. Kept field notebooks and also corresponded with anthropologist Marion Smith

All boxes reviewed.

Bruseth, Nels

Papers, 1918-1949. University of Washington, Special Collections, Seattle, Washington.

Naturalist and historian of Snohomish County, Washington. Collections include some Indian materials as well as plant collections.

All boxes reviewed.

Buchanan, Charles Milton

Papers, 1897-1914. University of Washington, Special Collections, microfilm, Seattle, Washington.

A physician on the Tulalip Reservation beginning in 1894, Buchanan eventually became superintendent of the school and the reservation, and later agent for nearby reservations. Microfilm includes writings on the Tulalip School, Indian legends and historical information

Superintendent's Diary, July 1, 1909 to November 30, 1912. Bureau of Indian Affairs, Tulalip, National Archives and Records Administration, Seattle, Washington.

Box 310: Diary of Buchanan as superintendent includes daily record of agency business; also includes description of Treaty Day celebrations.

Ebey, Winfield Scott

Papers, 1831-1865. University of Washington, Special Collections, Seattle, Washington

Winfield Scott Ebey was an early Whidbey Island pioneer. Collection contains letters from Morris Frost and Jacob Fowler soon after they settled the Mukilteo townsite.

Fowler, Enoch

Enoch S Fowler Papers, 1813-1876. Northwest Microfilm, Washington State Library, Olympia. Originals at the Jefferson County Historical Society, Port Townsend, WA.

Fowler was a Port Townsend merchant and sea captain who owned one of the vessels used by the Stevens party during the treaty council proceedings. Fowler attended the Point Elliott. Papers include some account books and other historical materials.

Gibbs, George

Manuscript Journal, 1854-1855. Microfilm Z75. National Archives and Records Administration, Pacific Northwest Regional Branch, Seattle, Washington.

Gibbs was a Harvard-trained lawyer who traveled West with the Stevens railroad survey party. He became interested in Native peoples and compiled ethnographic information. He participated in treaty negotiations in both Oregon and Washington, drafted the preliminary treaty terms for the Puget Sound councils and as the primary secretary, recorded the proceedings and scouted for reservation locations. This microfilm includes a fuller account of his daily activities at the Point Elliott council than in the treaty proceedings.

Gibbs Family Papers, Minnesota Historical Society, Minneapolis, Minnesota. Contacted but unable to view collection

Goldsborough, Hugh

Papers, University of Washington, Special Collections, Seattle, Washington. Accession No. 465-001.

Goldsborough, an early resident of the Shelton area, served as the commissary for Stevens during the Puget Sound treaty negotiations and signed the Point Elliott Treaty. Goldsborough's brother, Louis, was a noted naval office.

Letter Goldsborough to Tilton, October 27, 1857.

Goldsborough, Louis Malesherbes Collection, New York Public Library, New York, NY

Contacted and received inventory; unable to view

Goldsborough, Louis Malesherbes, Duke University, Rare Books, Manuscripts, and Special Collections Library, Durham, NC.

Family correspondence with Hugh Goldsborough-no treaty mention.

Gunther, Erna

Papers, University of Washington, Special Collections, Seattle, Washington. Accession No. 614-4-85-8

Gunther was a professor of anthropology at the University of Washington and director of what later became the Burke Museum. She both studied Northwest groups, but also advocated for political rights and cultural recognition. This collection includes correspondence, speeches and writings, oral literature and a section of Arthur ballard materials.

Hilbert, Vi

Papers, 1916-2002. University of Washington, Special Collections, Seattle, Washington. Accession No. 5401-001.

Vi Hilbert has worked to preserve the Lushootseed language through her teaching and story-telling, classes at the University of Washington and through the Lushootseed Research, which she founded. Hilbert has spent years transcribing and translating early interviews with Puget Sound elders by Leon Metcalf and other anthropologists as well as recording her own interviews. She has also published grammars, dictionaries and books of stories, teachings, and place names.

Box 5: Articles written by and about Hilbert. Correspondnece and drafts for *A Time of Gathering* article.

Box 8: Salish Conference, Port Angeles. Comparison of Upper Chinook and Lower Chinook t ranscription made by missionaries Reverend Francis Blanchet, and Reverend Modeste Demers in 1840, 1862 and 1871.

Box 9: Notebooks and translations of interviews, including Ruth Shelton, Dora Solomon.

Box 11: MS Translation of video-taped talk to Lushootseed class, University of Washington, May 16, 1977.

Box 13: Articles on Chief Sealth; transcriptions of Amelia Sneatlum materials on Sealth.

Hill, George D.

Papers, 1865-1901. University of Washington, Special Collections, Seattle, Washington. Acc. 4267-001

Hill was sent to Washington Territory to investigate Indian affairs and served as superintendent of the Tulalip Reservation from 1869-1871 and the Neah Bay Agency from 1877-1878.

Box 1-Includes abstracts of disbursements under the Point Elliott Treaty and Indian statements acknowledging receipt of annuities.

Jacobs, Melville

Papers, 1918-1974. University of Washington, Special Collections, Seattle, Washington. Accession No. 1693-001, 1693-002, 1693-003, 1693-005.

As a professor of anthropology at the University of Washington, Melville Jacobs was the teacher and mentor of many later Northwest anthropologists. His collection includes his own work as well as papers, correspondence and other materials relating to Northwest tribes written by many of his students and colleagues, including Sally Snyder, Pamela Amoss, Thom Hess, Warren Snyder and others.

Boxes consulted: 23, 107, 112, 120

Kellogg, David

Manuscript Files. 1852-1916, Museum of History and Industry, Library and Archives, Seattle, Washington.

An early Seattle pioneer, Kellogg made observations on life on Puget Sound and Indian relations, including the Treaty War period, in a series of letters written to Vivian Carkeek and other correspondents as well as additional personal reminiscences

"The Making of a Medicine Man." Kellogg to Vivian Carkeek, May 20, 1912.
Kellogg to Mrs. Carkeek, Founder's Day 1916.
Kellogg Reminiscences "About the Middle of the Last Century..."
Kellogg "Over the red trail..."
Kellogg to Mrs. Carkeek, regarding Administration building at University of Washington, n.d..
"A Chapter in the History of Seattle. The Anti-Chinese Riots", told by Kellogg.
"The Honorable Court of King County is now in session..."In Kellogg Box 5, Folder 112.

Mason, Charles H.

Correspondence, MS 10. Washington State Library, Olympia, Washington.

Mason was Territorial Secretary and became Acting Governor when Governor Stevens was away from Olympia negotiating treaties. Mason attended a few of the treaty gatherings on Puget Sound, including the Point Elliott Treaty council. Includes selected correspondence.

Meany, Edmond S.

Papers, University of Washington, Special Collections, Seattle, Washington. Accession No. 106-70-12, 106-2-75-10.

Box 2: General Correspondence. A-M.
Box 3: General Correspondence. M-Z.
Box 6: Treaty of Point Elliott, 1855. This folder included a copy of the text of the Point Elliott Treaty.
War Message of Governor Stevens, 1856
Box13: Letters authored by Meany, November 30, 1918 to May 4, 1920. Correspondence between Meany and James Buchanan, the superintendent of the Tulalip Agency, and Skookum George related to the visit of sculpture artist, James Wehn, to the Tulalip Reservation and the creation of a sculpture at Chief Patkanim's grave.
Box18: Tribute To A.S. Denny, 1899; Notes of conversations with Denny about local history
Box 22: General Correspondence January 1-14, 1930. Includes letters related to the Daughters of the American Revolution Point Elliott Treaty monument.
Box 24: General Correspondence 1931. Among the correspondence is Meany's response to Mrs. Harry John Miller on the possible location of the Point Elliott Treaty ceremony site.
Box 84-87, 93: Letters, field notes, speeches and writing primarily on Indian topics

McDonald, Lucile Saunders

Papers, 1941-1990. University Of Washington, Special Collections, Seattle, Washington. Accession No. 2234-3.

Lucile McDonald worked as a journalist including many years at the *Seattle Times* and also wrote numerous books on regional historical topics. Collections include notes and clippings files on Indians

Miller Family

Papers, 1851-1974. University of Washington, Special Collections, Seattle, WA. Accessions 3912-001

Prominent pioneer family in Olympia and Seattle. William Winlock Miller was a supporter of Stevens and active in territorial government and finance. Includes correspondence with other Stevens supporters and area pioneers. Little specific to Point Elliott Treaty.

Boxes 1-4. 6, 16, 19, 39, 57-58, 65-66.

Miller, William Winlock

Papers, University of Washington, Special Collections, Seattle, Washington. Acc. 4795-1

Smaller collection of correspondence of Miller with many early Puget Sound pioneers, including a number who were involved with the treaty or early Indian affairs.

Collection, Yale University, Beinecke Library, new haven Connecticut, WA Mss S-1172.

Collections includes an Isaac Ingalls Stevens series and correspondence of Miller with many Puget Sound leaders, 1845-1883.

Had correspondence but unable to view collection.

Prosch, Thomas Wickham

Papers, 1850-1915. University of Washington, Special Collections, Seattle, Washington.

Prosch was a pioneer Washington newspaperman with an additional interest in history. Prosch wrote a useful chronological history of Seattle as well as a number of publications on early pioneers including the Maynards and the Blaines. The collection includes correspondence, speeches and writings.

Shaw, Benjamin F.

Papers, Oregon Historical Society Research Library Collections, Portland, Oregon. Collection No. MSS 412.

Frank Shaw knew Chinook jargon and was the translator for Isaac Stevens at the Puget Sound treaty negotiation, including the Point Elliott council. Papers include an address Shaw gave about his early experiences.

Stevens, Hazard

Papers, University of Washington, Special Collections, Seattle, Washington.

Incoming Correspondence and Outgoing Correspondence. Stevens was the son of Isaac Ingalls Stevens and as a boy attended the Medicine Creek Treaty Council. Stevens later wrote a biography of his father, and this collection includes correspondence Stevens with former military colleagues and others who knew Isaac Stevens.

Stevens, Isaac Ingalls

Papers, 1831 to 1862. University of Washington, microfilm, Seattle, Washington.

This collection of papers primarily includes letters. Most of the reels are organized chronologically with an index by year and all were examined. There were a number of letters concerning Indian affairs, includingthe Walla Walla Treaty, but little discussion of the Point Elliott Treaty.

Papers. Washington State Archives, Olympia, WA

Territorial Governor Papers, General Correspondence, General Files and Indian War Correspondence

Papers. 1835-1862. MS 90 Washington State Library, Olympia, WA

Selected correspondence.

Swan, James Gilchrist

Papers, 1833-1909. University Of Washington, Special Collections, Seattle, Washington. Accession No. 1703-001, 1703-003.

An early pioneer and observer of Northwest Indian language and culture, Swan spent several years on the Makah reservation as a school teacher. He attended at least one treaty council and later was secretary to Isaac Stevens when he was Congressional delegate.

Tolmie, William Fraser
Papers, 1833-1865. University Of Washington, Special Collections, Seattle, Washington. Acc. 4577-001
Dr. Tolmie served the Hudson's Bay Company at Fort Nisqually and as superintendent of the Puget Sound Agricultural Company's nearby farms before the land was returned to the United States in 1870.
Box 1-2 Correspondence and accounts with local residents, including some treaty signers.

Yesler, Henry L. and Sarah
Papers, 1836-1890. Washington State Historical Society, Tacoma, Washington. Accession No. 1985.35.
Correspondence and other materials on Yesler, a Seattle pioneer and sawmill owner, who employed many Native peoples in the mill during the 1850s

Memoirs and Individual Reminiscences

Denny, Louisa Boren,
Interview with Mrs. D. T. Denny (Louisa Boren), n.d. Museum of History and Industry, Seattle, Washington.

Hanford, C.H.
Judge C. H. Hanford speech at the Battle of Seattle commemoration and unveiling historical tablet at foot of Cherry St., Seattle, Washington, November 13, 1905. Box 14, Folder 298. Museum of History and Industry, Seattle, Washington.

Kelly, Jane Fenton
The Trial of a Pioneer Family, published in the Duwamish Valley News, 1934. Museum of History and Industry, Seattle, Washington

Riddell, E. E.
History of Suquamish. Compiled by North End Improvement Council, 1962. University of Washingon, Special Collections, Pamphlet Files, Indians of North America, Oregon and Washington,:Suquamish.

Russell, Alonzo
Story of Alonzo Russell,, copied from a copy loaned by Ed. L. Terry, May 6, 1921. Museum of History and Industry, Seattle, Washington.

Walter, Graham
Interview with Mr. Graham Walter regarding 1850's Seattle. February 1914. Box 17, Folder 348, Museum of History and Industry, Seattle, Washington.

Ward, D.B.
From Salem, Oregon, to Seattle, Washington, in 1859. Box 6, Folder 138, Museum of History and Industry, Seattle, Washington.

Selected Newspaper Articles

Bremerton Sun. Suquamish Totem Carver Hillaire Readies His Masterpiece for Easter. November 14, 1962.

Eastside Journal. Juanita Beaches Lend Ideal Surroundings for Big Redskin Pow-wow. April 6, 1933.

Eastside Journal. Championship Canoe Race May Feature Big Indian Pow-wow. April 20, 1933.

Eastside Journal. Gov. Martin Asked to Assume the Role of Territorial Governor. April 27, 1933.

Eastside Journal. Two Day Pow-wow at Juanita. May 25, 1933.

Eastside Journal. Races and Colorful Pageant Declared Best Ever Presented. June 1, 1933.

Everett Herald. Will Celebrate Treaty Day. January 20, 1911.

Everett Daily Herald. Diary of Old Pioneer Recalls to Mind the Days when Puget Sound Shores were in Reality "Wild West". March 20, 1913.

Everett Daily Herald. Only Indians Take Part in Treaty Day Celebration. January 24, 1914.

Everett Daily Herald. Mukilteo, City of Contrasts, is Oldest in Snohomish County. November 4, 1928.

Everett Daily Herald. Descendants of Treaty Signers Will Be Present. May 1, 1931.

Everett Daily Herald. D.A.R. Dedicate Mukilteo Treaty Monument Today. May 2, 1931.

Everett Daily Herald. D.A.R. Chapter Unveils Shaft Commemorating Mukilteo Treaty. May 3, 1931.

Everett Daily Herald. Louisa Fowler Sinclair, The First White Child Born in County, Dies Monday. March 29, 1955.

Everett Daily Herald. First Time in 35 Years History Gets Cleaned Up. September 17, 1965.

Krenmayer, Janice. Bellevue Teacher is Linguistic Tool. *Seattle Times.* August 11, 1963.

McDonald, Lucile. Brush-Off at Olympia Led to Founding of Steilacoom. *Seattle Times.* June 25, 1950.

McDonald, Lucile. By Recording the Voices of Our Older Indians, a Seattle Professor is Preserving an Ancient Culture. *Seattle Times.* January 18, 1953.

Oregonian. Sudden Death of Pioneer. February 11, 1908.

Oregonian. Indian Totem Poles. April 4, 1937.

The Pioneer and Democrat , Olympia, Washington.
November 1854-January 1856. Reviewed all issues of the *Pioneer and Democrat* from November 1854 to January 1856 on microfilm.

Pioneer and Democrat. February 3, 1855.
Pioneer and Democrat. January 27, 1855.

Pioneer and Democrat. Deaths of Pat Kanim and John Taylor. November 26, 1858

Puget Sound Mail. Indians Present 'Treaty Play'. December 23, 1926.

Puget Sound Mail. Indians Dance 'Tamanaweis' in Celebration of Peace Treaty. January, 27, 1927.

Puget Sound Mail. Indians to Give Treaty Play. June 16, 1927.

Seattle P-I. Col. B.F. Shaw Dies in Portland. February 4, 1908.

Seattle P-I. E.S. Fowler Dead, Washington Pioneer. December 18, 1912.

Seattle P-I. Chief Patkamin: Friends of those He Befriended Propose to Honor Memory of Chief of Snoqualmie and Snohomish Tribes. December 7, 1919.

Seattle P-I. Powwow Recalls End of Indian War. January 24, 1939.

Seattle P-I. Snoqualmies Hold Pow-Wow in Bitter Mood. March 17, 1940.

Seattle P-I. Ground Broken for Replica of Blake Island Indian Village. May 4, 1961.

Seattle P-I. These Are Nordics–And These Are...Indians? August 2, 1965.

Seattle Sunday Star. Number Ten, Scraps from a Diary: Chief Seattle - A Gentleman by Instinct. October 29, 1887.

Seattle Times. Their Christmas in King County Forty-Two Years Ago. December 14, 1901.

Seattle Times. E.S. Fowler, Pioneer of Puget Sound, Dies. December 18, 1912.

Seattle Times. Indians Celebrate Signing Peace Pact with Whites. January 1918.

Seattle Times. Siwash Indians Commemorate Signing of Treaty of Mukilteo with Tribal Rites. January 23, 1928.

Seattle Times. Swinomish Indians Celebrate Signing of Ancient Treaty. January 1928.

Seattle Times. War Canoes Vie Tomorrow. May 27, 1933.

Seattle Times. Chief Shelton, Last of the Totem Pole Carvers, Dies in Everett. February 11, 1938.

Seattle Times. Tribes to Mark Anniversary of Peace Pact with Whites. January 21, 1940.

Seattle Times. Here's the Famed Speech Made By Chief Seattle. July 21, 1941.

Seattle Times. No War–Just Happiness–For Mercer's Daughter, 98. September 30, 1941.

Seattle Times. Aged Woman Recalls When Seattle Was a Village. January 22, 1946.

Seattle Times. Indian Celebration Fetes Treaty White Men 'Forget'. January 25, 1948.

Seattle Times. Signing of Indian Treaty Re-enacted on Blake Island. May 3, 1961.

The Timberman. Ancient Craft of Totem Carving. December 1929, p. 48.

Tulalip See-Yaht-Sub. Point Elliott Treaty Celebration on the Grounds Where Chiefs Once Stood. February 2, 2005.

Walla Walla Chamber of Commerce Circular. Walla Walla Valley: The Cradle of Northwest History. March 10, 1936.

Washington Standard. May 9, 1874.

Authored Articles

Davis, Don. "Firsts" in County History. *Everett Herald*. October 31, 1971.

Greene, Grace. Treaties with the Indians of Washington Territory. University of Washington. Bagley Scrapbook, vol. 2, p. 23.

McDonald, Lucile. Mukilteo's Early Trading Post Era. *Seattle Daily Times.* February 23, 1964.

Meeker, Ezra. Chief Leschi and Kitty Kautz both Recognized as Good Indians Before the Medicine Creek Treaty Went Into Effect–A Claim That the Warrior Did Not Sign the Document as Contended by Col. B.F. Shaw–Misunderstanding on the Part of the Aborigines and Bad Faith on the Part of the White Men Resulted in an Uprising and Indiscriminate Massacre. *Seattle P-I.* January 24, 1904.

Widrig, Charlotte. Point Elliott Treaty Centennial. *Seattle Times.* October 31, 1954. This article mentions previous efforts to commemorate the Treaty signing and also indicates that Edmond Meany and Clarence Bagley had researched the location of the treaty signing.

Historical Indexes and Clipping Collections

Dubuar Collection. On microfilm, University of Washigton, Special Collections, Seattle, Washington. Microfilm B1785, A2946.

Scrapbooks of clippings, primarily on Northwest historical topics. Available on microfilm.

Frontier Justice Records. Guide to the Court Records of Washington Territory, 1853-1889. State of Washington, Office of the Secretary of State, Archives and Records. Located at National Archives and Records Administration, Pacific Northwest Regional Branch, Seattle, Washington.

This guide to the territorial court records is organized by name and includes both civil and criminal cases. The index was used to locate probate records as well as other civil and criminal court files for the following individuals who signed the Point Elliott Treaty or were associated with early Mukilteo:

Isaac Ingalls Stevens
Michael T. Simmons
C. H. Mason:
Benjamin F. Shaw
Charles M. Hitchcock
H.A. Goldsborough
George Gibbs
John H. Scranton
Henry D. Cock
S. S. Ford, Jr.
Ellis Barnes
R. S. Bailey
S. M. Collins
Lafayette Balch
E.S. Fowler
Mary Fowler
J.H. Hall
Robert Davis
Jacob Fowler
Morris Frost

Meany Pioneer Files. On file, University of Washington, Special Collections, Seattle, Washington. These files were used to collect biographical information on both treaty signers as well as the earliest settlers of Mukilteo, Native peoples and other related individuals

Pacific Northwest Regional Newspaper and Periodical Index. University of Washington, Special Collections, Seattle, Washington.

This index to regional newspapers and periodicals was used to collect information on the treaty signers, early pioneers, Native peoples, businesses and other topics related to Indian affairs and the Mukilteo area. This index was an essential source for background and biographical information, and was particularly helpful in locating references to related newspaper articles.

Pamphlet Files. University of Washington, Special Collections, Seattle, Washington.

These files include collections of newspaper clippings, ephemera and other historical materials related to selected topics.

Biography
Indians of North America-Treaties.
Indians of North America -Tribes - Oregon and Washington.

Included files on a number of the Point Elliott Treaty tribes and clippings on individual Indians and events. Transcripts of what appear to be the script for the Joseph Hillaire pageant at a treaty celebration in the 1930s was found here as well as important clippings on Treaty Days and other related activities.

Snohomish County, Washington
Treaties
Washington Territory

Government Records and Reports

Bureau of Indian Affairs. Documents Relating to the Negotiation of Ratified and Unratified Treaties with Various Tribes of Indians, 1801-69. Record Group 75, Roll 4. Ratified Treaties 1854-1855

Bureau of Indian Affairs. Letters Received by the Office of Indian Affairs, 1824-1880. University of Washington, microfilm, Seattle, Washington.

Bureau of Indian Affairs, Records of the Washington Superintendency of Indian Affairs, 1853-1874. University of Washington, microfilm, Seattle, Washington.

Roll 1 Correspondence of the Washington Superintendency, printed in the Annual Reports of the Commissioner of Indian Affairs, 1853-1874.

Roll 9 Letters from Agents Assigned to the Puget Sound District as a Whole, December 4, 1853-August 16, 1862.

Roll 23 Miscellaneous Letters Received, August 22, 1853 to April 9, 1861. Includes letter from George Gibbs to Isaac Stevens on preparations for the Point Elliott council.

Roll 26 Records Relating to Treaties, December 7, 1854 to June 9, 1863. These records contained the official reports of Gibbs's exploration to locate a potential reservation site as well as of the treaty proceedings

Bureau of Indian Affairs. Report Books of Office of Indian Affairs. Microfilm 348, rolls 8,9, National Archives and Records Administration, Seattle, Washington.

Bureau of Indian Affairs, Special Reports. Microfilm 574, Rolls 30, 32, 43, National Archives and Records Administration, Seattle, Washington.

Bureau of Indian Affairs, Tulalip Agency Records, Microfilm P2011, National Archives and Records Administration, Seattle, Washington.

Correspondence, Puget Sound District. Includes December 17, 1947. Includes correspondence between Lucile McDonald and F. A. Gross, the superintendent of the Tulalip Agency related to Treaty Day Celebrations.

Bureau of Indian Affairs, Tulalip Agency Records. RG 75. National Archives and Records Administration, Seattle, Washington.

Correspondence with Commissioner of Indian Affairs. Letters Sent 1914-1915; 1919-1926 Annual Reports, Tulalip Indian Agency

Department of the Interior. Territorial Papers, Washington. Letters Received 1853-1868. University of Washington, microfilm, Seattle, Washington.

Department of the Interior. Office of Secretary of Interior, Solicitor, Letters Received by Indian Division, Office of the Secretary of the Interior 1849-1880. Microfilm 825, National Archives and Records Administration, Seattle, Washington.

General Land Office. Plat Maps. On file, National Archives and Records Administration, Seattle, Washington.

General Land Office. Tract Books. On file, National Archives and Records Administration, Seattle, Washington.

National Park Service, RG 79. Transfer of Lighthouse to Washington State Parks. Box 7. On file, National Archives and Records Administration, Seattle, Washington.

Surplus property correspondence and maps.

Northwest Boundary Commission, Records Relating to 1st Northwest Boundary Survey Commission,1853-1869, RG 76, Microfilm T606.

Post Office Department, Record of Appointment of Postmasters 1837-1971. Microfilm M841, Roll 137, National Archives and Records Administration, Seattle, Washington.

This reel includes a chronological listing of post offices in Snohomish County with name of post office, name of postmaster and date when it began operation as well as similar information for successive postmasters. The postoffice in Mukilteo was the first in Snohomish County, started by Jacob Fowler on July 5, 1861.

Post Office Department, Record of Site Locations, 1837-1950, Washington. Microfilm M1126, Roll 634, National Archives and Records Administration, Seattle, Washington.

Includes descriptions and maps of post office locations for Mukilteo as well as surrounding towns, including Lowell and Everett. Hand-drawn mas submitted by Jacob Fowler in 1866 shows location of his post office as well as trail inland to Snohomish. Early maps for other post offices near Mukilteo include trail, wagon road, and telegraph locations.

Territorial Volunteer Records, 1854-1858. Microcopies of Records in the Washington State Library and Washington State Archives, Washington
Governor's Correspondence, Incoming. December 1854-April 1856.
Governor's Correspondence, Outgoing. January 1855-March 1856.

United States Census, Washington Territory, 1860, 1870, 1880.

United States Congress, Territorial Papers of the United States "house file," Oregon and Washington.

United States Senate, Territorial Papers of the Senate, Washington. 1853-1868. University of Washington, microfilm, Seattle, Washington.
The papers on this reel contain letters relating to Washington Territory that are sorted chronologically.

Washington State Parks and Recreation. Mukilteo State Park-Legal. Box 76. Washington State Archives, Olympia, Washington.

Washington State Parks and Recreation. A History of Washington State Parks:1913-1988. Box 86. Washington State Archives, Olympia, Washington.

Washington State Parks and Recreation. Mukilteo Peace treaty Site, Box 88. Washington State Archives, Olympia, Washington.

Washington State Parks and Recreation. Correspondence with Army Corps of Engineers, Box 211. Washington State Archives, Olympia, Washington.
Includes public notice for installation of log breakwater and mooring piles at Mukilteo with contour and sketch maps

Legal Documents, Court Cases and Hearings

Appraisement of Estate of S.S. Hassard, Deceased. 1890. Snohomish County Probate Court, Snohomish
County, Washington. Snohomish County Government Center, Everett, Washington.

Crawford et.al. vs. Frost and Fowler, Case No. 20. Snohomish County Civil Court, Snohomish County, Washington. Snohomish County Government Center, Everett, Washington.

Crawford et. al. vs. Frost and Fowler, Case No. 55. Snohomish County Civil Court, Snohomish County, Washington. Snohomish County Government Center, Everett, Washington.

Crockett vs. Fowler, Case No. 38. Snohomish County Civil Court, Snohomish County, Washington. Snohomish County Government Center, Everett, Washington.

Davis vs. Johnson and Pieravic, Case No. 476. Snohomish County Civil Court, Snohomish County, Washington. Snohomish County Government Center, Everett, Washington.

Duwamish et al, claimants vs. United States of America, defendant. United States Court of Claims Argus Press, Seattle, Washington.
This court case contains several depositions of people who were present at the signing of the Point Elliott Treaty.

Jacob D. Fowler's petition to be appointed guardian of George Fowler and Ruth Fowler (minors). May 1890 to December 1891. Snohomish County Superior Court, Washington. Snohomish County Government Center, Everett, Washington

Matters of Estate of Morris Frost, Deceased, Petition for Letters of Administration. 1882. Snohomish County Probate Court, Snohomish County, Washington. In National Archives and Records Administration, Seattle, Washington.

McNaught and Leary vs. Frost, Case No. 19. Snohomish County Civil Court, Snohomish County, Washington,. Snohomish County Government Center, Everett, Washington.

Petition of Morris H. Frost and others for Letters of Administration on the Estate of Nathaniel B. Fowler. Filed May 6, 1873. Snohomish County Probate Court, Snohomish, Washington. Snohomish County Government Center, Everett, Washington.

Schwabacher et. al. vs. Frost and Fowler, Case No. 21. Snohomish County Civil Court, Snohomish County, Washington.

State of Washington v. Charles Alexis. Superior Court of the State of Washington, Case Number 1720, Office of the Attorney General, copy at Northwest Archaeological Associates, Seattle, Washington.

United States, Hillaire Crockett and Captain Jack v. The Alaska Packing Association. United States Circuit Court, District of Washington, Northern Division, Seattle, Washington. In RG 21, Box 82, National Archives and Records Administration, Seattle, Washington.

Evidence in fishing rights case includes affidavits from several Lummi elders who attended the Point Elliott council as well as an affidavit from B.F. Shaw, who was one of the interpreters for Governor Stevens at the event. The accounts provide brief descriptions of some aspects of the gathering, including length of time these attendees were there, the role of Shaw, and explanations made to the Indians about fishing rights. The affidavits provide the names of a number of Lummi who were in attendance at the council.

United States Congress, House of Representatives

Indian Tribes of Washington. Hearings before the Committee on Indian Affairs, 68th Congress, on HR 2694, February 2, 1924. Government Printing Office, Washington, DC.

Hearings on bill HR 2694 which waived the statute of limitations and gave tribes the right to bring suit against the government for unpaid claims under the Point Elliott Treaty and other Northwest treaties. Includes testimony by tribal representatives and delegates sent by the Northwest Federation of American Indians.

Oral History Interviews: Recorded and Unrecorded

Brown, Pat.

Unrecorded interview with author, September 17, 2007. Notes on files, Northwest Archaeological Associates, Seattle, Washington.

Forsman, Leonard

Unrecorded interview with author, August 14, 2007. Notes on file, Northwest Archaeological Associates, Seattle, Washington.

Gobin, Hank

Interview with author, April 23, 2007. On file, Northwest Archaeological Associates, Seattle, Washington.

McConnell, Opal.

Interview with author, August 26, 2007. On file, Northwest Archaeological Associates, Seattle, Washington.

Pennington, Lora

Interview with author, April 23, 2007. On file, Northwest Archaeological Associates, Seattle, Washington.

Webster, Lawrence

Interview August 21, 1980. Recorded by Susan Blalock. Suquamish Tribal Oral History Project. Suquamish Library and Archives, Suquamish, Washington.

Interview March 25, 1982. Recorded by J. Winterhaven. Suquamish Tribal Oral History Project. Tape No. OH W.1.11. Suquamish Library and Archives, Suquamish, Washington

Interview January 31, 1984. Recorded by Candi Bohlman. Suquamish Tribal Oral History Project. Tape No. OH W.1.27. Suquamish Library and Archives, Suquamish, Washington.

TREATY WITH THE DWAMISH, SUQUAMISH, ETC., 1855.

Jan. 22, 1855. | 12 Stat. 927. Ratified Mar. 8, 1859. | Proclaimed Apr. 11, 1859.

Articles of agreement and convention made and concluded at Múúcklte-óóh, or Point Elliott, in the Territory of Washington, this twenty-second day of January, eighteen hundred and fifty-five, by Isaac I. Stevens, governor and superintendent of Indian affairs for the said Territory, on the part of the United States, and the undersigned chiefs, head-men and delegates of the Dwáámish, Suquáámish, Sk-tááhlmish, Sam-ááhmish, Smalh-kamish, Skope-ááhmish, St-kááh-mish, Snoquáálmoo, Skai-wha-mish, N''Quentl-máá-mish, Sk-tááh-le-jum, Stoluck-wháá-mish, Sha-ho-mish, Skáágit, Kik-i-áállus, Swin-áá-mish, Squin-ááh-mish, Sah-ku-mééhu, Noo-wháá-ha, Nook-wa-chááh-mish, Mee-séée-qua-quilch, Cho-bah-ááh-bish, and other allied and subordinate tribes and bands of Indians occupying certain lands situated in said Territory of Washington, on behalf of said tribes, and duly authorized by them.

ARTICLE 1.

The said tribes and bands of Indians hereby cede, relinquish, and convey to the United States all their right, title, and interest in and to the lands and country occupied by them, bounded and described

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as follows: Commencing at a point on the eastern side of Admiralty Inlet, known as Point Pully, about midway between Commencement and Elliott Bays; thence eastwardly, running along the north line of lands heretofore ceded to the United States by the Nisqually, Puyallup, and other Indians, to the summit of the Cascade range of mountains; thence northwardly, following the summit of said range to the 49th parallel of north latitude; thence west, along said parallel to the middle of the Gulf of Georgia; thence through the middle of said gulf and the main channel through the Canal de Arro to the Straits of Fuca, and crossing the same through the middle of Admiralty Inlet to Suquamish Head; thence southwesterly, through the peninsula, and following the divide between Hood''s Canal and Admiralty Inlet to the portage known as Wilkes''Portage; thence northeastwardly, and following the line of lands heretofore ceded as aforesaid to Point Southworth, on the western side of Admiralty Inlet, and thence around the foot of Vashon''s Island eastwardly and southeastwardly to the place of begining, including all the islands comprised within said boundaries, and all the right, title, and interest of the said tribes and bands to any lands within the territory of the United States.

ARTICLE 2.

There is, however, reserved for the present use and occupation of the said tribes and bands the following tracts of land, viz: the amount of two sections, or twelve hundred and eighty acres, surrounding the small bight at the head of Port Madison, called by the Indians Noo-sohk-um; the amount of two sections, or twelve hundred and eighty acres, on the north side Hwhomish Bay and the creek emptying into the same called Kwilt-seh-da, the peninsula at the southeastern end of Perry''s Island, called Sháális-quihl, and the island called Chah-choo-sen, situated in the

Lummi River at the point of separation of the mouths emptying respectively into Bellingham Bay and the Gulf of Georgia. All which tracts shall be set apart, and so far as necessary surveyed and marked out for their exclusive use; nor shall any white man be permitted to reside upon the same without

permission of the said tribes or bands, and of the superintendent or agent, but, if necessary for the public convenience, roads may be run through the said reserves, the Indians being compensated for any damage thereby done them.

ARTICLE 3.

There is also reserved from out the lands hereby ceded the amount of thirty-six sections, or one township of land, on the northeastern shore of Port Gardner, and north of the mouth of Snohomish River, including Tulalip Bay and the before-mentioned Kwilt-seh-da Creek, for the purpose of establishing thereon an agricultural and industrial school, as hereinafter mentioed and agreed, and with a view of ultimately drawing thereto and settling thereon all the Indians living west of the Cascade Mountains in said Territory. *Provided, however*, That the President may establish the central agency and general reservation at such other point as he may deem for the benefit of the Indians.

ARTICLE 4.

The said tribes and bands agree to remove to and settle upon the said first above-mentioned reservations within one year after the ratification of this treaty, or sooner, if the means are furnished them. In the mean time it shall be lawful for them to reside upon any land not in the actual claim and occupation of citizens of the United States, and upon any land claimed or occupied, if with the permission of the owner.

ARTICLE 5.

The right of taking fish at usual and accustomed grounds and stations is further secured to said Indians in common with all citizens of the Territory, and of erecting temporary houses for the purposes of curing, together with the privilege of hunting and gathering roots and berries on open and unclaimed lands. *Provided, however*,

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That they shall not take shell-fish from any beds staked or cultivated by citizens. ARTICLE 6. In consideration of the above cession, the United States agree to pay to the said tribes and bands the sum of one hundred and fifty thousand dollars, in the following manner— — that is to say: For the first year after the ratification hereof, fifteen thousand dollars; for the next two year, twelve thousand dollars each year; for the next three years, ten thousand dollars each year; for the next four years, seven thousand five hundred dollars each years; for the next five years, six thousand dollars each year; and for the last five years, four thousand two hundred and fifty dollars each year. All which said sums of money shall be applied to the use and benefit of the said Indians, under the direction of the President of the United States, who may, from time to

time, determine at his discretion upon what beneficial objects to expend the same; and the superintendent of Indian affairs, or other proper officer, shall each year inform the President of the wishes of said Indians in respect thereto.

ARTICLE 7.

The President may hereafter, when in his opinion the interests of the Territory shall require and the welfare of the said Indians be promoted, remove them from either or all of the special reservations hereinbefore made to the said general reservation, or such other suitable place within said Territory as he may deem fit, on remunerating them for their improvements and the expenses of such removal, or may consolidate them with other friendly tribes or bands; and he may further at his discretion cause the whole or any portion of the lands hereby reserved, or of such other land as may be selected in lieu thereof, to be surveyed into lots, and assign the same to such individuals or families as are willing to avail themselves of the privilege, and will locate on the same as a permanent home on the same terms and subject to the same regulations as are provided in the sixth article of the treaty with the Omahas, so far as the same may be applicable. Any substantial improvements heretofore made by any Indian, and which he shall be compelled to abandon in consequence of this treaty, shall be valued under the direction of the President and payment made accordingly therefor.

ARTICLE 8.

The annuities of the aforesaid tribes and bands shall not be taken to pay the debts of individuals.

ARTICLE 9.

The said tribes and bands acknowledge their dependence on the Government of the United States, and promise to be friendly with all citizens thereof, and they pledge themselves to commit no depredations on the property of such citizens. Should any one or more of them violate this pledge, and the fact be satisfactorily proven before the agent, the property taken shall be returned, or in default thereof, of if injured or destroyed, compensation may be made by the Government out of their annuities. Nor will they make war on any other tribe except in self-defence, but will submit all matters of difference between them and the other Indians to the Government of the United States or its agent for decision, and abide thereby. And if any of the said Indians commit depredations on other Indians within the Territory the same rule shall prevail as that prescribed in this article in cases of depredations against citizens. And the said tribes agree not to shelter or conceal offenders against the laws of the United States, but to deliver them up to the authorities for trial.

ARTICLE 10.

The above tribes and bands are desirous to exclude from their reservations the use of ardent spirits, and to prevent their people from drinking the same, and therefore it is provided that any Indian belonging to said tribe who is guilty of bringing liquor into said reservations, or who drinks liquor, may have his or her proportion of the annuities withheld from him or her for such time as the President may determine.

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ARTICLE 11.

The said tribes and bands agree to free all slaves now held by them and not to purchase or acquire others hereafter.

ARTICLE 12.

The said tribes and bands further agree not to trade at Vancouver''s Island or elsewhere out of the dominions of the United States, nor shall foreign Indians be permitted to reside in their reservations without consent of the superintendent or agent.

ARTICLE 13.

To enable the said Indians to remove to and settle upon their aforesaid reservations, and to clear, fence, and break up a sufficient quantity of land for cultivation, the United States further agree to pay the sum of fifteen thousand dollars to be laid out and expended under the direction of the President and in such manner as he shall approve.

ARTICLE 14.

The United States further agree to establish at the general agency for the district of Puget''s Sound, within one year from the ratification hereof, and to support for a period of twenty years, an agricultural and industrial school, to be free to children of the said tribes and bands in common with those of the other tribes of said district, and to provide the said school with a suitable instructor or instructors, and also to provide a smithy and carpenter''s shop, and furnish them with the necessary tools, and employ a blacksmith, carpenter, and farmer for the like term of twenty years to instruct the Indians in their respective occupations. And the United States finally agree to employ a physician to reside at the said central agency, who shall furnish medicine and advice to their sick, and shall vaccinate them; the expenses of said school, shops, persons employed, and medical attendance to be defrayed by the United States, and not deducted from the annuities.

ARTICLE 15.

This treaty shall be obligatory on the contracting parties as soon as the same shall be ratified by the President and Senate of the United States. In testimony whereof, the said Isaac I. Stevens, governor and superintendent of Indian affairs, and the undersigned chiefs, headmen, and delegates of the aforesaid tribes and bands of Indians, have hereunto set their hands and seals, at the place and on the day and year herein-before written.

Isaac I. Stevens, Governor and Superintendent. [L. S.]
Seattle, Chief of the Dwamish and
Suquamish tribes, his x mark. [L. S.]
Pat-ka-nam, Chief of the Snoqualmoo, Snohomish and other tribes, his x mark. [L. S.]

Chow-its-hoot, Chief of the Lummi and other tribes, his x mark. [L. S.]
Goliah, Chief of the Skagits and other allied tribes, his x mark. [L. S.]
Kwallattum, or General Pierce, Sub-chief of the Skagit tribe, his x mark. [L. S.]
S''hootst-hoot, Sub-chief of Snohomish, his x mark. [L. S.]
Snah-talc, or Bonaparte, Sub-chief of Snohomish, his x mark. [L. S.]
Squush-um, or The Smoke, Sub-chief of the Snoqualmoo, his x mark. [L. S.]
See-alla-pa-han, or The Priest, Sub-chief of Sk-tah-le-jum, his x mark. [L. S.]
He-uch-ka-nam, or George Bonaparte, Sub-chief of Snohomish, his x mark. [L. S.]
Tse-nah-talc, or Joseph Bonaparte, Sub-chief of Snohomish, his x mark. [L. S.]
Ns''ski-oos, or Jackson, Sub-chief of Snohomish, his x mark. [L. S.]

Wats-ka-lah-tchie, or John Hobtsthoot, Sub-chief of Snohomish, his x mark. [L. S.]
Smeh-mai-hu, Sub-chief of Skaiwha-mish, his x mark. [L. S.]
Slat-eah-ka-nam, Sub-chief of Snoqualmoo, his x mark. [L. S.]
St''hau-ai, Sub-chief of Snoqualmoo, his x mark. [L. S.]
Lugs-ken, Sub-chief of Skai-wha-mish, his x mark. [L. S.]
S''heht-soolt, or Peter, Sub-chief of Snohomish, his x mark. [L. S.]
Do-queh-oo-satl, Snoqualmoo tribe, his x mark. [L. S.]
John Kanam, Snoqualmoo sub-chief, his x mark. [L. S.]
Klemsh-ka-nam, Snoqualmoo, his x mark. [L. S.]
Ts''huahntl, Dwa-mish sub-chief, his x mark. [L. S.]
Kwuss-ka-nam, or George Snatelum, Sen., Skagit tribe, his x mark. [L. S.]
Hel-mits, or George Snatelum, Skagit sub-chief, his x mark. [L. S.]
S''kwai-kwi, Skagit tribe, sub-chief, his x mark. [L. S.]
Seh-lek-qu, Sub-chief Lummi tribe, his x mark. [L. S.]

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S''h''-cheh-oos, or General Washington, Sub-chief of Lummi tribe, his x mark. [L. S.]
Whai-lan-hu, or Davy Crockett, Sub-chief of Lummi tribe, his x mark. [L. S.]
She-ah-delt-hu, Sub-chief of Lummi tribe, his x mark. [L. S.]
Kwult-seh, Sub-chief of Lummi tribe, his x mark. [L. S.]
Kwull-et-hu, Lummi tribe, his x mark. [L. S.]
Kleh-kent-soot, Skagit tribe, his x mark. [L. S.]
Sohn-heh-ovs, Skagit tribe, his x mark. [L. S.]
S''deh-ap-kan, or General Warren, Skagit tribe, his x mark. [L. S.]
Chul-whil-tan, Sub-chief of Suquamish tribe, his x mark. [L. S.]
Ske-eh-tum, Skagit tribe, his x mark. [L. S.]
Patchkanam, or Dome, Skagit tribe, his x mark. [L. S.]
Sats-Kanam, Squin-ah-nush tribe, his x mark. [L. S.]
Sd-zo-mahtl, Kik-ial-lus band, his x mark. [L. S.]
Dahtl-de-min, Sub-chief of Sah-ku-meh-hu, his x mark. [L. S.]
Sd''zek-du-num, Me-sek-wi-guilse sub-chief, his x mark. [L. S.]
Now-a-chais, Sub-chief of Dwamish, his x mark. [L. S.]
Mis-lo-tche, or Wah-hehl-tchoo, Sub-chief of Suquamish, his x mark. [L. S.]
Sloo-noksh-tan, or Jim, Suquamish tribe, his x mark. [L. S.]

Moo-whah-lad-hu, or Jack, Suquamish tribe, his x mark. [L. S.]
Too-leh-plan, Suquamish tribe, his x mark. [L. S.]
Ha-seh-doo-an, or Keo-kuck, Dwamish tribe, his x mark. [L. S.]
Hoovilt-meh-tum, Sub-chief of Suquamish, his x mark. [L. S.]
We-ai-pah, Skaiwhamish tribe, his x mark. [L. S.]
S''ah-an-hu, or Hallam, Snohomish tribe, his x mark. [L. S.]
She-hope, or General Pierce, Skagit tribe, his x mark. [L. S.]
Hwn-lah-lakq, or Thomas Jefferson, Lummi tribe, his x mark. [L. S.]
Cht-simpt, Lummi tribe, his x mark. [L. S.]
Tse-sum-ten, Lummi tribe, his x mark. [L. S.]
Klt-hahl-ten, Lummi tribe, his x mark. [L. S.]
Kut-ta-kanam, or John, Lummi tribe, his x mark. [L. S.]
Ch-lah-ben, Noo-qua-cha-mish band, his x mark. [L. S.]
Noo-heh-oos, Snoqualmoo tribe, his x mark. [L. S.]
Hweh-uk, Snoqualmoo tribe, his x mark. [L. S.]
Peh-nus, Skai-whamish tribe, his x mark. [L. S.]
Yim-ka-dam, Snoqualmoo tribe, his x mark. [L. S.]
Twooi-as-kut, Skaiwhamish tribe, his x mark. [L. S.]
Luch-al-kanam, Snoqualmoo tribe, his x mark. [L. S.]

S''hoot-kanam, Snoqualmoo tribe, his x mark. [L. S.]
Sme-a-kanam, Snoqualmoo tribe, his x mark. [L. S.]
Sad-zis-keh, Snoqualmoo, his x mark. [L. S.]
Heh-mahl, Skaiwhamish band, his x mark. [L. S.]
Charley, Skagit tribe, his x mark. [L. S.]
Sampson, Skagit tribe, his x mark. [L. S.]
John Taylor, Snohomish tribe, his x mark. [L. S.]
Hatch-kwentum, Skagit tribe, his x mark. [L. S.]
Yo-i-kum, Skagit tribe, his x mark. [L. S.]
T''kwa-ma-han, Skagit tribe, his x mark. [L. S.]
Sto-dum-kan, Swinamish band, his x mark. [L. S.]
Be-lole, Swinamish band, his x mark. [L. S.]
D''zo-lole-gwam-hu, Skagit tribe, his x mark. [L. S.]
Steh-shail, William, Skaiwhamish band, his x mark. [L. S.]
Kel-kahl-tsoot, Swinamish tribe, his x mark. [L. S.]
Pat-sen, Skagit tribe, his x mark. [L. S.]
Pat-teh-us, Noo-wha-ah sub-chief, his x mark. [L. S.]
S''hoolk-ka-nam, Lummi sub-chief, his x mark. [L. S.]
Ch-lok-suts, Lummi sub-chief, his x mark. [L. S.]

Executed in the presence of us— —

M. T. Simmons, Indian agent.
C. H. Mason, Secretary of Washington Territory.
Benj. F. Shaw, Interpreter.
Chas. M. Hitchcock.

H. A. Goldsborough.
George Gibbs.
John H. Scranton.
Henry D. Cock.
S. S. Ford, jr.
Orrington Cushman.
Ellis Barnes.
R. S. Bailey.
S. M. Collins.
Lafayetee Balch.
E. S. Fowler.
J. H. Hall.
Rob’’t Davis.

APPENDIX B: Unit Locations and Borehole Data

Map 1. Key map contains sensitive cultural resources information that is exempt from public disclosure pursuant to provisions of the Public Records Act (RCW 42.56.300).

MAP 1: Key map. These maps update the Figure 16 map with data from post-2007 projects.

Map 2. Core, Trench and Site Locations map (1 of 4) contains sensitive cultural resources information that is exempt from public disclosure pursuant to provisions of the Public Records Act (RCW 42.56.300).

MAP 2: Core, trench, and site locations, 1 of 4.

Map 3. Core, Trench and Site Locations map (2 of 4) contains sensitive cultural resources information that is exempt from public disclosure pursuant to provisions of the Public Records Act (RCW 42.56.300).

MAP 3: Core, trench, and site locations, 2 of 4.

Map 4. Core, Trench and Site Locations map (3 of 4) contains sensitive cultural resources information that is exempt from public disclosure pursuant to provisions of the Public Records Act (RCW 42.56.300).

MAP 4: Core, trench, and site locations, 3 of 4.

Map 5. Core, Trench and Site Locations map (4 of 4) contains sensitive cultural resources information that is exempt from public disclosure pursuant to provisions of the Public Records Act (RCW 42.56.300).

MAP 5: Core, trench, and site locations, 4 of 4.

Table B-1. Composition of Site Strata and Inferred Environments of Deposition.

STRATUM	DESCRIPTION	LITHOFACIES	INFERRED ENVIRONMENT OF DEPOSITION
I	Deposited since the beginning of historical occupation of the landform; includes early historical debris.	Not formally subdivided	Fill
II	The culture-bearing facies assemblage representing archaeological deposits created by pre-contact cultural activities on the landform.	**S** - sand; **Sg** - gravelly sand; pebble-sized gravel; **Aae** and **ae** - Undifferentiated midden matrix; **Ah** - A thin A horizon formed between occupations; **cs** - charcoal-stained; **sh** - shell/shelly	Archaeological midden on emergent portion of spit.
III	Moderately well-sorted sand containing few pebbles and fragmented natural shell; upper portion occasionally contains isolated archaeological deposits.	**S** (**ae**) - Culture-bearing sand **S** (**cs**) - Charcoal-stained sand **S** (**sh**) - Sand with crushed shell layer **Sg** - Gravelly sand **Zs** - Sandy silt	Beach barrier/berm cap overlying Stratum IV.
IV	Loosely consolidated pebbly sand and sandy pebble-gravel with detrital wood fragments (driftwood) and sea wrack; in places, submerged wetlands deposits.	**Sg** - Gravelly sand **Gs** - Sandy gravel **Wd** - Detrital wood (driftwood) **P** with **f** or **w** - Fibrous (f) or woody (w) peat.	Beach and spit
V	Moderately well-sorted medium sand containing fragmented natural shell.	**S** - Sand	Too few exposures to determine; may represent a submerged older barrier/berm.

Table B-2. Trench Summary Data.

[redacted]

Table B-3. Stratigraphic Log of Trenches.

TRENCH	TOP DEPTH (ft)	BOTTOM DEPTH (ft)	STRATIGRAPHY
1	0	6.2	I (Fill)
	6.2	7.2	Historic
	7.2	8.2	III (Beach Berm)
2	0	4.6	I (Fill)
	4.6	5.2	Historic
	5.2	8.2	III (Beach Berm)
	8.2	8.4	IV (Beach Gravels)
3	0	4.3	I (Fill)
	4.3	5.6	Historic
	5.6	6.9	Lagoon
	6.9	8.2	IV (Beach Gravels)
4	0	3.9	I (Fill)
	3.9	4.2	Historic
	4.2	9	IV (Beach Gravels)
5	0	6.4	I (Fill)
	6.4	7.6	II (Midden)
	7.6	8	III (Beach Berm)
	8	10	IV (Beach Gravels)

Table B-3. Stratigraphic Log of Trenches.

TRENCH	TOP DEPTH (ft)	BOTTOM DEPTH (ft)	STRATIGRAPHY
6	0	4	I (Fill)
	4	8.8	II (Midden)
	8.8	10.2	III (Beach Berm)
	10.2	10.5	IV (Beach Gravels)
7	0	7.9	I (Fill)
	7.9	10	Historic
	10	11.2	IV (Beach Gravels)
8	0	6.5	I (Fill)
	6.5	7.2	II (Midden)
	7.2	10.1	IV (Beach Gravels)
9	0	4.9	I (Fill)
	4.9	6.9	IV (Beach Gravels)
10	0	8	I (Fill)
	8	9	IV (Beach Gravels)
11	0	2.95	I (Fill)
	2.95	5.2	II (Midden)
	5.2	6.4	III (Beach Berm)
	6.4	8.2	IV (Beach Gravels)
12	0	7.4	I (Fill)
	7.4	10	IV (Beach Gravels)
13	0	7.4	I (Fill)
	7.4	9.2	II (Midden)
	9.2	9.9	III (Beach Berm)
	9.9	11.8	IV (Beach Gravels)
14	0	5.6	I (Fill)
	5.6	6.6	II (Midden)
	6.6	7.9	III (Beach Berm)
	7.9	9.5	IV (Beach Gravels)
15	0	8.9	I (Fill)
16	0	6.6	I (Fill)
	6.6	6.9	III (Beach Berm)

Table B-4. Summary Table, Archaeological Investigations 2006 Boreholes.

Table B-4. Summary Table, Archaeological Investigations 2006 Boreholes.

[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]

[redacted]

Table B-5. Stratigraphic Log, Archaeological Investigations 2006 Boreholes.

BORE	TOP DEPTH (ft)	BOTTOM DEPTH (ft)	STRATIGRAPHY
MR-02	0	4.5	I (Fill)
	4.5	5.5	Historic
MR-02B	0	5.6	I (Fill)
	5.6	20	IV (Beach Gravels)
MR-03	0	3.5	I (Fill)
	3.5	4.5	Historic
	4.5	10	III (Beach Berm)
	10	20	IV (Beach Gravels)
MR-05	0	2.5	I (Fill)
	2.5	6.3	II (Midden)
	6.3	8.5	III (Beach Berm)
	8.5	15	IV (Beach Gravels)
MR-06	0	4.5	I (Fill)
	4.5	5.3	II (Midden)
	5.3	8	III (Beach Berm)
	8	20	IV (Beach Gravels)
MR-07	0	6.3	I (Fill)
	6.3	20	IV (Beach Gravels)
MR-09	0	5	I (Fill)
	5	10.5	III (Beach Berm)
	10.5	20	IV (Beach Gravels)
MR-10	0	4	I (Fill)
	4	30	IV (Beach Gravels)
MR-12	0	3.5	I (Fill)
	3.5	7	II (Midden)
	7	8	III (Beach Berm)
	8	20	IV (Beach Gravels)
MR-16	0	7	I (Fill)
	7	40	IV (Beach Gravels)
MR-18	0	5.5	I (Fill)
	5.5	8.5	III (Beach Berm)
	8.5	20	IV (Beach Gravels)
MR-19	0	3.9	I (Fill)
	3.9	4.1	Historic
	4.1	7	II (Midden)
	7	9.3	III (Beach Berm)
	9.3	20	IV (Beach Gravels)
MR-22	0	4.2	I (Fill)
	4.2	7	Historic
	7	13	III (Beach Berm)
	13	16	IV (Beach Gravels)
MR-23	0	6.3	I (Fill)
	6.3	7.5	II (Midden)
	7.5	9	III (Beach Berm)
	9	20	IV (Beach Gravels)

Table B-5. Stratigraphic Log, Archaeological Investigations 2006 Boreholes.

BORE	TOP DEPTH (ft)	BOTTOM DEPTH (ft)	STRATIGRAPHY
MR-25	0	2.8	I (Fill)
	2.8	3.2	Historic
	3.2	7	II (Midden)
	7	15	IV (Beach Gravels)
MR-27	0	5.75	I (Fill)
	5.75	7	Historic
	7	15	IV (Beach Gravels)
MR-28	0	8	I (Fill)
	8	9	III (Beach Berm)
	9	15	IV (Beach Gravels)
MR-32	0	8	I (Fill)
	8	15	IV (Beach Gravels)
MR-33	0	6.5	I (Fill)
	6.5	8.3	II (Midden)
	8.3	9	III (Beach Berm)
	9	15	IV (Beach Gravels)
MR-36	0	5	I (Fill)
	5	10.5	III (Beach Berm)
	10.5	15	IV (Beach Gravels)
MR-38	0	9.5	I (Fill)
	9.5	33	IV (Beach Gravels)
	33	34	V
MR-41	0	9	I (Fill)
MR-41B	0	6	I (Fill)
	6	9	III (Beach Berm)
	9	15	IV (Beach Gravels)
MR-42	0	4.5	I (Fill)
	4.5	7.3	II (Midden)
	7.3	15	IV (Beach Gravels)
MR-43	0	4	I (Fill)
	4	6.2	II (Midden)
	6.2	6.8	III (Beach Berm)
	6.8	17	IV (Beach Gravels)
MR-45	0	8	I (Fill)
	8	13.5	III (Beach Berm)
	13.5	30	IV (Beach Gravels)
MR-46	0	8.5	I (Fill)
	8.5	9	II (Midden)
	9	15	IV (Beach Gravels)
MR-48	0	6.8	I (Fill)
	6.8	7.5	III (Beach Berm)
	7.5	20	IV (Beach Gravels)
MR-50	0	6.8	I (Fill)
	6.8	6.9	II (Midden)
	6.9	15	IV (Beach Gravels)

Table B-5. Stratigraphic Log, Archaeological Investigations 2006 Boreholes.

BORE	TOP DEPTH (ft)	BOTTOM DEPTH (ft)	STRATIGRAPHY
MR-51	0	8	I (Fill)
	8	9.5	III (Beach Berm)
	9.5	15	IV (Beach Gravels)
MR-52	0	6.8	I (Fill)
	6.8	9.5	III (Beach Berm)
	9.5	15	IV (Beach Gravels)
MR-54	0	7.5	I (Fill)
	7.5	15	IV (Beach Gravels)
MR-55	0	7	I (Fill)
	7	8.8	II (Midden)
	8.8	11.5	III (Beach Berm)
	11.5	15	IV (Beach Gravels)
MR-58	0	8.5	I (Fill)
	8.5	15	IV (Beach Gravels)
MR-59	0	8	I (Fill)
	8	9.8	III (Beach Berm)
	9.8	20	IV (Beach Gravels)
MR-62	0	5	I (Fill)
	5	8.5	III (Beach Berm)
	8.5	15	IV (Beach Gravels)
MR-64	0	6.5	I (Fill)
MR-66	0	7	I (Fill)
	7	8	III (Beach Berm)
	8	35.5	IV (Beach Gravels)
	35.5	40	V
MR-68	0	5.7	I (Fill)
	5.7	6.8	III (Beach Berm)
	6.8	30	IV (Beach Gravels)
MR-74	0	8	I (Fill)
	8	30	IV (Beach Gravels)
MR-75	0	7.5	I (Fill)
	7.5	15	IV (Beach Gravels)
MR-79	0	7.5	I (Fill)
	7.5	11.1	III (Beach Berm)
	11.1	15	IV (Beach Gravels)
MR-80	0	4	I (Fill)
	4	5.5	II (Midden)
	5.5	9	III (Beach Berm)
	9	15	IV (Beach Gravels)
MR-82	0	8	I (Fill)
	4.7	8	Historic
	8	9.5	III (Beach Berm)
	9.5	15	IV (Beach Gravels)
MR-83	0	10	I (Fill)
	10	16	IV (Beach Gravels)

Table B-5. Stratigraphic Log, Archaeological Investigations 2006 Boreholes.

BORE	TOP DEPTH (ft)	BOTTOM DEPTH (ft)	STRATIGRAPHY
MR-84	0	4	I (Fill)
	4	8.5	III (Beach Berm)
	8.5	15	IV (Beach Gravels)
MR-85	0	8	I (Fill)
	8	10	III (Beach Berm)
	10	25	IV (Beach Gravels)
	25	30	V
VC-01	0	4.2	I (Fill)
	4.2	4.6	II (Midden)
	4.6	7.9	III (Beach Berm)
	7.9	15	IV (Beach Gravels)
VC-04	0	7.42	I (Fill)
	7.42	15	IV (Beach Gravels)
VC-08	0	10.8	I (Fill)
	10.8	12.3	III (Beach Berm)
	12.3	15	IV (Beach Gravels)
VC-11	0	5.67	I (Fill)
	5.67	5.75	II (Midden)
	5.75	8.7	III (Beach Berm)
	8.7	15	IV (Beach Gravels)
VC-13	0	7.2	I (Fill)
	7.2	7.5	II (Midden)
	7.5	9.8	III (Beach Berm)
	9.8	15	IV (Beach Gravels)
VC-14	0	4.7	I (Fill)
	4.7	11	Historic
	11	15	IV (Beach Gravels)
VC-15	0	4.3	I (Fill)
	4.3	4.9	Historic
	4.9	8.7	III (Beach Berm)
	8.7	15	IV (Beach Gravels)
VC-17	0	5.6	I (Fill)
	5.6	6	Historic
	6	15	IV (Beach Gravels)
VC-20	0	9.9	I (Fill)
	9.9	10.3	III (Beach Berm)
	10.3	15	IV (Beach Gravels)
VC-21	0	5	I (Fill)
	5	15	IV (Beach Gravels)
VC-24	0	6	I (Fill)
	6	6.2	Historic
	6.2	7.6	II (Midden)
	7.6	15	IV (Beach Gravels)

Table B-5. Stratigraphic Log, Archaeological Investigations 2006 Boreholes.

BORE	TOP DEPTH (ft)	BOTTOM DEPTH (ft)	STRATIGRAPHY
VC-26	0	8.1	I (Fill)
	8.1	9.8	III (Beach Berm)
	9.8	15	IV (Beach Gravels)
VC-29	0	11.4	I (Fill)
	11.4	15	IV (Beach Gravels)
VC-30	0	5.75	I (Fill)
	5.75	6.25	II (Midden)
	6.25	10.83	III (Beach Berm)
	10.83	15	IV (Beach Gravels)
VC-31	0	6.25	I (Fill)
	6.25	7.83	II (Midden)
	7.83	10.58	III (Beach Berm)
	10.58	15	IV (Beach Gravels)
VC-34	0	9.08	I (Fill)
	9.08	11	III (Beach Berm)
	11	15	IV (Beach Gravels)
VC-35	0	6.25	I (Fill)
	6.25	9.6	II (Midden)
	9.6	15	IV (Beach Gravels)
VC-37	0	10.8	I (Fill)
	10.8	11	III (Beach Berm)
	11	15	IV (Beach Gravels)
VC-39	0	7.3	I (Fill)
	7.3	11.2	III (Beach Berm)
	11.2	15	IV (Beach Gravels)
VC-40	0	5.9	I (Fill)
	5.9	8.5	III (Beach Berm)
	8.5	15	IV (Beach Gravels)
VC-44	0	5.25	I (Fill)
	5.25	8.33	III (Beach Berm)
	8.33	15	IV (Beach Gravels)
VC-47	0	6.5	I (Fill)
	6.5	6.8	Historic
	6.8	7.25	II (Midden)
	7.25	9.9	III (Beach Berm)
	9.9	15	IV (Beach Gravels)
VC-49	0	7.58	I (Fill)
	7.58	8	II (Midden)
	8	14.1	III (Beach Berm)
	14.1	15	IV (Beach Gravels)
VC-53	0	7.4	I (Fill)
	7.4	8.2	Historic
	8.2	15	IV (Beach Gravels)

Table B-5. Stratigraphic Log, Archaeological Investigations 2006 Boreholes.

BORE	TOP DEPTH (ft)	BOTTOM DEPTH (ft)	STRATIGRAPHY
VC-56	0	6.75	I (Fill)
	6.75	8.67	II (Midden)
	8.67	15	IV (Beach Gravels)
VC-57	0	8.6	I (Fill)
	8.6	15	IV (Beach Gravels)
VC-60	0	5.67	I (Fill)
	5.67	8.42	II (Midden)
	8.42	9	III (Beach Berm)
	9	15	IV (Beach Gravels)
VC-61	0	12.42	I (Fill)
	12.42	15	IV (Beach Gravels)
VC-63	0	7	I (Fill)
	7	7.5	Historic
	7.5	15	IV (Beach Gravels)
VC-65	0	5.75	I (Fill)
	5.75	6.75	II (Midden)
	6.75	8.42	III (Beach Berm)
	8.42	15	IV (Beach Gravels)
VC-67	0	6.25	I (Fill)
	6.25	6.5	II (Midden)
	6.5	9	III (Beach Berm)
	9	15	IV (Beach Gravels)
VC-69	0	12	I (Fill)
	12	15	IV (Beach Gravels)
VC-70	0	7	I (Fill)
	7	7.5	II (Midden)
	7.5	10.6	III (Beach Berm)
	10.6	15	IV (Beach Gravels)
VC-71	0	7.3	I (Fill)
	5.5	7.3	Historic
	7.3	8.67	III (Beach Berm)
	8.67	15	IV (Beach Gravels)
VC-72	0	6.8	I (Fill)
	6.8	7.92	II (Midden)
	7.92	9	III (Beach Berm)
	9	15	IV (Beach Gravels)
VC-73	0	7.33	I (Fill)
	7.33	7.58	II (Midden)
	7.58	8.75	III (Beach Berm)
	8.75	15	IV (Beach Gravels)
VC-76	0	11.33	I (Fill)
	11.33	15	IV (Beach Gravels)
VC-77	0	6	I (Fill)
	6	8.5	III (Beach Berm)
	8.5	15	IV (Beach Gravels)

Table B-5. Stratigraphic Log, Archaeological Investigations 2006 Boreholes.

BORE	TOP DEPTH (ft)	BOTTOM DEPTH (ft)	STRATIGRAPHY
VC-78	0	5.67	I (Fill)
	5.67	7.5	II (Midden)
	7.5	9.83	III (Beach Berm)
	9.83	15	IV (Beach Gravels)
VC-81	0	4.2	I (Fill)
	4.2	8.7	II (Midden)
	8.7	9	III (Beach Berm)
	9	15	IV (Beach Gravels)

Table B-6. Summary Table, Geotechnical Explorations 2007, Archaeological Boreholes.

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Table B-7. Stratigraphic Log, Geotechnical Explorations 2007, Archaeological Boreholes.

BORE	TOP DEPTH (ft)	BOTTOM DEPTH (ft)	STRATIGRAPHY
AB-01	0	6.7	I (Fill)
	6.7	7.4	II (Midden)
	7.4	8.5	III (Beach Berm)
	8.5	14.3	IV (Beach Gravels)
AB-02	0	6	I (Fill)
	6	6.4	II (Midden)
	6.4	6.8	I (Fill)
	6.8	8.1	III (Beach Berm)
	8.1	15	IV (Beach Gravels)
AB-03	0	6.2	I (Fill)
	6.2	7	Historic
	7	7.1	II (Midden)
	7.1	9.7	III (Beach Berm)
	9.7	15	IV (Beach Gravels)

Table B-7. Stratigraphic Log, Geotechnical Explorations 2007, Archaeological Boreholes.

BORE	TOP DEPTH (ft)	BOTTOM DEPTH (ft)	STRATIGRAPHY
AB-04	0	8.2	I (Fill)
	8.2	14	IV (Beach Gravels)
AB-04B	0	10.8	I (Fill)
AB-05	0	9.1	I (Fill)
	9.1	14.7	IV (Beach Gravels)
AB-06	0	7	I (Fill)
	7	15	IV (Beach Gravels)
AB-07	0	7.4	I (Fill)
	7.4	14.7	IV (Beach Gravels)
AB-08	0	7	I (Fill)
	7	16	IV (Beach Gravels)
AB-09	0	6.8	I (Fill)
	6.8	15	IV (Beach Gravels)
AB-10	0	5.7	I (Fill)
	5.7	9.2	III (Beach Berm)
	9.2	16	IV (Beach Gravels)
AB-11	0	6.3	I (Fill)
	6.3	15	IV (Beach Gravels)
AB-12	0	1.3	I (Fill)
	1.3	2.5	II (Midden)
	2.5	8.9	III (Beach Berm)
	8.9	12	IV (Beach Gravels)
AB-13	0	3.9	I (Fill)
	3.9	4.4	II (Midden)
	4.4	7.8	III (Beach Berm)
	7.8	15	IV (Beach Gravels)
AB-15	0	8.2	I (Fill)
	8.2	14.9	III (Beach Berm)
	14.9	20	IV (Beach Gravels)
AB-16	0	3.7	I (Fill)
	3.7	4.5	II (Midden)
	4.5	8.5	III (Beach Berm)
	8.5	15	IV (Beach Gravels)
AB-17	0	2.4	I (Fill)
	2.4	4.4	II (Midden)
	4.4	6.7	III (Beach Berm)
	6.7	15	IV (Beach Gravels)
AB-18	0	8.7	I (Fill)
	8.7	9.3	III (Beach Berm)
	9.3	14	IV (Beach Gravels)
AB-19	0	5.6	I (Fill)
	5.6	6.6	II (Midden)
	6.6	7.3	III (Beach Berm)
	7.3	14	IV (Beach Gravels)

Table B-7. Stratigraphic Log, Geotechnical Explorations 2007, Archaeological Boreholes.

BORE	TOP DEPTH (ft)	BOTTOM DEPTH (ft)	STRATIGRAPHY
AB-20	0	5.5	I (Fill)
	5.5	6.4	Historic
	6.4	7	II (Midden)
	7	10	III (Beach Berm)
	10	15	IV (Beach Gravels)
VC-86	0	5.75	I (Fill)
	5.75	15	IV (Beach Gravels)
VC-87	0	6.3	I (Fill)
	6.3	7.25	Historic
	7.25	8	III (Beach Berm)
	8	15	IV (Beach Gravels)
VC-88	0	5.1	I (Fill)
	5.1	15	IV (Beach Gravels)

Table B-8. Summary Table, Geotechnical Explorations 2007, Monitored Geotechnical Boreholes.

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Table B-9. Stratigraphic Log, Geotechnical Explorations 2007, Monitored Geotechnical Boreholes.

BORE	TOP DEPTH (ft)	BOTTOM DEPTH (ft)	STRATIGRAPHY
A-09	0	50	IV (Beach Gravels)
A-10	0	58	IV (Beach Gravels)
	58	108.5	V
	108.5	110	VI
A-11	0	10	I (Fill)
	10	33.5	IV (Beach Gravels)
	33.5	90	V
	90	95	VI
A-12	0	92	IV/V
	92	98.5	VI
A-13	0	90	IV/V
	90	100	VI
A-14	0	9.5	I (Fill)
	9.5	23	IV (Beach Gravels)
	23	93	V
	93	99.5	VI
A-15	0	10	I (Fill)
	10	58	IV (Beach Gravels)
	58	91.5	V
	91.5	102	VI
A-16	0	9.3	I (Fill)
	9.3	73	IV (Beach Gravels)
	73	85	V
	85	100.5	VI
B-03	0	14.3	I (Fill)
	14.3	15	III (Beach Berm)
	15	100	IV/V
B-04	0	102	IV/V
BH-10	0	73.5	Holocene
	73.5	78	Pleistocene
BH-11	0	85	Holocene
BH-12	0	78	Holocene
	78	139.5	Pleistocene
BH-13	0	78.5	Holocene
	78.5	101	Pleistocene
BH-14	0	74	Holocene
	74	100	Pleistocene
BH-15	0	91.5	Holocene
	91.5	100	Pleistocene
BH-16	0	65	Holocene
	65	99	Pleistocene
BH-17	0	80	Holocene
	80	80.7	Pleistocene
BH-18	0	77	Holocene
	77	95.7	Pleistocene

Table B-9. Stratigraphic Log, Geotechnical Explorations 2007, Monitored Geotechnical Boreholes.

BORE	TOP DEPTH (ft)	BOTTOM DEPTH (ft)	STRATIGRAPHY
BH-19	0	89.67	Holocene
	89.67	96	Pleistocene
BH-20	0	91.5	Holocene
	91.5	120	Pleistocene
CPT-23-07*	0	6.25	I (Fill)
	6.25	15	IV (Beach Gravels)
CPT-24-07*	0	9.4	I (Fill)
	9.4	12.75	Historic
	12.75	15	IV (Beach Gravels)
H-21-07	0	11.2	I (Fill)
	11.2	45	IV (Beach Gravels)
	45	99.5	V
	99.5	104.5	VI
H-22-07	0	9.6	I (Fill)
	9.6	45	IV (Beach Gravels)
H-25-07	0	6	I (Fill)
	6	10	IV (Beach Gravels)
H-26-07	0	6	I (Fill)
	6	15	IV (Beach Gravels)
H-27-07	0	11.5	I (Fill)
	11.5	11.9	III (Beach Berm)
	11.9	42.5	IV (Beach Gravels)
	42.5	97	V
	97	100	VI
H-28-07	0	9.8	I (Fill)
	9.8	54	IV (Beach Gravels)
	54	100	V
	100	110	VI

*Not archaeologically monitored.

Table B-10. Summary Table, Other Geotechnical Investigations (not monitored).

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Table B-11. Stratigraphic Log, Other Geotechnical Investigations (not monitored).

BORE/ TRENCH	TOP DEPTH (ft)	BOTTOM DEPTH (ft)	STRATIGRAPHY
McCaughan and Squires 2008			
B-01 (GE)	0	9	I (Fill)
B-02 (GE)	0	7	I (Fill)
	7	21.5	IV (Beach Gravels)
B-03 (GE)	0	7.5	I (Fill)
	7.5	9	IV (Beach Gravels)
Anchor Environmental 2006			
H-01-04	0	10.5	I (Fill)
	10.5	79.5	Holocene
H-02-04	0	8	I (Fill)
	8	47	Holocene
	47	79.5	Pleistocene
H-03-04	0	10	I (Fill)
	10	47	Holocene
	47	59.4	Pleistocene(Whidbey)
H-04-04	0	22	Holocene
	22	103.5	Pleistocene(Whidbey)
H-05-04	0	64	Holocene
	64	91.8	Pleistocene(Whidbey)
H-06-04	0	69	Holocene
	69	102.5	Pleistocene(Whidbey)
H-07-04	0	7	I (Fill)
	7	10.5	Lagoon
	10.5	17	IV (Beach Gravels)
H-08-04	0	12.5	I (Fill)
	12.5	18	Lagoon
	18	33.5	IV (Beach Gravels)
HWA GeoSciences 2006			
PB-1	0	5	Fill
	5	7	Lagoon
	7	26	IV (Beach Gravels)
PB-3	0	7	Fill
	7	14.5	Lagoon
	14.5	31.5	IV (Beach Gravels)
PB-4	0	5	I (Fill)
	5	31.5	IV (Beach Gravels)
PB-5	0	7	I (Fill)
	7	13.5	Lagoon
	13.5	21.5	Beach Sand
PB-6	0	5	I (Fill)
	5	21.5	IV (Beach Gravels)
PB-7	0	5	I (Fill)
	5	11.5	Lagoon
	11.5	21.5	IV (Beach Gravels)

Table B-11. Stratigraphic Log, Other Geotechnical Investigations (not monitored).

BORE/ TRENCH	TOP DEPTH (ft)	BOTTOM DEPTH (ft)	STRATIGRAPHY
SB-1	0	5	Fill
	5	11	Lagoon
	11	31.5	Beach Sand
SB-2	0	5	Fill
	5	17.5	III (Beach Berm)
	17.5	31.5	Lagoon
SB-3	0	7.5	Fill
	7.5	17	Lagoon
	17	32.5	Beach Sand
	32.5	42.5	Non-glacial Fluvium
SB-4	0	7.5	I (Fill)
	7.5	14	Lagoon
	14	31.5	Beach Sand
SB-5	0	7	I (Fill)
	7	14	Lagoon
	14	21.5	Beach Sand
SB-6	0	7.5	I (Fill)
	7.5	10	Lagoon
	10	31.5	Beach Sand
TP-01	0	5.5	I (Fill)
	5.5	10	Lagoon
TP-02	0	5.5	I (Fill)
	5.5	7	Lagoon
TP-03	0	7	I (Fill)
	7	7.5	IV (Beach Gravels)
TP-04	0	6	I (Fill)
	6	9	Lagoon
TP-05	0	6	I (Fill)
	6	8	Lagoon
	8	9	IV (Beach Gravels)
TP-06	0	5	I (Fill)
	5	7	Lagoon
	7	8	IV (Beach Gravels)
TP-07	0	5.5	I (Fill)
	5.5	7	Lagoon
	7	8	IV (Beach Gravels)
TP-08	0	5.5	I (Fill)
	5.5	7	Lagoon
	7	8	IV (Beach Gravels)
TP-09	0	6	I (Fill)
	6	7	Lagoon
	7	8	IV (Beach Gravels)
TP-10	0	6	I (Fill)
	6	6.5	III (Beach Berm)

Table B-11. Stratigraphic Log, Other Geotechnical Investigations (not monitored).

BORE/ TRENCH	TOP DEPTH (ft)	BOTTOM DEPTH (ft)	STRATIGRAPHY
TP-11	0	4.5	I (Fill)
	4.5	6.5	III (Beach Berm)
TP-12	0	5	I (Fill)
	5	6	Lagoon
	6	7	IV (Beach Gravels)
TP-13	0	4.5	I (Fill)
	4.5	6	IV (Beach Gravels)
TP-14	0	2	I (Fill)
	2	5	IV (Beach Gravels)
TP-15	0	4	I (Fill)
	4	5	Lagoon
	5	7	III (Beach Berm)

Table B-12. Summary Table, Other Archaeologically Monitored Investigations.

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Table B-13. Stratigraphic Log, Other Archaeologically Monitored Investigations.

BORE/ TRENCH	TOP DEPTH (ft)	BOTTOM DEPTH (ft)	STRATIGRAPHY
Rink 2009, Lighthouse Park Phase II			
AP-1	0	1.3	Fill
AP-2	0	0.46	Fill
	0.46	0.98	Buried Soil A-Horizon
	0.98	1.6	IV (Beach Gravels)
AP-3	0	0.7	I (Fill)
	0.7	1	III (Beach Berm)
	1	1.3	IV (Beach Gravels)
AP-4	0	1.1	Fill
	1	1.3	III (Beach Berm)
	1.3	2	IV (Beach Gravels)
AP-5	0	0.66	Fill
	0.66	1.48	II (Midden)
	1.48	2	IV (Beach Gravels)

Table B-13. Stratigraphic Log, Other Archaeologically Monitored Investigations.

BORE/ TRENCH	TOP DEPTH (ft)	BOTTOM DEPTH (ft)	STRATIGRAPHY
AP-6	0	0.66	Fill
	0.66	2.13	II (Midden)
	2.13	3.4	Beach Sand
BH-01	0.5	3	I (Fill)
	3.25	4.5	III (Beach Berm)
	4.5	6.5	IV (Beach Gravels)
BH-02	0.5	3.4	I (Fill)
	3.4	3.9	II (Midden)
	3.9	6.5	III (Beach Berm)
	6.5	8	IV (Beach Gravels)
BH-03	0.5	2.6	I (Fill)
	2.6	3	II (Midden)
	3	5	III (Beach Berm)
	5	8	IV (Beach Gravels)
BH-04	0	1.5	I (Fill)
	1.5	2.25	III (Beach Berm)
	2.5	8	IV (Beach Gravels)
BH-05	0.6	2.7	I (Fill)
	2.7	3.5	II (Midden)
	3.5	5	III (Beach Berm)
	6.5	10	IV (Beach Gravels)
BH-06	1	1.4	I (Fill)
	1.4	1.8	II (Midden)
	1.8	3	III (Beach Berm)
	3	5	IV (Beach Gravels)
BH-07	1	1.4	I (Fill)
	1.4	2.4	II (Midden)
	2.4	5	III (Beach Berm)
	5	6.5	IV (Beach Gravels)
BH-08	0.5	1.6	I (Fill)
	1.6	2	II (Midden)
	2.5	3	III (Beach Berm)
	5	10	IV (Beach Gravels)
BH-09	0.4	4.8	I (Fill)
	4.8	10	Lagoon
BH-10	0	6.5	I (Fill)
Rinck 2010, Mukilteo Right Turn Lane and Signal Project			
L-1-10	0	16	I (Fill)
	16	22.5	III (Beach Berm)
	22.5	27	Pleistocene
S-1-10	0	5.4	I (Fill)
	5.4	13	III (Beach Berm)
	13	15	IV (Beach Gravels)
	15	25	Pleistocene

Table B-13. Stratigraphic Log, Other Archaeologically Monitored Investigations.

BORE/ TRENCH	TOP DEPTH (ft)	BOTTOM DEPTH (ft)	STRATIGRAPHY
S-2-10	0	1.3	I (Fill)
	1.3	1.9	II (Midden)
	1.9	8	III (Beach Berm)
	8	20.5	IV (Beach Gravels)
	20.5	27	Pleistocene
S-3-10	0	1.7	I (Fill)
	1.7	10	III (Beach Berm)
	10	13	IV (Beach Gravels)
	13	27	Pleistocene

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APPENDIX C: Artifact Catalogs and Sample Summary

CATALOG CODES FOR 45-SN-393 AND 45-SN-404

1) CLASS (CLS): **FLS** - FLAKED OBJECT
FAU - FAUNAL
GBS- GROUND OR BATTERED OBJECT
HIS - HISTORIC
SAM- SAMPLE
DOC-DOCUMENT

2) OBJECT (OBJ)	3) DESCRIPTION (DES)	4) MATERIAL/TYPE/CONDITION (MAT)
BIF--BIFACE (RETOUCH EXTENDS MORE THAN 10% ONTO BOTH SURFACES OF THE OBJECT)	**REC**-RECTANGULAR **USF**--FRAGMENT/UNSPECIFIED FORM	**BAS**--BASALT **CCS**--CRYPTOCRYSTALLINE SILICA **MET**--METASEDIMENT **OTH**--OTHER STONE **QZT**--QUARTZITE **SIL**--SILICATED WOOD **VOL**–VOLCANIC GENERAL same for all lithic material
COR--CORE	**BIP**–BIPOLAR **MIC**–MICROBLADE **FLC**-FLAKE/CORE (OBJECT IS SPLIT AND FLAKED ON VENTRAL SURFACE) **USF**--FRAGMENT/UNSPECIFIED FORM	
DEB--DEBITAGE	**BLD**-BLADE (Length is at least 2X the width) **FLK**--FLAKE **LIN**–LINEAR	
SPC-SPLIT COBBLE (COBBLE IS SPLIT AND MAY EITHER BE A CORE OR A FLAKE)	**SBP**-SPLIT WITHOUT ADDITIONAL FLAKING, BIPOLAR ATTRIBUTES PRESENT **USF**-SPLIT WITH NO TECHNOLOGICAL ATTRIBUTES PRESENT	
EAP--EDGE ALTERED PEBBLE (FLAKED ON EDGE AND FLAKING DOES NOT EXTEND MORE THAN 10% ONTO THE SURFACE OF THE OBJECT, OBJECT≤6.5 CM)	**OSI**-ONE SIDE	
EMP--EDGE MODIFIED PIECE (FLAKED) MODIFIED ON MARGIN (S) ONLY, EXTENDS ONTO ≤10% OF THE SURFACE AREA.	**EDF**--EDGE DAMAGE (USE-WEAR) **OTH**--OTHER **PRT**--PURPOSEFUL RETOUCH (TO A PATTERN)	
FMR–FIRE MODIFIED ROCK	**SPL** - SPALL	
ADZ--ADZE	**OTH**--OTHER	
HAM–HAMMERSTONE	**BEN**--BOTH ENDS	

2) OBJECT (OBJ)	3) DESCRIPTION (DES)	4) MATERIAL/TYPE/CONDITION (MAT)
MODIFIED FAUNAL **BON**–MODIFIED BONE **TTH**-MODIFIED (ANIMAL) TOOTH (Pendants etc. be sure to describe modification and tooth type-mammal etc. if poss ble)	**HAR**–HARPOON PART **PPT**--PROJECTILE POINT **USF**--UNSPECIFIED FORM/FRAGMENT	**USF**--FRAGMENT/UNSPECIFIED FORM *Be sure to descr be, if harpoon part, which part, what kind of projectile point, bead or tube, can the bone be recognized - ulna awl or etc., can the shell species be identified?
UNMODIFIED FAUNAL **AVI**--B IRD **FSH**--FISH **LML**–-LARGE MAMMAL (DEER, ELK, COW, ETC) **MML**– MEDIUM MAMMAL **SHL**–SHELL **SML**–SMALL MAMMAL (RODENT, BUNNY, ETC.) **USF**--UNSPECIFIED FORM/FRAGMENT OF MAMMAL BONE - UNKNOWN SIZE OF ANIMAL	**BON**–BONE **CLM**–CLAM **TOT**-UNMOD. TOOTH (TYPE IF POSSIBLE)	**CAL**–CALCINED BONE (ANY BONE WITH WHITE CALCINED AREA) **COM**–COMPLETE **NRN**--UNBURNED
ORG-ORGANIC (Use only for organics found in pre-contact context)	**BOT**-BOTANICAL	**OTH**-OTHER
SAM–SAMPLE	**BOT**–BOTANICAL (EG. WOOD, SEEDS) **SED**–SEDIMENT **OCR**–OCHRE	**COL**--COLUMN SAMPLE **PTV**-- POINT PROVENIENCE
CVS– CONSTANT VOLUME SAMPLE	**QRT**--¼” **ETH**--⅛” **SIX**--1/16"	**AVI--**BIRD **CHR**--CHARCOAL **COL**–COLUMN **DEB**--DEBITAGE **EXS**–EXOTIC STONE **FAU**–FAUNAL **FSH**–FISH **GLS**–GLASS **MAM**–MAMMAL **MTL**–METAL **OTH**–OTHER **ROC**--ROCK **SHL**–SHELL **UNK**–UNKNOWN **WOD**–WOOD
CER-CERAMIC	**ETH**–EARTHENWARE **POR**–PORCELAIN **STN**–STONEWARE	**CRK**–CROCK **CUP**–CUP **DEC**–DECORATIVE **FIG**–FIGURINE **OTH**–OTHER **PIP**–SMOKING PIPE **PLA**–PLATE **POT**–POT (PLANTING ETC.) **TBL**–TABLEWARE **UNK**–UNKNOWN **UTL**–INSULATORS, WATER/SEWER PIPE [DESCRIPTION–COLOR OF CLAY BODY AND GLAZE, DECORATION SUCH AS TRANSFER PRINT, MOLDED DESIGN, TRADEMARK, ETC..]

2) OBJECT (OBJ)	3) DESCRIPTION (DES)	4) MATERIAL/TYPE/CONDITION (MAT)
GLS–GLASS	**AMB**–AUTOMATIC MACHINE BOTTLE OR FRAGMENT (SEAMS OVER THE TOP) **BUT**–BUTTON **DEC**-DECORATIVE GLASS (VASE, CANDY DISH ETC.) **HMB**–HAND MANUFACTURED BOTTLE OR FRAGMENT (BUBBLES, GHOST SEAMS) **JAR**–JAR, SEMI-AUTO AND MACHINE **JRL**-JAR LID **UNK**–UNKNOWN **VES**–VESSEL FRAGMENT, UNK PROCESS **WIN**–WINDOW	**AME**–AMETHYST **AQU**–AQUA **BLK**–BLACK (usually color is really olive) **BRN**–BROWN **COB**–COBALT **CLR**–CLEAR **GRN**–GREEN **MLK**-MILK GLASS **OLV**–OLIVE **YEL**–YELLOW **WHT**-WHITE (do not confuse w/milk glass) [**DESCRIPTION**–MAKER'S MARK, PATINA, DECORATION, FRAGMENT OR COMPLETE, WHAT TYPE OF FRAGMENT (BASE, FINISH, PANEL BODY, CURVED BODY), SHAPE OF BASE, TYPE OF FINISH]
LEA–LEATHER	**FTW**–FOOTWEAR	**FRA**–FRAGMENT
MTL–METAL	**AMM**--AMMUNITION **CLC**–CLOTHING CLOSURE (BUTTONS, SUSPENDER CLASP, SAFETY PIN) **HRD**–HARDWARE (SCREWS, HINGES, KNOBS, STAPLES, ETC.) **FAS**–FASTENER (NON-CLOTHING) **NAI**–NAIL **OTH**–OTHER **UNK**–UNKNOWN	**BUT**–BUTTON **CLP**–CLASP **RND**–ROUND NAIL **SLL**–AMMUNITION SHELL **SQU**–SQUARE NAIL **OTH**–OTHER **UNK**–UNKNOWN FRAGMENTS
OTH–OTHER	**MUL**–MULTI-COMPONENT (METAL AND WOOD, ETC...) **OTH**–OTHER MATERIAL	**COM**–COMPLETE **FRA**–FRAGMENT
WOD–WOOD	**MLB**–MILLED LUMBER	**NRN**–UNBURNED

CAT: Catalog Number
UNIT: Unit, T-Trench, BH-Borehole
LEV: Level, cm below surface
SCRN: Screen Size, 4 - Quarter inch mesh, 8 - Eighth inch mesh, 16 - Sixteenth inch mesh

Table C-1. Artifact Catalog, Site 45SN393.

CAT	UNIT	LEV (cmbs)	SCRN	CLS	OBJ	DES	MAT	NO	WT (g)	VOL (ml)	DESCRIPTION
1	T13	240-250		SAM	SAM	SED	COL	1	1613.5		Facies Aae, sorted
2	T13	240-250	4	SAM	CVS	QRT	COL	1	649.1		Facies Aae, sorted
3	T13	240-250	8	SAM	CVS	ETH	COL	1	201.0		Facies Aae, sorted
4	T13	240-250	16	SAM	CVS	SIX	COL	1	145.5		Facies Aae
5	T13	240-250		SAM	CVS	QRT	CHR	4	0.4		Facies Aae
6	T13	240-250		SAM	CVS	QRT	ROC	467	601.2		Facies Aae
7	T13	240-250		SAM	CVS	QRT	FSH	1	0.2		Facies Aae, vertebrae
8	T13	240-250		SAM	CVS	QRT	SHL	187	46.4		Facies Aae
9	T13	260-266		SAM	SAM	SED	COL	1	1309.6		Facies Ah, sorted
10	T13	260-266	4	SAM	CVS	QRT	COL	1	289.6		Facies Ah, sorted
11	T13	260-266	8	SAM	CVS	ETH	COL	1	76.0		Facies Ah, sorted
12	T13	260-266	16	SAM	CVS	SIX	COL	1	94.0		Facies Ah
13	T13	260-266	4	SAM	CVS	QRT	CHR	6	0.4		Facies Ah
14	T13	260-266	4	SAM	CVS	QRT	ROC	150	240.1		Facies Ah
15	T13	260-266	4	SAM	CVS	QRT	SHL	107	48.9		Facies Ah
16	T13	260-266	4	SAM	CVS	QRT	FSH	1	<0.1		Facies Ah, Cottidae, 1 precaudal vertebraeebrae
17	T13	spoils	4	FAU	LML	BON	BRN	5	31.8		sorted
18	T13	spoils	4	FAU	LML	BON	NRN	7	14.3		sorted
19	T13	spoils	4	FAU	MML	BON	NRN	1	21.0		Odocoileus sp., 1 right calcaneous
20	T8	spoils	4	FAU	USF	BON	USF	1	0.3		unidentified mammal, longbone shaft fragment
21	T6	spoils	4	FLS	PPT	TRI	SIL	1	7.8		petrified wood
22	T13	spoils	4	FLS	DEB	BIP	QZT	1	4.4		
23	T13	spoils	4	FLS	DEB	FLK	BAS	7	449.1		
24	T13	spoils	4	HIS	OTH	OTH	FRA	1	1.0		
25	T13	270-278		SAM	SAM	SED	COL	1	1041.0		Facies Aae, sorted
26	T13	270-278	4	SAM	CVS	QRT	COL	1	387.1		Facies Aae, sorted
27	T13	270-278	8	SAM	CVS	ETH	COL	1	112.5		Facies Aae, sorted
28	T13	270-278	16	SAM	CVS	SIX	COL	1	116.1		Facies Aae
29	T13	270-278	4	SAM	CVS	QRT	CHR	4	0.1		Facies Aae
30	T13	270-278	4	SAM	CVS	QRT	ROC	181	272.8		Facies Aae
31	T13	270-278	4	SAM	CVS	QRT	SHL	168	113.5		Facies Aae
32	T13	270-278	4	SAM	CVS	QRT	FSH	1	<0.1		Facies Aae, vertebrae
33	T13	278-280		SAM	SAM	SED	COL	1	1317.0		Facies Ah, sorted
34	T13	278-280	4	SAM	CVS	QRT	COL	1	314.8		Facies Ah, sorted
35	T13	278-280	8	SAM	CVS	ETH	COL	1	100.4		Facies Ah, sorted
36	T13	278-280	16	SAM	CVS	SIX	COL	1	101.4		Facies Ah
37	T13	278-280	4	SAM	CVS	QRT	CHR	16	1.0		Facies Ah
38	T13	278-280	4	SAM	CVS	QRT	ROC	142	221.3		Facies Ah
39	T13	278-280	4	SAM	CVS	QRT	SHL	124	90.1		Facies Ah
40	T6	195-205		SAM	CVS	SED	COL	1	1241.3		sorted
41	T6	195-205	4	SAM	CVS	QRT	COL	1	221.1		sorted
42	T6	195-205	8	SAM	CVS	ETH	COL	1	88.5		sorted
43	T6	195-205	16	SAM	CVS	SIX	COL	1	144.8		
44	T6	195-205	4	SAM	CVS	QRT	SHL	36	16.2		
45	T6	195-205	4	SAM	CVS	QRT	FSH	2	0.4		Oncorhynchus sp., 2 caudal vertebraes
46	T6	195-205	4	SAM	CVS	QRT	ROC	150	204.4		
47	T5	200-210		SAM	SAM	SED	COL	1	1459.3		sorted
48	T5	200-210	4	SAM	CVS	QRT	COL	1	482.0		sorted

Table C-1. Artifact Catalog, Site 45SN393.

CAT	UNIT	LEV (cmbs)	SCRN	CLS	OBJ	DES	MAT	NO	WT (g)	VOL (ml)	DESCRIPTION
49	T5	200-210	8	SAM	CVS	ETH	COL	1	123.7		uniden ified fish, 1 miscellaneous ray/spine fragment
50	T5	200-210	16	SAM	CVS	SIX	COL	1	119.8		
51	T5	200-210	4	SAM	CVS	QRT	ROC	35	464.5		
52	T5	200-210	4	SAM	CVS	QRT	SHL	45	16.2		
53	T8	235-245		SAM	SAM	SED	COL	1	1658 9		Facies (G(sh,l)CS), sorted
54	T8	235-245	4	SAM	CVS	QRT	COL	1	1085.5		Facies (G(sh,l)CS), sorted
55	T8	235-245	8	SAM	CVS	ETH	COL	1	168.0		Facies (G(sh,l)CS), Oncorhynchus sp., 1 caudal vertebrae
56	T8	235-245	16	SAM	CVS	SIX	COL	1	104 8		Facies (G(sh,l)CS)
57	T8	235-245	4	SAM	CVS	QRT	FSH	1	0.1		Facies (G(sh,l)CS), Oncorhynchus sp., 1 caudal vertebrae
58	T8	235-245	4	SAM	CVS	QRT	SHL	72	60 5		Facies (G(sh,l)CS)
59	T8	235-245	4	SAM	CVS	QRT	ROC	648	1024.7		Facies (G(sh,l)CS)
60	T8	235-245	4	SAM	CVS	QRT	WOD	1	<0.1		Facies (G(sh,l)CS)
61	T11	160-162		SAM	SAM	SED	COL	1	1321 0		Facies Ah, sorted
62	T11	160-162	4	SAM	CVS	QRT	COL	1	384 8		Facies Ah, sorted
63	T11	160-162	8	SAM	CVS	ETH	COL	1	133.4		Facies Ah, sorted
64	T11	160-162	16	SAM	CVS	SIX	COL	1	122 5		Facies Ah
65	T11	160-162	4	SAM	CVS	QRT	SHL	126	65.0		Facies Ah
66	T11	160-162	4	SAM	CVS	QRT	ROC	239	319.6		Facies Ah
67	T11	160-162	4	SAM	CVS	QRT	CHR	2	0 2		Facies Ah
68	T6	265-275		SAM	SAM	SED	COL	1	1104.7		sorted
69	T6	265-275	4	SAM	CVS	QRT	COL	1	141.5		sorted
70	T6	265-275	8	SAM	CVS	ETH	COL	1	34.5		sorted
71	T6	265-275	16	SAM	CVS	SIX	COL	1	44.0		
72	T6	265-275	4	SAM	CVS	QRT	CHR	1	<0.1		
73	T6	265-275	4	SAM	CVS	QRT	ROC	76	110.2		
74	T6	265-275	4	SAM	CVS	QRT	SHL	89	30.9		
75	T6	255-265		SAM	SAM	SED	COL	1	1329.7		sorted
76	T6	255-265	4	SAM	CVS	QRT	COL	1	82.1		sorted
77	T6	255-265	8	SAM	CVS	ETH	COL	1	22.8		
78	T6	255-265	16	SAM	CVS	SIX	COL	1	63.3		
79	T6	255-265	4	SAM	CVS	QRT	CHR	3	0.1		
80	T6	255-265	4	SAM	CVS	QRT	SHL	10	4.1		
81	T6	255-265	4	SAM	CVS	QRT	ROC	34	77.9		
82	T5	220-230		SAM	SAM	SED	COL	1	1087.2		sorted
83	T5	220-230	4	SAM	CVS	QRT	COL	1	249.9		sorted
84	T5	220-230	8	SAM	CVS	ETH	COL	1	63.8		sorted
85	T5	220-230	16	SAM	CVS	SIX	COL	1	74.1		
86	T5	220-230	4	SAM	CVS	QRT	SHL	45	18.3		
87	T5	220-230	4	SAM	CVS	QRT	ROC	167	231.3		
88	T5	220-230	4	SAM	CVS	QRT	CHR	1	<0.1		
89	T6	245-255		SAM	SAM	SED	COL	1	1406.2		sorted
90	T6	245-255	4	SAM	CVS	QRT	COL	1	197.0		sorted
91	T6	245-255	8	SAM	CVS	ETH	COL	1	59.1		sorted
92	T6	245-255	16	SAM	CVS	SIX	COL	1	69.0		
93	T6	245-255	4	SAM	CVS	QRT	SHL	85	37.0		
94	T6	245-255	4	SAM	CVS	QRT	ROC	103	159.8		
95	T6	245-255	4	SAM	CVS	QRT	CHR	2	<0.1		

Table C-1. Artifact Catalog, Site 45SN393.

CAT	UNIT	LEV (cmbs)	SCRN	CLS	OBJ	DES	MAT	NO	WT (g)	VOL (ml)	DESCRIPTION
96	T6	205-215		SAM	SAM	SED	COL	1	1279.1		sorted
97	T6	205-215	4	SAM	CVS	QRT	COL	1	278.2		sorted
98	T6	205-215	8	SAM	CVS	ETH	COL	1	78.4		sorted
99	T6	205-215	16	SAM	CVS	SIX	COL	1	104.3		
100	T6	205-215	4	SAM	CVS	QRT	SHL	74	39.4		
101	T6	205-215	4	SAM	CVS	QRT	ROC	161	238.3		
102	T6	205-215	4	SAM	CVS	QRT	CHR	1	<0.1		
103	T6	205-215	4	SAM	CVS	QRT	FSH	2	0.2		Oncorhynchus sp., 2 caudal vertebraes
104	T6	205-215	4	SAM	CVS	QRT	WOD	2	0.1		
105	T5	190-200		SAM	SAM	SED	COL	1	1656.1		sorted
106	T5	190-200	4	SAM	CVS	QRT	COL	1	560.6		sorted
107	T5	190-200	8	SAM	CVS	ETH	COL	1	207.5		sorted
108	T5	190-200	16	SAM	CVS	SIX	COL	1	229.3		
109	T5	190-200	4	SAM	CVS	QRT	SHL	25	17.4		
110	T5	190-200	4	SAM	CVS	QRT	ROC	469	543.2		
111	T8	spoils	4	HIS	MTL	NAI	SQU	2	8.8		
112	T8	spoils	4	HIS	MTL	FAS	UNK	1	2.0		
113	T8	spoils	4	HIS	CER	ETH	TBL	2	6.7		
114	T8	spoils	4	HIS	GLS	UNK	GRN	2	27.0		
115	T8	spoils	4	HIS	GLS	UNK	BLK	1	17.9		
116	T11	162	4	FLS	DEB	BIP	VOL	1	102.5		from west profile wall, in situ
117	T8	spoils	4	FAU	LML	BON	NRN	26	109.5		sorted
118	T8	spoils	4	FAU	MML	BON	NRN	9	12.9		sorted
119	T8	spoils	4	FAU	MML	TOT	COM	1	4.2		U. americanus, 1 2nd molar upper
120	T8	spoils	4	FAU	MML	BON	NRN	2	36.1		Odocoileus sp., 2 left calcaneus
121	T8	spoils	4	FAU	AVI	BON	NRN	4	3.8		
122	T11	spoils		FLS	COR	FLC	CCS	1	8.1		from west profile wall, in situ
123	T8	spoils	4	FLS	PPT	BAS	CCS	1	2.5		
124	T8	spoils	4	FLS	COR	BIP	MET	1	7.7		
125	T8	spoils	4	GBS	ADZ	OTH	NEF	1	82.0		
126	T6	spoils		HIS	GLS	BUT	WHT	1	0.4		"prosser button"
127	T6	spoils	4	FLS	DEB	FLK	CCS	1	0.5		
128	T6	spoils	4	HIS	CER	ETH	FIG	1	1.7		doll arm
129	T6	spoils	4	HIS	CER	ETH	TBL	1	6.8		
130	T6	spoils	4	HIS	GLS	VES	CLR	2	14.5		
131	T6	spoils	4	HIS	GLS	UNK	BRN	1	9.5		
132	T6	spoils	4	HIS	GLS	UNK	BLK	5	83.1		
133	T8	spoils	4	HIS	GLS	UNK	AME	1	4.7		
134	T8	spoils	4	FLS	DEB	BIP	QZT	1	2.2		
135	T8	spoils	4	FLS	DEB	FLK	CCS	3	2.3		
135	T8	spoils	4	FLS	DEB	FLK	VOL	57	409.8		
136		spoils									Number not used
137	T6	spoils	4	FLS	DEB	SHA	CCS	1	0.4		
138	T6	spoils	4	FLS	DEB	FLK	BAS	1	3.4		
139	T6	spoils	4	FLS	DEB	FLK	QZT	1	3.3		
140	T6	spoils	4	FLS	DEB	FLK	VOL	19	167.5		
141	T6	spoils	4	FLS	DEB	FLK	SIL	1	3.4		
142	T6	spoils	4	FAU	LML	BON	NRN	47	375.9		sorted
143	T6	spoils	4	FAU	USF	BON	NRN	19	12.2		sorted

Table C-1. Artifact Catalog, Site 45SN393.

CAT	UNIT	LEV (cmbs)	SCRN	CLS	OBJ	DES	MAT	NO	WT (g)	VOL (ml)	DESCRIPTION
144	T6	spoils	4	FAU	AVI	BON	NRN	9	6.2		
145	T6	spoils	4	FAU	TTH	USF	USF	4	5.0		Beaver tooth fragments - possibly modified
146	T11	90-95		SAM	SAM	SED	COL	1	920.1		Facies Ah, sorted
147	T11	90-95	4	SAM	CVS	QRT	COL	1	316.4		Facies Ah, sorted
148	T11	90-95	8	SAM	CVS	ETH	COL	1	95.7		Facies Ah, unidentified fish, 2 unidentified fragments
149	T11	90-95	16	SAM	CVS	SIX	COL	1	63.7		Facies Ah
150	T11	90-95	4	SAM	CVS	QRT	SHL	14	7 5		Facies Ah
151	T11	90-95	4	SAM	CVS	QRT	MTL	1	4.5		Facies Ah
152	T11	90-95	4	SAM	CVS	QRT	ROC	207	301.2		Facies Ah
	153 to 187 not used										
188	T11	spoils	4	HIS	GLS	UNK	GRN	1	7.6		
189	T11	spoils	4	HIS	MTL	CLC	BUT	1	0.6		
190	T11	spoils	4	HIS	OTH	OTH	FRA	1	19.0		asphalt
191	T5	spoils	4	HIS	CER	ETH	PIP	1	1.6		
192	T11	spoils	4	FLS	DEB	FLK	VOL	5	178.5		
193	T11	spoils	4	FAU	FSH	BON	NRN	3	0.5		sorted
194	T11	spoils	4	FAU	AVI	BON	NRN	8	11.2		
195	T11	spoils	4	FAU	LML	BON	NRN	6	44.9		sorted
196	T11	spoils	4	FAU	MML	BON	NRN	65	70.0		sorted
197	T7	spoils		FAU	LML	BON	NRN	1	7.7		"back dirt pile", large mammal, 1 unidentified shaft fragment
198		spoils									See 45SN404 Cat #'s 120-132
199		spoils									See 45SN404 Cat #244
200		spoils									See 45SN404 Cat #245
201	T11	spoils	4	FLS	DEB	FLK	CCS	1	22.9		
202 to 216 not used											
217	T11	155-158		SAM	SAM	SED	COL	1	1337.4		Facies G, sh, l; sorted
218	T11	155-158	4	SAM	CVS	QRT	COL	1	422.3		Facies G, sh, l; sorted
219	T11	155-158	8	SAM	CVS	ETH	COL	1	119.0		Facies G, sh, l; sorted
220	T11	155-158	16	SAM	CVS	SIX	COL	1	137.1		Facies G, sh, l
221	T11	155-158	4	SAM	CVS	QRT	FSH	6	0.4		Facies G, sh, l; sorted
222	T11	155-158	4	SAM	CVS	QRT	CHR	6	0.2		Facies G, sh, l
223	T11	155-158	4	SAM	CVS	QRT	SHL	154	81.2		Facies G, sh, l
224	T11	155-158	4	SAM	CVS	QRT	ROC	246	340.2		Facies G, sh, l
225	T5	240-250		SAM	SAM	SED	COL	1	1344.4		sorted
226	T5	240-250	4	SAM	CVS	QRT	COL	1	501.6		sorted
227	T5	240-250	8	SAM	CVS	ETH	COL	1	206.7		uniden ified fish, 4 unidentified fragments
228	T5	240-250	16	SAM	CVS	SIX	COL	1	148.8		
229	T5	240-250	4	SAM	CVS	QRT	FSH	1	<0.1		Cottidae, 1 caudal vertebrae
230	T5	240-250	4	SAM	CVS	QRT	CHR	3	<0.1		
231	T5	240-250	4	SAM	CVS	QRT	SHL	84	116 9		
232	T5	240-250	4	SAM	CVS	QRT	ROC	373	384.1		
233	T5	spoils	4	HIS	GLS	UNK	YEL	1	6.2		
234	T5	spoils	4	HIS	GLS	BON	BRN	1	16.1		
235	T5	spoils	4	FAU	AVI	BON	NRN	2	0.8		2 vertebrae parts
236	T5	spoils	4	FAU	FSH	BON	NRN	4	2.1		sorted
237	T5	spoils	4	FAU	LML	BON	NRN	13	87.0		sorted
238	T5	spoils	4	FAU	USF	BON	NRN	7	2.2		7 unidentified mammal fragments
239	T5	230-240		SAM	SAM	SED	COL	1	1230.9		sorted

Table C-1. Artifact Catalog, Site 45SN393.

CAT	UNIT	LEV (cmbs)	SCRN	CLS	OBJ	DES	MAT	NO	WT (g)	VOL (ml)	DESCRIPTION
240	T5	230-240	4	SAM	CVS	QRT	COL	1	587.8		sorted
241	T5	230-240	8	SAM	CVS	ETH	COL	1	122.1		sorted
242	T5	230-240	16	SAM	CVS	SIX	COL	1	94.8		
243	T5	230-240	4	SAM	CVS	QRT	FAU	1	0.1		H. colliei, 1 tooth fragment
244	T5	230-240	4	SAM	CVS	QRT	CHR	4	0.1		
245	T5	230-240	4	SAM	CVS	QRT	SHL	363	207.4		
246	T5	230-240	4	SAM	CVS	QRT	ROC	232	378.7		
247	T11	132-135		SAM	SAM	SED	COL	1	1235.5		Facies Ah, sorted
248	T11	132-135	4	SAM	CVS	QRT	COL	1	355.2		Facies Ah, sorted
249	T11	132-135	8	SAM	CVS	ETH	COL	1	121.2		Facies Ah, sorted
250	T11	132-135	16	SAM	CVS	SIX	COL	1	83.5		Facies Ah
251	T11	132-135	4	SAM	CVS	QRT	FSH	15	1.2		Facies Ah, sorted
252	T11	132-135	4	SAM	CVS	QRT	SHL	172	39.3		Facies Ah
253	T11	132-135	4	SAM	CVS	QRT	ROC	259	314.6		Facies Ah
254	T11	132-135	4	SAM	CVS	QRT	CHR	2	0.1		Facies Ah
255	T6	215-225		SAM	SAM	SED	COL	1	1349.9		sorted
256	T6	215-225	4	SAM	CVS	QRT	COL	1	499.0		sorted
257	T6	215-225	8	SAM	CVS	ETH	COL	1	121.1		sorted
258	T6	215-225	16	SAM	CVS	SIX	COL	1	112.0		
259	T6	215-225	4	SAM	CVS	QRT	CHR	6	0.4		
260	T6	215-225	4	SAM	CVS	QRT	FSH	2	<0.1		sorted
261	T6	215-225	4	SAM	CVS	QRT	BON	3	2.1		unidentified mammal, 3 charred rib fragments
262	T6	215-225	4	SAM	CVS	QRT	BON	1	3.0		unidentified mammal, 1 longbone shaft fragment
263	T6	215-225	4	SAM	CVS	QRT	SHL	131	41.4		
264	T6	215-225	4	SAM	CVS	QRT	ROC	255	452.1		
265	T14	spoils	4	HIS	GLS	AQU	OTH	1	9.1		
266	T14	spoils	4	HIS	GLS	GRN	VES	2	3.0		
267	T14	spoils	4	HIS	MTL	CLC	CLP	1	2.1		
268	T14	spoils	4	HIS	MTL	UNK	UNK	1	10.0		
269	T14	spoils	4	FLS	DEB	FLK	VOL	12	43.2		
270	T14	spoils	4	GBS	HAM	BEN	VOL	1	420.0		Two round cobbles collected - non artifacts
271	T14	spoils	4	FAU	MML	BON	NRN	2	6.4		unidentified mammal, 2 longbone shaft fragments
272	T14	spoils	4	FAU	BON	HAR	USF	1	0.4		
273	T14	spoils	4	FAU	BON	PPT	USF	1	0.8		tip
274	T14	spoils	4	FAU	BON	USF	USF	1	1.2		ground fragment
275	T14	spoils	4	FAU	SHL	CLM	NRN	2	60.1		
276	T14	spoils	4	FAU	MML	TOT	COM	1	0.2		Odocoileus sp., 1 incisor
277	T14	spoils	4	FAU	USF	BON	NRN	23	27.3		sorted
278	T14	spoils	4	FAU	AVI	BON	NRN	29	12.6		
279	T14	spoils	4	FAU	FSH	BON	NRN	7	1.4		
280	T14	spoils	4	FAU	MML	BON	NRN	23	22.9		sorted
281	T14	spoils	4	FAU	MML	TOT	COM	1	2.6		Odocoileus sp., maxilla and 1st molar
282	T14	spoils	4	FAU	LML	BON	NRN	26	93.0		sorted
283	T11	150-152		SAM	SAM	SED	COL	1	1256.8		Facies Ah, sorted
284	T11	150-152	4	SAM	CVS	QRT	COL	1	506.4		Facies Ah, sorted
285	T11	150-152	8	SAM	CVS	ETH	COL	1	123.8		Facies Ah, sorted
286	T11	150-152	16	SAM	CVS	SIX	COL	1	105.9		Facies Ah
287	T11	150-152	4	SAM	CVS	QRT	CHR	11	0.9		Facies Ah

Table C-1. Artifact Catalog, Site 45SN393.

CAT	UNIT	LEV (cmbs)	SCRN	CLS	OBJ	DES	MAT	NO	WT (g)	VOL (ml)	DESCRIPTION
288	T11	150-152	4	SAM	CVS	QRT	FSH	1	0.1		Facies Ah, Oncorhynchus sp., 1 caudal vertebrae
289	T11	150-152	4	SAM	CVS	QRT	WOD	1	<0.1		Facies Ah
290	T11	150-152	4	SAM	CVS	QRT	SHL	188	131 0		Facies Ah
291	T11	150-152	4	SAM	CVS	QRT	ROC	266	374.1		Facies Ah
292	T14	210-220		SAM	SAM	SED	COL	1	1388.0		sorted
293	T14	210-220	4	SAM	CVS	QRT	COL	1	331.7		sorted
294	T14	210-220	8	SAM	CVS	ETH	COL	1	105.7		sorted
295	T14	210-220	16	SAM	CVS	SIX	COL	1	108.1		
296	T14	210-220	4	SAM	CVS	QRT	ROC	289	310.7		
297	T14	210-220	4	SAM	CVS	QRT	SHL	51	20.7		
298	T5	spoils	4	FLS	DEB	FLK	VOL	3	141.5		
299	T5	spoils	4	FLS	DEB	FLK	CCS	1	1.3		
300	T6	185-195		SAM	SAM	SED	COL	1	1340.5		sorted
301	T6	185-195	4	SAM	CVS	QRT	COL	1	306.4		sorted
302	T6	185-195	8	SAM	CVS	ETH	COL	1	101.1		sorted
303	T6	185-195	16	SAM	CVS	SIX	COL	1	101.9		
304	T6	185-195	4	SAM	CVS	QRT	SHL	16	8.6		
305	T6	185-195	4	SAM	CVS	QRT	CHR	4	0.6		
306	T6	185-195	4	SAM	CVS	QRT	ROC	222	295.7		
307	T14	220-230		SAM	SAM	SED	COL	1	1624.0		sorted
308	T14	220-230	4	SAM	CVS	QRT	COL	1	581.1		sorted
309	T14	220-230	8	SAM	CVS	ETH	COL	1	137.2		sorted
310	T14	220-230	16	SAM	CVS	SIX	COL	1	123.7		
311	T14	220-230	4	SAM	CVS	QRT	SHL	22	46.4		
312	T14	220-230	4	SAM	CVS	QRT	ROC	33	534.4		
313	T6	235-245		SAM	SAM	SED	COL	1	1435.2		sorted
314	T6	235-245	4	SAM	CVS	QRT	COL	1	300.5		sorted
315	T6	235-245	8	SAM	CVS	ETH	COL	1	100.2		sorted
316	T6	235-245	16	SAM	CVS	SIX	COL	1	89.5		
317	T6	235-245	4	SAM	CVS	QRT	CHR	2	0.1		
318	T6	235-245	4	SAM	CVS	QRT	SHL	126	43.1		
319	T6	235-245	4	SAM	CVS	QRT	ROC	211	257.2		
320	T5	215-225		SAM	SAM	BOT	PTV	-	0.3		Coniferous wood, analysed by S. Johannessen, 1 vial
320	T5	215-225		SAM	SAM	BOT	PTV	-	0.2		cf. Taxus, analysed by S. Johannessen, 1 vial
320	T5	215-225		SAM	SAM	BOT	PTV	-	0.2		analysed by S. Johannessen, 1 vial
320	T5	215-225		SAM	SAM	BOT	PTV	-	0.3		Thuja, analysed by S. Johannessen, 1 vial
320	T5	215-225		SAM	SAM	BOT	PTV	-	0.1		Acer, analysed by S. Johannessen, 1 vial
320	T5	215-225		SAM	SAM	BOT	PTV	-	0.5		Pseudotsuga, analysed by S. Johannessen, 1 vial
320	T5	215-225		SAM	SAM	BOT	PTV	-	0.2		Bark, analysed by S. Johannessen, 1 vial
320	T5	215-225		SAM	SAM	BOT	PTV	1	1931.1		Facies Ah, sample #1, seperated from bag #52, sorted for botanical analysis
320	T5	215-225		SAM	SAM	BOT	PTV	-	1.5		uniden ified wood, analysed by S. Johannessen, 1 vial
320	T5	215-225		SAM	SAM	BOT	PTV	-	0.2		uniden ified wood, analysed by S. Johannessen, 1 vial
320	T5	215-225		SAM	SAM	BOT	PTV	-	0.5		Tsuga, analysed by S. Johannessen, 1 vial
320	T5	215-225		SAM	SAM	BOT	PTV	-	0.2		Stem, analysed by S. Johannessen, 1 vial
321	T5	255-265		SAM	SAM	BOT	PTV	-	0.0		uniden ified wood, analysed by S. Johannessen, 1 vial

Table C-1. Artifact Catalog, Site 45SN393.

CAT	UNIT	LEV (cmbs)	SCRN	CLS	OBJ	DES	MAT	NO	WT (g)	VOL (ml)	DESCRIPTION
321	T5	255-265		SAM	SAM	BOT	PTV	-	0.1		Coniferous wood, analysed by S. Johannessen, 1 vial
321	T5	255-265		SAM	SAM	BOT	PTV	-	0.4		unidentified wood, analysed by S. Johannessen, 1 vial
321	T5	255-265		SAM	SAM	BOT	PTV	1	1906.0		sample #3, seperated from bag #54, sorted for botanical analysis
321	T5	255-265		SAM	SAM	BOT	PTV	-	0.1		Bark, analysed by S. Johannessen, 1 vial
322	T6	190-200		SAM	SAM	BOT	PTV	1	1221.0		Facies Aae, sample #1, seperated from bag #38, sorted for botanical analysis
322	T6	190-200		SAM	SAM	BOT	PTV	-	0.3		Coniferous wood, analysed by S. Johannessen, 1 vial
322	T6	190-200		SAM	SAM	BOT	PTV	-	6.1		wood/bark, analysed by S. Johannessen, 1 vial
322	T6	190-200		SAM	SAM	BOT	PTV	-	0.1		unidentified wood, analysed by S. Johannessen, 1 vial
323	T6	218-223		SAM	SAM	BOT	PTV	-	3.9		Pseudotsuga, not clean-see note, analysed by S. Johannessen, 1 vial
323	T6	218-223		SAM	SAM	BOT	PTV	1	1284.0		Facies Ah, sample #2, seperated from bag #39, sorted for botanical analysis
323	T6	218-223		SAM	SAM	BOT	PTV	-	19.2		Organic matrix mixed with charcoal wood, analysed by S. Johannessen, 1 vial
324	T6	295-305		SAM	SAM	BOT	PTV	-	1.7		unidentified wood, analysed by S. Johannessen, 1 vial
324	T6	295-305		SAM	SAM	BOT	PTV	1	1535.6		bottom of F. 2, sample #4, seperated from bag #41, sorted for botanical analysis
324	T6	295-305		SAM	SAM	BOT	PTV	-	0.1		Bark, analysed by S. Johannessen, 1 vial
324	T6	295-305		SAM	SAM	BOT	PTV	-	0.2		analysed by S. Johannessen, 1 vial
324	T6	295-305		SAM	SAM	BOT	PTV	-	0.6		Root, analysed by S. Johannessen, 1 vial
325	T11	108-112		SAM	SAM	BOT	PTV	-	0.2		Coniferous wood, analysed by S. Johannessen, 1 vial
325	T11	108-112		SAM	SAM	BOT	PTV	-	0.0		Thuja, analysed by S. Johannessen, 1vial
325	T11	108-112		SAM	SAM	BOT	PTV	-	0.4		unidentified wood, analysed by S. Johannessen, 1vial
325	T11	108-112		SAM	SAM	BOT	PTV	-	0.3		Bark, analysed by S. Johannessen, 1vial
325	T11	108-112		SAM	SAM	BOT	PTV	1	597.5		uppermost Ah, sample #1, seperated from bag #15, sorted for botanical analysis
326	T11	135-140		SAM	SAM	BOT	PTV	-	0.7		Stem, root, twig, analysed by S. Johannessen, 1 vial
326	T11	135-140		SAM	SAM	BOT	PTV	1	1085.8		sample #2, seperated from bag #16 for botanical analysis
326	T11	135-140		SAM	SAM	BOT	PTV	1vial	2.0		Pseudo tsuga, analysed by S. Johannessen
326	T11	135-140		SAM	SAM	BOT	PTV	-	9.0		unidentified wood, analysed by S. Johannessen, 1 vial
327	T11	162-168		SAM	SAM	BOT	PTV	-	1.0		Coniferous wood, analysed by S. Johannessen, 1 vial
327	T11	162-168		SAM	SAM	BOT	PTV	-	0.4		Bark, analysed by S. Johannessen, 1 vial
327	T11	162-168		SAM	SAM	BOT	PTV	-	4.3		unidentified wood, analysed by S. Johannessen, 1 vial
327	T11	162-168		SAM	SAM	BOT	PTV	-	0.0		Acer, analysed by S. Johannessen, 1 vial
327	T11	162-168		SAM	SAM	BOT	PTV	-	0.1		Thuja, analysed by S. Johannessen, 1 vial
327	T11	162-168		SAM	SAM	BOT	PTV	-	0.7		Tsuga, analysed by S. Johannessen, 1 vial
327	T11	162-168		SAM	SAM	BOT	PTV	1	717.4		sample #3, seperated from bag #17, sorted for botanical analysis
327	T11	162-168		SAM	SAM	BOT	PTV	-	33.0		Pseudo tsuga, analysed by S. Johannessen, 1 vial
328	T11	192-200		SAM	SAM	CHR	PTV	-	0.1		Psudotsuga, analysed by S. Johannessen, 1 vial

Table C-1. Artifact Catalog, Site 45SN393.

CAT	UNIT	LEV (cmbs)	SCRN	CLS	OBJ	DES	MAT	NO	WT (g)	VOL (ml)	DESCRIPTION
328	T11	192-200		SAM	SAM	CHR	PTV	-	0.2		Diffuse-porous B, analysed by S. Johannessen, 1 vial
328	T11	192-200		SAM	SAM	CHR	PTV	-	19.0		uniden ified wood, analysed by S. Johannessen, 1 vial
328	T11	192-200		SAM	SAM	CHR	PTV	-	0.4		Coniferous, analysed by S. Johannessen, 1 vial
328	T11	192-200		SAM	SAM	CHR	PTV	-	0.5		Thuja plicata, analysed by S. Johannessen, 1 vial
328	T11	192-200		SAM	SAM	CHR	PTV	-	0 2		Diffuse-p. A, analysed by S. Johannessen, 1 vial
328	T11	192-200		SAM	SAM	CHR	PTV	1	40 3		lowest Ah in northwall, sample #4, seperated from bag #18, sorted for botanical analysis
329	T14	180-190		SAM	SAM	BOT	PTV	-	0 0		Bark, analysed by S. Johannessen, 1 vial
329	T14	180-190		SAM	SAM	BOT	PTV	1	1742.1		sample #1, seperated from bag #84, sorted for botanical analysis
329	T14	180-190		SAM	SAM	BOT	PTV	-	0.0		Coniferous twig, analysed by S. Johannessen, 1 vial
329	T14	180-190		SAM	SAM	BOT	PTV	-	0.0		uniden ified wood, analysed by S. Johannessen, 1 vial
329	T14	180-190		SAM	SAM	BOT	PTV	-	0.1		Coniferous wood, analysed by S. Johannessen, 1 vial
330	T14	205-208		SAM	SAM	BOT	PTV	-	0.1		Bark, analysed by S. Johannessen, 1 vial
330	T14	205-208		SAM	SAM	BOT	PTV	-	0.8		uniden ified wood, analysed by S. Johannessen, 1 vial
330	T14	205-208		SAM	SAM	BOT	PTV	-	0.4		Coniferous wood, analysed by S. Johannessen, 1 vial
330	T14	205-208		SAM	SAM	BOT	PTV	-	0.2		cf. Thuja, analysed by S. Johannessen, 1 vial
330	T14	205-208		SAM	SAM	BOT	PTV	1	1545.8		Ah below the midden layer, sample #2, seperated from bag #85, sorted for botanical analysis
331	T14	230-235		SAM	SAM	BOT	PTV	-	0 2		Semi-diffuse porous "D", analysed by S. Johannessen, 1 vial
331	T14	230-235		SAM	SAM	BOT	PTV	-	0.1		Thuja, analysed by S. Johannessen, 1 vial
331	T14	230-235		SAM	SAM	BOT	PTV	-	0.2		cf. Tsuga, analysed by S. Johannessen, 1 vial
331	T14	230-235		SAM	SAM	BOT	PTV	-	0.4		Bark, analysed by S. Johannessen, 1 vial
331	T14	230-235		SAM	SAM	BOT	PTV	1	1600.8		upper Ah of lower Ah couplet, sample #3, seperated from bag #86, sorted for botanical analysis
331	T14	230-235		SAM	SAM	BOT	PTV	-	0.6		unidentified wood, analysed by S. Johannessen, 1 vial
331	T14	230-235		SAM	SAM	BOT	PTV	-	0.1		Acer, analysed by S. Johannessen, 1 vial
331	T14	230-235		SAM	SAM	BOT	PTV	-	0.2		Coniferous wood, analysed by S. Johannessen, 1 vial
332	T14	240-245		SAM	SAM	BOT	PTV	-	1.2		unidentified wood, analysed by S. Johannessen, 1 vial
332	T14	240-245		SAM	SAM	BOT	PTV	-	0.2		unidentified wood, analysed by S. Johannessen, 1 vial
332	T14	240-245		SAM	SAM	BOT	PTV	-	0.0		Tsuga, analysed by S. Johannessen, 1 vial
332	T14	240-245		SAM	SAM	BOT	PTV	-	0.4		Cf. Alnus, analysed by S. Johannessen, 1 vial
332	T14	240-245		SAM	SAM	BOT	PTV	-	0.0		Bark, analysed by S. Johannessen, 1 vial
332	T14	240-245		SAM	SAM	BOT	PTV	-	0.8		Coniferous cf. Pseudo tsuga, analysed by S. Joahannessen, 1 vial
332	T14	240-245		SAM	SAM	BOT	PTV	1	2059.2		lower Ah of lower Ah couplet, sample #4, seperated from bag #87, sorted for botanical analysis
332	T14	240-245		SAM	SAM	BOT	PTV	-	0.0		Thuja plicata, analysed by S. Johannessen, 1 vial
332	T14	240-245		SAM	SAM	BOT	PTV	-	0.0		Acer sp., analysed by S. Johannessen, 1 vial

Table C-1. Artifact Catalog, Site 45SN393.

CAT	UNIT	LEV (cmbs)	SCRN	CLS	OBJ	DES	MAT	NO	WT (g)	VOL (ml)	DESCRIPTION
333	T14	245-250		SAM	SAM	BOT	PTV	-	0.1		Thuja, analysed by S. Johannessen, 1 vial
333	T14	245-250		SAM	SAM	BOT	PTV	-	6.6		unidentified wood, analysed by S. Johannessen, 1 vial
333	T14	245-250		SAM	SAM	BOT	PTV	-	6.1		Bark, analysed by S. Johannessen, 1 vial
333	T14	245-250		SAM	SAM	BOT	PTV	-	0.3		Coniferous wood, analysed by S. Johannessen, 1 vial
333	T14	245-250		SAM	SAM	BOT	PTV	-	0.9		Pseudotsuga, analysed by S. Johannessen, 1 vial
333	T14	245-250		SAM	SAM	BOT	PTV	-	0.6		cf. Pirus, analysed by S. Johannessen, 1 vial
333	T14	245-250		SAM	SAM	BOT	PTV	1	1887.7		(east wall profile), sample #5, seperated from bag #88, sorted for botanical analysis
334	T5	210-220		SAM	SAM	BOT	PTV	1	1569.7		sorted
335	T5	210-220	4	SAM	CVS	QRT	COL	1	351.7		sorted
336	T5	210-220	8	SAM	CVS	ETH	COL	1	155.9		sorted
337	T5	210-220	16	SAM	CVS	SIX	COL	1	154.4		
338	T5	210-220	4	SAM	CVS	QRT	ROC	260	301.5		
339	T5	210-220	4	SAM	CVS	QRT	FSH	3	0.1		
340	T5	210-220	4	SAM	CVS	QRT	WOD	3	1.3		
341	T5	210-220	4	SAM	CVS	QRT	CHR	14	2.8		
342	T11	160-165		SAM	SAM	SED	COL	1	1371.3		Facies Ah, sorted
343	T5	210-220	4	SAM	CVS	QRT	SHL	92	46.0		
344	T11	160-165	4	SAM	CVS	QRT	COL	1	574.4		Facies Ah, sorted
345	T11	160-165	8	SAM	CVS	ETH	COL	1	247.2		Facies Ah, sorted
346	T11	160-165	16	SAM	CVS	SIX	COL	1	71.5		Facies Ah,
347	T11	160-165	4	SAM	CVS	QRT	WOD	2	0.1		Facies Ah,
348	T11	160-165	4	SAM	CVS	QRT	FSH	4	1.2		Facies Ah, sorted
349	T11	160-165	4	SAM	CVS	QRT	CHR	44	1.3		Facies Ah,
350	T11	160-165	4	SAM	CVS	QRT	ROC	235	479.5		Facies Ah,
351	T11	160-165	4	SAM	CVS	QRT	SHL	382	92.3		Facies Ah,
352	T11	105-110		SAM	SAM	SED	COL	1	1101.0		sorted
353	T11	105-110	4	SAM	CVS	QRT	COL	1	401.3		sorted
354	T11	105-110	8	SAM	CVS	ETH	COL	1	156.3		sorted
355	T11	105-110	16	SAM	CVS	SIX	COL	1	136.2		
356	T11	105-110	4	SAM	CVS	QRT	SHL	26	5.1		
357	T11	105-110	4	SAM	CVS	QRT	CHR	16	0.6		
358	T11	105-110	4	SAM	CVS	QRT	ROC	342	395.6		
359	T14	250-255		SAM	SAM	SED	COL	1	1188.3		sorted
360	T14	250-255	4	SAM	CVS	QRT	COL	1	294.0		sorted
361	T14	250-255	8	SAM	CVS	ETH	COL	1	167.4		sorted
362	T14	250-255	16	SAM	CVS	SIX	COL	1	150.3		
363	T14	250-255	4	SAM	CVS	QRT	FSH	2	0.2		sorted
364	T14	250-255	4	SAM	CVS	QRT	SHL	54	14.7		
365	T14	250-255	4	SAM	CVS	QRT	CHR	35	8.5		
366	T14	250-255	4	SAM	CVS	QRT	ROC	256	249.3		
367	T14	180-190		SAM	SAM	SED	COL	1	1339.1		sorted
368	T14	180-190	4	SAM	CVS	QRT	COL	1	338.0		sorted
369	T14	180-190	8	SAM	CVS	ETH	COL	1	105.4		sorted
370	T14	180-190	16	SAM	CVS	SIX	COL	1	93.4		
371	T14	230-240		SAM	SAM	SED	COL	1	1572.0		sorted
372	T14	230-240	16	SAM	CVS	SIX	COL	1	192.1		

Table C-1. Artifact Catalog, Site 45SN393.

CAT	UNIT	LEV (cmbs)	SCRN	CLS	OBJ	DES	MAT	NO	WT (g)	VOL (ml)	DESCRIPTION
373	T14	230-240	8	SAM	CVS	ETH	COL	1	175.2		sorted
374	T14	230-240	4	SAM	CVS	QRT	COL	1	582.7		sorted
375	T14	230-240	4	SAM	CVS	QRT	CHR	21	2.5		
376	T14	230-240	4	SAM	CVS	QRT	ROC	443	467.7		
377	T14	230-240	4	SAM	CVS	QRT	SHL	172	110.6		
378	T14	230-240	4	SAM	CVS	QRT	FSH	1	<0.1		
379	T6	225-235		SAM	SAM	SED	COL	1	1240.1		sorted
380	T6	225-235	8	SAM	CVS	ETH	COL	1	90.5		sorted
381	T6	225-235	16	SAM	CVS	SIX	COL	1	58.4		
382	T6	225-235	4	SAM	CVS	QRT	COL	1	493.9		sorted
383	T6	225-235	4	SAM	CVS	QRT	FSH	2	0.2		sorted
384	T6	225-235	4	SAM	CVS	QRT	ROC	219	464.7		
385	T6	225-235	4	SAM	CVS	QRT	SHL	277	29.0		
386	T14	180-190	4	SAM	CVS	QRT	SHL	50	9.6		
387	T14	180-190	4	SAM	CVS	QRT	ROC	210	260.6		
388	T14	180-190	4	SAM	CVS	QRT	FSH	2	0.6		sorted
389	T14	180-190	4	SAM	CVS	QRT	WOD	3	0.3		
390	T14	180-190	4	SAM	CVS	QRT	CHR	5	0.2		
391	T14	180-190	4	SAM	CVS	QRT	FAU	1	<0.1		
392	T14	240-250		SAM	SAM	SED	COL	1	1457.7		sorted
393	T14	240-250	4	SAM	CVS	QRT	COL	1	495.5		sorted
394	T14	240-250	8	SAM	CVS	ETH	COL	1	150.7		Oncorhynchus sp., 3 vertebrae fragments
395	T14	240-250	16	SAM	CVS	SIX	COL	1	149.6		
396	T14	240-250	4	SAM	CVS	QRT	SHL	51	16.0		
397	T14	240-250	4	SAM	CVS	QRT	CHR	12	0.5		
398	T14	240-250	4	SAM	CVS	QRT	ROC	376	479.4		
399	T14	205-208		SAM	SAM	SED	COL	1	1299.3		sorted
400	T14	205-208	4	SAM	CVS	QRT	COL	1	330.2		sorted
401	T14	205-208	8	SAM	CVS	ETH	COL	1	63.8		sorted
402	T14	205-208	16	SAM	CVS	SIX	COL	1	79.1		
403	T14	205-208	4	SAM	CVS	QRT	SHL	19	12.9		
404	T14	205-208	4	SAM	CVS	QRT	FSH	2	0.1		Oncorhynchus sp., 1 thoracic vertebrae, 1 caudal vertebrae
405	T14	205-208	4	SAM	CVS	QRT	CHR	3	0.1		
406	T14	205-208	4	SAM	CVS	QRT	ROC	192	316.8		
407	T14	230-235		SAM	SAM	SED	COL	1	1321.0		Facies Ah, sorted
408	T14	230-235	4	SAM	CVS	QRT	COL	1	365.1		Facies Ah, sorted
409	T14	230-235	8	SAM	CVS	ETH	COL	1	133.1		Facies Ah, sorted
410	T14	230-235	16	SAM	CVS	SIX	COL	1	129.1		Facies Ah
411	T14	230-235	4	SAM	CVS	QRT	SHL	108	107 8		Facies Ah
412	T14	230-235	4	SAM	CVS	QRT	FSH	3	0 3		Facies Ah, Oncorhynchus sp., 1 caudal vertebrae, 2 vertebrae fragments
413	T14	230-235	4	SAM	CVS	QRT	CHR	9	0 5		Facies Ah
414	T14	230-235	4	SAM	CVS	QRT	FAU	1	0 2		Facies Ah
415	T14	230-235	4	SAM	CVS	QRT	ROC	205	255.9		Facies Ah
416	T14	190-200		SAM	SAM	SED	COL	1	1316.0		sorted
417	T14	190-200	4	SAM	CVS	QRT	COL	1	203.2		sorted
418	T14	190-200	8	SAM	CVS	ETH	COL	1	38.9		sorted
419	T14	190-200	16	SAM	CVS	SIX	COL	1	53.2		
420	T14	190-200	4	SAM	CVS	QRT	ROC	111	194.0		

Table C-1. Artifact Catalog, Site 45SN393.

CAT	UNIT	LEV (cmbs)	SCRN	CLS	OBJ	DES	MAT	NO	WT (g)	VOL (ml)	DESCRIPTION
421	T14	190-200	4	SAM	CVS	QRT	FSH	1	<0.1		P. stellatus, 1 right quadrate
422	T14	190-200	4	SAM	CVS	QRT	SHL	28	9.0		
423	T14	190-200	4	SAM	CVS	QRT	FAU	1	0.1		
424	T14	200-210		SAM	SAM	SED	COL	1	1373.1		sorted
425	T14	200-210	4	SAM	CVS	QRT	COL	1	336.1		sorted
426	T14	200-210	8	SAM	CVS	ETH	COL	1	85.2		sorted
427	T14	200-210	16	SAM	CVS	SIX	COL	1	98.6		
428	T14	200-210	4	SAM	CVS	QRT	SHL	20	15.7		
429	T14	200-210	4	SAM	CVS	QRT	ROC	235	320.2		
430	T6	175-185		SAM	SAM	SED	COL	1	1107.8		sorted
431	T6	175-185	4	SAM	CVS	QRT	COL	1	293.6		sorted
432	T6	175-185	8	SAM	CVS	ETH	COL	1	82.6		sorted
433	T6	175-185	16	SAM	CVS	SIX	COL	1	81.4		
434	T6	175-185	4	SAM	CVS	QRT	CHR	46	13.1		
435	T6	175-185	4	SAM	CVS	QRT	SHL	13	4.7		
436	T6	175-185	4	SAM	CVS	QRT	ROC	209	245.8		
437	T6	175-185	4	SAM	CVS	QRT	FAU	1	0.5		unidentified mammal fragment
438	T6	175-185	4	SAM	CVS	QRT	WOD	20	1.5		
439	T8	215-220		SAM	SAM	SED	COL	1	1293.9		sorted
440	T8	215-220	4	SAM	CVS	QRT	COL	1	333.4		sorted
441	T8	215-220	8	SAM	CVS	ETH	COL	1	86.8		sorted
442	T8	215-220	16	SAM	CVS	SIX	COL	1	73.0		
443	T8	215-220	4	SAM	CVS	QRT	CHR	22	1.7		
444	T8	215-220	4	SAM	CVS	QRT	SHL	8	2.1		
445	T8	215-220	4	SAM	CVS	QRT	WOD	3	0.2		
446	T8	215-220	4	SAM	CVS	QRT	ROC	58	328.4		
447	T14	170-180		SAM	SAM	SED	COL	1	1386.5		sorted
448	T14	170-180	4	SAM	CVS	QRT	COL	1	513.6		sorted
449	T14	170-180	8	SAM	CVS	ETH	COL	1	126.6		sorted
450	T14	170-180	16	SAM	CVS	SIX	COL	1	114.3		
451	T14	170-180	4	SAM	CVS	QRT	SHL	12	6.0		
452	T14	170-180	4	SAM	CVS	QRT	ROC	374	506.4		
453	T14	240-245		SAM	SAM	SED	COL	1	1401.6		Facies Ah, sorted
454	T14	240-245	4	SAM	CVS	QRT	COL	1	512.6		Facies Ah, sorted
455	T14	240-245	8	SAM	CVS	ETH	COL	1	130.3		Facies Ah, sorted
456	T14	240-245	16	SAM	CVS	SIX	COL	1	111.1		Facies Ah
457	T14	240-245	4	SAM	CVS	QRT	CHR	27	2.0		Facies Ah
458	T14	240-245	4	SAM	CVS	QRT	FSH	2	<0.1		Facies Ah, sorted
459	T14	240-245	4	SAM	CVS	QRT	SHL	58	21.1		Facies Ah
460	T14	240-245	4	SAM	CVS	QRT	ROC	325	488.8		Facies Ah
461	T13	270-280		SAM	SAM	BOT	PTV	1	242.5		Facies Ah
462	T11	108-112		SAM	SAM	BOT	PTV	1	871.6		597.5g charcoal removed for C-14
463	T11	162-168		SAM	SAM	BOT	PTV	1	1980.4		717.4g charcoal removed for C-14, botanical analysis #1
464	T11	192-200		SAM	SAM	BOT	PTV	1	1931.9		40.3g charcoal removed for C-14, botanical analysis #4
465	T6	295-305		SAM	SAM	BOT	PTV	1	1367.4		1535.6g charcoal removed for C-14, botanical analysis #4
466	T8	spoils		SAM	SAM	OCR	COL	1	0.1		

Table C-1. Artifact Catalog, Site 45SN393.

CAT	UNIT	LEV (cmbs)	SCRN	CLS	OBJ	DES	MAT	NO	WT (g)	VOL (ml)	DESCRIPTION
467	T11	135-140		SAM	SAM	BOT	PTV	1	3700.0		1085.8g charcoal removed for C-14, botanical analysis #2
468	T6	240-255		SAM	SAM	BOT	PTV	1	3900.0		botanical analysis #3
469	T8	210-245		SAM	SAM	SED	COL	1	3950.0		sorted
470		spoils									See 45SN404 Cat #246
471		spoils									See 45SN404 Cat #247
472	T6	210-245	4	SAM	CVS	QRT	COL	1	1364.3		sorted
473	T6	210-245	8	SAM	CVS	ETH	COL	1	275.7		sorted
474	T6	210-245	16	SAM	CVS	SIX	COL	1	108.2		
475	T6	210-245	4	SAM	CVS	QRT	CHR	23	1.8		
476	T6	210-245	4	SAM	CVS	QRT	WOD	84	44.7		
477	T6	210-245	4	SAM	CVS	QRT	SHL	26	11.7		
478	T6	210-245	4	SAM	CVS	QRT	ROC	857	1299.8		
479	T14	180-190		SAM	SAM	BOT	PTV	1	2400.0		botanical sample #1, 1742.1g removed for C-14
480	T6	190-200		SAM	SAM	BOT	PTV	1	1109.5		botanical sample #1, 1221.0g removed for C-14
481	T14	240-245		SAM	SAM	BOT	PTV	1	1112.4		botanical sample #4, 2059.2g removed for C-14
482	T14	230-235		SAM	SAM	BOT	PTV	1	1508.3		botanical sample #3, 1600.8g removed for C-14
483	T5	255-265		SAM	SAM	BOT	PTV	1	2400.0		botanical sample #3, 1906.0g removed for C-14
484	T5	215-225		SAM	SAM	BOT	PTV	1	1285.2		botanical sample #1, 1931.1g removed for C-14
485	T6	218-223		SAM	SAM	BOT	PTV	1	2550.0		botanical sample #2, 1284.0g removed for C-14
486	T14	245-250		SAM	SAM	BOT	PTV	1	1454.4		botanical sample #5
487	T5	230-238		SAM	SAM	BOT	PTV	1	2800.0		botanical sample #2
488	T14	205-208		SAM	SAM	BOT	PTV	1	1841.8		botanical sample #2, 1545.8g removed for C-14
489	BH6	518.2		SAM	SAM	BOT	PTV	1			C-14 sample
490	BH12	206-213		SAM	SAM	SED	COL	1	1597.5	1000	SI 5-7 FBS, midden 21-24 inches, AH 12, sorted
491	BH12	206-213	4	SAM	CVS	QRT	COL	1	74.4		SI 5-7 FBS, midden 21-24 inches, AH 12, sorted
492	BH12	206-213	8	SAM	CVS	ETH	COL	1	23.0		SI 5-7 FBS, midden 21-24 inches, AH 12
493	BH12	206-213	16	SAM	CVS	SIX	COL	1	39.1		SI 5-7 FBS, midden 21-24 inches, AH 12
494	BH12	206-213	4	SAM	CVS	QRT	CHR	2	0.2		SI 5-7 FBS, midden 21-24 inches, AH 12
495	BH12	206-213	4	SAM	CVS	QRT	SHL	19	7.6		SI 5-7 FBS, midden 21-24 inches, AH 12
496	BH12	206-213	4	SAM	CVS	QRT	ROC	27	66.3		SI 5-7 FBS, midden 21-24 inches, AH 12
497	BH12	145-152		SAM	SAM	SED	COL	1	804.6	500	SI 4-5 FBS, midden 9-12 inches, AH 12, sorted
498	BH12	145-152	4	SAM	CVS	QRT	COL	1	89.0		SI 4-5 FBS, midden 9-12 inches, AH 12, sorted
499	BH12	145-152	8	SAM	CVS	ETH	COL	1	59.2		SI 4-5 FBS, midden 9-12 inches, AH 12
500	BH12	145-152	16	SAM	CVS	SIX	COL	1	63.5		SI 4-5 FBS, midden 9-12 inches, AH 12
501	BH12	145-152	4	SAM	CVS	QRT	FSH	2	0.2		SI 4-5 FBS, midden 9-12 inches, AH 12, Oncorhynchus sp., 1 epural, 1 caudal vertebrae
502	BH12	145-152	4	SAM	CVS	QRT	SHL	10	7.6		SI 4-5 FBS, midden 9-12 inches, AH 12
503	BH12	145-152	4	SAM	CVS	QRT	ROC	69	80.4		SI 4-5 FBS, midden 9-12 inches, AH 12
504	BH12	196-206		SAM	SAM	SED	COL	1	1489.9	1000	SI 5-7 FBS, midden 17-21 inches, AH 12, sorted

Table C-1. Artifact Catalog, Site 45SN393.

CAT	UNIT	LEV (cmbs)	SCRN	CLS	OBJ	DES	MAT	NO	WT (g)	VOL (ml)	DESCRIPTION
505	BH12	196-206	4	SAM	CVS	QRT	COL	1	266.4		SI 5-7 FBS, midden 17-21 inches, AH 12, sorted
506	BH12	196-206	8	SAM	CVS	ETH	COL	1	82.7		SI 5-7 FBS, midden 17-21 inches, AH 12
507	BH12	196-206	16	SAM	CVS	SIX	COL	1	78.7		SI 5-7 FBS, midden 17-21 inches, AH 12
508	BH12	196-206	4	SAM	CVS	QRT	SHL	53	16.0		SI 5-7 FBS, midden 17-21 inches, AH 12
509	BH12	196-206	4	SAM	CVS	QRT	ROC	97	250.2		SI 5-7 FBS, midden 17-21 inches, AH 12
510	BH12	196-206	4	SAM	CVS	QRT	CHR	1	0.1		SI 5-7 FBS, midden 17-21 inches, AH 12
511	BH12	121.9		SAM	SAM	SED	COL	1	588.7	500	SI 2-4 FBS, midden 4 FBS "shoe", AH 12, sorted
512	BH12	121.9	4	SAM	CVS	QRT	COL	1	185.7		SI 2-4 FBS, midden 4 FBS "shoe", AH 12, sorted
513	BH12	121.9	8	SAM	CVS	ETH	COL	1	75.1		SI 2-4 FBS, midden 4 FBS "shoe", AH 12
514	BH12	121.9	16	SAM	CVS	SIX	COL	1	78.5		SI 2-4 FBS, midden 4 FBS "shoe", AH 12
515	BH12	121.9	4	SAM	CVS	QRT	CHR	1	0.1		SI 2-4 FBS, midden 4 FBS "shoe", AH 12
516	BH12	121.9	4	SAM	CVS	QRT	FSH	1	<0.1		SI 2-4 FBS, midden 4 FBS "shoe", AH 12, Pleuronectiformes, 1 caudal vertebrae
517	BH12	121.9	4	SAM	CVS	QRT	SHL	3	0.8		SI 2-4 FBS, midden 4 FBS "shoe", AH 12
518	BH12	121.9	4	SAM	CVS	QRT	ROC	145	183.7		SI 2-4 FBS, midden 4 FBS "shoe", AH 12
519	BH12	185-196		SAM	SAM	SED	COL	1	1415.9	1000	SI 5-7 FBS, midden 13-17 inches, AH 12, sorted
520	BH12	185-196	4	SAM	CVS	QRT	COL	1	376.9		SI 5-7 FBS, midden 13-17 inches, AH 12, sorted
521	BH12	185-196	8	SAM	CVS	ETH	COL	1	104.6		SI 5-7 FBS, midden 13-17 inches, AH 12
522	BH12	185-196	16	SAM	CVS	SIX	COL	1	90.1		SI 5-7 FBS, midden 13-17 inches, AH 12
523	BH12	185-196	4	SAM	CVS	QRT	SHL	43	14.5		SI 5-7 FBS, midden 13-17 inches, AH 12
524	BH12	185-196	4	SAM	CVS	QRT	ROC	277	362.2		SI 5-7 FBS, midden 13-17 inches, AH 12
525	BH19	180-187		SAM	SAM	SED	COL	1	428.4	250	SI 5-7 FBS, midden 11-13.5 inches, AH 19, sorted
526	BH19	180-187	4	SAM	CVS	QRT	COL	1	196.8		SI 5-7 FBS, midden 11-13.5 inches, AH 19, sorted
527	BH19	180-187	8	SAM	CVS	ETH	COL	1	49.8		SI 5-7 FBS, midden 11-13.5 inches, AH 19
528	BH19	180-187	16	SAM	CVS	SIX	COL	1	23.0		SI 5-7 FBS, midden 11-13.5 inches, AH 19
529	BH19	180-187	4	SAM	CVS	QRT	ROC	88	196.7		SI 5-7 FBS, midden 11-13.5 inches, AH 19
530	BH12	111-122		SAM	SAM	SED	COL	1	1799.9	1500	SI 2-4 FBS, midden 19.5-24 inches, AH 12, sorted
531	BH12	111-122	4	SAM	CVS	QRT	COL	1	455.9		SI 2-4 FBS, midden 19.5-24 inches, AH 12, sorted
532	BH12	111-122	8	SAM	CVS	ETH	COL	1	192.5		SI 2-4 FBS, midden 19.5-24 inches, AH 12
533	BH12	111-122	16	SAM	CVS	SIX	COL	1	208.1		SI 2-4 FBS, midden 19 5-24 inches, AH 12
534	BH12	111-122	4	SAM	CVS	QRT	SHL	9	3.5		SI 2-4 FBS, midden 19.5-24 inches, AH 12
535	BH12	111-122	4	SAM	CVS	QRT	MTL	5	12.2		SI 2-4 FBS, midden 19.5-24 inches, AH 12
536	BH12	111-122	4	SAM	CVS	QRT	CHR	2	<0.1		SI 2-4 FBS, midden 19.5-24 inches, AH 12
537	BH12	111-122	4	SAM	CVS	QRT	MAM	1	0.1		SI 2-4 FBS, midden 19.5-24 inches, AH 12
538	BH12	111-122	4	SAM	CVS	QRT	ROC	68	438.5		SI 2-4 FBS, midden 19.5-24 inches, AH 12
539	BH12	111-122	4	SAM	CVS	QRT	OTH	1	0.1		SI 2-4 FBS, midden 19.5-24 inches, AH 12
540	BH12	135-145		SAM	SAM	SED	COL	1	1078.0	1000	SI 4-5 FBS, midden 5-9 inches, AH 12, sorted
541	BH12	135-145	4	SAM	CVS	QRT	COL	1	317.3		SI 4-5 FBS, midden 5-9 inches, AH 12, sorted
542	BH12	135-145	8	SAM	CVS	ETH	COL	1	112.4		SI 4-5 FBS, midden 5-9 inches, AH 12
543	BH12	135-145	16	SAM	CVS	SIX	COL	1	136.1		SI 4-5 FBS, midden 5-9 inches, AH 12
544	BH12	135-145	4	SAM	CVS	QRT	ROC	222	313.4		SI 4-5 FBS, midden 5-9 inches, AH 12
545	BH12	5.75-6.08		SAM	SAM	SED	COL	1	931.6	500	SI 5-7 FBS, midden 9-13 inches, AH 12, sorted

Table C-1. Artifact Catalog, Site 45SN393.

CAT	UNIT	LEV (cmbs)	SCRN	CLS	OBJ	DES	MAT	NO	WT (g)	VOL (ml)	DESCRIPTION
546	BH12	5.75-6.09	4	SAM	CVS	QRT	COL	1	202.3		SI 5-7 FBS, midden 9-13 inches, AH 12, sorted
547	BH12	5.75-6.10	8	SAM	CVS	ETH	COL	1	86.2		SI 5-7 FBS, midden 9-13 inches, AH 12
548	BH12	5.75-6.11	16	SAM	CVS	SIX	COL	1	76.4		SI 5-7 FBS, midden 9-13 inches, AH 12
549	BH12	5.75-6.12	4	SAM	CVS	QRT	SHL	17	9.8		SI 5-7 FBS, midden 9-13 inches, AH 12
550	BH12	5.75-6.13	4	SAM	CVS	QRT	ROC	187	191 5		SI 5-7 FBS, midden 9-13 inches, AH 12
551	BH23	213		SAM	SAM	SED	COL	1	385.2	250	SI 5-7 FBS, midden 7 FBS "shoe", AH 23, sorted
552	BH23	213	4	SAM	CVS	QRT	COL	1	119 2		SI 5-7 FBS, midden 7 FBS "shoe", AH 23, sorted
553	BH23	213	8	SAM	CVS	ETH	COL	1	29.6		SI 5-7 FBS, midden 7 FBS "shoe", AH 23
554	BH23	213	16	SAM	CVS	SIX	COL	1	31.8		SI 5-7 FBS, midden 7 FBS "shoe", AH 23
555	BH23	213	4	SAM	CVS	QRT	CHR	3	3.1		SI 5-7 FBS, midden 7 FBS "shoe", AH 23
556	BH23	213	4	SAM	CVS	QRT	SHL	30	10 2		SI 5-7 FBS, midden 7 FBS "shoe", AH 23
557	BH23	213	4	SAM	CVS	QRT	ROC	59	105.7		SI 5-7 FBS, midden 7 FBS "shoe", AH 23
558	BH25	208-213		SAM	SAM	SED	COL	1	1606.1	1000	SI 5-7 FBS, midden 20-24 inches, AH 25, sorted
559	BH25	208-213	4	SAM	CVS	QRT	COL	1	616.3		SI 5-7 FBS, midden 20-24 inches, AH 25, sorted
560	BH25	208-213	8	SAM	CVS	ETH	COL	1	213.7		SI 5-7 FBS, midden 20-24 inches, AH 25
561	BH25	208-213	16	SAM	CVS	SIX	COL	1	110.6		SI 5-7 FBS, midden 20-24 inches, AH 25
562	BH25	208-213	4	SAM	CVS	QRT	SHL	53	22 8		SI 5-7 FBS, midden 20-24 inches, AH 25
563	BH25	208-213	4	SAM	CVS	QRT	ROC	592	592 3		SI 5-7 FBS, midden 20-24 inches, AH 25
564	BH23	208-213		SAM	SAM	SED	COL	1	1496 8	1000	SI 5-7 FBS, midden 20-24 inches, AH 23, sorted
565	BH23	208-213	4	SAM	CVS	QRT	COL	1	415.1		SI 5-7 FBS, midden 20-24 inches, AH 23, sorted
566	BH23	208-213	8	SAM	CVS	ETH	COL	1	200.9		SI 5-7 FBS, midden 20-24 inches, AH 23
567	BH23	208-213	16	SAM	CVS	SIX	COL	1	153.4		SI 5-7 FBS, midden 20-24 inches, AH 23
568	BH23	208-213	4	SAM	CVS	QRT	SHL	34	8.8		SI 5-7 FBS, midden 20-24 inches, AH 23
569	BH23	208-213	4	SAM	CVS	QRT	ROC	430	460 0		SI 5-7 FBS, midden 20-24 inches, AH 23
570	BH25	193-203		SAM	SAM	SED	COL	1	1905 8	1000	SI 5-7 FBS, midden 16-20 inches, AH 25, sorted
571	BH25	193-203	4	SAM	CVS	QRT	COL	1	637.2		SI 5-7 FBS, midden 16-20 inches, AH 25, sorted
572	BH25	193-203	8	SAM	CVS	ETH	COL	1	222.3		SI 5-7 FBS, midden 16-20 inches, AH 25
573	BH25	193-203	16	SAM	CVS	SIX	COL	1	145 3		SI 5-7 FBS, midden 16-20 inches, AH 25
574	BH25	193-203	4	SAM	CVS	QRT	SHL	18	5.0		SI 5-7 FBS, midden 16-20 inches, AH 25
575	BH25	193-203	4	SAM	CVS	ETH	MTL	1	1.8		SI 5-7 FBS, midden 16-20 inches, AH 25
576	BH25	193-203	4	SAM	CVS	SIX	ROC	60	628.1		SI 5-7 FBS, midden 16-20 inches, AH 25
577	BH23	193-203		SAM	SAM	SED	COL	1	1993 2	1500	SI 5-7 FBS, midden 16-20 inches, AH 23, sorted
578	BH23	193-203	4	SAM	CVS	QRT	COL	1	553.3		SI 5-7 FBS, midden 16-20 inches, AH 23, sorted
579	BH23	193-203	8	SAM	CVS	ETH	COL	1	198.8		SI 5-7 FBS, midden 16-20 inches, AH 23
580	BH23	193-203	16	SAM	CVS	SIX	COL	1	224.6		SI 5-7 FBS, midden 16-20 inches, AH 23
581	BH23	193-203	4	SAM	CVS	QRT	SHL	14	9.4		SI 5-7 FBS, midden 16-20 inches, AH 23
582	BH23	193-203	4	SAM	CVS	QRT	GLS	1	0.4		SI 5-7 FBS, midden 16-20 inches, AH 23
583	BH23	193-203	4	SAM	CVS	QRT	ROC	396	542.1		SI 5-7 FBS, midden 16-20 inches, AH 23
584	BH42	155-175		SAM	SAM	SED	COL	1	401.1	100	SI 5-7 FBS, "wash" top of sample, 1-9 inches interval, AH 42, sorted
585	BH42	155-175	4	SAM	CVS	QRT	COL	1	304 8		SI 5-7 FBS, "wash" top of sample, 1-9 inches interval, AH 42, sorted

Table C-1. Artifact Catalog, Site 45SN393.

CAT	UNIT	LEV (cmbs)	SCRN	CLS	OBJ	DES	MAT	NO	WT (g)	VOL (ml)	DESCRIPTION
586	BH42	155-175	8	SAM	CVS	ETH	COL	1	282.2		SI 5-7 FBS, "wash" top of sample, 1-9 inches interval, AH 42
587	BH42	155-175	16	SAM	CVS	SIX	COL	1	12.6		SI 5-7 FBS, "wash" top of sample, 1-9 inches interval, AH 42
588	BH42	155-175	4	SAM	CVS	QRT	ROC	70	303.7		SI 5-7 FBS, "wash" top of sample, 1-9 inches interval, AH 42
589	BH42	155-175	4	SAM	CVS	QRT	OTH	2	1.1		SI 5-7 FBS, "wash" top of sample, 1-9 inches interval, AH 42
590	BH42	137-147		SAM	SAM	SED	COL	1	1084.8	750	SI 4-5 FBS, midden 6-10 inches, AH 42, sorted
591	BH42	137-147	4	SAM	CVS	QRT	COL	1	166.2		SI 4-5 FBS, midden 6-10 inches, AH 42, sorted
592	BH42	137-147	8	SAM	CVS	ETH	COL	1	73.6		SI 4-5 FBS, midden 6-10 inches, AH 42
593	BH42	137-147	16	SAM	CVS	SIX	COL	1	67.9		SI 4-5 FBS, midden 6-10 inches, AH 42
594	BH42	137-147	4	SAM	CVS	QRT	SHL	13	8.4		SI 4-5 FBS, midden 6-10 inches, AH 42
595	BH42	137-147	4	SAM	CVS	QRT	ROC	45	152.3		SI 4-5 FBS, midden 6-10 inches, AH 42
596	BH42	137-147	4	SAM	CVS	QRT	MTL	1	5.0		SI 4-5 FBS, midden 6-10 inches, AH 42
597		spoils									See 45SN404 Cat #248
598	BH33	208-213		SAM	SAM	SED	COL	1	1542.6	1000	SI 5-7 FBS, midden 22-24 inches"shoe and catcher", AH 33, sorted
599	BH33	208-213	4	SAM	CVS	QRT	COL	1	392.5		SI 5-7 FBS, midden 22-24 inches"shoe and catcher", AH 33, sorted
600	BH33	208-213	8	SAM	CVS	ETH	COL	1	95.6		SI 5-7 FBS, midden 22-24 inches"shoe and catcher", AH 33
601	BH33	208-213	16	SAM	CVS	SIX	COL	1	65.0		SI 5-7 FBS, midden 22-24 inches"shoe and catcher", AH 33
602	BH33	208-213	4	SAM	CVS	QRT	CHR	2	0.3		SI 5-7 FBS, midden 22-24 inches"shoe and catcher", AH 33
603	BH33	208-213	4	SAM	CVS	QRT	SHL	44	14.0		SI 5-7 FBS, midden 22-24 inches"shoe and catcher", AH 33
604	BH33	208-213	4	SAM	CVS	QRT	FSH	1	<0.1		SI 5-7 FBS, midden 22-24 inches"shoe and catcher", AH 33, Oncorhynchus sp., 1 thoracic vertebrae
605	BH33	208-213	4	SAM	CVS	QRT	ROC	312	374.7		SI 5-7 FBS, midden 22-24 inches"shoe and catcher", AH 33
606	BH33	198-208		SAM	SAM	SED	COL	1	1342.3	1000	SI 5-7 FBS, midden 18-22 inches, AH 33, sorted
607	BH33	198-208	4	SAM	CVS	QRT	COL	1	354.9		SI 5-7 FBS, midden 18-22 inches, AH 33, sorted
608	BH33	198-208	8	SAM	CVS	ETH	COL	1	129.9		SI 5-7 FBS, midden 18-22 inches, AH 33
609	BH33	198-208	16	SAM	CVS	SIX	COL	1	108.7		SI 5-7 FBS, midden 18-22 inches, AH 33
610	BH33	198-208	4	SAM	CVS	QRT	SHL	1	0.4		SI 5-7 FBS, midden 18-22 inches, AH 33
611	BH33	198-208	4	SAM	CVS	QRT	CHR	1	5.9		SI 5-7 FBS, midden 18-22 inches, AH 33
612	BH33	198-208	4	SAM	CVS	QRT	ROC	237	320.7		SI 5-7 FBS, midden 18-22 inches, AH 33
613	BH33	198-208	4	SAM	CVS	QRT	DEB	1	0.2		SI 5-7 FBS, midden 18-22 inches, AH 33
614	BH33	244-253		SAM	SAM	SED	COL	1	1224.2	1000	SI 7-9 FBS, midden 12-15.5 inches, AH 33, sorted
615	BH33	244-253	4	SAM	CVS	QRT	COL	1	490.3		SI 7-9 FBS, midden 12-15.5 inches, AH 33, sorted
616	BH33	244-253	8	SAM	CVS	ETH	COL	1	192.3		SI 7-9 FBS, midden 12-15.5 inches, AH 33
617	BH33	244-253	16	SAM	CVS	SIX	COL	1	107.0		SI 7-9 FBS, midden 12-15.5 inches, AH 33
618	BH33	244-253	4	SAM	CVS	QRT	SHL	15	7.7		SI 7-9 FBS, midden 12-15.5 inches, AH 33
619	BH33	244-253	4	SAM	CVS	QRT	ROC	504	479.0		SI 7-9 FBS, midden 12-15.5 inches, AH 33
620	BH33	244-253	4	SAM	CVS	QRT	WOD	2	0.1		SI 7-9 FBS, midden 12-15.5 inches, AH 33
621	BH42	146-152		SAM	SAM	SED	COL	1	1443.8	1000	SI 4-5 FBS, midden 10-12 inches plus shoe, AH 42, sorted

Table C-1. Artifact Catalog, Site 45SN393.

CAT	UNIT	LEV (cmbs)	SCRN	CLS	OBJ	DES	MAT	NO	WT (g)	VOL (ml)	DESCRIPTION
622	BH42	146-152	4	SAM	CVS	QRT	COL	1	381.4		SI 4-5 FBS, midden 10-12 inches plus shoe, AH 42, sorted
623	BH42	146-152	8	SAM	CVS	ETH	COL	1	82.2		SI 4-5 FBS, midden 10-12 inches plus shoe, AH 42
624	BH42	146-152	16	SAM	CVS	SIX	COL	1	75.1		SI 4-5 FBS, midden 10-12 inches plus shoe, AH 42
625	BH42	146-152	4	SAM	CVS	QRT	ROC	257	374 0		SI 4-5 FBS, midden 10-12 inches plus shoe, AH 42
626	BH42	146-152	4	SAM	CVS	QRT	SHL	25	6.3		SI 4-5 FBS, midden 10-12 inches plus shoe, AH 42
627	BH42	146-152	4	SAM	CVS	QRT	WOD	2	0.1		SI 4-5 FBS, midden 10-12 inches plus shoe, AH 42
628	BH42	178-188		SAM	SAM	SED	COL	1	1412.7	1000	SI 5-7 FBS, midden 10-14 inches, AH 42, sorted
629	BH42	178-188	4	SAM	CVS	QRT	COL	1	669.4		SI 5-7 FBS, midden 10-14 inches, AH 42, sorted
630	BH42	178-188	8	SAM	CVS	ETH	COL	1	128.1		SI 5-7 FBS, midden 10-14 inches, AH 42
631	BH42	178-188	16	SAM	CVS	SIX	COL	1	88.4		SI 5-7 FBS, midden 10-14 inches, AH 42
632	BH42	178-188	4	SAM	CVS	QRT	SHL	28	13.4		SI 5-7 FBS, midden 10-14 inches, AH 42
633	BH42	178-188	4	SAM	CVS	QRT	ROC	442	652.1		SI 5-7 FBS, midden 10-14 inches, AH 42
634	BH42	188-198		SAM	SAM	SED	COL	1	1463 0	1000	SI 5-7 FBS, midden 14-18 inches, AH 42, sorted
635	BH42	188-198	4	SAM	CVS	QRT	COL	1	284.8		SI 5-7 FBS, midden 14-18 inches, AH 42, sorted
636	BH42	188-198	8	SAM	CVS	ETH	COL	1	126.6		SI 5-7 FBS, midden 14-18 inches, AH 42
637	BH42	188-198	16	SAM	CVS	SIX	COL	1	139 9		SI 5-7 FBS, midden 14-18 inches, AH 42
638	BH42	188-198	4	SAM	CVS	QRT	SHL	56	26.9		SI 5-7 FBS, midden 14-18 inches, AH 42
639	BH42	188-198	4	SAM	CVS	QRT	CHR	1	<0.1		SI 5-7 FBS, midden 14-18 inches, AH 42
640	BH42	188-198	4	SAM	CVS	QRT	ROC	194	256.8		SI 5-7 FBS, midden 14-18 inches, AH 42
641	BH42	198-208		SAM	SAM	SED	COL	1	1312.1	1000	SI 5-7 FBS, midden 18-22 inches, AH 42, sorted
642	BH42	198-208	4	SAM	CVS	QRT	COL	1	199.2		SI 5-7 FBS, midden 18-22 inches, AH 42, sorted
643	BH42	198-208	8	SAM	CVS	ETH	COL	1	59.5		SI 5-7 FBS, midden 18-22 inches, AH 42
644	BH42	198-208	16	SAM	CVS	SIX	COL	1	79 8		SI 5-7 FBS, midden 18-22 inches, AH 42
645	BH42	198-208	4	SAM	CVS	QRT	SHL	43	18.0		SI 5-7 FBS, midden 18-22 inches, AH 42
646	BH42	198-208	4	SAM	CVS	QRT	ROC	117	180.9		SI 5-7 FBS, midden 18-22 inches, AH 42
647	BH42	208-213		SAM	SAM	SED	COL	1	1270.1	1000	SI 5-7 FBS, midden 22-24 inches plus "shoe", AH 42, sorted
648	BH42	208-213	4	SAM	CVS	QRT	COL	1	245 3		SI 5-7 FBS, midden 22-24 inches plus "shoe", AH 42, sorted
649	BH42	208-213	8	SAM	CVS	ETH	COL	1	104.0		SI 5-7 FBS, midden 22-24 inches plus "shoe", AH 42
650	BH42	208-213	16	SAM	CVS	SIX	COL	1	112 9		SI 5-7 FBS, midden 22-24 inches plus "shoe", AH 42
651	BH42	208-213	4	SAM	CVS	QRT	ROC	175	212.7		SI 5-7 FBS, midden 22-24 inches plus "shoe", AH 42
652	BH42	208-213	4	SAM	CVS	QRT	SHL	93	32.4		SI 5-7 FBS, midden 22-24 inches plus "shoe", AH 42
653	BH43	132-142		SAM	SAM	SED	COL	1	1379.6	1000	SI 4-5 FBS, midden 4-8 inches, AH 43, sorted
654	BH43	132-142	4	SAM	CVS	QRT	COL	1	485.8		SI 4-5 FBS, midden 4-8 inches, AH 43, sorted
655	BH43	132-142	8	SAM	CVS	ETH	COL	1	166 5		SI 4-5 FBS, midden 4-8 inches, AH 43
656	BH43	132-142	16	SAM	CVS	SIX	COL	1	102.5		SI 4-5 FBS, midden 4-8 inches, AH 43
657	BH43	132-142	4	SAM	CVS	QRT	WOD	26	8.8		SI 4-5 FBS, midden 4-8 inches, AH 43
658	BH43	132-142	4	SAM	CVS	QRT	CHR	22	4.5		SI 4-5 FBS, midden 4-8 inches, AH 43

Table C-1. Artifact Catalog, Site 45SN393.

CAT	UNIT	LEV (cmbs)	SCRN	CLS	OBJ	DES	MAT	NO	WT (g)	VOL (ml)	DESCRIPTION
659	BH43	132-142	4	SAM	CVS	QRT	SHL	24	12.0		SI 4-5 FBS, midden 4-8 inches, AH 43
660	BH43	132-142	4	SAM	CVS	QRT	ROC	335	446.0		SI 4-5 FBS, midden 4-8 inches, AH 43
661	BH43	142-152		SAM	SAM	SED	COL	1	1423.8	1000	SI 4-5 FBS, midden 8-12 inches, AH 43, sorted
662	BH43	142-152	4	SAM	CVS	QRT	COL	1	522.6		SI 4-5 FBS, midden 8-12 inches, AH 43, sorted
663	BH43	142-152	8	SAM	CVS	ETH	COL	1	121.7		SI 4-5 FBS, midden 8-12 inches, AH 43
664	BH43	142-152	16	SAM	CVS	SIX	COL	1	113.8		SI 4-5 FBS, midden 8-12 inches, AH 43
665	BH43	142-152	4	SAM	CVS	QRT	SHL	1	0.5		SI 4-5 FBS, midden 8-12 inches, AH 43
666	BH43	142-152	4	SAM	CVS	QRT	ROC	335	520.8		SI 4-5 FBS, midden 8-12 inches, AH 43
667	BH43	178-183		SAM	SAM	SED	COL	1	622.6	250	SI 5-7 FBS, midden 10-12 inches "wash", AH 43, sorted
668	BH43	178-183	4	SAM	CVS	QRT	COL	1	282.6		SI 5-7 FBS, midden 10-12 inches "wash", AH 43, sorted
669	BH43	178-183	8	SAM	CVS	ETH	COL	1	78.8		SI 5-7 FBS, midden 10-12 inches "wash", AH 43
670	BH43	178-186	16	SAM	CVS	SIX	COL	1	55.3		SI 5-7 FBS, midden 10-12 inches "wash", AH 43
671	BH43	178-183	4	SAM	CVS	QRT	ROC	225	282.6		SI 5-7 FBS, midden 10-12 inches "wash", AH 43
672	BH50	211-213		SAM	SAM	SED	COL	1	1234.6	1000	SI 5-7 FBS, midden 23-24 inches, AH 50, sorted
673	BH50	211-213	4	SAM	CVS	QRT	COL	1	344.0		SI 5-7 FBS, midden 23-24 inches, AH 50, sorted
674	BH50	211-213	8	SAM	CVS	ETH	COL	1	118.1		SI 5-7 FBS, midden 23-24 inches, AH 50
675	BH50	211-213	16	SAM	CVS	SIX	COL	1	84.7		SI 5-7 FBS, midden 23-24 inches, AH 50
676	BH50	211-213	4	SAM	CVS	QRT	ROC	289	332.5		SI 5-7 FBS, midden 23-24 inches, AH 50
677	BH50	211-213	4	SAM	CVS	QRT	SHL	13	5.3		SI 5-7 FBS, midden 23-24 inches, AH 50
678	BH50	211-213	4	SAM	CVS	QRT	MTL	3	4.1		SI 5-7 FBS, midden 23-24 inches, AH 50
679	BH50	211-213	4	SAM	CVS	QRT	WOD	9	1.3		SI 5-7 FBS, midden 23-24 inches, AH 50
680	BH50	231-242		SAM	SAM	SED	COL	1	1144.0	1000	SI 7-9 FBS, midden 7-11 inches, AH 50, sorted
681	BH50	231-242	4	SAM	CVS	QRT	COL	1	478.9		SI 7-9 FBS, midden 7-11 inches, AH 50, sorted
682	BH50	231-242	8	SAM	CVS	ETH	COL	1	201.2		SI 7-9 FBS, midden 7-11 inches, AH 50
683	BH50	231-242	16	SAM	CVS	SIX	COL	1	96.2		SI 7-9 FBS, midden 7-11 inches, AH 50
684	BH50	231-242	4	SAM	CVS	QRT	MTL	1	0.5		SI 7-9 FBS, midden 7-11 inches, AH 50
685	BH50	231-242	4	SAM	CVS	QRT	ROC	450	461.5		SI 7-9 FBS, midden 7-11 inches, AH 50
686	BH50	231-242	4	SAM	CVS	QRT	SHL	37	15.2		SI 7-9 FBS, midden 7-11 inches, AH 50
687	BH50	241-251		SAM	SAM	SED	COL	1	1368.4	750	SI 7-9 FBS, midden 11-15 inches, AH 50, sorted
688	BH50	241-251	4	SAM	CVS	QRT	COL	1	440.8		SI 7-9 FBS, midden 11-15 inches, AH 50, sorted
689	BH50	241-251	8	SAM	CVS	ETH	COL	1	193.6		SI 7-9 FBS, midden 11-15 inches, AH 50
690	BH50	241-251	16	SAM	CVS	SIX	COL	1	131.8		SI 7-9 FBS, midden 11-15 inches, AH 50
691	BH50	241-251	4	SAM	CVS	QRT	SHL	24	8.3		SI 7-9 FBS, midden 11-15 inches, AH 50
692	BH50	241-251	4	SAM	CVS	QRT	ROC	446	432.1		SI 7-9 FBS, midden 11-15 inches, AH 50
693	BH50	251-262		SAM	SAM	SED	COL	1	1159.4	750	SI 7-9 FBS, midden 15-19 inches, AH 50, sorted
694	BH50	251-262	4	SAM	CVS	QRT	COL	1	394.0		SI 7-9 FBS, midden 15-19 inches, AH 50, sorted
695	BH50	251-262	8	SAM	CVS	ETH	COL	1	175.1		SI 7-9 FBS, midden 15-19 inches, AH 50
696	BH50	251-262	16	SAM	CVS	SIX	COL	1	116.5		SI 7-9 FBS, midden 15-19 inches, AH 50
697	BH50	251-262	4	SAM	CVS	QRT	ROC	349	384.6		SI 7-9 FBS, midden 15-19 inches, AH 50

Table C-1. Artifact Catalog, Site 45SN393.

CAT	UNIT	LEV (cmbs)	SCRN	CLS	OBJ	DES	MAT	NO	WT (g)	VOL (ml)	DESCRIPTION
698	BH50	251-262	4	SAM	CVS	QRT	SHL	23	8.8		SI 7-9 FBS, midden 15-19 inches, AH 50
699	BH50	251-262	4	SAM	CVS	QRT	MTL	1	0.3		SI 7-9 FBS, midden 15-19 inches, AH 50
700	BH55	241-251		SAM	SAM	SED	COL	1	1005.5	750	SI 7-9 FBS, midden 11-15 inches, AH 55, sorted
701	BH55	241-251	4	SAM	CVS	QRT	COL	1	246.6		SI 7-9 FBS, midden 11-15 inches, AH 55, sorted
702	BH55	241-251	8	SAM	CVS	ETH	COL	1	111.4		SI 7-9 FBS, midden 11-15 inches, AH 55
703	BH55	241-251	16	SAM	CVS	SIX	COL	1	79.6		SI 7-9 FBS, midden 11-15 inches, AH 55
704	BH55	241-251	4	SAM	CVS	QRT	OTH	16	13.0		SI 7-9 FBS, midden 11-15 inches, AH 55
705	BH55	241-251	4	SAM	CVS	QRT	MTL	1	0.4		SI 7-9 FBS, midden 11-15 inches, AH 55
706	BH55	241-251	4	SAM	CVS	QRT	SHL	13	6.1		SI 7-9 FBS, midden 11-15 inches, AH 55
707	BH55	241-251	4	SAM	CVS	QRT	ROC	102	226.6		SI 7-9 FBS, midden 11-15 inches, AH 55
708	BH23	213	4	SAM	CVS	QRT	EXS	1	3.4		SI 5-7 FBS, midden 7 FBS, "shoe", AH 23
709	BH85	747-762		FLS	EAC	OSI	VOL	1	176.3		SI 24-25 FBS, 6-12 inches, AH 85
710	BH55	251-262		SAM	SAM	SED	COL	1	1503.5	1200	SI 7-9 FBS, midden 15-19 inches, AH 55, sorted
711	BH55	251-262	4	SAM	CVS	QRT	COL	1	397.0		SI 7-9 FBS, midden 15-19 inches, AH 55, sorted
712	BH55	251-262	8	SAM	CVS	ETH	COL	1	114.6		SI 7-9 FBS, midden 15-19 inches, AH 55
713	BH55	251-262	16	SAM	CVS	SIX	COL	1	114 3		SI 7-9 FBS, midden 15-19 inches, AH 55
714	BH55	251-262	4	SAM	CVS	QRT	SHL	114	59.1		SI 7-9 FBS, midden 15-19 inches, AH 55
715	BH55	251-262	4	SAM	CVS	QRT	ROC	235	336 5		SI 7-9 FBS, midden 15-19 inches, AH 55
716	BH55	262-272		SAM	SAM	SED	COL	1	1028.6	750	SI 7-9 FBS, midden 19-23 inches plus catcher and shoe, AH 55, sorted
717	BH55	262-272	4	SAM	CVS	QRT	COL	1	141.6		SI 7-9 FBS, midden 19-23 inches plus catcher and shoe, AH 55, sorted
718	BH55	262-272	8	SAM	CVS	ETH	COL	1	86.4		SI 7-9 FBS, midden 19-23 inches plus catcher and shoe, AH 55
719	BH55	262-272	16	SAM	CVS	SIX	COL	1	91 5		SI 7-9 FBS, midden 19-23 inches plus catcher and shoe, AH 55
720	BH55	262-272	4	SAM	CVS	QRT	ROC	99	92.4		SI 7-9 FBS, midden 19-23 inches plus catcher and shoe, AH 55
721	BH55	262-272	4	SAM	CVS	QRT	OTH	1	0.2		SI 7-9 FBS, midden 19-23 inches plus catcher and shoe, AH 55
722	BH55	262-272	4	SAM	CVS	QRT	SHL	66	47 9		SI 7-9 FBS, midden 19-23 inches plus catcher and shoe, AH 55
723	BH46	274		SAM	SAM	SED	COL	1	1187.2	1000	SI 7-9 FBS, midden "shoe and bottom of catcher", AH 46, sorted
724	BH46	274	4	SAM	CVS	QRT	COL	1	418.3		SI 7-9 FBS, midden "shoe and bottom of catcher", AH 46, sorted
725	BH46	274	8	SAM	CVS	ETH	COL	1	125.6		SI 7-9 FBS, midden "shoe and bottom of catcher", AH 46
726	BH46	274	16	SAM	CVS	SIX	COL	1	96.7		SI 7-9 FBS, midden "shoe and bottom of catcher", AH 46
727	BH46	274	4	SAM	CVS	QRT	ROC	272	414.4		SI 7-9 FBS, midden "shoe and bottom of catcher", AH 46
728	BH46	274	4	SAM	CVS	QRT	SHL	6	1.1		SI 7-9 FBS, midden "shoe and bottom of catcher", AH 46
729	BH46	274	4	SAM	CVS	QRT	WOD	4	0.3		SI 7-9 FBS, midden "shoe and bottom of catcher", AH 46
730	BH46	274	4	SAM	CVS	QRT	CHR	1	<0.1		SI 7-9 FBS, midden "shoe and bottom of catcher", AH 46
731	BH46	274	4	SAM	CVS	QRT	GLS	1	0.9		SI 7-9 FBS, midden "shoe and bottom of catcher", AH 46
732	BH6	518.2		SAM	SAM	BOT	PTV	1	23.0		4.2g removed for C-14
733	BH50	213		SAM	SAM	BOT	PTV	1	89.6		SI 5-7 FBS, "shoe", C-14 sample

Table C-1. Artifact Catalog, Site 45SN393.

CAT	UNIT	LEV (cmbs)	SCRN	CLS	OBJ	DES	MAT	NO	WT (g)	VOL (ml)	DESCRIPTION
734	BH85	685.8		SAM	SAM	BOT	PTV	1	31.7		SI 22-24 FBS, 6 inches, C-14 sample
735	BH85	871-874		SAM	SAM	BOT	PTV	1	23.2		SI 27-29 FBS, 19-20 inches, C-14 sample
736	BH85	883.9		SAM	SAM	BOT	PTV	1	706.4		SI 27-29 FBS, "shoe and catcher", C-14 sample
737	BH85	904-907		SAM	SAM	BOT	PTV	1	86.5		SI 29-30 FBS, 8-9 inches, C-14 sample
738	BH85	898-907		SAM	SAM	BOT	PTV	1	791.1		SI 29-30 FBS, 5.5-9 inches, C-14/sediment sample
739	BH85	907-914		SAM	SAM	SED	PTV	1	1742.4		SI 29-30 FBS, 9-12 inches "plus shoe and catcher", sediment sample
740	BH66	354-359		SAM	SAM	BOT	PTV	1	436.8		SI 10-12 FBS, 19 5-21.5 inches, C-14 sample
741	BH66	1127.8		SAM	SAM	BOT	PTV	1	2.5		SI 35-37 FBS, "shoe", C-14 sample
742	BH66	1151-1158		SAM	SAM	BOT	PTV	1	975.4		SI 37-39 FBS, 9-12 inches, C-14 sample
743	BH45	365.8		SAM	SAM	BOT	PTV	1	328.5		SI 10-12 FBS, "shoe", botanical/C-14 sample
744	BH52	357-363		SAM	SAM	BOT	PTV	1	915.1		SI 12-14 FBS, 11-14 inches, botanical/C-14 sample
745	BH52	401-411		SAM	SAM	BOT	PTV	1	431.8		SI 12-14 FBS, 14-18 inches, peat sample
746	BH52	411-422		SAM	SAM	BOT	PTV	1	249.1		SI 12-14 FBS, 18-22 inches, peat sample
747	BH52	422-427		SAM	SAM	BOT	PTV	1	563.1		SI 12-14 FBS, 22-24 inches, peat sample
748	BH52	426.7		SAM	SAM	BOT	PTV	1	844.5		SI 12-14 FBS, "shoe"
749	BH51	422-427		SAM	SAM	BOT	PTV	1	1118.2		SI 12-14 FBS, 22-24 inches, peat sample
750	BH51	426.7		SAM	SAM	BOT	PTV	1	505.4		SI 12-14 FBS, "shoe", botanical/C-14 sample
751	BH68	408-415		SAM	SAM	BOT	PTV	1	729.1		SI 12-14 FBS, 16 5-19.5 inches, C-14 sample
752	BH80	121.9		SAM	SAM	SED	COL	1	1369.0	1000	SI 2-4 FBS, midden "shoe", AH 80, sorted
753	BH80	121.9	4	SAM	CVS	QRT	COL	1	409.1		SI 2-4 FBS, midden "shoe", AH 80, sorted
754	BH80	121.9	8	SAM	CVS	ETH	COL	1	112.3		SI 2-4 FBS, midden "shoe", AH 80
755	BH80	121.9	16	SAM	CVS	SIX	COL	1	111.3		SI 2-4 FBS, midden "shoe", AH 80
756	BH80	121.9	4	SAM	CVS	QRT	SHL	10	2.7		SI 2-4 FBS, midden "shoe", AH 80
757	BH80	121.9	4	SAM	CVS	QRT	ROC	286	405.8		SI 2-4 FBS, midden "shoe", AH 80
758	BH80	193-198		SAM	SAM	SED	COL	1	650.0	500	SI 5-7 FBS, midden 16-18 inches, AH 80, sorted, treated wi h degreaser
759	BH80	193-198	4	SAM	CVS	QRT	COL	1	161.2		SI 5-7 FBS, midden 16-18 inches, AH 80, sorted, treated wi h degreaser
760	BH80	193-198	8	SAM	CVS	ETH	COL	1	35.6		SI 5-7 FBS, midden 16-18 inches, AH 80, treated with degreaser
761	BH80	193-198	16	SAM	CVS	SIX	COL	1	38.9		SI 5-7 FBS, midden 16-18 inches, AH 80, treated with degreaser
762	BH80	193-198	4	SAM	CVS	QRT	SHL	6	3.0		SI 5-7 FBS, midden 16-18 inches, AH 80, treated with degreaser
763	BH80	193-198	4	SAM	CVS	QRT	ROC	83	158.1		SI 5-7 FBS, midden 16-18 inches, AH 80, treated with degreaser
764	BH80	146-152		SAM	SAM	SED	COL	1	1869.8	1250	SI 4-5 FBS, midden 9.5-12 inches plus "shoe", AH 80, sorted, treated with degreaser
765	BH80	146-152	4	SAM	CVS	QRT	COL	1	481.1		SI 4-5 FBS, midden 9.5-12 inches plus "shoe", AH 80, sorted, treated with degreaser
766	BH80	146-152	8	SAM	CVS	ETH	COL	1	139.9		SI 4-5 FBS, midden 9.5-12 inches plus "shoe", AH 80, treated with degreaser
767	BH80	146-152	16	SAM	CVS	SIX	COL	1	151.0		SI 4-5 FBS, midden 9.5-12 inches plus "shoe", AH 80, treated with degreaser
768	BH80	146-152	4	SAM	CVS	QRT	SHL	14	4.2		SI 4-5 FBS, midden 9.5-12 inches plus "shoe", AH 80, treated with degreaser
769	BH80	146-152	4	SAM	CVS	QRT	ROC	390	476.5		SI 4-5 FBS, midden 9.5-12 inches plus "shoe", AH 80, treated with degreaser
770	BH80	183-193		SAM	SAM	SED	COL	1	1834.7	1500	SI 5-7 FBS, midden 12-16 inches, AH 80, sorted

Table C-1. Artifact Catalog, Site 45SN393.

CAT	UNIT	LEV (cmbs)	SCRN	CLS	OBJ	DES	MAT	NO	WT (g)	VOL (ml)	DESCRIPTION
771	BH80	183-193	4	SAM	CVS	QRT	COL	1	490.0		SI 5-7 FBS, midden 12-16 inches, AH 80, sorted
772	BH80	183-193	8	SAM	CVS	ETH	COL	1	216.1		SI 5-7 FBS, midden 12-16 inches, AH 80
773	BH80	183-193	16	SAM	CVS	SIX	COL	1	190.6		SI 5-7 FBS, midden 12-16 inches, AH 80
774	BH80	183-193	4	SAM	CVS	QRT	SHL	46	23 3		SI 5-7 FBS, midden 12-16 inches, AH 80
775	BH80	183-193	4	SAM	CVS	QRT	ROC	430	466 3		SI 5-7 FBS, midden 12-16 inches, AH 80
776	BH5	112-122		SAM	SAM	SED	COL	1	1532 0	1000	SI 2-4 FBS, midden 20-24 inches, AH 5, sorted
777	BH5	112-122	4	SAM	CVS	QRT	COL	1	419.1		SI 2-4 FBS, midden 20-24 inches, AH 5, sorted
778	BH5	112-122	8	SAM	CVS	ETH	COL	1	127 8		SI 2-4 FBS, midden 20-24 inches, AH 5
779	BH5	112-122	16	SAM	CVS	SIX	COL	1	141.7		SI 2-4 FBS, midden 20-24 inches, AH 5
780	BH5	112-122	4	SAM	CVS	QRT	SHL	28	16.9		SI 2-4 FBS, midden 20-24 inches, AH 5
781	BH5	112-122	4	SAM	CVS	QRT	ROC	258	401.8		SI 2-4 FBS, midden 20-24 inches, AH 5
782	BH5	121.9		SAM	SAM	SED	COL	1	558 2	500	SI 2-4 FBS, midden "shoe", AH 5, sorted
783	BH5	121.9	4	SAM	CVS	QRT	COL	1	105.8		SI 2-4 FBS, midden "shoe", AH 5, sorted
784	BH5	121.9	8	SAM	CVS	ETH	COL	1	37.9		SI 2-4 FBS, midden "shoe", AH 5
785	BH5	121.9	16	SAM	CVS	SIX	COL	1	48.5		SI 2-4 FBS, midden "shoe", AH 5
786	BH5	121.9	4	SAM	CVS	QRT	MAM	7	13.7		SI 2-4 FBS, midden "shoe", AH 5, sorted
787	BH5	121.9	4	SAM	CVS	QRT	SHL	13	7.7		SI 2-4 FBS, midden "shoe", AH 5
788	BH5	121.9	4	SAM	CVS	QRT	ROC	64	84.2		SI 2-4 FBS, midden "shoe", AH 5
789	BH5	101-112		SAM	SAM	SED	COL	1	1518 8	1000	SI 2-4 FBS, midden 16-20 inches, AH 5, sorted
790	BH5	101-112	4	SAM	CVS	QRT	COL	1	381.4		SI 2-4 FBS, midden 16-20 inches, AH 5, sorted
791	BH5	101-112	8	SAM	CVS	ETH	COL	1	119.1		SI 2-4 FBS, midden 16-20 inches, AH 5
792	BH5	101-112	16	SAM	CVS	SIX	COL	1	137.3		SI 2-4 FBS, midden 16-20 inches, AH 5
793	BH5	101-112	4	SAM	CVS	QRT	SHL	10	4.4		SI 2-4 FBS, midden 16-20 inches, AH 5
794	BH5	111-122	4	SAM	CVS	QRT	ROC	297	374 0		SI 2-4 FBS, midden 16-20 inches, AH 5
795	BH5	132-142		SAM	SAM	SED	COL	1	948.6	675	SI 4-5 FBS, midden 4-8 inches, AH 5, sorted
796	BH5	132-142	4	SAM	CVS	QRT	COL	1	310 8		SI 4-5 FBS, midden 4-8 inches, AH 5, sorted
797	BH5	132-142	8	SAM	CVS	ETH	COL	1	65 0		SI 4-5 FBS, midden 4-8 inches, AH 5
798	BH5	132-142	16	SAM	CVS	SIX	COL	1	72 9		SI 4-5 FBS, midden 4-8 inches, AH 5
799	BH5	132-142	4	SAM	CVS	QRT	SHL	14	5 3		SI 4-5 FBS, midden 4-8 inches, AH 5
800	BH5	132-142	4	SAM	CVS	QRT	ROC	220	305 5		SI 4-5 FBS, midden 4-8 inches, AH 5
801	BH5	152.4		SAM	SAM	SED	COL	1	668 5	500	SI 4-5 FBS, midden "shoe", AH 5, sorted
802	BH5	152.4	4	SAM	CVS	QRT	COL	1	213.1		SI 4-5 FBS, midden "shoe", AH 5, sorted
803	BH5	152.4	8	SAM	CVS	ETH	COL	1	46.0		SI 4-5 FBS, midden "shoe", AH 5
804	BH5	152.4	16	SAM	CVS	SIX	COL	1	53.6		SI 4-5 FBS, midden "shoe", AH 5
805	BH5	152.4	4	SAM	CVS	QRT	SHL	45	12 8		SI 4-5 FBS, midden "shoe", AH 5
806	BH5	152.4	4	SAM	CVS	QRT	ROC	134	200 3		SI 4-5 FBS, midden "shoe", AH 5
807	BH5	152.4	4	SAM	CVS	QRT	CHR	1	<0.1		SI 4-5 FBS, midden "shoe", AH 5
808	BH5	142-152		SAM	SAM	SED	COL	1	1283 2	1000	SI 4-5 FBS, midden 8-12 inches, AH 5, sorted
809	BH5	142-152	4	SAM	CVS	QRT	COL	1	320 8		SI 4-5 FBS, midden 8-12 inches, AH 5, sorted
810	BH5	142-152	8	SAM	CVS	ETH	COL	1	79 0		SI 4-5 FBS, midden 8-12 inches, AH 5
811	BH5	142-152	16	SAM	CVS	SIX	COL	1	140 8		SI 4-5 FBS, midden 8-12 inches, AH 5
812	BH5	142-152	4	SAM	CVS	QRT	CHR	7	3.7		SI 4-5 FBS, midden 8-12 inches, AH 5
813	BH5	142-152	4	SAM	CVS	QRT	SHL	51	27.3		SI 4-5 FBS, midden 8-12 inches, AH 5
814	BH5	142-152	4	SAM	CVS	QRT	ROC	210	289.6		SI 4-5 FBS, midden 8-12 inches, AH 5
815	BH5	180-191		SAM	SAM	SED	COL	1	1206 0	700	SI 5-7 FBS, midden 11-15 inches, AH 5, sorted

Table C-1. Artifact Catalog, Site 45SN393.

CAT	UNIT	LEV (cmbs)	SCRN	CLS	OBJ	DES	MAT	NO	WT (g)	VOL (ml)	DESCRIPTION
816	BH5	180-191	4	SAM	CVS	QRT	COL	1	449.9		SI 5-7 FBS, midden 11-15 inches, AH 5, sorted
817	BH5	180-191	8	SAM	CVS	ETH	COL	1	85.7		SI 5-7 FBS, midden 11-15 inches, AH 5
818	BH5	180-191	16	SAM	CVS	SIX	COL	1	61.5		SI 5-7 FBS, midden 11-15 inches, AH 5
819	BH5	180-191	4	SAM	CVS	QRT	SHL	24	7.0		SI 5-7 FBS, midden 11-15 inches, AH 5
820	BH5	180-191	4	SAM	CVS	QRT	ROC	395	442.7		SI 5-7 FBS, midden 11-15 inches, AH 5
821	BH79	350.5		SAM	FMR	SPL	VOL	1	342.4		SI 10-12 FBS, FMR 18 inches, below Zp
822	BH59	345-351		SAM	FMR	SPL	VOL	2	171.1		SI 10-12 FBS, FMR 16-18 inches
823	BH79	359.6		SAM	SAM	BOT	PTV	1	167.0		SI 10-12 FBS, C-14 sample, 13inches, base of Zp, AH 79
824	BH22	359.6		SAM	SAM	BOT	PTV	1	54.5		SI 10-12 FBS, C-14 sample 24 inches (in catcher) defuctal wood, AH 22
825	BH22	304.8		SAM	SAM	BOT	PTV	1	107.3		SI 9-10 FBS, C-14 sample 12 inches, base of Pf, AH 22
826	BH16	267-272		SAM	SAM	BOT	PTV	1	175.0		SI 7-9 FBS, C-14 sample 21-23 inches, AH 16
827	BH16	357-363		SAM	SAM	BOT	PTV	1	504.6		SI 10-12 FBS, C-14 sample 20.5-23 inches, AH 16
828	BH2	447-450		SAM	SAM	BOT	PTV	1	68.5		SI 14-15 FBS, C-14 8-9 inches, AH 2
829	BH27	345-348		SAM	SAM	BOT	PTV	1	321.0		SI 10-12 FBS, C-14 16-17 inches, AH 27
830	BH27	450-452		SAM	SAM	BOT	PTV	1	99.2		SI 14-15 FBS, C-14 9-10 inches, AH 27
831	T14	spoils	4	FAU	BON	USF	USF	1	3.1		
832	BH11	162-173		SAM	SAM	SED	COL	1	1485.8	800	Midden 64-68 IBS, AH 11, sorted
833	BH11	162-173	4	SAM	CVS	QRT	COL	1	511.8		Midden 64-68 IBS, AH 11, sorted
834	BH11	162-173	8	SAM	CVS	ETH	COL	1	103.5		Midden 64-68 IBS, AH 11
835	BH11	162-173	16	SAM	CVS	SIX	COL	1	88.1		Midden 64-68 IBS, AH 11
836	BH11	162-173	4	SAM	CVS	QRT	CHR	1	<0.1		Midden 64-68 IBS, AH 11
837	BH11	162-173	4	SAM	CVS	QRT	SHL	18	6.5		Midden 64-68 IBS, AH 11
838	BH11	162-173	4	SAM	CVS	QRT	ROC	297	505.3		Midden 64-68 IBS, AH 11
839	BH11	173-183		SAM	SAM	SED	COL	1	1523.0	1000	Midden 68-72 IBS, AH 11, sorted
840	BH11	173-183	4	SAM	CVS	QRT	COL	1	410.0		Midden 68-72 IBS, AH 11, sorted
841	BH11	173-183	8	SAM	CVS	ETH	COL	1	92.3		Midden 68-72 IBS, AH 11
842	BH11	173-183	16	SAM	CVS	SIX	COL	1	94.0		Midden 68-72 IBS, AH 11
843	BH11	173-183	4	SAM	CVS	QRT	FSH	7	1.1		Midden 68-72 IBS, AH 11
844	BH11	173-183	4	SAM	CVS	QRT	SHL	37	25.6		Midden 68-72 IBS, AH 11
845	BH11	173-183	4	SAM	CVS	QRT	ROC	237	382.3		Midden 68-72 IBS, AH 11
846	BH11	173-183	4	SAM	CVS	QRT	MTL	2	0.9		Midden 68-72 IBS, AH 11
847	BH30	173-183		SAM	SAM	SED	COL	1	1347.3	1000	Midden 68-72 IBS, AH 30, sorted
848	BH30	173-183	4	SAM	CVS	QRT	COL	1	286.6		Midden 68-72 IBS, AH 30, sorted
849	BH30	173-183	8	SAM	CVS	ETH	COL	1	88.1		Midden 68-72 IBS, AH 30
850	BH30	173-183	16	SAM	CVS	SIX	COL	1	91.1		Midden 68-72 IBS, AH 30
851	BH30	173-183	4	SAM	CVS	QRT	SHL	27	8.5		Midden 68-72 IBS, AH 30
852	BH30	173-183	4	SAM	CVS	QRT	ROC	194	277.6		Midden 68-72 IBS, AH 30
853	BH30	188-198		SAM	SAM	SED	COL	1	1263.3	900	Midden 74-78 IBS, AH 30, sorted
854	BH30	188-198	4	SAM	CVS	QRT	COL	1	251.1		Midden 74-78 IBS, AH 30, sorted
855	BH30	188-198	8	SAM	CVS	ETH	COL	1	100.9		Midden 74-78 IBS, AH 30
856	BH30	188-198	16	SAM	CVS	SIX	COL	1	153.9		Midden 74-78 IBS, AH 30
857	BH30	188-198	4	SAM	CVS	QRT	SHL	18	12.9		Midden 74-78 IBS, AH 30
858	BH30	188-198	4	SAM	CVS	QRT	ROC	183	237.3		Midden 74-78 IBS, AH 30
859	BH24	178-188		SAM	SAM	SED	COL	1	1570.9	1000	Midden 70-74 IBS, AH 24, sorted
860	BH24	178-188	4	SAM	CVS	QRT	COL	1	506.2		Midden 70-74 IBS, AH 24, sorted
861	BH24	178-188	8	SAM	CVS	ETH	COL	1	180.1		Midden 70-74 IBS, AH 24

Table C-1. Artifact Catalog, Site 45SN393.

CAT	UNIT	LEV (cmbs)	SCRN	CLS	OBJ	DES	MAT	NO	WT (g)	VOL (ml)	DESCRIPTION
862	BH24	178-188	16	SAM	CVS	SIX	COL	1	155.6		Midden 70-74 IBS, AH 24
863	BH24	178-188	4	SAM	CVS	QRT	SHL	7	1.6		Midden 70-74 IBS, AH 24
864	BH24	178-188	4	SAM	CVS	QRT	ROC	370	503.1		Midden 70-74 IBS, AH 24
865	BH24	188-198		SAM	SAM	SED	COL	1	1297.0	750	Midden 74-78 IBS, AH 24, sorted
866	BH24	188-198	4	SAM	CVS	QRT	COL	1	417.8		Midden 74-78 IBS, AH 24, sorted
867	BH24	188-198	8	SAM	CVS	ETH	COL	1	108.9		Midden 74-78 IBS, AH 24
868	BH24	188-198	16	SAM	CVS	SIX	COL	1	84.0		Midden 74-78 IBS, AH 24
869	BH24	188-198	4	SAM	CVS	QRT	MTL	1	1.8		Midden 74-78 IBS, AH 24
870	BH24	188-198	4	SAM	CVS	QRT	SHL	23	8.9		Midden 74-78 IBS, AH 24
871	BH24	188-198	4	SAM	CVS	QRT	ROC	285	406.3		Midden 74-78 IBS, AH 24
872	BH31	224-234		SAM	SAM	SED	COL	1	1299.4	750	Midden 88-92 IBS, AH 31, sorted
873	BH31	224-234	4	SAM	CVS	QRT	COL	1	276.6		Midden 88-92 IBS, AH 31, sorted
874	BH31	224-234	8	SAM	CVS	ETH	COL	1	129.0		Midden 88-92 IBS, AH 31
875	BH31	224-234	16	SAM	CVS	SIX	COL	1	118.8		Midden 88-92 IBS, AH 31
876	BH31	224-234	4	SAM	CVS	QRT	SHL	1	0.2		Midden 88-92 IBS, AH 31
877	BH31	224-234	4	SAM	CVS	QRT	ROC	255	276.1		Midden 88-92 IBS, AH 31
878	BH31	243-244		SAM	SAM	SED	COL	1	1454.9	1000	Midden 92-96 IBS, AH 31, sorted
879	BH31	243-244	4	SAM	CVS	QRT	COL	1	208.9		Midden 92-96 IBS, AH 31, sorted
880	BH31	243-244	8	SAM	CVS	ETH	COL	1	130.4		Midden 92-96 IBS, AH 31
881	BH31	243-244	16	SAM	CVS	SIX	COL	1	194.4		Midden 92-96 IBS, AH 31
882	BH31	243-244	4	SAM	CVS	QRT	DEB	1	1.8		Midden 92-96 IBS, AH 31
883	BH31	243-244	4	SAM	CVS	QRT	SHL	1	0.8		Midden 92-96 IBS, AH 31
884	BH31	243-244	4	SAM	CVS	QRT	ROC	204	205.9		Midden 92-96 IBS, AH 31
885	BH35	226-236		SAM	SAM	SED	COL	1	2075.7	1200	Midden 89-93 IBS, AH 35, sorted
886	BH35	226-236	4	SAM	CVS	QRT	COL	1	820.2		Midden 89-93 IBS, AH 35, sorted
887	BH31	183-193		SAM	SAM	SED	COL	1	1488.8	1250	Midden 72-76 IBS, AH 31, sorted
888	BH31	183-193	4	SAM	CVS	QRT	ROC	326	398.2		Midden 72-76 IBS, AH 31
889	BH31	183-193	4	SAM	CVS	QRT	SHL	12	6.1		Midden 72-76 IBS, AH 31
890	BH31	183-193	4	SAM	CVS	QRT	WOD	43	17.6		Midden 72-76 IBS, AH 31
891	BH31	183-193	4	SAM	CVS	QRT	CHR	2	<0.1		Midden 72-76 IBS, AH 31
892	BH31	183-193	8	SAM	CVS	ETH	COL	1	131.4		Midden 72-76 IBS, AH 31
893	BH31	183-193	16	SAM	CVS	SIX	COL	1	150.0		Midden 72-76 IBS, AH 31
894	BH31	208-213		SAM	SAM	SED	COL	1	1867.5	1100	Midden 80-84 IBS, AH 31, sorted
895	BH31	208-213	4	SAM	CVS	QRT	ROC	484	612.9		Midden 80-84 IBS, AH 31
896	BH31	208-213	4	SAM	CVS	QRT	SHL	25	11.3		Midden 80-84 IBS, AH 31
897	BH31	208-213	8	SAM	CVS	ETH	COL	1	150.0		Midden 80-84 IBS, AH 31
898	BH31	208-213	16	SAM	CVS	SIX	COL	1	100.3		Midden 80-84 IBS, AH 31
899	BH31	208-213	4	SAM	CVS	QRT	COL	1	624.3		Midden 80-84 IBS, AH 31, sorted
900	BH31	183-193	4	SAM	CVS	QRT	COL	1	422.1		Midden 72-76 IBS, AH 31, sorted
901	BH35	188-198		SAM	SAM	SED	COL	1	1268.8	750	Midden 74-78 IBS, AH 35, sorted
902	BH35	188-198	4	SAM	CVS	QRT	COL	1	247.3		Midden 74-78 IBS, AH 35, sorted
903	BH35	188-198	8	SAM	CVS	ETH	COL	1	183.7		Midden 74-78 IBS, AH 35
904	BH35	188-198	16	SAM	CVS	SIX	COL	1	181.6		Midden 74-78 IBS, AH 35
905	BH35	188-198	4	SAM	CVS	QRT	ROC	315	231.9		Midden 74-78 IBS, AH 35
906	BH35	188-198	4	SAM	CVS	QRT	WOD	2	0.2		Midden 74-78 IBS, AH 35
907	BH35	188-198	4	SAM	CVS	QRT	SHL	32	14.2		Midden 74-78 IBS, AH 35
908	BH40	280-290		SAM	SAM	SED	COL	1	2005 2	1250	Midden/sediment sample, 110-114 IBS, AH 35, sorted
909	BH40	280-290	4	SAM	CVS	QRT	COL	1	475.0		Midden/sediment sample, 110-114 IBS, AH 35, sorted

Table C-1. Artifact Catalog, Site 45SN393.

CAT	UNIT	LEV (cmbs)	SCRN	CLS	OBJ	DES	MAT	NO	WT (g)	VOL (ml)	DESCRIPTION
910	BH40	280-290	8	SAM	CVS	ETH	COL	1	235.5		Midden/sediment sample, 110-114 IBS, AH 35
911	BH31	193-203		SAM	SAM	SED	COL	1	2100.1	1300	Midden 76-80 IBS, AH 31, sorted
912	BH31	193-203	4	SAM	CVS	QRT	COL	1	614.3		Midden 76-80 IBS, AH 31, sorted
913	BH31	193-203	8	SAM	CVS	ETH	COL	1	296.4		Midden 76-80 IBS, AH 31
914	BH31	193-203	16	SAM	CVS	SIX	COL	1	278.7		Midden 76-80 IBS, AH 31
915	BH31	193-203	4	SAM	CVS	QRT	SHL	23	8.8		Midden 76-80 IBS, AH 31
916	BH31	193-203	4	SAM	CVS	QRT	ROC	579	605.4		Midden 76-80 IBS, AH 31
917	BH31	213-224		SAM	SAM	SED	COL	1	1714.2	1000	Midden 84-88 IBS, AH 31, sorted
918	BH31	213-224	4	SAM	CVS	QRT	COL	1	641.0		Midden 84-88 IBS, AH 31, sorted
919	BH31	213-224	8	SAM	CVS	ETH	COL	1	114.0		Midden 84-88 IBS, AH 31
920	BH31	213-224	16	SAM	CVS	SIX	COL	1	84.8		Midden 84-88 IBS, AH 31
921	BH31	213-224	4	SAM	CVS	QRT	SHL	10	3.5		Midden 84-88 IBS, AH 31
922	BH31	213-224	4	SAM	CVS	QRT	ROC	461	637.3		Midden 84-88 IBS, AH 31
923	BH35	226-236	8	SAM	CVS	ETH	COL	1	217.6		Midden 89-93 IBS, AH 35
924	BH35	226-236	16	SAM	CVS	SIX	COL	1	167.1		Midden 89-93 IBS, AH 35
925	BH35	226-236	4	SAM	CVS	QRT	SHL	76	28.3		Midden 89-93 IBS, AH 35
926	BH35	226-236	4	SAM	CVS	QRT	ROC	603	791.6		Midden 89-93 IBS, AH 35
927	BH40	180-191		SAM	SAM	SED	COL	1	1500.2	1000	Midden 71-75 IBS, AH 40, sorted
928	BH40	180-191	4	SAM	CVS	QRT	COL	1	385.5		Midden 71-75 IBS, AH 40, sorted
929	BH40	180-191	8	SAM	CVS	ETH	COL	1	88.6		Midden 71-75 IBS, AH 40
930	BH40	180-191	16	SAM	CVS	SIX	COL	1	93.6		Midden 71-75 IBS, AH 40
931	BH40	180-191	4	SAM	CVS	QRT	SHL	17	6.6		Midden 71-75 IBS, AH 40
932	BH40	180-191	4	SAM	CVS	QRT	ROC	320	378.2		Midden 71-75 IBS, AH 40
933	BH47	208-213		SAM	SAM	SED	COL	1	1622.0	1000	Midden 80-84 IBS, AH 47, sorted
934	BH47	208-213	4	SAM	CVS	QRT	COL	1	190.1		Midden 80-84 IBS, AH 47, sorted
935	BH40	280-290	16	SAM	CVS	SIX	COL	1	243.8		Midden/sediment sample, 110-114 IBS, AH 35
936	BH40	280-290	4	SAM	CVS	QRT	ROC	510	459.3		Midden/sediment sample, 110-114 IBS, AH 35
937	BH40	280-290	4	SAM	CVS	QRT	SHL	17	7.2		Midden/sediment sample, 110-114 IBS, AH 35
938	BH40	191-201		SAM	SAM	SED	COL	1	1836.0		Midden/sediment sample, 75-79 IBS, AH 40, sorted
939	BH40	191-201	4	SAM	CVS	QRT	COL	1	657.6		Midden/sediment sample, 75-79 IBS, AH 40, sorted
940	BH40	191-201	8	SAM	CVS	ETH	COL	1	151.4		Midden/sediment sample, 75-79 IBS, AH 40
941	BH40	191-201	16	SAM	CVS	SIX	COL	1	140.8		Midden/sediment sample, 75-79 IBS, AH 40
942	BH40	191-201	4	SAM	CVS	QRT	ROC	686	707.8		Midden/sediment sample, 75-79 IBS, AH 40
943	BH40	191-201	4	SAM	CVS	QRT	SHL	29	11.1		Midden/sediment sample, 75-79 IBS, AH 40
944	BH40	201-211		SAM	SAM	SED	COL	1	1877.0	1000	Midden 79-83 IBS, AH 40, sorted
945	BH40	201-211	4	SAM	CVS	QRT	COL	1	771.7		Midden 79-83 IBS, AH 40, sorted
946	BH40	201-211	8	SAM	CVS	ETH	COL	1	176.8		Midden 79-83 IBS, AH 40
947	BH40	201-211	16	SAM	CVS	SIX	COL	1	142.0		Midden 79-83 IBS, AH 40
948	BH40	201-211	4	SAM	CVS	QRT	ROC	610	759.9		Midden 79-83 IBS, AH 40
949	BH40	201-211	4	SAM	CVS	QRT	SHL	33	10.2		Midden 79-83 IBS, AH 40
950	BH40	201-211	4	SAM	CVS	QRT	WOD	1	0.1		Midden 79-83 IBS, AH 40
951	BH49	243-244		SAM	SAM	SED	COL	1	1680.5	800	Midden 92-96 IBS, AH 49, sorted
952	BH49	243-244	4	SAM	CVS	QRT	COL	1	391.9		Midden 92-96 IBS, AH 49, sorted
953	BH49	243-244	8	SAM	CVS	ETH	COL	1	191.7		Midden 92-96 IBS, AH 49
954	BH49	243-244	16	SAM	CVS	SIX	COL	1	180.1		Midden 92-96 IBS, AH 49
955	BH49	243-244	4	SAM	CVS	QRT	ROC	241	391.7		Midden 92-96 IBS, AH 49
956	BH49	243-244	4	SAM	CVS	QRT	WOD	2	<0.1		Midden 92-96 IBS, AH 49
957	BH65	183-193		SAM	SAM	SED	COL	1	1560.3	900	Midden 72-76 IBS, AH 65, sorted

Table C-1. Artifact Catalog, Site 45SN393.

CAT	UNIT	LEV (cmbs)	SCRN	CLS	OBJ	DES	MAT	NO	WT (g)	VOL (ml)	DESCRIPTION
958	BH65	183-193	4	SAM	CVS	QRT	COL	1	276.3		Midden 72-76 IBS, AH 65, sorted
959	BH47	208-213	8	SAM	CVS	ETH	COL	1	112.9		Midden 80-84 IBS, AH 47
960	BH47	208-213	16	SAM	CVS	SIX	COL	1	97.8		Midden 80-84 IBS, AH 47
961	BH47	208-213	4	SAM	CVS	QRT	SHL	8	1.9		Midden 80-84 IBS, AH 47
962	BH47	208-213	4	SAM	CVS	QRT	WOD	3	<0.1		Midden 80-84 IBS, AH 47
963	BH47	208-213	4	SAM	CVS	QRT	ROC	218	187.7		Midden 80-84 IBS, AH 47
964	BH47	213-223		SAM	SAM	SED	COL	1	1969.6	1200	Midden 84-88 IBS, AH 47, sorted
965	BH47	213-223	4	SAM	CVS	QRT	COL	1	560.1		Midden 84-88 IBS, AH 47, sorted
966	BH47	213-223	8	SAM	CVS	ETH	COL	1	207.5		Midden 84-88 IBS, AH 47
967	BH47	213-223	16	SAM	CVS	SIX	COL	1	160.3		Midden 84-88 IBS, AH 47
968	BH47	213-223	4	SAM	CVS	QRT	SHL	5	1.2		Midden 84-88 IBS, AH 47
969	BH47	213-223	4	SAM	CVS	QRT	CHR	1	0.2		Midden 84-88 IBS, AH 47
970	BH47	213-223	4	SAM	CVS	QRT	ROC	468	557.2		Midden 84-88 IBS, AH 47
971	BH60	173-183		SAM	SAM	SED	COL	1	1557.6	1000	Midden 68-72 IBS, AH 60, sorted
972	BH60	173-183	4	SAM	CVS	QRT	COL	1	364.2		Midden 68-72 IBS, AH 60, sorted
973	BH60	173-183	8	SAM	CVS	ETH	COL	1	133.2		Midden 68-72 IBS, AH 60
974	BH60	173-183	16	SAM	CVS	SIX	COL	1	155.8		Midden 68-72 IBS, AH 60
975	BH60	173-183	4	SAM	CVS	QRT	SHL	10	2.2		Midden 68-72 IBS, AH 60
976	BH60	173-183	4	SAM	CVS	QRT	ROC	276	360.7		Midden 68-72 IBS, AH 60
977	BH60	243-244		SAM	SAM	SED	COL	1	1360.7	1000	Midden 92-96 IBS, AH 60, sorted
978	BH60	243-244	4	SAM	CVS	QRT	COL	1	309.2		Midden 92-96 IBS, AH 60, sorted
979	BH60	243-244	8	SAM	CVS	ETH	COL	1	88.0		Midden 92-96 IBS, AH 60
980	BH60	243-244	16	SAM	CVS	SIX	COL	1	109.2		Midden 92-96 IBS, AH 60
981	BH60	243-244	4	SAM	CVS	QRT	CHR	1	0.1		Midden 92-96 IBS, AH 60
982	BH60	243-244	4	SAM	CVS	QRT	SHL	51	20.6		Midden 92-96 IBS, AH 60
983	BH60	223-234		SAM	SAM	SED	COL	1	1342 5	800	Midden 88-92 IBS, AH 60, sorted
984	BH60	223-234	4	SAM	CVS	QRT	COL	1	379.2		Midden 88-92 IBS, AH 60, sorted
985	BH60	223-234	8	SAM	CVS	ETH	COL	1	156.1		Midden 88-92 IBS, AH 60
986	BH60	223-234	16	SAM	CVS	SIX	COL	1	153.6		Midden 88-92 IBS, AH 60
987	BH60	223-234	4	SAM	CVS	QRT	ROC	265	348.6		Midden 88-92 IBS, AH 60
988	BH60	223-234	4	SAM	CVS	QRT	SHL	43	21.7		Midden 88-92 IBS, AH 60
989	BH60	223-234	4	SAM	CVS	QRT	OTH	7	1.8		Midden 88-92 IBS, AH 60, concrete and brick
990	BH60	254-264		SAM	SAM	SED	COL	1	1697.3	1000	Midden 100-104 IBS, AH 60, sorted
991	BH60	254-264	4	SAM	CVS	QRT	COL	1	195.9		Midden 100-104 IBS, AH 60, sorted
992	BH60	254-264	8	SAM	CVS	ETH	COL	1	71.8		Midden 100-104 IBS, AH 60
993	BH60	254-264	16	SAM	CVS	SIX	COL	1	98.7		Midden 100-104 IBS, AH 60
994	BH60	254-264	4	SAM	CVS	QRT	ROC	170	174.8		Midden 100-104 IBS, AH 60
995	BH60	254-264	4	SAM	CVS	QRT	SHL	39	13.5		Midden 100-104 IBS, AH 60
996	BH78	173-183		SAM	SAM	SED	COL	1	1067 8	900	Midden 68-72 IBS, AH 78, sorted
997	BH78	173-183	4	SAM	CVS	QRT	COL	1	132.1		Midden 68-72 IBS, AH 78, sorted
998	BH78	173-183	8	SAM	CVS	ETH	COL	1	90.2		Midden 68-72 IBS, AH 78
999	BH78	173-183	16	SAM	CVS	SIX	COL	1	100.0		Midden 68-72 IBS, AH 78
1000	BH78	173-183	4	SAM	CVS	QRT	ROC	143	125.9		Midden 68-72 IBS, AH 78
1001	BH78	173-183	4	SAM	CVS	QRT	SHL	4	2.1		Midden 68-72 IBS, AH 78
1002	BH78	173-183	4	SAM	CVS	QRT	OTH	5	2.6		Midden 68-72 IBS, AH 78, concrete and rubber
1003	BH78	193-203		SAM	SAM	SED	COL	1	1305.7	1000	Midden 76-80 IBS, AH 78, sorted
1004	BH78	193-203	4	SAM	CVS	QRT	COL	1	371.9		Midden 76-80 IBS, AH 78, sorted
1005	BH78	193-203	8	SAM	CVS	ETH	COL	1	71.4		Midden 76-80 IBS, AH 78

Table C-1. Artifact Catalog, Site 45SN393.

CAT	UNIT	LEV (cmbs)	SCRN	CLS	OBJ	DES	MAT	NO	WT (g)	VOL (ml)	DESCRIPTION
1006	BH78	193-203	16	SAM	CVS	SIX	COL	1	63.8		Midden 76-80 IBS, AH 78
1007	BH60	243-244	4	SAM	CVS	QRT	ROC	187	286.9		Midden 92-96 IBS, AH 60
1008	BH60	244-254		SAM	SAM	SED	COL	1	1538.7	1200	Midden 96-100 IBS, AH 60, sorted
1009	BH60	244-254	4	SAM	CVS	QRT	COL	1	355.4		Midden 96-100 IBS, AH 60, sorted
1010	BH60	244-254	8	SAM	CVS	ETH	COL	1	94.4		Midden 96-100 IBS, AH 60
1011	BH60	244-254	16	SAM	CVS	SIX	COL	1	89.9		Midden 96-100 IBS, AH 60
1012	BH60	244-254	4	SAM	CVS	QRT	SHL	138	76.0		Midden 96-100 IBS, AH 60
1013	BH60	244-254	4	SAM	CVS	QRT	ROC	84	277.4		Midden 96-100 IBS, AH 60
1014	BH78	183-193		SAM	SAM	SED	COL	1	1203.2	1000	Midden 72-76 IBS, AH 78, sorted
1015	BH78	183-193	4	SAM	CVS	QRT	COL	1	215.3		Midden 72-76 IBS, AH 78, sorted
1016	BH78	183-193	8	SAM	CVS	ETH	COL	1	64.5		Midden 72-76 IBS, AH 78
1017	BH78	183-193	16	SAM	CVS	SIX	COL	1	70.5		Midden 72-76 IBS, AH 78
1018	BH78	183-193	4	SAM	CVS	QRT	SHL	38	16.1		Midden 72-76 IBS, AH 78
1019	BH78	183-193	4	SAM	CVS	QRT	ROC	147	198.0		Midden 72-76 IBS, AH 78
1020	BH78	208-213		SAM	SAM	SED	COL	1	1316.5	800	Midden 80-84 IBS, AH 78, sorted
1021	BH78	208-213	4	SAM	CVS	QRT	COL	1	334.0		Midden 80-84 IBS, AH 78, sorted
1022	BH78	208-213	8	SAM	CVS	ETH	COL	1	59.4		Midden 80-84 IBS, AH 78
1023	BH78	208-213	16	SAM	CVS	SIX	COL	1	67.9		Midden 80-84 IBS, AH 78
1024	BH78	208-213	4	SAM	CVS	QRT	MAM	2	0.7		Midden 80-84 IBS, AH 78
1025	BH78	208-213	4	SAM	CVS	QRT	SHL	34	30.4		Midden 80-84 IBS, AH 78
1026	BH78	208-213	4	SAM	CVS	QRT	ROC	187	302.5		Midden 80-84 IBS, AH 78
1027	BH78	213-223		SAM	SAM	SED	COL	1	1392.4	1000	Midden 84-88 IBS, AH 78, sorted
1028	BH78	213-223	4	SAM	CVS	QRT	COL	1	406.2		Midden 84-88 IBS, AH 78, sorted
1029	BH78	213-223	8	SAM	CVS	ETH	COL	1	106.6		Midden 84-88 IBS, AH 78
1030	BH78	213-223	16	SAM	CVS	SIX	COL	1	91.8		Midden 84-88 IBS, AH 78
1031	BH78	193-203	4	SAM	CVS	QRT	ROC	217	326.5		Midden 76-80 IBS, AH 78
1032	BH78	193-203	4	SAM	CVS	QRT	SHL	31	33.5		Midden 76-80 IBS, AH 78
1033	BH78	193-203	4	SAM	CVS	QRT	MAM	3	2.9		Midden 76-80 IBS, AH 78
1034	BH78	223-234		SAM	SAM	SED	COL	1	1319.9	1000	Midden 88-92 IBS, AH 78, sorted
1035	BH78	223-234	4	SAM	CVS	QRT	COL	1	204.0		Midden 88-92 IBS, AH 78, sorted
1036	BH78	223-234	8	SAM	CVS	ETH	COL	1	98.2		Midden 88-92 IBS, AH 78
1037	BH78	223-234	16	SAM	CVS	SIX	COL	1	140.2		Midden 88-92 IBS, AH 78
1038	BH78	223-234	4	SAM	CVS	QRT	ROC	171	193.4		Midden 88-92 IBS, AH 78
1039	BH78	223-234	4	SAM	CVS	QRT	SHL	36	8.1		Midden 88-92 IBS, AH 78
1040	BH78	spoils		SAM	SAM	SED	COL	1	1662.8	1100	Midden "sluff" from top of midden deposit, sorted
1041	BH78	spoils	4	SAM	CVS	QRT	COL	1	208.7		Midden "sluff" from top of midden deposit, sorted
1042	BH78	spoils	8	SAM	CVS	ETH	COL	1	128.7		Midden "sluff" from top of midden deposit
1043	BH78	spoils	16	SAM	CVS	SIX	COL	1	133.2		Midden "sluff" from top of midden deposit
1044	BH78	spoils	4	SAM	CVS	QRT	ROC	233	196.6		Midden "sluff" from top of midden deposit
1045	BH78	spoils	4	SAM	CVS	QRT	SHL	14	5.7		Midden "sluff" from top of midden deposit
1046	BH65	183-193	8	SAM	CVS	ETH	COL	1	84.0		Midden 72-76 IBS, AH 65
1047	BH65	183-193	16	SAM	CVS	SIX	COL	1	88.4		Midden 72-76 IBS, AH 65
1048	BH65	183-193	4	SAM	CVS	QRT	ROC	213	272.8		Midden 72-76 IBS, AH 65
1049	BH65	183-193	4	SAM	CVS	QRT	SHL	14	3.4		Midden 72-76 IBS, AH 65
1050	BH65	173-183		SAM	SAM	SED	COL	1	1670.2	800	Midden 68-72 IBS, AH 65, sorted
1051	BH65	173-183	4	SAM	CVS	QRT	COL	1	638.4		Midden 68-72 IBS, AH 65, sorted
1052	BH65	173-183	8	SAM	CVS	ETH	COL	1	169.2		Midden 68-72 IBS, AH 65
1053	BH65	173-183	16	SAM	CVS	SIX	COL	1	132.4		Midden 68-72 IBS, AH 65

Table C-1. Artifact Catalog, Site 45SN393.

CAT	UNIT	LEV (cmbs)	SCRN	CLS	OBJ	DES	MAT	NO	WT (g)	VOL (ml)	DESCRIPTION
1054	BH65	173-183	4	SAM	CVS	QRT	ROC	417	608.3		Midden 68-72 IBS, AH 65
1055	BH78	213-223	4	SAM	CVS	QRT	CHR	7	1.5		Midden 84-88 IBS, AH 78
1056	BH78	213-223	4	SAM	CVS	QRT	OTH	15	10.8		Midden 84-88 IBS, AH 78, brick
1057	BH78	213-223	4	SAM	CVS	QRT	SHL	32	12.1		Midden 84-88 IBS, AH 78
1058	BH78	213-223	4	SAM	CVS	QRT	ROC	243	378.0		Midden 84-88 IBS, AH 78
1059	BH81	223-234		SAM	CVS	SED	COL	1	1310.8	1000	Midden 88-92 IBS, AH 81, sorted
1060	BH81	223-234	4	SAM	CVS	QRT	COL	1	204.2		Midden 88-92 IBS, AH 81, sorted
1061	BH81	223-234	8	SAM	CVS	ETH	COL	1	78.3		Midden 88-92 IBS, AH 81
1062	BH81	223-234	16	SAM	CVS	SIX	COL	1	67.3		Midden 88-92 IBS, AH 81
1063	BH81	223-234	4	SAM	CVS	QRT	MAM	2	0.3		Midden 88-92 IBS, AH 81
1064	BH81	223-234	4	SAM	CVS	QRT	SHL	8	3.1		Midden 88-92 IBS, AH 81
1065	BH81	223-234	4	SAM	CVS	QRT	ROC	141	200.1		Midden 88-92 IBS, AH 81
1066	BH81	243-244		SAM	CVS	SED	COL	1	1471.8	1000	Midden 92-96 IBS, AH 81, sorted
1067	BH81	243-244	4	SAM	CVS	QRT	COL	1	129.9		Midden 92-96 IBS, AH 81, sorted
1068	BH81	243-244	8	SAM	CVS	ETH	COL	1	42.1		Midden 92-96 IBS, AH 81
1069	BH81	243-244	16	SAM	CVS	SIX	COL	1	55.5		Midden 92-96 IBS, AH 81
1070	BH81	243-244	4	SAM	CVS	QRT	CHR	1	<0.1		Midden 92-96 IBS, AH 81
1071	BH81	243-244	4	SAM	CVS	QRT	MAM	1	<0.1		Midden 92-96 IBS, AH 81
1072	BH81	243-244	4	SAM	CVS	QRT	SHL	2	1.1		Midden 92-96 IBS, AH 81
1073	BH81	243-244	4	SAM	CVS	QRT	ROC	93	128.6		Midden 92-96 IBS, AH 81
1074	BH47	282-292		SAM	SAM	SED	PTV	1	2034 2		Sediment sample 111-115 IBS, Stratum III Aae
1075	BH47	292-302		SAM	SAM	SED	PTV	1	1534.3		Sediment sample 115-119 IBS, Stratum III Aae
1076	BH56	229-239		SAM	SAM	SED	PTV	1	2323.3		Sediment sample 90-94 IBS, Stratum III Aae
1077	BH60	264-274		SAM	SAM	SED	PTV	1	1838.4		Sediment sample 104-108 IBS, Stratum III Aae
1078	BH81	244-254		SAM	SAM	SED	COL	1	1861.3	1000	Midden 96-100 IBS, AH 81, sorted
1079	BH81	244-254	4	SAM	CVS	QRT	COL	1	508.8		Midden 96-100 IBS, AH 81, sorted
1080	BH81	244-254	8	SAM	CVS	ETH	COL	1	120.9		Midden 96-100 IBS, AH 81
1081	BH81	244-254	16	SAM	CVS	SIX	COL	1	118.2		Midden 96-100 IBS, AH 81
1082	BH81	244-254	4	SAM	CVS	QRT	CHR	1	0.1		Midden 96-100 IBS, AH 81
1083	BH81	244-254	4	SAM	CVS	QRT	SHL	61	27.0		Midden 96-100 IBS, AH 81
1084	BH81	244-254	4	SAM	CVS	QRT	ROC	402	481 5		Midden 96-100 IBS, AH 81
1085	BH81	254-264		SAM	SAM	SED	COL	1	1929.1	1200	Midden 100-104 IBS, AH 81, sorted
1086	BH81	254-264	4	SAM	CVS	QRT	COL	1	475.3		Midden 100-104 IBS, AH 81, sorted
1087	BH81	254-264	8	SAM	CVS	ETH	COL	1	197.1		Midden 100-104 IBS, AH 81
1088	BH81	254-264	16	SAM	CVS	SIX	COL	1	224.3		Midden 100-104 IBS, AH 81
1089	BH81	254-264	4	SAM	CVS	QRT	SHL	38	14.3		Midden 100-104 IBS, AH 81
1090	BH81	254-264	4	SAM	CVS	QRT	ROC	337	460.9		Midden 100-104 IBS, AH 81
1091	BH65	208-213		SAM	SAM	SED	COL	1	1493.5	1000	Midden 80-84 IBS, AH 65, sorted
1092	BH65	208-213	4	SAM	CVS	QRT	COL	1	132.7		Midden 80-84 IBS, AH 65, sorted
1093	BH65	208-213	8	SAM	CVS	ETH	COL	1	43.8		Midden 80-84 IBS, AH 65
1094	BH65	208-213	16	SAM	CVS	SIX	COL	1	42.0		Midden 80-84 IBS, AH 65
1095	BH65	208-213	4	SAM	CVS	QRT	CHR	1	<0.1		Midden 80-84 IBS, AH 65
1096	BH65	208-213	4	SAM	CVS	QRT	SHL	25	8.1		Midden 80-84 IBS, AH 65
1097	BH65	208-213	4	SAM	CVS	QRT	ROC	96	124.1		Midden 80-84 IBS, AH 65
1098	BH65	254-267		SAM	SAM	SED	COL	1	849.4	700	Midden 101-105 IBS, AH 65, sorted
1099	BH65	254-267	4	SAM	CVS	QRT	COL	1	131.8		Midden 101-105 IBS, AH 65, sorted
1100	BH65	254-267	8	SAM	CVS	ETH	COL	1	50.8		Midden 101-105 IBS, AH 65

Table C-1. Artifact Catalog, Site 45SN393.

CAT	UNIT	LEV (cmbs)	SCRN	CLS	OBJ	DES	MAT	NO	WT (g)	VOL (ml)	DESCRIPTION
1101	BH65	254-267	16	SAM	CVS	SIX	COL	1	47.8		Midden 101-105 IBS, AH 65
1102	BH65	254-267	4	SAM	CVS	QRT	WOD	6	0.6		Midden 101-105 IBS, AH 65
1103	BH65	173-183	4	SAM	CVS	QRT	SHL	40	20.8		Midden 68-72 IBS, AH 65
1104	BH65	173-183	4	SAM	CVS	QRT	WOD	8	0.7		Midden 68-72 IBS, AH 65
1105	BH65	193-203		SAM	SAM	SED	COL	1	2007.8	1000	Midden 78-80 IBS, AH 65, sorted
1106	BH65	193-203	4	SAM	CVS	QRT	COL	1	572.3		Midden 78-80 IBS, AH 65, sorted
1107	BH65	193-203	8	SAM	CVS	ETH	COL	1	113.6		Midden 78-80 IBS, AH 65
1108	BH65	193-203	16	SAM	CVS	SIX	COL	1	117.9		Midden 78-80 IBS, AH 65
1109	BH65	193-203	4	SAM	CVS	QRT	ROC	349	555.8		Midden 78-80 IBS, AH 65
1110	BH65	193-203	4	SAM	CVS	QRT	SHL	30	13.6		Midden 78-80 IBS, AH 65
1111	BH65	193-203	4	SAM	CVS	QRT	CHR	2	0.9		Midden 78-80 IBS, AH 65
1112	BH65	223-234		SAM	SAM	SED	COL	1	1574.7	900	Midden 88-92 IBS, AH 65, sorted
1113	BH65	223-234	4	SAM	CVS	QRT	COL	1	117.2		Midden 88-92 IBS, AH 65, sorted
1114	BH65	223-234	8	SAM	CVS	ETH	COL	1	67.2		Midden 88-92 IBS, AH 65
1115	BH65	223-234	16	SAM	CVS	SIX	COL	1	94.3		Midden 88-92 IBS, AH 65
1116	BH65	223-234	4	SAM	CVS	QRT	ROC	126	116.6		Midden 88-92 IBS, AH 65
1117	BH65	223-234	4	SAM	CVS	QRT	SHL	1	0.3		Midden 88-92 IBS, AH 65
1118	BH65	243-244		SAM	SAM	SED	COL	1	2452.2	1500	Midden 92-96 IBS, AH 65, sorted
1119	BH65	243-244	4	SAM	CVS	QRT	COL	1	706.4		Midden 92-96 IBS, AH 65, sorted
1120	BH65	243-244	8	SAM	CVS	ETH	COL	1	251.8		Midden 92-96 IBS, AH 65
1121	BH65	243-244	16	SAM	CVS	SIX	COL	1	182.9		Midden 92-96 IBS, AH 65
1122	BH65	243-244	4	SAM	CVS	QRT	ROC	718	705.6		Midden 92-96 IBS, AH 65
1123	BH65	243-244	4	SAM	CVS	QRT	SHL	2	0.3		Midden 92-96 IBS, AH 65
1124	BH65	267-277		SAM	SAM	SED	COL	1	1153.4	600	Midden 105-109 IBS, AH 65, sorted
1125	BH65	267-277	4	SAM	CVS	QRT	COL	1	269.5		Midden 105-109 IBS, AH 65, sorted
1126	BH65	267-277	8	SAM	CVS	ETH	COL	1	103.8		Midden 105-109 IBS, AH 65
1127	BH65	254-267	4	SAM	CVS	QRT	SHL	7	3.1		Midden 101-105 IBS, AH 65
1128	BH65	254-267	4	SAM	CVS	QRT	ROC	129	127.5		Midden 101-105 IBS, AH 65
1129	BH67	173-183		SAM	SAM	SED	COL	1	990.8	500	Midden 68-72 IBS, AH 67, sorted
1130	BH67	173-183	4	SAM	CVS	QRT	COL	1	220.0		Midden 68-72 IBS, AH 67, sorted
1131	BH67	173-183	8	SAM	CVS	ETH	COL	1	136.4		Midden 68-72 IBS, AH 67
1132	BH67	173-183	16	SAM	CVS	SIX	COL	1	130.1		Midden 68-72 IBS, AH 67
1133	BH67	173-183	4	SAM	CVS	QRT	SHL	2	0.6		Midden 68-72 IBS, AH 67
1134	BH67	173-183	4	SAM	CVS	QRT	ROC	224	218.9		Midden 68-72 IBS, AH 67
1135	BH67	183-193		SAM	SAM	SED	COL	1	1040.1	800	Midden 72-76 IBS, AH 67, sorted
1136	BH67	183-193	4	SAM	CVS	QRT	COL	1	310.3		Midden 72-76 IBS, AH 67, sorted
1137	BH67	183-193	8	SAM	CVS	ETH	COL	1	111.7		Midden 72-76 IBS, AH 67
1138	BH67	183-193	16	SAM	CVS	SIX	COL	1	91.3		Midden 72-76 IBS, AH 67
1139	BH67	183-193	4	SAM	CVS	QRT	SHL	4	1.2		Midden 72-76 IBS, AH 67
1140	BH67	183-193	4	SAM	CVS	QRT	ROC	285	308.6		Midden 72-76 IBS, AH 67
1141	BH67	193-203		SAM	SAM	SED	COL	1	1543.2	1000	Midden 76-80 IBS, AH 67, sorted
1142	BH67	193-203	4	SAM	CVS	QRT	COL	1	428.2		Midden 76-80 IBS, AH 67, sorted
1143	BH67	193-203	8	SAM	CVS	ETH	COL	1	93.3		Midden 76-80 IBS, AH 67
1144	BH67	193-203	16	SAM	CVS	SIX	COL	1	107.9		Midden 76-80 IBS, AH 67
1145	BH67	193-203	4	SAM	CVS	QRT	CHR	1	0.1		Midden 76-80 IBS, AH 67
1146	BH67	193-203	4	SAM	CVS	QRT	SHL	18	5.2		Midden 76-80 IBS, AH 67
1147	BH67	193-203	4	SAM	CVS	QRT	ROC	260	421.5		Midden 76-80 IBS, AH 67
1148	BH72	213-223		SAM	SAM	SED	COL	1	1513.4	1100	Midden 84-88 IBS, AH 72, sorted
1149	BH72	213-223	4	SAM	CVS	QRT	COL	1	372.7		Midden 84-88 IBS, AH 72, sorted

Table C-1. Artifact Catalog, Site 45SN393.

CAT	UNIT	LEV (cmbs)	SCRN	CLS	OBJ	DES	MAT	NO	WT (g)	VOL (ml)	DESCRIPTION
1150	BH72	213-223	8	SAM	CVS	ETH	COL	1	86.0		Midden 84-88 IBS, AH 72
1151	BH65	267-277	16	SAM	CVS	SIX	COL	1	107.0		Midden 105-109 IBS, AH 65
1152	BH65	267-277	4	SAM	CVS	QRT	ROC	209	264.7		Midden 105-109 IBS, AH 65
1153	BH65	267-277	4	SAM	CVS	QRT	SHL	3	0.7		Midden 105-109 IBS, AH 65
1154	BH65	267-277	4	SAM	CVS	QRT	WOD	4	0.3		Midden 105-109 IBS, AH 65
1155	BH72	244-254		SAM	SAM	SED	COL	1	1781.0	1200	Midden 96-100 IBS, AH 72, sorted
1156	BH72	244-254	4	SAM	CVS	QRT	COL	1	308.6		Midden 96-100 IBS, AH 72, sorted
1157	BH72	244-254	8	SAM	CVS	ETH	COL	1	90.1		Midden 96-100 IBS, AH 72
1158	BH72	244-254	16	SAM	CVS	SIX	COL	1	87.5		Midden 96-100 IBS, AH 72
1159	BH72	244-254	4	SAM	CVS	QRT	ROC	155	234.1		Midden 96-100 IBS, AH 72
1160	BH72	244-254	4	SAM	CVS	QRT	SHL	140	65 2		Midden 96-100 IBS, AH 72
1161	BH72	208-213		SAM	SAM	SED	COL	1	1226 5	900	Midden 80-84 IBS, AH 72, sorted
1162	BH72	208-213	4	SAM	CVS	QRT	COL	1	494.1		Midden 80-84 IBS, AH 72, sorted
1163	BH72	208-213	8	SAM	CVS	ETH	COL	1	118.2		Midden 80-84 IBS, AH 72
1164	BH72	208-213	16	SAM	CVS	SIX	COL	1	95.6		Midden 80-84 IBS, AH 72
1165	BH72	208-213	4	SAM	CVS	QRT	ROC	346	413.0		Midden 80-84 IBS, AH 72
1166	BH72	208-213	4	SAM	CVS	QRT	SHL	19	15.1		Midden 80-84 IBS, AH 72
1167	BH72	208-213	4	SAM	CVS	QRT	OTH	22	38.4		Midden 80-84 IBS, AH 72, brick
1168	BH72	223-234		SAM	SAM	SED	COL	1	1469.7	1000	Midden 88-92 IBS, AH 72, sorted
1169	BH72	223-234	4	SAM	CVS	QRT	COL	1	380.1		Midden 88-92 IBS, AH 72, sorted
1170	BH72	223-234	8	SAM	CVS	ETH	COL	1	94.1		Midden 88-92 IBS, AH 72
1171	BH72	223-234	16	SAM	CVS	SIX	COL	1	89.6		Midden 88-92 IBS, AH 72
1172	BH72	223-234	4	SAM	CVS	QRT	ROC	260	367.2		Midden 88-92 IBS, AH 72
1173	BH72	223-234	4	SAM	CVS	QRT	SHL	23	11.8		Midden 88-92 IBS, AH 72
1174	BH72	spoils		SAM	SAM	SED	COL	1	1576.9	1000	Midden "slump" from top of midden deposit, sorted
1175	BH72	213-223	16	SAM	CVS	SIX	COL	1	93.9		Midden 84-88 IBS, AH 72
1176	BH72	213-223	4	SAM	CVS	QRT	SHL	28	9.9		Midden 84-88 IBS, AH 72
1177	BH72	213-223	4	SAM	CVS	QRT	ROC	225	361.3		Midden 84-88 IBS, AH 72
1178	BH72	254-264		SAM	SAM	SED	COL	1	1397.6	1000	Midden 100-104 IBS, AH 72, sorted
1179	BH72	254-264	4	SAM	CVS	QRT	COL	1	169.0		Midden 100-104 IBS, AH 72, sorted
1180	BH72	254-264	8	SAM	CVS	ETH	COL	1	51.7		Midden 100-104 IBS, AH 72
1181	BH72	254-264	16	SAM	CVS	SIX	COL	1	58.7		Midden 100-104 IBS, AH 72
1182	BH72	254-264	4	SAM	CVS	QRT	SHL	4	1.2		Midden 100-104 IBS, AH 72
1183	BH72	254-264	4	SAM	CVS	QRT	ROC	129	167.6		Midden 100-104 IBS, AH 72
1184	BH72	243-244		SAM	SAM	SED	COL	1	1826.9	1250	Midden 92-96 IBS, AH 72, sorted
1185	BH72	243-244	4	SAM	CVS	QRT	COL	1	297.2		Midden 92-96 IBS, AH 72, sorted
1186	BH72	243-244	8	SAM	CVS	ETH	COL	1	106.8		Midden 92-96 IBS, AH 72
1187	BH72	243-244	16	SAM	CVS	SIX	COL	1	105 9		Midden 92-96 IBS, AH 72
1188	BH72	243-244	4	SAM	CVS	QRT	MAM	1	<0.1		Midden 92-96 IBS, AH 72
1189	BH72	243-244	4	SAM	CVS	QRT	CHR	2	0.2		Midden 92-96 IBS, AH 72
1190	BH72	243-244	4	SAM	CVS	QRT	SHL	53	36.1		Midden 92-96 IBS, AH 72
1191	BH72	243-244	4	SAM	CVS	QRT	ROC	246	260.1		Midden 92-96 IBS, AH 72
1192	BH70	208-213		SAM	SAM	SED	COL	1	1530 0	1000	Midden 80-84 IBS, AH 70, sorted
1193	BH70	208-213	4	SAM	CVS	QRT	COL	1	331.5		Midden 80-84 IBS, AH 70, sorted
1194	BH70	208-213	8	SAM	CVS	ETH	COL	1	91.8		Midden 80-84 IBS, AH 70
1195	BH70	208-213	16	SAM	CVS	SIX	COL	1	89.0		Midden 80-84 IBS, AH 70
1196	BH70	208-213	4	SAM	CVS	QRT	SHL	29	12.8		Midden 80-84 IBS, AH 70
1197	BH70	208-213	4	SAM	CVS	QRT	ROC	224	318.4		Midden 80-84 IBS, AH 70

Table C-1. Artifact Catalog, Site 45SN393.

CAT	UNIT	LEV (cmbs)	SCRN	CLS	OBJ	DES	MAT	NO	WT (g)	VOL (ml)	DESCRIPTION
1198	BH70	223-234		SAM	SAM	SED	COL	1	1667.2	1000	Midden 88-92 IBS, AH 70, sorted
1199	BH72	spoils	4	SAM	CVS	QRT	COL	1	197.5		Midden "slump" from top of midden deposit, sorted
1200	BH72	spoils	8	SAM	CVS	ETH	COL	1	102.2		Midden "slump" from top of midden deposit
1201	BH72	spoils	16	SAM	CVS	SIX	COL	1	116.4		Midden "slump" from top of midden deposit
1202	BH72	spoils	4	SAM	CVS	QRT	ROC	159	182.1		Midden "slump" from top of midden deposit
1203	BH72	spoils	4	SAM	CVS	QRT	SHL	15	5.6		Midden "slump" from top of midden deposit
1204	BH72	spoils	4	SAM	CVS	QRT	OTH	11	3.4		Midden "slump" from top of midden deposit
1205	BH70	193-203		SAM	SAM	SED	COL	1	116.8	800	Midden 76-80 IBS, AH 70, sorted
1206	BH70	193-203	4	SAM	CVS	QRT	COL	1	417.7		Midden 76-80 IBS, AH 70, sorted
1207	BH70	193-203	8	SAM	CVS	ETH	COL	1	74.9		Midden 76-80 IBS, AH 70
1208	BH70	193-203	16	SAM	CVS	SIX	COL	1	71.4		Midden 76-80 IBS, AH 70
1209	BH70	193-203	4	SAM	CVS	QRT	ROC	279	407.1		Midden 76-80 IBS, AH 70
1210	BH70	193-203	4	SAM	CVS	QRT	SHL	14	4.8		Midden 76-80 IBS, AH 70
1211	BH70	213-223		SAM	SAM	SED	COL	1	1598.5	1000	Midden 84-88 IBS, AH 70, sorted
1212	BH70	213-223	4	SAM	CVS	QRT	COL	1	295.5		Midden 84-88 IBS, AH 70, sorted
1213	BH70	213-223	8	SAM	CVS	ETH	COL	1	91.2		Midden 84-88 IBS, AH 70
1214	BH70	213-223	16	SAM	CVS	SIX	COL	1	113.2		Midden 84-88 IBS, AH 70
1215	BH70	213-223	4	SAM	CVS	QRT	ROC	218	263.7		Midden 84-88 IBS, AH 70
1216	BH70	213-223	4	SAM	CVS	QRT	SHL	87	28.5		Midden 84-88 IBS, AH 70
1217	BH15	219-229		SAM	SAM	SED	COL	1	1636.3	1200	Stratum III Aae, 86-90 IBS, AH 15, sorted
1218	BH15	219-229	4	SAM	CVS	QRT	COL	1	774.0		Stratum III Aae, 86-90 IBS, AH 15, sorted
1219	BH15	219-229	8	SAM	CVS	ETH	COL	1	194.7		Stratum III Aae, 86-90 IBS, AH 15
1220	BH15	219-229	16	SAM	CVS	SIX	COL	1	198.1		Stratum III Aae, 86-90 IBS, AH 15
1221	BH15	219-229	4	SAM	CVS	QRT	ROC	512	715.1		Stratum III Aae, 86-90 IBS, AH 15
1222	BH15	219-229	4	SAM	CVS	QRT	SHL	59	7.9		Stratum III Aae, 86-90 IBS, AH 15
1223	BH70	223-234	4	SAM	CVS	QRT	COL	1	196.7		Midden 88-92 IBS, AH 70, sorted
1224	BH70	223-234	8	SAM	CVS	ETH	COL	1	112.1		Midden 88-92 IBS, AH 70
1225	BH70	223-234	16	SAM	CVS	SIX	COL	1	133.0		Midden 88-92 IBS, AH 70
1226	BH70	223-234	4	SAM	CVS	QRT	SHL	20	5.7		Midden 88-92 IBS, AH 70
1227	BH70	223-234	4	SAM	CVS	QRT	ROC	186	190.8		Midden 88-92 IBS, AH 70
1228	BH15	208-213		SAM	SAM	SED	COL	1	1443.5	1000	Stratum III Aae, 82-86 IBS, AH 15, sorted
1229	BH15	208-213	4	SAM	CVS	QRT	COL	1	670.8		Stratum III Aae, 82-86 IBS, AH 15, sorted
1230	BH15	208-213	8	SAM	CVS	ETH	COL	1	157.3		Stratum III Aae, 82-86 IBS, AH 15
1231	BH15	208-213	16	SAM	CVS	SIX	COL	1	153.6		Stratum III Aae, 82-86 IBS, AH 15
1232	BH15	208-213	4	SAM	CVS	QRT	SHL	14	3.2		Stratum III Aae, 82-86 IBS, AH 15
1233	BH15	208-213	4	SAM	CVS	QRT	ROC	452	664.3		Stratum III Aae, 82-86 IBS, AH 15
1234	BH15	239-249		SAM	SAM	SED	COL	1	1855.6	1100	Stratum III Aae, 94-98 IBS, AH 15, sorted
1235	BH15	239-249	4	SAM	CVS	QRT	COL	1	347.1		Stratum III Aae, 94-98 IBS, AH 15, sorted
1236	BH15	239-249	8	SAM	CVS	ETH	COL	1	156.5		Stratum III Aae, 94-98 IBS, AH 15
1237	BH15	239-249	16	SAM	CVS	SIX	COL	1	172.1		Stratum III Aae, 94-98 IBS, AH 15
1238	BH15	239-249	4	SAM	CVS	QRT	SHL	8	2.4		Stratum III Aae, 94-98 IBS, AH 15
1239	BH15	239-249	4	SAM	CVS	QRT	ROC	309	343.4		Stratum III Aae, 94-98 IBS, AH 15
1240	BH13	219-229		SAM	SAM	SED	COL	1	1227.4	1000	Stratum III Aae, 86-90 IBS, AH 13, sorted
1241	BH13	219-229	4	SAM	CVS	QRT	COL	1	330.9		Stratum III Aae, 86-90 IBS, AH 13, sorted
1242	BH13	219-229	8	SAM	CVS	ETH	COL	1	116.0		Stratum III Aae, 86-90 IBS, AH 13
1243	BH13	219-229	16	SAM	CVS	SIX	COL	1	79.9		Stratum III Aae, 86-90 IBS, AH 13
1244	BH13	219-229	4	SAM	CVS	QRT	WOD	1	<0.1		Stratum III Aae, 86-90 IBS, AH 13
1245	BH13	219-229	4	SAM	CVS	QRT	SHL	24	6.7		Stratum III Aae, 86-90 IBS, AH 13

Table C-1. Artifact Catalog, Site 45SN393.

CAT	UNIT	LEV (cmbs)	SCRN	CLS	OBJ	DES	MAT	NO	WT (g)	VOL (ml)	DESCRIPTION
1246	BH13	219-229	4	SAM	CVS	QRT	ROC	289	322.8		Stratum III Aae, 86-90 IBS, AH 13
1247	BH15	249-259		SAM	SAM	SED	COL	1	1804 3	1000	Stratum III Aae, 98-102 IBS, AH 15, sorted
1248	BH15	249-259	4	SAM	CVS	QRT	COL	1	200.6		Stratum III Aae, 98-102 IBS, AH 15, sorted
1249	BH15	249-259	8	SAM	CVS	ETH	COL	1	92.8		Stratum III Aae, 98-102 IBS, AH 15
1250	BH15	249-259	16	SAM	CVS	SIX	COL	1	129.7		Stratum III Aae, 98-102 IBS, AH 15
1251	BH15	249-259	4	SAM	CVS	QRT	ROC	162	200.5		Stratum III Aae, 98-102 IBS, AH 15
1252	BH15	249-259	4	SAM	CVS	QRT	SHL	1	0.1		Stratum III Aae, 98-102 IBS, AH 15
1253	BH13	229-239		SAM	SAM	SED	COL	1	1520 0	900	Stratum III Aae, 90-94 IBS, AH 13, sorted
1254	BH13	229-239	4	SAM	CVS	QRT	COL	1	420.3		Stratum III Aae, 90-94 IBS, AH 13, sorted
1255	BH13	229-239	8	SAM	CVS	ETH	COL	1	100.8		Stratum III Aae, 90-94 IBS, AH 13
1256	BH13	229-239	16	SAM	CVS	SIX	COL	1	87.6		Stratum III Aae, 90-94 IBS, AH 13
1257	BH13	229-239	4	SAM	CVS	QRT	ROC	325	417.5		Stratum III Aae, 90-94 IBS, AH 13
1258	BH13	239-249		SAM	SAM	SED	COL	1	1529 0	700	Stratum III Aae, 94-98 IBS, AH 13, sorted
1259	BH13	239-249	4	SAM	CVS	QRT	COL	1	204.9		Stratum III Aae, 94-98 IBS, AH 13, sorted
1260	BH13	239-249	8	SAM	CVS	ETH	COL	1	39.3		Stratum III Aae, 94-98 IBS, AH 13
1261	BH13	239-249	16	SAM	CVS	SIX	COL	1	43.2		Stratum III Aae, 94-98 IBS, AH 13
1262	BH13	239-249	4	SAM	CVS	QRT	ROC	124	204.4		Stratum III Aae, 94-98 IBS, AH 13
1263	BH15	229-239		SAM	SAM	SED	COL	1	1861.7	1300	Stratum III Aae, 90-94 IBS, AH 15, sorted
1264	BH15	229-239	4	SAM	CVS	QRT	COL	1	575.4		Stratum III Aae, 90-94 IBS, AH 15, sorted
1265	BH15	229-239	8	SAM	CVS	ETH	COL	1	216.4		Stratum III Aae, 90-94 IBS, AH 15
1266	BH15	229-239	16	SAM	CVS	SIX	COL	1	188.9		Stratum III Aae, 90-94 IBS, AH 15
1267	BH15	229-239	4	SAM	CVS	QRT	ROC	535	568.3		Stratum III Aae, 90-94 IBS, AH 15
1268	BH15	229-239	4	SAM	CVS	QRT	SHL	7	1.1		Stratum III Aae, 90-94 IBS, AH 15
1269	BH1	127-137		SAM	SAM	SED	COL	1	2622.2	1400	Midden 50-54 IBS, AH 1, sorted
1270	BH1	127-137	4	SAM	CVS	QRT	COL	1	436.0		Midden 50-54 IBS, AH 1, sorted
1271	BH72	264-274		SAM	SAM	SED	COL	1	2248.6	1500	Midden/sediment sample 104-108 IBS, AH 72
1272	BH81	239-241		SAM	SAM	BOT	PTV	1	31.1		C-14 sample 94-95 IBS, AH 81
1273	BH1	127-137	8	SAM	CVS	ETH	COL	1	163.9		Midden 50-54 IBS, AH 1
1274	BH1	127-137	16	SAM	CVS	SIX	COL	1	210.1		Midden 50-54 IBS, AH 1
1275	BH1	127-137	4	SAM	CVS	QRT	ROC	360	421.3		Midden 50-54 IBS, AH 1
1276	BH1	127-137	4	SAM	CVS	QRT	SHL	50	13.8		Midden 50-54 IBS, AH 1
1277	BH67	373-383		SAM	SAM	SED	COL	1	1431 9	800	Midden 147-151 IBS "slump", AH 67, sorted, treated with degreaser
1278	BH67	373-383	4	SAM	CVS	QRT	COL	1	426.7		Midden 147-151 IBS "slump", AH 67, sorted, treated with degreaser
1279	BH67	373-383	8	SAM	CVS	ETH	COL	1	156 5		Midden 147-151 IBS "slump", AH 67, treated with degreaser
1280	BH67	373-383	16	SAM	CVS	SIX	COL	1	162.7		Midden 147-151 IBS "slump", AH 67, treated with degreaser
1281	BH67	373-383	4	SAM	CVS	QRT	SHL	2	0.5		Midden 147-151 IBS "slump", AH 67, treated with degreaser
1282	BH67	373-383	4	SAM	CVS	QRT	ROC	340	425 5		Midden 147-151 IBS "slump", AH 67, treated with degreaser
1283	BH73	223-234		SAM	SAM	SED	COL	1	1792.3	1100	Midden 88-92 IBS, AH 73, sorted, treated with degreaser
1284	BH73	223-234	4	SAM	CVS	QRT	COL	1	295.2		Midden 88-92 IBS, AH 73, sorted, treated with degreaser
1285	BH73	223-234	8	SAM	CVS	ETH	COL	1	98.1		Midden 88-92 IBS, AH 73, treated with degreaser
1286	BH73	223-234	16	SAM	CVS	SIX	COL	1	122.7		Midden 88-92 IBS, AH 73, treated with degreaser
1287	BH73	223-234	4	SAM	CVS	QRT	UNK	1	0.1		Midden 88-92 IBS, AH 73, treated with degreaser

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CAT	UNIT	LEV (cmbs)	SCRN	CLS	OBJ	DES	MAT	NO	WT (g)	VOL (ml)	DESCRIPTION
1288	BH73	223-234	4	SAM	CVS	QRT	SHL	15	6.4		Midden 88-92 IBS, AH 73, treated with degreaser
1289	BH73	223-234	4	SAM	CVS	QRT	ROC	242	287.4		Midden 88-92 IBS, AH 73, treated with degreaser
1290	BH67	363-373		SAM	SAM	SED	COL	1	1420.7	1000	Midden 143-147 IBS "slump", AH 67, sorted, treated with degreaser
1291	BH67	363-373	4	SAM	CVS	QRT	COL	1	383.1		Midden 143-147 IBS "slump", AH 67, sorted, treated with degreaser
1292	BH67	363-373	8	SAM	CVS	ETH	COL	1	128.6		Midden 143-147 IBS "slump", AH 67, treated wi h degreaser
1293	BH67	363-373	16	SAM	CVS	SIX	COL	1	140.3		Midden 143-147 IBS "slump", AH 67, treated wi h degreaser
1294	BH67	363-373	4	SAM	CVS	QRT	OTH	1	0.4		Midden 143-147 IBS "slump", AH 67, treated wi h degreaser
1295	BH67	363-373	4	SAM	CVS	QRT	SHL	3	1.3		Midden 143-147 IBS "slump", AH 67, treated wi h degreaser
1296	BH67	363-373	4	SAM	CVS	QRT	ROC	230	381.1		Midden 143-147 IBS "slump", AH 67, treated wi h degreaser
1297	T11	160-162	8	SAM	CVS	ETH	FSH	12			9 unidentified fragments, 3 miscellaneous ray/spine fragments, from cat #63
1298	T13	240-250	8	SAM	CVS	ETH	FSH	4			1 miscellaneous ray/spine fragment, 3 unidentified fragments, from cat #3
1299	T13	240-250	8	SAM	CVS	ETH	FSH	3			3 Oncorhynchus sp., from cat #3
1300	T8	spoils	4	SAM	CVS	QRT	MAM	2			Odocoileus sp., 1 right humerus, distal end, 1 left metacarpal, distal end, cutmarks on both, from cat #142
1301	T8	spoils	4	SAM	CVS	QRT	MAM	26			unidentified mammal fragments, from cat #142
1302	T8	spoils	4	SAM	CVS	QRT	MAM	2			P. vitulina, 1 innominate ilium fragment, 1 innominate ischium fragment, both infant lefts, from cat #142
1303	T8	spoils	4	SAM	CVS	QRT	MAM	1			Bos sp., 1 right scaupla, head and neck, from cat #142
1304	T8	spoils	4	SAM	CVS	QRT	MAM	5			C. elaphus, 2 cervical vertebrae centrum fragments, 2 cervical vertebrae arch fragments, 1 metatarsal, distal shaft, all mature, from cat #142
1305	T8	spoils	4	SAM	CVS	QRT	MAM	11			Phocoenidae, 2 lumbar vertebraes, 3 vertebrae epiphyseals, 1 occipital fragment, 5 cranial fragments, from cat #142
1306	T8	spoils	4	SAM	CVS	QRT	MAM	14			unidentified mammal fragments, from cat #117
1307	T8	spoils	4	SAM	CVS	QRT	MAM	2			unidentified mammal fragments, 2 sawed/modified fragments, from cat #117
1308	T8	spoils	4	SAM	CVS	QRT	MAM	3			Odocoileus sp., 1 left scapula fragment, 1 left rib shaft fragment mature, 1 metapodial, distal end of diaphysis juvenile, from cat #117
1309	T8	spoils	4	SAM	CVS	QRT	MAM	1			P. vitulina, 1 right radius shaft fragment, mature, from cat #117
1310	T8	spoils	4	SAM	CVS	QRT	MAM	1			Phocoenidae, 1 lumbar vertebrae fragment, from cat #117
1311	T8	spoils	4	SAM	CVS	QRT	MAM	3			Cervidae, 1 right scapula fragment, 2 unidentified Scapula fragments, from cat #117
1312	T11	spoils	4	SAM	CVS	QRT	FSH	1			R. vacca, 1 lower pharyngeal plate, from cat #196
1313	T11	spoils	4	SAM	CVS	QRT	MAM				unidentified mammal, 2 rib fragments, 17 longbone shaft fragments, 29 unidentified fragments, 2 phalanges, 6 vertebrae fragments, from cat #196
1314	T11	spoils	4	SAM	CVS	QRT	MAM	1			cf. Otariidae, 1 lumbar vertebrae spinous process, from cat #196

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CAT	UNIT	LEV (cmbs)	SCRN	CLS	OBJ	DES	MAT	NO	WT (g)	VOL (ml)	DESCRIPTION
1315	T11	spoils	4	SAM	CVS	QRT	MAM	1			Odocoileus sp., 1 medial phalanx, from cat #196
1316	T11	spoils	4	SAM	CVS	QRT	MAM	6			P. vitulina, 1 proximal phalanx distal end, 1 left tibia diaphysis fragment, 1 left 5th metatarsal proximal end juvenile, 1 left innominate ischium fragment, 1 sphenoid fragment, 1 parietal auditory bulla fragment, from cat #196
1317	T6	spoils	4	SAM	CVS	QRT	FSH	1			L. bilineata, 1 right dentary, from cat #143
1318	T6	spoils	4	SAM	CVS	QRT	FSH	1			Oncorhynchus sp., 1 cranial fragment, from cat #143
1319	T6	spoils	4	SAM	CVS	QRT	MAM	1			Odocoileus sp., 1 cervical vertebrae, right anterior articular process fragment, juvenile, from cat #143
1320	T6	spoils	4	SAM	CVS	QRT	MAM	16			unidentified mammal, 4 cranial fragments, 12 uniden ified fragments, from cat #143
1321	T14	spoils	4	SAM	CVS	QRT	AVI	1			uniden ified Bird, 1 longbone shaft fragment, from cat #277
1322	T14	spoils	4	SAM	CVS	QRT	MAM	21			uniden ified mammal, 13 longbone shaft fragments, 5 unidentified fragments, 3 longbone shaft fragments that exhibit small cutmarks, from cat #277
1323	T13	spoils	4	SAM	CVS	QRT	MAM	1			Odocoileus sp., 1 right tibia, distal end, from cat #17
1324	T13	spoils	4	SAM	CVS	QRT	MAM	3			uniden ified mammal, 1 charred and calcined longbone shaft fragment, 2 longbone shaft fragments, from cat #17
1325	T8	spoils	4	SAM	CVS	QRT	MAM	3			Odocoileus sp., 2 scapula fragments, 1 horacic vertebrae right arch fragment infant, from cat #118
1326	T8	spoils	4	SAM	CVS	QRT	MAM	2			P. vitulina, 1 sphenoid fragment, mature, 1 right ulna shaft fragment, from cat #118
1327	T8	spoils	4	SAM	CVS	QRT	MAM	4			uniden ified mammal, 3 longbone shaft fragments, 1 rib shaft fragment, from cat #118
1328	T14	spoils	4	SAM	CVS	QRT	MAM	1			Large mammal, 1 rib fragment, from cat #282
1329	T14	spoils	4	SAM	CVS	QRT	MAM	1			Bos sp., 1 3rd phalanx distal, from cat #282
1330	T14	spoils	4	SAM	CVS	QRT	MAM	22			unidentified mammal, 22 uniden ified fragments, from cat #282
1331	T14	spoils	4	SAM	CVS	QRT	MAM	1			Odocoileus sp., 1 cervical vertebrae fragment, from cat #282
1332	T14	spoils	4	SAM	CVS	QRT	MAM	3			Otariidae, 3 sternabrae fragments, from cat #282
1333	T14	spoils	4	SAM	CVS	QRT	MAM	19			unidentified mammal, 17 uniden ified fragments, 1 vertebrae arch fragment, 1 vertebrae articular process fragment, from bag #280
1334	T14	spoils	4	SAM	CVS	QRT	MAM	3			P. vitulina, 1 right humerus distal end of diaphysis infant, 1 left innominate ischium, infant, 1 left parietal fragment mature, from cat #280
1335	T5	spoils	4	SAM	CVS	QRT	MAM	2			Odocoileus sp., 1 left humerus distal end, 1 left radius proximal end, from cat #237
1336	T5	spoils	4	SAM	CVS	QRT	MAM	2			Cervidae, 2 antler fragments, from cat #237
1337	T5	spoils	4	SAM	CVS	QRT	MAM	1			Phocoenidae, 1 thoracic vertebrae, from cat #237
1338	T5	spoils	4	SAM	CVS	QRT	MAM	2			P. vitulina, 1 proximal phalanx proximal end, 1 sternabrae, from cat #237
1339	T5	spoils	4	SAM	CVS	QRT	MAM	6			unidentified mammal, 5 longbone shaft fragments, 1 vertebrae arch fragment, from cat #237
1340	T11	spoils	4	SAM	CVS	QRT	MAM	4			P. vitulina, 1 innominate ilium fragment, 1 innominate ischium fragment, 1 sternabrae fragment, 1 occipital fragment, from cat #195

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CAT	UNIT	LEV (cmbs)	SCRN	CLS	OBJ	DES	MAT	NO	WT (g)	VOL (ml)	DESCRIPTION
1341	T11	spoils	4	SAM	CVS	QRT	MAM	2			unidentified mammal, 1 vertebrae arch fragment, 1 rib fragment, from cat #195
1342	T14	spoils	4	SAM	CVS	QRT	FSH	4			Oncorhynchus sp., 1 left exoccipital, 1 1st vertebrae, 2 caudal vertebraes, from cat #279
1343	T14	spoils	4	SAM	CVS	QRT	FSH	2			Pleuronec iformes, 1 penultimate vertebrae, 1 interhaemal spine fragment, from cat #279
1344	T14	spoils	4	SAM	CVS	QRT	FSH	1			H. colliei, 1 left lower lateral too h, from cat #279
1345	T11	132-135	4	SAM	CVS	QRT	FSH	2			Cottidae, 2 left hyomandibular, from cat #251
1346	T11	132-135	4	SAM	CVS	QRT	FSH	1			Pleuronectiformes, 1 caudal vertebrae, from cat #251
1347	T11	132-135	4	SAM	CVS	QRT	FSH	1			unidentified fish, 1 unidentified fragment, from cat #251
1348	T11	132-135	4	SAM	CVS	QRT	FSH	8			Oncorhynchus sp., 1 left exoccipital, 1 basioccipital, 1 1st vertebrae, 2 thoracic vertebrae, 1 caudal vertebrae, 1 vertebrae fragment, 1 ceratobranchial, from cat #251
1349	T6	225-235	4	SAM	CVS	QRT	FSH	1			Pleuronectiformes, 1 caudal vertebrae, from cat #383
1350	T6	225-235	4	SAM	CVS	QRT	FSH	1			unidentified fish, 1 unidentified fragment, from cat #383
1351	T11	155-158	4	SAM	CVS	QRT	FSH	5			Oncorhynchus sp., 3 thoracic vertebrae, 1 caudal vertebrae, 1 vertebrae fragment, from cat #221
1352	T11	155-158	4	SAM	CVS	QRT	FSH	1			unidentified fish, 1 unidentified fragment, from cat #221
1353	T6	215-225	4	SAM	CVS	QRT	FSH	1			Oncorhynchus sp., 1 caudal vertebrae, from cat #260
1354	T6	215-225	4	SAM	CVS	QRT	FSH	1			unidentified fish, 1 miscellaneous ray/spine, from cat #260
1355	T6	195-205	8	SAM	CVS	ETH	FSH	2			Oncorhynchus sp., 2 vertebrae fragments, from cat #42
1356	T6	195-205	8	SAM	CVS	ETH	FSH	4			unidentified fish, 2 miscellaneous ray/spine fragments, 2 unidentified fragments, from cat #42
1357	T13	270-278	8	SAM	CVS	ETH	FSH	4			Cottidae, 3 caudal vertebraes, 1 right posttemporal, from cat #27
1358	T13	270-278	8	SAM	CVS	ETH	FSH	2			H. colliei, 1 left medial tooth fragment charred, 1 right medial tooth fragment charred, from cat #27
1359	T13	270-278	8	SAM	CVS	ETH	FSH	5			unidentified fish, 5 unidentified fragments, from cat #27
1360	T6	205-215	8	SAM	CVS	ETH	FSH	5			Oncorhynchus sp., 5 vertebrae fragments, from cat #98
1361	T6	205-215	8	SAM	CVS	ETH	FSH	7			unidentified fish, 5 miscellaneous ray/spine fragments, 2 unidentified fragments, from cat #98
1362	T11	105-110	8	SAM	CVS	ETH	FSH	1			Oncorhynchus sp., 1 vertebrae fragment, from cat #354
1363	T11	105-110	8	SAM	CVS	ETH	FSH	3			unidentified fish, 1 miscellaneous ray/spine, 2 unidentified fragments, from cat #354
1364	T5	spoils	4	SAM	CVS	QRT	FSH	1			Sebastes sp., 1 right angular articular portion in 2 pcs, from cat #236
1365	T5	spoils	4	SAM	CVS	QRT	FSH	2			unidentified fish, 2 unidentified fragments, from cat #236
1366	T14	170-180	8	SAM	CVS	ETH	FSH	2			Oncorhynchus sp., 2 vertebrae fragments, from cat #449
1367	T14	170-180	8	SAM	CVS	ETH	FSH	9			unidentified fish, 9 unidentified fragments, from cat #449
1368	T14	190-200	8	SAM	CVS	ETH	FSH	1			Oncorhynchus sp., 1 vertebrae fragment, from cat #418

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CAT	UNIT	LEV (cmbs)	SCRN	CLS	OBJ	DES	MAT	NO	WT (g)	VOL (ml)	DESCRIPTION
1369	T14	190-200	8	SAM	CVS	ETH	FSH	2			unidentified fish, 2 unidentified fragments, from cat #418
1370	T14	230-240	8	SAM	CVS	ETH	FSH	10			Oncorhynchus sp., 9 vertebrae fragments, 1 caudal vertebrae fragment, from cat #373
1371	T14	230-240	8	SAM	CVS	ETH	FSH	4			unidentified fish, 3 miscellaneous ray/spine fragments, 1 charred fragment, from cat #373
1372	T14	205-208	8	SAM	CVS	ETH	FSH	7			Oncorhynchus sp., 7 vertebrae fragments, from cat #401
1373	T14	205-208	8	SAM	CVS	ETH	FSH	5			unidentified fish, 2 miscellaneous ray/spine fragments, 3 unidentified fragments, from cat #401
1374	T6	225-235	8	SAM	CVS	ETH	FSH	2			Oncorhynchus sp., 2 caudal vertebrae fragments, from cat #380
1375	T6	225-235	8	SAM	CVS	ETH	FSH	8			unidentified fish, 4 miscellaneous ray/spine fragments, 4 unidentified fragments, from cat #380
1376	T14	250-255	8	SAM	CVS	ETH	FSH	4			Oncorhynchus sp., 2 thoracic vertebrae calcined, 2 vertebrae fragments calcined, from cat #361
1377	T14	250-255	8	SAM	CVS	ETH	FSH	1			unidentified fish, 1 miscellaneous ray/spine fragment calcined, from cat #361
1378	T14	180-190	8	SAM	CVS	ETH	FSH	20			Oncorhynchus sp., 20 vertebrae fragments, 1 charred, from cat #369
1379	T14	180-190	8	SAM	CVS	ETH	FSH	2			Pleuronectiformes, 1 precaudal vertebrae, 1 caudal vertebrae, from cat #369
1380	T14	180-190	8	SAM	CVS	ETH	FSH	19			unidentified fish, 10 miscellaneous ray/spine fragments, 9 unidentified fragments, from cat #369
1381	T14	230-235	8	SAM	CVS	ETH	FSH	10			Oncorhynchus sp., 10 vertebrae fragments, 1 charred, from cat #409
1382	T14	230-235	8	SAM	CVS	ETH	FSH	1			Embiotocidae, 1 caudal vertebrae, from cat #409
1383	T14	230-235	8	SAM	CVS	ETH	FSH	12			unidentified fish, 6 miscellaneous ray/spine fragments, 6 unidentified fragments, from cat #409
1384	T11	150-152	8	SAM	CVS	ETH	FSH	22			Oncorhynchus sp., 22 vertebrae fragments, 2 charred, from cat #285
1385	T11	150-152	8	SAM	CVS	ETH	FSH	1			Pleuronectiformes, 1 caudal vertebrae, from cat #285
1386	T11	150-152	8	SAM	CVS	ETH	FSH	1			C.harengus pallasi, 1 right opercle, from cat #285
1387	T11	150-152	8	SAM	CVS	ETH	FSH	25			unidentified fish, 12 miscellaneous ray/spine fragments, 13 unidentified fragments, from cat #285
1388	T6	215-225	8	SAM	CVS	ETH	FSH	5			Oncorhynchus sp., 3 branchial fragments, 2 vertebrae fragments, from cat #257
1389	T6	215-225	8	SAM	CVS	ETH	FSH	15			unidentified fish, 7 miscellaneous ray/spine fragments, 8 unidentified fragments, from cat #257
1390	T5	210-220	8	SAM	CVS	ETH	FSH	15			Oncorhynchus sp., 14 vertebrae fragments, 1 tooth, from cat #336
1391	T5	210-220	8	SAM	CVS	ETH	FSH	1			cf. L bilineata, 1 left quadratem from cat #336
1392	T5	210-220	8	SAM	CVS	ETH	FSH	5			unidentified fish, 3 miscellaneous ray/spine fragments, 2 unidentified fragments, from cat #336
1393	T14	220-230	8	SAM	CVS	ETH	FSH	5			Oncorhynchus sp., 5 vertebrae fragments, from cat #309
1394	T14	220-230	8	SAM	CVS	ETH	FSH	1			L. armatus, 1 otolith, from cat #309
1395	T14	220-230	8	SAM	CVS	ETH	FSH	1			Cottidae, 1 caudal vertebrae, from cat #309
1396	T14	220-230	8	SAM	CVS	ETH	FSH	1			Pleuronectidae, 1 left ectopterygoid, from cat #309

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CAT	UNIT	LEV (cmbs)	SCRN	CLS	OBJ	DES	MAT	NO	WT (g)	VOL (ml)	DESCRIPTION
1397	T14	220-230	8	SAM	CVS	ETH	FSH	6			unidentified fish, 1 miscellaneous ray/spine fragment, 5 unidentified fragments, from cat #309
1398	T6	210-245	8	SAM	CVS	ETH	FSH	1			Oncorhynchus sp., 1 vertebrae fragment, from cat #473
1399	T6	210-245	8	SAM	CVS	ETH	FSH	4			unidentified fish, 4 unidentified fragments, from cat #473
1400	T5	220-230	8	SAM	CVS	ETH	FSH	4			Oncorhynchus sp., 4 vertebrae fragments, from cat #84
1401	T5	220-230	8	SAM	CVS	ETH	FSH	1			unidentified fish, 1 miscellaneous ray/spine fragment, from cat #84
1402	T11	155-158	8	SAM	CVS	ETH	FSH	27			Oncorhynchus sp., 25 vertebrae fragments, 1 tooth, 1 thoracic vertebrae fragment, from cat #219
1403	T11	155-158	8	SAM	CVS	ETH	FSH	1			Cottidae, 1 precaudal vertebrae, from cat #219
1404	T11	155-158	8	SAM	CVS	ETH	FSH	30			unidentified fish, 13 miscellaneous ray/spine fragments, 17 unidentified fragments, from cat #219
1405	T11	132-135	8	SAM	CVS	ETH	FSH	38			Oncorhynchus sp., 27 vertebrae fragments, 5 branchials, 6 gill rakers, from cat #249
1406	T11	132-135	8	SAM	CVS	ETH	FSH	1			L. armatus, 1 left angular, from cat #249
1407	T11	132-135	8	SAM	CVS	ETH	FSH	102			unidentified fish, 27 miscellaneous ray/spine fragments, 75 unidentified fragments, from cat #249
1408	T13	278-280	8	SAM	CVS	ETH	FSH	3			Cottidae, 1 parietal fragment, 1 caudal vertebrae, 1 ultimate vertebrae, from cat #35
1409	T13	278-280	8	SAM	CVS	ETH	FSH	1			Embiotocidae, 1 precaudal vertebrae charred, from cat #35
1410	T13	278-280	8	SAM	CVS	ETH	FSH	4			Oncorhynchus sp., 4 vertebrae fragments, from cat #35
1411	T13	278-280	8	SAM	CVS	ETH	FSH	1			P. stellatus, 1 left premaxilla, from cat #35
1412	T13	278-280	8	SAM	CVS	ETH	FSH	4			Pleuronectiformes, 3 caudal vertebraes, 1 vertebrae fragment, from cat #35
1413	T13	278-280	8	SAM	CVS	ETH	FSH	11			unidentified fish, 3 miscellaneous ray/spine fragments, 8 unidentified fragments, from cat #35
1414	T13	260-266	8	SAM	CVS	ETH	FSH	2			Cottidae, 1 lacharcoalymal fragment charred, 1 cranial fragment charred, from cat #11
1415	T13	260-266	8	SAM	CVS	ETH	FSH	9			unidentified fish, 9 unidentified fragments, from cat #11
1416	T14	spoils	4	SAM	CVS	QRT	FSH	2			R. vacca, 1 parasphenoid, 1 basioccipital, from cat #280
1417	T11	160-162	8	SAM	CVS	ETH	FSH	6			Oncorhynchus sp., 5 vertebrae fragments, 1 tooth, from cat #63
1418	T11	160-162	8	SAM	CVS	ETH	FSH	2			S. acanthias, 2 vertebrae fragments, from cat #63
1419	T11	160-162	8	SAM	CVS	ETH	FSH	3			unidentified fish, 3 unidentified fragments, from cat #63
1420	T6	265-275	8	SAM	CVS	ETH	FSH	1			C. harengus pallasi, 1 caudal vertebrae, from cat #70
1421	T6	265-275	8	SAM	CVS	ETH	FSH	1			Cottidae, 1 caudal vertebrae fragment, from cat #70
1422	T6	265-275	8	SAM	CVS	ETH	FSH	1			Pleuronec idae, 1 right quadrate, from cat #70
1423	T6	265-275	8	SAM	CVS	ETH	FSH	2			unidentified fish, 2 unidentified fragments, from cat #70
1424	T6	245-255	8	SAM	CVS	ETH	FSH	2			Cottidae, 2 caudal vertebraes, from cat #91
1425	T6	245-255	8	SAM	CVS	ETH	FSH	1			L. armatus, 1 right angular, from cat #91
1426	T6	245-255	8	SAM	CVS	ETH	FSH	2			Oncorhynchus sp., 1 caudal vertebrae fragment, 1 vertebrae fragment, from cat #91

Table C-1. Artifact Catalog, Site 45SN393.

CAT	UNIT	LEV (cmbs)	SCRN	CLS	OBJ	DES	MAT	NO	WT (g)	VOL (ml)	DESCRIPTION
1427	T6	245-255	8	SAM	CVS	ETH	FSH	5			unidentified fish, 5 unidentified fragments, from cat #91
1428	T11	spoils	4	SAM	CVS	QRT	FSH	1			Oncorhynchus sp., 1 vertebrae fragment, from cat #193
1429	T11	spoils	4	SAM	CVS	QRT	FSH	1			P. stellatus, 1 right quadrate, from cat #193
1430	T11	spoils	4	SAM	CVS	QRT	FSH	1			unidentified fish, 1 unidentified fragment, from cat #193
1431	T5	230-240	8	SAM	CVS	ETH	FSH	1			L. armatus, 1 1st vertebrae, from cat #241
1432	T5	230-240	8	SAM	CVS	ETH	FSH	2			unidentified fish, 1 vertebrae fragment, 1 unidentified fragment, from cat #241
1433	T6	185-195	8	SAM	CVS	ETH	FSH	2			Ocorhynchus sp., 2 vertebrae fragments, from cat #302
1434	T6	185-195	8	SAM	CVS	ETH	FSH	1			Pleuronectiformes, 1 caudal vertebrae, from cat #302
1435	T6	185-195	8	SAM	CVS	ETH	FSH	5			unidentified fish, 2 miscellaneous ray/spine fragments, 3 unidentified fragments, from cat #302
1436	T6	235-245	8	SAM	CVS	ETH	FSH	1			Cottidae, 1 caudal vertebrae, from cat #315
1437	T6	235-245	8	SAM	CVS	ETH	FSH	1			Embiotocidae, 1 upper pharyngeal plate fragment, from cat #315
1438	T6	235-245	8	SAM	CVS	ETH	FSH	2			unidentified fish, 2 unidentified fragments, from cat #315
1439	T5	210-220	4	SAM	CVS	QRT	FSH	1			Oncorhynchus sp., 1 vertebrae fragment, from cat #339
1440	T5	210-220	4	SAM	CVS	QRT	FSH	1			S. acanthias, 1 vertebrae fragment, from cat #339
1441	T8	spoils	4	FLS	COR	BIP	CCS	1	1.9		Bipolar microblade core
1442	T8	spoils	4	FLS	COR	BIP	QZT	1	11.3		
1443	T11	spoils	4	FLS	EMP	OTH	BAS	1	166.3		Probable bipolar flake
1444	T11	spoils	4	FLS	EMP	EDF	BAS	1	55.6		Bipolar flake
1445	T13	spoils	4	FLS	EMP	PRT	BAS	1	40.1		
1446	T13	spoils	4	FLS	EMP	EDF	BAS	1	87.3		Bipolar flake
1447	T11	spoils	4	FLS	EMP	PRT	BAS	1	87.1		
1449	T14	spoils	4	GBS	HAM	END	OTH	1	315.3		
1452	T6	spoils	4	FLS	EMP	EDF	BAS	1	5.2		Bipolar flake
1453	T14	spoils	4	FLS	SPC	USF	BAS	1	129.4		
1454	T14	spoils	4	FLS	COR	BIP	BAS	1	801.9		
1455	T14	spoils	4	FLS	EMP	EDF	BAS	1	49.3		
1456	T14	spoils	4	FLS	EMP	EDF	BAS	1	19.6		
1457	T14	spoils	4	FLS	SPC	USF	BAS	1	17.5		
1458	T14	spoils	4	FLS	EMP	EDF	BAS	1	30.0		
1459	T14	spoils	4	FLS	COR	USF	CCS	1	25.7		
1460	T8	spoils	4	FLS	SPC	SBP	MET	1	15.7		Bipolar split pebble, linear flake removed from ventral surface
1461	T8	spoils	4	FLS	COR	BIP	MUD	1	22.3		Multiple platform pebble core
1462	T8	spoils	4	FLS	EMP	EDF	BAS	1	4.4		
1463	T8	spoils	4	FLS	EMP	EDF	BAS	1	5.3		Multiple platforms
1464	T8	spoils	4	FLS	EMP	EDF	BAS	1	9.3		
1465	T8	spoils	4	FLS	EMP	EDF	BAS	1	13.8		
1466	T8	spoils	4	FLS	EMP	EDF	BAS	1	10.6		
1467	T8	spoils	4	FLS	EMP	EDF	BAS	1	8.0		
1468	T8	spoils	4	FLS	EMP	EDF	BAS	1	7.1		
1469	T8	spoils	4	FLS	COR	BIP	MET	1	10.0		
1470	T8	spoils	4	FLS	EMP	EDF	CCS	1	9.8		Split pebble bipolar reduction

Table C-1. Artifact Catalog, Site 45SN393.

CAT	UNIT	LEV (cmbs)	SCRN	CLS	OBJ	DES	MAT	NO	WT (g)	VOL (ml)	DESCRIPTION
1471	T8	spoils	4	FLS	COR	BIP	BAS	1	14.0		
1472	T8	spoils	4	FLS	DEB	LIN	BAS	1	1.3		
1473	T8	spoils	4	FLS	EMP	OTH	BAS	1	4.3		
1474	T8	spoils	4	FLS	DEB	LIN	MET	1	0.8		
1475	T8	spoils	4	FLS	EMP	EDF	MET	1	0.9		
1476	T8	spoils	4	FLS	DEB	LIN	MET	1	0.5		
1477	T8	spoils	4	FLS	EMP	PRT	MET	1	10.3		
1478	T8	spoils	4	FLS	EMP	EDF	MET	1	6.1		
1480	T8	spoils	4	FLS	EMP	OTH	BAS	1	5.6		
1481	T8	spoils	4	FLS	EMP	EDF	BAS	1	118.0		
1482	T8	spoils	4	FLS	EMP	EDF	BAS	1	10.3		Bipolar core with wear modification.
1483	T8	spoils	4	FLS	SPC	USF	BAS	1	15.8		
1484	T8	spoils	4	FLS	EMP	EDF	MET	1	6.7		Bipolar flake
1485	T8	spoils	4	FLS	EMP	EDF	MET	1	6.7		
1486	T8	spoils	4	FLS	EMP	EDF	MUD	1	10.2		Bipolar
1487	T8	spoils	4	FLS	EMP	EDF	BAS	1	7.4		Bipolar
1488	T8	spoils	4	FLS	SPC	SBP	MET	1	11.3		
1489	T8	spoils	4	FLS	SPC	USF	VOL	1	13.4		
1490	T11	160-165	8	SAM	CVS	ETH	FSH	4			Pleuronec iformes, 4 caudal vertebrae fragments, from cat #345
1491	T11	160-165	8	SAM	CVS	ETH	FSH	1			Pleuronectidae, 1 right ectopterygoid, from cat #345
1492	T11	160-165	8	SAM	CVS	ETH	FSH	1			Cottidae, 1 left premaxilla, from cat #345
1493	T11	160-165	8	SAM	CVS	ETH	FSH	1			S. acanthias, 1 vertebrae fragment, from cat #345
1494	T11	160-165	8	SAM	CVS	ETH	FSH	36			unidentified fish, 3 calcined unidentified fragments, 22 unidentified fragments, 11 miscellaneous ray/spine fragments, from cat #345
1495	T11	160-165	4	SAM	CVS	QRT	FSH	1			Embiotocidae, 1 parasphenoid fragment, from cat #348
1496	T11	160-165	4	SAM	CVS	QRT	FSH	1			Pleuronectiformes, 1 caudal vertebrae, from cat #348
1497	T11	160-165	4	SAM	CVS	QRT	FSH	3			unidentified fish, 3 unidentified fragments, from cat #348
1498	T14	200-210	8	SAM	CVS	ETH	FSH	1			Cottidae, 1 epibranchial, from cat #426
1499	T14	200-210	8	SAM	CVS	ETH	FSH	1			Oncorhynchus sp., 1 vertebrae fragment, from cat #426
1500	T14	200-210	8	SAM	CVS	ETH	FSH	2			unidentified fish, 2 unidentified fragments, from cat #426
1501	T14	240-245	8	SAM	CVS	ETH	FSH	1			Pleuronectidae, 1 left ectopterygoid, from cat #455
1502	T14	240-245	8	SAM	CVS	ETH	FSH	2			Pleuronec iformes, 1 precaudal vertebrae, 1 caudal vertebrae, from cat #455
1503	T14	240-245	8	SAM	CVS	ETH	FSH	13			Oncorhynchus sp., 13 vertebrae fragments, from cat #455
1504	T14	240-245	4	SAM	CVS	QRT	FSH	1			Embiotocidae, 1 thoracic vertebrae, from cat #458
1505	T14	240-245	4	SAM	CVS	QRT	FSH	1			Cottidae, 1 caudal vertebrae, from cat #458
1506	BH12	145-152	4	SAM	CVS	QRT	FSH	2			Oncorhynchus sp., 1 epural, 1 caudal vertebrae centrum, from cat #501
1507	BH12	145-152	4	SAM	CVS	QRT	FSH	1			unidentified fish, 1 unidentified fragment, from cat #501

Table C-2. Artifact Catalog for Sites 45SN404.

CAT	UNIT	FEA	LEVEL cmbs	CLS	OBJ	DES	MAT	NO	WGT (g)	DESCRIPTION
1	North wall trench		--	HIS	CER	POR	PLA	1	15.5	disturbed content; painted
2	North wall trench		--	HIS	CER	ETH	UNK	2	27.8	disturbed content
3			251	HIS	GLS	VES	BRN	3	289.2	in pipe fill; 135' W V30; base fragments
4			251	HIS	GLS	UNK	AQU	1	12.5	in pipe fill; 135' W V30
5			251	HIS	LEA	FTW	FRA	1	0.6	in pipe fill; 135' W V30
6			251	FAU	LML	BON	USF	2	22.1	in pipe fill; 135' W V30
7			251	HIS	CER	STN	CRK	1	93.5	in pipe fill; 135' W V30; brown glaze
8			130	HIS	LEA	FTW	FRA	8	503.7	108-133' W V30
9	backdirt		--	HIS	GLS	HMB	AQU	1	430.5	"Everett Bot ling Works, Trademark"; complete
10	backdirt		--	HIS	GLS	HMB	AQU	1	61.6	"Three In One","3 In One Oil Co"; complete
11	backdirt		--	HIS	GLS	VES	AQU	1	186.5	"Sanford's Inks"; no finish
12	backdirt		--	HIS	GLS	HMB	AQU	1	59.8	finish fragment
13	backdirt		--	HIS	GLS	HMB	AQU	1	19.5	"Gebroeders Wanning Till"
14	backdirt		--	HIS	GLS	HMB	GRN	1	164.8	base fragment
15	backdirt		--	HIS	GLS	JAR	GRN	1	74.5	trademark on base, metal lid; complete
16	backdirt		--	HIS	GLS	AMB	COB	1	40.4	"Gromo Seltzer Emerson Drug Co. Baltimore MD"; complete
17	backdirt		--	HIS	GLS	JAR	MLK	1	76.1	base reads "Musterole Cleveland"; complete
18	backdirt		--	HIS	GLS	JRL	MLK	1	28.6	"Boyd's Genuine Porcelain Lined Cap, 3"; complete
19	backdirt		--	HIS	GLS	HMB	AME	1	50.1	finish fragment
20	backdirt		--	HIS	GLS	AMB	AME	1	213.3	external threads; complete
21	backdirt		--	HIS	GLS	AMB	BRN	1	741.2	"One Quart", trademark on base, external threads; complete
22	backdirt		--	HIS	GLS	VES	BRN	1	621.7	"S.C.Co., 2"; no finish
23	backdirt		--	HIS	GLS	AMB	BRN	1	369.6	"Federal Law Forbids Sale or Re-Use of This Bottle","One Pint", trademark on bottom, external threads; complete
24	backdirt		--	HIS	GLS	VES	OLV	1	336.7	base fragment, push up
25	backdirt		--	HIS	GLS	HMB	CLR	1	142.2	complete
26	backdirt		--	HIS	GLS	AMB	CLR	1	213.2	external threads; complete
27	backdirt		--	HIS	GLS	HMB	CLR	1	226.2	milk bottle neck
28	backdirt		--	HIS	GLS	AMB	CLR	1	50.1	reinforced extract finish; complete
29	backdirt		--	HIS	GLS	AMB	CLR	1	235.0	"333x"; complete
30	backdirt		--	HIS	GLS	HMB	CLR	1	305.4	double ring finish; complete
31	backdirt		--	HIS	GLS	AMB	CLR	1	342.0	external threads; complete
32	backdirt		--	HIS	GLS	AMB	CLR	1	355.2	complete
33	backdirt		--	HIS	GLS	JAR	CLR	1	200.5	complete
34	backdirt		--	HIS	GLS	VES	CLR	1	364.8	no finish
35	backdirt		--	HIS	GLS	HMB	CLR	1	312.8	complete
36	backdirt		--	HIS	GLS	AMB	CLR	1	96.7	"JAF & C", double ring finish; complete
37	backdirt		--	HIS	GLS	HMB	CLR	1	233.5	"Half Pint Full Measure", brandy finish; complete
38	backdirt		--	HIS	GLS	HMB	CLR	1	335.3	complete
39	backdirt		~ 130	HIS	OTH	OTH	COM	1	1560.0	grinding stone?; complete
40	backdirt		--	FAU	LML	BON	COM	1	32.3	deer, right metacarpal
41	backdirt		--	FAU	LML	BON	NRN	1	186.9	cow, right scapula
42	backdirt		--	HIS	LEA	FTW	FRA	1	37.0	
43	backdirt		--	HIS	CER	STN	OTH	2	63.3	yellow and brown glaze, bowl fragment
44	backdirt		--	HIS	CER	STN	UNK	1	35.1	brown and gray glaze
45	backdirt		--	HIS	CER	ETH	UNK	1	71.6	"Wilkinson England" trademark

Table C-2. Artifact Catalog for Sites 45SN404.

CAT	UNIT	FEA	LEVEL cmbs	CLS	OBJ	DES	MAT	NO	WGT (g)	DESCRIPTION
46	backdirt		--	HIS	CER	ETH	UNK	1	46.7	"W.S. George, Derwood" trademark
47	backdirt		--	HIS	CER	ETH	UNK	1	47.7	"Royal Ironstone…" partial trademark
48	backdirt		--	HIS	CER	POR	CUP	1	69.1	"Tuscan China England" trademark
49	backdirt		--	HIS	CER	ETH	UNK	1	7.0	red and green floral decal; rim fragment
50	backdirt		--	HIS	CER	POR	UNK	1	30.0	blue stripe; rim fragment
51	backdirt		--	HIS	CER	ETH	CUP	1	28.4	gold guilding; rim fragment
52	backdirt		~ 130	HIS	OTH	OTH	COM	1	43.8	"Thomas", stone toilet piece
53	0N 0E		~ 100	HIS	GLS	HMB	CLR	1	139.9	complete
54	0N 0E		~ 100	HIS	GLS	AMB	AQU	1	409.7	complete
55	0N 0E		~ 100	HIS	GLS	AMB	COB	1	39.4	"Bromo Selter Emerson Drug Co, Baltimore MD"; complete
56	0N 0E		~ 100	HIS	GLS	AMB	AME	1	306.0	complete
57	0N 0E		~ 100	HIS	GLS	VES	BRN	1	634.1	no neck
58	1N 3E		70	HIS	CER	ETH	UNK	1	8.1	partial trademark "…De…Terre"
59	1N 0E		70	HIS	CER	ETH	UNK	1	1.5	blue; rim fragment
60	1N 0E		70	HIS	GLS	DEC	CLR	1	18.1	stemmed glassware fragment
61	5N 0E		70	HIS	GLS	DEC	OTH	1	4.0	vaseline glass/irredescent; unknown fragment
62	5N 0E		70	HIS	CER	ETH	PIP	1	2.4	"…Depose…", ceramic pipe
63	2N 0E		70	HIS	GLS	VES	CLR	1	45.0	partial finish
64	4N 0E		85	HIS	GLS	HMB	AQU	1	24.1	neck and finish
65	4N 0E		85	HIS	CER	ETH	UNK	1	3.5	
66	4N 0E		90	HIS	CER	POR	UNK	1	2.9	
67	4N 0E		90	HIS	GLS	UNK	AQU	1	4.6	
68	4N 0E		90	HIS	GLS	UNK	BRN	1	2.4	
69	4N 0E		90	HIS	GLS	UNK	CLR	5	26.7	
70	4N 0E		90	HIS	GLS	VES	CLR	1	30.0	neck with brandy finish
71	4N 0E		90	HIS	GLS	WIN	CLR	1	2.9	flat glass
72	4N 0E		~ 80	HIS	OTH	OTH	FRA	1	20.8	stone blob fragment
73	1N 3E		~ 80	HIS	GLS	VES	AQU	1	11.5	"14 1/2 O…"; body fragment
74	1N 3E		~ 80	HIS	GLS	UNK	CLR	1	12.3	fragment
75	1N 3E		~ 80	HIS	GLS	VES	CLR	1	31.2	brandy finish with partial neck
76	1N 3E		~ 80	HIS	GLS	DEC	CLR	1	32.9	juicer fragment, "…SEP. 10…"
77	1N 3E		~ 80	HIS	CER	ETH	UNK	1	9.6	
78	1N 3E		~ 80	FAU	LML	BON	NRN	1	17.7	
79	0N 0E		~ 130	HIS	GLS	HMB	GRN	1	724.6	below wood flooring/paneling; champagne finish; complete; Olive green glass
80	0N 0E		~ 130	HIS	GLS	JRL	MLK	5	33.2	below wood flooring/paneling; pieces refit
81	0N 0E		~ 130	HIS	GLS	UNK	BRN	3	5.6	below wood flooring/paneling; etched star design, pieces refit
82	0N 0E		~ 130	HIS	OTH	MUL	COM	1	12.2	below wood flooring/paneling; lure, weight/sinker?
83	0N 0E		~ 130	HIS	MTL	AMM	SLL	1	3.5	below wood flooring/paneling
84	0N 0E		~ 130	HIS	OTH	OTH	FRA	1	31.9	below wood flooring/paneling; smooth rock fragment
85	1N 1E		~ 80	HIS	GLS	VES	CLR	1	6.1	finish fragment
86	1N 1E		~ 80	HIS	GLS	UNK	CLR	1	33.4	body fragment
87	1N 1E		~ 80	HIS	GLS	HMB	BRN	1	24.2	brandy finish
88	1N 1E		~ 80	HIS	CER	POR	UNK	1	3.0	
89	West wall trench		~ 130	HIS	GLS	HMB	CLR	1	164.7	below dimensional lumbar; crown finish; complete
90	1N 2E		~ 80	HIS	MTL	NAI	UNK	2	9.7	
91	1N 2E		~ 80	HIS	CER	POR	PLA	2	21.6	pieces refit, molded design and gold guilding

Table C-2. Artifact Catalog for Sites 45SN404.

CAT	UNIT	FEA	LEVEL cmbs	CLS	OBJ	DES	MAT	NO	WGT (g)	DESCRIPTION
92	1N 2E		~ 80	HIS	CER	ETH	UNK	4	16.4	miscellaneous pieces
93	1N 2E		~ 80	HIS	CER	ETH	UNK	1	0.9	molded design, blue transfer prints and glaze; rim fragment
94	1N 2E		~ 80	HIS	CER	ETH	UNK	1	22.9	gold guilding; rim fragment
95	1N 2E		~ 80	HIS	CER	ETH	UNK	1	3.0	blue glaze; rim fragment
96	1N 2E		~ 80	HIS	GLS	VES	OLV	1	65.9	push up fragment
97	1N 2E		~ 80	HIS	GLS	AMB	CLR	1	24.4	finish fragment
98	1N 2E		~ 80	HIS	GLS	AMB	CLR	1	36.7	external threads, wide mouth
99	1N 2E		~ 80	HIS	GLS	VES	CLR	1	11.7	square base fragment, "Schilling & Co. 2 oz. Net"
100	1N 2E		~ 80	HIS	GLS	AMB	CLR	1	9.1	finish fragment
101	1N 2E		~ 80	HIS	GLS	UNK	CLR	2	28.9	body fragment
102	1N 2E		~ 80	HIS	GLS	HMB	CLR	1	11.9	ring fragment?
103	1N 2E		~ 80	HIS	GLS	UNK	CLR	1	16.8	light shade/fixture, flat fragment, molded on both sides, thick
104	1N 2E		~ 80	FAU	LML	BON	NRN	1	13.2	
105	1N 2E		~ 80	HIS	MTL	OTH	OTH	3	34.9	From 50x50 cm test square, withn black layer, pocket watch
106	1N 4E		~ 80	HIS	GLS	HMB	OLV	1	1056.6	champagne finish, complete
107	1N 4E		~ 80	HIS	GLS	UNK	AQU	2	9.2	
108	1N 4E		~ 80	HIS	GLS	JAR	CLR	1	202.2	complete
109	1N 4E		~ 80	HIS	GLS	UNK	CLR	7	93.1	
110	1N 4E		~ 80	HIS	GLS	UNK	BRN	6	97.1	
111	1N 4E		~ 80	HIS	CER	ETH	UNK	1	42.1	rim fragment
112	1N 4E		~ 80	HIS	CER	ETH	UNK	1	1.8	gold guilding; rim fragment
113	1N 4E		~ 80	HIS	CER	ETH	UNK	1	1.7	blue glaze
114	1N 4E		~ 80	HIS	CER	POR	UNK	1	1.9	
115	1N 4E		~ 80	HIS	CER	POR	UNK	1	1.6	pink decal/hand painted ?
116	1N 4E		~ 80	FAU	USF	BON	CAL	1	0.6	
117	1N 4E		~ 80	HIS	MTL	NAI	RND	1	6.2	
118	1N 4E		~ 80	HIS	MTL	HRD	OTH	1	10.4	bracket
119	1N 4E		70	HIS	OTH	PLA	BUT	1	0.4	button, material-plastic?
120	Trench 3		130-180	FAU	LML	BON	NRN	1	16.6	Odocoileus sp, 1 left scap fragment
121	Trench 3		130-180	FAU	LML	BON	NRN	1	16.8	Odocoileus sp, 1 right metacarpal
122	Trench 3		130-180	FAU	LML	BON	NRN	1	12.6	Odocoileus sp, 1 left astragulus
123	Trench 3		130-180	FAU	LML	BON	NRN	1	62.5	Bos sp, 1 left astragulus
124	Trench 3		130-180	FAU	LML	BON	NRN	1	160.8	Bos sp, 1 left scapula
125	Trench 3		130-180	FAU	LML	BON	NRN	1	80.7	Bos sp, 1 left tibia
126	Trench 3		130-180	FAU	LML	BON	NRN	1	139.6	Bos sp, 1 left calcaneous
127	Trench 3		130-180	FAU	LML	BON	NRN	7	249.4	Bos sp, 7 longbone shafts
128	Trench 3		130-180	FAU	LML	BON	NRN	6	113.3	c.f. O. aries, 2 left tibia shafts, 4 longbone shafts
129	Trench 3		130-180	FAU	LML	BON	NRN	8	116.9	Bos sp, 8 rib fragments
130	Trench 3		130-180	FAU	LML	BON	NRN	5	100.1	Uni. Mammal, 3 longbone shaft fragments, 1 innominate fragment, 1 unidentified fragment
131	Trench 3		130-180	FAU	LML	BON	NRN	1	40.4	Bos sp, 1 innominate fragment
132	Trench 3		130-180	FAU	LML	BON	NRN	2	35.1	Bos sp, 2 vert fragments
133	0N 0E		~ 100	HIS	GLS	VES	OLV	7	206.1	6 body fragments, 1 base fragment
134	0N 0E		~ 100	HIS	GLS	UNK	OLV	1	16.3	"…NIE…SC"; body fragment
135	0N 0E		~ 100	HIS	GLS	VES	BRN	1	21.5	round base "S.G.G…11"
136	0N 0E		~ 100	HIS	GLS	VES	AQU	3	63.8	rim fragment
137	0N 0E		~ 100	HIS	GLS	VES	AQU	5	84.1	body fragment

Table C-2. Artifact Catalog for Sites 45SN404.

CAT	UNIT	FEA	LEVEL cmbs	CLS	OBJ	DES	MAT	NO	WGT (g)	DESCRIPTION
138	0N 0E		~ 100	HIS	GLS	VES	GRN	1	106.7	round base "274 H"
139	0N 0E		~ 100	HIS	GLS	HMB	GRN	1	215.4	round base "0"
140	0N 0E		~ 100	HIS	GLS	VES	GRN	1	85.6	body fragment
141	0N 0E		~ 100	HIS	GLS	VES	GRN	1	37.8	"A.L. Van…Bottling W…Everett Was…"
142	0N 0E		~ 100	HIS	GLS	VES	GRN	1	16.8	"…58"
143	0N 0E		~ 100	HIS	GLS	VES	GRN	1	49.4	crown finish
144	0N 0E		~ 100	HIS	GLS	AMB	GRN	1	78.3	prescription finish; complete
145	0N 0E		~ 100	HIS	GLS	UNK	CLR	6	58.0	miscellaneous pieces
146	0N 0E		~ 100	HIS	GLS	VES	GRN	1	67.5	body fragment
147	0N 0E		~ 100	HIS	GLS	VES	CLR	7	431.2	round base fragments
148	0N 0E		~ 100	HIS	GLS	AMB	CLR	4	175.7	external threads finish
149	0N 0E		~ 100	HIS	GLS	AMB	CLR	1	103.0	double ring with crown finish
150	0N 0E		~ 100	HIS	GLS	HMB	CLR	1	52.2	extract finish
151	0N 0E		~ 100	HIS	GLS	DEC	CLR	1	22.7	molded inside surface; light amethyst
152	0N 0E		~ 100	HIS	GLS	VES	CLR	1	34.5	rectangular base "…ITY" "Blue Ribbon"?
153	0N 0E		~ 100	HIS	GLS	UNK	CLR	1	22.3	decorative or light shade fragment, molded design
154	0N 0E		~ 100	HIS	GLS	VES	CLR	1	75.0	"Buckeye Extract Co, Olympia, Wash." "Sheldon"; no finish
155	0N 0E		~ 100	HIS	GLS	DEC	CLR	1	13.6	stemmed glassware fragment
156	0N 0E		~ 100	HIS	GLS	VES	CLR	1	22.1	molded design; body fragment
157	0N 0E		~ 100	HIS	GLS	WIN	CLR	1	7.9	flat glass fragment
158	0N 0E		~ 100	HIS	GLS	UNK	CLR	1	4.4	rim fragment
159	0N 0E		~ 100	HIS	GLS	UNK	CLR	1	12.1	solid tube/stem
160	0N 0E		~ 100	HIS	GLS	UNK	MLK	1	42.7	rectangular base and body fragment, molded sides
161	0N 0E		~ 100	HIS	GLS	JRL	MLK	2	23.2	translucent, fit together
162	0N 0E		~ 100	HIS	MTL	NAI	RND	2	24.5	
163	0N 0E		~ 100	HIS	OTH	MUL	FRA	5	67.2	metal and glass-light bulb bases?
164	0N 0E		~ 100	HIS	OTH		1		2.7	stone
165	0N 0E		~ 100	FAU	LML	BON	NRN	1	4.5	
166	0N 0E		~ 100	HIS	CER	ETH	PLA	3	32.1	gold guilding, pink and green floral decals
167	0N 0E		~ 100	HIS	CER	ETH	UNK	6	77.0	gold guilding
168	0N 0E		~ 100	HIS	CER	ETH	UNK	1	12.2	blue stripe; rim fragment
169	0N 0E		~ 100	HIS	CER	ETH	DEC	7	46.6	blue transfer print-building scenery
170	0N 0E		~ 100	HIS	CER	ETH	DEC	2	6.1	dark blue transfer print
171	0N 0E		~ 100	HIS	CER	ETH	DEC	1	3.4	blue print
172	0N 0E		~ 100	HIS	CER	ETH	PLA	7	102.4	pink and green transfer prints, miscellaneous fragments
173	0N 0E		~ 100	HIS	CER	ETH	PLA	3	76.8	miscellaneous floral decals
174	0N 0E		~ 100	HIS	CER	ETH	PLA	7	55.0	rim fragment
175	0N 0E		~ 100	HIS	CER	ETH	PLA	6	40.4	body fragment
176	0N 0E		~ 100	HIS	CER	ETH	PLA	5	65.0	molded rim fragments
177	0N 0E		~ 100	HIS	CER	ETH	UNK	1	1.5	miscellaneous fragment with gold guilding
178	0N 0E		~ 100	HIS	CER	ETH	PLA	19	475.3	base fragments
179	0N 0E		~ 100	HIS	CER	ETH	UNK	1	17.7	decal-gray dog with childs play hoop
180	0N 0E		~ 100	HIS	CER	ETH	PLA	1	24.7	"…eakim…England"; base fragment
181	0N 0E		~ 100	HIS	CER	ETH	PLA	2	79.8	"Imperial"; base fragment
182	0N 0E		~ 100	HIS	CER	ETH	PLA	1	38.3	"P.Co.,…NA"; base fragment
183	0N 0E		~ 100	HIS	CER	POR	PLA	3	34.8	gold guilding
184	0N 0E		~ 100	HIS	CER	POR	DEC	8	12.4	yellow glaze with gold guilding
185	0N 0E		~ 100	HIS	CER	POR	FIG	1	9.1	doll leg, blue, green, and pink paint

Table C-2. Artifact Catalog for Sites 45SN404.

CAT	UNIT	FEA	LEVEL cmbs	CLS	OBJ	DES	MAT	NO	WGT (g)	DESCRIPTION
186	0N 0E		~ 100	HIS	GLS	BUT	MLK	1	0.8	
187	0N 0E		~ 100	HIS	CER	STN	CRK	1	34.8	orange, brown and cream glaze
188	0N 0E		~ 100	HIS	CER	STN	CRK	1	27.0	orange glaze
189	0N 0E		~ 100	HIS	CER	STN	CRK	1	17.8	yellow and brown glaze, bowl fragment
190	0N 0E		~ 100	HIS	CER	STN	CRK	2	38.3	yellow/green glaze
191	0N 0E		~ 100	HIS	CER	STN	CRK	1	26.9	brown glaze
192	0N 0E		~ 100	HIS	CER	STN	CRK	1	26.0	brown glaze, "SOU…"
193	0N 0E		~ 100	HIS	CER	STN	OTH	1	14.9	handle knob, gray brown glaze
194	Trench 2		140-160	FAU	MML	BON	NRN	1	0.5	Odocoileus sp., 1 medial phalanx
195	Trench 2		140-160	HIS	GLS	WIN	CLR	6	2.17	flat
196	Trench 2		140-160	HIS	GLS	VES	CLR	1	5.3	partial base
197	Trench 2		140-160	HIS	GLS	HMB	BRN	1	41.4	round push up
198	Trench 2		140-160	HIS	MTL	NAI	RND	2	155.0	1-60d, 1-larger size
199	Trench 2		140-160	HIS	MTL	NAI	SQU	1	226.1	
200	Trench 2		140-160	HIS	LEA	FTW	FRA	1	45.3	sole and top toe part
201	Trench 2		140-160	HIS	CER	ETH	TBL	1	56.3	John Edwards England trademark
202	Trench 2		140-160	HIS	CER	POR	TBL	1	0.8	transfer print
203	Trench 2		140-160	HIS	CER	ETH	TBL	1	10.3	rim
204	Trench 2		140-160	HIS	CER	ETH	TBL	2	29.0	
205	Trench 2		140-160	HIS	CER	POR	TBL	1	11.4	decal, partial base
206	Trench 2		140-160	HIS	CER	ETH	TBL	1	16.2	partial base
207	Trench 2		140-160	HIS	CER	ETH	TBL	3	16.9	
208	Trench 2		140-160	HIS	CER	ETH	TBL	1	1.4	transfer print
209	Trench 3	3	130-180	HIS	GLS	HMB	AQU	1	17.1	complete
210	Trench 3	3	130-180	HIS	CER	ETH	PLA	4	113.9	
211	Trench 3	3	130-180	HIS	CER	ETH	POT	5	51.5	
212	Trench 3	3	130-180	HIS	GLS	UNK	CLR	1	0.8	
213	Trench 3		130-180	HIS	ORG	BOT	OTH	1	23.8	coconut shell
214	Trench 3		130-180	HIS	LEA	FTW	FRA	1	11.5	
215	Trench 3		130-180	HIS	MTL	UNK	UNK	1	3.7	
216	Trench 3		130-180	HIS	ORG	BOT	OTH	2	0.5	seed shell
217	Trench 3		130-180	HIS	MTL	UNK	UNK	2	6.3	
218	Trench 3		130-180	HIS	WOD	MLB	NRN	3	88.3	
219	Trench 3	3	130-180	HIS	GLS	VES	AQU	1	21.8	embossed design
220	Trench 3	3	130-180	HIS	GLS	DEC	CLR	2	293.4	
221	Trench 3	3	130-180	HIS	GLS	HMB	GRN	1	462.3	push up base
222	Trench 3	3	130-180	HIS	GLS	HMB	BRN	1	40.5	brandy finish
223	Trench 3	3	130-180	HIS	GLS	HMB	BRN	1	64.7	ring finish
224	Trench 3	3	130-180	HIS	GLS	HMB	BRN	1	213.4	round base
225	Trench 3	3	130-180	HIS	GLS	HMB	CLR	2	119.0	round base, embossed sides
226	Trench 3	3	130-180	HIS	GLS	HMB	AQU	1	21.8	oval base
227	Trench 3	3	130-180	HIS	GLS	HMB	CLR	1	89.6	ring finish
228	Trench 3	3	130-180	HIS	GLS	HMB	CLR	1	104.3	round base
229	Trench 3	3	130-180	HIS	GLS	VES	CLR	2	19.7	partial bases
230	Trench 3	3	130-180	HIS	CER	ETH	UNK	4	131.9	chamber pot?
231	Trench 3	3	130-180	HIS	CER	ETH	TBL	7	162.9	
232	Trench 3	3	130-180	HIS	CER	ETH	TBL	1	23.9	partial base, marked
233	Trench 3	3	130-180	HIS	CER	POR	TBL	2	13.0	
234	Trench 3	3	130-180	HIS	CER	ETH	TBL	1	34.3	partial base

Table C-2. Artifact Catalog for Sites 45SN404.

CAT	UNIT	FEA	LEVEL cmbs	CLS	OBJ	DES	MAT	NO	WGT (g)	DESCRIPTION
235	Trench 3	3	130-180	HIS	CER	ETH	TBL	1	5.7	floral decal
236	Trench 3	3	130-180	HIS	GLS	HMB	CLR	1	208.6	round base,external threads finish, complete
237	Trench 3	3	130-180	HIS	GLS	HMB	CLR	1	325.2	six-sided base
238	Trench 3	3	130-180	HIS	GLS	HMB	GRN	1	102.4	partial base, push up
239	Trench 3	3	130-180	HIS	GLS	VES	CLR	1	31.7	round base, embossed on side
240	Trench 3	3	130-180	HIS	GLS	VES	CLR	1	38.0	finish-other
241	Trench 3	3	130-180	HIS	GLS	VES	CLR	1	17.0	finish-other
242	Trench 3	3	130-180	HIS	GLS	VES	CLR	1	7.2	partial double ring finish
243	Trench 3	3	130-180	HIS	GLS	VES	CLR	1	11.1	embossed sides
244	Trench 3	3	130-180	FAU	MML	BON	CAL	2	3.7	
245	Trench 3	3	130-180	FAU	MML	BON	NRN	1	5.3	P. lotor, 1 all but proximal end humerus
246	Trench 3		130-180	FAU	SML	BON	NRN	1	0.6	
247	Trench 3		130-180	FAU	FSH	BON	NRN	4	0.2	sorted
248			surface	HIS	GLS	HMB	COB	1	17.5	Surface, near trench 3, extract finish

APPENDIX D: C14 Analysis

FROM: Darden Hood, Director (mailto:mailto:dhood@radiocarbon.com)
(This is a copy of the letter being mailed. Invoices/receipts follow only by mail.)

September 14, 2006

Dr. Robert E. Kopperl
Northwest Archaeological Associates, Inc.
5418 20th Ave. NW
Suite 200
Seattle, WA 98107
USA

RE: Radiocarbon Dating Results For Samples 45SN393 #AH6, 45SN393 #320, 45SN393 #321, 45SN393 #322, 45SN393 #324, 45SN393 #325, 45SN393 #328, 45SN393 #329, 45SN393 #332

Dear Dr. Kopperl:

Enclosed are the radiocarbon dating results for nine samples recently sent to us. They each provided plenty of carbon for accurate measurements and all the analyses proceeded normally. As usual, the method of analysis is listed on the report with the results and calibration data is provided where applicable.

You will notice that Beta-219893 (45SN393 #329) is reported with the units “pMC” rather than BP. “pMC” stands for "percent modern carbon". Results are reported in the pMC format when the analyzed material had more ^{14}C than did the modern (AD 1950) reference standard. The source of this "extra" ^{14}C in the atmosphere is thermo-nuclear bomb testing which on-set in the 1950s. Its presence generally indicates the material analyzed was part of a system that was respiring carbon after the on-set of the testing (AD 1950s). On occasion, the two sigma lower limit will extend into the time region before this "bomb-carbon" onset (i.e. less than 100 pMC). In those cases, there is some probability for 18th, 19th, or 20th century antiquity.

As always, no students or intern researchers who would necessarily be distracted with other obligations and priorities were used in the analyses. We analyzed them with the combined attention of our entire professional staff.

If you have specific questions about the analyses, please contact us. We are always available to answer your questions.

The cost of the analysis was charged to the MASTERCARD card provided. A receipt is enclosed. Thank you. As always, if you have any questions or would like to discuss the results, don’t hesitate to contact me.

Sincerely,

Darden Hood

Dr. Robert E. Kopperl

Report Date: 9/14/2006

Northwest Archaeological Associates, Inc.

Material Received: 8/14/2006

Sample Data	Measured Radiocarbon Age	13C/12C Ratio	Conventional Radiocarbon Age(*)
Beta - 219886 SAMPLE : 45SN393 #AH6 ANALYSIS : AMS-Standard delivery MATERIAL/PRETREATMENT : (wood): acid/alkali/acid 2 SIGMA CALIBRATION : Cal AD 400 to 570 (Cal BP 1550 to 1380)	1640 +/- 40 BP	-28.6 o/oo	1580 +/- 40 BP
Beta - 219887 SAMPLE : 45SN393 #320 ANALYSIS : AMS-Standard delivery MATERIAL/PRETREATMENT : (charred material): acid/alkali/acid 2 SIGMA CALIBRATION : Cal AD 1420 to 1500 (Cal BP 530 to 450)	460 +/- 40 BP	-26.3 o/oo	440 +/- 40 BP
Beta - 219888 SAMPLE : 45SN393 #321 ANALYSIS : AMS-Standard delivery MATERIAL/PRETREATMENT : (charred material): acid/alkali/acid 2 SIGMA CALIBRATION : Cal AD 1300 to 1430 (Cal BP 650 to 520)	610 +/- 40 BP	-27.3 o/oo	570 +/- 40 BP
Beta - 219889 SAMPLE : 45SN393 #322 ANALYSIS : AMS-Standard delivery MATERIAL/PRETREATMENT : (charred material): acid/alkali/acid 2 SIGMA CALIBRATION : Cal AD 1660 to 1950 (Cal BP 290 to 0)	140 +/- 40 BP	-23.5 o/oo	160 +/- 40 BP
Beta - 219890 SAMPLE : 45SN393 #324 ANALYSIS : AMS-Standard delivery MATERIAL/PRETREATMENT : (charred material): acid/alkali/acid 2 SIGMA CALIBRATION : Cal AD 1000 to 1180 (Cal BP 950 to 780)	950 +/- 40 BP	-24.6 o/oo	960 +/- 40 BP

Dr. Robert E. Kopperl

Report Date: 9/14/2006

Sample Data	Measured Radiocarbon Age	13C/12C Ratio	Conventional Radiocarbon Age(*)
Beta - 219891	290 +/- 40 BP	-29.4 o/oo	220 +/- 40 BP

SAMPLE : 45SN393 #325
ANALYSIS : AMS-Standard delivery
MATERIAL/PRETREATMENT : (charred material): acid/alkali/acid
2 SIGMA CALIBRATION : Cal AD 1640 to 1680 (Cal BP 310 to 260) AND Cal AD 1730 to 1810 (Cal BP 220 to 140)
Cal AD 1930 to 1950 (Cal BP 20 to 0)

Beta - 219892	600 +/- 40 BP	-25.5 o/oo	590 +/- 40 BP

SAMPLE : 45SN393 #328
ANALYSIS : AMS-Standard delivery
MATERIAL/PRETREATMENT : (charred material): acid/alkali/acid
2 SIGMA CALIBRATION : Cal AD 1300 to 1420 (Cal BP 650 to 530)

Beta - 219893	99.7 +/- 0.5 pMC	-27.8 o/oo	100.3 +/- 0.5 pMC

SAMPLE : 45SN393 #329
ANALYSIS : AMS-Standard delivery
MATERIAL/PRETREATMENT : (charred material): acid/alkali/acid
COMMENT: reported result indicates an age of post 0 BP and has been reported as a % of the modern reference standard, indicating the material was living within the last 50 years.

Beta - 219894	600 +/- 40 BP	-24.8 o/oo	600 +/- 40 BP

SAMPLE : 45SN393 #332
ANALYSIS : AMS-Standard delivery
MATERIAL/PRETREATMENT : (charred material): acid/alkali/acid
2 SIGMA CALIBRATION : Cal AD 1290 to 1420 (Cal BP 660 to 530)

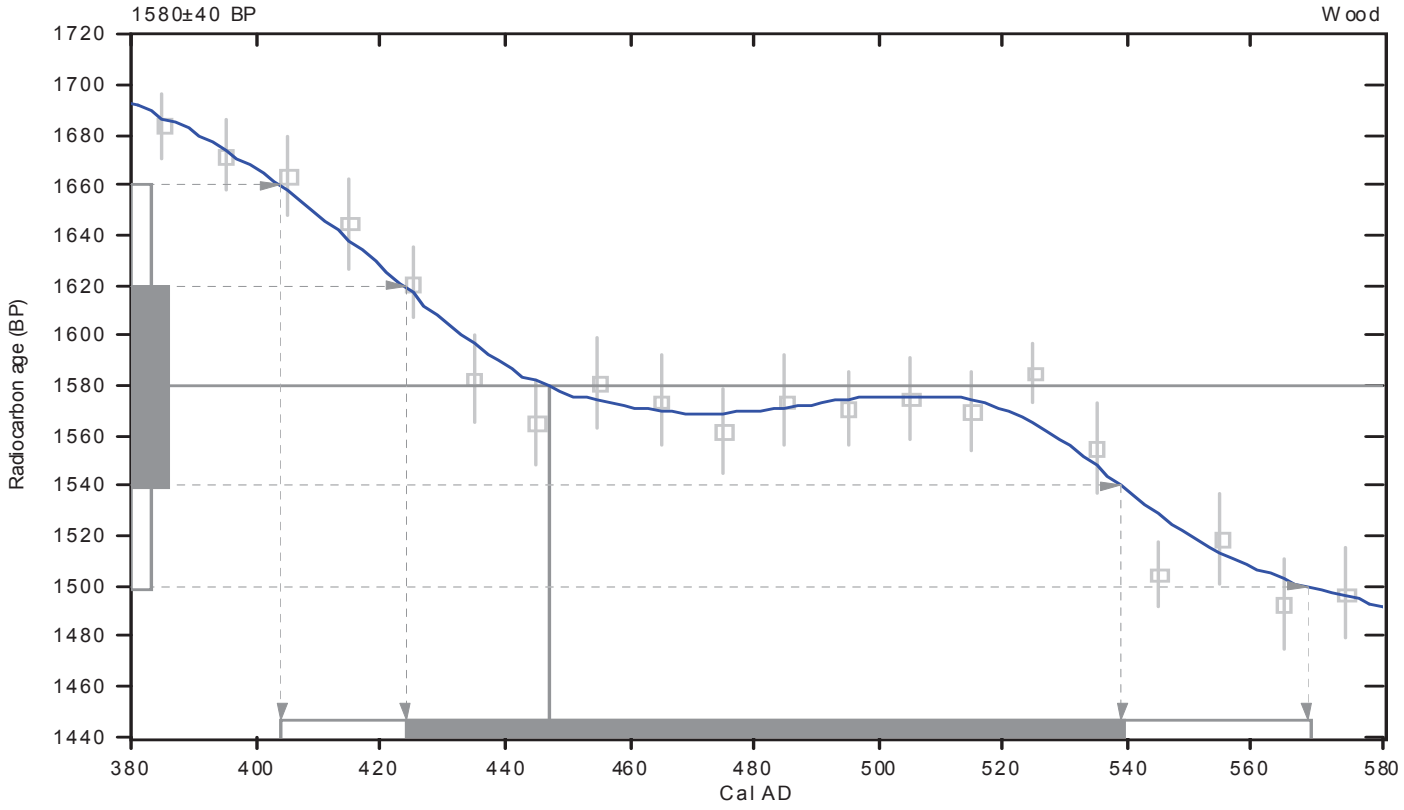
CALIBRATION OF RADIOCARBON AGE TO CALENDAR YEARS

(Variables: C13/C12=-28.6:lab. mult=1)

Laboratory number:	**Beta-219886**
Conventional radiocarbon age:	**1580±40 BP**
2 Sigma calibrated result: (95% probability)	**Cal AD 400 to 570 (Cal BP 1550 to 1380)**

Intercept data

Intercept of radiocarbon age with calibration curve:	Cal AD 450 (Cal BP 1500)
1 Sigma calibrated result: (68% probability)	Cal AD 420 to 540 (Cal BP 1530 to 1410)



References:

Database used

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Calibration Database

Editorial Comment

Stuiver, M., van der Plicht, H., 1998, Radiocarbon 40(3), pxii-xiii

INTCAL98 Radiocarbon Age Calibration

Stuiver, M., et. al., 1998, Radiocarbon 40(3), p1041-1083

Mathematics

A Simplified Approach to Calibrating C14 Dates

Talma, A. S., Vogel, J. C., 1993, Radiocarbon 35(2), p317-322

Beta Analytic Radiocarbon Dating Laboratory

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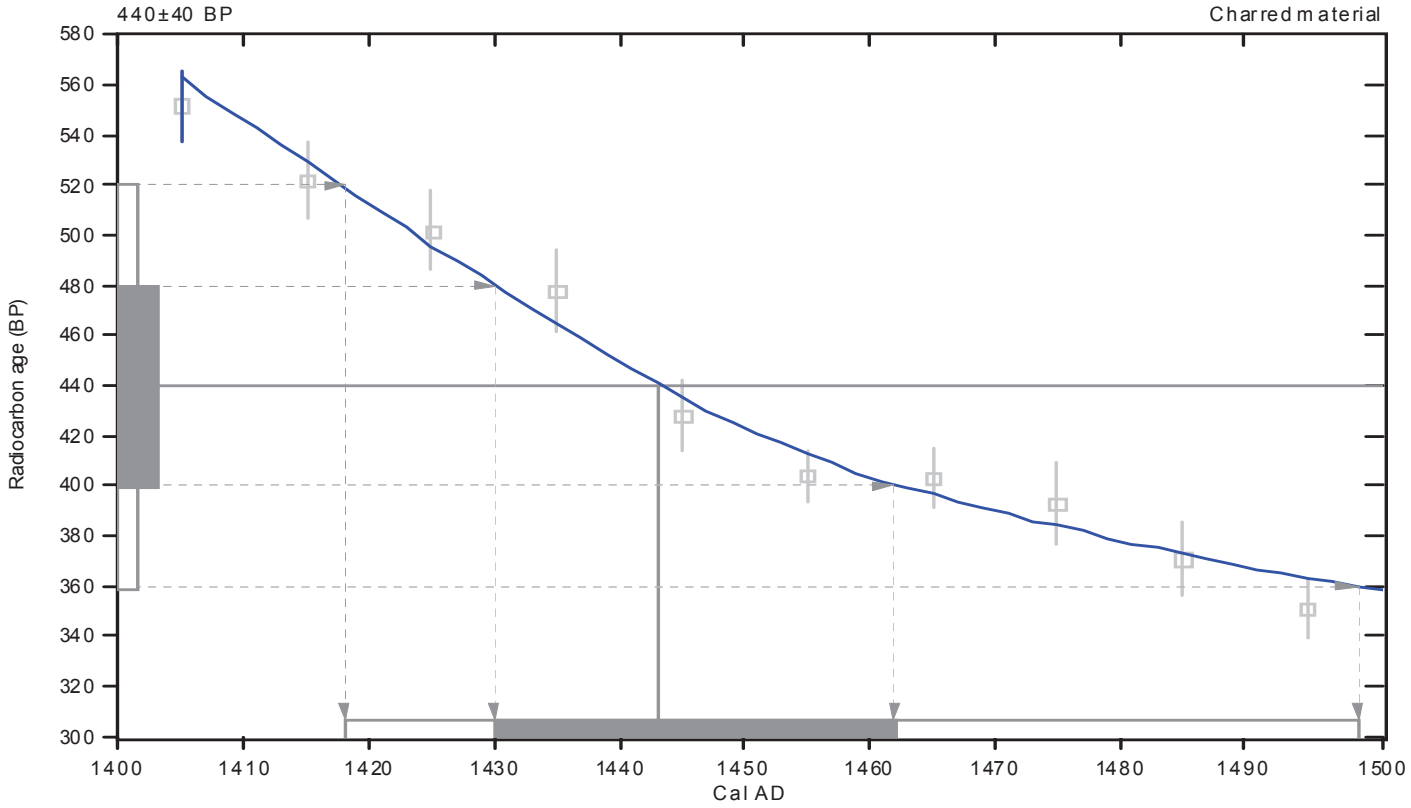
CALIBRATION OF RADIOCARBON AGE TO CALENDAR YEARS

(Variables: C13/C12=-26.3:lab. mult=1)

Laboratory number:	**Beta-219887**
Conventional radiocarbon age:	**440±40 BP**
2 Sigma calibrated result: (95% probability)	**Cal AD 1420 to 1500 (Cal BP 530 to 450)**

Intercept data

Intercept of radiocarbon age with calibration curve:	Cal AD 1440 (Cal BP 510)
1 Sigma calibrated result: (68% probability)	Cal AD 1430 to 1460 (Cal BP 520 to 490)



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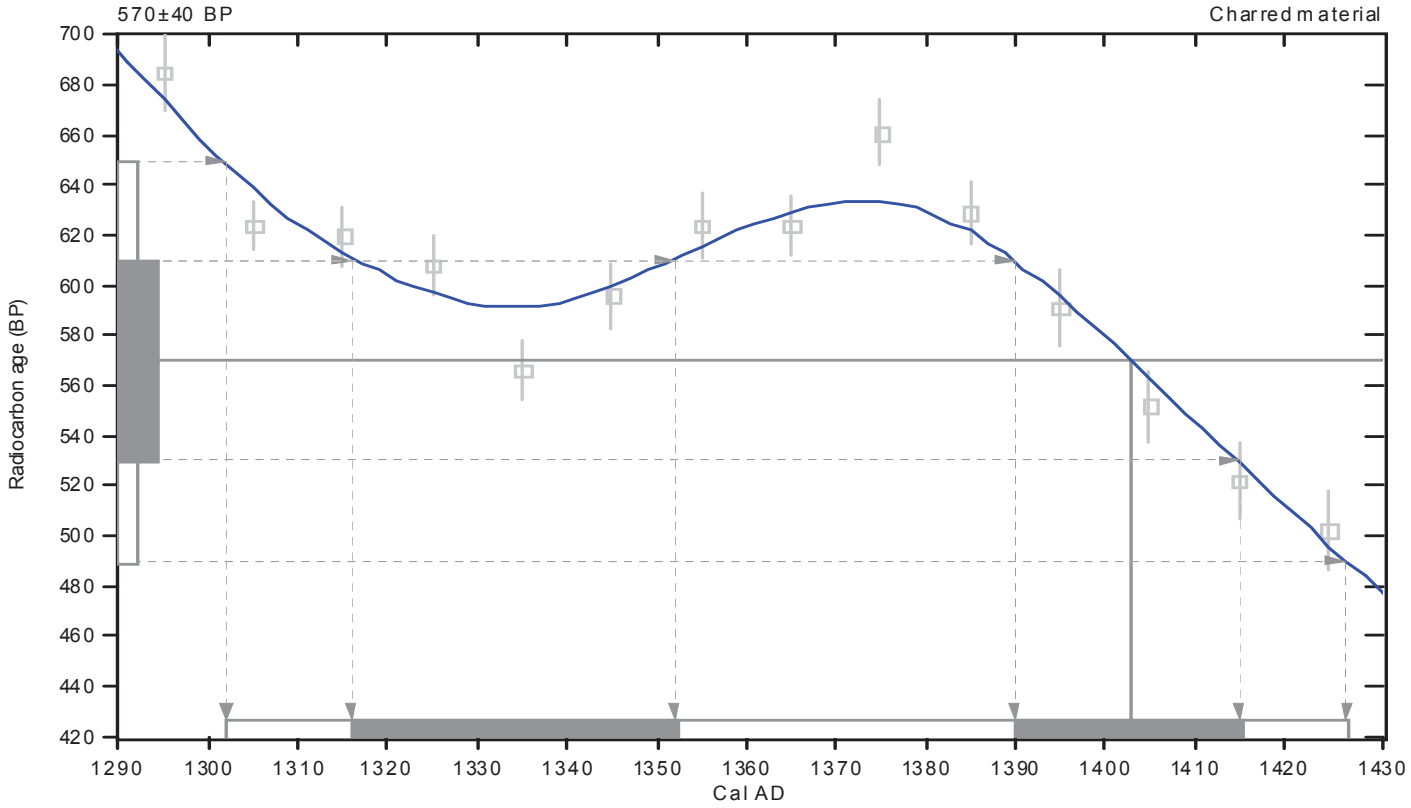
CALIBRATION OF RADIOCARBON AGE TO CALENDAR YEARS

(Variables: C13/C12=-27.3:lab. mult=1)

Laboratory number:	**Beta-219888**
Conventional radiocarbon age:	**570±40 BP**
2 Sigma calibrated result: (95% probability)	**Cal AD 1300 to 1430 (Cal BP 650 to 520)**

Intercept data

Intercept of radiocarbon age with calibration curve:	Cal AD 1400 (Cal BP 550)
1 Sigma calibrated results: (68% probability)	Cal AD 1320 to 1350 (Cal BP 630 to 600) and Cal AD 1390 to 1420 (Cal BP 560 to 540)



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INTCAL98 Radiocarbon Age Calibration

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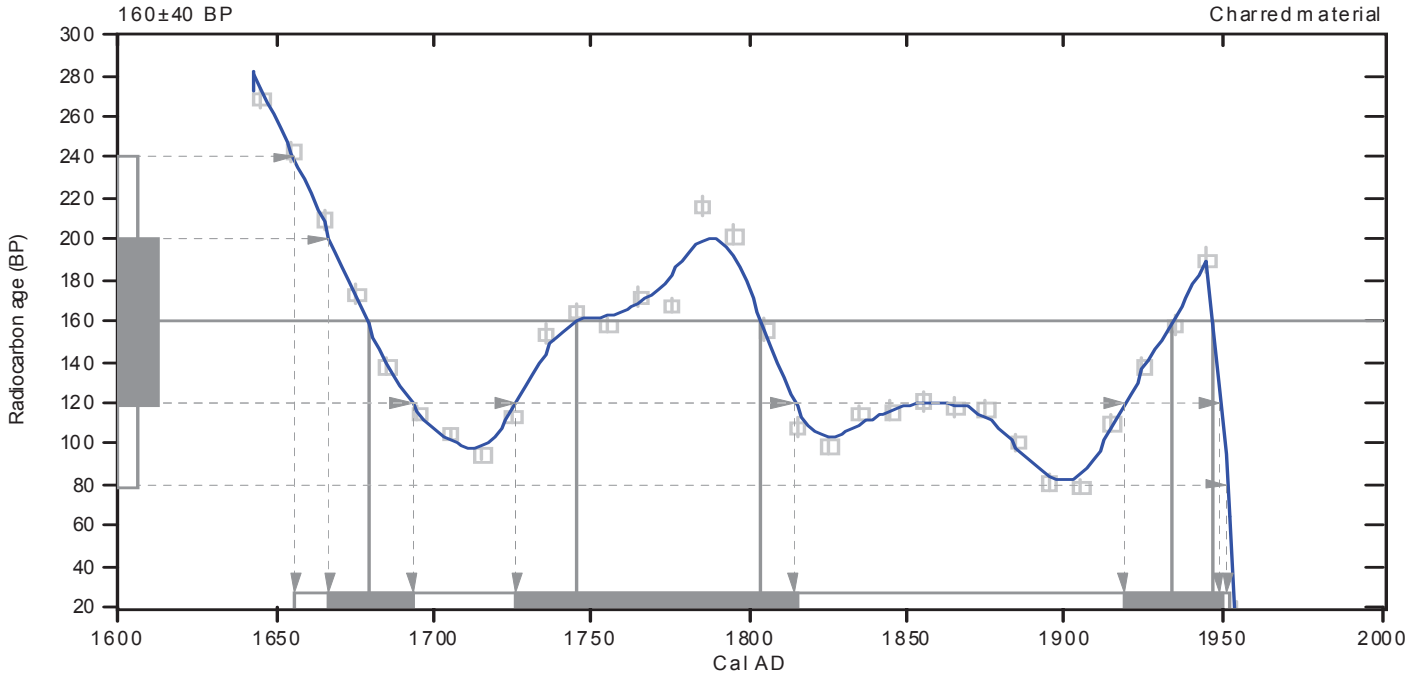
CALIBRATION OF RADIOCARBON AGE TO CALENDAR YEARS

(Variables: C13/C12=-23.5:lab. mult=1)

Laboratory number:	**Beta-219889**
Conventional radiocarbon age:	**160±40 BP**
2 Sigma calibrated result: (95% probability)	**Cal AD 1660 to 1950 (Cal BP 290 to 0)**

Intercept data

Intercepts of radiocarbon age with calibration curve:	Cal AD 1680 (Cal BP 270) and Cal AD 1740 (Cal BP 200) and Cal AD 1800 (Cal BP 150) and Cal AD 1930 (Cal BP 20) and Cal AD 1950 (Cal BP 0)
1 Sigma calibrated results: (68% probability)	Cal AD 1670 to 1690 (Cal BP 280 to 260) and Cal AD 1730 to 1810 (Cal BP 220 to 140) and Cal AD 1920 to 1950 (Cal BP 30 to 0)



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INTCAL98 Radiocarbon Age Calibration

Stuiver, M., et. al., 1998, Radiocarbon 40(3), p1041-1083

Mathematics

A Simplified Approach to Calibrating C14 Dates

Talma, A. S., Vogel, J. C., 1993, Radiocarbon 35(2), p317-322

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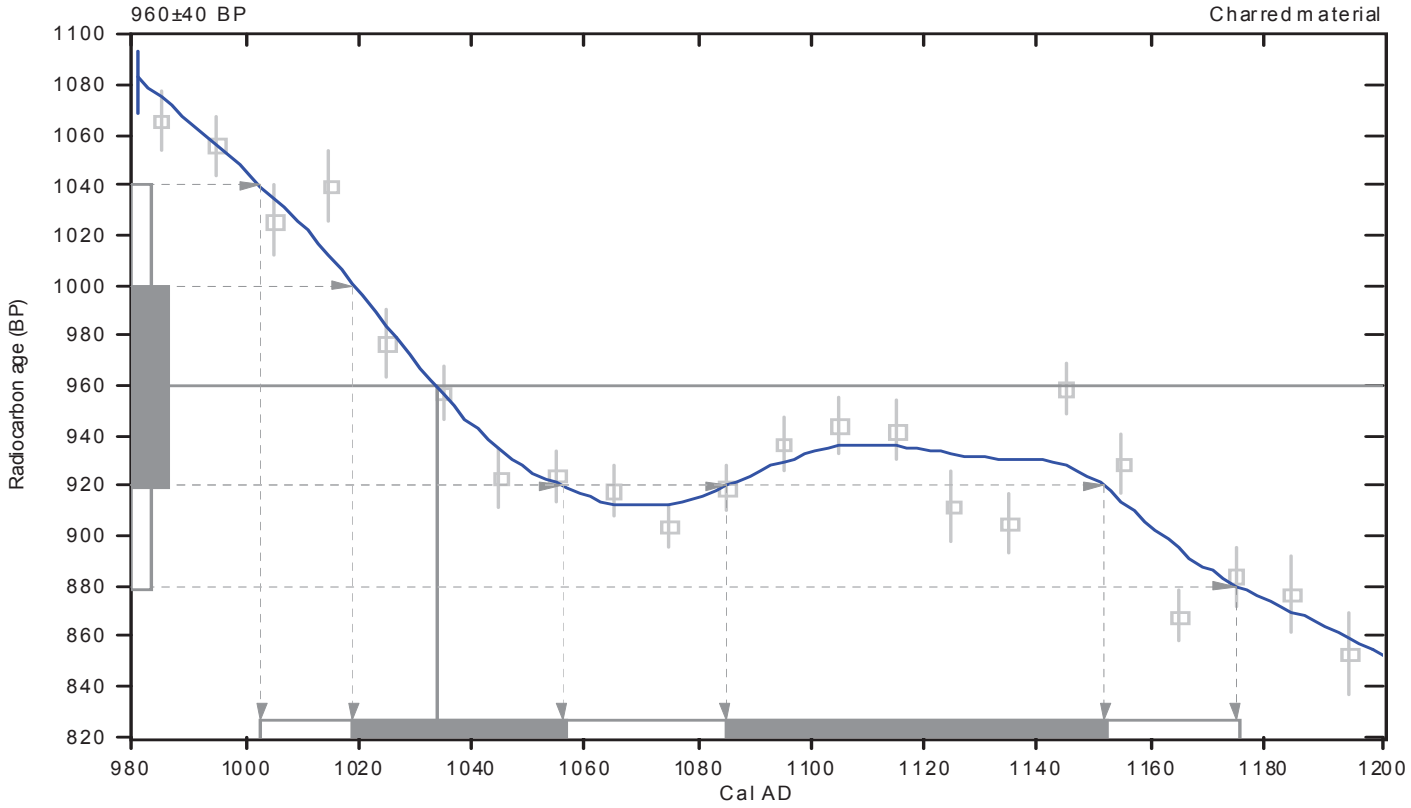
CALIBRATION OF RADIOCARBON AGE TO CALENDAR YEARS

(Variables: C13/C12=-24.6:lab. mult=1)

Laboratory number:	**Beta-219890**
Conventional radiocarbon age:	**960±40 BP**
2 Sigma calibrated result: (95% probability)	**Cal AD 1000 to 1180 (Cal BP 950 to 780)**

Intercept data

Intercept of radiocarbon age with calibration curve:	Cal AD 1030 (Cal BP 920)
1 Sigma calibrated results: (68% probability)	Cal AD 1020 to 1060 (Cal BP 930 to 890) and Cal AD 1080 to 1150 (Cal BP 860 to 800)



References:

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INTCAL98

Calibration Database

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INTCAL98 Radiocarbon Age Calibration

Stuiver, M., et. al., 1998, Radiocarbon 40(3), p1041-1083

Mathematics

A Simplified Approach to Calibrating C14 Dates

Talma, A. S., Vogel, J. C., 1993, Radiocarbon 35(2), p317-322

Beta Analytic Radiocarbon Dating Laboratory

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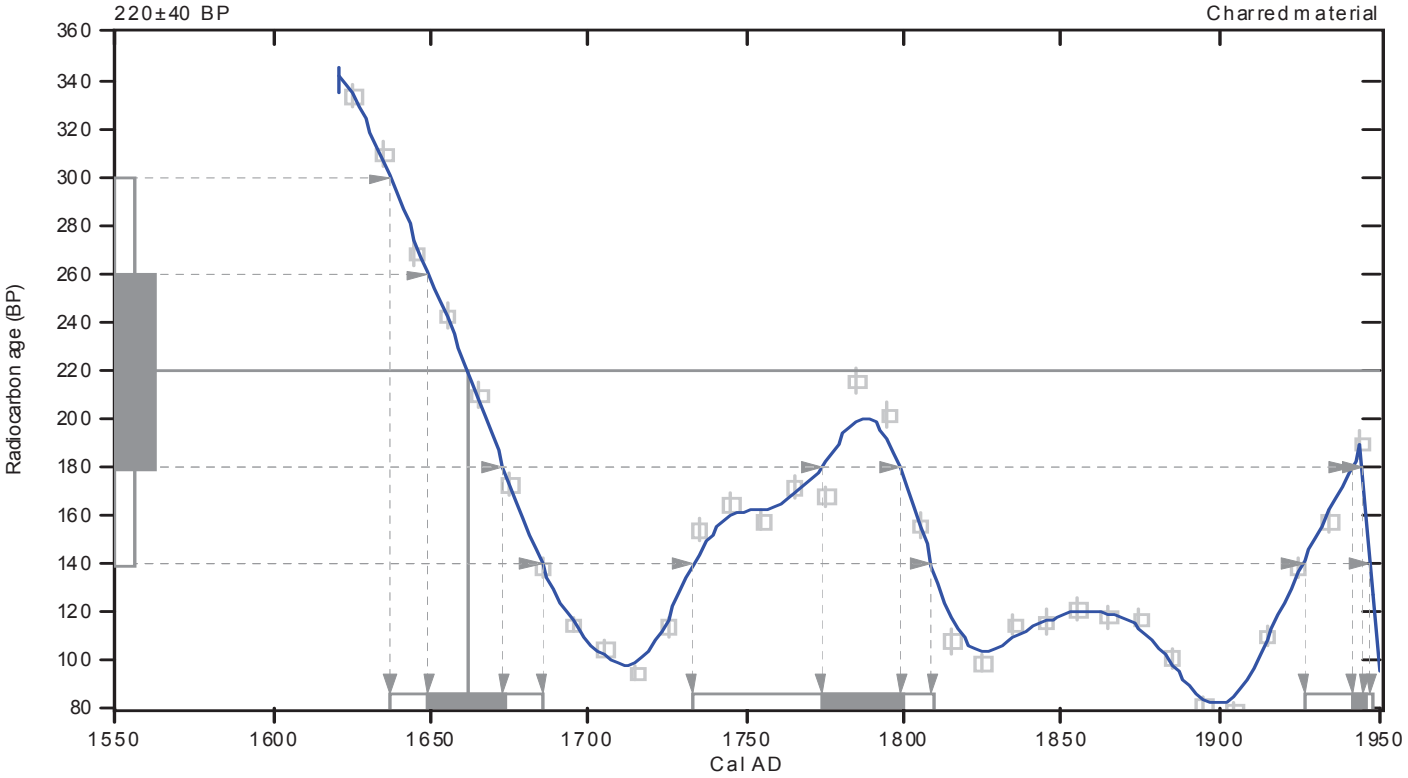
CALIBRATION OF RADIOCARBON AGE TO CALENDAR YEARS

(Variables: C13/C12=-29.4:lab. mult=1)

Laboratory number:	**Beta-219891**
Conventional radiocarbon age:	**220±40 BP**
2 Sigma calibrated results: (95% probability)	**Cal AD 1640 to 1680 (Cal BP 310 to 260) and Cal AD 1730 to 1810 (Cal BP 220 to 140) and Cal AD 1930 to 1950 (Cal BP 20 to 0)**

Intercept data

Intercept of radiocarbon age with calibration curve:	Cal AD 1660 (Cal BP 290)
1 Sigma calibrated results: (68% probability)	Cal AD 1650 to 1670 (Cal BP 300 to 280) and Cal AD 1770 to 1800 (Cal BP 180 to 150) and Cal AD 1940 to 1950 (Cal BP 10 to 0)



References:

Database used

INTCAL98

Calibration Database

Editorial Comment

Stuiver, M., van der Plicht, H., 1998, Radiocarbon 40(3), pxii-xiii

INTCAL98 Radiocarbon Age Calibration

Stuiver, M., et. al., 1998, Radiocarbon 40(3), p1041-1083

Mathematics

A Simplified Approach to Calibrating C14 Dates

Talma, A. S., Vogel, J. C., 1993, Radiocarbon 35(2), p317-322

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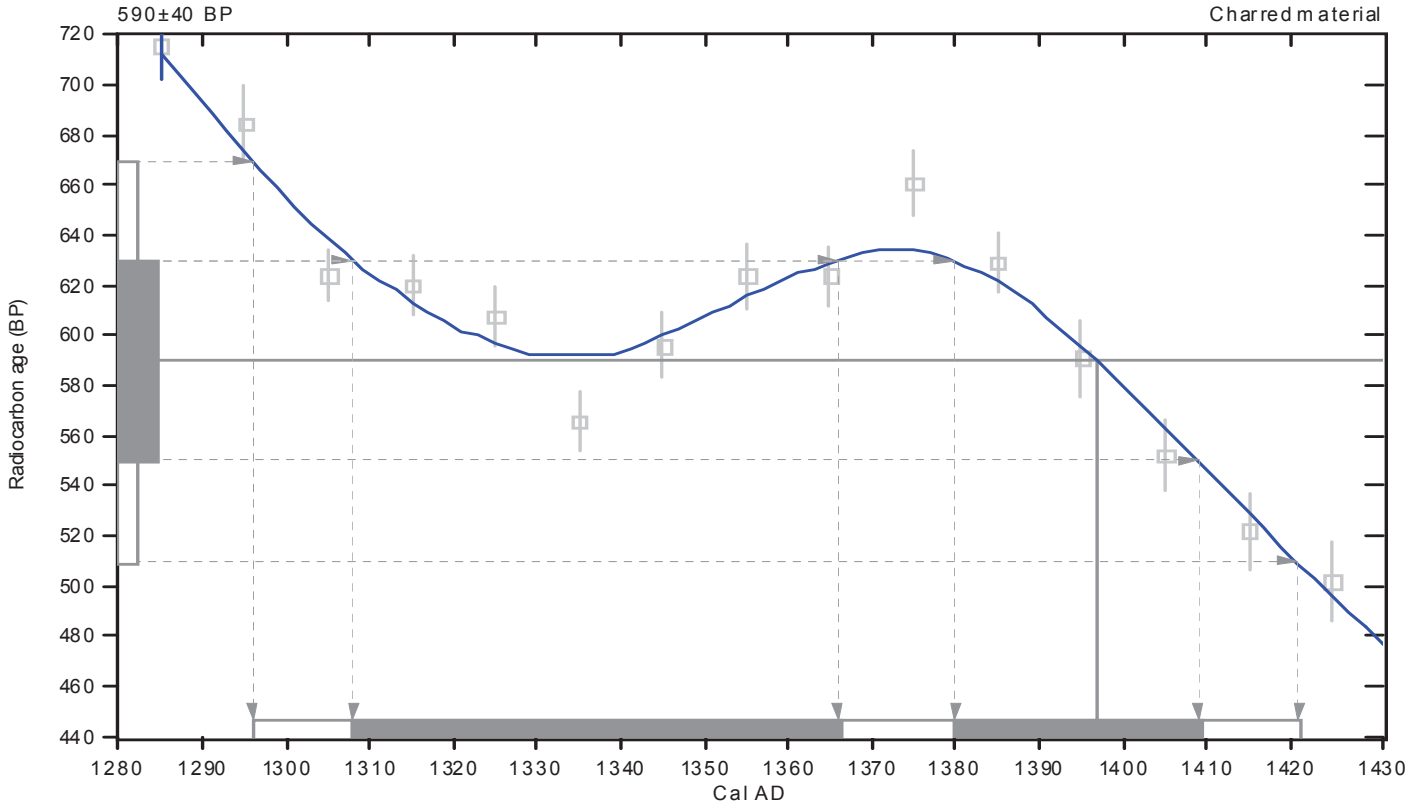
CALIBRATION OF RADIOCARBON AGE TO CALENDAR YEARS

(Variables: C13/C12=-25.5:lab. mult=1)

Laboratory number:	**Beta-219892**
Conventional radiocarbon age:	**590±40 BP**
2 Sigma calibrated result: (95% probability)	**Cal AD 1300 to 1420 (Cal BP 650 to 530)**

Intercept data

Intercept of radiocarbon age with calibration curve:	Cal AD 1400 (Cal BP 550)
1 Sigma calibrated results: (68% probability)	Cal AD 1310 to 1370 (Cal BP 640 to 580) and Cal AD 1380 to 1410 (Cal BP 570 to 540)



References:

Database used

INTCAL98

Calibration Database

Editorial Comment

Stuiver, M., van der Plicht, H., 1998, Radiocarbon 40(3), pxii-xiii

INTCAL98 Radiocarbon Age Calibration

Stuiver, M., et. al., 1998, Radiocarbon 40(3), p1041-1083

Mathematics

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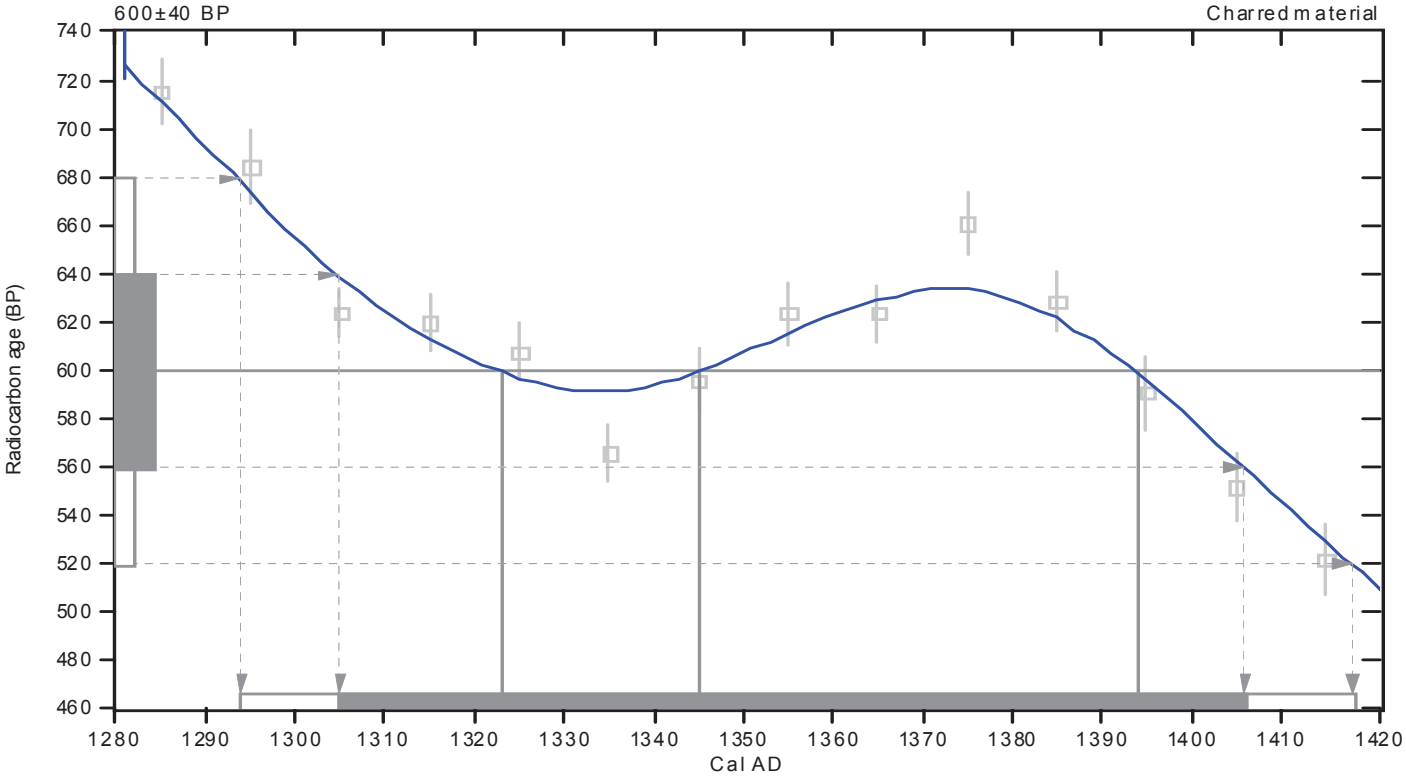
CALIBRATION OF RADIOCARBON AGE TO CALENDAR YEARS

(Variables: C13/C12=-24.8:lab. mult=1)

Laboratory number:	**Beta-219894**
Conventional radiocarbon age:	**600±40 BP**
2 Sigma calibrated result: (95% probability)	**Cal AD 1290 to 1420 (Cal BP 660 to 530)**

Intercept data

Intercepts of radiocarbon age with calibration curve:	Cal AD 1320 (Cal BP 630) and Cal AD 1340 (Cal BP 600) and Cal AD 1390 (Cal BP 560)
1 Sigma calibrated result: (68% probability)	Cal AD 1300 to 1410 (Cal BP 640 to 540)



References:

Database used

INTCAL98

Calibration Database

Editorial Comment

Stuiver, M., van der Plicht, H., 1998, Radiocarbon 40(3), pxii-xiii

INTCAL98 Radiocarbon Age Calibration

Stuiver, M., et. al., 1998, Radiocarbon 40(3), p1041-1083

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APPENDIX E: Bone Tool and Lithic Analyses

MODIFIED FAUNAL REMAINS, ARCHAEOLOGICAL TESTING AT 45-SN-393, MUKILTEO, WASHINGTON.

Sophisticated bone tool technology is a hallmark of Northwest Coast Native Americans. A wide variety of implements have been found preserved in shell midden deposits that span the past several millennia, including the Mukilteo Shoreline site. Eight fragments of modified mammal bone and teeth were found during test excavation at 45SN393, all in spoils screened from Trenches 6 and 14.

METHODS

All mammal and bird remains were examined visually in the field without magnification for possible modification, and obviously modified specimens were separated prior to cataloging. Modified remains, and unmodified remains that were analyzed in the laboratory, were examined for modification again using a 10x hand lens after being dry-brushed. Because of the very small sample size, a formal classification system was not developed for this assemblage, however the descriptions of each artifact are based on attributes of modified faunal remains given by Larson (1995) for the West Point site, following Matson's (1976, 1991) classification developed for the Glenrose Cannery Site near Vancouver, BC. Each artifact is described here and its possible function discussed based on data and classifications from other sites and known ethnographic patterns of bone-working.

RESULTS

Cat # 45SN393-145, Beaver tooth fragments

Four fragments of the lower incisor of a beaver (*Castor canadensis*) were found in the screened spoils of Trench 6. The fragments have all been split along the length of the incisor, and are between 2.75 and 5 cm long (Figure E-1, a). Two of the fragments re-fit, although all four may have come from the same specimen. One of the fragments has a portion of the distal end, showing bevels of two different angles on the inner surface. Both bevels show light striations roughly perpendicular to the direction of biting that would be done by the beaver. Beaver are not uncommon in the Puget Sound lowlands, although no other beaver remains were found at the site. Beaver teeth are known in many other bone tool assemblages around Puget Sound, including those of West Point (Larson 1995:10-27) and Old Man House (Gaston and Jermann 1975:40). Beaver incisors, when found in archaeological sites, are often presumed to have been used as graving tools (e.g., Matson 1976:173) and ethnographic observations and modern use of hafted beaver incisors support these inferences (e.g., Stewart 1996). Suttles (1951:96) also noted beaver teeth used to make dice by the Strait of Georgia-area Saanich tribe (see also Smith 1940:218-219).

Cat # 45SN393-272, Composite toggling harpoon valve fragment

This artifacts is the central portion of a small toggling harpoon valve, ground from the shaft portion of bone from a medium to large-sized terrestrial mammal, probably a cervid (Figure E-1, d). It was found in the screened spoils of Trench 14. The original size of the valve is indeterminate, however the narrow width of the artifact (6 mm) and the u-shaped cross-section of the socket hollows on both ends suggest that the harpoon was armed with a bone point instead of a larger blade, and was probably used to capture small mammals, birds, or fish

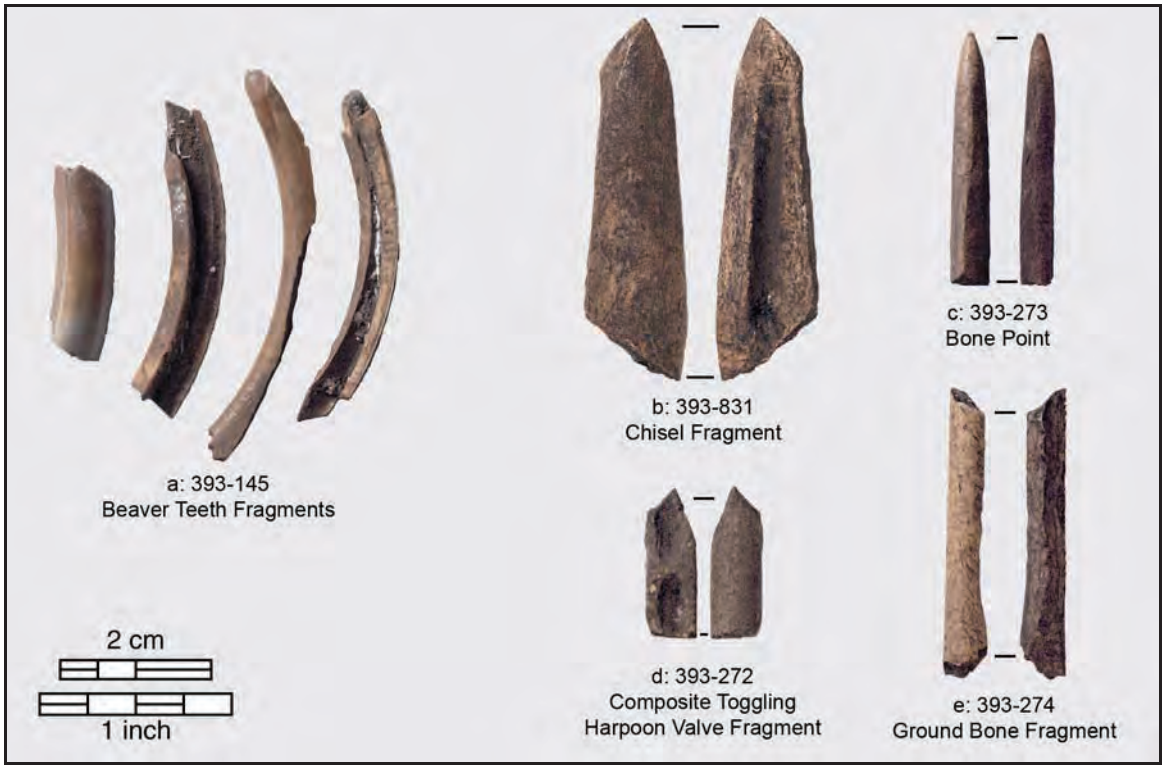

Figure E-1. Modified faunal remains from site 45SN393 (Site No. - Catalog No.).

(Stewart 1996:109-110). Although composite toggling harpoon valves are absent in the large bone tool assemblage at West Point, similar artifacts have been found in shell middens in other parts of Puget Sound, such as at Old Man House (Gaston and Jermann 1975:40), along Quartermaster Harbor in Vashon Island (Phillips 2002), and on Utsaladay Bay on the north end of Camano Island (Bryan 1963). Campbell (1981:289) notes two different kinds of toggling harpoon valves at the Duwamish No. 1 site, ones with sockets at both ends and ones with a socket on one end and a flat surface at the other. She ascribes this dichotomy to functional differences in the haft end of the point or blade placed between the sockets to arm the harpoon. The valve fragment from 45SN393 corresponds with the Type I valve at Duwamish No. 1. Descriptions of Native American use of toggling harpoons for spearing fish are given by Smith (1940:266) for the Puyallup and Nisqually, and for sea mammal hunting by Suttles (1951:106) for the Straits Salish.

Cat # 45SN393-273, Bone point fragment

One bone point fragment was found at 45SN393, in screened spoils from Trench 14. It is 3.5 cm long from tip to broken end (Figure E-1, c). The point appears to have been ground from the shaft of a long bone from a terrestrial mammal. Past the round cross-section tip portion, the shaft is ground on four sides, and changes to grinding on three sides about 1.5 cm from the point, creating a triangular cross-section near the break. Points with one or both ends ground to a sharp tip are relatively common in bone artifact assemblages recovered from shell middens across Puget Sound. Similar artifacts from the West Point site were categorized as small or large bone unipoints, bipoints, point tips, and point mid-sections. Because it is not clear whether #273 had both ends sharpened to a point or not, it is best classified as a point tip. Although bipoints have been frequently associated with fishing activities by Puget Sound Native Americans (e.g., Chatters 1981, 1988; Schalk and Rhode 1985), unipoints have been

ethnographically observed used to arm small composite toggling harpoons and arrows, and were also placed along the edge of wooden paddles to make herring rakes (Roll 1974; Stewart 1996).

Cat # 45SN393-274, Ground bone fragment

This artifact was found in the spoils of Trench 14, and is a splinter of shaft of a mammal longbone ground on the exterior surface of the shaft, creating parallel striations (Figure E-1, e). It is about 4 cm long, and 5 mm wide and 5 mm thick. Because it is incomplete, placing the artifact within a particular class of ground bone tool or estimating where it is situated along a hypothetical manufacturing sequence is not possible.

Cat # 45SN393-831, Bone chisel fragment

This artifacts was found in the spoils of Trench 14 and is the pointed end of a chisel, ground from the shaft portion of a bone from a medium to large-sized mammal, probably a cervid (Figure E-1, b). Following the criteria used for the West Point assemblage (Larson 1995:10-3, 10-6 following Matson et al. 1991:41), it is categorized as a chisel based on use-wear polish on the single bevel of the bilaterally tapering end but little or no evidence of more forceful battering. The bevel has been ground to a tip on the interior, marrow cavity side of the shaft fragment. The artifact is 5 cm long, and 1.5 cm wide at the distal end. Chisels and similar wedge-shaped bone tools have been found at West Point, Duwamish No. 1, and are not uncommon in assemblages from other Puget Sound sites. Northwest Native Americans have used tools such as bone chisels and wedges for working wood and other material, and description of the tools and finished products of their work abound in ethnographic sources for the region (e.g., Smith 1940:320-321; Stewart 1996).

SUMMARY

Distribution of Artifacts

Although the sample size of the bone artifact assemblage found during testing at 45SN393 was small, recovery of artifact types was noticeably different between units. As expected, most of the artifacts were found in the trench spoils, which provided a greater volume of archaeological deposits for screening than the core samples. All modified bone artifacts (with the exception of the beaver tooth fragments from Trench 6) were found in Trench 14.

Bone Tool Technology

Despite being a small assemblage from the testing fieldwork, the modified faunal remains reflect a variety of activities at the site and a well-developed ground bone tool technology. Functions usually ascribed to the harpoon valve fragment and bone point are hunting and fishing, and those ascribed to the beaver teeth and chisel are inscribing and working raw material such as bone or wood (e.g., Stewart 1996). This range of artifacts is expected in assemblages that date to the last 1,000 years, when it is often surmised that the cultural patterns seen in the ethnographic record become more widely adopted throughout the Pacific Northwest (e.g., Matson and Coupland 1995).

Large terrestrial mammal bone was an important raw material for tool manufacture as well as subsistence on the Northwest Coast (Hodgetts and Rahemtulla 2001), and is shown to be so in

the 45SN393 assemblage. Hypothetical manufacturing sequences were developed for the large modified bone and antler assemblage at the Duwamish No. 1 site (Campbell 1981:379-403). Here, a dimensional classification of modified faunal fragments allows placement of bone, antler, or shell artifacts into these models along the use-life of the object. Only one bone artifact at the Mukilteo Shoreline site, Cat # 45SN393-274, appears to have been deposited into the shell midden at a point prior to completion along the manufacturing sequence. A lack of modified but unshaped bone fragments in the assemblage may suggest that bone tool technology was limited at the site to maintenance, use, and discard of tools, however the presence of unmodified bone shaft fragments of cervids may indicate otherwise.

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LITHIC ANALYSIS, ARCHAEOLOGICAL TESTING AT 45-SN-393, MUKILTEO, WASHINGTON

A total of 175 lithic artifacts were identified in the trench spoils and trench and core CVS. These artifacts represent a variety of expedient and more carefully formed tools and tool-making debris. Analysis of the lithic artifacts provides information on the ways in which the occupants of 45SN393 made, used, maintained, and discarded their stone tools.

METHODS

The entire assemblage of lithic objects collected from the site was analyzed by identifying technological and functional attributes that highlight intra- and inter-site assemblage variability. Each technological and functional dimension consists of a set of mutually exclusive alternate modes (attributes) whose intersection result in class formation (Dunnell 1971:73).

Analysis first involved assigning each object an Object Type code based on gross morphological characteristics (see for example Crabtree 1972, Odell 2003). The Object Type code acted as an initial sorting device identifying each object as either a technological by-product (debitage and cores), a formed tool such as a projectile point or biface, or an object that was part of the tool making process such as a hammerstone. Each item was then assigned a raw material type to investigate the role of locally available toolstone versus imported materials in the assemblage. Several technological dimensions informative of the stone tool manufacturing process were employed for the analysis of flakes and modified flakes, including type of striking platform, the amount of dorsal cortex, object morphology, number of dorsal flake scars, and evidence of heat treatment. Codes used for the lithic analysis are listed on the table included in this appendix. Size measurements were recorded to the nearest millimeter for all objects except shatter and broken unmodified flakes. For broken flakes, measurements were collected for any unbroken dimension, for example flake width and thickness if intact. General size was recorded for shatter and broken flake dimensions (i.e. <2 cm, etc.). The same dimensions were recorded for cores, cobble derived objects, formed tools and ground stone tools whenever applicable.

The combination of modes from each technological dimension define the manufacturing process for each lithic object. The type of striking platform is indicative of the reduction technology employed in flake production as well as the general reduction stage and type of object from which the flake was removed (core, biface, etc.). The amount of cortex on an item provides insight into the shape of the piece of raw material from which the flake was removed (sub-round pebble, etc.), the reduction stage, and may have functional implications as well. For example, Close (2006) determined that the presence of a cortical edge (natural backing) was a desired and purposefully manufactured attribute of many unretouched lithic objects used at the English Camp site (45SJ24) on San Juan Island. The number of dorsal flake scars on an object also reflects reduction stage, or amount of effort employed in the production of the object. Flakes were also identified by the type of core from which they were struck based on the orientation of dorsal flake scars. This attribute was noted in the comments section and is based on the lithic analysis for 45SJ24 (Close 2006). This attribute provides additional interpretive value to the analysis by connecting the flake to the parent product from which it was struck.

After the technological portion of the analysis was complete for a given object, the artifact was examined with a 10x hand lens for evidence of shaping modification (retouch) and use-wear. If either were identified, the type, location, and edge angle of each occurrence was recorded.

Retouch is commonly defined as intentional shaping of an object's edge or surface through pressure or percussion flaking (Andrefsky 1998:xxvi; Odell 2003:64). For the purposes of this analysis, the term modification applies to secondary flaking retouch, grinding or pecking resulting in edge modification and/or intentional, invasive shaping modification of an objects surface. Individual retouch scars are visible with the naked eye and edge retouched items exhibit retouch scars that do not extend more than 10 percent onto the interior of the flake. Objects with edge modification extending less than 10 percent onto the surface of the item were coded as Object Type flake, core, or split. Those with retouch extending more than 10 percent onto the interior of the item were assigned a conventional Object Type name such as projectile point, biface, etc.

Investigation of use-wear included examination of wear patterns, defined as edge damage to object margins or surfaces, that may take the form of micro-flake scars, striations, polish, and battering. Micro-flake scars are made on an object's edge during its use as a tool (Kooyman 2000:151). Such scar patterns are visible with the naked eye, but identification of individual scars was made with a hand lens. The scars form a continuous, non-random pattern on the object's edge, and typically range between one and two millimeters in width (Kooyman 2000:153-155). Polish results from abrasive contact between the tool and the worked material and results in a glossy sheen on the working edge or surface of the tool. Polish is often the result of bone, hide, and plant processing (Kooyman 2000:156-157). Striations result when contact between the tool and worked material encounters small fragments of debris that causes scratches on the tool's surface or edge (Kooyman 2000:151). This type of damage may result from working almost any type of material. Battering is typically the result of contact between two hard objects such as stone upon stone. Chips of stone are removed typically in a localized area from repeated percussive force, creating a depressed area on the surface or edge of the tool. This damage is commonly found on objects such as hammerstones and anvils.

Any item modified by surface and/or edge retouch, or those exhibiting use-wear was classified as a lithic tool. Items with modification only on an edge or edges are commonly called expedient tools. Because a single object can be used for different purposes and in different ways, each discontinuous occurrence of wear and/or retouch is classified individually. As a result, one object may be coded with more than one class of wear/retouch modification and each occurrence is considered a separate tool.

RESULTS

Of the 175 lithic objects examined, 149 flakes and shatter, 12 cores, nine split or edge flaked pebbles/cobbles, two projectile points, one ground stone adze blade and two hammerstones were identified (Table E-1). The majority of lithic artifacts were found in Trench 8, including one of the projectile points and the adze blade. Raw material at the site is dominated by locally available igneous rocks including basalt, dacite, andesite, and rhyolite (combined in this analysis as volcanic rock), followed by metasediment, cryptocrystalline stone (CCS), siltstone, quartzite, petrified wood, volcanic breccia, and a single occurrence of nephrite.

The lithic assemblage is dominated by debitage including flakes, flake fragments and shatter (n=149) which comprise 85.1% of the 175 objects recovered. The majority of the flakes (n=107) and all of the shatter (n=12) are unmodified and encompass 68% of the assemblage. Two unmodified and one modified flake are categorized as specialized linear flakes. Microblades are defined as flakes that have approximately parallel sides, are less than 5 cm

Table E-1. Lithic Assemblage by Material Type.

OBJECT	MATERIAL TYPE								TOTAL
	Vol.	CCS	Quartz-ite	Pet. Wood	Meta sed.	Siltstone	Breccia	Nephr.	
TECHNOLOGICAL BY-PRODUCT									
Debitage	65	7	5	2	30	8	0	0	117
Core	0	2	1	0	1	1	0	0	5
Subtotal #	65	9	6	2	31	9	0	0	122
Subtotal %	53.3	7.4	4.9	1.6	25.4	7.4	0	0	
SPECIALIZED DEBITAGE									
Linear Flake	1	0	0	0	1	0	0	0	2
Subtotal #	1	0	0	0	1	0	0	0	
Subtotal %	50	0	0	0	50	0	0	0	
PEBBLE/COBBLE DERIVED									
Split Pebble	3	0	0	0	2	0	0	0	5
Split Cobble	0	0	0	0	0	0	1	0	1
Subtotal #	3	0	0	0	2	0	1	0	6
Subtotal %	50	0	0	0	33.3	0	16.7	0	
MODIFIED OBJECTS									
Edge Modified Flake	24	0	0	0	4	1	0	0	29
Edge Modified Linear Flake	0	0	0	0	1	0	0	0	1
Edge Modified Core	5	1	0	0	1	0	0	0	7
Modified Split Pebble	0	1	0	0	0	0	0	0	1
Modified Split Cobble	1	0	0	0	0	0	0	0	1
Edge Altered Cobble	0	0	0	0	1	0	0	0	1
Hammerstone	0	0	0	0	0	0	2	0	2
Projectile Point	0	1	0	1	0	0	0	0	2
Ground Adze Blade	0	0	0	0	0	0	0	1	1
Subtotal #	30	3	0	1	7	1	2	1	45
Subtotal %	66.7	6.7	0	2.2	15.6	2.2	4.4	2.2	
TOTAL #	99	12	6	3	41	10	3	1	175
TOTAL %	56.6	6.9	3.4	1.7	23.4	5.7	1.7	0.6	100

long and 1 cm wide (Kooyman 2000:74-75). The linear flakes were not considered microblades because they

The lithic assemblage is dominated by debitage including flakes, flake fragments and shatter (n=149) which comprise 85.1% of the 175 objects recovered. The majority of the flakes (n=107) and all of the shatter (n=12) are unmodified and encompass 68% of the assemblage. Two unmodified and one modified flake are categorized as specialized linear flakes. Microblades are defined as flakes that have approximately parallel sides, are less than 5 cm long and 1 cm wide (Kooyman 2000:74-75). The linear flakes were not considered microblades because they fail to meet this criteria, although they are similar in appearance. Of the 137 flakes, 30 (21.8% of the flakes and 17.1% of the assemblage) have been edge modified either through use or secondary retouch. The remainder of the assemblage includes five unmodified cores (2.9%), seven modified cores (4%), five split pebbles (2.9%), one modified split pebble (0.6%), one split cobble, one modified split cobble, one edge altered cobble from which the flakes removed to create the edge would have been of a useable size, two (1.1%)

hammerstones, two projectile points, and one groundstone adze blade. A selection of lithic artifacts is shown in plates below

Debitage

The debitage (including edge modified flakes) portion of the assemblage includes 74 complete flakes (22 modified), 21 proximal flakes (5 modified), and 42 broken flakes (3 modified) that retain no portion of the striking platform. Based on overall flake characteristics, 68 were manufactured through freehand reduction, 45 through bipolar reduction, and 24 could not be definitively assigned to a reduction technique. The products of bipolar reduction typically exhibit a flaking angle of 90 degrees or more, a point of applied force that has very little flaking but shows dispersed, expansive and coarse platform crushing with individual step fractures visible to the naked eye, generally appear relatively flat in side-view, commonly exhibit crushing damage at the distal end, and are often wider than they are long (Desilits 1995:37-38, 61; Flenniken 1980:51-52; Kobayashi 1973). Freehand reduction products, on the other hand, exhibit a flaking angle of less than 90 degrees, localized platform crushing (if present at all) that is highly centralized with individual fractures unidentifiable with the naked eye and generally display a concave ventral surface and convex dorsal curve (Desilits 1995:52, 108). The striking platforms recorded for the 45SN393 lithics include the following:

- Cortical: The platform exhibits the unmodified, cortical surface from the objective piece it was removed from. This type of platform is common on freehand reduction flakes and may be found on pressure flakes. Because bipolar reduction results in crushing, the point of impact will not exhibit cortex, although the remainder of the proximal end may be cortical .

- Simple: The platform is a single flat surface. Flakes with this type of platform have usually been removed from non-bifacial objects and are commonly from uni-directional cores (Andrefsky 1998:94).

- Dihedral: The platform exhibits two flake scars and is generally indicative of the shaping stage of tool manufacture in which more than one episode of flake removal has already taken place as the object is thinned. Flakes with this type of platform are the result of freehand reduction (Kooyman 2000:52-54).

- Faceted: The platform exhibits more than two flake scars and is generally indicative of the finishing stages of tool manufacture. Several episodes of flake removal have taken place and flakes with faceted platforms are the result of freehand percussion and pressure flaking (Kooyman 2000: 52-54).

- Crushed: The point of impact is crushed from a smashing blow indicative of bipolar reduction. The point of impact exhibits dispersed platform crushing and battering that is expansive and coarse with individual step fractures visible to the naked eye (Desilits 1995:52, 108).

The composition of striking platform types of a lithic flake assemblage reflects the reduction stages of stone tools that occurred at the site (Table E-2).

Table E-2. Debitage Platform Types and Inferred Manufacturing Stages.

PLATFORM TYPE	CHARACTERISTICS	LIKELY MANUFACTURE STAGE	QUANTITY UNMODIFIED	QUANTITY MODIFIED	TOTAL
Cortical	Cortex covers entire platform, dorsal cortex common	Early-stage reduction if on decortication flake, middle-stage shaping if no surface cortex present	5 early stage, 14 middle stage	3 middle stage	22
Simple	A single flat surface, dorsal cortex common	Early-stage reduction	12	2	14
Dihedral	Two flake scars	Middle-stage reduction, shaping and thinning	4	3	7
Faceted	Three or more flake scars	Late-stage thinning and resharpening	5	2	7
Crushed	Platform is crushed due to impact	Early-stage reduction, common on decortication flakes or on flakes with 1 or 2 dorsal flake scars.	28	17	45
Total			68	27	95

It is apparent that the 45SN393 assemblage is dominated by flakes (based on the type of striking platform) produced from early (n=64 or 67.4%) and middle-stage reduction (n=24 or 25.3%), while very few (n=7 or 7.4%) late-stage reduction flakes indicative of bifacial reduction, finishing, and rejuvenation activities are present. This suggests that production of formed tools such as bifaces and unifaces was not an important activity at the site, and expedient tools produced from flakes were the more desired end product. As the table indicates, 45 (47.4%) of the platform-bearing flakes are the result of bipolar reduction, and of these 38% were modified. Of the flakes resulting from freehand reduction (n=50 or 52.6%), only 10 (20%) were modified. This suggests that the bipolar reduction technique produced flakes more readily suitable for use as expedient tools than did freehand reduction. The bipolar produced flakes tend to be slightly larger (average size 3.74 cm long, 3.90 cm wide, 1.11 cm thick) than the freehand produced flakes (average size 3.21 cm long, 2.66 cm wide, 0.80 cm thick), and may offer a more robust object for use.

Of the specialized linear flakes, two (cat. # 45SN393-1472 and 1474) have cortical platforms and the other (cat. # 45SN393-1476) has a simple platform (Figure E-2, a-c). This is notable because, as will be addressed later, the object identified as a microblade core and the two cores with linear flake removal, all exhibit crushed points of impact where flakes were removed, however crushing is not evidenced on any of the blade-like flakes produced. This implies that either both freehand and bipolar reduction were used in the production of blade-like objects or, as Close (2006:53) observes, the frequency of bipolar reduction objects is typically underestimated because evidence of the technology is not always recognizable on end products.

To further examine the hypothesis that reduction effort in flake/tool production was low at 45SN393, the amount of dorsal cortex by platform type was examined to determine if reduction effort was expended to remove cortex prior to use (Table E-3).

The amount of dorsal cortex exhibited on the complete flakes can also be used to discriminate between early and later stages in the manufacturing sequence because surface cortex is usually indicative of early reduction stages. As previously discussed, the majority of the flakes with striking platforms represent the early and middle reduction stages. The majority of the complete flakes (67.6%), however, have either no cortex (n=25) or less than 25% cortex (n=25), suggesting that no dorsal cortex is a favorable trait. It is interesting to note, however, that of the 25 complete flakes with no cortex, only four (16%) exhibit retouch and/or wear modification. In fact, the number of complete edge modified flakes is distributed evenly (n=4

Figure E-2. Selected flakes, modified flakes, and cores from Site 45SN393 (Site No. - Catalog No.).

Table E-3. Distribution of Cortex on Complete Flakes by Platform Type.

PLATFORM TYPE	AMOUNT OF CORTEX					TOTAL
	None	100%	50-99%	>25<50%	<25%	
UNMODIFIED FLAKE						
Cortical	9	1	1	0	2	13
Simple	2	0	1	0	5	8
Dihedral	2	0	0	1	0	3
Faceted	3	0	0	0	0	3
Crushed	5	6	3	2	9	25
Subtotal #	21	7	5	3	16	52
Subtotal %	40.4	13.5	9.6	5.8	30.7	
MODIFIED FLAKE						
Cortical	3	0	0	0	0	3
Simple	0	0	1	0	1	2
Dihedral	1	0	0	0	0	1
Faceted	0	0	0	0	0	0
Crushed	0	4	3	1	8	16
Subtotal #	4	4	4	1	9	22
Subtotal %	18.2	18.2	18.2	4.5	40.9	
TOTAL #	25	11	9	4	25	74
TOTAL %	33.8	14.8	12.2	5.4	33.8	100

for each category) between those with no cortex, 100% cortex, and 50% or more cortex. Only four flakes were grouped in the “>25,<50%” cortex category, and only one of these displays edge modification. Of the 25 flakes with less than 25% cortex, nine or 36% have been modified and comprise 40.9% of all complete, edge modified flakes.

Close (2006) defines the attribute of natural backing as cortex on a lateral, proximal, or distal edge. As a result of her analysis of a the 45SJ24 lithic assemblage, she concludes there is an overall preference for flakes with cortical platforms, natural backing, and little surface cortex. Objects chosen for tool use without secondary retouch typically displayed a natural cortical back with use-wear located opposite the cortical edge. The presence or absence of a natural cortical back was also included in the present analysis. Of the 107 flakes, including broken and proximal fragments, 39 (36.4%) display this attribute. Of the 52 unmodified complete flakes, 23 (45.2%) display a natural backed edge, and 50% (n=11) of the modified complete flakes have this same trait. Interestingly, within the unmodified complete flake category, natural backing occurs more frequently on freehand produced flakes than on those determined to be from bipolar reduction. Within the modified complete flake group, however, exactly one-half of both freehand and bipolar flakes display a backed edge. All of these objects except two, one bipolar flake and one freehand flake, have use-wear modification restricted to the opposite edge of the backed edge.

Edge-Modified Debitage

Thirty flakes and fragments display edge modification in the form of use-wear and/or secondary retouch. Four of these objects display two discrete instances of modification for a total of 34 tools. The majority of the edge modified flakes are complete (n=22) including one linear flake, followed by five modified proximal flakes, and three modified broken flakes. Within the edge modified flake group, 17 (56.7%) are determined the products of bipolar reduction, 10 (33.3%) are the result of freehand reduction, and three (10%) are unidentified in terms of reduction technique (Table E-4).

Table E-4. Tool Occurrences by Type and Location of Modification.

FLAKE TYPE	WEAR/ VENTRAL	WEAR/ DORSAL	WEAR/ BIFACIAL	RETOUCH/ DORSAL	RETOUCH/ VENTRAL	RETOUCH & WEAR/ DORSAL	TOTAL
Freehand	3	4	2	1	2	0	12
Bipolar	1	11	3	2	0	1	18
Undetermined	2	0	0	0	1	1	4
Total	6	15	5	3	3	2	34
%	17.6	44.2	14.7	8.8	8.8	5.9	100

The majority of the tool occurrences occur on a dorsal edge (n=20, 58.8%), followed by modification on a ventral edge (n=9, 26.5%), then bifacial edge modification (n=5, 14.7%). Use-wear on an otherwise unmodified edge is the most common tool occurrence (n=26, 76.5%) regardless of reduction technique. Only eight of the 34 tool occurrences (23.5%) are secondary retouch modification, which is also primarily confined to the dorsal edge (n=5). Again, neither reduction product is favored for this type of modification. However, 17 (38%) of the 34 bipolar flakes exhibit 18 of the total tool occurrences, compared to 12 (18%) modified freehand flakes out of the 68 identified. Only four of the tool occurrences are present on flakes that could not be identified by reduction technique. The implication is that flakes were produced with minimal reduction effort and provided the desired end product of a flake with a moderately flat ventral surface and sharp edges, which could be used without any further edge modification. These objects were not rejuvenated but discarded after their use life ended. Although freehand reduction produced the majority of the debitage, more of the bipolar produced portion of the flake assemblage were chosen for tool use suggesting this technique supplied a desirable end product for use without further modification.

The type of edge modification and associated edge angle provides additional insight into tool function. In general, tools associated with scraping activities have an edge angle in the range of 60 to 90 degrees, the modification is on the edge or is slightly unifacial, and the modification consists of hinge and feather flake scars. Tools associated with cutting activities have an edge angle of greater than 18 degrees but less than 60 degrees and the damage consists of bifacial feathered flake scars. Chopping tools are typically large and have an edge angle between 60 and 90 degrees and the damage is often hinge flake scars; bifacial or unifacial crushing may be present on the edge and extending slightly onto the surface. Finally, tools used for sawing activities typically have edge angles between 25 and 80 degrees (Kooyman 2000:94-95).

The majority of the use-wear damage (n=18) is associated with an edge angle between 61 and 90 degrees, including 15 objects with step-hinge fractures and three with feathered scars indicative of scraping activities. Five objects, including the modified linear flake, exhibit step-hinge fractures associated with an edge angle between 31 and 60 degrees, and one object shows step-hinge fracturing associated with an angle less than 31 degrees. These objects were likely used for either cutting or sawing activities. The remaining two artifacts with wear damage include one object with variable crushing damage and one object with grinding polish and an edge angle of 61-90 degrees. The object with crushing (cat # 45SN393-1451) is traditionally called a *piece esquilles*, in North American archaeological literature (Figure E-2, d). This item has not been categorized as a bipolar core because flake scars are only present on the dorsal surface. The distal edge crushing is patterned and appears to have resulted from use, possibly as a wedge, rather than due to impact during the manufacturing process. The object with grinding polish (cat # 45SN393-1478) is of coarse grain metasediment and the grinding appear to result from use, such as working wood or cutting plant material.

There are six occurrences of secondary retouch modification on a flake edge. In six of the eight instances, the edge angle created is steep (61-90 degrees) and these items may have been intended for scraping activities. The other two instances have a moderate edge angle of 31-60 degrees, possibly intended as cutting tools. Two of the freehand produced retouched objects exhibit two discrete instances of modification. The first (cat # 45SN393-1447) exhibits two instances of steep modification on opposing lateral edges (Figure E-2, f). The second (cat # 45SN393-1480) exhibits moderate use-wear on a dorsal edge and steep retouch on the opposite ventral edge. Two objects exhibit retouch with associated wear. The first (cat #45SN393-1443) exhibits moderate retouch with wear on a dorsal edge (Figure E-2, e) and the second (cat # 45SN393-1473) is a bipolar flake with steep retouch and associated wear, also on a dorsal edge. Cat # 45SN393-1443 is grouped in the undetermined reduction technology category, but is most probably the result of bipolar reduction.

Cores and Pebble/Cobble-Derived Objects

The lithic assemblage includes two freehand cores and 10 bipolar cores, two hammerstones, two split cobbles, six split pebbles, and one edge altered cobble. Objects defined as cores are pieces of lithic material exhibiting no evidence of removal from a parent piece and exhibit only negative flake scars. Cortex amount was recorded for cores and cobble derived objects such that if a single surface retained cortex it was considered the dorsal surface. If two surfaces retained cortex, the surface exhibiting the larger amount was considered the dorsal. If no cortex was noted, the surface was considered unoriented. Cores may be unidirectional, in which flakes have been removed from one direction and generally from a single striking platform. Cores may also be multidirectional, in which flakes have been removed from two or more directions and several points of impact may be present (Andrefsky 1998:15-16). Objects defined as split must retain the majority of the smooth round portion of the rock, and do not exhibit dorsal flake scars. These objects may be regarded as either the parent piece (core) or detached piece (flake). The single edge-altered cobble displays cortex on two surfaces and unidirectional flake removal from a single edge margin.

Cores

The two CCS freehand cores are relatively small (less than 4 cm along the maximum dimension) and retain no cortex (Figure E-2, k and l). The first (cat # 45SN393-122) is a multidirectional exhausted core with two distinct platforms, one dihedral and the other faceted. The second core (cat # 45SN393-1459) is also multidirectional and the primary platform exhibits extensive crushing/grinding damage that served as platform preparation. A single edge exhibits slight crushing and associated polish at a moderate edge angle resulting from use rather than technological impact.

The bipolar cores include five volcanic, two metasediment, one volcanic breccia, one quartzite, and one CCS core, and range in size from 1.97 cm to 14.60 cm along the maximum dimension. One of these objects is traditionally called a microblade core (cat # 45SN393-1441 of CCS) exhibiting unidirectional, parallel, linear flake scars extending the length of the object (Figure E-2, i). Cat # 45SN393-124 is the single exception to the core definition given above (Figure E-2, j). This object is metasediment and displays recognizable dorsal and ventral surfaces indicative of removal from a parent piece, however the object was clearly used in liner flake production, then retouched for further use as a tool. The object is categorized as a modified bipolar core to signify what appears to be its initial role in the assemblage. A third object (cat # 45SN393-1442) appears to have been employed in linear flake production as well but also has

additional non-liner flake removal, possibly in an attempt to shape the object after flake production for another use (Figure E-2, g).

All of the bipolar cores, except the metasediment linear flake core, retain cortex on at least one surface and eight of the 10 exhibit multidirectional flake scars and two or more striking platforms. Six of the bipolar cores exhibit edge modification, including four occurrences of retouch, one use-wear, and two objects exhibit retouch and associated wear (Table E-5).

Table E-5. Type and Location of Edge Modification on Bipolar Cores.

EDGE ANGLE	RETOUCH/ DORSAL	RETOUCH/ VENTRAL	RETOUCH/ UNORIENTED	RETOUCH & WEAR/ VENTRAL	WEAR/ UNORIENTED	RETOUCH DORSAL/ WEAR BIFACIAL	TOTAL
≤30 degrees	0	0	1	0	0	0	1
31-60 degrees	0	1	0	0	0	0	1
61-90 degrees	2	0	0	1	1	1	5
Total	2	1	1	1	1	1	7
%	28.5	14.3	14.3	14.3	14.3	14.3	

The majority of the bipolar cores exhibit edge modification associated with a steep edge angle (n=5, 71.4%), followed by one occurrence of retouch associated with a moderate edge angle and one associated with a low (<30 degree) edge angle. In contrast to the modified flakes which were primarily used without secondary retouch, all but one of the bipolar cores exhibit retouch to shape the edge prior to use. This may indicate a functional preference since the bipolar cores are, on average, larger in terms of length, width, and thickness than the modified flakes and were perhaps chosen for more robust scraping and cutting activities. Of additional note, two of the bipolar cores (cat # 45SN393-1454 and -1482) exhibit modification that incorporates the crushed point of impact, using this concave area for the creation of a very steep edge via retouch (-1454) or using the concavity for use without further modification (-1482).

Modified bipolar core # 45SN393-1445 (Figure E-2, h) stands alone in terms of morphological attributes. This object was placed in the core category but did not likely function primarily for flake production. This object exhibits impact crushing that forms a notch-like area at one end that is reminiscent of net-weight notching. The opposite end exhibits a flake scar on each surface and the resulting thin, non-cortical edge exhibits unifacial retouch. This object may have served as a net weight and was then curated into a functionally different tool, or perhaps attempts at the second notch failed and the object was then fashioned into a usable tool.

Cobble Derived Objects

This portion of the assemblage includes two hammerstones, two split cobbles, six split pebbles, and one edge modified cobble. The hammerstones (cat # 45SN393-270 and -1449) are small sub-round cobbles of volcanic material and each exhibits two instances of battering damage consistent with use in percussion technology (Figure E-3, a and b). These objects are remarkably similar in appearance and may have been used in both freehand and bipolar reduction. The two small split cobbles, on the other hand, are very dissimilar in appearance. The first (cat # 45SN393-822) is of volcanic breccia and exhibits no modification or flake

Figure E-3. Selected cobble and pebble derived objects from site 45SN393 (Site No. - Catalog No.).

removal. This object does not exhibit end battering damage indicative of use as a hammerstone and was thus intentionally split. The second object (cat # 45SN393-1453) is heavily water-worn and exhibits two flake removal scars on the ventral surface. A lateral ventral edge displays retouch forming a moderate (31-60 degree) edge angle with associated wear at a slightly steeper angle (Figure E-3, d).

The single edge altered cobble (cat #45SN393-709) exhibits cortex on both surfaces with four flakes removed to create a steep, beaked edge (Figure E-3, c). The flakes removed are larger than those typical of retouch and could have been manufactured for use. This object not only served as a tool but potentially in flake tool production.

Split Pebbles

The six split pebbles are very similar in appearance, all being smaller than 5 cm along the maximum dimension and all are less than 2 cm thick. Interestingly, only one exhibits modification and two have been flaked on the ventral surface. All were initially split along the shortest axis so the split object is wider than it is long. The single modified split pebble (cat # 45SN393-1470) exhibits patterned, slightly bifacial crushing damage across an entire edge that appears to result from use rather than technological impact (Figure E-3, e). Cat # 45SN393-1460 exhibits a linear flake scar down the center of the longitudinal ventral surface (Figure E-3, f).

Formed Tools

Three formed tools are present in the assemblage, including one triangular projectile point, one projectile point base, and one groundstone adze blade.

Projectile Points

The expanding triangular biface/projectile point (cat # 45SN393-21) is of petrified wood and measures 4.99 cm long, 2.32 cm wide, and 0.65 cm thick (Figure E-4, a). The object displays a straight base and regular to oblique transverse pressure flaking. This tool may have functioned as a hafted knife rather than a projectile. This type of tool is similar to those described by Kornbacher (1992:171-174) from the English Camp shell midden (45SJ24) in deposits dating from 1500 BP to the historic period and is stylistically consistent with the radiocarbon chronology of 45SN393.

The opalitic projectile point base (cat # 45SN393-123) is heavily water-worn and patinated (Figure E-4, b). The expanding base has a small indentation in its center formed by a notch. Because the point is broken below the blade-stem intersection it is difficult to ascertain the point type, but based on its narrow base width (2.07 cm) it is of a size consistent with later period projectile points.

Ground Stone Adze Blade

A single nephrite adze blade (cat # 45SN393-125) measures 7.10 cm long, 4.65 cm wide, and 1.80 cm thick (Figure E-4, c). The adze exhibits manufacturing striations across both surfaces and beveled facets form the edge of the blade. Two areas of crushing wear damage are present, both along the blade and battering damage is present at the haft end of the object. Adze blades have been found in other shoreline occupation sites in the Puget Sound and Straits

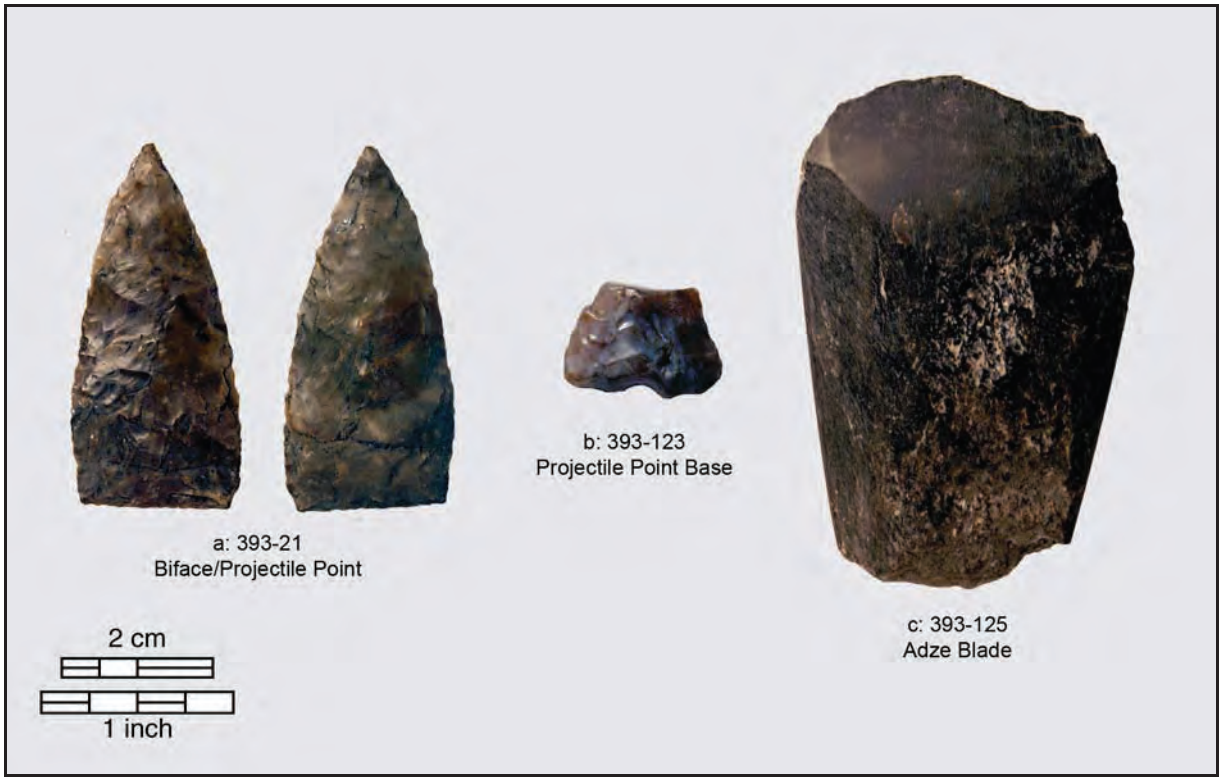

Figure E-4. Selected formed tools from Site 45SN393 (Site No. - Catalog No.).

region, including English Camp, Duwamish No. 1, and Component 4 from West Point, which were inhabited during the same general time period as 45SN393.

SUMMARY - LITHIC TOOL TECHNOLOGY AT 45SN393

The lithic assemblage at 45-SN-393 is a diverse assemblage with a few specialized tool types. The specialized tools include two projectile points, an adze, a wedge tool, and two hammerstones. Locally available raw materials, in the form of sub-rounded pebbles and cobbles, were reduced on-site via bipolar and/or freehand reduction primarily for the production of expedient flake stone tools. The majority of the debitage is indicative of early to middle-stage reduction and roughly two-thirds of the debitage retain some amount of cortex regardless of reduction technique. The two freehand reduction cores retain no cortex and exhibit multiple platforms. One of the bipolar cores exhibits flake scars indicative of microblade production. Two other bipolar cores exhibit linear flake scars that extend the length of the core and a split pebble displays a linear flake scar on the ventral surface suggesting the production of small linear flakes, quite similar to microblades, was an important activity. The bipolar cores are the result of sub-rounded pebble/cobble reduction. Minimal reduction effort was expended in tool production, as evidenced by the paucity of late stage reduction flakes and the scarcity of tools displaying bifacial or unifacial surface modification. In fact very few flake tools display evidence of secondary retouch edge modification, suggesting edge alteration of flakes was not required for the majority of the tasks undertaken. The types of wear modification observed on the tools are indicative of a variety of cutting, sawing, and scraping activities that would be expected with occupation, such as processing plant and animal food and working wood or other plant material to make shelters, watercraft, or personal objects.

Several nearby shell midden sites occupied during the same time period as 45SN393 have analyzed lithic assemblages. The two most recent cultural components defined at the West Point site temporally overlap with 45SN393 (Lewarch and Bangs 1995). At West Point, both bipolar and freehand reduction technologies were employed to reduce locally available raw materials for expedient tool use, but only during the earlier components prior to 1500 BP. By 1500 BP, the area was no longer a year-round occupation but a small specialized activity camp, and tools manufactured from non-local CCS were brought into the area (Lewarch and Bangs 1995:7-176). In comparison, at 45SN393, reduction of local raw materials produced the majority of the assemblage, suggesting more permanent or regular occupation such as that evidenced in the earlier periods of the West Point occupation.

A lithic assemblage more similar to that of 45SN393 was recovered from the English Camp shell midden (45SJ24). Although a smaller sample, the 45SN393 lithic assemblage has several commonalities with the post-1000 BP component recovered English Camp (Close 2006; Kornbacher 1992). Both contain similar types of formed tools, evidence of microblade production, evidence of both freehand and bipolar reduction, and an emphasis on non-retouched expedient tools primarily manufactured through bipolar reduction. Kornbacher (1992:181-183) describes a decrease in chipped stone tools at English Camp including small bifaces over time between the pre-1000 BP and post-1000 BP components. The paucity of bifacial tools and lack of bifacial thinning flakes in the 45SN393 assemblage is also similar to the more recent (post- 1000 BP) portion of the English Camp assemblage. Unlike 45SN393, however, the raw crystalline volcanic rock used in tool production at English Camp was transported to the site from other locations (Close 2006:160-161). In this case, English Camp and West Point are similar in that stone considered most desirable for tool manufacture was transported into the area either in raw material form, or as finished tools. On the other hand, at 45SN393 tool manufacture was primarily accomplished through reduction of raw materials readily available on-site.

The lithic assemblage collected from the Duwamish No. 1 Site (45KI23), located near the mouth of the Duwamish River, is very extensive with a wide variety of artifact types not found in the 45SN393 assemblage. However, bipolar and freehand reduction of locally available raw materials was still a common occurrence and all manufacturing stages are represented including finished formed tools. The majority of the local basalt debitage does not exhibit cortex and is unmodified. Within the modified basalt flake group, those with cortex exhibit more occurrences of use without retouch while those without cortex exhibit more occurrence of retouch shaping than use (Campbell 1981:317-378). This is a contrast to the 45SN393 assemblage in which the majority of the debitage exhibits cortex, late-stage manufacturing flakes are rare, the majority of the tools regardless of cortex presence are not shaped, and the only two formed chipped stone tools are of CCS. Campbell (1981:464) also reports increasing diversity of lithic materials in the more recent components of Duwamish No. 1, and it is possible that the CCS artifacts from site 45SN393 are indicative of such a change as well.

A common thread among the West Point, English Camp, Duwamish No. 1, and 45SN393 assemblages is one of freehand and bipolar reduction of raw material sources primarily for the production of expedient tools. However, the West Point, English Camp, and Duwamish No. 1 assemblages all show diachronic change in terms of tool manufacture and/or the use of raw material resources. Functionally discrete areas within each of the sites have been demonstrated based on stratigraphically controlled excavation. This is not currently possible for the present 45SN393 lithic assemblage. It is intriguing that shoreline occupation sites in Western Washington, while exhibiting much in common, also exhibit variation in terms of the raw materials chosen, the distribution of living, work, and refuse areas within the site and the

tools manufactured and used in daily life. Additional, controlled investigation of 45SN393 could provide more information regarding regional and local variations for shoreline locations occupied during roughly the same time period.

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LITHIC ANALYSIS CODES

TECHNOLOGICAL DIMENSIONS

I. Object Type (O)
- 0 - Chunk, Shatter
- 1 - Flake
- 2 - Linear Flake
- 6 - Bipolar Flake
- 7 - Edge Modified Piece
- 8 - Core
- 9 - Split Cobble
- 10 - Edge Altered Cobble
- 11 - Split Cobble
- 18 - Projectile Point
- 32 - Hammerstone
- 33 - Microblade
- 34 - Bipolar Core

II. Raw Material (M)
- 1 - Basalt/Dacite
- 3 - CCS
- 7 - Petrified Wood
- 11 - Metasediment
- 22 - Red Jasper
- 24 - Nephrite
- 25 - Volcanic (general)
- 28 - Siltstone
- 29 - Volcanic Breccia

III. Condition (C)
- 0 - Indeterminate
- 1 - Complete Flake
- 2 - Broken Flake (platform missing)
- 3 - Proximal Flake (distal end missing)
- 4 - Complete Formed Tool
- 5 - Broken Formed Tool
- 6 - N/A (core, shatter)

IV. Platform/Point of Impact (P)
- 0 - None/Missing
- 1 - Cortical
- 2 - Simple (one flake scar)
- 3 - Dihedral (two flake scars)
- 4 - Faceted (more than two flake scars)
- 6 - Crushed

V. Amount of Cortex on Dorsal Surface (CR)
- 0 - None
- 1 - Complete (100%)
- 3 - 50-99%
- 4 - >25<50%
- 5 - <25%

VI. Backed (Cortical edge perpendicular to ventral surface) (BD)
- 0 - No Natural Backing Present
- 1 - Natural Backing Present

VII. Outline (applies to complete flakes only) (OT)
- 0 - Indeterminate
- 1 - Expanding
- 2 - Contracting
- 3 - Parallel
- 4 - Incurvate
- 5 - Excurvate
- 6 - Wide Body
- 7 - Oval
- 8 - N/A

VIII. Number of Dorsal Flake Scars (flakes only) (DR)

IX. Heat (H)
- 0 - Unheated
- 1 - Heat Damage (potlids, crazing)
- 2 - Heat Treated (mixed luster/non-luster flake scar surfaces)

X. Metric Measurements
- Length (L) cm
- Width (W) cm
- Thickness (TH) cm
- Weight (WG) g

I. Utilization/Modification (MD)
- 0 - None
- 1 - Wear Only
- 2 - Manufacture Only
- 3 - Manufacture and Associated Wear

II. Type of Non-Wear Modification (RT)
- 0 - None
- 1 - Flaked
- 2 - Ground
- 3 - Pecked

III. Location of Non-Wear Modification (RL)
- 0 - N/A
- 1 - Unifacial Edge Margin Dorsal
- 2 - Unifacial Edge Margin Ventral
- 3 - Unifacial Across 10-49% of Dorsal Surface
- 4 - Unifacial Across 10-49% of Ventral Surface
- 5 - Unifacial Across 50-100% of Dorsal Surface
- 6 - Unifacial Across 50-100% of Ventral Surface
- 7 - Bifacial Edge Margin
- 8 - Bifacial Across 10-49% of Surfaces
- 9 - Bifacial Across 50-100% of Surfaces
- 10 - Unifacial Edge on Unoriented Surface

IV. Edge Angle of Non-Wear Modification (RA)
- 0 - N/A
- 1 - ≤30 Degrees
- 2 - 31-60 Degrees
- 3 - 61-90 Degrees

V. Type of Wear Modification (WT)
- 0 - N/A
- 1 - Step/Hinge
- 2 - Feathered
- 3 - Abrasions/Striations
- 4 - Polishing/Grinding
- 5 - Crushing/Battering

VI. Location of Wear (WL)
- 0 - N/A
- 1 - Unifacial Dorsal Edge
- 2 - Unifacial Ventral Edge
- 3 - Unifacial Dorsal Surface
- 4 - Unifacial Ventral Surface
- 5 - Bifacial Edge
- 6 - Point
- 7 - End
- 8 - Unifacial Unoriented Edge
- 9 - Unifacial Unoriented Surface

VII. Shape of Worn Area (SW)
- 0 - N/A
- 1 - Convex
- 2 - Concave
- 3 - Straight
- 4 - Point
- 5 - Irregular

VIII. Edge Angle Wear Modification (WA)
- 0 - N/A
- 1 - ≤30 Degrees
- 2 - 31-60 Degrees
- 3 - 61-90 Degrees
- 4 - Greater Than 90 Degrees
- 5 - Variable

Cat: Catalog Number
U : Unit
- T = Trench
- BH = Borehole

Lithic Analysis Data, Site 45SN393.

CAT	U	TECHNOLOGICAL DIMENSIONS													FUNCTIONAL DIMENSIONS								COMMENTS
		O	M	C	P	CR	BD	OT	DR	H	L	W	TH	WG	MD	RT	RL	RA	WT	WL	SW	WA	
21	T6	18	7	4	0	0	0	0	0	0	4.99	2 32	0.65	7.7	2	1	9	0	0	0	0	0	Triangular blade, no stem, straight base, haft element suggests projectile or hafted knife, regular pressure flaking to oblique transverse flaking on blade
22	T13	6	5	1	1/6	0	1	6	1	0	2.39	3 66	0.65	4.4	0	0	0	0	0	0	0	0	
23	T13	6	1	1	6	3	0	7	3	0	8.75	11.87	3.32	395.0	0	0	0	0	0	0	0	0	Bipolar, three crushed impacts indicative of multiple reduction attempts
23	T13	1	1	1	2	3	0	2	1	0	4.16	2.76	0.84	8.7	0	0	0	0	0	0	0	0	Simple flake from unidirectional core
23	T13	1	1	2	0	0	0	3	2	0	<3	1 21	0.31	1 2	0	0	0	0	0	0	0	0	Simple flake from unidirectional core
23	T13	1	1	1	2	5	1	1	2	0	1.23	2.12	0.33	0 8	0	0	0	0	0	0	0	0	Simple flake from core with more than one platform
23	T13	1	11	1	1	5	1	3	1	0	2.95	0 87	0.34	1.1	0	0	0	0	0	0	0	0	Simple flake from unidirectional core
23	T13	1	5	2	0	5	1	0	0	1	6.64	5 08	1.24	40.9	0	0	0	0	0	0	0	0	Otherwise unidentifiable simple flake, unable to orient proximal/distal
23	T13	1	5	1	3	0	0	1	2	0	2.32	1.77	0.43	1.4	0	0	0	0	0	0	0	0	Simple flake from unidirectional core
116	T11	6	1	1	6	1	0	7	0	0	5.91	10.20	1.50	102.5	1	0	0	0	1	1	5	3	Bipolar First Flake, collected from west profile wall in situ
122	T11	8	22	6	3/4	0	0	8	0	0	2.14	2 03	2.11	8 0	0	0	0	0	0	0	0	0	Multidirectional with two distinct platforms, one dihedral and one faceted.
123	T8	18	3	5	0	0	0	0	0	0	1.48	2 07	0.63	2 6	2	1	9	0	0	0	0	0	Projectile point base (proximal snap), slight basal notch, regular pressure flaking
124	T8	34													2	1	1	3	0	0	0	0	
124	T8	34	11	6	6	0	0	3	3	0	2.93	2 58	0.81	7.7	2	1	1	3	0	0	0	0	Bipolar flake/Bipolar microblade core, crushed platform and distal end, uni-directional micro-blade scars, retouch both lateral dorsal edge margins (flake-core-tool)
125	T8	29													3	0	0	0	5	7	0	0	Three areas of wear, two along blade, one at butt end from battering use
125	T8	29	24	5	0	3	0	8	0	0	7.10	4 65	1.80	81.9	2	2	9	0	0	0	0	0	Adze Blade, striations across both surfaces, facets form edge of blade
127	T6	1	3	3	4	0	0	0	2	0	<2	1.17	0.26	0 5	0	0	0	0	0	0	0	0	Simple flake from uni-directional core
134	T8	6	5	3	6	0	0	0	1	0	<3	1 66	0.45	2 2	0	0	0	0	0	0	0	0	
135	T8	1	28	1	2	5	1	1	1	0	1.76	2.40	0.44	2 3	0	0	0	0	0	0	0	0	Backed on two edges, simple flake from unidirectional core
135	T8	1	22	2	0	0	0	0	1	0	<2	1.16	0.34	0.7	0	0	0	0	0	0	0	0	Simple flake from unidirectional core
135	T8	6	3	1	6	1	0	1	0	0	1.81	1 88	0.49	1 3	0	0	0	0	0	0	0	0	Split from small sub-rounded pebble. Bipolar First Flake.
135	T8	1	7	1	4	0	0	6	3	1	2.25	3.13	0.47	3 3	0	0	0	0	0	0	0	0	Simple flake from core with more than one platform, extensive heat damage may obscur additional flake scars
135	T8	1	22	2	0	0	0	0	1	1	<1	1.13	0.44	0 3	0	0	0	0	0	0	0	0	Simple flake from undetermined core type
135	T8	6	11	1	6	5	0	7	2	0	3.93	2 62	1.36	15.4	0	0	0	0	0	0	0	0	Bipolar from subround pebble
135	T8	1	11	1	1	5	1	6	3	0	2.29	2 20	0.55	4.1	0	0	0	0	0	0	0	0	Simple flake from unidirectional core, backed on three edges (includes platform)
135	T8	6	1	1	6	5	1	5	1	1	3.35	3 31	0.66	8.4	0	0	0	0	0	0	0	0	Flake exhibits extensive heat damage, warped
135	T8	1	1	1	1	0	1	6	5	0	2.36	3 55	1.48	12.9	0	0	0	0	0	0	0	0	Flake removal likely attempted object shaping, multi directional flake scars
135	T8	1	25	2	0	0	0	0	1	1	<4	<3	0.68	8 8	0	0	0	0	0	0	0	0	Unidentified flake
135	T8	1	1	3	4	0	0	0	3	0	3.92	2 56	0.91	10.1	0	0	0	0	0	0	0	0	Simple flake from core with more than one platform
135	T8	1	11	2	0	4	0	0	1	0	<3	2 28	0.54	5 0	0	0	0	0	0	0	0	0	Unidentified flake
135	T8	6	28	3	6	0	0	0	2	0	<3	<3	0.85	3 5	0	0	0	0	0	0	0	0	
135	T8	1	11	2	0	0	0	0	2	0	<3	2 36	0.53	3 9	0	0	0	0	0	0	0	0	Unidentified flake
135	T8	1	1	1	1	1	0	7	0	0	6.48	4 35	0.82	30.0	0	0	0	0	0	0	0	0	Simple First Flake, heavily water worn

Lithic Analysis Data, Site 45SN393.

CAT	U	TECHNOLOGICAL DIMENSIONS													FUNCTIONAL DIMENSIONS								COMMENTS
		O	M	C	P	CR	BD	OT	DR	H	L	W	TH	WG	MD	RT	RL	RA	WT	WL	SW	WA	
135	T8	1	11	1	1	0	1	2	1	0	3.97	2.10	0.84	7.7	0	0	0	0	0	0	0	0	Simple flake from unidirectional core
135	T8	0	11	6	0	0	0	8	0	0	<3	<2	<2	4.1	0	0	0	0	0	0	0	0	
135	T8	1	1	1	3	4	0	2	1	0	2.04	2.25	0.48	3.2	0	0	0	0	0	0	0	0	Simple flake from unidirectional core
135	T8	0	1	6	0	0	0	8	0	0	<6	>3	<2	12.7	0	0	0	0	0	0	0	0	
135	T8	6	11	1	6	3	0	7	1	0	9.07	4.52	1.52	73.3	0	0	0	0	0	0	0	0	Bipolar (metamorphosed mudstone)
135	T8	1	11	2	0	0	0	0	1	0	<2	<2	0.36	1.1	0	0	0	0	0	0	0	0	Unidentified flake
135	T8	1	1	2	0	5	0	0	3	0	<2	2.63	0.50	2.2	0	0	0	0	0	0	0	0	Simple flake from unidirectional core, small patch of cortex at distal end
135	T8	1	25	2	0	1	0	0	0	0	<4	3.17	0.85	11.3	0	0	0	0	0	0	0	0	Probable bipolar from subrounded pebble
135	T8	6	11	1	6	0	0	3	3	0	3.78	2.72	0.79	12.3	0	0	0	0	0	0	0	0	Three parallel flake scars, potential use modification obscurred by coarse material type
135	T8	0	1	6	0	5	0	8	0	1	<4	<2	1.08	10.3	0	0	0	0	0	0	0	0	
135	T8	1	11	2	0	5	1	0	1	0	<2	1.52	0.47	1.4	0	0	0	0	0	0	0	0	Simple flake from unidirectional core
135	T8	1	1	2	0	0	0	0	3	0	<4	<3	0.68	4.8	0	0	0	0	0	0	0	0	Unidentified flake
135	T8	1	1	2	0	0	0	0	1	0	<2	<2	0.30	0.6	0	0	0	0	0	0	0	0	Unidentified flake
135	T8	1	11	2	0	5	1	0	1	0	<2	<5	<2	0.9	0	0	0	0	0	0	0	0	Unidentified flake, general shape indicative of possible bipolar
135	T8	1	1	3	1	0	1	0	1	0	<3	2.44	0.75	6.0	0	0	0	0	0	0	0	0	Simple flake from unidirectional core
135	T8	0	11	6	0	3	0	8	0	0	<3	<2	0.75	3.5	0	0	0	0	0	0	0	0	
135	T8	1	1	2	0	5	1	0	1	0	<4	<3	0.48	3.4	0	0	0	0	0	0	0	0	Unidentified flake
135	T8	1	28	2	0	1	0	0	1	0	<4	1.97	1.11	7.0	0	0	0	0	0	0	0	0	Probable bipolar split from subrounded pebble
135	T8	1	1	3	3	0	0	0	3	0	1.83	1.50	0.41	1.4	0	0	0	0	0	0	0	0	Simple flake from unidirectional core
135	T8	1	1	2	0	1	0	0	0	0	<2	2.18	0.42	1.1	0	0	0	0	0	0	0	0	Unidentified flake
135	T8	1	1	2	0	0	0	0	1	0	<2	1.06	0.33	0.7	0	0	0	0	0	0	0	0	Unidentified flake
135	T8	1	11	1	1	0	1	2	2	0	2.49	3.58	1.95	10.3	0	0	0	0	0	0	0	0	Wedge shaped cortical platform (orange slice) suggests earlier bipolar reduction. Platform is backed edge, flake scars unidirectional.
135	T8	6	11	1	6	5	1	5	1	0	2.60	1.69	0.59	2.6	0	0	0	0	0	0	0	0	Lateral edges both backed, attrition at distal end may be result of wear but coarse material obscurs evidence
135	T8	6	25	1	6	4	1	7	1	0	3.90	2.00	1.55	10.6	0	0	0	0	0	0	0	0	Orange-slice bipolar flake, cortical rim forms backing
135	T8	6	1	1	6	1	0	7	0	0	3.25	4.13	1.01	15.9	0	0	0	0	0	0	0	0	Bipolar first flake split from pebble
135	T8	1	11	1	1	0	1	3	3	0	3.29	1.57	0.82	4.3	0	0	0	0	0	0	0	0	Simple flake from unidirectional core, coarse material may obscur wear
135	T8	1	11	1	2	0	0	5	2	0	2.47	1.07	0.32	1.0	0	0	0	0	0	0	0	0	Simple flake from unidirectional core
135	T8	1	1	1	3	0	0	5	2	0	2.20	0.70	0.29	0.4	0	0	0	0	0	0	0	+0	Simple flake from unidirectional core
135	T8	1	11	1	2	5	1	2	1	0	2.62	2.21	0.46	3.0	0	0	0	0	0	0	0	0	Simple flake from unidirectional core
135	T8	1	11	2	0	0	0	0	2	0	<3	<2	0.52	2.2	0	0	0	0	0	0	0	0	
135	T8	1	11	1	4	0	0	2	2	0	2.01	0.72	0.26	0.4	0	0	0	0	0	0	0	0	Simple flake from unidirectional core
135	T8	1	11	1	2	5	1	2	2	0	4.57	2.45	1.06	15.3	0	0	0	0	0	0	0	0	Simple flake from unidirectional core, edge attrition along backed edge may indicate wear but coarse material prohibits certainty
135	T8	1	11	1	1	0	0	2	1	0	3.31	1.89	1.04	4.5	0	0	0	0	0	0	0	0	Simple flake from unidirectional core (metamorphosed mudstone)
135	T8	1	1	1	1	0	0	5	2	0	3.76	2.23	0.95	7.9	0	0	0	0	0	0	0	0	Simple flake from unidirectional core
135	T8	0	1	6	0	5	0	8	0	0	<2	<2	0.39	0.8	0	0	0	0	0	0	0	0	
135	T8	1	1	2	0	1	0	0	0	0	<3	<2	0.53	2.9	0	0	0	0	0	0	0	0	Probable bipolar flake from subround pebble

Lithic Analysis Data, Site 45SN393.

CAT	U	TECHNOLOGICAL DIMENSIONS													FUNCTIONAL DIMENSIONS								COMMENTS
		O	M	C	P	CR	BD	OT	DR	H	L	W	TH	WG	MD	RT	RL	RA	WT	WL	SW	WA	
135	T8	6	11	1	6	5	1	6	1	0	2.43	4.73	0.92	11.0	0	0	0	0	0	0	0	0	Two backed edges, coarse material
135	T8	6	1	1	6	0	0	5	2	0	3.49	3.43	0.81	10.4	0	0	0	0	0	0	0	0	
135	T8	1	11	3	2	0	0	0	2	0	<3	1 96	0.66	3.7	0	0	0	0	0	0	0	0	Simple flake from unidirectional core
135	T8	6	1	1	6	0	0	5	2	0	2.26	1 97	0.42	2 2	0	0	0	0	0	0	0	0	
135	T8	0	1	6	0	0	0	8	0	0	<2	<2	0.40	0 8	0	0	0	0	0	0	0	0	
135	T8	6	1	1	6	5	1	6	1	0	1.74	1 93	1.03	3 5	0	0	0	0	0	0	0	0	Bipolar from small subround pebble
135	T8	1	28	2	0	0	0	0	2	0	<2	<1	0.42	1 0	0	0	0	0	0	0	0	0	Unidentified flake
135	T8	0	1	6	0	5	0	8	0	0	<3	<2	0.56	1 5	0	0	0	0	0	0	0	0	
135	T8	1	11	1	1	0	1	2	2	0	1.40	1 22	0.37	0 6	0	0	0	0	0	0	0	0	Simple flake from unidirectional core
137	T6	0	3	6	0	0	0	8	0	0	<1	<1	<1	0.4	0	0	0	0	0	0	0	0	
138	T6	1	1	2	0	3	0	2	1	0	<4	1 65	0.57	3.4	0	0	0	0	0	0	0	0	Simple flake from uni-directional core, water worn
139	T6	1	5	2	0	0	0	2	3	0	<4	2.18	0.69	3 3	0	0	0	0	0	0	0	0	Simple flake from unidirectional core
140	T6	1	1	3	1	5	1	0	3	0	<3	3.43	1.15	9 3	0	0	0	0	0	0	0	0	Platform is backed edge, parallel flake scars
140	T6	0	1	6	0	1	0	8	0	0	<3	<2	0.77	3.1	0	0	0	0	0	0	0	0	
140	T6	0	1	6	0	0	0	8	0	0	<3	<2	0 57	2 0	0	0	0	0	0	0	0	0	
140	T6	1	1	2	0	1	0	0	0	0	<2	<3	0.42	1 9	0	0	0	0	0	0	0	0	Unidentified flake
140	T6	1	28	2	0	5	0	0	1	1	<2	1 92	0.59	1 0	0	0	0	0	0	0	0	0	Simple flake from unidirectional core, extensive heat damage
140	T6	1	28	1	1	0	1	6	2	1	2.46	2 34	0.82	3.7	0	0	0	0	0	0	0	0	Simple flake from unidirectional core, extensive heat damage
140	T6	1	1	2	0	1	0	0	0	0	<2	<3	0 81	4 8	0	0	0	0	0	0	0	0	Unidentified flake, likely bipolar from subround pebble
140	T6	1	1	3	1	0	1	0	1	0	<3	1 90	0.56	2.7	0	0	0	0	0	0	0	0	Simple flake from unidirectional core
140	T6	1	1	3	2	0	0	1	2	0	<4	3 03	1.07	12.9	0	0	0	0	0	0	0	0	Simple flake from unidirectional core
140	T6	1	1	1	2	5	1	2	2	0	3.81	2 56	0.86	12.6	0	0	0	0	0	0	0	0	Simple flake from core with more than one platform, backed on two edges
140	T6	1	11	2	0	5	1	0	1	0	<2	1 65	0.28	0 9	0	0	0	0	0	0	0	0	Simple flake from unidirectional core
140	T6	6	1	1	1/6	0	1	6	3	0	1.35	2 37	0.91	2 8	0	0	0	0	0	0	0	0	Bipolar, cortical platform with crushing from impact
140	T6	1	1	3	2	4	0	0	2	0	2.30	4 24	0.87	10.6	0	0	0	0	0	0	0	0	Simple flake from core with more than one platform
140	T6	6	1	1	6	0	0	2	1	0	3.20	2 36	0.60	5 8	0	0	0	0	0	0	0	0	Bipolar
140	T6	6	1	1	6	1	0	7	0	0	3.99	2 99	1.41	19.9	0	0	0	0	0	0	0	0	Bipolar First Flake
140	T6	6	1	1	6	4	0	6	1	0	3.70	3 20	1.95	22.6	0	0	0	0	0	0	0	0	Bipolar
140	T6	1	1	1	1	3	0	7	2	0	5.44	3 67	1.54	38.6	0	0	0	0	0	0	0	0	Simple flake from unidirectional core
140	T6	1	1	2	0	3	0	0	2	0	<2	3 53	0.72	6 0	0	0	0	0	0	0	0	0	Unidentified flake
140	T6	6	1	1	6	5	1	3	1	0	4.33	2 09	0.70	5.4	0	0	0	0	0	0	0	0	Bipolar
141	T6	1	7	3	2	5	1	0	1	0	<3	2 07	0.55	3.4	0	0	0	0	0	0	0	0	Simple flake from uni-directional core
192	T11	6	25	1	6	3	0	7	3	0	3.71	4 25	1.31	17.2	0	0	0	0	0	0	0	0	Two of three flake scars result from technological impact
192	T11	6	25	1	6	1	0	7	0	0	6.16	10.16	2.46	153.5	0	0	0	0	0	0	0	0	Bipolar First Flake, edges on line of split cobble
192	T11	1	11	2	0	4	0	0	1	0	<2	<3	0.29	0.7	0	0	0	0	0	0	0	0	Simple flake from unidirectional core?
192	T11	6	11	1	6	5	1	7	1	9	4.37	2 62	0.41	5 8	0	0	0	0	0	0	0	0	Bipolar
192	T11	1	1	2	0	0	0	0	1	0	<3	1.77	0.22	1 3	0	0	0	0	0	0	0	0	Simple flake from unidirectional core?
201	T11	1	22	2	0	0	0	6	3	1	<4	4 89	1.06	22.9	0	0	0	0	0	0	0	0	Simple flake from unidirectional core, heavily water worn
269	T14	6	1	1	6	1	0	7	0	0	3.96	5 52	1.08	24.5	0	0	0	0	0	0	0	0	Flake split from small sub-round pebble
269	T14	1	1	1	4	0	0	6	2	0	2.30	2 89	0.62	2 9	0	0	0	0	0	0	0	0	Simple flake from unidirectional core
269	T14	0	28	6	0	0	0	8	0	0	<3	<2	0.98	1 8	0	0	0	0	0	0	0	0	
269	T14	6	25	3	6	3	0	0	1	0	<3	3 52	0.58	6 5	0	0	0	0	0	0	0	0	
269	T14	1	11	1	2	0	0	2	2	0	3.61	2.11	0.66	4 9	0	0	0	0	0	0	0	0	Simple flake from unidirectional core

Lithic Analysis Data, Site 45SN393.

CAT	U	TECHNOLOGICAL DIMENSIONS													FUNCTIONAL DIMENSIONS								COMMENTS
		O	M	C	P	CR	BD	OT	DR	H	L	W	TH	WG	MD	RT	RL	RA	WT	WL	SW	WA	
269	T14	1	1	2	0	5	0	0	1	0	<3	3.24	0.50	4.4	0	0	0	0	0	0	0	0	Simple flake from unidirectional core
269	T14	1	1	2	0	1	0	0	0	0	<2	<2	0.50	1.6	0	0	0	0	0	0	0	0	Unidentified flake from sub-round pebble
269	T14	1	1	2	0	5	0	0	3	0	<5	2.79	1.28	12.6	0	0	0	0	0	0	0	0	Simple flake from core with more than one platform, highly water worn
269	T14	1	1	3	1	0	1	0	4	0	<2	<3	0.96	5.2	0	0	0	0	0	0	0	0	Simple flake from unidirectional core, platform is backed edge
269	T14	1	1	1	1	0	1	3	1	1	6.08	5.82	1.32	50.1	0	0	0	0	0	0	0	0	Simple flake from unidirectional core
269	T14	0	11	6	0	5	1	8	0	0	<3	<2	0.59	3.5	0	0	0	0	0	0	0	0	
269	T14	1	11	2	0	5	1	0	2	0	<4	2.01	0.73	5.1	0	0	0	0	0	0	0	0	Probable bipolar flake
270	T14	32	25	4	0	2	0	8	0	0	8.10	7.05	5.39	420 0	1	0	0	0	5	7	2	4	Hammerstone wear
270	T14	32													1	0	0	0	5	7	2	4	Hammerstone wear
298	T5	1	1	2	0	3	0	0	0	0	4.12	11.57	1.62	97.6	0	0	0	0	0	0	0	0	Unidentified flake, possible bipolar, small fragment of original piece
298	T5	6	1	1	6	1	0	1	0	0	4.84	3.97	0.79	15.7	0	0	0	0	0	0	0	0	Bipolar First Flake
298	T5	1	1	2	0	3	0	0	1	0	5.65	4.02	1.16	28.2	0	0	0	0	0	0	0	0	Unidentifiable flake type
299	T5	1	22	2	0	0	0	0	4	1	<2	<2	0.59	1.3	0	0	0	0	0	0	0	0	Simple flake from unidirectional core, extensive heat damage
613	BH 33	1	1	2	0	3	0	0	0	1	<2	<1	0.41	0.2	0	0	0	0	0	0	0	0	Simple flake from undetermined core type, severe heat damage
709	BH 85	10	11	4	6	3	0	0	0	0	6.11	6.57	3.58	175 9	2	1	1	3	0	0	0	0	Flakes removed to form edge are not retouch size. Flake removal may have served in flake production as well as edge modification of the parent object.
822	BH 59	9	29	1	6	1	0	7	0	0	7.05	5.43	2.64	111 9	0	0	0	0	0	0	0	0	Bipolar split with crushing at proximal and distal ends. Bipolar First Flake?
882	BH 31	6	28	1	6	0	0	2	3	0	2.10	1.53	0.45	1.8	0	0	0	0	0	0	0	0	
1441	T8	34	3	6	6	5	0	8	4	0	2.08	0.87	0.83	1.9	0	0	0	0	0	0	0	0	Bipolar microblade core
1442	T8	34	5	6	2/6	5	0	8	0	0	3.41	2.08	1.58	11.3	0	0	0	0	0	0	0	0	Opposed platform core, marjority of core exhibits linear parallel flake scars (microblade)
1443	T11	1	1	2	0	3	0	0	2	0	8.74	7.95	1.96	166 3	3	1	1	2	1	1	5	2	Probable bipolar split, flat ventral surface, collected from west profile wall in situ
1444	T13	6	1	1	6	1	0	7	0	0	5.26	6.94	1.41	55.6	1	0	0	0	1	5	5	1	Wear primarily along ventral edge but wraps slightly onto dorsal surface, very low edge angle
1445	T13	34	1	0	6	3	0	7	0	0	5.70	4.84	1.10	40.1	2	1	8	1	0	0	0	0	One crushed platform, cortex on both surfaces, bifacial modification opposite platform (possible attempted bipolar notching for netweight then re-worked distal end with bifacial flaking)
1446	T13	6	1	1	6	5	1	6	1	0	6.78	8.20	1.91	87.3	1	0	0	0	1	5	3	2	Two backed edges, wear at distal end
1446	T13	6													1	0	0	0	1	5	3	2	Wear along one backed edge
1447	T11	1	1	1	1	0	1	6	3	0	5.70	6.75	2.32	87.1	2	1	1	3	0	0	0	0	Flake from a core with more than one platform, modification on lateral edge
1447	T11	1													2	1	2	3	0	0	0	0	Modification on lateral edge
1448	T5	34	1	6	6	5	1	8	0	0	14.6 0	7.33	2.33	248 2	3	1	1	2	1	5	3	3	Bipolar, multiple platforms, tabular, cortex only on dorsal, flaked both surfaces
1449	T14	32	25	4	0	2	0	8	0	0	8.66	6.77	3.54	315 3	1	0	0	0	5	7	2	4	Hammerstone wear
1449	T14	32													1	0	0	0	5	7	2	4	Hammerstone wear, cracks radiate out from blow
1450	T6	1	1	3	1	0	0	1	1	0	4.26	5.15	1.17	24.7	1	0	0	0	1	5	5	3	Simple flake from unidirectional core
1451	T6	6	1	1	1/6	5	1	3	2	0	2.08	2.65	1.04	8.1	1	0	0	0	5	1	5	5	Bipolar core with one flake removed from ventral surface, crushing at distal end, wedge-like tool (piece esquilles), backed on both unworked edges.
1452	T6	6	1	1	6	5	1	6	2	0	1.53	2.38	1.34	5.2	1	0	0	0	1	5	3	3	
1453	T14	9	1	1	1/6	1	0	6	0	0	5.66	9.27	2.41	129.4	3	1	2	2	1	2	5	3	Split cobble with two crushed platforms, heavily water worn

Lithic Analysis Data, Site 45SN393.

CAT	U	TECHNOLOGICAL DIMENSIONS													FUNCTIONAL DIMENSIONS								COMMENTS
		O	M	C	P	CR	BD	OT	DR	H	L	W	TH	WG	MD	RT	RL	RA	WT	WL	SW	WA	
1454	T14	34	1	6	6	3	1	7	5	0	13.58	11.49	3.22	801.9	3	1	2	3	1	2	5	3	Multi-directional bipolar core, one platform exhibits grinding preparation after initial crushing blow, primarily flaked on ventral, retouch/wear incorporates crushed platform from flake removal and is directly opposite of backed edge left on ventral edge
1455	T14	1	1	1	2	5	0	2	2	1	6.92	5.79	1 27	49.3	2	1	2	2	0	0	0	0	Simple flake from unidirectional core
1456	T14	1	1	1	2	3	1	1	0	0	3.71	4 93	0 97	19.6	1	0	0	0	1	2	1	3	Simple platform although some crushing also visible, step-hinge possibly from attempted bipolar removed small amount of cortex from dorsal, wear at right angle to backed edge
1457	T14	11	1	1	6	1	0	7	0	0	2.65	3 90	1.18	17.5	0	0	0	0	0	0	0	0	
1458	T14	1	1	2	0	5	1	0	2	0	6.01	3.75	1 59	30.0	1	0	0	0	1	1	3	3	Simple flake from core with more than one platform, backed on edge opposite wear
1459	T14	8	3	6	2/6	0	0	8	0	0	3.32	3 95	1.47	25.7	1	0	0	0	5	8	3	2	Multidirectional multiple platform core, shape now wedge-like, crushing on distal edge due to use not technology
1460	T8	11	11	1	6	1	0	8	0	0	3.74	2.49	1.31	15.7	0	0	0	0	0	0	0	0	Bipolar split pebble, Microblade core, flaked on ventral
1461	T8	34	28	6	6	4	0	8	0	0	2.43	3 84	1.79	22.3	0	0	0	0	0	0	0	0	Multiple platform pebble core
1462	T8	1	1	3	2	0	0	0	1	0	3.35	2 92	0.41	4.4	1	0	0	0	2	2	5	3	Simple flake from unidirectional core
1463	T8	1	1	3	4	0	0	0	6	0	2.47	2.10	0.74	5 3	1	0	0	0	1	2	2	2	Simple flake from core with more than one platform
1464	T8	1	1	3	4	0	0	1	3	1	3.15	3.78	0.75	9 3	1	0	0	0	2	1	3	3	Simple flake from core with more than one platform, water worn, wear along distal technological induced step-hinge fracture
1464	T8	1													1	0	0	0	1	1	3	3	Entire dorsal edge utilized
1465	T8	6	1	1	6	1	0	6	0	0	3.19	3.77	1 04	13.8	1	0	0	0	1	2	2	3	Bipolar first flake, split from subrounded pebble
1466	T8	6	1	1	6	3	0	7	2	0	3.24	3.15	0 81	10.6	2	1	1	3	0	0	0	0	Flakes removed from opposite end of platform, one scar is likely result of technological impact
1467	T8	6	1	1	6	5	1	2	1	0	3.76	3 03	0 63	8 0	1	0	0	0	1	1	5	3	Wear opposite backed edge
1468	T8	6	1	1	6	1	0	7	0	0	5.40	1 50	0.77	7.1	1	0	0	0	1	1	1	3	
1469	T8	34	11	6	6	4	0	7	1	0	2.03	3.14	1.22	10.0	0	0	0	0	0	0	0	0	Crushing from initial split, second crushed platform for additional flake removal (flake/core)
1470	T8	11	3	1	6	3	0	7	0	0	2.14	2.72	1 35	9 8	1	0	0	0	5	5	3	3	Pebble bipolar split, additional crushing damage from use as wedge-like tool, minor cortex removal from dorsal the result of crushing damage and not reduction
1471	T8	34	1	6	6	3	0	7	2	0	3.90	2 39	1.13	14.0	2	1	2	2	0	0	0	0	Two platforms, one from initial split, second flake removal, retouch on ventral adjacent to cortical surface left on dorsal
1472	T8	2	1	3	1	0	0	3	4	0	1.95	1 08	0.46	1 3	0	0	0	0	0	0	0	0	Object does not fit criteria for microblade, simple flake from core with more than one platform
1473	T8	6	1	1	6	3	0	1	1	0	3.18	2 65	0 61	4 3	3	1	1	3	1	1	5	3	
1474	T8	2	11	1	1	0	0	2	2	0	2.15	1 03	0.35	0 8	1	0	0	0	1	1	3	2	Object does not fit criteria for blade/microblade, simple flake from unidirectional core
1475	T8	1	11	1	3	0	0	1	3	0	1.12	2.19	0.43	0 9	1	0	0	0	1	1	5	3	Simple flake from core with more than one platform, distal dorsal edge wear
1476	T8	33	11	3	2	0	0	3	2	0	1.79	0.76	0.30	0 5	0	0	0	0	0	0	0	0	Distal end broken but object fulfills microblade criteria
1477	T8	6	11	1	2/6	0	1	6	1	0	2.35	3 50	1.09	10.3	2	1	1	3	0	0	0	0	Simple platform with crushing on dorsal side of platform, steep scraper like retouch along distal dorsal edge
1478	T8	6	11	1	6	5	0	1	2	0	2.68	2.45	0.73	6.1	1	0	0	0	4	1	3	3	Edge with slight grinding undetermined if from use or platform preparation, very coarse material

Lithic Analysis Data, Site 45SN393.

CAT	U	TECHNOLOGICAL DIMENSIONS													FUNCTIONAL DIMENSIONS								COMMENTS
		O	M	C	P	CR	BD	OT	DR	H	L	W	TH	WG	MD	RT	RL	RA	WT	WL	SW	WA	
1479	T8	6	1	3	6	3	0	0	1	0	2.39	2.95	0.84	5.4	1	0	0	0	1	2	1	3	
1480	T8	1													2	1	2	3	0	0	0	0	
1480	T8	1	1	2	0	4	0	5	1	0	3.17	2.15	0.65	5.6	1	0	0	0	1	1	3	2	
1481	T8	6	1	1	1/6	4	1	6	1	0	5.06	9.47	2.87	118 0	1	0	0	0	1	1	5	3	Two platforms, one from initial split, second flake removal (flake/core) wear opposite backed edge
1482	T8	34	1	6	6	5	0	8	0	0	1.97	3.66	1.14	10.3	1	0	0	0	1	8	2	3	Multi directional flake scars, wear incorporates concave area from initial split
1483	T8	11	1	3	6	1	0	7	0	0	2.27	4.08	1.51	15.8	0	0	0	0	0	0	0	0	Split pebble, flaked on ventral
1484	T8	6	11	1	1/6	0	1	2	3	0	2.76	3.04	0.92	6.7	1	0	0	0	1	1	1	3	Platform is backed edge, wear directly adjacent to cortex
1485	T8	1	11	1	1	0	1	3	2	0	2.78	2.60	0.87	6.7	1	0	0	0	1	5	3	3	Platform is backed edge, wear at distal edge heaviest on dorsal but extends onto ventral
1486	T8	6	28	1	6	5	0	3	3	0	3.00	3.19	0.81	10.2	1	0	0	0	2	1	2	3	Multi directional flake scars, multiple crushing from flake removal
1487	T8	6	1	1	6	3	1	5	2	0	3.09	2.43	0.86	7.4	1	0	0	0	1	1	1	3	Wear at distal dorsal edge, backed edge on same edge
1488	T8	11	11	1	6	1	0	7	0	0	2.36	3.05	1.37	11.3	0	0	0	0	0	0	0	0	Bipolar split pebble
1489	T8	11	25	1	6	1	0	7	0	0	2.09	4.00	1.16	13.4	0	0	0	0	0	0	0	0	Two areas of crushing, one appears to be attempt while the other is actual platform

APPENDIX F: Faunal and Shell Analyses

BONE ANALYSIS, ARCHAEOLOGICAL TESTING AT 45SN393 AND 45SN404, MUKILTEO, WASHINGTON

Analysis methods, descriptive summaries, and the implication of the results of each analysis are given in turn for fish, bird, and mammal remains from 45SN393, followed by a combined descriptive summary for the historical faunal assemblage from 45SN404. The raw tabular data for the entire analysis are included in a full table at the end of the appendix. Fish bone analysis was completed using NWAA comparative collections, which contain modern specimens of most representative taxa of fish found throughout Puget Sound. Bird remains were analyzed by Kristine Bovy (University of Rhode Island) using comparative material at Department of Orinthology of the Harvard Museum of Comparative Zoology. Mammal bones were sorted in the NWAA laboratory and then taken to the Mammalogy skeletal collection at the Burke Museum of Natural History and Culture for further analysis by an NWAA zooarchaeologist. Analytical methods specific to material type are described in the individual results sections below.

SITE 45SN393

FISH

Fish bones were sorted in the trench CVS samples from 45SN393, and the ¼-inch and ⅛-inch fractions analyzed. Descriptions are given here of each fish taxon identified from the trench CVS samples, in standard phylogenetic order following Hart (1973). A total of 705 specimens were analyzed, 330 (46.8%) of which were identified to at least the taxonomic level of Order. Quantification is by the number of identified specimens for a particular taxon (NISP). Other methods of quantification were not used, such as Minimum Number of Individuals (MNI), which is the minimum number of individuals of a particular taxon represented by an aggregate of specimens. This method is not as likely to be biased from differential fragmentation of specimens, however it has been in several studies that NISP and MNI are highly correlated (e.g., Grayson 1984). Because of this correlation, the dependence of MNI calculations on aggregation methods, and the small sample size of specimens from paired fish elements, fish were quantified by NISP. MNI can be calculated, however, from the raw data in this analysis. Table F-1 list NISP of particular fish taxa by trench and by screen size.

Table F-1. Fish NISP from 45SN393 Trench CVS.

Trench # / Screen Size	*S. acanthias*	*H. colliei*	*C. harengus pallasi*	*Oncorhynchus sp.*	Embiotocidae	*R. vacca*	Scorpaenidae	Cottidae	*L. armatus*	Pleuronectiformes	Pleuronectidae	*L. bilineata*	*P. stellatus*	Unid. Fish	Total
5 / ¼	1	1	-	1	-	-	1	1	-	-	-	-	-	2	**7**
5 / ⅛	-	-	-	19	-	-	-	-	1	-	-	1	-	13	**34**
6 / ¼	-	-	-	6	-	-	-	-	-	1	-	1	-	2	**10**
6 / ⅛	-	-	1	19	1	-	-	4	1	1	1	-	-	52	**80**
8 / ¼	-	-	-	1	-	-	-	-	-	-	-	-	-	-	**1**
8 / ⅛	-	-	-	1	-	-	-	-	-	-	-	-	-	-	**1**
11 / ¼	-	-	-	15	1	1	-	2	-	2	-	-	1	6	**28**
11 / ⅛	3	-	1	94	-	-	-	3	1	5	2	-	-	210	**319**
13 / ¼	-	-	-	1	-	-	-	1	-	1	-	-	-	-	**3**
13 / ⅛	-	2	-	7	1	-	-	9	-	4	-	-	1	30	**54**
14 / ¼	-	1	-	13	1	2	-	1	-	2	-	-	1	-	**21**
14 / ⅛	-	-	-	77	1	-	-	2	1	4	2	-	-	60	**147**
Total ¼	1	1	-	37	2	3	1	5	-	6	-	1	2	10	**70**
Total ⅛	3	2	2	217	3	-	-	18	4	14	5	1	1	365	**635**
Grand Total	**4**	**4**	**2**	**254**	**5**	**3**	**1**	**23**	**4**	**20**	**5**	**2**	**3**	**375**	**705**

Class Chondrichthyes (Cartilaginous fish)
Subclass Elasmobranchii (sharks, rays)
Family Squalidae
***Squalus acanthias* (Spiny Dogfish)**

Materials: 4 vertebra.
Total: 4 specimens.
Remarks: Dogfish are the most abundant of the seven shark families and ten shark species found in Puget Sound (Miller and Borton 1980). The modern distribution of spiny dogfish includes the waters surrounding Point Elliot (Miller and Borton 1980:7.2). Dogfish inhabit both shallow and deep water, feeding on small fish such as herring and smelt. Historically, they were harvested on a commercial scale for their oil, first used for lamps and as an industrial lubricant and later as a vitamin supplement (Hart 1973: 44-46). Dogfish oil, called *s'qatc*, was used by the Snohomish to sell or trade, and to grease logging skids (Tweddell

1974). Spiny dogfish vertebrae have a very distinctive spool-shape allowing for species-level identification when encountered.

Order Chimaeriformes
Family Chimaeridae
***Hydrolagus colliei* (Spotted Ratfish)**

Material: 1 lower lateral tooth, 2 medial teeth, 1 undifferentiated tooth.
Total: 4 specimens
Remarks: The spotted ratfish is the only member of the order Chimaeriformes found along the Northwest Coast (Hart 1973: 65). Identification is therefore made at the species level. The fish often inhabits deep waters but has been known to exhibit seasonal variation in its depth in Puget Sound. This occurs mainly in the spring when the spotted ratfish shows greater abundance in shallower water (Quinn et al. 1980) and would presumably be more readily caught during near-shore fishing. They have been observed in the waters north and south of Point Elliot (Miller and Borton 1980:11.1). Despite their unpopularity in the modern fishing and culinary community, their remains are sometimes found in abundance in archaeological shell middens and speculated by some archaeologists to be consumed during lean subsistence times (e.g., Cannon 1995). The teeth of the spotted ratfish are distinctive bony plates with vertical ridges perpendicular to the cutting edge.

Class Osteichthyes
Order Clupeiformes
Family Clupidae
***Clupea harengus pallasi* (Pacific Herring)**

Materials: 1 caudal vertebrae, 1 opercle.
Total: 2 specimens.
Remarks: Two native species from this family are found in the northeast Pacific: *C. harengus pallasi* (Pacific herring) and *Sardinops sagax* (Pacific sardine) (Hart 1973:94). Herring migrate to shallow water in the late winter to spawn, remaining in protected bays and coves until the early spring (Hart 1973:96-99). Today the sardine is very rare in Puget Sound whereas herring are abundant. The remains found at the Mukilteo Shoreline site area are therefore considered Pacific herring. Miller and Borton (1980:14.2) have reported herring spawning areas clustered around Point Elliot and the protected embayments of Possession Sound to the north. Puget Sound Native Americans traditionally collected herring eggs by anchoring the top boughs of young cedar trees to ropes submerged in shallow marine water, removing them after sufficient eggs have accumulated and are ready to be dried. Herring attracted other prey as well; during the herring spawn, other animal such as ducks could be netted as they fed on the eggs (Stern 1934:41,50; see also Monks 1987). The presence of herring bones in many archaeological sites in the region attests to the consumption of large quantities of mature herring as well as spawn (e.g., Kopperl 2001).

Order Salmoniformes
Family Salmonidae
***Oncorhynchus sp.* (Pacific salmon and trout)**

Materials: 2 1st vertebrae, 14 thoracic vertebrae, 18 caudal vertebrae, 200 undiff. vertebrae fragments, 1 basioccipital, 8 branchials, 1 ceratobranchial, 1 cranial, 1 epural, 2 exoccipitals, 6 gill rakers, 3 teeth.

Total: 257 elements.
Remarks: Puget Sound region hosts seven species of the genus *Oncorhynchus*, two species of *Salvenlinus* (S. *malma* - dolly varden; S. *confluentus* - bull trout), and one species of whitefish (*Prosopium williamsoni*) (Miller and Borton 1980). Any of these species might be represented by the 45SN393 assemblage, although the size of the specimens strongly suggests they are the remains of salmon, *Oncorhynchus*. All species within genus *Oncorhynchus,* except *Oncorhynchus nerka* (sockeye salmon) are found in Possession Sound on their way to spawn in both large and small streams and rivers nearby (Miller and Borton 1980: 16.1-16.5). The vertebrae and other skeletal elements of salmon and trout are easy to identify because of their morphology and texture (Cannon 1987). Taxonomic discrimination beyond genus level, however, is usually not possible except on certain elements (e.g., Butler 1987), and was not done for this analysis. Traditional salmon procurement and processing by the Snohomish occurred from May to October, and steelhead were fished as late as January (Tweddell 1974:532-534). Traditional fishing often used dip nets at weirs to catch ascending salmon whose progress was blocked by the weir (Tweddell 1974:523). To the north, reef netting large runs of salmon in open waters of Puget Sound and the Straits was well-documented ethnographically (e.g., Suttles 1951).

Order Perciformes
Family Embiotocidae (surfperch)

Materials*:* 1 thoracic vertebrae, 1 precaudal vertebrae, 1 caudal vertebrae, 1 parasphenoid, 1 upper pharyngeal plate*.*
Total: 4 elements.
Remarks: Six species of surfperch inhabit Puget Sound today. Three species, *C. aggregata* (shiner perch), *E. lateralis* (striped seaperch), and *R. Vacca* (pile perch) have been observed in the vicinity of Point Elliot (Miller and Borton 1980:36.1-36.6). These relatively small fish can be found year-round in a variety of near-shore marine habitats, including sandy beaches, eelgrass and kelp beds, and rock reefs (Lamb and Edgell 1986:59). Although many of their elements are quite distinct to taxonomic family, most of their vertebrae and individual pharyngeal teeth are morphologically similar. These elements and fragments of others were therefore identified to the taxonomic level of family.

Rhacochilus vacca (Pile Perch)

Materials: 1 basiocciptial, 1 lower pharyngeal plate, 1 parasphenoid.
Total: 3 elements.
Remarks: Pile perch are most commonly found during the summer months in shallow water and have been observed in Possession Sound just north of Point Elliot (Miller and Borton 1980:36.6). Their toothed pharyngeal plates are larger relative to other species of surfperch, reflecting a dietary focus on mussels as opposed to smaller invertebrates (Hart 1973: 313). The lower pharyngeal plate and many cranial elements are distinctive to species, and are identified in this assemblage as pile perch.

Order Scorpaeniformes (Rockfish, Greenlings, Sculpins)
Family Scorpaenidae (Rock Fish)

Materials: 1 angular.
Total: 1 element
Remarks: Numerous species of rockfish inhabit Puget Sound and are grouped under two genera, *Sebastes* and *Sebastolobus*. Rockfish are highly adaptable and thrive in a variety of

marine habitats, including rocky shorelines and deep open water. Rockfish feed on crustaceans and smaller fish at various depths (Hart 1973:388-454; Love et al. 2002). Of the 27 species that have been observed in the modern waters of Puget Sound, ten have been found within several kilometers of Point Elliot: *Sebastes aleutianus* (rougheye rockfish), *Sebastes caurinus* (copper rockfish), *Sebastes crameri* (darkblotched rockfish), *Sebastes maliger* (quillback rockfish), *Sebastes melanops* (black rockfish), *Sebastes paucispinis* (bocaccio), *Sebastes pinniger* (canary rockfish), *Sebastes ruberrimus* (yelloweye rockfish), *Sebastes saxicola* (stripetail rockfish), *Sebastes zacentrus* (sharpchin rockfish) (Miller and Borton 1980:25.1-25.5). Despite the great diversity of rockfish in the region, their skeletal elements cannot be differentiated and were identified to family level for this analysis.

Family Cottidae (Sculpins)

Materials: 2 precaudal vertebrae, 12 caudal vertebrae, 1 ultimate vert, 1 cranial, 1 epibranchial, 2 hyomandibular, 1 lachrymal, 1 parietal, 1 posttemporal, 1 premaxilla.
Total: 23 elements.
Remarks: A total of 36 sculpin species have been observed in Puget Sound in modern times (Miller and Borton 1980). These fish are highly variable in size, salinity tolerance, habitat preference, and behavior (Hart 1973: 472-546). Many sculpin elements including most vertebrae (with the exception of the 1st vertebra) are not identifiable to finer taxon.

Leptocottus armatus (Pacific Staghorn Sculpin)

Materials: 1 first vertebrae, 2 angulars, 1 otolith.
Total: 4 elements
Remarks: The Pacific staghorn sculpin is a common species of small to medium-sized sculpin found from shallow to moderate depths across the Pacific Northwest. They prefer silt- or mud-bottomed nearshore subtidal areas as well as estuaries and lower portions of coastal streams (Hart 1973:518-519; Lamb and Edgell 1986:168). They are most abundant inshore while spawning, which takes place in mid-winter (Hart 1973; Wydoski and Whitney 2003). They have been observed in abundance in modern times in the waters surrounding Point Elliot (Miller and Borton 1980:55.22). Although most sculpin elements are not identifiable to taxon finer than family or genus, the morphology and texture of the 1st vertebra, angular, and otolith are distinct to this species.

Order Pleuronectiformes (Flatfish, flounder and sole)

Materials: 1 thoracic vertebrae, 2 precaudal vertebrae, 15 caudal vertebrae, 1 penultimate vertebrae, 1 undifferentiated vertebrae, 1 interhaemal spine.
Total: 21 elements
Remarks: Two taxonomic families of the order Pleuronectiformes are found in Puget Sound today: 13 species of right-eyed flounders (Pleuronectidae) and two species of left-eyed flounders (Bothidae) (Miller and Borton 1980). Flatfish are distinguished by their flattened bodies and asymmetrical crania in which their eyes migrate as juveniles to either their left or right side. Adult flatfish species vary greatly in size and depth preference, but all are normally bottom-dwellers. Many types of flounder and sole are abundant in both deep and shallow waters of Possession Sound near Point Elliot (Hart 1973:595; Miller and Borton 1980). Despite morphological characteristics that distinguish flatfish skeletal specimens from other taxonomic orders of fish, many specimens in this assemblage could not be identified to a finer taxonomic level. This includes vertebrae and cranial elements which could not be sided and therefore not identified to the Family level as either Pleuronectidae or Bothidae.

Family Pleuronectidae (Right-eyed flounders)

Materials: 1 dentary, 3 ectopterygoid, 1 quadrate.
Total: 5 elements.
Remarks: There are 13 species of right-eyed flounder in the waters surrounding Point Elliot (Miller and Borton 1980:59.1-59.13). Elements identifiable to this family include mouthparts and other cranial elements that are complete or mostly complete and can be positively sided allowing identification as belonging to a right-eyed individual.

Lepidopsetta bilineata (Rock sole)

Material: 1 dentary, 1 quadrate.
Total: 2 elements
Remarks: Puget Sound is a well known spawning ground of the rock sole. This is one of several species reported in the waters surrounding Point Elliot (Miller and Borton 1980:59.7). These two cranial specimens are of elements with landmarks morphologically distinctive to this species.

Platichthys stellatus (Starry flounder)

Material: 1 premaxilla, 2 quadrate.
Total: 3 elements.
Remarks: The starry flounder is a medium-sized flatfish that inhabits a variety of depths and habitats, including estuaries and lower courses in freshwater streams. Despite belonging to the family of right-eyed flounders, they may become right- or left-eyed upon maturity. Starry flounders spawn between February and April, but may be found in shallow water during the rest of the year as well (Hart 1973:631-632; Lamb and Edgell 1986:204). Starry flounder are abundant throughout the waters surrounding Point Elliot (Miller and Borton 1980:59.11). These three cranial specimens are of elements with landmarks morphologically distinctive to this species.

Unidentified Fish

Materials: 120 miscellaneous rays/spines, 256 unidentified fishbone fragments, 1 unidentified vertebra.
Total: 377
Remarks: In most cases, specimens of a known element could be further identified to a specific taxon, but for one vertebra specimens this was not possible. The majority of unidentified fish specimens in this assemblage, however, are very small fragments from undetermined elements or ray or spine fragments that would not likely be identified to a finer taxonomic level even if the ray or spine were intact.

Discussion

The remains of eight taxonomic fish families and several more specific genera and species within those families were identified in the 45SN393 assemblage. These taxa represent fish commonly found in the vicinity of Point Elliot today, and would likely have been available nearby over the past 1,000 years as well. The richness of this assemblage, 13 identified taxa, is not as large as other analyzed fish bone assemblages from similar extensive shell middens, such as West Point (Wigen 1995), or from smaller shell middens with more specialized fish bone assemblages, such as the herring processing site of Burton Acres on Vashon Island

(Kopperl 2001). In terms of evenness, this assemblage reflects a focus on salmonids, with much smaller numbers of sculpins and flatfish and isolated specimens of dogfish, ratfish, herring, surfperch, and rockfish. This may in part be due to sample size and the ease of identifying salmonid vertebra fragments in fine-fraction samples relative to other taxa, resulting in inflated salmonid NISP values (Wigen and Stucki 1988). Small body size of most of the fish taxa present in the 45SN393 assemblage, coupled with the generally fragmented condition of the midden fauna, has resulted in the majority of fish remains being found in the ⅛-inch fraction of each CVS. Herring, Pacific staghorn sculpin, and right-eyed flounder remains were identified in this fraction and not the ¼-inch fraction, while remains of pile surfperch and rockfish may have been present in the finer fraction but were only identifiable in specimens recovered in ¼-inch screen.

Of the 714 analyzed fish remains, 336 or 47% were identified to a specific skeletal element or element group. The majority are vertebrae or vertebra fragments, which is not surprising given the previously mentioned ease of identifying small fragments of salmonid vertebrae. Of the skeletally identified specimens, only 55 or 16% of the specimens came from fish heads, including the cranium, jaws and teeth, and branchial (gill) region. A total of 281 or 84% came were post-cranial specimens including elements of the vertebral column, interhaemel spines, and the epural element of the tail. Herring, sculpin, surfperch, flatfish, and salmon are all represented by both cranial and post-cranial elements, indicating that entire fish were processed at 45SN393. Factors such as bone density, degree of burning, and ground-water saturated depositional environments are known to structure the survivorship of fish remains (Butler and Chatters 1994; Lubinski 1996; Pegg 1999), however the sample size from this assemblage is too small to quantify these effects.

Skeletal elements of varying density are represented, from relatively dense vertebrae and teeth of larger fish such as salmonids to very delicate cranial elements of smaller fish such as herring, suggesting good overall preservation. Burned fish bones are present in small numbers in the assemblage, recorded during analysis as being either charred or calcined. Color is the most commonly used characteristic for identifying thermal alteration of bone, although numerous chemical processes unrelated to burning can have a similar effect on the structure of bone (Lyman 1994; Shipman et al. 1984). The most effective means of identification of burned bone and the temperature range in which a specimen has been burned is by scanning-electron microscopic examination of the specimen's crystalline structure (e.g., McCutcheon 1992). Because the procedure was not practical for this analysis, it was assumed that specimens exhibiting blackening, whitening, or a combination of the two underwent some form of thermal alteration. Blackened specimens were identified as "charred", and are assumed to have been carbonized at a relatively low temperature. Whitened specimens that also exhibited a brittle, chalky texture were identified as "calcined", and are assumed to have been heated to higher temperatures in which much of the organic material within the mineral structure of the bone has been removed. A total of 20 specimens, 2.8% of the entire analyzed assemblage (the same proportion as shellfish remains), were either charred or calcined. Of these burned bones, 10 were charred and 10 were calcined. The specimens are distributed throughout CVS from Trenches 6, 11, 13, and 14 in proportion to the total numbers of fish bones in those samples. By identified taxon, the burned specimens are from ratfish, salmonid, surfperch, and sculpin. Most of these specimens are found by taxon in the same proportion as that of burned specimens overall with the exception of the very small number of ratfish teeth, of which half (n=2) of the specimens were burned. Burned fish bones within the 45SN393 assemblage suggest either cooking, heat smoking or drying, or disposal of fish in fire, although their small numbers and random distribution throughout the assemblage preclude more detailed inferences.

BIRDS

Bird remains from four taxonomic families and several genera and species within those families were identified for this analysis. A total of 57 bird specimens were found distributed throughout all of the trenches with shell midden deposits except Trench 13, in addition to one bird specimens from a CVS from Core 12. Most of the bird remains from the trenches were found in the screened spoils, however several specimens were found in both CVS ¼-inch and ⅛-inch fractions.

The taxonomic names of birds used here follow the Seventh Edition of the American Ornithologists' Union check-list (1998), as well as recent changes to this check-list (e.g., Banks et al. 2003). The avian osteological terms used follow Howard (1929). The modern range distributions of the birds are discussed, using information primarily from Wahl et al. (2005). Table F-2 lists the bird remains identified for this analysis. Because of the small overall sample size of bird remains and the paucity of specimens recovered from the ⅛-inch fraction, the table lists taxa by Trench or Core number only.

Table F-2. Bird Remains from 45SN393.

Trench # / Screen Size	Anatinae	*Anas* sp.	*Mergini*	*Melanitta* sp.	*Gavia* sp.	*G. stellata*	Podicipedidae	Large Podicipedidae	Small Podicipedidae	*Podiceps* sp.	c.f. Alcidae, small	Alcidae, medium	Alcidae, large	Unid. Aves	Total
Trench 5														4	**4**
Trench 6					3		2					1		3	**9**
Trench 8														2	**2**
Trench 11					1	1							1	3	**6**
Trench 14	4	1	2	1			1	1	1	2	1			22	**36**
Core 12														1	**1**
Total	**4**	**1**	**2**	**1**	**4**	**1**	**3**	**1**	**1**	**2**	**1**	**1**	**1**	**35**	**58**

Class Aves

Order Anseriformes (Ducks, Geese, Swans)

Family Anatidae (Ducks, Geese, Swans)

Anatinae (Ducks)

Material: 1 skull (frontal), 1 coracoid (fragment), 1 ulna (proximal left), 1 second wing digit (first phalanx).
Total: 4 specimens.
Remarks: At least twenty-nine species of ducks are found in or near Washington State. These ducks are divided into 4 tribes: Anatini (dabbling ducks- 10 species), Aythyini (Bay Ducks/

Pochards- 6 species), Mergini (Sea Ducks- 12 species), and Oxyurini (Ruddy Duck- 1 species). These tribes can often be distinguished on the basis of morphology and metric criteria (Bovy 2005; Broughton 2004; Woolfenden 1961). These specimens were fragmented and were not readily identifiable without the aid of additional comparative specimens. No attempt was made to identify the second wing digit beyond the sub-family level.

Haeberlin and Gunther (1930:25-26; see also Tweddell 1974:539) note that the Snohomish used large nets hung between trees near beaches to catch ducks and geese flying out of bays. Suttles (1951:70-80) describes in detail the variety of nets and spears used by the Straits Salish to hunt waterfowl, and techniques used such as spearing ducks from a canoe at night using a contained fire at the stern of the boat.

***Anas* sp.- large (Dabbling Duck, large-sized)**

Material: 1 humerus (distal right).
Total: 1 specimen.
Remarks: Mallards (*Anas platyrhynchos*) and Northern Pintails (*Anas acuta*) are the largest dabbling ducks in the region. Although male mallards can be distinguished due to their large size, female Mallards and male Northern Pintails overlap in size.

Mergini- medium (Sea Duck, medium-sized)

Material: 1 radius (distal left), 1 tibiotarsus (distal left)
Total: 2 specimens.
Remarks: There are five species of sea ducks that fall in the size range of "medium." These are the Surf Scoter (*Melanitta perspicillata*), Black Scoter (*Melanitta nigra*), Common Goldeneye (*Bucephala clangula*), Barrow's Goldeneye (*B. islandica*), and the Red-breasted Merganser (*Mergus serrator*). Although generally smaller, bones of the Long-tailed Duck (*Clangula hyemalis*) may be difficult to differentiate from these medium- sized ducks when fragmented.

***Melanitta* sp.- large (Scoter, large-sized)**

Material: 1 humerus (proximal left).
Total: 1 specimen.
Remarks: The three scoters found in the Pacific Northwest are the Surf Scoter (*Melanitta perspicillata*), Black Scoter (*M. nigra*), and White-winged Scoter (*M. fusca*). The bones of the Surf Scoter and Black Scoter are generally smaller and more gracile, while those of the White-winged Scoter are larger and more robust (Bovy 2005; Woolfenden 1961). This humerus is likely a White-winged Scoter on the basis of size, but may possibly be a large Black or Surf Scoter.

Order Gaviiformes (Loons)
Family Gaviidae (Loons)
***Gavia* sp.- large (Common or Yellow-billed Loon)**

Material: 2 tibiotarsi (1 proximal left, 1 distal left), 1 tarsometatarsus (distal left), 1 phalanx.
Total: 4 specimens.
Remarks: There are two large species of loons present in the Pacific Northwest: the Common (*Gavia immer*), and Yellow-billed (*G. adamsii*) Loons. These can be distinguished from the smaller Red-throated (*G. stellata*) and Pacific (*G. pacifica*) Loons on the basis of size.

Yellow-billed Loons (especially the males) are somewhat larger on average than the Common Loon, but there is significant overlap in size (Bovy 2005; Fitzgerald 1980). Although some morphological differences exist between the Common and Yellow-billed Loons, the elements present in this assemblage were not diagnostic. They are more likely to be the Common Loon, however, given that the Yellow-billed Loon is very rare today and was not recorded in Washington prior to the 1960s (Wahl et al. 2005:77).

***Gavia stellata* (Red-throated Loon)**

Material: 1 coracoid (right).
Total: 1 specimen.
Remarks: This specimen was distinguished from the similarly sized Pacific Loon using criteria discussed in Howard (1929:326) and Boertmann (1990:27).

Order Podicipediformes (Grebes)
Family Podicipedidae (Grebes)

Podicipedidae- large (Grebes)

Material: 2 femora (proximal left), 1 tarsometatarsus (proximal right).
Total: 3 specimens.
Remarks: There are 3 large grebes present in the Pacific Northwest Coast during winter months: the Red-necked (*Podiceps grisegena*), Western (*Aechmophorus occidentalis*), and Clark's (*A. clarkii*) Grebe. Of these, Clark's Grebe is the least common today. In many cases these two genera can be securely distinguished on the basis of morphology and sometimes size (e.g. Bochenski 1994; Broughton 2004; Howard 1929). I was unable to distinguish them, however, given the fragmentary nature of the specimens and the limited number of comparative specimens available.

cf. Podicipedidae- large (Grebes)

Material: 1 coracoid.
Total: 1 specimen.
Remarks: This specimen is similar in size and shape to a large grebe, but is highly eroded so the identification is tentative.

cf. Podicipedidae- small (Grebes)

Material: 1 ulna (distal right).
Total: 1 specimen.
Remarks: There are 3 small grebes present in the Pacific Northwest Coast. The Pied-billed Grebe (*Podilymbus podiceps*) is present in the region year-round, while Horned (*Podiceps auritus*) and Eared (*Podiceps nigricollis*) Grebes are primarily winter residents.

***Podiceps* sp.- small (Horned or Eared Grebe)**

Material: 1 femur (distal left), 1 tarsometatarsus (proximal left).
Total: 2 specimens
Remarks: These specimens were distinguished from the Pied-billed Grebe (*Podilymbus podiceps*) using criteria described by Bochenski (1994) and Howard (1929).

Order Charadriiformes (Shorebirds, Gulls, Alcids)
Family Alcidae (Auks, Murres, Puffins)
cf. Alcidae- small (Alcid, small-sized)

Material: 1 ulna (distal right).
Total: 1 specimen.
Remarks: Small-bodied alcids present in the Pacific Northwest include the Marbled Murrelet (*Brachyramphus marmoratus*), Ancient Murrelet (*Synthliboramphus antiquus*), and Cassin's Auklet (*Ptychoramphus aleuticus*). This ulna specimen appears to be consistent in size and shape to a small alcid. However, there were no comparative specimens of small alcids available, so this identification is tentative.

Alcidae- medium (Alcid, medium-sized)

Material: 1 femur (complete left).
Total: 1 specimen.
Remarks: Of the medium-sized alcids found in the region, both the Pigeon Guillemot (*Cepphus columba*) and Rhinoceros Auklet (*Cerorhinca monocerata*) are common year-round residents found near shore. In contrast, the Horned Puffin (*Fratercula corniculata*), a pelagic species, has only rarely been observed this far south. This nearly complete femur was similar in size and morphology to the Rhinoceros Auklet. However, there were no specimens of the Pigeon Guillemot or Horned Puffin available for comparison.

Alcidae- large (Alcid, large-sized)

Material: 1 synsacrum.
Total: 1 specimen.
Remarks: There are three large-bodied alcid species present in the Pacific Northwest. The Common Murre (*Uria aalge*) is a very abundant year- round resident. Tufted Puffins (*Fratercula cirrhata*) are a declining breeding species in the Gulf of Georgia and the outer coast, most commonly found in the summer months. Finally, the Thick-billed Murre (*U. lomvia*), a pelagic species, is an accidental visitor this far south. The bones of murres are generally larger than those the Tufted Puffin, but some overlap in size may occur. This synsacrum fragment could likely be identified to genera with the aid of additional comparative specimens.

Class Aves (Undifferentiated Birds)

Material: 8 vertebrae (5 cervical, 2 thoracic, 1 centrum), 1 humerus (shaft right), 2 ulnae shafts, 1 tibiotarsus (distal left), 14 limb bone (shafts), 10 unidentifiable fragments.
Total: 36 specimens.
Remarks: No attempt was made to identify vertebrae beyond the class level. The rest of the specimens were too fragmented to identify further (at least without more time and comparative specimens). One vertebra may be partially burnt along a broken edge, while one limb bone was possibly modified (ground?). No other evidence of cultural modification was noted in the small assemblage.

Discussion

Bird remains were found in small numbers in most of the test trenches and one core at 45SN393. Trench 14 contained the greatest number of bird bones representing the greatest number of taxa, all except those of loons which were found in Trenches 6 and 11. Only one specimen, a thoracic vertebra from Trench 5 of an unidentified bird, was noted as possibly burnt on one edge. The small sample size precludes further inference regarding distribution of bird bones throughout the site or generalizations about taphonomic processes specific to bird remains in the shell midden. The taxonomic richness of the bird bone assemblage is high relative to some bird bone assemblages analyzed from other large shell midden sites, such as West Point, and considering its small sample size (e.g., Lyman 1995). Large bird bone assemblages from Old Man House, Duwamish No. 1, Tualdad Altu, and *Heb'olb* suggest the taxonomic richness that may be present at 45SN393 and obtainable with large enough samples.

MAMMALS

Because mammal bones are a much rarer class of faunal remains than shellfish and fish at 45SN393, they were collected from the trench spoils which provided the majority of this data. The spoils collection provides mammalian taxonomic presence/absence information and some indication of distribution across space, but not stratigraphically within each trench. The very small sample size from each trench and core CVS that contained mammal remains highlights a need for larger collection units that have the same stratigraphic precision as the CVS to obtain an adequate sample of rarer classes of fauna as well as artifacts if this site is further investigated.

The descriptive summary for mammal remains includes taxa identified in the trench spoils and the trench and core CVS. Taxonomic names and phylogenetic ordering are based on the classification in Wilson and Cole (2000). Quantification is by NISP. Because of the correlation between NISP and MNI, the dependence of MNI calculations on aggregation methods (in the cae of mammals, by trench in most cases), and the small overall sample size of mammal remains, this analysis uses NISP. MNI can be calculated, however, from the raw data in this analysis.

A total of 85 specimens were identified to mammalian taxa finer than Class level, from three Orders and six Families. Most of these specimens were of porpoise (Phocoenidae), harbor seal (*P. Vitulina*) and deer (*Odocoileus* sp.). Another 211 specimens were identifiable only as having come from a mammal. Table F-3 lists the mammalian remains identified at 45SN393.

Table F-3. Mammalian Remains Identified (NISP) at 45SN393.

Unit	Otariidae	c.f. Otariidae	*P. Vitulina*	*U. Americanus*	Phocoenidae	*C. Elaphus*	*Odocoileus* sp.	Cervidae	*Bos* sp.	Unid. Large Mammal	Unid. Mammal	TOTAL
Trench 5, Spoils			2		1		2	2			13	20
Trench 6, Spoils			2		17	5	3		1		42	70
Trench 6, 175-185 cmbs											1	1
Trench 6, 215-225 cmbs											4	4
Trench 8, Spoils			3	1	1		8	3			21	37
Trench 11, Spoils		1	10				1				58	70
Trench 13, Spoils					7		2				3	12
Trench 14, Spoils	3		3				3		1	1	64	75
Core 5, 122 cmbs			3								4	7
TOTAL	3	1	23	1	26	5	19	5	2	1	210	296

Class Mammalia
Order Carnivora
Family Otariidae (Sea Lions)

Material: 3 Sternabrae Frags
Total: 3 NISP
Remarks: The Otariid taxonomic family includes fur seals and sea lions. In Puget Sound, this family is represented by the California sea lion (*Zalophus californianus*) and the Steller's sea lion (*Eumetopias jubatus*). Both species may be found throughout the Sound, primarily during fall and winter when they follow seasonal salmon runs from the open ocean. Both species exhibit sexual dimorphism, with adult males substantially larger than females (Angell and Balcomb 1982:110-111). The age of the individual or individuals from which the three sternebrae fragments found in the 45SN393 assemblage came is not clear based on the specimens. Despite being regular seasonal visitors to Puget Sound, Otariid remains in shell middens near 45SN393 are somewhat elusive. Otariid remains have been found at Old Man House (45KP2) (Snyder 1956:33) and the Preston Point Site (45SN17) or *Hebolb* village (Dunnell and Fuller 1975).

c.f. Otariidae (Sea Lions)

Material: 1 Lumbar Vertebra (Spinous Process)
Total: 1 NISP
Remarks: This single specimen is a small portion of a lumbar vertebra spinous process from a mature individual. It is tentatively identified as Otariid based on comparison with several sea lion skeletons but the extent of fragmentation precludes a more definitive identification.

Family Phocidae
***P. Vitulina* (Harbor Seals)**

Material: 1 Left 5th Metatarsal (Proximal End), 1 Unsided Humerus (Distal Half of Diaphysis), 6 Left Innominates (2 Ilium Frags, 4 Ischium Frags), 3 Left Mandibles (Frags plus Molar), 1 Occipital, 2 Left Parietal (1 Auditory Bulla and 1 Mandibular Fossa), 2 Unsided Proximal Phalanges (1 Mostly Whole, 1 Distal End), 1 Right Radius (Shaft Frag), 2 Sphenoids (Frags), 2 Sternabrae (1 Mostly Whole, 1 Frag), 1 Left Tibia (Diaphysis Frag), 1 Right Ulna (Shaft Frag).
Total: 23 NISP
Remarks: Harbor seals are the one species of the Phocid family that regularly inhabit the waters of the north Pacific south of the winter Bering Sea pack ice limit. Elephant seals (*Mirounga angustirostris*) are very rare visitors to the Puget Sound, and the specimens in this assemblage are clearly *P. vitulina*. Harbor seals are a common sight year-round of the shore of Point Elliot, feeding on fish, squid, and octopus (Angell and Balcomb 1982:108-109), and their remains have been identified in small to moderate amounts in analyzed shell midden assemblages throughout Puget Sound. Ethnographically, many Native American tribal communities that settled on the coast of Puget Sound included harbor seal into their subsistence round. The Snohomish, who hunted seals in summer and winter, were notable amongst the other tribes of Puget Sound for this (Haeberlin and Gunther 1930:20; Tweddell 1974:537-538). Seals were usually hunted by canoe with composite harpoons and sometimes with seal gut floats, large wood lances, or clubs as well (e.g., Smith 1940:267; Suttles 1951:106-107). Their carcasses provided not only meat but oil as well, which was eaten with other foods and used as an aid in building and maintaining fires (Haeberlin and Gunther 1930:22). The presence of infant harbor seal specimens in the 45SN393 assemblage, including a humerus fragment that is the same size as modern newborn harbor seal specimens from the Burke Museum, gives a relatively precise seasonal indicator for the death of that individual pup, since they breed and bear young between July and September (Angell and Balcomb 1982). Birthing seasons vary within this range, however, amongst different harbor seal populations of Puget Sound (Bigg 1969; Lyman 1995; Newby 1973).

Family Ursidae
***Ursus americanus* (Black Bears)**

Material: 1 Upper Right 2nd Molar (Mostly Whole)
Total: 1 NISP
Remarks: Black bear are the one species of ursid known to inhabit the Puget Sound lowlands. Black bear remains have been found in most of the more extensively excavated sites in central Puget Sound, including shoreline sites (West Point, Old Man House) and sites in riverine settings (Sbabadid and Tualdad Altu sites). Bears figure prominently in the mythology of many Native American tribes, and Lyman (1995:9-39), in his analysis of West Point mammal bones, conjectures that the lack of skeletal elements of black bear other than crania may suggest

some ritual use. The presence of an isolated molar at 45SN393 precludes interpretation of the use of black bear by the occupants of the site from this sample.

Order Cetacea
Family Phocoenidae (Porpoises)

Material: 11 Unsided Cranial Frags, 6 Lumbar Vertebrae (2 Centra, 1 Centrum Fragment, 3 Epiphyseal Discs), 1 Occipital (Frag), 8 Thoracic Vertebrae (3 Arch Fragments, 4 Centra, 1 Epihyseal Disc).
Total: 26 NISP
Remarks: The two species of porpoise that inhabit Puget Sound, the harbor porpoise (*Phocoena phocoena*) and Dall's porpoise (*Phocoenoides dalli*), have resident subpopulations that remain in the area year-round (Angell and Balcomb 1982:122-123). Although more elusive and solitary than harbor seals, porpoises may have been more abundant in Puget Sound in the past, and the presence of their bones in many shell midden sites including West Point, Old Man House, and *Hebolb*. Porpoise have been ethnographically observed hunted by the Snohomish (Tweddell 1974) and tribes to the north (Suttles 1951:109), speared from canoes in a similar manner as for seals. Although some skeletal features allow differentiation of a porpoise specimen into a particular species, the specimens in this assemblage could not be identified to a finer taxon using the Burke Museum comparative skeletons.

Order Artiodactyla
Family Cervidae (Deer or Elk)

Material: 2 Unsided Antler Frags, 1 Right Scapula Frag, 2 Unsided Scapula Frags
Total: 5 NISP
Remarks: These specimens, small fragments of scapula and antler, are distinctive to the cervid family but could not be further identified given their small size. Both elk and deer remains were found in the assemblage, therefore these specimens may represent either taxon.

***Cervus elaphus* (Elk)**

Material: 4 Cervical Vertebrae (2 Arch Frags, 2 Centrum Frags), 1 Unsided Metatarsal Frag (Distal Shaft End)
Total: 5 NISP
Remarks: Elk, or wapiti, are represented in the mammal bone assemblage by five bone fragments from a mature individual or individuals. Modern distribution of elk west of the Cascades is limited to the Roosevelt elk (*C. elaphus roosevelti*), which congregate in herds in the Cascade and Olympic ranges. The Snohomish would hunt elk in the Sultan basin and Pilchuck valley in August and early fall after summer hunting, fishing, and gathering activities ended. Tweddell (1974:533-535) notes that the fall elk hunt by the Snohomish was usually focused on obtaining a seasonal surplus of meat that could be dried and used during the winter.

***Odocoileus* sp. (Deer)**

Material: 2 Left Calcaneus, 1 Right Calcaneus, 2 Cervical Vertebrae (1 Articular Process, 1 Centrum Frag), 1 Left Humerus (Distal End), 1 Right Humerus (Distal End), 1 Right Incisor, 1 Left Maxilla (Frag plus Molar), 1 Unsided Medial Phalanx (Mostly Whole), 1 Left Metacarpal (Distal End), 1 Unsided Metapodial (Distal End of Diaphysis), 1 Left Radius (Proximal End), 1 Unsided Rib Frag, 1 Left Scapula (Head and Neck), 2 Unsided Scapula (Spine/Border Frags), 1 Thoracic Vertebra (Arch Frag), 1 Right Tibia (Distal End).

Total: 19 NISP
Remarks: These specimens could not be identified to species based on morphology, and may be from either white-tailed deer (*O. virginianus*) or mule, or black-tailed, deer (*O. hemionus*). Modern distribution of white-tailed deer is east of the Cascade range, however, while mule deer are found in abundance in the Puget Sound lowlands away from heavily developed urban areas (Ingles 1965). Although a lack of mandibular specimens with teeth preclude more specific estimates of age of individual deer represented in this assemblage, the maxilla fragment includes a molar that has not fully erupted, and several of the other specimens clearly come from infants, juveniles, and mature individuals based on epiphyseal fusion and size (Lewall and Cowan 1963). The small sample of specimens that exhibit degree of epiphyseal fusion suggests that deer of all ages were processed at 45SN393. A thoracic vertebra fragment and medial phalanx match Burke Museum comparative skeletons of newborn fawns, which are usually born in late June (Ingles 1965). Three deer bone fragments exhibit butchery marks, the only such mammal specimens identified to a finer taxon, however generalizations of butchery and carcass transport cannot be made from this small sample. Deer were hunted by Puget Sound Native Americans with bow and arrow, spear, nets, and traps, and they provided meat and marrow for eating, hide for clothing, and sinew, bone, and antler for manufacture of a variety of tools (Suttles 1951:82-91). The Snohomish would hunt deer in the Puget Sound lowlands May through August, and pursue deer farther inland along the Pilchuck, Skykomish, and Sultan drainages in the fall and possibly later given the opportunity or the need (Tweddell 1974:533-534).

Family Bovidae
***Bos* sp. (Cow)**

Material: 1 Unsided 3rd Phalanx (Mostly Whole), 1 Right Scapula (Head and Neck)
Total: 2 NISP
Remarks: Two bones of domestic cow were found in screened spoils from Trenches 6 and 14. Given the coarse-grained recovery of these spoils by backhoe and the proximity of historic fill directly above the pre-contact shell midden deposit, the presence of isolated post-contact material such as cow bones is not surprising. Dense concentrations of domesticated animal bone, including cow and lamb, were found in Trench 3 south of the western end of 45SN393, associated with the early historic commercial district of Mukilteo. The two cow bones found within the 45SN393 deposits were a scapula fragment and the 3rd phalanx from the hoof. The former specimen was likely associated with meat processing, while the latter, not being a part of the cow with high meat utility, may have been from the carcass of a draught animal or related to processing for non-meat animal products such as gelatin.

Mammalia, Large (Unidentified Large Mammal)

Material: 1 Unsided Rib Fragment
Total: 1 Specimen
Remarks: This single specimen is a rib fragment that came from an unidentified mammal. Given the size of the fragment, it may have come from an elk, large deer, bear, or large sea mammal such as a sea lion.

Mammalia (Unidentified Mammal)

Material: 4 Cranial Frags, 48 Long Bone Shaft Frags, 2 Phalanges, 7 Rib Frags, 10 Vertebra Frags, 139 Unidentified Frags.
Total: 210 Specimens

Remarks: The majority of mammal remains analyzed from 45SN393 are fragmented to such an extent that further taxonomic identification was not possible, even when the element that the specimen represents was identified. Three long bone shaft fragments exhibited small cutmarks, while two other specimens from unknown elements were sawed, suggesting a post-contact date for those particular specimens.

Discussion

Mammal remains were primarily identifiable in the larger fragments recovered in ¼-inch screens, mostly from the trench spoils but also in the larger fraction of the CVS samples as well. Eight mammalian taxa were identified, representing both terrestrial and marine animals found near in the Puget Sound lowlands and Possession Sound near Point Elliot today, and are well known archaeologically and ethnographically as having been hunted by Native Americans. The remains of domestic cow, however, are considered intrusive to the shell midden deposit. The sample sizes of mammal remains identifiable to specific taxa are small, none show signs of burning, and very few exhibit cutmarks. Inferences about butchery and carcass transport decisions and post-depositional density-mediated preservation of mammalian remains are therefore not made from this assemblage, but could be made if a larger sample is obtained from 45SN393.

Summary of Animal Utilization at 45SN393

From analysis of the assemblage of faunal remains from 45SN393, it is clear that a wide variety of locally available animals were used by the Native American occupants of the site. The animals that were brought to the site not only provided meat in both large packages (e.g. elk, sea lion) and small (e.g., clams, sculpins) but were also a source of raw material such as hide, sinew, bone, antler, feathers, and oil to manufacture clothing, tools, ornaments, and other goods for use or trade.

The faunal assemblage also provides an indication of how the site was used throughout the year. Some resources such as shellfish would have been available as a general class of food year-round. Seasonal indicators, on the other hand, include species that are only available at particular times of the year, such as salmon, herring, and migratory waterfowl, and also specimens from individual animals that were harvested at a particular age that occurs at a regular time during the annual cycle, such as newborn harbor seals. Table F-4 lists the seasonally-restricted taxa found (aggregated into larger taxonomic units in some cases) and their availability near Point Elliot throughout the year. Although the presence of certain taxa at the site may be attributed to stored food obtained at a different time or place than when consumed, such as dried salmon, the taxonomic and demographic composition of the faunal assemblage suggests utilization of a suite of animal resources available near the site at different times throughout the entire year. Microscopic study of seasonal markers of shellfish was beyond the scope of this analysis, but may provide more fine-grained seasonality data in the future.

Table F-4. Availability of Seasonally Restricted Animal Taxa Found at 45SN393

Resource	Month											
	J	F	M	A	M	Jn	Jy	A	S	O	N	D
Spotted Ratfish	*	*	*	X	X	X	*	*	*	*	*	*
Pacific Herring		**X**	**X**									
Salmonids	**X**				**X**	**X**	**X**	**X**	**X**	**X**	**X**	**X**
Pacific Staghorn Sculpin	x	**X**	x	x	x	x	x	x	x	x	x	x
Ducks	X	X	X	*	*	*	*	*	*	*	X	X
Loons	*	x	x	*	*	*	*	*	*	*	*	*
Grebes	x	x	x	*	*	*	*	*	*	*	x	x
Sea Lions	X	X	X	X	*						X	X
Harbor Seals (newborn)							**X**	**X**	**X**			
Elk	x	x	x	x	x	x	x	X	X	X	X	x
Deer (fawn)					x	**X**	x					

* Uncommon in the region during this period
x Available in the region during this period
X Abundant or primarily hunted or fished ethnographically in the region during this period
X Breeding or bearing young during this period

Although unmodified faunal remains found in shell midden sites are usually associated with subsistence practices, the presence of some faunal constituents may be due to natural or non-subsistence cultural processes. Erlandson and Moss (2001) and Lyman (2002) note a wide variety of terrestrial and marine animals that feed on aquatic prey and may bring their remains into the shell midden, which is often interpreted in terms of its anthropogenesis. Animals such as raccoons (present in the 45SN404 faunal assemblage; see below), mustelids, dogs and foxes, seals and sea lions, and a variety of birds are some of the animals that may deposit bone, shell, or other parts of animals into a shell midden. Some of these animals may introduce such remains as stomach contents when they are caught and brought to the site by the sites human occupants. Lyman (1994; 2002) encourages taphonomic analysis of faunal assemblages to identify agents that may have incorporated particular remains into a deposit and agents that may have affected faunal remains after initial deposition. Modification observed on the analyzed faunal specimens is limited to a few cutmarks, limited burning on one bird bone and some fish and shell specimens, and erosion of some bone surfaces that were more likely caused by physical or chemical weathering than corrosion from passing through a digestive tract, and none of the mammal or bird bones exhibit gnawing or puncture marks. Additionally, no rodent bones were identified in the screen spoils or the small screen size fractions of any CVS. Although the lack of these indicators in the faunal assemblage and the clear archaeological context of the shell midden in general suggest that most of the bones and shells in the midden represent human hunting, fishing, and gathering efforts, other agents should not be dismissed and any further faunal samples from the site should be examined for such taphonomic agents.

Faunal remains may also be deposited into a shell midden by non-subsistence cultural reasons such as tool manufacturing. Several bone tools and modified beaver teeth found at 45SN393 attest to the need for faunal raw materials to make a variety of implements. The faunal remains

analyzed here are included in this analysis because they are not modified, however they may represent portions of animals brought to the site not for food but for their value as tools. Hodgetts and Rahemtulla (2001) note the value of cervid bones for tool manufacture to Northwest Coast Native Americans reflected in ethnographic documentation and the archaeological record. The small samples of modified faunal remains and unmodified mammal remains preclude attempts to connect any hypothesized bone tool manufacturing strategy that took place at the site with the particular taxonomic and skeletal representation of the unmodified fauna at the site. There is no reason not to assume, however, that the remains of cervids, black bear, sea mammals, birds, fish, and molluscs at 45SN393 represent not only a broad range of subsistence pursuits by Native Americans but also the need for other parts of these animals to help build the implements and ornaments essential to their culture.

Site 45SN404

Faunal remains found in Trench 3 near and below the wooden decking allow provide some indication of animal utilization along this historic commercial block of Mukilteo. A total of 42 bone fragments were recovered by hand from the trench spoils pile amidst wooden planks and beams and historic artifacts dating primarily between the 1880s and 1930s. Because of the coarse-grained provenience control within the spoils pile, it was not possible to differentiate animal remains deposited during the 19th century from those deposited during the Crown Lumber company store and butcher shop era (1900-1938). Of the 42 specimens collected, four were of fish, on of bird, and 37 of mammal. The mammal remains were primarily of domestic cow and sheep fish were not identifiable to specific taxon

Osteoichthyes (Unidentified Bony Fish)

Materials: 1 Right dentary fragment, 1 miscellaneous ray/spine, 2 unidentified fishbone fragments.
Total: 4 Specimens.
Remarks: In most cases, specimens of a known element could be further identified to a specific taxon, but for one dentary specimen this was not possible. The other unidentified fish specimens in this assemblage are very small fragments from undetermined elements or ray or spine fragments that would not likely be identified to a finer taxonomic level even if the ray or spine were intact. Fish were undoubtedly consumed by the residents of Old Mukilteo, given the presence of an early historic salmon cannery and the proximity of commercial fishing grounds offshore.

Aves (Undifferentiated Birds)

Material: 1 cervical vertebra.
Total: 1 specimen.
Remarks: This specimen may represent a locally caught fowl or upland game bird, or a domestic chicken or turkey.

Mammalia

Order Carnivora

Family Procyonidae

***Procyon lotor* (Raccoon)**

Material: 1 Right humerus.
Total: 1 Specimen
Remarks: The raccoon is an omnivorous mammal native to the region, ranging throughout the Puget Sound lowlands prior to Euroamerican contact and concentrating in urban and suburban areas with the development of cities, towns, and predictable and abundant food sources. Although most often considered a pest, raccoon pelts did fetch small prices for trappers earlier in the 20th century (Ingles 1965:357-359). It is not clear if the one specimen found in this assemblage, a humerus, was from an animal that was trapped for fur, was killed as a pest, or died incidentally and whose remains were mixed with the other faunal remains under the plank decking of the mill.

Order Artiodactyla

Family Cervidae

***Odocoileus* sp. (Deer)**

Material: 1 Left astragalus, 1 right metacarpal, 1 left scapula.
Total:
Remarks: Deer, despite being non-domestic and generally a non-commercial source of meat, have been hunted for millennia. The establishment of a company store on the corner of Front Street and Park Avenue likely did not stop people from hunting, either for sport or subsistence, and the presence of these deer bones attests to that. The elements represent the distal portions of both hind legs and front legs and the anterior portion of the carcass. The scapula fragment has been sawed on the proximal end, indicating the assistance of some mechanical means of butchery.

Family Bovidae

***Bos* sp. (Domestic Cattle)**

Material: 1 Left astragalus, 1 left calcaneus, 1 innominate fragment, 1 left scapula, 1 left tibia, 7 long bone shaft fragments, 8 rib fragments, 2 vertebra fragments.
Total: 22 Specimens
Remarks: The remains of domestic cow comprise the bulk of the identified faunal assemblage from 45SN404, most of which have been sawed. The variety of elements and portions of elements represented by the assemblage reflect both finished cuts of meat (seven steak bones which are narrow sections of long bone shafts) and portions of less utility (distal end of the tibia, the astragalus and the calcaneus) at the distal end of the hind leg that would have been culled by a butcher or possibly sold as part of a round roast. The innominate fragment is associated with the sirloin and rump; the scapula is associated with the chuck; the vertebrae with the chuck, rib roast, short loin, or sirloin; and the ribs with various rib roast cuts (Smith et al. 1978)

***Ovis aries* (Domestic Sheep)**

Material: 2 Left tibia shaft fragments, 4 long bone shaft fragments.
Total: 6 Specimens
Remarks: Domestic sheep are another common taxon present in historic faunal assemblages, although here are only represented by six specimens. These bones are identified as sheep

based on morphology and size in comparison with cow, pig, and lamb shanks. Although they most closely match the lamb shanks, the actual age of the individuals cannot be determined given the lack of epiphyses present. All but one of the specimens was sawed at one end of the shaft.

Mammalia (Unidentified Mammal)

Material: 1 Innominate fragment, 3 long bone shaft fragments, 1 unidentified fragment.
Total: 5 Specimens
Remarks: These specimens were fragmented to the extent that they could not be identified beyond level of medium- to large-sized mammal.

Discussion

The faunal assemblage from Trench 3 primarily contains the remains of domestic cow and sheep, from both finished retail cuts of meat and carcass portions of less utility. Also present in small numbers are deer bones and fish bones. The proximity of the Crown Lumber company store and meat market and several hotels and restaurants, including the Bay View Hotel, to Trench 3 may account for the mixture of domestic animal parts. A substantial amount of sediment was used to fill the tidal lagoon that once existed in this area, and combined with preparation of the wooden plank decking for the mill probably mixed historic material from several sources.

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SHELL ANALYSIS, ARCHAEOLOGICAL TESTING AT 45-SN-393, MUKILTEO, WASHINGTON

METHODS

For this analysis, the shellfish remains from the trench constant volume samples were compared quantitatively for an indication of changes in shellfish consumption at 45SN393 over time. This comparison examines shell weight in grams in the ¼-inch fraction because taxonomic identification of smaller specimens may skew measures of abundance and weight towards certain taxa. Shell weight provides a consistent measure of a particular shellfish taxon and a means of quantifying relative change in taxa across space and through time.

The names and ordering of the molluscan groups are based on the classification established by Vaught (1989). Shells were identified to finest taxonomic category using NWAA comparative collections. Many of the modern comparative shellfish specimens came from Picnic Point, a few kilometers south of 45SN393, and represent most of the broad invertebrate categories that may be found in shell middens in the area. Additional assistance came from several guides, including Kozloff (1996), Quayle (1960), Griffith (1967), and Cornwall (1955). Identification of the parts of shells that were represented followed Claassen (1998) and Kozloff (1996).

Number of specimens refers to the number of shells and shell fragments identified to a particular taxon. Minimum number of individual shellfish (MNI) is based on the number of complete umbones of a bivalve taxon identified in a CVS divided by two; MNI for gastropods within a CVS is based on the number of columellae (central portion of the shell) with an intact apex; MNI was not counted for barnacles because the plate fragments that allow MNI calculation when identified (Huber and Sommer 2003:213-214) were not differentiated in this assemblage.

The descriptive summary includes shell taxa identified in each trench CVS, plus two additional taxa, a moon snail shell identified in a core sample and two geoduck shell fragments identified in the Trench 14 spoils. Table F-6 lists the weight of taxa identified from each trench CVS.

The descriptive summary includes shell taxa identified in each trench CVS, plus two additional taxa, a moon snail shell identified in a core sample and two geoduck shell fragments identified in the Trench 14 spoils. The names and ordering of the molluscan groups are based on the classification established by Vaught (1989). Number of specimens refers to the number of shells and shell fragments identified to a particular taxon. Minimum number of individual shellfish (MNI) is based on the number of complete umbones of a bivalve taxon identified in a CVS divided by two; MNI for gastropods within a CVS is based on the number of columellae (central portion of the shell) with an intact apex; MNI was not counted for barnacles because the plate fragments that allow MNI calculation when identified (Huber and Sommer 2003:213-214) were not differentiated in this assemblage.

Table F-6. Shellfish Taxonomic Abundance in Weight (g) by 1-Liter Constant-Volume Sample.

TRENCH NO	DEPTH (cmbs)	GASTROPODS		BIVALVES							BARNACLES		Unidentified Shell	TOTAL
		Lottidae	*Nucella* sp.	Mytilidae	*Clinocardium* sp.	*Tresus* sp.	*Macoma* sp.	c.f. *Protothaca staminea*	*Saxidomus giganteus*	Unidentified Bivalve	cf *Semibalanus cariosus*	Balanidae		
5	190-200			0.2	0.2			3.9	1.6	10.1	0.9	0.5		17.4
	200-210			1.5	0.8			4.5	3.0	4.9	1.3	0.2		16.2
	210-220		9.1	3.5	0.4	3.9		0.3	4.5	22.5		0.8	0.2	12.4
	220-230		3.6	0.2	2.3			4.2		8.0				18.3
	230-240		50.1	0.3	27.7			91.9	3.7	33.7				207.4
	240-250		29.9	0.2	0.2			63.0		22.6		0.1	0.9	116.9
6	175-185		0.9					0.7		3.1				4.7
	185-195			0.3				0.1		6.8	1.4			8.6
	195-205		0.4	0.8						12.8		2.2		16.2
	205-215		0.3	3.5	0.5			0.4		33.1		0.4	1.2	39.4
	215-225		0.7	10.3	0.8			2.2		17.8	8.2	1.8		41.4
	225-235		0.3	18.8	0.6			1.1		5.5		1.8		29.0
	235-245	0.1	1.2	5.5	0.2			2.7		4.5		0.1		43.1
	245-255		30.0	2.6	0.1			16.6		7.0		0.6		37.0
	255-265		9.9	0.2	0.1			1.5		2.3				4.1
	38978							30.9						30.9
8	215-220									1.9		0.1	0.1	2.1
	235-245	0.1	6.9	1.0	1.2	11.8		2.4		35.3	1.5	0.3		60.5
11	90-95				0.5					5.7	0.6		0.7	7.5
	105-110			0.7	0.2			0.1		4.0		0.1		5.1
	132-135			12.1				0.8		24.1		2.3		39.3
	150-152		0.1	4.6	44.1			5.9	26.9	47.2		1.6	0.6	131.0
	155-158		1.1	3.6	55.3			0.1		20.7	0.4			81.2
	160-162		5.0	3.2	8.8			16.1		32.1		0.3		65.0
	160-165		1.9	14.3	36.7			10.1		28.2		1.1		92.3
13	240-250			7.2	7.3	2.5		11.6		10.2		2.1		46.4
	38816			1.4	3.1			3.8	0.9	20.0	1.0	0.1		48.9
	270-278			3.2	0.4			51.2	21.7	32.1		0.1		113.5
	278-280			1.5	2.6	0.4		12.8	44.5	18.2				90.1
14	170-180			0.3				1.0		4.7				6.0
	180-190			2.0	1.0			0.5		6.1				9.6
	190-200			0.5	0.3			1.6		3.8	2.7	0.1		9.0
	200-210		0.5		0.8	2.0		4.2		8.2				15.7
	205-208			0.1	0.8			9.5		2.5				12.9
	210-220		1.8	0.1	1.7		0.6	2.2		14.3				20.7
	220-230		9.5	1.3	2.7			9.3		22.6		0.3	0.7	46.4
	230–235		10.9	2.6	13.6	37.1		11.3	15.2	17.5	1.1	0.1		107.8
	230–240		1.1	6.8	7.4		0.1	9.9	35.0	50.2		0.1		95.6
	240-245		1.5	0.6	0.2			2.4		16.3			0.1	21.1
	240-250		0.8	1.4	0.3			2.4		21.0		0.1		16.0
	250-255			0.8	0.5			3.5		9.4	0.2	0.3		14.7
Total		0.2	177.5	117.2	223.4	57.7	0.7	396.7	157.0	651.0	19.3	17.6	4.5	1822.8

Class Gastropoda
Order Patellogastropoda
Family Lottiidae (Limpets)

Material: Shells
Total: 2 Specimens; 2 MNI (2 complete shells) 0.2 grams
Remarks: Limpets are commonly found on rocks, reefs, and rocky substrates in the mid- to upper intertidal zone. In general the shells are distinctive to Family, although the archaeological specimens were eroded and finer identification was not possible.

Order Mesogastropoda/Neogastropoda
Family Muricidae
***Nucella* sp. (Dogwinkles)**

Material: Shell Fragments, Columella Fragments, Apex Fragments, Whole Shells
Total: 263 Specimens; 42 MNI; 177.5 grams
Remarks: These specimens were identified as a dogwinkle based on morphological characteristics, but not to a more specific genus or species given the fragmented nature of the assemblage and limited comparative collection of gastropods within this genus. These molluscs inhabits a variety of littoral settings in Puget Sound, varying from rocky to muddy substrates in the intertidal zone, usually in the same immediate area as their preferred prey, intertidal barnacles.

Family Naticidae
***Polinices* sp. (Moon Snail)**

Material: Whorl Fragment
Total: 1 Specimen; 1 MNI (1 fragment); 0.2 grams
Remarks: The shells of these large snails are distinctive because of their size amongst gastropods inhabiting the shores of Puget Sound. Moon snails are commonly found in intertidal and subtidal sandflats during summer months. Although Lewis' moon snail (*P. Lewisii*) is much more common than other species of moon snail, differentiation between the species is based upon whole-shell characteristics and therefore was not made for this single specimen, which was found in a core sample.

Class Bivalvia
Order Mytiloida
Family Mytilidae (Mussel)

Material: Valve and Hinge Fragments
Total: 1,507 Specimens; 53 MNI (106 complete umbones); 117.2 grams
Remarks: Three molluscan species belonging to the Mytilid family are common in the Pacific Northwest, *Mytilus edulis* (blue mussel), *Mytilus californianus* (California mussel), and *Modiolus rectus* (horse mussel). The *Mytilus* genera inhabit near-shore rocky substrates, while *Modiolus* inhabit softer substrates further from shore. Both hinges and valve fragments of Mytilids were identified at 45SN393, the valves having cross-section patterning and color distinctive to the Family. Identification to Genus or species level was not conducted, however, given the extent of weathering of mussel specimens. Several strata exposures within the trenches were differentiated from the surrounding cultural deposit based on the distinctive color and texture of mussel shell fragments.

Order Veneroida

Family Cardiidae

***Clinocardium spp.* (Cockle)**

Material: Hinge and Valve Fragments
Total: 418 Specimens; 4 MNI (7 complete umbones); 223.4 grams
Remarks: Several species of cockle are common in Puget Sound and their remains are very common in shell middens throughout the Northwest. The distinctive radial ribbing of cockle valves makes identification to the genus level relatively easy. Five species of cockle (*C. nuttallii, C. blandum, C. ciliatum, C. californiense,* and *C. fucanum*) are found in the Puget Sound region, and differentiation between species requires measurement of height/length ratios and rib counts of whole valves. Given the fragmentation of the assemblage, no species identifications were made. By far the most common cockle species, *Clinocardium nuttalli* (basket cockle) is abundant in a variety of high intertidal and shallow subtidal substrates, from mud to gravel.

Family Mactridae

***Tresus* sp. (Horse and Gaper Clams)**

Material: Hinge Fragments
Total: 8 Specimens; 4 MNI (8 complete umbones); 57.7 grams
Remarks: Two species from this genus inhabit lower intertidal sandy or muddy substrates in Puget Sound, *T. Capax* (horse clam) and *T. Gapperi* (gaper clam). Hinges of the shells of this Genus have distinctive chondrophore morphology (Kozloff 1996), although other parts of the shells of the different species are very similar. Identification was therefore made on specimens exhibiting portions of the hinge and valve fragments exhibiting the noticeable “gaped” siphon opening at the posterior end.

Family Tellinidae

***Macoma* sp. (Macoma)**

Material: Whole Valve, Hinge Fragment
Total: 2 Specimens, 1 MNI (2 complete umbones), 0.7 grams
Remarks: Numerous species of the small clam genus *Macoma* are found in sandy or muddy intertidal zones throughout Puget Sound. Because differentiation of many of the species is dependent upon surface polish or color (Kozloff 1996:279) and the archaeological specimens are water-worn, identification of these two specimens was only made to genus level.

Family Veneridae

c.f. *Protothaca staminea* (Native Littleneck Clam)

Material: Whole Valves, Hinge and Valve Fragments
Total: 791 Specimens; 29 MNI (58 complete umbones); 396.7 grams
Remarks: Native littleneck clams are a relatively long-living (up to 14 years) species that are tolerant of a variety of substrates and are concentrated in the mid-intertidal to subtidal zones (Harbo 1997:166; Quayle 1960:58-59). Shell fragments identified to this species were the most abundant type counted during analysis. The distinctive cross-hatching visible on the outer surface of littleneck shells and their hinge morphology are shared with the historically introduced Japanese littleneck, or Manila, clam (*Tapes philippinarum*). The two species can be distinguished by interior features of the shell (Kozloff 1996:281-282). Because all the archaeological specimens of complete or mostly complete valves are of Native littleneck clams

and the Japanese littleneck was introduced relatively recently, it is assumed that the less complete cross-hatched valve fragments found in the 45SN393 shell midden deposit are from Native littleneck clams. This species is quite common throughout the intertidal zone, and is often the dominant species or one of the most abundant in Puget Sound shell middens as well (Phillips 2002:121-122).

Saxidomus giganteus (Butter Clam)

Material: Whole Valves and Hinge Fragments
Total: 22 Specimens; 11 MNI (22 complete umbones); 157.0 grams
Remarks: Butter clams inhabit the lower intertidal zone of many Puget Sound shorelines, and are a ubiquitous component of shell middens throughout the area as well. Given the non-diagnostic concentric banding on the outer surface of their valves, only hinge fragments were identified as butter clams, although many of the "unidentified clam" valve fragments probably represent this species given their natural and archaeological abundance.

Family Hiatellidae
Panope abrupta (Geoduck)

Material: Valve Fragments
Total: 2 Specimens; 1 MNI (2 mostly complete valve fragments); 60.0 grams
Remarks: The two specimens identified as *P. abrupta* are large valve fragments with the majority of their lateral teeth intact, and were found in the screened spoils of Trench 14. Geoducks are bivalves with a large, gape-ended shell and a distinctive non-retractable siphon that provides a large amount of meat relative to other molluscan species. They are the largest intertidal clam in the world and can have a tremendously long lifespan, reportedly up to 146 years (Harbo 1997:171). They prefer intertidal and shallow subtidal mudflats, where they burrow as deep as one meter (Harbo 1997; Kozloff 1996:284). Despite their distinctive shell morphology, small fragments of geoduck valves are indistinguishable from many other species with thick, concentric-ringed valves such as horse and butter clams. It is not surprising, therefore, that geoduck was identified in small quantities in only one other shell assemblage from a site in King, eastern Kitsap, or Snohomish County: the Duwamish No. 1 site (Campbell 1981).

Class Bivalvia (Unidentified Bivalve)

Material: Valve Fragments with Lateral Tooth, Valve Fragments with Partial Umbone, Unidentified Valve Body Fragments
Total: 1,154 Specimens, no MNI counted, 651.0 grams
Remarks: This category includes valve fragments of bivalves that do not exhibit landmarks or features that allow identification to a level finer than taxonomic Class. These specimens likely belong to one of the more specific taxa identified within the assemblage.

Phylum Arthropoda
Class Cirripedia
Suborder Balanomorpha
Family Archaeobalanidae
c.f. _Semibalanus cariosus_ (Thatched Barnacle)

Material: Unidentified Body Plate Fragments
Total: 16 Specimens, no MNI counted, 19.3 grams

Thatched barnacles thrive on rocks and larger molluscs in the low to mid-intertidal and shallow subtidal zones. Barnacle specimens tentatively identified to this species are body plate fragments from relatively larger individuals that exhibit ridges that form downward-pointing, finger-like projections on the exterior surface characteristic of the species. These identifications are tentative because of a lack of comparative material for this analysis and reliance of key information from Kozloff (1996:316) and photographs and diagrams in Fournier and Dewhirst (1980).

Family Balanidae
***Balanus* sp. (Barnacle)**

Material: Unidentified Body Plate Fragments
Total: 149 Specimens; no MNI counted; 17.6 grams
Remarks: Barnacles are common in Puget Sound on hard substrates such as rocks and in softer or finer substrates anchored to larger mollusc shells. Although several of these species have been identified in archaeological sites in the area, it is often not clear if such specimens were consumed as food or incorporated into shell midden deposits incidentally. Lack of comparative material and undifferentiated nature of the body plate fragments resulted in identification of barnacle specimens to Genus level (Fournier and Dewhirst 1980; Huber and Sommer 2003).

Phylum Mollusca or Arthropoda (Unspecified Mollusc or Arthropod)

Material: Indistinct Shell Fragments
Total: 25 Specimens; 0 MNI (no complete umbones); 4.5 grams
Remarks: These specimens could only be identified as shell fragments of invertebrates, without characteristics that would allow finer taxonomic identification as either univalve or bivalve molluscs.

Discussion

The analyzed shellfish assemblage represents a broad but typical array of shellfish species for central Puget Sound shell middens. The assemblage is weighted towards cockle and littleneck clams, which is not surprising given the present substrate of the intertidal zone near the site. Based on the analyzed assemblage, almost all of the shellfish deposited at 45SN393 could have been gathered in the immediate vicinity of the Point Elliot barrier berm. Geoduck is the only unusual taxon, and to date has only been identified elsewhere in central Puget Sound at the Duwamish No. 1 site (Campbell 1981). Geoduck have been identified near 45SN393 in modern shellfish surveys in very low numbers, but in greater abundances to the east and south along the mainland shore and along the south shore of Whidbey Island across Possession Sound from Point Elliot (Anchor 2005; Goodwin 1973:51). During occupation of 45SN393 prior to historic filling, the tidal lagoon south of the berm may have provided an adequate habitat for geoduck, or this taxon may have been transported from some distance to the site.

The shell assemblage is highly fragmented, which may be attributed to shellfish processing or post-depositional processes such as high-energy wave action from storms striking the beach berm and/or historic or modern human-induced processes that likely aided in fragmentation. Although only the ¼-inch fraction was examined for relative taxonomic abundance, comparison of screen size proportions in overall shell amounts in each CVS suggests that, by weight, the finer fraction comprises a substantial part of the midden matrix. The CVS sequence in most trenches shows fluctuation in the proportion of ⅛-inch shell weight to ¼-inch shell weight with

depth, while Trenches 5 and 8 show directional trends of decreasing finer shell fractions with depth (Table F-6).

Burned shell fragments in the assemblage may represent cooking, post-consumption disposal, or post-depositional processes within the shell midden, any of which would change shell color and texture and increase fragmentation (Claassen 1998). Burned shell was identified as such in the analyzed assemblage based on color if they were blackened, were gray throughout, or from exposed breaks showing white on the exterior surface of the shell and gray in the interior. A total of 152 shell fragments out of 5,299 analyzed (2.8%) were burned, or 67.8 grams of a total of 2,360.1 grams (also about 2.8%). These burned specimens were of most of the identified taxa and distributed throughout most of the trenches and several of the core CVS.

Changes over time in relative taxonomic abundance of shell are investigated using broader taxonomic categories of shell than the range identified during the analysis, providing a general reflection of changes in shell composition in the 45SN393 midden. Taxa such as macoma, horse clams, and geoduck were found in small numbers and omitted, while other classes such as limpets and whelks were combined into larger units. Figure F-1 shows overall variability in shell composition within the four trenches with bracketing radiocarbon dates. The total percentage of gastropods, mussels, cockles, and venus clams (including littleneck and butter clams) varies from trench to trench, with the greatest relative abundance of gastropods in Trenches 5 and 6, mussels in Trench 6, cockles in Trench 11, and venus clams in Trench 14. Despite the overall abundance of gastropods in Trench 5, the uppermost midden layers are predominantly venus clam and lack gastropods, while gastropods make up between about 30% and 50% of the assemblages from the deeper layers. Trench 6 provided a thicker midden deposit than Trench 5 and more individually defined strata within the midden, some characterized by thin layers of crushed mussel shell. The analyzed CVS assemblages reflect this, with proportion of mussel fluctuating throughout the sequence and being absent in a few samples but comprising between 50% and 90% of the assemblages by weight between 185 and 245 cmbs. The Trench 11 profile also contained several thin, dense crushed mussel shell layers in the upper portion of the midden, and had very high proportions of mussel shell in the two samples between 105 and 135 cmbs. A sample from above these layers and the samples from deeper within the midden, however, show greater proportions of cockle. Venus clams are the predominant shellfish in Trench 14, with samples from 170-180, 205-208, 230-240, and 250-255 cmbs (this last sample being below the shell midden deposit) containing greater proportions of littleneck and butter clams than samples from the intervening layers.

Analysis of the material recovered during testing suggests a generalized pattern of harvest of locally available shellfish species, but variability in the spatial patterning of specific relative shellfish abundance, both horizontally between trenches and vertically between stratigraphically sequential CVS. Because of the difficulty of associating the CVS shellfish remains with artifacts primarily found in the spoils, or features that could not readily be defined in the trench profiles, further inferences are limited from the testing data. Broad-scale shifts in taxonomic abundance and inferred changes in harvest intensity of particular shellfish types, such as the shift from mussels to venus clams between temporal components at the West Point site (Larson 1995:13/25-26), are not apparent in the 45SN393 assemblage. Unidirectional changes, including an abrupt decrease in gastropods between the lower and upper layers of Trench 5 and a dramatic increase in mussel shell in the upper layers of Trench 11, may reflect shifts in particular shellfish harvesting strategies over time or changes in the concurrent use of particular portions of the site. Such inferences, however, require more detailed information on spatial associations of specific deposits within the general shell midden stratum.

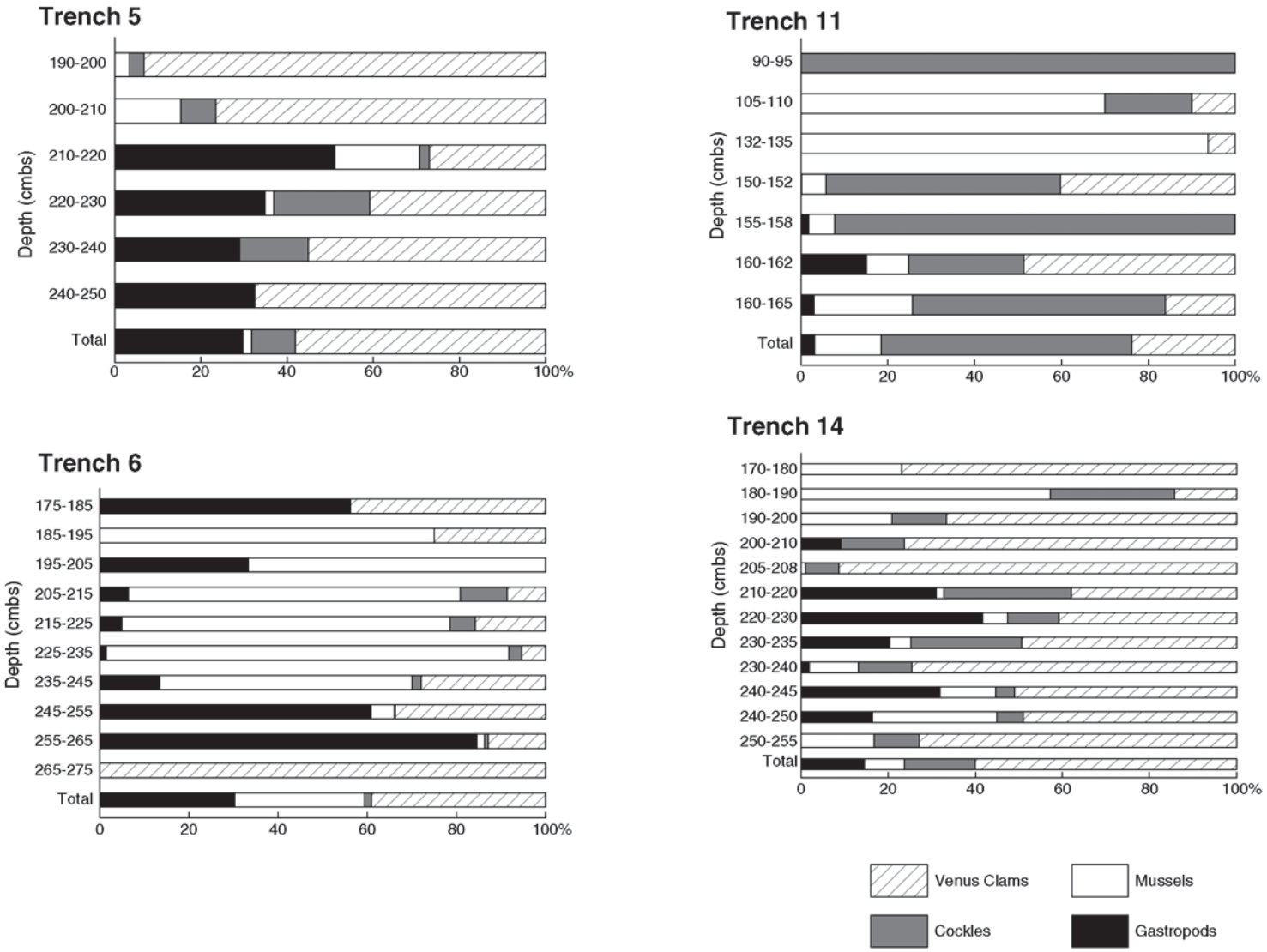

Figure F-1. Graphs of relative taxonomic abundance of major shellfish between trenches.

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Table F-7. Shell Analysis Data, Site 45SN393.

Cat #	Tr. #	Depth (cmbs)	Taxon	Shell Portion	Lmk. For MNI	Valve Side	Qty	Weight (g)	Comments
8	13	240-250	Mytilidae	Fragment with umbo	Y		5	1.0	
8	13	240-250	Mytilidae	Valve body fragment	N		75	6.2	
8	13	240-250	Clinocardium sp.	Valve body fragment	N		23	7 3	
8	13	240-250	Unidentified bivalve	Valve body fragment	N		30	9.0	
8	13	240-250	Nucella sp.	Spire top	Y		1	0.4	
8	13	240-250	Nucella sp.	Spire fragment	N		2	1 9	
8	13	240-250	Tresus sp.	Fragment with umbo and chond.	Y		2	2 5	
8	13	240-250	Balanidae	Unidentified body plate fragment	N		17	2.1	
8	13	240-250	Nucella sp.	Whorl fragment	N		4	2 2	
8	13	240-250	Unidentified bivalve	Fragment with umbo	Y		2	0.9	
8	13	240-250	cf Protothaca staminea	Fragment with umbo	Y		4	5.0	
8	13	240-250	cf Protothaca staminea	Valve body fragment	N		10	6.6	
15	13	260-266	Clinocardium sp.	Valve body fragment	N		8	3.1	
15	13	260-266	Nucella sp.	Whole	Y		1	3.4	
15	13	260-266	Nucella sp.	Spire top	Y		5	7.0	
15	13	260-266	Nucella sp.	Whorl fragment	N		18	6.4	
15	13	260-266	Nucella sp.	Spire fragment	N		5	1.8	
15	13	260-266	Mytilidae	Valve body fragment	N		13	1.3	
15	13	260-266	Mytilidae	Fragment with umbo	Y		1	<0.1	
15	13	260-266	Unidentified bivalve	Fragment with umbo	Y		1	0.1	
15	13	260-266	cf Protothaca staminea	Valve body fragment	N		7	2.7	
15	13	260-266	Unidentified bivalve	Valve body fragment	N		5	0.6	burned
15	13	260-266	Unidentified bivalve	Fragment with lateral tooth	N		5	8.0	
15	13	260-266	Unidentified bivalve	Valve body fragment	N		35	9.4	
15	13	260-266	Saxidomus giganteus	Fragment with umbo	Y		2	0.9	
15	13	260-266	Balanidae	Unidentified body plate fragment	N		1	<0.1	
15	13	260-266	cf Protothaca staminea	Fragment with umbo	Y		1	1.1	
15	13	260-266	cf Semibalanus cariosus	Unidentified body plate fragment	N		1	1.0	
31	13	270-278	Clinocardium sp.	Valve body fragment	N		1	0.4	
31	13	270-278	Mytilidae	Valve body fragment	N		55	3.2	
31	13	270-278	Balanidae	Unidentified body plate fragment	N		1	0.1	
31	13	270-278	Nucella sp.	Whorl fragment	N		5	1 9	
31	13	270-278	Nucella sp.	Spire top	Y		1	2.9	
31	13	270-278	Unidentified bivalve	Fragment with umbo	Y		2	1.4	
31	13	270-278	Unidentified bivalve	Fragment with lateral tooth	N		3	1.2	
31	13	270-278	Saxidomus giganteus	Mostly whole	Y	L	1	21.7	
31	13	270-278	cf Protothaca staminea	Fragment with umbo	Y		11	18 0	
31	13	270-278	cf Protothaca staminea	Fragment with lateral tooth	N		2	6.6	
31	13	270-278	cf Protothaca staminea	Valve body fragment	N		48	26.6	
31	13	270-278	Unidentified bivalve	Valve body fragment	N		33	28.8	
39	13	278-280	Nucella sp.	Spire fragment	N		1	0 9	
39	13	278-280	Unidentified bivalve	Valve body fragment	N		31	13.4	
39	13	278-280	cf Protothaca staminea	Valve body fragment	N		26	12.6	
39	13	278-280	Saxidomus giganteus	Mostly whole	Y	L	2	44 5	
39	13	278-280	Unidentified bivalve	Fragment with umbo	Y		7	4.5	
39	13	278-280	Tresus sp.	Fragment with chondrophore	Y		1	0.4	
39	13	278-280	cf Protothaca staminea	Fragment with umbo and lat. too h	Y		1	0.2	
39	13	278-280	Nucella sp.	Whorl fragment	N		4	0 8	

Table F-7. Shell Analysis Data, Site 45SN393.

Cat #	Tr. #	Depth (cmbs)	Taxon	Shell Portion	Lmk. For MNI	Valve Side	Qty	Weight (g)	Comments
39	13	278-280	Mytilidae	Valve body fragment	N		27	1.4	
39	13	278-280	Clinocardium sp.	Valve body fragment	N		11	2.6	
39	13	278-280	Nucella sp.	Whole	Y		2	6.7	
39	13	278-280	Mytilidae	Fragment wi h umbo	Y		1	0.1	
39	13	278-280	Nucella sp.	Spire top	Y		1	0.7	
44	6	195-205	Unidentified bivalve	Valve body fragment	N		18	9.2	
44	6	195-205	Unidentified bivalve	Fragment with umbo	Y		1	0.3	
44	6	195-205	Balanidae	Unidentified body plate fragment	N		2	2.2	
44	6	195-205	Mytilidae	Valve body fragment	N		13	0.8	
44	6	195-205	Nucella sp.	Whorl fragment	N		1	0.4	
44	6	195-205	Unidentified bivalve	Fragment with lateral tooth	N		3	5.2	
52	5	200-210	Unidentified bivalve	Fragment with umbo	Y		2	0.2	
52	5	200-210	Unidentified bivalve	Valve body fragment	N		14	4.5	
52	5	200-210	Clinocardium sp.	Valve body fragment	N		5	0.8	
52	5	200-210	Saxidomus giganteus	Fragment wi h umbo	Y		3	3.0	
52	5	200-210	Mytilidae	Fragment wi h umbo	Y		1	0.7	
52	5	200-210	Balanidae	Unidentified body plate fragment	N		2	0.2	
52	5	200-210	cf Semibalanus cariosus	Unidentified body plate fragment	N		1	1.3	
52	5	200-210	cf Protothaca staminea	Valve body fragment	B		10	4.5	
52	5	200-210	Mytilidae	Valve body fragment	N		9	0.8	
58	8	235-245	Unidentified bivalve	Valve body fragment	N		40	31.8	
58	8	235-245	Mytilidae	Fragment wi h umbo	Y		1	0.5	
58	8	235-245	Tresus sp.	Fragment wi h umbo and chond.	Y		1	11.8	
58	8	235-245	cf Semibalanus cariosus	Unidentified body plate fragment	N		3	1.5	
58	8	235-245	Mytilidae	Fragment wi h umbo	Y		1	0.5	
58	8	235-245	Nucella sp.	Whole	Y		1	0.3	
58	8	235-245	Nucella sp.	Mostly whole	Y		2	6.2	
58	8	235-245	Unidentified bivalve	Fragment with lateral tooth	N		3	3.4	
58	8	235-245	Lottidae	Whole	Y		1	0.1	
58	8	235-245	Balanidae	Unidentified body plate fragment	N		2	0.3	
58	8	235-245	Clinocardium sp.	Valve body fragment	N		4	1.2	
58	8	235-245	cf Protothaca staminea	Valve body fragment	N		4	2.4	
58	8	235-245	Nucella sp.	Whorl fragment	N		1	0.4	
65	11	160-162	cf Protothaca staminea	Fragment wi h umbo	Y	R	1	0.1	
65	11	160-162	Nucella sp.	Whole	Y		1	0.5	
65	11	160-162	Unidentified bivalve	Fragment with umbo	N		1	1.6	
65	11	160-162	Mytilidae	Valve body fragment	N		47	3.2	
65	11	160-162	cf Protothaca staminea	Fragment wi h umbo and lat tooth	N		1	3.2	
65	11	160-162	cf Protothaca staminea	Valve body fragment	N		11	5.1	
65	11	160-162	Unidentified bivalve	Valve body fragment	N		40	32.1	
65	11	160-162	Balanidae	Unidentified body plate fragment	N		2	0.3	
65	11	160-162	Nucella sp.	Spire fragment	N		2	0.9	
65	11	160-162	Nucella sp.	Whorl fragment	N		6	3.6	
65	11	160-162	Unidentified bivalve	Valve body fragment	N		2	1.7	burned
65	11	160-162	cf Protothaca staminea	Fragment with lateral tooth	N		7	7.7	
65	11	160-162	Clinocardium sp.	Valve body fragment	N		17	8.8	
74	6	265-282	Unidentified bivalve	Valve body fragment	N		47	13.8	
74	6	265-276	Mytilidae	Valve body fragment	N		1	0.1	

Table F-7. Shell Analysis Data, Site 45SN393.

Cat #	Tr. #	Depth (cmbs)	Taxon	Shell Portion	Lmk. For MNI	Valve Side	Qty	Weight (g)	Comments
74	6	265-277	cf Semibalanus cariosus	Unidentified body plate fragment	N		1	0.1	
74	6	265-278	Unidentified bivalve	Fragment with umbo	N		4	1.0	
74	6	265-275	cf Protothaca staminea	Fragment with umbo	Y		2	0.6	
74	6	265-280	cf Protothaca staminea	Valve body fragment	N		29	12.7	
74	6	265-281	cf Protothaca staminea	Fragment with lateral tooth	N		1	2.2	
74	6	265-279	Unidentified bivalve	Fragment with lateral tooth	N		1	0.2	
80	6	255-265	Unidentified bivalve	Valve body fragment	N		5	2.4	
80	6	255-265	Mytilidae	Valve body fragment	N		1	0.2	
80	6	255-265	Clinocardium sp.	Valve body fragment	N		1	<0.1	
80	6	255-265	cf Protothaca staminea	Valve body fragment	N		3	1.5	
86	5	220-230	cf Protothaca staminea	Valve body fragment	N		12	3.6	
86	5	220-230	cf Protothaca staminea	Fragment with umbo	Y		1	0.6	
86	5	220-230	Clinocardium sp.	Valve body fragment	N		4	2.3	
86	5	220-230	Nucella sp.	Whorl fragment	N		2	1.6	
86	5	220-230	Nucella sp.	Spire top	Y		2	2.0	
86	5	220-230	Mytilidae	Valve body fragment	N		4	0 2	
86	5	220-230	Unidentified bivalve	Fragment with umbo	Y		3	0.8	
86	5	220-230	Unidentified bivalve	Fragment with lateral tooth	N		1	0 3	
86	5	220-230	Unidentified bivalve	Valve body fragment	N		15	6 5	
93	6	245-255	Nucella sp.	Spire fragment	N		7	4.6	
93	6	245-255	Nucella sp.	Whorl fragment	N		13	4.5	
93	6	245-255	Unidentified bivalve	Valve body fragment	N		12	4 8	
93	6	245-255	Nucella sp.	Almost whole	Y		1	0.8	
93	6	245-255	Mytilidae	Valve body fragment	N		36	2.4	
93	6	245-255	cf Protothaca staminea	Valve body fragment	N		14	8.4	
93	6	245-255	Unidentified bivalve	Fragment with umbo	Y		1	0.2	
93	6	245-255	Clinocardium sp.	Valve body fragment	N		1	<0.1	
93	6	245-255	Mytilidae	Fragment with umbo	Y		1	0 2	
93	6	245-255	Unidentified bivalve	Fragment with lateral tooth	N		3	1.1	
93	6	245-255	Balanidae	Unidentified body plate fragment	N		5	0.6	
93	6	245-255	cf Protothaca staminea	Fragment with umbo	N		2	8 2	
100	6	205-215	Balanidae	Unidentified body plate fragment	N		2	0.4	
100	6	205-215	Unidentified shell	Unidentified fragment	N		1	0 8	
100	6	205-215	Unidentified bivalve	Valve body fragment	N		30	33.1	
100	6	205-215	cf Protothaca staminea	Valve body fragment	N		1	0.4	
100	6	205-215	Nucella sp.	Spire fragment	N		1	0 3	
100	6	205-215	Mytilidae	Fragment with umbo	Y		2	0 3	
100	6	205-215	Clinocardium sp.	Valve body fragment	N		2	0 5	
100	6	205-215	Mytilidae	Valve body fragment	N		51	3 2	
109	5	190-200	Unidentified bivalve	Valve body fragment	N		8	7.6	
109	5	190-200	cf Protothaca staminea	Valve body fragment	N		5	3 9	
109	5	190-200	Unidentified bivalve	Fragment with umbo	Y		1	0 2	
109	5	190-200	Saxidomus giganteus	Fragment with umbo	Y		1	1.6	
109	5	190-200	Mytilidae	Valve body fragment	N		2	0 2	
109	5	190-200	Balanidae	Unidentified body plate fragment	N		4	0.5	
109	5	190-200	Unidentified bivalve	Fragment with lateral tooth	N		2	1 0	
109	5	190-200	cf Semibalanus cariosus	Unidentified body plate fragment	N		1	0 9	
109	5	190-200	Clinocardium sp.	Valve body fragment	N		1	0 2	

Table F-7. Shell Analysis Data, Site 45SN393.

Cat #	Tr. #	Depth (cmbs)	Taxon	Shell Portion	Lmk. For MNI	Valve Side	Qty	Weight (g)	Comments
150	11	90-95	Unidentified shell	Unidentified fragment	N		3	0.7	
150	11	90-95	cf Semibalanus cariosus	Unidentified body plate fragment	N		1	0.6	
150	11	90-95	Clinocardium sp.	Valve body fragment	N		2	0.5	
150	11	90-95	Unidentified bivalve	Valve body fragment	N		8	5.6	
223	11	155-158	Mytilidae	Valve body fragment	N		29	3.1	
223	11	155-158	Unidentified bivalve	Fragment with lateral tooth	N		5	4.3	
223	11	155-158	Clinocardium sp.	Fragment wi h lateral tooth	N		1	0.7	
223	11	155-158	Nucella sp.	Spire fragment	N		1	0.5	
223	11	155-158	cf Semibalanus cariosus	Unidentified body plate fragment	N		2	0.4	
223	11	155-158	Unidentified bivalve	Valve body fragment	N		29	14.9	
223	11	155-158	Unidentified bivalve	Fragment with umbo	Y		2	0.4	
223	11	155-158	Clinocardium sp.	Fragment wi h umbo	Y		4	8.3	
223	11	155-158	cf Protothaca staminea	Valve body fragment	N		1	0.1	
223	11	155-158	Clinocardium sp.	Valve body fragment	N		65	46.3	
223	11	155-158	Unidentified bivalve	Valve body fragment	N		2	0.6	burned
223	11	155-158	Nucella sp.	Whole	Y		1	0.1	
223	11	155-158	Nucella sp.	Whorl fragment	N		1	0.5	
223	11	155-158	Mytilidae	Fragment with umbo	Y		3	0.5	
231	5	240-250	cf Protothaca staminea	Fragment with umbo	Y		1	0.7	
231	5	240-250	Unidentified bivalve	Fragment with umbo	Y		7	1.8	
231	5	240-250	Nucella sp.	Spire fragment	N		6	12.9	
231	5	240-250	Nucella sp.	Mostly whole with spire top	Y		2	3.2	
231	5	240-250	Clinocardium sp.	Valve body fragment	N		1	0.2	
231	5	240-250	Unidentified bivalve	Fragment with lateral tooth	N		6	3.7	
231	5	240-250	Balanidae	Unidentified body plate fragment	N		2	0.1	
231	5	240-250	cf Protothaca staminea	Fragment with lateral tooth	N		9	6.6	
231	5	240-250	Unidentified shell	Unidentified fragment	N		5	0.7	
231	5	240-250	Unidentified shell	Unidentified fragment	N		1	0.2	burned
231	5	240-250	Nucella sp.	Whorl fragment	N		18	13.8	
231	5	240-250	Unidentified bivalve	Valve body fragment	N		28	18.6	
231	5	240-250	cf Protothaca staminea	Whole	Y	2R, 1L	3	3.5	
231	5	240-250	Mytilidae	Valve body fragment	N		4	0.2	
231	5	240-250	cf Protothaca staminea	Valve body fragment	N		93	52.2	
245	5	230-240	Mytilidae	Valve body fragment	N		4	0.3	
245	5	230-240	cf Protothaca staminea	Fragment with lateral tooth	N		6	2.0	
245	5	230-240	cf Protothaca staminea	Fragment with umbo and lat. tooth	Y		2	1.7	
245	5	230-240	Saxidomus giganteus	Fragment with umbo	Y		8	3.7	
245	5	230-240	Nucella sp.	Spire fragment	N		6	15.5	
245	5	230-240	cf Protothaca staminea	Almost whole	Y	1R, 1L	2	4.9	
245	5	230-240	Nucella sp.	Whole	Y		1	3.1	
245	5	230-240	Nucella sp.	Spire top	Y		7	7.1	
245	5	230-240	Clinocardium sp.	Valve body fragment	N		33	27.7	
245	5	230-240	Unidentified bivalve	Valve body fragment	N		67	31.8	
245	5	230-240	cf Protothaca staminea	Valve body fragment	N		164	71.9	
245	5	230-240	cf Protothaca staminea	Fragment with umbo	Y		18	11.4	
245	5	230-240	Nucella sp.	Whorl fragment	N		38	24.4	
245	5	230-240	Unidentified bivalve	Fragment with lateral tooth	N		2	0.7	
252	11	132-135	Unidentified bivalve	Fragment with umbo and lat. tooth	Y		1	2.7	

Table F-7. Shell Analysis Data, Site 45SN393.

Cat #	Tr. #	Depth (cmbs)	Taxon	Shell Portion	Lmk. For MNI	Valve Side	Qty	Weight (g)	Comments
252	11	132-135	Balanidae	Unidentified body plate fragment	N		23	2.3	
252	11	132-135	Unidentified bivalve	Fragment with lateral tooth	N		2	10.2	
252	11	132-135	Unidentified bivalve	Valve body fragment	N		11	9.8	
252	11	132-135	cf Protothaca staminea	Whole	Y	1R, 1L	2	0.3	
252	11	132-135	cf Protothaca staminea	Valve body fragment	N		2	0.5	
252	11	132-135	Mytilidae	Valve body fragment	N		142	11.0	
252	11	132-135	Mytilidae	Fragment with umbo	Y		8	1.1	
263	6	215-225	Balanidae	Unidentified body plate fragment	N		10	1 3	
263	6	215-225	Clinocardium sp.	Valve body fragment	N		2	0 8	
263	6	215-225	Nucella sp.	Whorl fragment	N		1	0 3	
263	6	215-225	Balanidae	Unidentified body plate fragment	N		6	0.5	burned
263	6	215-225	cf Semibalanus cariosus	Unidentified body plate fragment	N		2	8.2	
263	6	215-225	cf Protothaca staminea	Valve body fragment	N		1	0.7	
263	6	215-225	Unidentified bivalve	Valve body fragment	N		22	16.7	
263	6	215-225	cf Protothaca staminea	Fragment with lateral tooth	N		1	1.2	
263	6	215-225	cf Protothaca staminea	Valve body fragment	N		1	0.3	burned
263	6	215-225	Unidentified bivalve	Valve body fragment	N		4	0.5	burned
263	6	215-225	Mytilidae	Valve body fragment	N		22	2.4	burned
263	6	215-225	Mytilidae	Fragment with umbo	Y		5	1.3	burned
263	6	215-225	Mytilidae	Valve body fragment	N		47	4.9	
263	6	215-225	Mytilidae	Fragment with umbo	Y		10	1.7	
275	14	Spoils	Panopea abrupta	Fragment with lateral tooth	N		2	60.0	
290	11	150-152	Balanidae	Whole	Y		1	0.6	
290	11	150-152	Balanidae	Unidentified body plate fragment	N		8	1.0	
290	11	150-152	Mytilidae	Fragment with umbo	Y		5	1.2	
290	11	150-152	Mytilidae	Valve body fragment	N		35	3.4	
290	11	150-152	cf Protothaca staminea	Valve body fragment	N		5	5.3	
290	11	150-152	cf Protothaca staminea	Fragment with lateral tooth	N		1	0.6	
290	11	150-152	Unidentified bivalve	Fragment with umbo	N		3	1.4	
290	11	150-152	Unidentified bivalve	Valve body fragment	N		46	36.2	
290	11	150-152	Clinocardium sp.	Valve body fragment	N		75	40.8	
290	11	150-152	Saxidomus giganteus	Almost whole	Y	1R	1	26.9	2 frags.
290	11	150-152	Clinocardium sp.	Fragment with lateral tooth	N		3	3 3	
290	11	150-152	Unidentified bivalve	Fragment with lateral tooth	N		6	8.1	
290	11	150-152	Unidentified shell	Unidentified fragment	N		2	0.2	
290	11	150-152	Nucella sp.	Whole	Y		1	0.1	
290	11	150-152	Unidentified shell	Unidentified fragment	N		3	0.4	burned
297	14	210-220	Unidentified bivalve	Fragment with umbo	Y		1	0.5	
297	14	210-220	Macoma sp	Almost whole	Y	1R	1	0.6	
297	14	210-220	Unidentified bivalve	Fragment with umbo	Y		2	0.4	
297	14	210-220	Unidentified bivalve	Fragment with lateral tooth	N		1	0.1	
297	14	210-220	Unidentified bivalve	Valve body fragment	N		25	13.0	
297	14	210-220	Mytilidae	Valve body fragment	N		4	0.1	
297	14	210-220	cf Protothaca staminea	Valve body fragment	N		8	2.2	
297	14	210-220	Clinocardium sp.	Valve body fragment	N		4	1.7	
297	14	210-220	Nucella sp.	Whorl fragment	N		4	1 3	
297	14	210-220	Nucella sp.	Spire fragment	N		2	0.5	
304	6	185-195	Mytilidae	Valve body fragment	N		3	0.3	

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Cat #	Tr. #	Depth (cmbs)	Taxon	Shell Portion	Lmk. For MNI	Valve Side	Qty	Weight (g)	Comments
304	6	185-195	cf Protothaca staminea	Valve body fragment	N		1	0.1	
304	6	185-195	cf Semibalanus cariosus	Unidentified body plate fragment	N		1	1.4	
304	6	185-195	Unidentified bivalve	Valve body fragment	N		11	6.8	
311	14	220-230	Unidentified bivalve	Fragment with umbo	Y		4	1.3	
311	14	220-230	Unidentified bivalve	Fragment with lateral tooth	N		6	1.9	
311	14	220-230	Balanidae	Unidentified body plate fragment	N		1	<0.1	burned
311	14	220-230	Balanidae	Unidentified body plate fragment	N		3	0.2	
311	14	220-230	Clinocardium sp.	Valve body fragment	N		8	2.7	
311	14	220-230	Mytilidae	Fragment with umbo	Y		1	<0.1	
311	14	220-230	Nucella sp.	Spire top	Y		2	0.1	
311	14	220-230	Nucella sp.	Whorl fragment	N		9	9.4	
311	14	220-230	cf Protothaca staminea	Valve body fragment	N		29	9.3	
311	14	220-230	Unidentified bivalve	Valve body fragment	N		41	18.4	
311	14	220-230	Unidentified shell	Unidentified fragment	N		3	0.7	burned
311	14	220-230	Mytilidae	Valve body fragment	N		12	1.2	
318	6	235-245	Nucella sp.	Spire fragment	N		5	4.7	
318	6	235-245	Nucella sp.	Whorl fragment	N		14	16.8	
318	6	235-245	Nucella sp.	Whole	Y		3	7.6	
318	6	235-245	Mytilidae	Valve body fragment	N		52	3.9	
318	6	235-245	Balanidae	Unidentified body plate fragment	N		1	0.1	
318	6	235-245	Clinocardium sp.	Valve body fragment	N		3	0.2	
318	6	235-245	Mytilidae	Fragment wi h umbo	Y		7	1.6	
318	6	235-245	cf Protothaca staminea	Valve body fragment	N		8	2.6	
318	6	235-245	cf Protothaca staminea	Fragment wi h umbo	Y		1	0.1	
318	6	235-245	Unidentified bivalve	Fragment wi h umbo	Y		3	1.3	
318	6	235-245	Lottidae	Whole	Y		1	0.1	
318	6	235-245	Nucella sp.	Whorl fragment	N		2	0.9	
318	6	235-245	Unidentified bivalve	Valve body fragment	N		29	11.5	
318	6	235-245	Unidentified bivalve	Valve body fragment	N		2	1.2	
343	5	210-220	Saxidomus giganteus	Whole	Y	1R	1	4.5	
343	5	210-220	Nucella sp.	Spire top	Y		1	0.6	
343	5	210-220	Balanidae	Unidentified body plate fragment	N		6	0.8	
343	5	210-220	Unidentified shell	Unidentified fragment	N		1	0.2	
343	5	210-220	cf Protothaca staminea	Valve body fragment	N		1	0.3	
343	5	210-220	Clinocardium sp.	Valve body fragment	N		1	0.4	
343	5	210-220	Unidentified bivalve	Fragment with lateral tooth	N		1	1.0	
343	5	210-220	Unidentified bivalve	Fragment with umbo	Y		1	0.3	
343	5	210-220	Tresus sp.	Fragment wi h chond. and umbo	Y		1	3.9	
343	5	210-220	Mytilidae	Fragment with umbo	Y		5	0.8	
343	5	210-220	Mytilidae	Valve body fragment	N		46	2.7	
343	5	210-220	Unidentified bivalve	Valve body fragment	N		24	11.1	
343	5	210-220	Nucella sp.	Whorl fragment	N		6	8.5	
351	11	160-165	Unidentified bivalve	Fragment with umbo	N		1	0.2	
351	11	160-165	Balanidae	Unidentified body plate fragment	N		3	0.3	burned
351	11	160-165	Clinocardium sp.	Fragment wi h umbo	Y		2	3.7	
351	11	160-165	Clinocardium sp.	Valve body fragment	N		50	22.3	
351	11	160-165	Clinocardium sp.	Valve body fragment	N		41	10.7	burned
351	11	160-165	cf Protothaca staminea	Valve body fragment	N		1	0.2	burned

Table F-7. Shell Analysis Data, Site 45SN393.

Cat #	Tr. #	Depth (cmbs)	Taxon	Shell Portion	Lmk. For MNI	Valve Side	Qty	Weight (g)	Comments
351	11	160-165	cf Protothaca staminea	Valve body fragment	N		26	9.7	
351	11	160-165	cf Protothaca staminea	Fragment with umbo	Y		1	0 2	
351	11	160-165	Unidentified bivalve	Valve body fragment	N		29	15.8	
351	11	160-165	Mytilidae	Valve body fragment	N		185	11.6	
351	11	160-165	Unidentified bivalve	Fragment with lateral tooth	N		1	0.2	
351	11	160-165	Mytilidae	Valve body fragment	N		21	1.6	burned
351	11	160-165	Mytilidae	Fragment with umbo	Y		9	1.1	
351	11	160-165	Nucella sp.	Whorl fragment	N		4	0.7	
351	11	160-165	Nucella sp.	Spire fragment	N		1	0.2	
351	11	160-165	Nucella sp.	Spire top	Y		1	1.0	
351	11	160-165	Unidentified bivalve	Valve body fragment	N		24	5.3	burned
351	11	160-165	Balanidae	Unidentified body plate fragment	N		10	0.8	
356	11	105-110	Unidentified bivalve	Valve body fragment	N		11	2.0	
356	11	105-110	Unidentified bivalve	Valve body fragment	N		5	1.2	
356	11	105-110	Unidentified bivalve	Fragment with umbo	Y		1	0.5	
356	11	105-110	Clinocardium sp.	Valve body fragment	N		1	0.2	
356	11	105-110	Unidentified bivalve	Fragment with lateral tooth	N		1	0.5	
356	11	105-110	cf Protothaca staminea	Valve body fragment	N		1	0.1	
356	11	105-110	Mytilidae	Valve body fragment	N		9	0.7	
356	11	105-110	Balanidae	Unidentified body plate fragment	N		2	0.1	
364	14	250-255	Unidentified bivalve	Valve body fragment	N		34	7.6	
364	14	250-255	cf Semibalanus cariosus	Unidentified body plate fragment	N		1	0.2	
364	14	250-255	Mytilidae	Valve body fragment	N		2	0.3	
364	14	250-255	Clinocardium sp.	Valve body fragment	N		2	0.5	
364	14	250-255	cf Protothaca staminea	Valve body fragment	N		7	3.5	
364	14	250-255	Balanidae	Unidentified body plate fragment	N		3	0.3	
364	14	250-255	Unidentified bivalve	Valve body fragment	N		1	0 3	
364	14	250-255	Mytilidae	Valve body fragment	N		6	0.5	
364	14	250-255	Unidentified bivalve	Valve body fragment	N		1	0 3	
377	14	230-240	Balanidae	Unidentified body plate fragment	N		2	0.1	
377	14	230-240	cf Protothaca staminea	Almost whole	Y	1R, 1L	2	0.2	
377	14	230-240	Saxidomus giganteus	Almost whole	Y	1R, 1L	2	35.0	
377	14	230-240	Unidentified bivalve	Fragment with lateral tooth	N		5	14.2	
377	14	230-240	Clinocardium sp.	Valve body fragment	N		13	6 9	
377	14	230-240	Macoma sp	Fragment with umbo	Y		1	0.1	
377	14	230-240	Nucella sp.	Spire fragment	N		2	0.6	
377	14	230-240	Nucella sp.	Whorl fragment	N		3	0 5	
377	14	230-240	cf Protothaca staminea	Fragment with umbo	Y		1	0 5	
377	14	230-240	cf Protothaca staminea	Valve body fragment	N		24	9 2	
377	14	230-240	Unidentified bivalve	Fragment with umbo	Y		2	0.4	
377	14	230-240	Clinocardium sp.	Fragment with umbo	Y		1	0.5	
377	14	230-240	Unidentified bivalve	Valve body fragment	N		34	20.6	
377	14	230-240	Mytilidae	Valve body fragment	N		68	6.4	
377	14	230-240	Mytilidae	Fragment with umbo	Y		2	0.4	
385	6	225-235	Balanidae	Unidentified body plate fragment	N		17	1.3	
385	6	225-235	Mytilidae	Fragment with umbo	Y		29	3 3	
385	6	225-235	Clinocardium sp.	Valve body fragment	N		1	0.6	
385	6	225-235	cf Protothaca staminea	Valve body fragment	N		2	1.1	

Table F-7. Shell Analysis Data, Site 45SN393.

Cat #	Tr. #	Depth (cmbs)	Taxon	Shell Portion	Lmk. For MNI	Valve Side	Qty	Weight (g)	Comments
385	6	225-235	Mytilidae	Valve body fragment	N		275	14.0	
385	6	225-235	Mytilidae	Fragment with umbo	Y		5	0.6	
385	6	225-235	Unidentified bivalve	Valve body fragment	N		3	1.1	
385	6	225-235	Mytilidae	Valve body fragment	N		9	0.9	
385	6	225-235	Nucella sp.	Whorl fragment	N		2	1.2	
385	6	225-235	Unidentified bivalve	Valve body fragment	N		2	0.8	
385	6	225-235	Balanidae	Unidentified body plate fragment	N		7	0.5	
386	14	180-190	Unidentified bivalve	Fragment with lateral tooth	N		1	1.0	
386	14	180-190	Mytilidae	Valve body fragment	N		24	1.8	
386	14	180-190	Unidentified bivalve	Valve body fragment	N		16	3.7	
386	14	180-190	Unidentified bivalve	Fragment with umbo	Y		3	0.5	
386	14	180-190	cf Protothaca staminea	Valve body fragment	N		3	0.5	
386	14	180-190	Clinocardium sp.	Valve body fragment	N		2	1.0	
386	14	180-190	Mytilidae	Fragment with umbo	Y		1	0.2	
386	14	180-190	Unidentified bivalve	Valve body fragment	N		1	0.8	
396	14	240-250	Mytilidae	Fragment with umbo	Y		1	0.2	
396	14	240-250	Unidentified bivalve	Fragment with umbo	Y		1	0.2	
396	14	240-250	Nucella sp.	Whorl fragment	N		3	0.8	
396	14	240-250	cf Protothaca staminea	Valve body fragment	N		7	2.4	
396	14	240-250	Clinocardium sp.	Valve body fragment	N		1	0.3	
396	14	240-250	Unidentified bivalve	Valve body fragment	N		26	10.0	
396	14	240-250	Mytilidae	Valve body fragment	N		13	1.2	
396	14	240-250	Unidentified bivalve	Fragment with lateral tooth	N		2	0.2	
396	14	240-250	Balanidae	Unidentified body plate fragment	N		1	0.1	
403	14	205-208	cf Protothaca staminea	Valve body fragment	N		6	3.6	
403	14	205-208	Unidentified bivalve	Fragment with lateral tooth	N		2	0.8	
403	14	205-208	cf Protothaca staminea	Almost whole	Y	1R	1	5.9	2 frags.
403	14	205-208	Unidentified bivalve	Valve body fragment	N		4	1.8	
403	14	205-208	Mytilidae	Valve body fragment	N		1	0.1	
403	14	205-208	Clinocardium sp.	Valve body fragment	N		4	0.8	
411	14	230-235	cf Protothaca staminea	Almost whole	Y	2L	2	3.0	
411	14	230-235	cf Protothaca staminea	Valve body fragment	N		9	6.9	
411	14	230-235	cf Protothaca staminea	Fragment with lateral tooth	N		2	1.2	
411	14	230-235	Unidentified bivalve	Valve body fragment	N		27	12.0	
411	14	230-235	Unidentified bivalve	Fragment with umbo	Y		2	0.5	
411	14	230-235	Unidentified bivalve	Fragment with lateral tooth	N		6	4.2	
411	14	230-235	Mytilidae	Fragment with umbo	Y		1	0.3	
411	14	230-235	Clinocardium sp.	Valve body fragment	N		12	12.5	
411	14	230-235	Clinocardium sp.	Fragment wi h lateral tooth	N		1	1.1	
411	14	230-235	Nucella sp.	Spire fragment	N		1	0.4	
411	14	230-235	Nucella sp.	Almost whole	Y		1	0.2	
411	14	230-235	Mytilidae	Valve body fragment	N		28	2.3	
411	14	230-235	Nucella sp.	Whorl fragment	N		12	9.9	
411	14	230-235	cf Semibalanus cariosus	Unidentified body plate fragment	N		1	1.1	
411	14	230-235	Balanidae	Unidentified body plate fragment	N		1	<0.1	
411	14	230-235	cf Protothaca staminea	Whole	Y	1R	1	0.2	
411	14	230-235	Saxidomus giganteus	Whole	Y	1L	1	15.2	
411	14	230-235	Tresus sp.	Fragment with lateral tooth	Y	1L	1	37.1	

Table F-7. Shell Analysis Data, Site 45SN393.

Cat #	Tr. #	Depth (cmbs)	Taxon	Shell Portion	Lmk. For MNI	Valve Side	Qty	Weight (g)	Comments
411	14	230-235	Nucella sp.	Spire top	Y		1	0.4	
422	14	190-200	Unidentified bivalve	Valve body fragment	N		9	3.0	
422	14	190-200	Unidentified bivalve	Fragment with lateral tooth	N		2	0.5	
422	14	190-200	cf Protothaca staminea	Valve body fragment	N		3	1.6	
422	14	190-200	Clinocardium sp.	Valve body fragment	N		1	0.3	
422	14	190-200	Mytilidae	Valve body fragment	N		13	0.5	
422	14	190-200	cf Semibalanus cariosus	Unidentified body plate fragment	N		1	2.7	
422	14	190-200	Balanidae	Unidentified body plate fragment	N		1	<0.1	
428	14	200-210	Unidentified bivalve	Valve body fragment	N		10	4.7	
428	14	200-210	Nucella sp.	Spire top	Y		1	0.5	
428	14	200-210	cf Protothaca staminea	Valve body fragment	N		4	4.2	
428	14	200-210	Tresus sp.	Fragment with umbo and chond.	Y		2	2 0	
428	14	200-210	Clinocardium sp.	Valve body fragment	N		1	0 8	
428	14	200-210	Unidentified bivalve	Fragment with lateral tooth	N		2	3.5	
435	6	175-185	Unidentified bivalve	Fragment with lateral tooth	N		1	0.8	
435	6	175-185	Unidentified bivalve	Valve body fragment	N		7	1.7	
435	6	175-185	cf Protothaca staminea	Valve body fragment	N		2	0.7	
435	6	175-185	Nucella sp.	Whole	Y		1	0.9	
435	6	175-185	Unidentified bivalve	Fragment with umbo	Y		2	0.5	
444	8	215-220	Unidentified shell	Unidentified fragment	N		3	<0.1	
444	8	215-220	Balanidae	Unidentified body plate fragment	N		1	<0.1	
444	8	215-220	Unidentified bivalve	Valve body fragment	N		7	1 9	
451	14	170-180	cf Protothaca staminea	Valve body fragment	N		2	1.0	
451	14	170-180	Mytilidae	Valve body fragment	N		2	0.3	
451	14	170-180	Unidentified bivalve	Valve body fragment	N		8	4.7	
459	14	240-245	Unidentified bivalve	Valve body fragment	N		28	15.9	
459	14	240-245	cf Protothaca staminea	Valve body fragment	N		10	2.4	
459	14	240-245	Nucella sp.	Whorl fragment	N		6	1.3	
459	14	240-245	Mytilidae	Valve body fragment	N		12	0.6	
459	14	240-245	Unidentified shell	Unidentified fragment	N		2	0.1	
459	14	240-245	Clinocardium sp.	Valve body fragment	N		2	0.2	
459	14	240-245	Nucella sp.	Spire fragment	Y		1	0 2	
477	6	210-245	Unidentified bivalve	Fragment with lateral tooth	N		1	2.7	
477	6	210-245	Nucella sp.	Whorl fragment	N		2	0.7	
477	6	210-245	Balanidae	Unidentified body plate fragment	N		2	0.3	
477	6	210-245	Clinocardium sp.	Valve body fragment	N		3	1.0	
477	6	210-245	Unidentified shell	Unidentified fragment	N		1	<0.1	
477	6	210-245	Unidentified bivalve	Valve body fragment	N		18	6.6	
495	12	6.75-7	Unidentified bivalve	Fragment with umbo and lat. too h	Y		2	0.5	
495	12	6.75-7	Unidentified bivalve	Valve body fragment	N		14	6.3	
495	12	6.75-7	cf Protothaca staminea	Valve body fragment	N		3	0.8	
502	12	4.75-5.0	Unidentified bivalve	Valve body fragment	N		3	0.9	
502	12	4.75-5.0	cf Protothaca staminea	Almost whole	Y	1R 1L	2	3.7	
502	12	4.75-5.0	cf Protothaca staminea	Valve body fragment	N		5	3.0	
508	12	6.42-6.75	Unidentified bivalve	Valve body fragment	N		33	10.3	
508	12	6.42-6.75	cf Protothaca staminea	Valve body fragment	N		19	4.8	
508	12	6.42-6.75	Unidentified bivalve	Fragment with umbo and lat. too h	Y		2	0.2	
508	12	6.42-6.75	Unidentified bivalve	Fragment with lateral tooth	N		1	<0.1	

Table F-7. Shell Analysis Data, Site 45SN393.

Cat #	Tr. #	Depth (cmbs)	Taxon	Shell Portion	Lmk. For MNI	Valve Side	Qty	Weight (g)	Comments
517	12	4	Unidentified shell	Unidentified fragment	N		3	0.9	
523	12	6 08-6.42	Unidentified bivalve	Valve body fragment	N		13	3.0	
523	12	6 08-6.42	Nucella sp.	Whorl fragment	N		7	2.5	
523	12	6 08-6.42	cf Protothaca staminea	Valve body fragment	N		10	2.7	
523	12	6 08-6.42	Unidentified bivalve	Fragment with umbo and lat. tooth	Y		3	0.9	
523	12	6 08-6.42	Nucella sp.	Spire fragment	N		2	1.2	
523	12	6 08-6.42	Mytilidae	Valve body fragment	N		1	0.1	
523	12	6 08-6.42	Clinocardium sp.	Valve body fragment	N		7	3.6	
534	12	3.63-4.0	Unidentified bivalve	Fragment with umbo and lat. tooth	Y		1	<0.1	
534	12	3.63-4.0	Unidentified bivalve	Valve body fragment	N		7	2.8	
534	12	3.63-4.0	cf Protothaca staminea	Valve body fragment	N		1	0.4	
549	12	5.75-6.08	cf Protothaca staminea	Valve body fragment	N		1	0.1	
549	12	5.75-6.08	Unidentified bivalve	Valve body fragment	N		12	7.5	
549	12	5.75-6.08	Nucella sp.	Whorl fragment	N		3	0.9	
549	12	5.75-6.08	Clinocardium sp.	Fragment wi h lateral tooth	N		1	0.4	
556	23	7	Unidentified bivalve	Fragment with umbo	Y		1	0.1	
556	23	7	Clinocardium sp.	Valve body fragment	N		8	3.5	
556	23	7	Unidentified bivalve	Valve body fragment	N		20	6.4	
556	23	7	Mytilidae	Valve body fragment	N		1	0.2	
562	25	6.66-7.0	Nucella sp.	Whorl fragment	N		5	2.9	
562	25	6.66-7.0	Unidentified bivalve	Unidentified fragment	N		1	0.5	
562	25	6.66-7.0	Clinocardium sp.	Valve body fragment	N		3	1.1	
562	25	6.66-7.0	Balanidae	Unidentified body plate fragment	N		3	0.7	
562	25	6.66-7.0	Unidentified bivalve	Valve body fragment	N		34	13.0	
562	25	6.66-7.0	Unidentified bivalve	Fragment with lateral tooth	N		2	1.2	
562	25	6.66-7.0	Nucella sp.	Spire fragment	N		1	2.4	
562	25	6.66-7.0	Unidentified bivalve	Fragment with umbo and lat. tooth	Y		2	1.6	
568	23	6.66-7.0	Nucella sp.	Whorl fragment	N		3	0.9	
568	23	6.66-7.0	Clinocardium sp.	Valve body fragment	N		1	0.2	
568	23	6.66-7.0	Unidentified bivalve	Fragment with lateral tooth	N		2	1.2	
568	23	6.66-7.0	Unidentified bivalve	Valve body fragment	N		20	5.9	
568	23	6.66-7.0	Balanidae	Unidentified body plate fragment	N		3	0.5	
568	23	6.66-7.0	Mytilidae	Valve body fragment	N		3	0.3	
574	25	6 33-6.66	Balanidae	Unidentified body plate fragment	N		1	<0.1	
574	25	6 33-6.66	Unidentified bivalve	Valve body fragment	N		16	4.5	
574	25	6 33-6.66	Nucella sp.	Spire fragment	N		1	0.4	
581	23	6 33-6.66	cf Semibalanus cariosus	Unidentified body plate fragment	N		1	3.4	
581	23	6 33-6.66	cf Semibalanus cariosus	Unidentified body plate fragment	N		2	1.2	burned
581	23	6 33-6.66	Unidentified bivalve	Valve body fragment	N		11	4.9	
589	42	5 08-5.75	Unidentified shell	Unidentified fragment	N		1	0.8	
589	42	5 08-5.75	Unidentified bivalve	Valve body fragment	N		1	0.4	
594	42	4.5-4.83	cf Protothaca staminea	Valve body fragment	N		3	0.8	
594	42	4.5-4.83	Nucella sp.	Spire top	Y		1	1.4	
594	42	4.5-4.83	Unidentified bivalve	Fragment with umbo and lat. tooth	Y		1	0.6	
594	42	4.5-4.83	Clinocardium sp.	Valve body fragment	N		1	0.4	
594	42	4.5-4.83	Unidentified bivalve	Valve body fragment	N		7	5.5	
603	33	6.83-7.0	Unidentified bivalve	Fragment with lateral tooth	N		4	1.8	
603	33	6.83-7.0	Unidentified bivalve	Fragment with umbo and lat. tooth	Y		1	0.5	

Table F-7. Shell Analysis Data, Site 45SN393.

Cat #	Tr. #	Depth (cmbs)	Taxon	Shell Portion	Lmk. For MNI	Valve Side	Qty	Weight (g)	Comments
603	33	6.83-7.0	Unidentified bivalve	Valve body fragment	N		27	7.6	
603	33	6.83-7.0	Nucella sp.	Whorl fragment	N		2	0 8	
603	33	6.83-7.0	Unidentified shell	Unidentified fragment	N		1	0 3	burned
603	33	6.83-7.0	cf Protothaca staminea	Valve body fragment	N		2	0.7	
603	33	6.83-7.0	cf Semibalanus cariosus	Unidentified body plate fragment	N		3	1.3	
603	33	6.83-7.0	Unidentified bivalve	Fragment with umbo	Y		1	0.8	
603	33	6.83-7.0	Mytilidae	Valve body fragment	N		1	0.2	
610	33	6.5-6.83	Unidentified bivalve	Fragment with lateral tooth	N		1	0.2	
618	33	8.0-8.29	Unidentified bivalve	Fragment with umbo	N		1	0.6	
618	33	8.0-8.29	Unidentified shell	Unidentified fragment	N		1	0.4	
618	33	8.0-8.29	Nucella sp.	Spire top	Y		1	1 3	
618	33	8.0-8.29	Nucella sp.	Whorl fragment	N		8	1 5	
618	33	8.0-8.29	Unidentified bivalve	Valve body fragment	N		4	1.6	
626	42	4.83-5.0	Nucella sp.	Spire fragment	N		1	0 8	
626	42	4.83-5.0	Nucella sp.	Whorl fragment	N		1	0.1	
626	42	4.83-5.0	cf Protothaca staminea	Valve body fragment	N		2	0.5	
626	42	4.83-5.0	Unidentified bivalve	Valve body fragment	N		19	4.8	
632	42	5.83-6.17	Unidentified bivalve	Valve body fragment	N		18	5.6	
632	42	5.83-6.17	Clinocardium sp.	Valve body fragment	N		2	1 2	
632	42	5.83-6.17	cf Protothaca staminea	Valve body fragment	N		6	3.7	
632	42	5.83-6.17	cf Protothaca staminea	Fragment with umbo	Y		1	1.9	
632	42	5.83-6.17	Unidentified bivalve	Fragment with lateral tooth	N		1	0.7	
638	42	6.17-6.5	Clinocardium sp.	Valve body fragment	N		4	2.4	
638	42	6.17-6.5	cf Protothaca staminea	Valve body fragment	N		7	2.5	
638	42	6.17-6.5	Unidentified bivalve	Valve body fragment	N		29	15.8	
638	42	6.17-6.5	Unidentified shell	Unidentified fragment	N		1	0.4	
638	42	6.17-6.5	Unidentified bivalve	Fragment with lateral tooth	N		2	0.7	
638	42	6.17-6.5	Nucella sp.	Spire fragment	N		2	0.6	
638	42	6.17-6.5	Unidentified bivalve	Fragment with lateral tooth	N		1	1.4	
638	42	6.17-6.5	Balanidae	Unidentified body plate fragment	N		2	0.2	
638	42	6.17-6.5	Mytilidae	Valve body fragment	N		5	0.6	
638	42	6.17-6.5	Tresus sp.	Fragment with umbo and chond.	Y		1	0 3	
638	42	6.17-6.5	Nucella sp.	Whorl fragment	N		4	2.1	
645	42	6.5-6.83	Clinocardium sp.	Valve body fragment	Y		7	2.7	
645	42	6.5-6.83	Nucella sp.	Whorl fragment	N		3	1.1	
645	42	6.5-6.83	cf Protothaca staminea	Valve body fragment	N		8	2.5	
645	42	6.5-6.83	Unidentified bivalve	Valve body fragment	N		19	7.3	
645	42	6.5-6.83	Unidentified bivalve	Fragment with umbo and lat. too h	N		4	2.0	
645	42	6.5-6.83	Unidentified bivalve	Fragment with lateral tooth	N		1	1.8	
645	42	6.5-6.83	cf Protothaca staminea	Fragment with umbo	N		1	0 5	
652	42	6.83-7.0	Unidentified bivalve	Valve body fragment	N		14	20.1	
652	42	6.83-7.0	Unidentified bivalve	Fragment with umbo and lat. too h	Y		7	3.3	
652	42	6.83-7.0	Nucella sp.	Spire fragment	N		1	0.4	
652	42	6.83-7.0	Unidentified bivalve	Fragment with lateral tooth	N		56	1.9	
652	42	6.83-7.0	cf Protothaca staminea	Valve body fragment	N		6	2.8	
652	42	6.83-7.0	Clinocardium sp.	Valve body fragment	N		2	0.5	
652	42	6.83-7.0	Nucella sp.	Whorl fragment	N		7	3.1	
659	43	4.33-4.66	Unidentified bivalve	Fragment with lateral tooth	N		3	6.2	

Table F-7. Shell Analysis Data, Site 45SN393.

Cat #	Tr. #	Depth (cmbs)	Taxon	Shell Portion	Lmk. For MNI	Valve Side	Qty	Weight (g)	Comments
659	43	4 33-4.66	Unidentified bivalve	Valve body fragment	N		12	3.6	
659	43	4 33-4.66	Unidentified bivalve	Fragment with umbo	Y		1	0.2	
659	43	4 33-4.66	Balanidae	Unidentified body plate fragment	N		1	0.1	
665	43	4.66-5.0	Unidentified bivalve	Valve body fragment	N		1	0.4	
677	50	6.92-7.0	cf Protothaca staminea	Valve body fragment	N		1	0.7	
677	50	6.92-7.0	Unidentified bivalve	Fragment with lateral tooth	N		1	0.1	burned
677	50	6.92-7.0	Unidentified bivalve	Fragment with umbo	Y		1	0.3	
677	50	6.92-7.0	Unidentified bivalve	Valve body fragment	N		10	4.1	
686	50	7 58-7.92	Unidentified bivalve	Valve body fragment	N		22	8.6	
686	50	7 58-7.92	Polinices sp.	Whorl fragment	Y		1	0.2	
686	50	7 58-7.92	Mytilidae	Valve body fragment	N		1	0.2	
686	50	7 58-7.92	Clinocardium sp.	Valve body fragment	N		1	0.3	
686	50	7 58-7.92	Nucella sp.	Whorl fragment	N		3	2.9	
686	50	7 58-7.92	Nucella sp.	Spire fragment	N		1	0.4	
686	50	7 58-7.92	Tresus sp.	Fragment wi h chrond.	Y		1	0.6	
686	50	7 58-7.92	Balanidae	Unidentified body plate fragment	N		4	0.6	
691	50	7 92-8.25	Unidentified bivalve	Valve body fragment	N		12	4.0	
691	50	7 92-8.25	Nucella sp.	Whorl fragment	N		1	0.4	
691	50	7 92-8.25	Nucella sp.	Whole	Y		1	0.3	
691	50	7 92-8.25	Unidentified bivalve	Fragment with lateral tooth	N		1	<0.1	
691	50	7 92-8.25	Nucella sp.	Spire fragment	N		1	0.6	
691	50	7 92-8.25	Clinocardium sp.	Valve body fragment	N		7	2.4	
691	50	7 92-8.25	cf Protothaca staminea	Valve body fragment	N		1	0.1	
698	50	8 25-8.58	Unidentified shell	Unidentified fragment	N		1	0.4	
698	50	8 25-8.58	Unidentified bivalve	Valve body fragment	N		16	6.6	
698	50	8 25-8.58	Clinocardium sp.	Valve body fragment	N		2	0.5	
698	50	8 25-8.58	Nucella sp.	Whorl fragment	N		1	0.4	
698	50	8 25-8.58	cf Protothaca staminea	Valve body fragment	N		3	1.0	
706	55	7 92-8.25	Nucella sp.	Spire top	Y		2	2.5	
706	55	7 92-8.25	cf Protothaca staminea	Fragment wi h lateral tooth	N		1	0.3	
706	55	7 92-8.25	Unidentified bivalve	Fragment with lateral tooth	N		1	0.3	
706	55	7 92-8.25	cf Protothaca staminea	Valve body fragment	N		1	0.9	
706	55	7 92-8.25	Nucella sp.	Whorl fragment	N		2	0.5	
706	55	7 92-8.25	Unidentified shell	Unidentified fragment	N		6	1.5	
714	55	8 25-8.58	Unidentified bivalve	Fragment with lateral tooth	N		8	15.2	
714	55	8 25-8.58	Saxidomus giganteus	Fragment with umbo and lat. tooth	Y		1	3.1	
714	55	8 25-8.58	cf Protothaca staminea	Fragment with umbo and lat. tooth	Y		1	0.2	
714	55	8 25-8.58	Unidentified bivalve	Valve body fragment	N		3	0.6	
714	55	8 25-8.58	Nucella sp.	Whorl fragment	N		6	2.6	
714	55	8 25-8.58	Unidentifed bivalve	Valve body fragment	N		65	27.4	
714	55	8 25-8.58	Unidentified bivalve	Fragment with lateral tooth	N		6	2.1	
714	55	8 25-8.58	cf Protothaca staminea	Valve body fragment	N		22	6.7	
714	55	8 25-8.58	Clinocardium sp.	Valve body fragment	N		5	4.1	
714	55	8 25-8.58	Mytilidae	Valve body fragment	N		1	0.1	
714	55	8 25-8.58	Nucella sp.	Spire top	Y		1	0.4	
714	55	8.25-8.58	Nucella sp.	Almost whole	Y		1	0.8	
714	55	8 25-8.58	Nucella sp.	Spire fragment	N		1	0.2	
722	55	8 58-8.92	Unidentified bivalve	Fragment with lateral tooth	N		4	30.6	

Table F-7. Shell Analysis Data, Site 45SN393.

Cat #	Tr. #	Depth (cmbs)	Taxon	Shell Portion	Lmk. For MNI	Valve Side	Qty	Weight (g)	Comments
722	55	8.58-8.92	Clinocardium sp.	Valve body fragment	N		6	2 2	
722	55	8.58-8.92	Nucella sp.	Whorl fragment	N		1	0 3	
722	55	8.58-8.92	Unidentified bivalve	Fragment with umbo and lat. too h	Y		2	1.2	
722	55	8.58-8.92	cf Protothaca staminea	Valve body fragment	N		10	3.6	
722	55	8.58-8.92	Unidentified bivalve	Valve body fragment	N		43	30.6	
728	46	9	Unidentified bivalve	Valve body fragment	N		6	1.1	
756	80	4	Nucella sp.	Whorl fragment	N		2	0.6	
756	80	4	Unidentified bivalve	Valve body fragment	N		8	2 2	
762	80	6.33-6.5	Clinocardium sp.	Valve body fragment	N		1	0 3	
762	80	6.33-6.5	Unidentified bivalve	Fragment with lateral tooth	N		2	1.0	
762	80	6.33-6.5	Unidentified bivalve	Valve body fragment	N		3	1.8	
768	80	4.79-5.0	Nucella sp.	Whorl fragment	N		1	0 2	
768	80	4.79-5.0	Balanidae	Unidentified body plate fragment	N		2	0 3	
768	80	4.79-5.0	Unidentified shell	Unidentified fragment	N		1	0.6	
768	80	4.79-5.0	Unidentified bivalve	Valve body fragment	N		10	3 2	
774	80	6.0-6.33	Unidentified bivalve	Valve body fragment	N		27	11 9	
774	80	6.0-6.33	Unidentified bivalve	Fragment with umbo and lat. tooth	Y		3	1.1	
774	80	6.0-6.33	cf Protothaca staminea	Valve body fragment	N		3	1 0	
774	80	6.0-6.33	Clinocardium sp.	Valve body fragment	N		7	2.4	
774	80	6.0-6.33	Nucella sp.	Whorl fragment	N		3	0.7	
774	80	6.0-6.33	Unidentified bivalve	Fragment with lateral tooth	N		1	0 3	
774	80	6.0-6.33	Nucella sp.	Whole	Y		1	6.1	2 frags.
780	5	3.67-4.0	Nucella sp.	Whorl fragment	N		3	0 8	
780	5	3.67-4.0	Clinocardium sp.	Valve body fragment	N		5	1 5	
780	5	3.67-4.0	Unidentified bivalve	Fragment with lateral tooth	N		1	1.9	
780	5	3.67-4.0	Unidentified bivalve	Valve body fragment	N		19	12.8	

APPENDIX G: Botanical Analysis

Plant Remains from 45 SN 393, Mukilteo Ferry Terminal Project, Snohomish County, Washington

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Plant Remains from 45 SN 393, Mukilteo Ferry Terminal Project, Snohomish County, Washington

Introduction

This report details the analysis of carbonized plant remains from sediment samples from 45 SN 393. Northwest Archaeological Associates submitted fourteen soil samples for flotation and analysis.

The site, 45 SN 393, is located in Snohomish County adjacent to the town of Mukilteo on Elliot Point, a shoreline landform on the east shore of Possession Sound in northern Puget Sound. The soil samples, from 0.9 to 2.8 liters in volume, were taken from four deep test trenches (Trenches 5, 6, 11, and 14) at depths ranging from 1-3 meters below the surface. Plant remains were extracted by flotation from a total of 26.5 liters of soil.

The site is within the Puget Sound Douglas-fir vegetation zone occupying the lowlands around Puget Sound in the rain shadow of the Olympic Mountains. Characteristic of the zone is a temperate rainforest dominated by Douglas-fir (*Pseudotsuga menzies*ii), western redcedar (*Thuja plicata*), and western hemlock (*Tsuga heterophylla*), with bigleaf maple (*Acer macrophyllm*) on moist sites, and madrone (*Arbutus menziesii*) along the shorelines and on drained, sunny slopes.

Methods

Fourteen sediment samples from 45 SN 393 were logged in and assigned paleoethnobotany lab numbers 111-124 for ease of reference. In an earlier analysis (Johannessen 2006), the sediment samples were divided in half and the larger charcoal fragments in one of the sample halves were examined and assessed for radiocarbon dating. In that analysis, the sample halves analyzed were assigned paleoethnobotany lab numbers 94-107. In the present analysis, the divided sediment samples were reunited and measured and floated as one. Thus the numbers of the fourteen samples in this report are #94/111 through #107/124. The data from the charcoal extracted in the previous analysis was also added to the data from the flotation analysis, so that the data presented here detail all the plant remains from each of the original 14 samples.

In the flotation process, the sediment volume was first measured (in liters) and recorded. The flotation system used is a manual system in which the sediment is gently agitated in water until all of the light fraction has been floated off the surface and caught in fine mesh fabric (aperture 0.5mm). The heavy fraction is then washed onto window screen and the remaining soil rinsed with a fine spray.

The resultant light and heavy fractions of each sample are then dried. The heavy fractions, which in this case were generally large and consisting of abundant pebbles, gravel, shell fragments, and occasionally bone and other materials, were then sorted and examined for any plant remains that did not float. First, the heavy fraction was passed through a 4.7mm sieve, and any shell, bone, and charcoal fragments in the larger fraction removed. The smaller fraction was scanned and any charcoal picked out. Any shell and bone from the >4.7mm fraction was weighed, and any charcoal removed was added to the light fraction.

The light fraction was first passed through a 2.0mm sieve. The larger fragments in the >2mm fraction are first examined under low magnification (10X). Any fresh plant material is removed, and the carbonized plant remains are sorted into categories, e.g., wood, seed, amorphous tissue. Each category is weighed and the fragments counted. Then the <2.0mm fraction is systematically sorted under at least 15X magnification. All seeds, seed/fruit fragments, and other material that may have diagnostic characteristics are removed. The numerous wood charcoal fragments in the <2.0mm fraction are not removed, as they are too numerous and too small to be identified.

Thus, the analyzed plant remains from a flotation sample consist of all material >2.0mm in size, as well as the seeds, seed/fruit fragments, and any other diagnostic material from the <2.mm fraction.

Carbonized wood fragments are identified by examination of their internal structure at 30X-45X magnification, using standard texts (Core *et al*. 1976, Panshin and de Zeeuw 1970) and by comparison to specimens in a reference collection. At least 20 fragments of wood picked randomly from each sample are identified. A reference collection and standard texts are also used in seed identification (Delorit 1970, Martin and Barkley 1961, Montgomery 1977).

Results

In general, the flotation samples from 45 SN 393 are characterized by large heavy fractions made up of pebbles and coarse gravel, abundant shell fragments, a few small bones and bone fragments. Most also had a few spalled fragments of fire-cracked cobbles. Several of the samples had varying amounts of volcanic ash, which floated into the light fractions.

All samples yielded some plant remains, generally made up largely of carbonized (and in some cases uncarbonized) wood and bark. Twelve of the fourteen samples also yielded small seeds, mostly from weedy annual plants, but with a few from small fruits. Most of the samples (especially from Trenches 5,6 and 11) also yielded amorphous fragments of plant tissue most likely from starchy plant parts or processed plants. Another feature of the flotation analysis was the presence in many of the samples of clumps of carbonized

insect eggs. These plant categories (wood, seed, and other) are discussed in more detail below.

Wood

In general, coniferous wood dominated the assemblage, making up about half of the identified fragments (see Table 1). Various hardwood taxa made up a further 26% of the assemblage, and most samples also contained a considerable amount of bark (20% overall).

Douglas fir was the most commonly occurring coniferous wood (in 11 of the 14 samples), followed by western redcedar (also in 11 of the 14 samples), hemlock (in 7 samples) and yew (in four samples). Fragments tentatively identified as pine (in 1 sample) and spruce (in one sample) also occurred.

The most common hardwood type was from the birch family, including birch and alder (in 7 of 14 samples). Maple also occurred in 7 of the 14 samples, but generally in smaller quantities than alder. The assemblage also yielded four unidentified taxa of diffuse-porous hardwood wood; these do not match any of the major hardwood types in the area, and are probably from shrubs or understory trees.

The assemblage is generally reflective of the dominant trees of Puget Sound area forests. Major tree types not identified in the Mukilteo assemblage are the willow family (poplar and willow), and, most conspicuously, madrone (*Arbutus menziesii*).

Table 1. Summary of Mukilteo Wood Assemblage

Taxon	**% of Identified fragments (n=696)**
Major types in order of abundance:	
Coniferous (not further identifiable)	22.6%
Bark	20.3
Douglas fir (*Pseudotsuga menziesii*)	16.2
Birch/alder (Betulaceae)	13.0
Hardwood (not further identifiable)	6.3
Western redcedar (*Thuja plicata*)	6.2
Small hardwoods (Types A, B, C, and D)	4.5
Hemlock (*Tsuga* sp.)	5.5
Maple (*Acer* sp.)	1.9
Yew (*Taxus* sp.)	1.0
(Total	97.5%)
General categories:	
Coniferous wood	52%
Hardwoods	26%
Bark	20%
(Total	98%)

Seeds

Small carbonized seeds (almost all from the <2mm fraction) were fairly common in the flotation samples; all but two of the samples contained seeds. Table 2 lists the taxa in order of the number of samples in which that taxon occurred. This is considered to be a better measure of comparative abundance than the percentage of the total seeds, since a large number of seeds of a particular taxon may occur in a single sample. For example, a type of knotweed seed makes up 35% of all seeds recovered, but they occurred only in a single sample, whereas bedstraw and goosefoot seeds occurred in about half the samples, though in lower numbers.

The most commonly occurring seeds are bedstraw and goosefoot. Bedstraw, or cleavers, is an annual plant with sprawling bristly stems. The small burrs also are covered with hooked bristles. It is common in open and disturbed moist habitats at low elevations. Goosefoot, or lamb's quarters, is also an annual inhabiting open and disturbed habitats.

Also occurring in multiple samples are elderberry, a type of sedge seed, and a type of grass seed. The sedge family (Cyperaceae) contains several general genera, the largest of which are the sedges (*Carex* spp.) and the bulrushes (*Scirpus* spp.). The seed type in the Mukilteo samples most resembles *Scirpus*. This family occurs in open wet habitats such as marshes, wet meadows and swamps. The grass seed type in the samples is a long thin grooved seed with a basal embryo, most similar to genera in the barley tribe (Hordeae), such as wheatgrass (*Agropyron)*, ryegrass (*Lolium)* and dunegrass (*Elymus.)*

Occurring in a concentration in a single sample from the bottom of Trench 14 were a number of small seeds, all distorted and eroded. The curved embryo and pointed apex triangular in cross-section suggest a type of knotweed. A number of seeds of a type in the mustard family, as well goosefoot and sedge/bulrush seeds, also occurred in this sample. Knotweeds and mustards are weedy annuals commonly inhabiting open, disturbed moist habitats.

Table 2. Seeds/fruits from the Mukilteo samples (all seeds are carbonized)

Taxon	**# samples in which present (total=14)**	**% of total seeds (n=330)**
Goosefoot (*Chenopodium* sp.)	8	29%
Bedstraw (*Galium* sp.)	7	14%
Grass Type 1 (Poaceae, cf. Hordeae)	3	5%
Sedge/bulrush (Cyperaceae)	3	2%
Elderberry (*Sambucus* sp.)	3	1%
Unknown Type A (possibly a knotweed, cf. *Polygonum* sp.)	2	2%
Knotweed? (cf. *Polygonum* sp.)	1	35%
Mustard family (Brassicaceae)	1	2%
Blackberry (*Rubus* sp.)	1	<1%
Unknown Type B (possible grass)	1	<1%
Unidentifiable seed/fruit	8	9%

Other

Two other categories of materials were common in the flotation samples. First, many of the samples in Trenches 5, 6 and 11 contained fragments of amorphous, bubbly plant tissue. This appearance is typical of carbonized starchy plant parts (the starch cells burst when heated), and possibly of processed plant tissues. The Trench 14 samples did not yield any of these starchy/processed plant fragments.

Another category of material typical of the site was carbonized clumps of insect eggs, which appear throughout Trenches, 5, 6 and 11 (again virtually absent from Trench 14). These are all of the same type; small (ca. 1mm) cylindrical bodies with blunt ends, most often stuck together in clumps, but also occurring singly in the <1mm fraction. The identification of these would be helpful in understanding their presence in these deposits.

Sample descriptions

The detailed results of the analysis of the samples are shown in Table 3. Each sample is further described and discussed below.

Lab #94/111. Catalogue #320/484. Trench 5, 215-225 cmbs. This sediment sample (2.1 liters) consisted of coarse dark grayish sand and pebbles, with very abundant shell (92g)and crushed shell and a few bone fragments (1.85g). When floated, the light fraction was full of a light-gray, fibrous volcanic ash, which hardened when dry to a crusty matrix from which the charcoal had to be picked by hand. After the charcoal was removed, the large ash residue from the light fraction weighed 88g.

The sample yielded a moderate amount of carbonized plant remains (8.13g), almost entirely of wood and bark. The wood charcoal was very various, made up of at least six taxa of hardwoods and softwoods, including alder, Douglas fir, hemlock, Western redcedar, yew, and maple. Also recovered were one *Galium* seed and a fragment of amorphous tissue with large irregular vacuoles, which may be from a starchy plant part or some kind of processed plant tissue.

Lab #95/112. Catalogue #321/483. Trench 5, 255-265 cmbs. This 2.2 liter sediment sample consisted of coarse dark sand and pebbles, again with abundant shell (unusually large fragments) (82g), no bone, and one large cobble that appears fire-cracked. The light fraction was only slightly ashy, yielding an ash residue of five grams.

The sample had sparse carbonized plant remains (1.41g). These were almost entirely bark and wood, including Douglas fir, yew, and two taxa of broad-leafed shrubs. The sample also contained 1 fragment of a fleshy fruit, and 2 fragments of amorphous starchy plant tissue.

Also present was a small clump of carbonized insect eggs. These insect eggs proved to be common in many of the samples from this site.

Lab #96/113. Catalogue #322/480; Trench 6, 190-200 cmbs. This 1.35-liter sediment sample consisted of dark coarse sand and pebbles, with abundant shell (54g) and a few bone fragments (0.45g). The light fraction was slightly ashy, yielding an ash residue of 5.4 grams.

Almost half of the wood in this sample was uncarbonized or partially carbonized; this uncarbonized material was either bark or compressed and distorted coniferous wood. The carbonized plant material was sparse (1.92g), and made up mostly of wood, including the wood of Western redcedar, Douglas fir, and alder. The sample also yielded one *Galium* seed, and a few fragments of the amorphous starchy or processed plant tissue that occurs throughout the samples from this site.

Lab #97/114. Catalogue #323/485. Trench 6, 218-223 cmbs . This 2.5-liter sediment sample had a number of unusual characteristics. It consisted of coarse dark sand and pebbles with a very large quantity shell fragments (of unusual type) (216 grams), a number of large spongy bone fragments (9.4 grams), and several spalled fragments of fire-cracked cobbles. The sample contained no ash.

The plant remains were also unusual. The dark organic material proved to be fragments and thin layers of carbonized and partially carbonized wood (Douglas fir) embedded in what looks like a decayed, non-structural, uncarbonized organic matrix. When floated, the sample yielded abundant charred plant remains, consisting almost entirely of Douglas fir. This is an unusually homogenous wood assemblage. The sample also contained abundant insect egg clumps, many starchy plant tissue fragments, and fairly abundant seeds, including *Galium*, goosefoot, a type that may be a knotweed species (cf. *Polygonum* sp.), and a grass Type 1.

The unusual characteristics of this sample indicate a primary deposition context (e.g. a feature) of a particular function, in contrast to the more mixed and generalized contents of most of the other samples.

Lab #98/115. Catalogue #324/465. Trench 6, 295-305 cmbs, Base of Feature 2. This sediment sample (1.6 l) consisted of coarse dark sand , very little shell and no bone.

The sample contained a moderate amount of plant material (5.76g), which was unusually clean charcoal with no uncharred or fresh material. The wood remains consisted largely of alder, although small amounts of maple, Douglas fir, yew and Western redcedar were present, as well as bark. Insect egg clumps were common, as well as a few fragments of starchy/processed plant tissue and three seeds, of which only a goosefoot seed (*Chenopodium* sp.) was identifiable.

Table 3. Plant Remains from the Mukilteo Flotation Samples

General description: Ash and ash residue wt. in Light fraction. O.S.= orange stain on charcoal	Very ashy 88.0g	Slight -ly ashy 5.0g	Slight -ly ashy 5.4g		Base Of Pit Fea.			Trace ash	Char-coal Samp.		Trace ash O.S.	Very ashy 25.2g O.S.	Very ashy 36.4g O.S.	O.S.	
Lab numbers	**94 & 111**	**95 & 112**	**96 & 113**	**97 & 114**	**98 & 115**	**99 & 116**	**100 & 117**	**101 & 118**	**102 & 119**	**103 & 120**	**104 & 121**	**105 & 122**	**106 & 123**	**107 & 124**	**Totals**
Catalogue numbers	320 & 484	321 & 483	322 & 480	323 & 485	324 & 465	325 & 462	326 & 467	327 & 463	328 & 464	329 & 479	330 & 488	331 & 482	332 & 481	333 & 486	
Trench	**5**	**5**	**6**	**6**	**6**	**11**	**11**	**11**	**11**	**14**	**14**	**14**	**14**	**14**	
Level (cmbs)	**215-225**	**255-265**	**190-200**	**218-223**	**295-305**	**108-112**	**135-140**	**162-168**	**192-200**	**180-190**	**205-208**	**230-235**	**240-245**	**245-250**	
Soil sample size (liters)	2.1	2.2	1.35	2.5	1.6	0.9	2.8	2.0	1.25	2.2	2.0	1.8	1.8	2.0	26.5 liters
Total charcoal wt (g)	8.13	1.41	1.92	31.63	5.67	3.09	29.86	16.50	36.75	3.39	5.61	4.30	5.29	21.18	174.73g
Total # fragments	407	180	175	800	438	420	2000	1539	1205	440	445	382	268	730	9429
WOOD															
No. fragments examined & wt (g)	69 4 24g	47 0 69g	37 0 99g	57 5 56g	45 2 94g	48 02 10g	49 4 94g	57 3 17g	64 9 94g	45 0 88g	50 1 75g	46 2 04g	54 2 52g	60 9 36g	728 51 12g
Acer sp. (maple)	1 0 08g				2 0 04g	3? 0 10g		1 0 03g	2 0 10g				3 0 02g		12 0 37g
Acer macrophyllum (bigleaf maple)												1 0 07g			1 0 07g
Alnus sp. (alder)	11 1 07g		1 0 01g		33 3 06g					3 0 08g					48 4 22g
Betulaceae (birch family: alder/birch)					9 0 21g	1 0 01g			27 7 54g				6 0 41g		43 8 17g
Cf. Picea (spruce?)									2 0 09g						2 0 09g
Pinus sp. (pine)														2 0 60g	2 0 60g
Pseudotsuga menziesii (Douglas-fir)	7 0 52g	8 0 15g	1 0 01g	35 3 85g	3 0 14g		31 2 49g	9 0 37g	3 0 20g		4 0 17g		9? 0 77g	3 0 09g	113 8 76g
Cf. *Taxus* sp. (yew)	2 0 18g	2? 0 03g			2 0 06g									1 0 02g	7 0 29g
Thuja plicata (Western redcedar)	5 0 32g		2 0 02g		2 0 06g	2 0 04g	14 1 34g	2 0 05g	4 0 48g		5? 0 17g	2 0 08g	1 0 01g	4 0 16g	43 2 73g
Tsuga heterophylla (hemlock)	5 0 53g							13 0 69g		4 0 19g	1 0.01g	6 0 33g	2 0 02g	7 0 92g	38 2 69g

Table 3, continued

Lab numbers	**94 & 111**	**95 & 112**	**96 & 113**	**97 & 114**	**98 & 115**	**99 & 116**	**100 & 117**	**101 & 118**	**102 & 119**	**103 & 120**	**104 & 121**	**105 & 122**	**106 & 123**	**107 & 124**	**Totals**
Trench	**5**	**5**	**6**	**6**	**6**	**11**	**11**	**11**	**11**	**14**	**14**	**14**	**14**	**14**	
Level (cmbs)	**215-225**	**255-265**	**190-200**	**218-223**	**295-305**	**108-112**	**135-140**	**162-168**	**192-200**	**180-190**	**205-208**	**230-235**	**240-245**	**245-250**	
Semi-ring-porous D (cf. *Alnus* sp.)		1 0 02g				7 0 05g			3 0 11g			2 0 22g			13 0 40g
Diffuse-porous "A" (Cf. *Crataegus* sp.)									1 0 15g						1 0 15g
Diffuse-porous "B"									3 0 28g						3 0 28g
Diffuse-porous "C"		4 0 07g				3 0 08g						1 0 18g	6 0 69g		14 1 02g
Unidentifiable diffuse-porous	7 0 10g		5 0 17g	1 0 03g	3 0 03g	6 0 13g			7 0 24g	2 0 02g	3 0.04		9 0 16g	1 0 01g	44 0 93g
Stem/twig, cf. dicot	1 0 23g						4 0 71g								5 0 94g
Unidentifiable coniferous	14 0 50g	5 0 03g	17 0 50g		1 0 01g	15 0 23g		16 1 31g	8 0 63g	19 0 26g	25 0 86g	19 0 61g	11 0 21g	7 0 43g	157 5 58g
Unidentifiable wood	4 0 20	8 0 08g	7 0 09g							5 0 03			4 0 17g		28 0 57g
root					2 0 61g		7 0 40g								9 1 01g
Bark	11 0 36g	19 0 22g	4 0 06g		7 0 20g	11 0 34g		16 0 72g		8 0 30g	12 0 50g	15 0 55g	3 0 06g	35 7 13g	141 10 44g
>2.0mm OTHER															
Insect egg clumps		1 0 01g		52 0 86g	11 0 11g		65 1 10g		35 0 33g						164 2 41g
Amorphous bubbly tissue/starchy/PET	1 0 15g	2 0 01g	4 0 09g	6 0 15g	3 0 21g	34 0 20g	1 0 01g								51 0 82g
<2.0 mm fraction SEED/FRUIT															
Chenopodium sp. (goosefoot seeds)				4	1	19	2		18	1	1			52	98
Brassicaceae (mustard family)														8	8
Cyperaceae (sedge family)						1			2					2	5
Galium sp. (bedstraw, cleavers)	1		1	7		10	19	5		2					45
Poaceae Type 1 cf. Hordeae (grass family, cf. barley tribe)				2		14				1					17

Table 3, continued

Trench	**5**	**5**	**6**	**6**	**6**	**11**	**11**	**11**	**11**	**14**	**14**	**14**	**14**	**14**	
Level (cmbs)	**215-225**	**255-265**	**190-200**	**218-223**	**295-305**	**108-112**	**135-140**	**162-168**	**192-200**	**180-190**	**205-208**	**230-235**	**240-245**	**245-250**	
Lab numbers	**94 & 111**	**95 & 112**	**96 & 113**	**97 & 114**	**98 & 115**	**99 & 116**	**100 & 117**	**101 & 118**	**102 & 119**	**103 & 120**	**104 & 121**	**105 & 122**	**106 & 123**	**107 & 124**	**Totals**
Type C cf. *Polygonum* sp. (knotweed)														115	115
Rubus sp. (blackberry/raspberry								1							1
Sambucus sp. (elderberry)								1	2					1	4
Unknown Type A				4				2							6
Unknown Type B								1							1
Unidentifiable seed/fruit		1	2	3	2		10	5	2	5					30
Globular seed-like bodies				32					1						33
<2.0 mm fraction OTHER															
Insect egg cluster					13		120	4			2				139
Amorphous bubbly tissue/starchy/PET				11	3	80		5	7						106

Lab #99/116 Catalogue #325/462. Trench 11, 108-112 cmbs. This small sediment sample (0.9g) consisted of coarse dark sand with pebbles and a small amount of mostly crushed shell, and a few bone fragments, some of which appears burnt.

The sample yielded a moderate amount of carbonized plant remains (3.09g), consisting mostly of wood (including maple, birch/alder, western redcedar and two hardwood types probably from small broad-leafed trees or shrubs). This sample is notable for containing very abundant fragments of starchy/processed plant tissue and abundant seeds, including goosefoot, bedstraw, sedge or rush, and the grass (Type 1) that occurs throughout these samples.

Lab #100/117. Catalogue #326/467. Trench 11, 135-140 cmbs. This large sediment sample (2.8 liters) consisted of coarse dark sand with pebbles, a relatively small amount of shell (20g), and a few bone fragments (0.13g).

The plant remains from this sample are notable for being very abundant (29.86g). Most are clean chunks of wood charcoal, although the sample also contained a fair amount of uncharred and partially charred wood fragments. The wood remains are unusually homogeneous, including only Douglas fir and western redcedar (no bark), as well as a number of small-diameter root sections. The sample also contained an unusually large number of the carbonized insect egg clusters, as well as bedstraw and goosefoot seeds.

Lab #101/118. Catalogue #327/463. Trench 11, 162-168 cmbs. This 2.0-liter sample consisted of coarse dark sand with pebbles, abundant shell fragments (89g), a few bone fragments (0.21g), and one spalled fragment of a fire-cracked cobble. The light fraction contained a trace of volcanic ash.

Plant remains are abundant (16.50g). The wood was almost entirely coniferous, including hemlock, Douglas fir and Western redcedar, but one fragment of maple was identified. The sample contained a few carbonized insect clusters and fragments of starchy/processed plant tissue, and 15 seeds, including the weedy annuals bedstraw, possible knotweed (Type A, cf. *Polygonum* sp.), and grass, as well as fruit seeds from a berry (*Rubus* sp.) and elderberry (*Sambucus*).

Lab #102/119. Catalogue #328/464. Trench 11, 192-200 cmbs. This 1.25-liter sediment sample was soil with unusually few pebbles, no shell or bone, and several large spalled pieces of fire-cracked cobble.

Plant remains are very abundant in this sample, made up largely of a very diverse wood assemblage. The main wood type is birch/alder, but at least three coniferous taxa (Douglas fir, western redcedar and possibly spruce) are represented, as well as four hardwood taxa (maple, and Types A, B, and D). Insect egg clusters are very

common in this sample, as well as seeds, including goosefoot, sedge/rush, grass, and elderberry.

Lab #103/120. Catalogue #329/479. Trench 14, 180-190 cmbs. This 2.2-liter sediment sample (1742.1g) from the upper levels of Trench 14 consisted of coarse dark sand with a small amount of shell (20g) and a few bone fragments (0.23).

Moderate amounts of plant remains ((3.39g) were recovered, mostly wood charcoal (hemlock and alder) and bark, and a few seeds, including cleavers, goosefoot, and a grass seed.

Lab #104/121. Catalogue #330/488. Trench 14, 205-208 cmbs. This sediment sample (2.0-liters) consisted of coarse dark sand and pebbles with a moderate amount of shell (40g) and a few bone fragments (0.67g). The light fraction showed a trace of volcanic ash.

The sample yielded moderate a amount (5.61g) of plant remains. The wood charcoal was made up of several coniferous taxa (Douglas fir, hemlock, and western redcedar) and bark fragments. The charcoal fragments are not clean as in some other samples- many have an orange stain on the exterior, which looks like an organic growth. One goosefoot seed was also recovered.

Lab #105/122. Catalogue #331/482. Trench 14, 230-235 cmbs. This sediment sample (1.8 liters) consisted of dark coarse sand and pebbles with abundant shell (132g) and a few bone fragments (0.55g). This was a very ashy sample, with 25.2g of ash residue in the light fraction.

The moderate amount of plant remains (4.30g) in this sample consisted only of bark and wood charcoal. Wood taxa identified included hemlock, western redcedar, maple, and two additional hardwood taxa. The charcoal in this sample was also characterized by an orange stain/growth on the exterior. No other types of plant material were recovered.

Lab #106/123. Catalogue #332/481 Trench 14, 240-245 cmbs. This 1.8-liter sediment sample consisted of coarse dark sand with some shell (35g) and no bone. This sample was also very ashy, with a light fraction ash residue of 36.4g.

The sample yielded a moderate amount (5.29g) of carbonized wood and bark. The charcoal shows the orange staining seen elsewhere in Trench 14. At least six wood taxa are represented, including three coniferous (Douglas fir, hemlock and Western redcedar) and three hardwood types. The hardwood taxa are: maple, alder/birch (Betulaceae), and an unidentified hardwood Type C. No seeds or other plant material types were recovered.

Lab #107/124. Catalogue #333/486, Trench 14, 245-250 cmbs. This 2.0-liter sediment sample consisted of dark coarse sand and pebbles with some shell (55g) and a few bone fragments (1.16g), some burnt. In contrast to the samples from just above this, no volcanic ash was evident.

The sample yielded very abundant charcoal (21.18g), consisting of charred wood and bark (the bark fragments are in some cases only partially carbonized). Most of the material is bark, and the rest coniferous wood, including at least five coniferous taxa (Douglas fir, Western redcedar, hemlock, yew, and possibly pine). Notable in this sample was the large numbers of seeds, a total of 178. The most abundant seed type is a type that resembles a knotweed (*Polygonum* sp.), but all the specimens are distorted as though they had been dried or parched. Goosefoot seeds (*Chenopodium* sp.) were also common. Several seeds of a type in the mustard family (Brassicaceae) were also recovered, plus a few of a sedge/rush type (Cyperaceae), and one elderberry seed.

Variability among samples.

Table 4 is a comparison by trench and depth of a number of flotation sample variables: volcanic ash content, shell and bone abundance, amount of charcoal, variability of the wood assemblage, number of seeds, and presence of insect eggs and starchy/processed plant tissue. However, comparing the relative values of the variables among the samples is difficult, since the samples also vary in volume.

To compare the samples to each other quantitatively, we first standardize the samples for volume. In Table 5, the quantities for each variable have been standardized to a 2.0 liter sample size, so that we see for each sample the weight or number of fragments per 2.0 liters of sediment. (The “# of wood taxa” has not been adjusted, since this variable does not necessarily vary with sample size.)

By examining the variability in each category, we can begin to see patterning in the data. In Table 5 the numbers in red mark unusually high or low values for that particular variable. Volcanic ash appears only in Trench 5 (especially heavy at 215-225 cmbs, which has twice as much ash per volume as any other sample), and the top level of Trench 6, and also quite heavily at 230-245 cmbs in Trench 14. Shell fragments are very common in most samples, but occur at more than twice the normal density in the middle layers of Trenches 6 and 14, while the lowest layers of Trenches 6 and 11 have little or no shell. Bone occurs in very small quantities in almost all the samples, the notable exception being at 218-223 cmbs in Trench 6, which shows a concentration of the fragments of large mammal bones.

Table 4 . Comparison of sample variables (unstandardized data)

Depth (cmbs)	Soil volume (liters)	Wt. ash (g) in Light fraction	Shell Wt (g)	Bone wt. (g)	Charcoal wt (g)	# of wood taxa	# seeds	# insect egg clumps (>2.0mm)	# starchy tissue frags (>2.0mm)
TRENCH 5 (PEB #s 94/111 and 95/112)									
215-225	2.1	88.0	91.8	1.85	8.13	11	1	0	1
255-265	2.2	5.0	82.2	0	1.41	7	1	1	2
TRENCH 6 (PEB #s 96/113, 97/114, 98/115)									
190-200	1.35	5.4	54.1	0.45	1.92	7	3	0	4
218-223	2.5	0	215.6	9.43[1]	31.63	2	20	52	6
295-305	1.6	0	2.1	0	5.67	10	3	11	3
TRENCH 11 (PEB #s 99/116, 100/117, 101/118 and 102/119)									
108-112	0.9	0	9.3	0.28	3.09	8	44	0	34
135-140	2.8	0	19.6	0.13	29.86	4	31	65	1
162-168	2.0	trace	89.7	0.21	16.50	6	15	0	0
192-200	1.25	0	0	0	36.75	10	24	35	0
TRENCH 14 (PEB #s 103/120, 104/121, 105/122, 106/123, and 107/124)									
180-190	2.2	0	20.3	0.23	3.39	6	9	0	0
205-208	2.0	trace	40.1	0.67	5.61	7	1	0	0
230-235	1.8	25.2	132.2	0.55	4.30	7	0	0	0
240-245	1.8	36.4	35.0	0	5.29	10	0	0	0
245-250	2.0	0	55.4	1.16	21.18	8	178	0	0

Table 5 Comparison of sample variables (standardized to volume 2.0 liters) (red indicates particularly high or low values)

Depth (cmbs)	Soil volume (liters)	Wt. ash (g) in Light fraction	Shell Wt (g)	Bone wt. (g)	Charcoal wt (g)	# of wood taxa	# seeds	# insect egg clumps (>2.0mm)	# starchy plant frags (>2.0mm)
TRENCH 5 (PEB #s 94/111 and 95/112)									
215-225	2.0	83.6	87.2	1.76	7.72	11	1	0	1
255-265	2.0	4.6	74.8	0	1.28	7	1	1	2
TRENCH 6 (PEB #s 96/113, 97/114, 98/115)									
190-200	2.0	7.8	80.1	0.67	2.89	7	4	0	6
218-223	2.0	0	172.5	7.54	25.30	2	16	42	5
295-305	2.0	0	2.6	0	7.09	10	4	14	4
TRENCH 11 (PEB #s 99/116, 100/117, 101/118 and 102/119)									
108-112	2.0	0	20.6	0.62	6.86	8	98	0	75
135-140	2.0	0	13.9	0.09	21.20	4	22	46	1
162-168	2.0	trace	89.7	0.21	16.50	6	15	0	0
192-200	2.0	0	0	0	58.80	10	38	56	0
TRENCH 14 (PEB #s 103/120, 104/121, 105/122, 106/123, and 107/124)									
180-190	2.0	0	18.5	0.21	3.08	6	8	0	0
205-208	2.0	trace	40.1	0.67	5.61	7	1	0	0
230-235	2.0	28.0	146.7	0.61	4.77	7	0	0	0
240-245	2.0	40.4	38.8	0	5.87	10	0	0	0
245-250	2.0	0	55.4	1.16	21.18	8	178	0	0

[1] large chunks of mammalian bone

In the plant remains, we see in Table 5 that the samples generally contain moderate amounts between about 1 and 7 grams of charcoal per 2 liters of sediment. In contrast, we see unusually heavy concentrations at 218-223 cmbs in Trench 6, throughout most of Trench 11, and at the lowest level of Trench 14. These higher concentrations of wood charcoal generally coincide with the highest numbers of seeds per soil volume; also in 218-223 cmbs in Trench 6, throughout Trench 11, and in the 245-250 cmbs level in Trench 14. Also notable, (although I have no explanation), is the abundance of carbonized insect egg clumps in some of those same levels with high wood charcoal and seed densities: again, 218-223 cmbs in Trench 6, and two of the Trench 11 levels. Lastly, the level at 108-112 cmbs in Trench 11 has an unusual abundance of the amorphous, bubbly fragments of plant tissue that may be from starchy plant parts or plant processing.

The only factors that emerge as being perhaps characteristic of the individual trenches are the heavier concentrations of charcoal and seeds in the Trench 11 samples, and the lack of seeds, insect eggs and amorphous plant tissue in the Trench 14 samples (except at the base). The Trench 14 charcoal was also characterized by the orange stain/growth on their exterior, which perhaps reflects conditions of moisture or acidity that promote fungal growth.

In terms of qualitative variation in the types of plant remains among the samples, most of the samples are similar in having a diverse wood assemblage made up of the major coniferous and hardwood species, plus a few seeds usually including bedstraw and goosefoot. The only samples that stand out are from Trench 6, 218-223 cmbs and Trench 11, 135-140, which both have unusually homogeneous wood remains; and the base of Trench 14, which had a concentration of a seed type that occurred no where else. There is no clear systematic variation in the plant remain assemblage with depth.

Summary and Discussion of 45 SN 393 Paleoethnobotany

Plant remains recovered from fourteen flotation samples from four deep trenches at 45 SN 393 were analyzed. Most samples yielded assemblages of carbonized plant remains that, although of varying quantities, were similar in being composed of a diverse wood assemblage and a few seeds of various weedy annuals.

The wood taxa in the archaeological deposits are reflective of the nearby forests. The dominance of the conifers Douglas fir, western redcedar, hemlock (three types common in other Puget Sound archaeological sites, see Stenholm 2002), together with the hardwoods maple and alder, and broad-leafed shrubs, are similar to the major constituents of the Puget Sound area forests. The archaeological charcoal appears for the most part to be the generalized remains of fuel-wood, gathered relatively indiscriminantly from the forests. Yew (appearing in a few of the archaeological samples) is also grows in the Puget Sound forests, but only as isolated specimens, and it’s inclusion may be from its

technological use, rather than as fuel. The heavy durable wood was considered by all coastal groups to be valuable for carving (Gunther 1945, Pojar and MacKinnon 2004). Madrone, a conspicuous element of the Puget Sound forests, was not identified from this site, and it also seems to be absent from other Northwest coast archaeological wood assemblages. It is a puzzling omission, since madrone is an excellent fuel wood. Pojar and MacKinnon (2004:49) cite a traditional Straits Salish story in which madrone played an important role, and is therefore not used as fuel even up to the present.

While most of the wood assemblages seem to reflect a generalized use of mixed wood types from the surrounding forest for fuel-wood, there is also an example (Trench 6, 218-223 cmbs) of what appears to be a specialized context- rather than mixed wood types we see only thin layers of Douglas fir in an organic matrix that also included a very heavy shell concentration, chunks of burnt mammal bone, and fairly abundant seeds.

The seed types recovered with some regularity for the site include goosefoot (*Chenopodium* sp.), bedstraw or cleavers (*Galium* sp.), a long grooved grass type probably belonging to the barley tribe (Hordeae), seeds of cress or mustard, seeds of sedge or bulrush, and of a probable knotweed species (*Polygonum* sp.). Small fruits are represented by a blackberry/raspberry seed (*Rubus* sp.) and 4 elderberry seeds (*Sambucus* sp.).

The goosefoot, bedstraw, grass, mustard, sedge/bulrush, and knotweed are all weedy annuals that thrive in open, disturbed and/or wet habitats. All would probably have grown in the vicinity of the site. Representatives of these taxa are all known to have economic uses by North American peoples (although Gunther 1945 lists neither a *Chenopodium* nor a *Polygonum* use in her *Ethnobotany of Western Washington*); and their presence due to deliberate gathering and economic use by the inhabitants of the site is plausible. For example, bedstraw often grows abundantly along the driftwood zones of beaches, and Pojar and MacKinnon (2004:330) record use of the dried plants to start fires. I believe the fact that the same few seed types are found repeatedly in a number of contexts at the site indicates that they were part of established cultural practice. However, there is no strong evidence as to whether the seeds were from gathered plants or adventitious inclusion in the cooking fires. The same is true for the fruit seeds – *Rubus* berries and elderberries are well-known food sources of the northwest people, and the seeds may have been from gathered fruits. But the sparse occurrence in the samples is not strong evidence as to whether their inclusion was economic or accidental.

The plant remains from 45 SN 393 establish a tentative and sketchy pattern of plant use by the coastal inhabitants of this site. This tentative pattern includes: generally non-selective use of the local forests for fuel-wood (except for the apparent exclusion of madrone), and the economic use of certain small-seeded weedy annuals as well as berries. Systematic flotation analysis of other coastal sites will clarify this pattern.

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APPENDIX H: Site and Historic Property Records

APPENDIX H:

Site and Historic Property Records contains sensitive cultural resources information that is exempt from public disclosure pursuant to provisions of the Public Records Act (RCW 42.56.300).

APPENDIX I: FTA to SHPO Letter

U.S. Department
of Transportation
**Federal Transit
Administration**

REGION X
Alaska, Idaho, Oregon,
Washington

915 Second Avenue
Federal Bldg. Suite 3142
Seattle, WA 98174-1002
206-220-7954
206-220-7959 (fax)

June 4, 2012

Dr. Allyson Brooks
State Historic Preservation Officer
Department of Archaeological and Historic Preservation
PO Box 48343
Olympia, WA
98504-8343

Re: Washington State Ferries Mukilteo Multimodal Project
Determination of Adverse Effect and
Request for Concurrence
DAHP Log # 040110-29-FTA

Dear Dr. Brooks:

Consistent with the National Historic Preservation Act (NHPA), the Federal Transit Administration (FTA) has determined the Preferred Alternative (Elliot Point 2 Alternative) for the Mukilteo Multimodal Project is an undertaking that would result in an adverse effect to historic resources. The basis for that determination is summarized below. FTA and the Washington State Department of Transportation, Ferries Division (WSF) request your written concurrence with this determination.

The Mukilteo Multimodal Project Draft EIS (January 2012) details the basis for our effect determination, and documents our efforts to identify potentially affected resources and avoidance alternatives. As a cooperating agency under the National Environmental Policy Act and pursuant to its role under the NHPA, DAHP received a copy of the Draft EIS and its supporting documents, including the Cultural Resources Discipline Report. The Draft EIS concluded that all of the alternatives being considered might adversely affect historic resources.

Consultation to Resolve Adverse Effects
Having reached a project-level determination of adverse effect, FTA and WSF are now initiating consultation to resolve the project's adverse effects to specific historic properties. We are advising the Advisory Council for Historic Preservation of the determination and our intent to prepare a Memorandum of Agreement (MOA). We are simultaneously inviting the participation of other parties who have indicated an interest in the project and the potentially affected resources. These parties include the following federally recognized Tribes that have been acting as cooperating agencies in the environmental review and coordination to date: the Samish Indian Tribe, the Stillaguamish Tribe of Washington, the Suquamish Indian Tribe of the Port Madison Reservation, and the Tulalip Tribes of the Tulalip Reservation.

We have also been consulting with other tribes who chose not to participate as cooperating agencies. They received copies of the EIS and invitations to comment on it, and we will be inviting them to participate in preparing the MOA. These tribes include the Lummi Tribe of the Lummi Reservation, the Muckleshoot Indian Tribe of Washington, Nooksack Indian Tribe of Washington, Sauk-Suiattle Indian Tribe of Washington, Snoqualmie Tribe, Swinomish Indians of the Swinomish Reservation, and Upper Skagit Indian Tribe of Washington.

We have also been in contact with other parties that may have in interest in the project's historic resources, and have attached to this letter a list of the additional parties FTA anticipates inviting to participate.

Project Summary
The WSDOT Preferred Alternative (Elliot Point 2) would remove the existing ferry terminal facilities and construct a new ferry terminal with integrated multimodal facilities on the Mukilteo Tank Farm, a nearby waterfront parcel that is currently vacant and was previously used for industrial and military purposes. The new facility would include the development of a new berth for the ferry, passenger and maintenance buildings, toll booths, holding lanes for vehicles, a transit center, parking areas, walkways, and a shoreline esplanade. The project would also improve and extend connecting roadways to the site, and provide lighting and utilities to the site. Some existing or remnant facilities and buildings would be removed, as would the existing ferry terminal facilities.

While several historic properties are within the area to be redeveloped, project designers have been able to site many of the necessary improvements above or outside the known limits of archaeological resources in the area. Since publishing the Draft EIS, WSDOT has identified additional design refinements to Elliot Point 2 to further minimize the risk of disturbance.

Historic Properties Affected
45SN404 – Old Mukilteo Townsite (OMT); determined NRHP eligible per Criterion D
45SN108 – Point Elliott Treaty Site (PETS); determined National Register of Historic Places (NRHP) eligible per Criteria A, B, and D
45SN393 – Mukilteo Shoreline Site (MSS); determined NRHP eligible per Criterion D

Continuing consultation is required to determine the appropriateness, adequacy, scale, schedule, and methodology for resolving or avoiding adverse effects to these properties. As directed by the NHPA, a Memorandum of Agreement will be developed that seeks to resolve adverse effects to historic properties by detailing *adverse effect resolution*, stipulating *measures to avoid adverse effects*, and including a *treatment plan to guide actions* during future design and construction activities.

Old Mukilteo Townsite
We anticipate direct adverse effects to this property arising from the construction of retaining walls on the First Street extension, installation of stormwater ponds and other facilities, installation of utilities, and potential foundation footings for retaining walls. Avoidance may be an option for some elements, such as utilities, and data recovery would also be an option for resolution of other adverse effects to Old Mukilteo Townsite.

Point Elliott Treaty Site
The EIS did not identify likely adverse effects to the Point Elliott Treaty Site. However, fill would help avoid any potential effects to archaeological resources relating to the treaty signing. In addition, due to the sensitivity of the site to tribal members, the project could also employ context-sensitive design, public education, and/or commemorative project elements. The goal would be to recognize the

importance of the site to tribes and avoid adversely affecting characteristics related to broad historical patterns and significant persons.

Mukilteo Shoreline Site
Adverse effects would come from disturbing the artifacts within this site. To resolve them, the project intends to (a) avoid the known horizontal and vertical limits of the site, and (b) place engineered fill to encapsulate and protect areas within the site. Still, we recognize that construction activities could intersect with intact or sensitive materials that were not anticipated, such as site limit extensions or within previously disturbed areas.

Request for Concurrence
FTA requests your concurrence with the Adverse Effect Determination within 30 days. As always, we would appreciate any comments or suggestions relating to the participation of other consulting parties in developing an MOA. We will keep you informed about the project on a regular basis, and will provide you with all correspondence between us and the identified Native American tribes and other interested parties.

We are asking other invited consulting parties to respond with their interest in participating no later than July 9 to allow us to initiate formal consultation and allow multiple opportunities for the participants to develop the MOA approach.

To brief DAHP staff, Tribes, and other invited parties, FTA and WSDOT will host a pre-consultation meeting focusing on the Preferred Alternative and recent design refinements during the week of June 25th. We will send a separate invitation to that event. At that meeting, we plan to outline our approach to resolving adverse effects and offer a proposed schedule for developing an MOA with DAHP and the other consulting parties. We anticipate formal MOA coordination to begin in mid-July.

Thank you for your ongoing help with this project. If you have any questions, please contact Dan Drais of my office at 206.220.4465 or at daniel.drais@dot.gov. You may also contact Michael Chidley, WSDOT Cultural Resources Specialist 206.440.4525 or at chidlem@wsdot.wa.gov, or Paul Krueger, WSDOT Project Environmental Manager, at 206.805.2892 or kruegep@wsdot.wa.gov. Additional information about the project and its Preferred Alternative, as well as a summary of public comments received during the Draft EIS review period earlier this year can be found at: http://www.wsdot.wa.gov/projects/ferries/mukilteoterminal/multimodal/.

Sincerely,

Linda M Gehrke

R.F. Krochalis
Regional Administrator

cc: Nicole McIntosh, WSF

Attachment 1
Potential Additional Consulting Parties – Section 106 Process

In addition to DAHP and interested federally-recognized tribes that have already been invited to participate in the Section 106 process, the following organizations have been identified as potentially interested consulting parties for the Mukilteo Multimodal Project.

Yoshiaki G. Takemura
Japanese American Issei Pioneer Museum
36001 Hood Canal Drive NE
Hansville, WA 98340

Bif Brigman
Japanese Cultural & Community Center of Washington
1414 South Weller Street
Seattle, WA 98144

The Honorable Cecile Hansen
Duwamish Tribe
4717 W. Marginal Way
Seattle , WA 98106

The Honorable Mike Evans
Snohomish Tribe of Indians
11014 19th Avenue SE, Suite 8, PMB 101
Everett WA 98208

Valerie Steel, President
Historic Everett
2112 Rucker Avenue #8
Everett, WA 98201

Jan Meston
City of Everett Historical Commission
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Wendy Becker
Snohomish County Historic Preservation Commission
3000 Rockefeller, MS 411
Everett, WA 98201

Lisa Romo, President
Mukilteo Historic Society
304 Lincoln Avenue, Suite 101
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Doug Allbright
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507 Symington Drive
Scott AFB IL 62225-5022