APPENDIX 6.1
SHELL REMAINS FROM THE CASTLE HILL MIDDEN, SIT-002
(Nora R. Foster)

Shell Remains from the Castle Hill Midden, SIT-002

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Introduction

I am a co-investigator in a project which seeks to determine whether nonindigenous species are being introduced into Prince William Sound through tanker ballast water. One major question we have is the status of the softshell clam, *Mya arenaria*. It was supposed to have been introduced to the west coast of North America in the 1880's, first in San Francisco Bay, and subsequently farther north. We are suspicious of it status as an introduced species, because it is so common and abundant on the Alaskan coast from Southeast Alaska to the Seward Peninsula. One way to determine if the species is native to Alaska or introduced is to examine shell from middens and other archaeological deposits. Its presence in archaeological sites would indicate that the clam had been harvested in Alaska before the 1880's.

Samples from the Sitka Castle Hill Midden were among the samples from coastal sites requested to screen for the presence of *Mya arenaria*. Even though softshell clams were not found, a brief description of the species present may contribute toward understanding the environment and people's use of marine resources.

Methods

Field and laboratory methods for processing samples are described in the letter to received with the samples. (attached)

Seven bags of sediments and shell fragments were received January 23, 2000 at the University of Alaska Museum, Fairbanks. The contents of each bag was spread on a try and sorted to remove recognizable shell fragments from rock and other sediments. The shell fragments were sorted and identified. Minimum number of individuals (MNI) for each taxon was determined based on bivalve hinges, whole shells or columellas of gastropods, or the distinctive posterior most valve of the chiton *Katherina tunicata*. Barnacle (*Semibalanus cariosus*) and sea urchin (*Strongylocentrotus* sp.) fragments, while distinctive, could not be quantified.

Results were entered into Excel Tables for comparisons among samples.

Results

Seven bags were examined, representing three (?) sites: Upper Switchback, Upper Trail, and Upper Trail (lower level). (Table 1) Sample volume varied between 0.4 and 4.2 liters. With the exception of sample 98-5, which was almost devoid of shell fragments, the species richness and MNI generally varied directly with sample size. (Table 2). The number of taxa distinguished varied from 4 in sample 98-4 to 13 in 98-8. Radiocarbon dates were given as 460 +/- 40 years B.P. to 1070 +/- 60 B.P.

Eleven taxa could be distinguished to the species level. (Table 2) In some cases, bivalve hinges could not be distinguished beyond the family level. These probably represented a mixture of *Protothaca staminea* and *Saxidomus giganteus* (Veneridae) or the cardiid, *Clinocardium nuttallii*. Large hinge fragments from *Mytilus californianus* could be distinguished, but the smaller *Mytilus* hinges could represent either small individuals of *M. californianus* or *M. trossulus*.

In all samples, Venerids (*Protothaca / Saxidomus*), *Mytilus*, and *Katherina tunicata* fragments accounted for over 80% of the MNI counts. Within these three groups, *Katherina tunicata* accounted for less than 10% of MNI in all samples except 98-8 (13%). (Table 3).

All species are known from the Sitka area, and occur in upper to mid intertidal zone on rock or in sediments between beach cobbles. *Mya arenaria* was not present in this sample, however, the species present are more associated with open coast and rubble- sand beaches than with the sheltered upper inter intertidal habitat of *Mya*.

catalog #	sample #	volume (liters)	mass (grams)	location	radiocarbon date
10794	98-9	2.6	2511.7	shell midden upper trail lower level 80 cm B.S.	460 B.P.
10802	98-10	0.5	743.8	upper trail, 80 cm B.S.	
10793	98-1	2.4	2762.9	shell midden upper switchback	640 +/- 50 B.P.
10799	98-2	2.7	2268.4	shell midden upper switchback	
10803	98-11	0.4	696.3	shell midden upper switchback	
10795	98-5	1.8	1396.9	upper trail compact organic soil	1070+/- 60 B.P.
10796	98-8	4.2	2349.7	shell midden upper trail	

Table 1. summary of samples

MNI

sample number	98-9	98-9	98-10	98-10	98-11	98-11	98-1	98-1	98-2	98-2	98-5	98-5	98-8	98-8
	MNI	% of total MNI	MNI	% of total MNI	MNI	% of total MNI	MNI	% of total MNI	MNI	% of total MNI	MNI	% of total MNI	MNI	% of total MNI
CHITONS														
Katharina tunicata	6	7%	2	9%	2	7%	2	3%	3	6%			11	13%
Cryptochiton stelleri													1	1%
BIVALVES														
Mytilus californianus	5	6%					4	5%	2	4%				
Mytilus trossulus	38	42%	8	35%	4	14%	27	34%	18	34%	1		15	18%
Clinocardium nuttallii	p						p		p				p	
Saxidomus giganteus	9	10%	3	13%	13	45%	13	16%	9	17%	p		20	24%
Protothaca staminea	6	7%	3	13%	1	3%	13	16%	5	9%	p		11	13%
Veneridae	20	22%	7	30%	7	24%	20	25%	13	25%			22	26%
Cardiidae					1	3%								
unidentified	3	3%			1	3%			2	4%			1	1%
GASTROPOS														
Littorina sitkana	3	3%							1	2%			1	1%
Nucella lima													1	1%
unidentified													1	1%
BARNACLE														
Semibalanus cariosus	p		p		p		p		p		p		p	
URCHIN														
Strongylocentrotus sp.	p		p				p		p				p	
no. taxa	11		7		8		9		11		4		13	
total MNI	90		23		29		79		53		1		84	
volume (liters)	2.6		0.5		0.4		2.4		2.7		1.8		4.2	
mass (grams)	2511.7		743.8		696.3		2762.9		2268.4		1396.9		2349.7	
radiocarbon date (B.P.)	460						640				1070			
p = present, but could not be counted														

Table 2. Species composition by sample

	sample number							
taxon	98-9	98-10	98-11	98-1	98-2	98-8		
Mytilus	48%	35%	14%	39%	38%	18%		
Veneridae	39%	57%	72%	58%	51%	63%		
Katharina	7%	9%	7%	3%	6%	13%		
other	7%		7%		6%	6%		

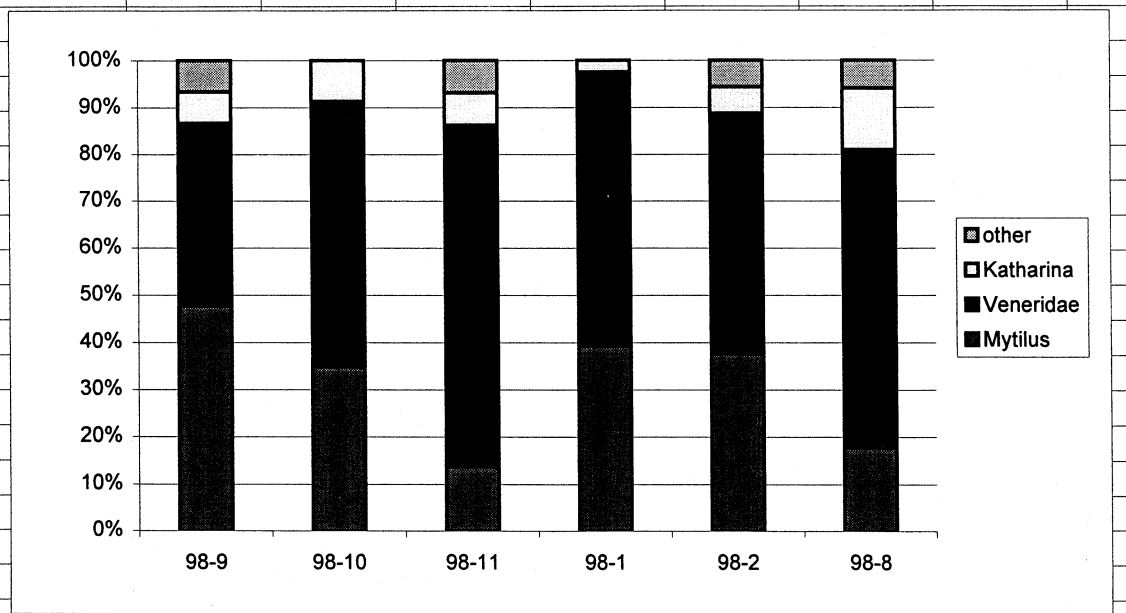

Table 3. Major taxa by percent

Methods:

During trail construction at Castle Hill, a backhoe inadvertently exposed a presumed prehistoric shell midden deposit. Prior to Russian occupation of the site in 1804, the site (*Noow Tlein*) was inhabited by the Kiksadi Tlingit (refer to our web site at http://www.dnr.state.ak.us/parks/oha_web/castle~1.htm for a detailed history. Eleven samples were collected in 1-gallon or quart ziplocks, of which seven are enclosed. The remaining 4 samples (in 1-gallon ziplocks) can be sent to you upon request.

Field Methods
Shovels and trowels were used to further expose the midden, and samples were collected for laboratory processing. The exposed midden was initially believed to be a relatively thin deposit, so early samples are not identified to a particular level. When it was realized that the deposit had depth, samples were arbitrarily separated into 3 levels (indicated on the bags or forms when available).

Lab Methods
Samples were placed in a FLOTECH water flotation device to remove flotable (light fraction) materials. Light fractions included wood charcoal which was used to date 3 of the samples (indicated on forms in individual bags). Heavy fractions consist of materials that did not float (i.e., mineral matter, shell, etc.) and were collected from a 300 micron mesh. All of the enclosed samples are "heavy fractions" although it is probable that they include bits of dense charcoal and "near flotables" that weren't recovered initially.