

Section 5 Faunal Analysis

5.1 Methodology

Following the completion of fieldwork, all collected samples were analyzed using standard archaeological laboratory techniques. Bulk sediments collected from discrete sampling were screened through 1/8 inch wire mesh. Screening methods were dependent on the soil texture and composition. Samples containing higher sand content were dry screened and samples containing higher clay content were wet screened. Faunal vertebrate material collected individually during excavations were cleaned, if needed, using a dry toothbrush.

The faunal material was sorted into several different categories: Mammalian/ Aves (Bird)/ Osteichthyes (Fish)/ Chelonioida (Turtle)/ Chondrichthyes (Shark)/ Marine Mollusk Shell/ Crustacea (Decapoda)/ and Echinoidea. When possible, specimens were identified to Class/Family and/or species.

Each specimen was analyzed for evidence of cultural modification and for its historic or traditional Hawaiian context. Faunal material collected individually during excavations were tabulated separately (see Appendix A) than faunal material collected during discrete sampling from a test excavation trench wall or floor.

Terrestrial faunal tables (material collected individually during excavation and dry screened in the field to confirm the remains were either human or non-human) were included in a test excavation discussion if it contained four or more species/Class. Midden tables were included in a test excavation discussion if the test excavation contained a strong midden signature. Most of the test excavations tabulated directly correspond to the cultural resources (SIHP #s) documented. SIHP charts were created to illustrate the general categories of fauna consumed to aid in a comparative discussion between cultural resources.

Primary vertebrate and marine fauna identifications were conducted by a forensic and biological anthropologist/ archaeologist with extensive experience in osteology and Hawai'i marine fauna. Skeletal reference collections of Polynesian-introduced and post-Contact species were used. Marine mollusk shell identifications were conducted using (Kay 1979). This book is accepted as a standard reference within Hawaiian archaeology for marine fauna. Vertebrate reference books accepted within the professions were also used: Bass (2005); Dye and Longenecker (2004); Scheuer and Black (2000); Schmid (1972); Simon (1987), and White and Folkens (2005).

Secondary marine mollusk shell identifications were conducted by a General Manager/ Senior Archaeologist from Cultural Surveys Hawaii, LLC. The General Manager verified and agreed with the primary identifications.

Secondary vertebrate identifications were conducted by Dr. Sara Collins, Lead Archaeologist from Pacific Consulting Services, Inc. on February 1, 2013. Dr. Collins verified and agreed with the primary identifications.

Tertiary vertebrate identifications were conducted at The Bernice Pauahi Bishop Museum. The Osteichthyes and mammalian collections were used on February 20, 2013. The fish

collection was useful in the identification of previously unidentified fish spines. Spelling of Hawaiian fish names is consistent with Pukui and Elbert (1986).

5.2 Mammalian/ Aves (Bird)/ Osteichthyes (Fish)/ Chelonioidea (Turtle)/ Chondrichthyes (Shark)/ Marine Mollusk Shell/Crustacea (Decapoda)/Echinoidea

This section provides an overview of how the fauna material was classified and a brief discussion about habitats for the common and uncommon marine fauna collected during the Archaeological Inventory Survey for the Honolulu High-Capacity Transit Corridor Project for the City Center (Section 4).

Fauna material and classifications: Mammals: Polynesian-introduced Canidae, Suidae, and Muridae (possibly the Polynesian Rat *Rattus exulans*). *Rattus* sp. designation was used for all rat bones that belong to the smaller sized rat genera. The larger rat bones were identified as post-Contact *Rattus norvegicus*. Other post-Contact mammals include Felidae, Bovidae (cow, sheep, and goat), and Equidae (horse) (Hammett et al. 2000; Riper and Riper 1982). Aves: (unidentified bird), Duck (*Anas platyrhynchos domesticus*), and Red Jungle fowl/chicken (*Gallus gallus*). Osteichthyes: (unidentified and identified species). Chelonioidea: Green sea turtle (*Chelonia mydas*). Chondrichthyes: (unidentified shark teeth). Marine mollusk shells: (unidentified and identified Family/species), Crustacea (Decapoda), and Echinoidea (varies species).

Common marine mollusks such as *Turbo sandwicensis* and *Strombus* sp. dwell in shallow sandy portions of the coast that are protected from the surf. Conidae exist on benches fringing the shorelines. Tellinidae and *Brachidontes crebristriatus* thrives on rocks and rock shelves within intertidal zones. Rocky substrates and tide-pools provide shelter for *Nerita picea* and *Theodoxus neglectus*, *Theodoxus vespertinus* (which migrate between freshwater and saltwater), *Cellana* sp., Cypraeidae, and *Cypraea caputserpentis* (Hammatt et al. 2000; Kay 1979).

Echinoidea such as *Echinometra mathaei*, *Echinothrix diadema*, and *Heterocentrotus mamillatus* were present in the midden and non-midden assemblages. The sea urchin within the non-midden assemblage reflects a sandy marine environment (Hammatt et al. 2000:179).

Crustacea (not identified further) was present in the midden and non-midden assemblages. The crustacean within the non-midden assemblage reflects a sandy marine environment along the coast (Hammatt et al. 2000:179)

Chelonioidea *Chelonia mydas* was represented only once in the whole assemblage by a possible cranial fragment (0.7g) from Test Excavation 124. It is not known as to why turtles are so uncommon in Hawaiian midden assemblages considering the abundance of the species. Dr. Ziegler, referenced in (Hammatt et al. 2000:158-59) states that "...the essential absence of this type of large marine reptile...seems strange. Possibly, such turtles were commonly taken but...the large heavy individuals were always cooked at a particular spot along the shore...and little if any bone material was carried along with the cooked meat for consumption...."

In the following sections, test excavations are organized by geographical zones. Only test excavations that contained faunal material are discussed individually (within its SIHP #, if applicable).

5.3 Faunal Analysis for West Kalihi (Test Excavations 1-20A)

T-001

One bulk sediment sample was collected from Test Excavation 1, Stratum II, at a depth of 1.80-2.40 mbs. Faunal analysis of this stratum identified non-midden marine mollusk shells from various families and species: *Isognomon* sp. (5.1 g), Tellinidae (3.5 g), *Tellina palatam* (1.1 g), *Tellina* sp. (0.4 g), *Periglypta reticulata* (2.3 g), Pyramidellidae (0.1 g), Veneridae (0.1 g), *Ctena bella* (0.1 g), and *Brachidontes crebristriatus* (0.1 g). Crustacea (0.6 g) was also documented. No vertebrate material was collected. The sample collected from Stratum II contained taxa consistent with an estuary deposit and not culturally enriched.

T-004

Two bulk sediment samples were collected from Test Excavation 4, Stratum II, (1.7-2.08 mbs). Faunal analysis of this stratum identified naturally-deposited non-midden marine mollusk shells from various families and species: Ostreidae (33.3 g), *Tellina* spp. (16.1 g), *Tellina palatam* (8.1 g), *Brachidontes crebristriatus* (4.4 g), and *Nerita picea* (2.0 g). No vertebrate material was collected. The sample from Stratum II contained taxa consistent with an estuary deposit and not culturally enriched.

T-008

T-008 did not contain faunal material. Wet-screened samples from Stratum II (1.5-2.0 mbs) were consistent with a natural alluvial deposit and not culturally enriched.

T-009

One bulk sediment sample was collected from Test Excavation 9, Stratum II (2.0-2.2 mbs). Faunal analysis of this stratum identified naturally-deposited marine mollusk shells from various families and species: Isognomidae (3.9 g) and *Tellina palatam* (0.9 g). A single burned shell (0.9 g) was also discovered during the lab analysis process. The burned shell has been identified as possible midden from a previous unknown location. Field observations of Stratum II indicated that this stratum had likely been previously disturbed, and it is possible that the burned shell was incorporated at that time. No vertebrate material was collected.

T-010

One bulk sediment sample was collected from Test Excavation 10, Stratum Ih (0.9-1.15 mbs). Faunal analysis of this stratum identified naturally-deposited limpets (0.3 g). Stratum Ih was identified as a fill deposit.

T-012

One bulk sediment sample was collected from Test Excavation 12, Stratum Id (1.80 mbs). Faunal analysis of this stratum identified naturally-deposited marine mollusk shells from various families and species: *Brachidontes crebristriatus* (1.3 g), Cypraeidae (0.3 g), and *Tellina* sp. (0.1 g). This stratum was identified as a sandy loam fill deposit. The invertebrate material was likely imported with a marine deposit utilized/intermixed as fill. No vertebrate material was collected.

T-014

Two bulk sediment samples were collected from Test Excavation 14, Stratum II (1.80-2.07 mbs). Faunal analysis of this stratum identified naturally-deposited Ostreidae (2.8 g) shells. Lab faunal results are consistent with a shallow marine environment.

T-018

Three bulk sediment samples were collected from Test Excavation 18 from Stratum IIa (1.15-1.30 mbs), Stratum III (1.7-2.2 mbs), and Stratum IV (2.2 mbs). Faunal analysis of Stratum IIa, documented as fill material, identified naturally-deposited Echinoidea (0.1 g) material. Faunal analysis of Stratum IV, documented as natural sediment below the water table, identified naturally-deposited gastropod material (0.1 g). No faunal material was found within the bulk sample from Stratum III. Lab faunal results are consistent with a natural alluvial deposit and not culturally enriched.

T-019

Three bulk sediment samples were collected from Test Excavation 19 from Stratum II (1.98-2.2 and 2.13-2.23 mbs) and Stratum III (3.0-3.25 mbs). No faunal material was found within the bulk samples from Stratum II. Faunal analysis of Stratum III identified naturally-deposited marine mollusk shells from various families and species: *Tellina palatam* (262.4 g), *Pinctada radiata* (17.0 g), *Brachidontes crebristriatus* (6.0 g), *Natica* sp. (5.0 g), *Theodoxus vesperinus* / *Nerita picea* (2.2 g), and gastropod (0.5 g). The abundant quantity of *Tellina palatam* and *Pinctada radiata* indicate a shallow marine environment. No vertebrate material was collected.

T-020

A total of six bulk sediment samples were collected from Test Excavation 20 from various depths within Strata II (1.55-1.93 mbs), IIIa (2.8-3.0 mbs), IIIb (2.9-3.0 mbs), and IV (3.0-3.1 mbs). Faunal analysis of Stratum II identified a small amount of unidentifiable marine shell fragments (0.3 g) and fresh or brackish water gastropods (0.9 g). Faunal analysis of Stratum IIIa identified a small amount fresh or brackish water gastropods (<0.1 g). No faunal material was found within the bulk samples from Strata IIIb or IV. No vertebrate material was collected. Lab faunal results are consistent with natural alluvial deposit and not culturally-enriched.

T-020A

Three bulk sediment samples were collected from Test Excavation 20A, two from Stratum II (1.7-1.89 mbs) and (2.26-2.53 mbs), and one from Stratum III (2.56-2.85 mbs). No faunal material was identified. Lab faunal results are consistent with natural alluvial deposit and not culturally-enriched.

Summary of Faunal Assemblage from West Kalihi

Nine of the 21 test excavations (T-001, T-004, T-008, T-009, T-014, and T-018 to T-020A) contained samples from natural sediments. Five of these trenches (T-001, T-004, T-009, T-014, and T-019) contained non-midden marine invertebrate material indicating an estuary or shallow marine environment. Very minimal (or no) invertebrate material was found within T-008, T-018, T-020, and T-020A. However, T-018 and T-020 did contain fresh or brackish water gastropods, indicating a wetland environment. No vertebrate faunal material was collected. The faunal lab

results indicate a previous marine environment within the deposits beneath the overlying historic fill layers. No evidence of cultural enrichment was observed.

5.4 Faunal Analysis for East Kalihi (Test Excavations 21-47)

T-021

Faunal remains from *Equus ferus caballus* (metacarpus) was collected individually during excavations from Stratum Ic (1.80-1.90 mbs). The metacarpus was not modified. It can be concluded from the presence of introduced species *Equus ferus caballus* that this is a post-Contact context and not of traditional Hawaiian origin.

T-022

One bulk sediment sample was collected from Test Excavation 2, Stratum II (1.84-2.02 mbs). Faunal analysis of this stratum identified gastropod (0.2 g) and a small amount of burned shell (0.5 g). The burned shell has been identified as possible midden from a previous unknown location. This stratum was identified as natural alluvium with some disturbance and historic inclusions. It is likely that the burned shell was deposited during the previous disturbance.

T-031

Faunal remains from *Sus scrofa* were collected individually during excavations from Stratum Ic (0.3 mbs). The diaphysis showed evidence of butchering marks from a metal saw blade, indicating an historic origin and not a traditional Hawaiian origin.

T-034

Faunal remains from *Bos taurus* were collected individually during excavations from Stratum Ib (0.7-0.83 mbs). The vertebra showed evidence of possible carnivore gnawing. All of the elements showed evidence of butchering marks from a metal saw blade indicating an historic origin and not traditional Hawaiian.

T-037

Faunal remains from *Bos taurus* were collected individually during excavations from Stratum I (0.7 mbs). All of the elements showed evidence of butchering marks from a metal saw blade indicating an historic origin not traditional Hawaiian.

Summary of Faunal Assemblage from East Kalihi

Four of the 20 test excavations contained terrestrial vertebrate material within East Kalihi: Test Excavations 21, 31, 34, and 37. T-021 contained an introduced species *Equus ferus caballus*, while T-034 and T-037 also contained an introduced species *Bos taurus*. Both of these species are from a post-Contact context and not of traditional Hawaiian origin. T-021 contained the Polynesian-introduced species *Sus scrofa*; however, the element showed evidence of butchering marks from a metal saw blade, indicating an historic origin and not a traditional Hawaiian origin.

Invertebrate faunal material was identified within Test Excavation 22, Stratum II, which contained a small amount of gastropod and burned shell. There is no evidence of cultural usage

in the strata of T-022. Stratum II had been previously disturbed; it is likely the burned shell, possible midden, was imported from an unknown location and context.

5.5 Faunal Analysis for West Kapālama (Test Excavations 48-53)

Four of the six test excavations T-049, T-0 50, T-052, and T-053; contained natural alluvial deposits. No faunal material was identified within West Kapālama.

Summary of faunal Assemblage from West Kapālama

No test excavations within West Kapālama contained faunal material.

5.6 Faunal Analysis for East Kapālama (Test Excavations 54-84)

T-054

One bulk sediment sample was collected from Test Excavation 54, Stratum II (1.7-1.92 mbs). Faunal analysis of this stratum identified naturally-deposited marine mollusk shells: *Tellina palatam* (1.6 g) and gastropod (0.5 g). The bulk sediment sample collected from Stratum II contained taxa that are consistent with a wetland or shallow marine / estuary deposit and not culturally enriched.

T-057

One bulk sediment sample was collected from Test Excavation 57, Stratum II (1.62 mbs). Faunal analysis of this stratum identified naturally-deposited marine mollusk shells, Tellinidae and Mytilidae fragments (1.3 g), and fresh or brackish water gastropods (snails). The bulk sediment sample collected from Stratum II contained taxa that are consistent with a wetland or shallow marine / estuary deposit (see Section 6).

T-058

Bulk sediment samples were collected from Test Excavation 58, Stratum II (1.68-1.78 mbs) and (1.68-1.85 mbs). Faunal analysis of this stratum identified naturally-deposited fresh or brackish water gastropods (snails) and marine mollusk shells: Trochidae (1.0 g), Trochidae and bivalve fragments (7.5 g), and bivalve and gastropod fragments (4.9 g). The bulk sediment samples collected from Stratum II contained taxa that are consistent with a wetland or shallow marine / estuary deposit.

T-059

One bulk sediment sample was collected from Test Excavation 59, Stratum II (1.65-1.75 mbs). Faunal analysis of this stratum identified naturally-deposited fresh or brackish water gastropods (snails) and marine mollusk shells consisting of Tellinidae (2.7 g). The bulk sediment samples collected from Stratum II contained taxa that are consistent with a wetland or shallow marine / estuary deposit.

T-060

Three bulk sediment samples were collected from Test Excavation 60, Strata IIb and III (1.7 mbs and 1.98 mbs) for Stratum IIb and (2.34 mbs) for Stratum III. Faunal analysis of Stratum IIb identified naturally-deposited fresh or brackish water gastropods (snails), Crustacea (0.5 g), and marine mollusk shells consisting of: *Tellina palatam* (3.8 g), *Brachidontes crebristriatus* (0.7 g),

and mixed micro-gastropods (2.7 g). Faunal analysis of Stratum III identified Crustacea (0.6 g) and naturally-deposited marine mollusk shells consisting of: *Brachidontes crebristriatus* (125.8 g), *Tellina palatam* (39.5 g), miscellaneous gastropods and limpets (32.2 g), Trochidae (17.9 g), and *Ctena bella* (3.3 g). The faunal analysis of Stratum IIb is consistent with a wetland or shallow marine / estuary deposit. Stratum III is consistent with a shallow marine or estuary deposit.

T-061

One bulk sediment sample was collected from Test Excavation 61, Stratum II (1.40-2.05 mbs). Faunal analysis of this stratum identified naturally-deposited fresh or brackish water gastropods (snails) and marine mollusk shell consisting of *Hipponix* sp. The samples collected from Stratum II taxa are consistent with a wetland or shallow marine / estuary deposit.

T-062

Two bulk samples were collected from Test Excavation 62, Strata II and III (1.45-1.7 mbs) and (2.05 mbs), respectively. No faunal material was identified within the bulk sample from Stratum II. Faunal analysis of Stratum III identified Crustacea (2.5 g) and abundant naturally-deposited marine shell mollusk shells from various families and species: *Brachidontes crebristriatus* (142.9 g), Pteriidae (14.4), *Trochus* sp. (14.15 g), Fascioliidae (9.1 g), *Isognomon* sp. (7.9 g), Thaididae (7.7 g), *Ctena bella* (5.7 g), *Tellina* spp. (3.2 g), *Tellina* sp. (0.4 g), *Tellina palatam* (0.9 g), *Natica* sp. (1.8 g), *Cymatium* sp. (1.2 g), *Hipponix* spp. (1.1 g), Ostreidae (0.2 g), Architectonicidae (0.1 g), limpets (1.6 g), and unidentified dark-stained shell fragments (21.5 g). The faunal analysis of Stratum III is consistent with a shallow marine or estuary deposit.

T-063

Two bulk samples were collected from Test Excavation 63, Strata IIb and III (1.72-1.9 mbs) and (2.15-2.28 mbs), respectively. Faunal analysis of Stratum IIb identified faunal remains from Osteichthyes (<0.1 g). Faunal analysis of Stratum III identified Crustacea (0.1 g) and naturally-deposited marine shell mollusk shells from various families and species: *Tellina* spp. (80.3 g), *Brachidontes crebristriatus* (15.8 g), *Trochus* sp. (11.1 g), *Ctena bella* (1.3 g), *Pinctada radiata* (1.3 g), *Nerita picea* (1.2 g), Ostreidae (1.1 g), and shell fragments (4.4 g). The faunal analysis of Stratum IIb is consistent with a wetland or shallow marine environment. The faunal analysis of Stratum III is consistent with a shallow marine or estuary deposit.

T-064

Two bulk samples were collected from Test Excavation 64, Strata IIa and IIb (1.3-1.53 mbs) and (1.53-1.8 mbs), respectively. No faunal material was identified within Stratum IIa. Faunal analysis of Stratum IIb identified Crustacea (3.6 g) and naturally-deposited marine shell mollusk shells from various families and species: *Brachidontes crebristriatus* (43.4 g), *Trochus* sp. (9.4 g), *Tellina palatam* (3.9 g), *Isognomon* sp. (3.1 g), Pyramidellidae (2.9 g), *Ctena bella* (0.7 g), *Nerita picea* (0.4 g), Fascioliidae (0.2 g), and unidentified dark-stained shell fragments (7.4 g). The faunal analysis of Stratum III is consistent with a shallow marine or estuary deposit.

Faunal remains from *Bos taurus* were collected individually during excavations from Stratum Ie (0.63-1.35 mbs). The diaphysis sections showed evidence of breakaway spurs, indicating

cultural modification. *Bos taurus* is a post-Contact species of an historic origin and not traditional Hawaiian.

T-065

One bulk sediment sample was collected from Test Excavation 65, Stratum II (1.67-1.7 mbs). No marine faunal material was identified within Stratum II.

Faunal remains from an unidentified bird (Aves) were collected individually during excavations from Stratum Id (0.37-1.56 mbs). There is no evidence of cultural modification. A cultural context is inconclusive because the remains are unidentified, unmodified, and from a fill layer.

T-066

Faunal remains from *Bos taurus* and *Sus scrofa* were collected individually during excavations from Stratum Ic (0.48-1.48 mbs). The diaphysis section from the *Bos taurus* element was butchered with a metal saw blade indicating an historic origin and not traditional Hawaiian. Both *Sus scrofa* and *Bos taurus* showed evidence of rust staining indicating *Sus scrofa* is also historic in origin.

T-067

Two bulk sediment samples were collected from Test Excavation 67, Strata II and III (1.5-1.65 mbs) and (1.84-1.98 mbs), respectively. Faunal analysis of Stratum II identified naturally-deposited marine shell mollusk shells consisting of: Vermetidae (5.4 g), *Brachidontes crebristriatus* (1.2 g), and unidentified shell fragments (1.6 g). Faunal analysis of Stratum III identified naturally-deposited marine shell mollusk shells from various families and species: *Trochus* sp. (18.6 g), *Tellina palatam* (20.6 g), *Brachidontes crebristriatus* (16.9 g), Fascioliidae (2.6 g), *Ctena bella* (2.0 g), *Pinctada radiata* (1.0 g), *Natica* sp. (0.3 g), limpets and gastropods (0.7 g), and unidentified shell fragments (1.0 g). The faunal analysis of Strata II and III is consistent with a shallow marine or estuary deposit.

Faunal remains from *Bos taurus*, possible *Felis catus*, (both post-Contact species) and Aves (unidentified bird) were collected individually during excavations from Stratum Ib (0.63-1.0 mbs). *Bos taurus* showed evidence of butchering marks from a metal saw blade indicating an historic origin and not a traditional Hawaiian origin. *Bos taurus*, *Felis catus*, and Aves all showed evidence of rust staining, further indicating a historic origin.

T-068

Two bulk sediment samples were collected from Test Excavation 68, Stratum IIIb (1.78-1.83 mbs) and (1.83-1.91 mbs). Faunal analysis of Stratum IIIb identified only (0.1 g) of burned Osteichthyes. The faunal material present within T-068 is consistent with a wetland or marine environment.

T-069

One bulk sediment sample was collected from Test Excavation 69, at the interface of Strata II and III (1.63-1.94 mbs). Faunal analysis of Strata II-III identified naturally-deposited marine shell mollusk consisting of: *Tellina palatam* (17.1 g), Trochidae (2.3 g), and *Brachidontes*

crebristriatus (2.0 g). The faunal analysis Strata II-III is consistent with a shallow marine or estuary deposit.

T-070

T-070 did not contain faunal material. A wet-screened sample from Stratum II (1.3-1.5 mbs) were consistent with a natural alluvial deposit.

T-071

Three bulk sediment samples were collected from Test Excavation 71, from Strata II, III and IV (1.15-1.22 mbs), (1.4-1.55 mbs), and (1.75-1.85 mbs) respectively. Faunal analysis of Stratum II identified a small amount of limpets and gastropods (0.1 g). No faunal material was observed within Stratum III. Faunal analysis of Stratum IV identified naturally-deposited marine shell mollusk shells consisting of: *Brachidontes crebristriatus*, *Ctena bella*, Trochidae, and waterworn shell fragments. The faunal analysis of Strata II is consistent with a wetland or estuary deposit. The faunal analysis of Strata IV is consistent with a shallow marine or estuary deposit.

T-073

Two bulk sediment samples were collected from Test Excavation 73, from Stratum II, (1.51-1.6 mbs) and (1.57-1.68 mbs). Faunal analysis of Stratum II identified naturally-deposited fresh or brackish water gastropods (snails) (3.9 g). The faunal analysis of Stratum II is consistent with a wetland or estuary deposit.

T-075

Bulk sediment samples were collected from Test Excavation 75, Strata IIa and IIb (1.53-1.68 mbs and 1.58-1.68 mbs) (Stratum IIa) and (1.68-1.95 mbs) (Stratum IIb). Faunal analysis of Stratum IIa identified naturally-deposited fresh or brackish water gastropods (snails), bivalve fragments (<0.1 g), and Osteichthyes (0.1 g). Faunal analysis of Stratum IIb identified naturally-deposited fresh or brackish water gastropods (snails) and bivalve shell fragments (0.1 g). The faunal analysis of Strata IIa and IIb is consistent with a wetland or estuary deposit (see Section 6).

T-076

Two bulk sediment samples were collected from Test Excavation 76, from Stratum II (1.59 mbs) and (1.7 mbs). Faunal analysis of Stratum II identified Crustacea (0.4 g) and naturally-deposited marine shell mollusk within the lower bulk sample and none within the upper bulk sample. Marine shell mollusk consisted of: *Brachidontes crebristriatus* (9.2 g), *Tellina palatam* (3.8 g), gastropods (1.3 g), *Natica* sp. (1.1 g), *Trochus* sp. (0.9 g), and a small amount of fresh or brackish water gastropod (0.1 g). The faunal analysis of Stratum II is consistent with a wetland or estuary deposit.

T-077

Column samples for potential pollen analysis were collected from the interface of Strata IIa-IIb within Test Excavation 77. It was determined not necessary and the samples were not processed. No faunal material was identified.

T-078

Four bulk sediment samples were collected from Test Excavation 78, Strata If, IIa and IIb; (1.55-1.65 mbs) Stratum If, (1.73-1.75 mbs) Stratum IIa, and (1.8-1.9 mbs and 1.85-1.94 mbs) Stratum IIb. Faunal analysis of Stratum If identified waterworn bivalve fragments (*Tellina* sp., *Brachidontes crebristriatus*) and Echinoidea. Stratum If was identified as a sand fill. The results of faunal analysis for this stratum were consistent with a marine deposit. Faunal analysis of Stratum IIa identified Osteichthyes (0.1 g), consistent with a wetland or marine environment. Faunal analysis of Stratum IIb identified limpet and bivalve fragments (7.2 g) and abundant fresh or brackish water gastropods (snails). The faunal analysis of Stratum IIb is consistent with a wetland or estuary deposit.

T-079

Two bulk sediment samples were collected from Test Excavation 79, feature fill and Stratum II, (1.45-1.61 mbs) and (1.68-1.84 mbs). Faunal analysis of the sand feature fill identified a small amount of waterworn marine shell fragments, consistent with a marine deposit. Faunal analysis of Stratum II identified Echinoidea and fresh or brackish water gastropods (snails). The faunal analysis of Stratum II is consistent with a wetland or estuary deposit.

T-080

Two bulk sediment samples were collected from Test Excavation 80, Stratum II (1.6-1.75 mbs) and (1.75-1.85 mbs). Faunal analysis of Stratum II identified bivalve and gastropod fragments (3.9 g), Tellinidae (1.8 g), and abundant fresh or brackish water gastropods (snails). The faunal analysis of Stratum II is consistent with a wetland or estuary deposit.

T-081

Two bulk sediment samples were collected from Test Excavation 81, Strata IIa and IIb (1.9-1.95 mbs) and (2.0-2.05 mbs). Faunal analysis of Stratum IIa identified bivalve and limpet fragments (2.8 g) and fresh or brackish water gastropods (snails). Faunal analysis of Stratum IIb identified Crustacea (0.1 g), Echinoidea (0.1 g), and naturally-deposited marine shell mollusk shells from various families and species: *Brachidontes crebristriatus* (47.6 g), *Cymatium* sp. (29.6 g), *Tellina palatam* (23.8 g), Naticidae (9.4 g), Pyramidellidae (7.9 g), Isognomidae (6.5 g), Coralliophilidae (5.0 g), Fasciolaridae (3.3 g), *Nassarius gaudiosus* (2.9 g), *Ctena bella* (1.2 g), *Crepidula aculeate* (0.7 g), *Nerita picea* (0.2 g), *Hipponix* sp. (0.1 g), Melampidae (0.1 g), *Melampus castaneus* (0.1 g), Vermetidae (0.1 g). A single unidentified shark tooth (0.2 g) was also collected. The faunal analysis of Stratum IIa is consistent with a wetland or estuary deposit. The faunal analysis of Stratum IIb is consistent with a marine deposit.

Summary of Faunal Assemblage from East Kapālama

Bulk samples of natural sediments within East Kapālama documented faunal material consistent with wetlands, estuary, and/or shallow marine waters. In the majority of cases in which multiple natural strata within a test excavation were analyzed, invertebrate material consistent with a wetland or estuary environment overlay a marine deposit containing invertebrate material consistent with shallow marine or estuary waters. A majority of the wetland

or estuary deposits contained fresh or brackish water gastropods (snails), indicative of wetland and/or agricultural sediments (see Section 6).

Four of the 30 Test Excavations contained terrestrial faunal material collected individually during excavations; T-064, T-065, T-066, and T-067 within the East Kapālama area. T-064 contained *Bos taurus* a post-Contact species, however, the breakage pattern is not conclusive evidence as to a traditional Hawaiian or non-traditional butchery process. T-065 contained Aves (unidentified bird), with no cultural modifications, even though the remains were located in fill; there is no conclusive evidence to indicate an historic or traditional Hawaiian origin. T-066 contains both post-Contact species *Bos taurus* and Polynesian-introduced *Sus scrofa*. *Bos taurus* was butchered with a metal saw blade indicating an historic origin, not traditional Hawaiian. However, *Sus scrofa* and *Bos taurus* showed evidence of rust staining indicating *Sus scrofa* is also historic in origin. T-067 contains *Bos taurus*, possible *Felis catus*, (both post-Contact species) and Aves (unidentified bird). *Bos taurus* showed evidence of butchering marks from a metal saw blade indicating an historic origin, not traditional Hawaiian. *Bos taurus*, *Felis catus*, and Aves all showed evidence of rust staining further indicating an historic origin.

5.7 Faunal Analysis for Iwilei (Test Excavations 85-95)

Bulk samples of natural sediments were collected within three test excavations: T-085, T-092, and T-093. Test Excavations 85 and 92 documented invertebrate species consistent with a shallow marine or estuary environment. Test Excavation 93 documented invertebrate species, primarily fresh or brackish water gastropods, consistent with wetland or estuary deposits.

Two of the 10 test excavations contained terrestrial faunal material collected individually during excavations: T-086 and T-094. Test Excavation 86 contained *Ovis aries*, a post-Contact species. The metatarsal showed no indication of cultural modification and is historic in origin, not traditional Hawaiian. Test Excavation 94 contained *Bos taurus*, a post-Contact species. The rib fragment showed no indication of cultural modification and is historic in origin, not traditional Hawaiian.

T-085

One bulk sediment sample was collected from Test Excavation 85, Stratum II (2.05-2.1 mbs). Faunal analysis of Stratum II identified Crustacea (0.1 g) and naturally-deposited marine shell mollusk shells from various families and species: *Tellina palatam* (5.7 g), *Brachidontes crebristriatus* (1.2 g), gastropods (0.9 g), *Nerita picea* (0.5 g), and *Pinctada radiata* (0.4 g). The faunal analysis of Stratum II is consistent with a shallow marine or estuary deposit.

T-086

Faunal remains from *Ovis aries* were collected individually during excavations from Stratum Ig (1.55 mbs). *Ovis aries*, a post-Contact species. The metatarsal showed no evidence of cultural modification and is historic in origin, not traditional Hawaiian.

T-092

One bulk sediment sample was collected from Test Excavation 92, Stratum II (1.73-1.83 mbs). Faunal analysis of Stratum II identified Crustacea (0.1 g) and naturally-deposited marine mollusk shell from various families and species: *Brachidontes crebristriatus* (1.1 g), *Theodoxus*

vespertinus (0.5 g), *Tellina* sp. (0.2 g), and worn shell fragments (0.5 g). In addition, possible midden marine shell consisting of burned Naticidae (1.1 g) was identified. The faunal analysis of Stratum II is consistent with a wetland or estuary deposit. The presence of a small amount of possible midden marine shell is likely the result of water transport.

T-093

Three bulk sediment samples were collected from Test Excavation 93, Strata IIa and IIb, at a depth of 1.95-2.2 mbs (Stratum IIa) and 2.29-2.5 mbs and 2.5-2.74 mbs (Stratum IIb). Faunal analysis of Stratum IIa identified Crustacea and fresh or brackish water gastropods (snails). Faunal analysis of Stratum IIb identified fresh or brackish water gastropods within the upper sample and naturally-deposited marine mollusk shell within the deeper sample: *Nerita picea* and *Brachidontes crebristriatus*. The faunal analysis of Strata IIa and IIb are consistent with a wetland or estuary deposit.

T-094

Faunal remains from *Bos taurus* were collected from Stratum Ic (0.40 mbs). *Bos Taurus* is a post-Contact species. The rib fragment showed no indication of cultural modification and is historic in origin, not traditional Hawaiian.

Summary of Faunal Assemblage from Iwilei

Bulk samples of natural sediments were collected within three test excavations: T-085, T-092, and T-093. Test Excavations 85 and 92 documented invertebrate species consistent with a shallow marine or estuary environment. Test Excavation 93 documented invertebrate species, primarily fresh or brackish water gastropods, consistent with wetland or estuary deposits.

Two of the 10 test excavations contained terrestrial faunal material collected individually during excavations: T-086 and T-094. Test Excavation 86 contained *Ovis aries*, a post-Contact species. The metatarsal showed no indication of cultural modification and is historic in origin, not traditional Hawaiian. Test Excavation 94 contained *Bos taurus*, a post-Contact species. The rib fragment showed no indication of cultural modification and is historic in origin, not traditional Hawaiian.

5.8 Faunal Analysis for Downtown Waterfront (Test Excavations 96-115)

SIHP # 50-8-14-7427 (Test Excavations 96, 97, 98, 99, 100, 101)

Test Excavations comprising SIHP # -7427 contained invertebrate and vertebrate faunal material expressing a strong midden signature. This strong midden content was identified within two culturally-enriched deposits, Strata Ii and II (also designated as Features 3 and 16 of SIHP # -7427). All midden within these strata is tabulated for each individual trench (Table 195, Table 197, and Table 199) below. The marine mollusk faunal material identified as naturally-deposited shell or as juvenile in size is not included in the midden table. Any vertebrate faunal material collected individually from various strata is also discussed within each test excavation discussion.

T-096

A midden table of marine and terrestrial faunal material identified within bulk sediment samples within Test Excavation 96, cultural resource SIHP # -7427, is provided in Table 194 below. The invertebrate species most represented within the midden signature include: *Isognomon* spp., *Brachidontes crebristriatus*, *Tellina palatam*, and *Nerita picea*. These species are naturally found within a near-shore environment: on rocks and rock shelves within intertidal zones, tide-pools, and shallow marine waters. The vertebrate species identified within bulk samples were consistent with pre-Contact terrestrial and marine species, including: medium mammal, pig, dog, rat, fish, and shark. However, hand-collected terrestrial faunal remains within SIHP # -7427 also included historically introduced species (see below).

Faunal remains were also collected individually during excavation from three strata (Id, Ii, and II). Faunal remains, collected from Stratum Id of T-096 (0.35-0.7 mbs) include *Bos taurus*, *Sus scrofa*, *Capra aegagrus hircus* and *Capra aegagrus hircus* (possible) skeletal elements. In addition to the mammalian remains recovered, there were also unmodified rib fragments and vertebrae, from an unidentified Osteichthyes (fish) recovered from Stratum Id (see Appendix A).

Faunal remains collected from Stratum Ii (1.32-1.35 mbs) include *Canis lupus familiaris*, *Sus scrofa*, *Bos taurus* and medium mammal skeletal elements. This stratum (Ii), a culturally enriched fill with historic, is designated Feature 3 of SIHP # 50-80-14-7427.

The faunal remains collected from Stratum II (1.7 mbs) consisted of *Sus scrofa*, *Canis lupus familiaris*, and other medium mammal skeletal elements. This stratum (II), a culturally enriched and reworked natural sediment, is designated Feature 16 of SIHP # 50-80-14-7427.

Some of the bones showed marks consistent with butchering by a metal saw blade, which (in addition to the introduced species) indicate an historic origin, not traditional Hawaiian: *Bos taurus*, *Capra aegagrus hircus* and possible *Capra aegagrus hircus* from Id; *Bos taurus* from Ii; and the medium mammal fragment from II. The *Sus scrofa* femur from Ii showed butcher marks from some other type of blade, and the rest of the bones showed no indication of cultural modification (Table 195).

Table 194. Invertebrate and Vertebrate Midden Identified Within Bulk Sediment Samples from Test Excavation 96, SIHP # -7427

Test Excavation	96	96	Weight (g)	Total %
Stratum	II	Ii		
Feature	16	3		
Invertebrate Midden				
Conidae <i>Conus</i> sp.	7.1		7.1	4.8%
Gastropod/bivalve	0.4		0.4	0.3%
Isognomidae <i>Isognomon</i> sp.	59.7		59.7	40.1%
Isognomidae <i>Isognomon</i> spp.	23.6		23.6	15.8%
Mytilidae <i>Brachidontes crebristriatus</i>	17.2		17.2	11.6%
Neritidae <i>Nerita picea</i>	12.3		12.3	8.3%
Neritidae <i>Theodoxus neglectus</i>	0.1		0.1	0.1%
Tellinidae <i>Tellina palatam</i>	22.3		22.3	15.0%

Test Excavation	96	96	Weight (g)	Total %
Stratum	II	Ii		
Feature	16	3		
Trochidae <i>Trochus</i> sp.	1.6		1.6	1.1%
Burned shell	2		2	1.3%
Calcified shell		1.0	1.0	0.7%
Crustacea	0.3		0.3	0.2%
Crustacea (burned)	0.1		0.1	0.1%
Echinoidea <i>diadema</i> sp.	0.1		0.1	0.1%
Echinoidea <i>mathaei</i> sp. and <i>diadema</i> sp.	1.0	0.1	1.1	0.7%
Total Invertebrate Midden	147.8	1.1	148.9	100.0%
Vertebrate Midden				
Medium mammal	1.0	0.1	1.1	34.4%
<i>Sus scrofa</i> (pig)	0.1		0.1	3.1%
<i>Canis lupus familiaris</i> (dog)	0.3		0.3	9.4%
<i>Rattus</i> sp. (rat)	0.3		0.3	9.4%
Osteichthyes (fish)	0.5	0.7	1.2	37.5%
Scaridae (fish)	0.1		0.1	3.1%
Chondrichthyes (shark tooth)	0.1		0.1	3.1%
Total Vertebrate Midden	2.4	0.8	3.2	100.00%

Table 195. Terrestrial Faunal Material Collected Individually During Test Excavation 96.

Acc. #	Stratum	Depth (cmbs)	Feature	Family/ Class	Species	Element	Description	Modification
096-F-1	Id	35-70	-	Bovidae (cow)	<i>Bos taurus</i>	Diaphysis section	Fragment	Butchered (cut with metal saw blade)
096-F-2	Id	35-70	-	Suidae (pig)	<i>Sus scrofa</i>	Incisor	Complete	None
096-F-3	Id	35-70	-	Bovidae (goat)	<i>Capra aegagrus hircus</i>	Metacarpal; Metatarsus; Phalanges; Vertebra	Complete/ fragments	Phalanges butchered (cut with metal saw blade)
096-F-4	Id	35-70	-	Bovidae (goat)	<i>Capra aegagrus hircus</i> (possible goat)	Cranial; diaphysis sections; ulna	Fragments	Ulna butchered (cut with metal saw blade)
096-F-5	Ii	132-135	7427-3	Suidae (pig)	<i>Sus scrofa</i>	Incisor; Mandible; Mandible portion; Teeth; Molars	Complete/ fragments	None

Acc. #	Stratum	Depth (cmbs)	Feature	Family/ Class	Species	Element	Description	Modification
096-F-6	Ii	132-135	7427-3	Canidae (dog)	<i>Canis lupus familiaris</i>	Radius; Diaphysis sections; Femur; Coracoid process; Cranial; Petrous process; Possible metatarsal	Complete/ fragments	None
096-F-7	Ii	132-135	7427-3	Mammalia	Medium mammal	Diaphysis sections; Irregular bones	Fragments	None
096-F-8	Ii	133	7427-3	Bovidae (cow)	<i>Bos taurus</i>	Ribs	Fragments	Butchered (cut with metal saw blade)
096-F-9	Ii	133	7427-3	Suidae (pig)	<i>Sus scrofa</i>	Femur; Left supra orbital margin; Proximal end of rib; Diaphysis section (possible pig)	Fragments	Butcher marks on femur
096-F-10	II	170	7427-16	Suidae (pig)	<i>Sus scrofa</i>	Mandibular tusk; Mandible	Fragments	None
096-F-11	II	170	7427-16	Canidae (dog)	<i>Canis lupus familiaris</i>	Distal tibia; Rib; Metatarsal	Fragments	None
096-F-12	II	170	7427-16	Mammalia	Medium mammal	Diaphysis section	Fragment	Butchered (cut with metal saw blade)

T-097

A midden table of marine and terrestrial faunal material identified within bulk sediment samples within Test Excavation 97, cultural resource SIHP # -7427, is provided in Table 196 below. The midden content within Stratum II of T-097 is similar to that identified within T-096, although less in amount due to the lesser sampling volume (6.5 L from T-097; 30 L from T-096). The invertebrate species most represented within the midden signature include: *Brachidontes crebristriatus*, *Tellina palatam*, and *Cymatium* sp. These species are naturally found within a near-shore environment: on rocks and rock shelves within intertidal zones, tide-pools, and shallow marine waters. The vertebrate species identified within bulk samples were consistent with pre-Contact terrestrial and marine species. However, hand-collected terrestrial faunal remains within SIHP # -7427 also included historically introduced species (see below).

Terrestrial faunal remains collected individually during excavation were a single *Bos taurus* rib fragment collected from Stratum Ij (1.2-1.8 mbs). The rib showed evidence of being butchered by a metal saw blade, which (in addition to being an introduced species) indicates a historic origin, not traditional Hawaiian.

Terrestrial faunal remains collected individually during excavation from Stratum Ic (0.45 mbs and at 0.59 mbs), Stratum Ie (1.04 mbs) and the Stratum II/III interface (1.8 mbs). Stratum Ic faunal remains consisted of *Bos taurus* and *Rattus norvegicus* (possible) fragments. Faunal remains within Stratum Ie consisted of *Bos taurus* (possible) fragments. The Stratum III/II remains consisted of *Equus ferus caballus* with perimortem trauma on the distal metapodial. The *Bos taurus* fragments from Ic were cut with a metal saw blade, indicating an historic origin (not traditional Hawaiian) while the *Bos taurus* fragments from Ie, showed butcher marks other than from a metal saw blade. The *Equus ferus caballus* skeletal elements (with Perimortem trauma on the distal metapodial) were collected at the interface of Strata II and III, at the base of SIHP # 50-80-14-7427, Feature 16. Due to the fact that horses (*Equus ferus caballus*) were not introduced in Hawai'i until the early 1800s (Riper and Riper 1982), the presence of this bone at the base of Stratum Feature 16 provides an early nineteenth century *terminus post quem* for this depositional event (Table 197).

Table 196. Invertebrate and Vertebrate Midden Identified Within Bulk Sediment Samples from Test Excavation 97, SIHP # -7427

Test Excavation	97	Weight (g)	Total %
Stratum	II		
Feature	16		
Invertebrate Midden			
Cymatiidae <i>Cymatium</i> sp.	1.5	1.5	30.6%
Mytilidae <i>Brachidontes crebristriatus</i>	1.5	1.5	30.6%
Neritidae <i>Nerita picea</i>	0.1	0.1	2.0%
Tellinidae <i>Tellina palatam</i>	1.2	1.2	24.5%
Crustacea	0.1	0.1	2.0%
Crustacea (burned)	0.1	0.1	2.0%
Echinoidea	0.3	0.3	6.1%
Echinoidea <i>mathaei</i> sp. and <i>diadema</i> sp.	0.1	0.1	2.0%
Total Invertebrate Midden	4.9	4.9	100.0%
Vertebrate Midden			
Medium mammal	1.6	1.6	13.6%
<i>Canis lupus familiaris</i> (dog)	5.9	5.9	50.0%
Osteichthyes (fish)	4.3	4.3	36.4%
Total Vertebrate Midden	11.8	11.8	100%

Table 197. Terrestrial Faunal Material Collected Individually During Test Excavation 97

Acc. #	Stratum	Depth (cmbs)	Feature	Family/Class	Species	Element	Description	Modification
097-F-1	Ic	45	-	Bovidae (cow)	<i>Bos taurus</i>	Diaphysis sections	Fragments	Butchered (cut with metal saw blade)
097-F-2	Ic	59	-	Muridae (rat)	<i>Rattus norvegicus</i> (possible)	Calcaneus; Metacarpals/metatarsals	Fragments	None
097-F-3	Ie	104	-	Bovidae (cow)	<i>Bos taurus</i> (possible)	Diaphysis sections (Mostly thin cortical bone)	Fragments	Butcher marks on cortical bone
097-F-4	II/III	180	7427-16	Equidae (horse)	<i>Equus ferus caballus</i>	Distal metapodial; Metatarsals (possible); Unfused diaphysis section (possible horse)	Complete/fragments	Perimortem trauma on distal metapodial

T-100

A midden table of marine and terrestrial faunal material identified within bulk sediment samples within Test Excavation 97, cultural resource SIHP # -7427, is provided in Table 198 below. The midden content within Stratum II of T-097 is similar to that identified within T-096, although less in amount due to the lesser sampling volume (4.0 L from T-100; 30 L from T-096). The invertebrate species most represented within the midden signature include: *Brachidontes crebristriatus*, *Tellina palatam*, and *Nerita picea*. These species are naturally found within a near-shore environment: on rocks and rock shelves within intertidal zones, tide-pools, and shallow marine waters. The vertebrate species identified within bulk samples were consistent with pre-Contact terrestrial and marine species, including: medium mammal and fish.

In addition to the midden analysis tabulated within Table 198, faunal analysis was conducted of bulk sediment samples collected from Strata III and IV, at a depth of 1.74-2.07 mbs and 2.05-2.2 mbs, respectively. Faunal analysis of Stratum III identified naturally-deposited gastropods and limpets (8.6 g) and *Echinometra mathaei* (1.1 g). Faunal analysis of Stratum IV identified naturally-deposited marine fauna consistent with a shallow marine or estuary deposit, including: *Brachidontes crebristriatus* (6.5 g), *Conus* sp. (5.6 g), *Nerita picea* (2.0 g), *Tellina palatam* (1.6 g), *Tellina* sp. (1.1 g), Ostreidae (0.2 g), *Isognomon* sp. (0.1 g), *Laemodonta octanfracta* (0.2 g), *Melampus castaneus* (0.5 g), *Hipponix* sp. (0.3 g), *Natica* sp. (0.3 g), gastropods (0.1 g), Crustacea (0.5 g), and *Echinothrix diadema* and *Echinometra mathaei* (0.1 g).

Terrestrial faunal remains collected individually during excavation from Stratum If/Ik (0.85 mbs) consisted of a single *Bos taurus* fragment, with striations on one end (possibly taphonomic) and cut marks (from other type of blade) along the exterior. *Bos taurus* is an introduced species

and its presence is indicative of a post-Contact context. This trench is associated with SIHP# 50-80-14-7427; however the faunal remains originated in non-feature strata.

Table 198. Invertebrate and Vertebrate Midden Identified Within Bulk Sediment Samples from Test Excavation 100, SIHP # -7427

Test Excavation	100	Weight (g)	Total %
Stratum	II		
Feature	16		
Invertebrate Midden			
Cymatiidae <i>Cymatium</i> sp.	0.7	0.7	4.0%
Mytilidae <i>Brachidontes crebristriatus</i>	4.2	4.2	24.3%
Neritidae <i>Nerita picea</i>	4.3	4.3	24.9%
Ostreidae	0.7	0.7	4.0%
Isognomidae <i>Isognomon</i> sp.	0.5	0.5	2.9%
Tellinidae <i>Tellina palatam</i>	6.1	6.1	35.3%
Echinoidea <i>mathaei</i> sp. and <i>diadema</i> sp.	0.8	0.8	4.6%
Total Invertebrate Midden	17.3	17.3	100.0%
Vertebrate Midden			
Medium mammal	0.4	0.4	57.1%
Medium mammal (tooth)	0.1	0.1	14.3%
Osteichthyes (fish)	0.2	0.2	28.6%
Total Vertebrate Midden	0.7	0.7	100.0%

T-101

Terrestrial faunal remains were collected individually during excavation from Stratum Ic and from a pit feature within Stratum Ie/II (SIHP# 50-80-14-7427, Feature 15). Faunal remains from Stratum Ic (0.40 mbs) included unmodified *Felis catus* skeletal elements. Faunal remains from Stratum Ie/II (Feature 15) consisted of a single *Bos taurus* (possible) fragment at (0.67 mbs), as well as *Bos taurus*, *Sus scrofa* and unidentified Aves skeletal elements between (0.90 and 1.10 mbs). The *Bos taurus* and possible *Bos taurus* bone fragments were butchered using a metal saw blade, indicating an historic origin, not traditional Hawaiian. The other bones show no signs of cultural modification (Table 199).

Table 199. Terrestrial Faunal Material Collected Individually During Test Excavation 101

Acc. #	Stratum	Depth (cmbs)	Feature	Family/Class	Species	Element	Description	Modification
101-F-1	Ic	40	-	Felidae (cat)	<i>Felis catus</i>	Left and right humeri	Complete/fragment; Distal 2/3 of right humerus	None
101-F-2	Ie/II	67	7427-15	Bovidae (cow)	<i>Bos taurus</i> (possible)	Flat bone portion (Possible scapula, rib, or	Fragment	Butchered (cut with metal saw blade)

Acc. #	Stratum	Depth (cmbs)	Feature	Family/ Class	Species	Element	Description	Modification
						transverse process)		
101-F-3	Ie/II	90-110	7427-15	Bovidae (cow)	<i>Bos taurus</i>	Tooth; Diaphysis section	Fragment	Diaphysis section butchered (cut with metal saw blade)
101-F-4	Ie/II	90-110	7427-15	Suidae (pig)	<i>Sus scrofa</i>	Teeth (2) (molar and incisor); Diaphysis sections (possible <i>Sus scrofa</i>)	Fragments	None
101-F-5	Ie/II	90-110	7427-15	Aves (bird)	Unidentified	Metatarsus	Complete	None

T-104

Bulk sediment samples from Test Excavation 104, Stratum If, between 0.65-1.12 mbs, were dry-screened in the field and their faunal contents analyzed. Faunal analysis of Stratum If identified a large amount of possible marine fauna midden. All faunal material collected from Stratum If is tabulated in Table 200 below.

Table 200. Stratum If Faunal Material Collected from Test Excavation 104

Faunal Material	Weight (g)
Conidae <i>Conus</i> sp.	65.0
Cypraeidae	0.1
Cypraeidae <i>Cypraea caputserpentis</i>	1.1
Isognomidae <i>Isognomon</i> sp.	3.5
Lucinidae <i>Ctena bella</i>	0.8
Mytilidae <i>Brachidontes crebristriatus</i>	0.8
Naticidae <i>Natica</i> sp.	5.7
Neritidae <i>Nerita picea</i>	0.5
Ostreidae	5.1
Tellinidae <i>Tellina</i> sp.	16.3
Tellinidae <i>Tellina</i> spp.	16.3
Tellinidae <i>Tellina palatam</i>	61.3
<i>Echinothrix diadema</i> and <i>Echinometra mathaei</i>	1.1
Total	177.6

Terrestrial faunal remains collected individually during excavation from Strata Ie (at 0.5 mbs), If (at 0.65-0.90, 0.80-0.84, and 0.87-1.12 mbs respectively), Ig (1.15-1.25 mbs) and Ik (1.9-2.14 mbs). Stratum Ie produced a single complete and unmodified *Bos taurus* phalanx. Stratum If remains included *Sus scrofa* fragments between (0.65 and 0.90 mbs); *Bos taurus*, *Sus scrofa* and Medium mammal between (0.80 and 0.84 mbs); and *Sus scrofa* and *Canis lupus*

familiaris between (0.87 and 1.12 mbs). The species represented in Stratum Ig consisted of *Bos taurus*, *Sus scrofa*, *Canis lupus familiaris* and unidentified medium mammal. While Stratum Ik contained skeletal elements of *Sus scrofa*, *Carpa aegagrus hircus* and unidentified medium mammal.

In addition to the mammalian remains recovered, there were also unmodified spine fragments, from an unidentified Osteichthyes (fish) from Stratum If (see Appendix A).

The *Bos taurus* and *Sus scrofa* from If, *Bos taurus* from Ig, and medium mammal from Ik, were all butchered using a metal saw blade, indicating an historic origin, not traditional Hawaiian. Additionally, the *Bos taurus* ribs from Ig had butcher marks made by another type of blade. The other bones showed no signs of cultural modification. All of the strata containing faunal material (Ie, If, Ig and Ik) are of post-Contact origin based on the presence of metal saw blade butcher marks and introduced species (e.g. *Bos taurus* and *Carpa aegagrus hircus*) in each layer. The presence of *Carpa aegagrus hircus* in Stratum Ik provides a late 1700s (Van Riper and Van Riper 1982) *terminus post quem* (see Table 201).

Table 201. Terrestrial Faunal Material Collected Individually During Test Excavation 104

Acc. #	Stratum	Depth (cmbs)	Feature	Family/ Class	Species	Element	Description	Modification
104-F-1	Ie	50	-	Bovidae (cow)	<i>Bos taurus</i>	Phalanx	Complete	None
104-F-2	If	65-90	-	Suidae (pig)	<i>Sus scrofa</i>	Molar; Diaphysis sections	Fragments	None
104-F-3	If	80-84	-	Bovidae (cow)	<i>Bos taurus</i>	Ribs	Fragments	Butchered (cut with metal saw blade)
104-F-4	If	80-84	-	Suidae (pig)	<i>Sus scrofa</i>	Femur diaphysis section; Femur diaphysis frag.; Ribs; Large maxillary tusk	Fragments	Femur diaphysis section butchered (cut with metal saw blade)
104-F-5	If	80-84	-	Mammalia	Medium mammal	Unidentified	Fragments	None
104-F-6	If	87-112	-	Suidae (pig)	<i>Sus scrofa</i>	Diaphysis sections; Canine; Incisor	Fragments	None
104-F-7	If	87-112	-	Canidae (dog)	<i>Canis lupus familiaris</i>	Cranial; Intermediate phalanx	Complete/ fragments	None
104-F-8	Ig	115-125	-	Bovidae (cow)	<i>Bos taurus</i>	Scapula; Metatarsus (epiphyses absent); Ribs	Complete/ fragments	Scapula butchered (cut with metal saw blade); Butcher marks on ribs

Acc. #	Stratum	Depth (cmbs)	Feature	Family/ Class	Species	Element	Description	Modification
104-F-9	Ig	115-125	-	Bovidae (cow)	<i>Bos taurus</i>	Metacarpus; possible vertebra; Diaphysis section; Diaphysis section fragments	Complete/ fragments	Diaphysis section butchered (cut with metal saw blade)
104-F-10	Ig	115-125	-	Suidae (pig)	<i>Sus scrofa</i>	Humerus	Complete	None
104-F-11	Ig	115-125	-	Canidae (dog)	<i>Canis lupus familiaris</i>	Ulna; Ribs; Lt humerus	Complete/ fragments	None
104-F-12	Ig	115-125	-	Mammalia	Medium mammal	Diaphysis sections/irregular bone	Fragments; Pieces mend	None
104-F-13	Ig	115-125	-	Mammalia	Medium mammal	Diaphysis sections	Fragments	None
104-F-14	Ik	190-214	-	Suidae (pig)	<i>Sus scrofa</i>	Left humerus	Complete	None
104-F-15	Ik	190-214	-	Bovidae (goat)	<i>Capra aegagrus hircus</i>	Teeth	Complete	None
104-F-16	Ik	190-214	-	Mammalia	Medium mammal	Rib; Condyle	Fragments	Rib butchered (with metal saw blade)

T-104A

One bulk sediment sample was collected from Test Excavation 104A, Stratum II, at a depth of 1.38-1.48 mbs. Faunal analysis identified a single Vermetidae (0.1 g).

T-108

One bulk sediment sample was collected from Test Excavation 108, Stratum II, at a depth of 1.4-1.48 mbs. Faunal analysis of Stratum II identified Aves (0.3 g), *Echinothrix diadema* (0.1 g), and marine mollusk shell consisting of *Cypraea* sp. (2.1 g) and *Hipponix* sp. (0.4 g).

Terrestrial faunal remains were collected individually during excavation from Stratum Id: an *Ovis aries* Distal metatarsal shaft with perimortem breakage at (0.68 mbs); and *Bos taurus* (juvenile) and medium mammal skeletal elements at (1.00 mbs). None of the bones showed evidence of cultural modification. The presence of introduced species (*Ovis aries* and *Bos taurus*) indicates that Stratum Id was deposited in the post-Contact period.

T-109

One bulk sediment sample was collected from Test Excavation 109, Stratum Ie, at a depth of 2.21 mbs. Faunal analysis of Stratum Ie, identified as fill, identified medium mammal (11.0 g), Osteichthyes (0.7 g), *Echinothrix diadema* (1.0 g) and marine mollusk shell consisting of: *Periglypta hieroglyphica* (4.4 g), Ostreidae (2.7 g), *Nerita picea* (1.2 g), *Isognomon* sp. (1.1 g), *Brachidontes crebristriatus* (1.1), *Nassarius gaudiosus* (1.0 g), and *Hipponix* sp. (0.6 g).

T-112

Terrestrial faunal remains were collected from the spoil bin, and individually during excavation from Stratum Ib. The spoil bin collection consisted of *Carpa aegagrus hircus*, *Canis lupus familiaris* and other medium mammal fragments. *Bos taurus* fragments were found throughout Stratum Ib (0.47-2.5 mbs) and a concentration of *Bos taurus*, *Sus scrofa*, *Carpa aegagrus hircus*, and *Canis lupus familiaris* skeletal elements was collected from Stratum Ib at (1.97 mbs). Most of the *Bos taurus* fragments from Ib had been butchered with a metal saw blade, indicating an historic origin not a traditional Hawaiian. The rest of the bones showed no signs of cultural modifications (see Table 202).

Table 202. Terrestrial Faunal Material Collected Individually During Test Excavation 112

Acc. #	Stratum	Depth (cmbs)	Feature	Family/Class	Species	Element	Description	Modification
112-F-1	Spoil bin	-	-	Bovidae (goat)	<i>Carpa aegagrus hircus</i>	Left mandible	Fragments	None
112-F-2	Spoil bin	-	-	Canidae (dog)	<i>Canis lupus familiaris</i>	Fibula; Proximal rib; Radius	Fragments	None
112-F-3	Spoil bin	-	-	Mammalia	Medium mammal	Possible facial bones	Fragments	None
112-F-4	Ib	47-250	-	Bovidae (cow)	<i>Bos taurus</i>	Ribs; Scapula; femur (possible); Diaphysis sections; Diaphysis sections/irregular bones	Fragments	Butchered (cut with metal saw blade)
112-F-5	Ib	197	-	Bovidae (cow)	<i>Bos taurus</i>	Innominate; Ribs	Fragments	Ribs butchered (with metal saw blade)
112-F-6	Ib	197	-	Suidae (pig)	<i>Sus scrofa</i>	Tibia diaphysis (distal portion); Proximal rib	Fragments	None
112-F-7	Ib	197	-	Bovidae (goat)	<i>Carpa aegagrus hircus</i>	Left mandible with molars; Scapular spine	Fragments	None
112-F-8	Ib	197	-	Canidae (dog)	<i>Canis lupus familiaris</i>	Tibial condyle	Fragment	None

T-114

A single *Bos taurus* rib fragment was collected individually during excavation from Stratum Ic (at 0.48 mbs). This bone showed marks from being butchered by a metal saw blade, which (in addition to being an introduced species) indicating a historic origin, not traditional Hawaiian.

Summary of Faunal Assemblage from Downtown Waterfront

The faunal material collected within bulk sediment samples within Downtown Waterfront evidenced a strong terrestrial and marine midden signature within the natural alluvial deposits of T-096, T-097, and T-100. The midden consisted of marine mollusk shell, fish, shark, and terrestrial mammals that were typical of traditional Hawaiian consumption. Test Excavation 104 also contained a high marine mollusk content. However, as it was found within a historic fill deposit and thus had been removed from its original context, no conclusions can be drawn.

Five of the 19 test excavations contained vertebrate material collected individually during excavation: T-096, T-097, T-101, T-104, and T-112. Test Excavation 96 included faunal remains from three strata (Id, Ii, and II). Species collected from Stratum Id include *Bos taurus*, *Sus scrofa*, *Capra aegagrus hircus* and *Capra aegagrus hircus* (possible) skeletal elements. In addition to the mammalian remains recovered, there were also unmodified rib fragments and vertebrae, from an unidentified Osteichthyes (fish) recovered from Stratum Id (see Appendix A for Osteichthyes table). Remains collected from Stratum Ii include *Canis lupus familiaris*, *Sus scrofa*, *Bos taurus* and medium mammal skeletal elements. This stratum (Ii), a culturally enriched fill with historic, is included in Feature 3 of SIHP # 50-80-14-07427. Remains collected from Stratum II consisted of *Sus scrofa*, *Canis lupus familiaris*, and other medium mammal skeletal elements. This stratum (II) is a culturally enriched and reworked natural sediment, is included in Feature 16 of SIHP # 50-80-14-07427. Some of the bones showed marks consistent with butchering by a metal saw blade, which (in addition to the introduced species) indicated an historic origin, not traditional Hawaiian: *Bos taurus*, *Capra aegagrus hircus* and possible *Capra aegagrus hircus* from Id; *Bos taurus* from Ii; and the medium mammal fragment from II. The *Sus scrofa* femur from Ii showed butcher marks from some other type of blade, and the rest of the bones showed no indication of cultural modification.

Test Excavation 97 included a single *Bos taurus* rib fragment collected from Stratum Ij. The rib showed evidence of being butchered by a metal saw blade, which (in addition to being an introduced species) indicates a historic origin, not traditional Hawaiian. Remains from Stratum Ic consisted of *Bos taurus* and *Rattus norvegicus* (possible) fragments. The remains within Stratum Ie consisted of *Bos taurus* (possible) fragments. The Stratum III/II remains consisted of *Equus ferus caballus* with perimortem trauma on the distal metapodial. The *Bos taurus* fragments from Ic were cut with a metal saw blade, indicating an historic origin (not traditional Hawaiian) while the *Bos taurus* fragments from Ie, showed butcher marks other than from a metal saw blade. The *Equus ferus caballus* skeletal elements (with perimortem trauma on the distal metapodial) were collected at the interface of Strata II and III, at the base of SIHP # 50-80-14-7427, Feature 16. Due to the fact that horses (*Equus ferus caballus*) were not introduced in Hawai'i until the early 1800s (Riper and Riper 1982), the presence of this bone at the base of Feature 16 provides an early nineteenth century *terminus post quem* for this depositional event.

Test Excavation 100 faunal remains from Stratum If/Ik consisted of a single *Bos taurus* fragment, with striations on one end (possibly taphonomic) and cut marks (from other than a metal saw blade) along the exterior. *Bos taurus* is an introduced species and its presence is indicative of a post-Contact context. This trench is associated with SIHP # 50-80-14-7427; however the faunal remains originated in non-feature strata.

Test Excavation 101 contained remains from Stratum Ic and from a pit feature within Stratum Ie/II (SIHP # 50-80-14-7427, Feature 15). Faunal remains from Stratum Ic included unmodified *Felis catus* skeletal elements. Faunal remains from Stratum Ie/II (Feature 15) consisted of a single *Bos taurus* (possible) fragment, as well as *Bos taurus*, *Sus scrofa* and unidentified Aves skeletal elements. The *Bos taurus* and possible *Bos taurus* bone fragments were butchered using a metal saw blade, indicating an historic origin, not traditional Hawaiian. The other bone elements showed no sign of cultural modification.

Test Excavation 104 consisted of remains collected from Strata Ie, If, Ig and Ik. Stratum Ie produced a single complete unmodified *Bos taurus* phalanx. The *Bos taurus* and *Sus scrofa* from If, *Bos taurus* from Ig, and medium mammal from Ik, were all butchered using a metal saw blade, indicating an historic origin, not traditional Hawaiian. Additionally, the *Bos taurus* ribs from Ig had butcher marks made by a non-metal saw blade. The other bones showed no signs of cultural modification. All of the strata containing faunal material (Ie, If, Ig and Ik) are of post-Contact origin based on the presence of metal saw blade butcher marks and introduced species (e.g. *Bos taurus* and *Carpa aegagrus hircus*) in each layer. The presence of *Carpa aegagrus hircus* in Stratum Ik provides a late 1700s (Van Riper and Van Riper 1982) *terminus post quem*. In addition to the mammalian remains recovered, unidentified and unmodified Osteichthyes (fish) spine fragments were collected from Stratum If (see Appendix A).

Test Excavation 108 remains collected from Stratum Id includes an *Ovis aries* distal metatarsal shaft with perimortem breakage, *Bos taurus* (juvenile), and medium mammal skeletal elements. None of the bones showed evidence of cultural modification with a metal saw blade. The presence of introduced species (*Ovis aries* and *Bos taurus*) indicate a post-Contact period.

Test Excavation 112 faunal remains collected from Stratum Ib were *Carpa aegagrus hircus*, *Canis lupus familiaris* and medium mammal fragments. *Bos taurus* fragments were found throughout Stratum Ib. Most of the *Bos taurus* fragments from Ib showed evidence of being butchered with a metal saw blade, indicating an historic origin, not traditional Hawaiian. The rest of the bones showed no evidence of cultural modifications.

Test Excavation 114 contained a single *Bos taurus* rib fragment from Stratum Ic. The rib showed evidence of being butchered with a metal saw blade, which (in addition to being an introduced species) indicates a historic origin, not traditional Hawaiian.

5.9 Faunal Analysis for West Kaka‘ako (Test Excavations 116-161)

T-116

A single *Bos taurus* rib fragment was collected individually during excavation from Stratum Ij (1.2-1.8 mbs). This bone showed marks from being butchered by a metal saw blade, which (in addition to being an introduced species) indicating a historic origin, not traditional Hawaiian.

T-117

Bos taurus fragments were collected individually during excavation throughout Stratum Ic (0.2-1.33 mbs) and a concentration of *Bos taurus*, *Sus scrofa*, and *Canis lupus familiaris* skeletal elements was collected from Stratum Ic at 1 mbs. Most of the *Bos taurus* fragments had been butchered with a metal saw blade (indicating an historic origin, not traditional Hawaiian), the rest of the bones showed no signs of cultural modifications.

T-118

One bulk sediment sample was collected from Test Excavation 118, Stratum Ie (identified as a fill deposit), at a depth of 1.55-1.7 mbs. Faunal analysis of Stratum Ie identified marine mollusk shell from various families and species: *Nerita picea* (5.3 g), *Turbo sandwicensis* (3.2 g), *Brachidontes crebristriatus* (1.9 g), *Isognomon* sp. (0.8 g), and various gastropods (1.15 g). In addition, *Echinothrix diadema* and *Echinometra mathaei* (0.1 g), Osteichthyes (0.1 g), and Chondrichthyes (tooth) (0.1 g) were documented. The faunal material is consistent with culturally-associated midden obtained from a marine environment; however, it has been moved from its cultural context.

SIHP # 50-8-14-7428 (Test Excavations 119, 119A, 120, 120A, 120B)

Test Excavations comprising SIHP # -7428 contain invertebrate and vertebrate faunal material expressing a strong midden signature. This strong midden content was identified within the buried A-horizon (Stratum II) and associated features (Features 2-13). All midden within this stratum and associated features is tabulated for each individual trench (Table 203 to Table 206, and Table 208) below. The marine mollusk faunal material identified as naturally-deposited shell or as juvenile in size is not included in the midden table. Any vertebrate faunal material collected individually from various strata is also discussed within each test excavation discussion.

T-119

A midden table of marine and terrestrial faunal material identified within bulk sediment samples within Test Excavation 119, cultural resource SIHP # -7428, is provided in Table 203 below. The invertebrate species most represented within the midden signature include: *Cypraea caputserpentis*, *Cypraea tigris*, *Conus* sp., *Tellina palatam*, *Nassarius gaudiosus*, and *Brachidontes crebristriatus*. These species are naturally found within a near-shore environment: on rocks and rock shelves within intertidal zones, tide-pools, and shallow marine waters. No vertebrate species were identified within the cultural resource.

Terrestrial faunal remains of *Bos taurus* were also collected individually during excavation from Stratum Ic at (0.8 mbs). Faunal fragments included a cervical vertebra portion (butchered with a metal saw blade, indicating an historic origin, not traditional Hawaiian) and irregular bones that mend (fit together). The faunal remains within Ic originated from a non-feature, fill layer, and are not associated with SIHP # -7428.

Table 203. Invertebrate and Vertebrate Midden Identified Within Bulk Sediment Samples from Test Excavation 119, SIHP # -7428

Test Excavation	119	Weight (g)	Total %
Stratum	II		
Feature	-		
Invertebrate Midden			
Conidae <i>Conus</i> sp.	8.5	8.5	22.8%
Cypraeidae <i>Cypraea caputserpentis</i>	7.3	7.3	19.6%
Cypraeidae <i>Cypraea tigris</i>	9.9	9.9	26.6%
Isognomidae <i>Isognomon</i> sp.	0.5	0.5	1.3%
Mytilidae <i>Brachidontes crebristriatus</i>	1.1	1.1	3.0%
Nassariidae <i>Nassarius gaudiosus</i>	2.2	2.2	5.9%
Strombidae <i>Strombus</i> sp.	0.9	0.9	2.4%
Tellinidae <i>Tellina palatam</i>	6.8	6.8	18.3%
Total Invertebrate Midden	37.2	37.2	100.0%

T-119A

A midden table of marine and terrestrial faunal material identified within bulk sediment samples within Test Excavation 119A, cultural resource SIHP # -7428, is provided in Table 204 below. The invertebrate species most represented within the midden signature consist of *Nerita picea* and *Tellina palatam*, although a wide variety of species in lesser amounts were also present. These species are naturally found within a near-shore environment: on rocks and rock shelves within intertidal zones, tide-pools, and shallow marine waters. The vertebrate species identified are consistent with pre-Contact terrestrial and marine species, including: medium mammal, dog, and fish. The fish was identified to species, *Pervagor spilosoma* (Fantail file fish, or 'ō'ili'uwī'uwī) (see the Cultural and Environmental Osteichthyes Discussion in Section 5.1)

In addition to the midden analysis tabulated within Table 204, faunal analysis was conducted of a bulk sediment sample collected from Stratum Id. Faunal analysis identified marine mollusk shell consisting of both naturally-deposited marine shell and culturally-associated midden obtained from a marine environment. Shell midden included: *Nerita picea* (22.5 g), *Conus* sp. (4.2 g), *Brachidontes crebristriatus* (2.9 g), *Tellina palatam* (2.3 g), and *Isognomon* sp. (0.1 g). In addition, faunal material of *Pervagor spilosoma* (Fantail file fish, or 'ō'ili'uwī'uwī), *Echinothrix diadema* (0.4 g), and Crustacea (0.3 g) were documented (see the Cultural and Environmental Osteichthyes Discussion in Section 5.1). Stratum Id was identified as a fill deposit associated with a historic foundation wall, thus the shell midden had been previously removed from its cultural context.

Canis lupus familiaris remains were also recovered from the spoil bin (diaphysis sections) as well as collected individually in context during excavation from Stratum II (molar fragments that mend) between 0.45 and 1.3 mbs. There was no indication of cultural modification on the remains, and *Canis lupus familiaris* is a Polynesian introduction common in both pre- and post-Contact contexts, and is therefore inconclusive. Stratum II of this test excavation is part of SIHP # 50-80-14-7428.

Table 204. Invertebrate and Vertebrate Midden Identified Within Bulk Sediment Samples from Test Excavation 119A, SIHP # -7428

Test Excavation	119A	Weight (g)	Total %
Stratum	II		
Feature	-		
Invertebrate Midden			
Conidae	2.7	2.7	3.2%
Conidae <i>Conus</i> sp.	1.4	1.4	1.7%
Cymatiidae	1.7	1.7	2.0%
Cypraeidae <i>Cypraea caputserpentis</i>	0.9	0.9	1.1%
Cypraeidae <i>Cypraea</i> sp.	0.4	0.4	0.5%
Gastropod	0.5	0.5	0.6%
Mytilidae <i>Brachidontes crebristriatus</i>	16	16	19.3%
Nassariidae <i>Nassarius hirtus</i>	2.3	2.3	2.8%
Naticidae	0.4	0.4	0.5%
Neritidae <i>Nerita picea</i>	36.7	36.7	44.2%
Pteriidae <i>Pinctada radiata</i>	0.8	0.8	1.0%
Strombidae <i>Strombus</i> sp.	2.8	2.8	3.4%
Tellinidae cf. <i>Tellina elizabethae</i>	2.9	2.9	3.5%
Tellinidae <i>Tellina palatam</i>	5.1	5.1	6.1%
Thaididae <i>Morula granulata</i>	2	2	2.4%
Trochidae <i>Trochus</i> sp.	0.3	0.3	0.4%
Turbinidae opercula	1	1	1.2%
Turbinidae <i>Turbo sandwicensis</i>	0.8	0.8	1.0%
Isognomidae <i>Isognomon</i> sp.	0.1	0.1	0.1%
Tellinidae <i>Tellina</i> spp.	2.4	2.4	2.9%
Crustacea	0.6	0.6	0.7%
Echinoidea	1.1	1.1	1.3%
Echinoidea <i>mathaei</i> sp.	0.1	0.1	0.1%
Echinoidea <i>diadema</i> sp. and <i>mathaei</i> sp.	0.1	0.1	0.1%
Total Invertebrate Midden	83.1	83.1	100.0%
Vertebrate Midden			
Medium mammal	0.1	0.1	3.0%
<i>Canis lupus familiaris</i> (dog)	1.8	1.8	54.5%
Monacanthidae <i>Pervagor spilosoma</i> (fish)	1.4	1.4	42.4%
Total Vertebrate Midden	3.3	3.3	100.0%

T-120

A midden table of marine and terrestrial faunal material identified within bulk sediment samples within Test Excavation 120, cultural resource SIHP #-7428, is provided in Table 205 below. The invertebrate families and species most represented within the midden signature include: *Nerita picea*, *Theodoxus neglectus*, *Brachidontes crebristriatus*, *Tellina palatam*, *Conus quercinus*, unidentified gastropod, Crustacea, and Echinoidea. These species are naturally found within a near-shore environment: on rocks and rock shelves within intertidal zones, tide-pools, and shallow marine waters. The vertebrate species identified are consistent with pre-Contact

terrestrial and marine species, including: medium mammal, pig, dog, rat, and bird. Of particular note are the variety of fish identified to species, including: *Scarus perspicillatus* (*uhu*), *Pervagor spilosoma* (*'ō'ili'uwī'uwī*), *Bilunulatus albotaeniatus* (*'a'awa*), *Chaetodon miliaris* (*lau-wiliwili*), and *Diodon holocanthu* (*kōkala*) (see the Cultural and Environmental Osteichthyes Discussion in Section 5.1). Hand-collected terrestrial faunal remains within SIHP #-7428 also included historically introduced species (see below).

Faunal remains were also collected individually during excavation from Stratum II (0.65-1.35 mbs). These consisted of one *Bos taurus* fragment, two *Canis lupus familiaris* fragments, and one *Sus scrofa* fragment. The *Bos taurus* fragment was butchered with a metal saw blade indicating an historic origin, not traditional Hawaiian. Stratum II of this test excavation is associated with Feature 2 of SIHP #50-80-14-7428 (a culturally enriched A-horizon).

Table 205. Invertebrate and Vertebrate Midden Identified Within Bulk Sediment Samples from Test Excavation 120, SIHP #-7428

Test Excavation	120	120	120	120	120	120	120	120	Weight (g)	Total %
Stratum	IIa	IIa	IIa	IIa	IIa	IIa	IIa	IIa		
Feature	-	2	3	4	5	6	7	8		
Invertebrate Midden										
Cassididae <i>Casmaria ponderosa</i>								0.5	0.5	0.1
Conidae <i>Conus</i> sp.	4.3				0.6				4.9	0.5
Conidae <i>Conus quercinus</i>						35.4			35.4	3.9
Cymatiidae							9.1		9.1	1.0
Cymatiidae <i>Cymatium</i> sp.								2.3	2.3	0.23
Cymatiidae <i>Cymatium maricium</i>	3.3								3.3	0.4
Cypraeidae <i>Cypraea</i> sp.		0.4					0.9		1.3	0.1
Cypraeidae <i>Cypraea</i> spp.						2.4			2.4	0.3
Cypraeidae <i>Cypraea caputserpentis</i>	0.4								0.4	0.0
Cypraeidae <i>Cypraea teres</i>	1.2								1.2	0.1
Fascioliidae	1								1.0	0.1
Gastropod	31.8								31.8	3.5
Hipponicidae <i>Hipponix</i> sp.						0.5			0.5	0.1
Isognomidae <i>Isognomon</i> sp.		0.1		0.6		2.5			3.2	0.4
Isognomidae <i>Isognomon</i> spp.							2.1		2.1	0.2
Lucinidae <i>Ctena bella</i>					0.5				0.5	0.1
Mytilidae <i>Brachidontes crebristriatus</i>	14	3.2	3.6	13.4	19.1	62	62.7	13.9	191.9	21.1
Nassariidae	1								1.0	0.1
Nassariidae <i>Nassarius hirtus</i>						1.7			1.7	0.2

Test Excavation	120	120	120	120	120	120	120	120	Weight (g)	Total %
Stratum	IIa	IIa	IIa	IIa	IIa	IIa	IIa	IIa		
Feature	-	2	3	4	5	6	7	8		
Naticidae <i>Natica</i> sp.	1.2								1.2	0.1
Naticidae <i>Natica gualteriana</i>					2.2		2.6		4.8	0.5
Neritidae <i>Nerita picea</i>		2.7	1.8	13	21.2	66.9	43		148.6	16.3
Neritidae <i>Nerita picea</i> opercula	100.5							9.4	109.9	12.1
Neritidae <i>Theodoxus neglectus/Nerita picea</i>	215.5								215.5	23.7
Ostreidae						2.4			2.4	0.3
Planaxidae <i>Planaxis labiosa</i>	0.1								0.1	0.0
Pteriidae <i>Pinctada radiata</i>	1.3				0.1				1.4	0.2
Strombidae <i>Strombus</i> sp.	1.1				1.7		1		3.8	0.4
Tellinidae <i>Tellina palatam</i>	15	0.2		1.8	7.6	17.9	5.5	1.7	49.7	5.5
Trochidae				1.1					1.1	0.1
Trochidae <i>Trochus</i> sp.	1.2					2.9	1.3		5.4	0.6
Turbinidae <i>Turbo sandwicensis</i>						1.8			1.8	0.2
Turbinidae <i>Turbo sandwicensis</i> , operculum	3.3								3.3	0.4
Burned shell		0.2		8.3	3		1.6	5.5	18.6	2.0
Crustacea		1.3	0.7	7.4		4	3.8	1.4	18.6	2.0
Echinoidea	0.3	0.1	0.3	5	3.8	11.5	5	2.4	28.4	3.1
Total Invertebrate Midden	396.5	8.2	6.4	50.6	59.8	211.9	138.6	37.1	909.1	100.0
Vertebrate Midden										
Medium mammal	1.3		0.1	0.9	2.2				4.5	9.1
<i>Sus scrofa</i> (pig)	0.3				7.3	0.5			8.1	16.3
<i>Canis lupus familiaris</i> (dog)	3.4				0.6	8.3	1.2	13.6	27.1	54.6
<i>Rattus</i> sp. (rat)	0.1			0.1	0.1	0.9	0.1	0.1	1.4	2.8
Aves (bird)					0.1				0.1	0.2
Osteichthyes (fish)	0.1	0.1	0.1	0.3					0.6	1.2
<i>Scarus perspicillatus</i> (fish)					0.15				0.15	0.3
Monacanthidae <i>Pervagor pilosoma</i> (fish)				0.1	0.15	5.5	0.3	0.3	6.35	12.8
<i>Bilumulatus alboteniatus</i> (fish)							0.3		0.3	0.6
<i>Chaetodon miliaris</i> (fish)	0.3								0.3	0.6
<i>Diodon holocanthus</i> (fish)	0.3								0.3	0.6
Chondrichthyes (shark tooth)		0.1			0.1		0.1	0.1	0.4	0.8
Total Vertebrate Midden	5.8	0.2	0.2	1.4	10.7	15.2	2	14.1	49.6	100.0

T-120A

A midden table of marine and terrestrial faunal material identified within bulk sediment samples within Test Excavation 120A, cultural resource SIHP # -7428, is provided in Table 206 below. The invertebrate species most represented within the midden signature consisted of *Brachidontes crebristriatus* and *Tellina palatam*, although a wide variety of species in lesser amounts were also present. These species are naturally found within a near-shore environment: on rocks and rock shelves within intertidal zones, tide-pools, and shallow marine waters. The vertebrate species identified are consistent with pre-Contact terrestrial and marine species, including: medium mammal, rat, shark, and fish. The fish was identified to species, *Pervagor spilosoma* (Fantail file fish, or 'ō'ili'uwī'uwī) (see the Cultural and Environmental Osteichthyes Discussion in Section 5.1). Hand-collected terrestrial faunal remains within SIHP # -7428 also included historically introduced species (see below).

Terrestrial faunal remains collected individually during excavation from Stratum II of T-120A consisted of multiple species including: *Equus ferus caballus*, *Bos taurus*, *Sus scrofa* and unidentified medium mammal. The *Sus scrofa* fragments were butchered with a metal saw blade, indicating an historic origin, not traditional Hawaiian, which is consistent with the presence of introduced species (*Bos taurus* and *Equus ferus caballus*) in the same deposit. Stratum II of this test excavation is associated with Feature 2 of SIHP # 50-80-14-7428 (a culturally enriched A-horizon) (Table 207).

Table 206. Invertebrate and Vertebrate Midden Identified Within Bulk Sediment Samples from Test Excavation 120A, SIHP # -7428

Test Excavation	120A	120A	120A	120A	120A	120A	Weight (g)	Total %
Stratum	II	II	II	II	II	II		
Feature	-	1	2	3	4	5		
Invertebrate Midden								
cf. Terebridae					7.1		7.1	4.0%
Conidae <i>Conus</i> sp.	5.1				0.3		5.4	3.1%
Cymatiidae <i>Cymatium</i> sp.	1.7						1.7	1.0%
Cypraeidae					0.1		0.1	0.1%
Cypraeidae <i>Cypraea caputserpentis</i>	2.4						2.4	1.4%
Cypraeidae <i>Cypraea</i> spp.	0.7						0.7	0.4%
Gastropod/bivalve (burned)	3						3	1.7%
Isognomidae <i>Isognomon</i> sp.	0.6			0.2	1		1.8	1.0%
Mytilidae <i>Brachidontes crebristriatus</i>	20.3	0.1	1.2	2.8	9.5		33.9	19.3%
Nassariidae	2.5						2.5	1.4%
Naticidae <i>Natica</i> sp.	0.4						0.4	0.2%
Neritidae <i>Nerita picea</i>	33	0.9	2.4	3.1	9.8	0.8	50	28.5%
Neritidae <i>Nerita picea</i> (burned)					1.1		1.1	0.6%
Ostreidae	0.3						0.3	0.2%
Pteriidae <i>Pinctada radiata</i>	0.1						0.1	0.1%
Strombidae <i>Strombus</i> sp.	1.8		0.1				1.9	1.1%
Tellinidae	0.3						0.3	0.2%

Test Excavation	120A	120A	120A	120A	120A	120A	Weight (g)	Total %
Stratum	II	II	II	II	II	II		
Feature	-	1	2	3	4	5		
Tellinidae <i>Tellina palatam</i>	19.8	0.7		0.5	2.6	0.1	23.7	13.5%
Tellinidae <i>Tellina</i> sp.			1.8				1.8	1.0%
Tellinidae <i>Tellina</i> spp.	1.4			0.6			2	1.1%
Thaididae <i>Morula</i> sp.				1.6			1.6	0.9%
Trochidae	2.7						2.7	1.5%
Trochidae <i>Trochus</i> sp.	0.4	0.1	0.3	0.2			1	0.6%
Turbinidae <i>Turbo sandwicensis</i>	2.8						2.8	1.6%
Turbinidae <i>Turbo</i> sp. (burned)	0.2						0.2	0.1%
Veneridae	5.8						5.8	3.3%
Burned shell			3.9	3.2	2.7		9.8	5.6%
Crustacea	1.9	1			0.3	0.1	3.3	1.9%
Crustacea (burned)	0.3				0.3		0.6	0.3%
Echinoidea <i>mathaei</i> sp. and <i>diadema</i> sp.	3	0.1	0.8	0.8	2.9		7.6	4.3%
Total Invertebrate Midden	110.5	2.9	8.7	13	37.7	1	175.6	100%
Vertebrate Midden								
Medium mammal	0.6			0.3			0.9	20.5%
Small mammal (cf. <i>Rattus</i> sp.)	0.2						0.2	4.5%
Osteichthyes (fish)	0.5		2.2				2.7	61.4%
Osteichthyes (fish) (burned)	0.2						0.2	4.5%
Scaridae (fish)	0.1						0.1	2.3%
Monacanthidae <i>Pervagor spilosoma</i> (fish)	0.2						0.2	4.5%
Chondrichthyes (shark tooth)				0.1			0.1	2.3%
Total Vertebrate Midden	1.8	0	2.2	0.4	0	0	4.4	100%

Table 207. Terrestrial Faunal Material Collected Individually During Test Excavation 120

Acc. #	Stratum	Depth (cmbs)	Feature	Family/ Class	Species	Element	Description	Modification
120A-F-1	II	110-118	7428-2	Equidae (horse)	<i>Equus ferus caballus</i>	Scapula; Distal portion metacarpus; Mandibular molar	Fragments	None
120A-F-2	II	110-118	7428-2	Bovidae (cow)	<i>Bos taurus</i>	Scapula; Right proximal metatarsal; Rib; Spinous process (pieces mend); Astragalus	Fragments	None
120A-F-3	II	110-118	7428-2	Suidae (pig)	<i>Sus scrofa</i>	Ulna; Distal end metatarsal	Fragments	Ulna butchered (cut with metal saw blade)

Acc. #	Stratum	Depth (cmbs)	Feature	Family/Class	Species	Element	Description	Modification
120A-F-4	II	110-118	7428-2	Mammalia	Medium mammal	Irregular bones; Diaphysis sections	Fragments	Burned diaphysis sections

T-120B

A midden table of marine and terrestrial faunal material identified within bulk sediment samples within Test Excavation 120B, cultural resource SIHP # -7428, is provided in Table 208 below. The invertebrate species most represented within the midden signature include: *Conus* sp., *Nerita picea*, *Tellina palatam*, *Pinctada radiata*, *Cypraea maculifera*, *Brachidontes crebristriatus*, and *Isognomon* spp. These species are naturally found within a near-shore environment: on rocks and rock shelves within intertidal zones, tide-pools, and shallow marine waters. The vertebrate species identified are consistent with pre-Contact terrestrial and marine species, including: small and medium mammal, pig, dog, rat, chicken, shark, and fish. The fish was identified to species, *Pervagor spilosoma* (Fantail file fish, or 'ō'ili'uwī'uwī) (see the Cultural and Environmental Osteichthyes Discussion in Section 5.1). Hand-collected terrestrial faunal remains within SIHP #-7428 also included historically introduced species (see below).

The faunal remains collected individually during excavation from Stratum Ic/II (0.65-1 mbs) consisted of several species: *Bos taurus*, *Sus scrofa*, *Sus scrofa* (juvenile) and *Canis lupus familiaris*. Three of the bones (*Bos taurus* (glenoid fossa and tibia); *Canis lupus familiaris* (left glenoid fossa) showed butcher marks from a metal saw blade indicating an historic origin, not traditional Hawaiian. Stratum II remains were collected in three separate samples: 1-1.1 mbs, which contained *Bos taurus*, *Canis lupus familiaris* and Medium mammal fragments; 1.1-1.2 mbs, which contained *Sus scrofa* and medium mammal fragments; and 1.1-1.3 mbs, where a single *Equus ferus caballus* vertebra fragment was recovered. None of the Stratum II remains showed evidence of cultural modification. Due to the fact that horses (*Equus ferus caballus*) were not introduced in Hawai'i until the early 1800s (Van Riper and Van Riper 1982), the presence of this bone at the base of Stratum II provides an early nineteenth century *terminus post quem* for this depositional event. Stratum II of this test excavation is associated with Feature 2 of SIHP # 50-80-14-7428 (a culturally enriched A-horizon). A complete right tibia, from a *Canis lupus familiaris* (possible) was collected individually during excavation from Stratum Ic at 0.61 mbs. This bone showed no evidence of cultural modification. *Canis lupus familiaris* is a Polynesian introduction common in both pre- and post-Contact contexts, and is therefore inconclusive (see Table 209).

Table 208. Invertebrate and Vertebrate Midden Identified Within Bulk Sediment Samples from Test Excavation 120B, SIHP # -7428

Test Excavation	120B	Weight (g)	Total %
Stratum	II		
Feature	-		
Invertebrate Midden			
Conidae <i>Conus</i> sp.	56.9	56.9	22.8%
Cymatiidae <i>Cymatium</i> sp.	1.4	1.4	0.6%
Cypraeidae <i>Cypraea caputserpentis</i>	0.8	0.8	0.3%
Cypraeidae <i>Cypraea maculifera</i>	16.8	16.8	6.7%
Gastropod	3	3	1.2%
Isognomidae	1	1	0.4%
Isognomidae <i>Isognomon</i> sp.	5.5	5.5	2.2%
Isognomidae <i>Isognomon</i> spp.	11.7	11.7	4.7%
Mytilidae <i>Brachidontes crebristriatus</i>	16.8	16.8	6.7%
Naticidae <i>Natica</i> sp.	1	1	0.4%
Naticidae <i>Natica gualteriana</i>	1	1	0.4%
Neritidae	5.1	5.1	2.0%
Neritidae <i>Nerita picea</i>	37.2	37.2	14.9%
Neritidae <i>Nerita picea</i> Opercula	2.6	2.6	1.0%
Neritidae <i>Theodoxus neglectus</i>	0.3	0.3	0.1%
Pteriidae <i>Pinctada radiata</i>	20.5	20.5	8.2%
Strombidae	1.6	1.6	0.6%
Strombidae <i>Strombus maculatus</i>	3	3	1.2%
Strombidae <i>Strombus</i> sp.	2	2	0.8%
Tellinidae	2.6	2.6	1.0%
Tellinidae <i>Tellina palatam</i>	32.6	32.6	13.1%
Tonnidae <i>Tonna dolium</i>	7.2	7.2	2.9%
Trochidae <i>Trochus</i> sp.	2.5	2.5	1.0%
Turbinidae <i>Turbo</i> sp. Opercula	1.3	1.3	0.5%
Burned shell	9.1	9.1	3.6%
Crustacea	2.4	2.4	1.0%
Crustacea (burned)	0.5	0.5	0.2%
Echinoidea <i>mathaei</i> sp. and <i>diadema</i> sp.	3.4	3.4	1.4%
Total Invertebrate Midden	249.8	249.8	100.0%
Vertebrate Midden			
Medium mammal	0.1	0.1	1.4%
Medium mammal teeth (burned)	0.5	0.5	7.0%
Small mammal	0.1	0.1	1.4%
<i>Sus scrofa</i> (pig)	0.5	0.5	7.0%
<i>Canis lupus familiaris</i> (dog)	1.2	1.2	16.9%
<i>Rattus</i> sp. (rat teeth)	0.1	0.1	1.4%
<i>Gallus gallus</i> (chicken)	3.9	3.9	54.9%
Osteichthyes (fish)	0.5	0.5	7.0%
Monacanthidae <i>Pervagor spilosoma</i> (fish)	0.1	0.1	1.4%
Chondrichthyes (shark tooth)	0.1	0.1	1.4%
Total Vertebrate Midden	7.1	7.1	100.0%

Table 209. Terrestrial Faunal Material Collected Individually During Test Excavation 120B

Acc. #	Stratum	Depth (cmbs)	Feature	Family/Class	Species	Element	Description	Modification
120B-F-1	Ic/II	65-100	7428-2	Bovidae (cow)	<i>Bos taurus</i>	Ribs; Distal radius; Calcaneus, Radius (pieces mend); Glenoid fossa; Tibia; Proximal phalanx	Fragments	Glenoid fossa and tibia butchered (cut with metal saw blade)
120B-F-2	Ic/II	65-100	7428-2	Suidae (pig)	<i>Sus scrofa</i>	Mandible with molars; Incisors, Cranial bones; Ribs; Irregular bones	Fragments	None
120B-F-3	Ic/II	65-100	7428-2	Suidae (pig)	<i>Sus scrofa</i> (Juvenile)	Mandible with molars; Vertebrae	Fragments	None
120B-F-4	Ic/II	65-100	7428-2	Canidae (dog)	<i>Canis lupus familiaris</i>	Left Glenoid fossa portion, Ulna; Diaphysis sections	Fragments	Left Glenoid fossa butchered (cut with metal saw blade)
120B-F-5	II	100-110	7428-2	Bovidae (cow)	<i>Bos taurus</i>	Ribs; Diaphysis sections	Fragments	None
120B-F-6	II	100-110	7428-2	Canidae (dog)	<i>Canis lupus familiaris</i>	Femoral epiphysis	Fragment	None
120B-F-7	II	100-110	7428-2	Mammalia	Medium mammal	Irregular bones; Diaphysis section	Fragments	None
120B-F-8	II	110-120	7428-2	Suidae (pig)	<i>Sus scrofa</i>	Incisor root	Fragment	None
120B-F-9	II	110-120	7428-2	Mammalia	Medium mammal	Irregular bones	Fragments	None
120B-F-10	II	110-130	7428-2	Equidae	<i>Equus ferus caballus</i>	Vertebra	Fragment	None

T-121

One bulk sediment sample was collected from Test Excavation 121, Stratum V, at a depth of 1.63 mbs. Faunal analysis of Stratum V identified Osteichthyes (0.1 g), Crustacea (0.3 g), Echinoidea *Echinometra mathaei* (0.1 g), and marine mollusk shell consisting of naturally-

deposited marine shell (0.4 g) and culturally-associated midden: *Brachidontes crebristriatus* (3.6 g) and *Nerita polita* (0.1 g).

Tibia and metatarsi fragments from an unidentified Aves (bird) were collected individually during excavation from Stratum Ib (0.93-1.26 mbs). The remains showed no evidence of cultural modification and are inconclusive as to a particular cultural time period.

SIHP # 50-8-14-2963 (Test Excavations 122, 123, 124)

Test Excavations comprising SIHP # -2963 contained invertebrate and vertebrate faunal materials expressing a wetland environment and/or a strong midden signature. The wetland environment was expressed within Test Excavations 123 by a high content of fresh or brackish water gastropods (snails). The strong midden signature was identified within Test Excavation 122 and 124, within the buried A-horizons (Strata IIa and IIb) and associated features (Features 1, 2, 5, 8, 11). All midden within the buried A-horizon and associated features are tabulated for each individual trench (Table 210 to Table 212) below. The marine mollusk faunal material identified as naturally-deposited shell or as juvenile in size is not included in the midden table. Any vertebrate faunal material collected individually from various strata is also discussed within each test excavation discussion.

T-122

A midden table of marine and terrestrial faunal material documented within Test Excavation 122, cultural resource SIHP # -2963, is provided in Table 210 below. The invertebrate species most represented within the midden signature consists of *Nerita picea*. All identified invertebrate species are naturally found within a near-shore environment: on rocks and rock shelves within intertidal zones, tide-pools, and shallow marine waters. The vertebrate species identified consisted of bird and fish.

Table 210. Invertebrate and Vertebrate Midden Within Test Excavation 122, SIHP # -2963

Test Excavation	122	Weight (g)	Total %
Stratum	II		
Feature	-		
Invertebrate Midden			
Neritidae <i>Nerita picea</i>	1.8	1.8	58.1%
Tellinidae <i>Tellina palatam</i>	1.1	1.1	35.5%
Crustacea (burned)	0.1	0.1	3.2%
Echinoidea <i>mathaei</i> sp.	0.1	0.1	3.2%
Total Invertebrate Midden	3.1	3.1	100.0%
Vertebrate Midden			
Aves (bird)	0.2	0.2	66.7
Osteichthyes (fish)	0.1	0.1	33.3%
Total Vertebrate Midden	0.3	0.3	100.0%

T-123

The faunal analysis Stratum II identified fresh or brackish water gastropods (snails) indicative of a wetland deposit as well as Osteichthyes (0.1 g) and medium mammal (0.1 g).

The faunal analysis of Stratum III identified a distinct midden signature and is tabulated below (Table 211). The invertebrate species most represented within the midden signature consists of *Conus* spp., although a variety of species in lesser amounts were also present. These species are naturally found within a near-shore environment: on rocks and rock shelves within intertidal zones, tide-pools, and shallow marine waters. The vertebrate species identified consisted of medium mammal and fish.

Faunal analysis of Strata Id and If also identified a small amount of non-midden marine shell and Osteichthyes (fish) (0.1 g).

Table 211. Invertebrate and Vertebrate Midden Within Test Excavation 123, SIHP # -2963

Test Excavation	123	123	Weight (g)	Total %
Stratum	II	III		
Feature	-	-		
Invertebrate Midden				
Conidae <i>Conus</i> spp.		27.0	27.0	77.8%
Isognomidae <i>Isognomon</i> sp.		0.1	0.1	0.3%
Neritidae <i>Nerita picea</i>		3.1	3.1	8.9%
Mytilidae <i>Brachidontes crebristriatus</i>		2.9	2.9	8.4%
Tellinidae <i>Tellina palatam</i>		1.1	1.1	3.2%
Trochidae <i>Trochus intextus</i>		0.2	0.2	0.6%
Crustacea		0.3	0.3	0.9%
Total Invertebrate Midden	0.0		34.7	100.0%
Vertebrate Midden				
Medium mammal	0.1	0.3	0.4	66.7%
Osteichthyes (fish)	0.1	0.1	0.2	33.3%
Total Vertebrate Midden	0.2	0.4	0.6	100.0%

T-124

A midden table of marine and terrestrial faunal material documented within Test Excavation 124, cultural resource SIHP # -2963, is provided in Table 212 below. The invertebrate families and species most represented within the midden signature include: *Tellina palatam*, *Nerita picea*, *Theodoxus neglectus*, *Conus* sp., and Crustacea. These species are naturally found within a near-shore environment: on rocks and rock shelves within intertidal zones, tide-pools, and shallow marine waters. The vertebrate species identified are consistent with pre-Contact terrestrial and marine species. Of particular note is the presence of green sea turtle (*Chelonia mydas*) within Feature 5 (for detailed discussion see Section 5.14). The fish species *Pervagor spilosoma* ('ō'ili'uwī'uwī) and *Seriola* cf. *dumerili* (kāhala) are also present (see Cultural and Environmental Osteichthyes Discussion in Section 5.1).

Faunal remains were also collected individually during excavation from Stratum Id (0.56-0.67 mbs). The remains consisted of *Bos taurus* fragments and an unidentified medium mammal fragment. All the bones showed butcher marks from a metal saw blade indicating an historic origin, not traditional Hawaiian, which is consistent with the presence of the introduced species

(*Bos taurus*). Test Excavation 124 is associated with SIHP # 50-80-14-02963, however the faunal remains originated from a non-feature fill layer.

Table 212. Invertebrate and Vertebrate Midden Within Test Excavation 124, SIHP # -2963

Test Excavation	124	124	124	124	124	Weight (g)	Total %
Stratum	IIa	IIa	IIb	IIb	IIb		
Feature	1	2	5	8	11		
Invertebrate Midden							
Conidae <i>Conus</i> sp.	8.3					8.3	11.2%
Isognomidae <i>Isognomon</i> sp.		0.1				0.1	0.1%
Mytilidae <i>Brachidontes crebristriatus</i>	12.3	5.5	4.6	1.6		24	32.5%
Neritidae <i>Theodoxus neglectus</i>			7.2	0.1		7.3	9.9%
Neritidae <i>Nerita picea</i>	5.8	2.5				8.3	11.2%
Strombidae	0.1	0.4				0.5	0.7%
Strombidae <i>Strombus</i> sp.	0.8					0.8	1.1%
Tellinidae <i>Tellina palatam</i>	5.6	1.1		2.2		8.9	12.0%
Trochidae	1	0.4			0.3	1.7	2.3%
Burned shell		0.6	0.7		0.7	2	2.7%
Crustacea	3.8	2.2	1	0.4	0.3	7.7	10.4%
Echinoidea	0.4			0.3		0.7	0.9%
Echinoidea <i>mathaei</i> sp.					0.1	0.1	0.1%
Echinoidea <i>mathaei</i> sp. and <i>diadema</i> sp.	1.6	0.6	1.3			3.5	4.7%
Total Invertebrate Midden	39.7	13.4	14.8	4.6	1.4	73.9	100%
Vertebrate Midden							
Medium mammal	2.7	1.8	0.1			4.6	38.7%
Small mammal		0.1			0.1	0.2	1.7%
<i>Rattus</i> sp. (rat)	0.3			0.1		0.4	3.4%
Osteichthyes (fish)	2.9	0.3	2.2	0.2		5.6	47.1%
Carangidae <i>Seriola</i> cf. <i>dumerili</i> (fish)			0.2			0.2	1.7%
Monacanthidae <i>Pervagor spilosoma</i> (fish)	0.1					0.1	0.8%
<i>Chelonia mydas</i> (green sea turtle)			0.7			0.7	5.9%
Chondrichthyes (shark tooth)	0.1					0.1	0.8%
Total Vertebrate Midden	6.1	2.2	3.2	0.3	0.1	11.9	100%

T-125

Bos taurus skeletal elements were collected individually during excavation from Stratum Id (0.45-0.5 mbs). Some of the bones show evidence of being butchered with a metal saw blade. Both the butchering evidence and *Bos taurus* being an introduced species indicate an historic origin, not traditional Hawaiian.

T-126

One bulk sediment sample was collected from Test Excavation 126, Stratum II, at a depth of 1.5 mbs. Faunal analysis of this stratum identified naturally-deposited bivalves and gastropods (5.5 g).

A complete right tibia, from a *Canis lupus familiaris* (possible) was collected individually during excavation from Stratum Ic at (0.61 mbs). This bone showed no evidence of cultural modification. *Canis lupus familiaris* is a Polynesian introduction common in both pre- and post-Contact contexts, and is therefore inconclusive.

T-129

Two bulk sediment samples were collected from Test Excavation 129, Strata II and III, at a depth of 1.39-1.45 mbs and 1.55-1.59 mbs, respectively. Faunal analysis of Stratum II identified naturally-deposited limpets and micro-gastropods (0.8 g). Faunal analysis of Stratum III identified a small amount of fresh or brackish water gastropods (snails), Crustacea (0.4 g) and naturally-deposited marine mollusk shell indicative of a shallow marine or estuary deposit: *Tellina* sp. (0.7 g), *Brachidontes crebristriatus* (0.5 g), *Tellina palatam* (0.1 g), and Neritidae operculum.

Terrestrial faunal remains were collected individually during excavation from Strata Id (at 0.4 mbs), Ie (at 0.6) and II (0.85-1.2 mbs). Species represented in Stratum Id consisted of *Bos taurus*, *Sus scrofa*, *Canis lupus familiaris* and unidentified medium mammal fragments. None of the remains from Id showed evidence of cultural modification. At 0.6 mbs, within Stratum Ie, many unmodified *Felis catus* skeletal fragments were collected, along with *Bos taurus* fragments that were butchered with a metal saw blade, indicating an historic origin not traditional Hawaiian for both species. Within Stratum II (0.85-1.2 mbs) unmodified skeletal elements of *Sus scrofa* and juvenile *Canis lupus familiaris* were collected. The natural stratum context and lack of modification might indicate a traditional Hawaiian context. Based on the presence of introduced species in Id (*Bos taurus*) and Ie (*Bos taurus* and *Felis catus*) these strata are of post-Contact origin, however Stratum II (0.85-1.2 mbs) contained only Polynesian introductions common in both pre- and post-Contact contexts, and is therefore inconclusive (see Table 213).

In addition to the mammalian remains, Stratum Id produced a very large unmodified vertebra fragment (at 0.6 mbs) and an unmodified fin fragment (between 0.34 and 0.49 mbs) from an unidentified Osteichthyes (fish) (see Appendix A).

Table 213. Terrestrial Faunal Material Collected Individually During Test Excavation 129

Acc. #	Stratum	Depth (cmbs)	Feature	Family/Class	Species	Element	Description	Modification
129-F-1	Id	40	-	Bovidae (cow)	<i>Bos taurus</i>	Vertebral facet; Vertebra (pieces mend)	Fragment	None
129-F-2	Id	40	-	Suidae (pig)	<i>Sus scrofa</i>	Rib	Fragment	None
129-F-3	Id	40	-	Canidae (dog)	<i>Canis lupus familiaris</i>	Rib	Fragment	None

Acc. #	Stratum	Depth (cmbs)	Feature	Family/ Class	Species	Element	Description	Modification
129-F-4	Id	40	-	Mammalia	Medium mammal	Diaphysis section	Fragment	None
129-F-5	Ie	60	-	Bovidae (cow)	<i>Bos taurus</i>	Ribs (pieces mend); Proximal rib end	Fragments	Butchered (cut with metal saw blades)
129-F-6	Ie	60	-	Felidae (cat)	<i>Felis catus</i>	Right innominate (ala); Innominate (acetabulum); Right ulna (pieces mend); Left ulna; Distal ulna portion (might mend with right ulna); Radius (proximal portion); Right femoral epiphysis; Right femur; Femoral epiphysis; Femur diaphysis; Tibia diaphysis; Vertebrae; Caudal vertebra; Ribs; Irregular bones/diaphysis sections	Fragments	None
129-F-7	II	85-120	-	Suidae (pig)	<i>Sus scrofa</i>	Ribs; Diaphysis section; Mandible	Fragments	None
129-F-8	II	85-120	-	Canidae (dog)	<i>Canis lupus familiaris</i> (Juvenile)	Innominate (ala, unfused); Mandible	Fragments	None

T-130

Terrestrial faunal remains collected individually during excavation from Stratum II (0.76-1.38 mbs) consisted of *Carpa aegagrus hircus*, *Anas platyrhynchos domesticus*, and *Gallus gallus* skeletal elements. None of the bones showed evidence of cultural modification, but the presence of introduced species (*Carpa aegagrus hircus* and *Anas platyrhynchos domesticus*) indicates a post-Contact date for the deposition of Stratum II.

T-131

One bulk sediment sample was collected from Test Excavation 131, Stratum II, at a depth of 1.33 mbs. Faunal analysis of Stratum II identified fresh or brackish water gastropods (snails) (12.3 g), bivalve and gastropod fragments (0.6 g), *Brachidontes crebristriatus* (1.0 g), burned shell fragment (0.1 g), and burned Crustacea (0.1 g). The faunal analysis of Stratum III is consistent with a wetland deposit.

Terrestrial faunal remains were collected individually during excavation from the Strata Ic/II interface (0.54-1.33 mbs). The species represented were *Bos taurus*, *Sus scrofa*, *Felis catus*, *Meleagris gallopavo*, and unidentified medium mammal vertebra fragment. The *Bos taurus* fragment showed evidence of being butchered with a metal saw blade, and the medium mammal vertebra fragment was fused to a piece of metal both of which indicate an historic origin, not traditional Hawaiian for the collected remains. This correlates with the assemblage of identified species that include historic introductions (*Bos taurus*, *Felis catus*, and *Meleagris gallopavo*) (Table 214).

Table 214. Terrestrial Faunal Material Collected Individually During Test Excavation 131

Acc. #	Stratum	Depth (cmbs)	Feature	Family/ Class	Species	Element	Description	Modification
131-F-1	Ic-II	54-133	-	Bovidae (cow)	<i>Bos taurus</i>	Vertebra (pieces mend); Ribs; Long bone condyles	Fragments	Butchered (cut with metal saw blade)
131-F-2	Ic-II	54-133	-	Suidae (pig)	<i>Sus scrofa</i>	Humerus (distal portion)	Fragment	None
131-F-3	Ic-II	54-133	-	Felidae (cat)	<i>Felis catus</i>	Left scapula; Right calcaneus	Complete	None
131-F-4	Ic-II	54-133	-	Mammalia	Medium mammal	Vertebra (possible)	Fragment	Fused to metal matrix
131-F-5	Ic-II	54-133	-	Aves (Rio Grande wild turkey)	<i>Meleagris gallopavo</i>	Left tibiotarsus (distal portion)	Fragment	None

T-132

Terrestrial faunal remains were collected individually during excavation from Strata Id (0.5-1 mbs) and Ie (1.2-1.39 mbs). A *Felis catus* left humerus fragment was retrieved from Id, and the species represented in Ie consisted of *Sus scrofa*, *Canis lupus familiaris*, *Gallus gallus* and an unidentified Aves (bird) fragment. None of the bones exhibited evidence of cultural modification. The presence of the introduced species *Felis catus* is indicative of a post-Contact

origin for Stratum Id, while the identified species present in Ie (*Sus scrofa*, *Canis lupus familiaris*, *Gallus gallus*) are Polynesian introductions common in both pre- and post-Contact contexts, and therefore inconclusive (Table 215).

Table 215. Terrestrial Faunal Material Collected Individually During Test Excavation 132

Acc. #	Stratum	Depth (cmbs)	Feature	Family/ Class	Species	Element	Description	Modification
132-F-1	Id	50-100	-	Felidae (cat)	<i>Felis catus</i>	Left humerus (distal portion)	Fragment	None
132-F-2	Ie	120-139	-	Suidae (pig)	<i>Sus scrofa</i>	Tibia diaphysis section; Metatarsal (proximal portion)	Fragments	None
132-F-3	Ie	120-139	-	Canidae (dog)	<i>Canis lupus familiaris</i>	Humerus diaphysis section	Fragment	None
132-F-4	Ie	120-139	-	Aves (chicken)	<i>Gallus gallus</i>	Left humerus	Complete	None
132-F-5	Ie	120-139	-	Aves (bird)	Unidentified	Tibiotarsus (distal portion)	Fragment	None

T-133

Two bulk sediment samples were collected from Test Excavation 133, Strata Ig and II (1.1-1.45 mbs and 1.55-1.59 mbs) respectively. Faunal analysis of Stratum Ig identified bivalve and gastropod (2.4 g), *Echinothrix diadema* and *Echinometra mathaei*. (0.2 g), and burned Crustacea (1.4 g). Faunal analysis of Stratum II identified naturally-deposited marine mollusk, Crustacea, and Echinoidea indicating a shallow marine or estuary environment (Table 216).

Butchered *Sus scrofa* rib fragments were collected individually during excavation from Stratum Ic (0.15-0.7 mbs). These bones were butchered using a metal saw blade, which indicates an historic origin not traditional Hawaiian.

Table 216. Stratum II Faunal Material Collected from Test Excavation 133

Faunal Material	Weight (g)
Gastropod/limpets/micro-shell	3.2
Mytilidae <i>Brachidontes crebristriatus</i>	7.8
Naticidae <i>Natica</i> sp.	5.1
Tellinidae <i>Tellina</i> sp.	8.4
Tellinidae <i>Tellina palatam</i>	0.2
Crustacea	1.0
<i>Echinothrix diadema</i> / <i>Echinometra mathaei</i>	0.9
Total	26.6

T-134

One bulk sediment sample was collected from Test Excavation 134, Stratum II (1.15-1.45 mbs). Faunal analysis of Stratum II identified naturally-deposited marine mollusk, Crustacea, and Echinoidea indicating a shallow marine or estuary environment (Table 217).

Terrestrial faunal remains were collected individually during excavation from Stratum Ib (0.15-0.6 mbs) and from the Ib/Ic interface (0.6 mbs). The remains from Ib consisted of fragmentary *Bos taurus*, *Sus scrofa* and medium mammal skeletal elements, none of which showed evidence of cultural modification. The remains from the Ib/Ic interface consisted of a single *Bos taurus* tibia fragment with butcher marks from a metal saw blade, indicating an historic (not traditional Hawaiian) origin; an unmodified medium mammal cranial fragment; and an unmodified irregular bone from a medium mammal. It can be concluded from the presence of introduced species (*Bos taurus*) that these are post-Contact strata and not of traditional Hawaiian origin (Table 218).

Table 217. Stratum II Faunal Material Collected from Test Excavation 134

Faunal Material	Weight (g)
Gastropod/limpets/micro-shell	2.9
Mytilidae <i>Brachidontes crebristriatus</i>	4.3
Naticidae <i>Natica</i> sp.	3.3
Tellinidae <i>Tellina</i> sp.	2.4
Trochidae <i>Trochus</i> sp.	1.5
Crustacea	2.8
Echinoidea <i>diadema</i> sp. and <i>mathaei</i> sp.	0.9
Total	18.1

Table 218. Terrestrial Faunal Material Collected Individually During Test Excavation 134

Acc. #	Stratum	Depth (cmbs)	Feature	Family/Class	Species	Element	Description	Modification
134-F-1	Ib	15-60	-	Bovidae (cow)	<i>Bos taurus</i>	Right femoral head (pieces mend)	Fragments	None
134-F-2	Ib	15-60	-	Suidae (pig)	<i>Sus scrofa</i>	Right femoral diaphysis section with femoral head (pieces mend)	Fragments	None
134-F-3	Ib	15-60	-	Mammalia	Medium mammal	Epiphysis portions; Diaphysis sections	Fragments	None

Acc. #	Stratum	Depth (cmbs)	Feature	Family/ Class	Species	Element	Description	Modification
134-F-4	Ib/Ic	60	-	Bovidae (cow)	<i>Bos taurus</i>	Tibia diaphysis section	Fragment	Butchered both ends (cut with metal saw blade)
134-F-5	Ib/Ic	60	-	Mammalia	Medium mammal	Cranial	Fragment	None
134-F-6	Ib/Ic	60	-	Mammalia	Medium mammal	Irregular bone	Fragment	None

T-136

One bulk sediment sample was collected from Test Excavation 136, Stratum II, at a depth of 1.85 mbs. Faunal analysis of Stratum II identified naturally-deposited marine mollusk, Crustacea, and Echinoidea indicating a shallow marine or estuary environment (Table 219).

A single *Bos taurus* scapula fragment was collected individually during excavation from Stratum Ih (0.86 mbs). This bone showed evidence of being butchered by a metal saw blade, which (in addition to being an introduced species) indicates an historic origin not traditional Hawaiian.

Table 219. Stratum II Faunal Material Collected from Test Excavation 136

Faunal Material	Weight (g)
Tellinidae <i>Tellina</i> sp.	37.1
Mytilidae <i>Brachidontes crebristriatus</i>	19.9
Naticidae	5.7
Pteriidae <i>Pinctada radiata</i>	4.2
cf. Fascioliariidae <i>Peristrenia ustulata</i>	0.6
Trochidae	0.5
Lucinidae <i>Ctena bella</i>	0.1
Neritidae opercula	0.1
Pyramidellidae <i>Pyramidula dolabrata</i>	1.0
Hipponicidae <i>Hipponix</i> spp.	0.5
Cardiidae <i>Fragum mundum</i>	0.1
Cymatiidae	0.1
Crustacea	3.9
<i>Echinothrix diadema</i> and <i>Echinometra mathaei</i>	9.2
Limpets	0.3
Misc. shell	0.8
Total	84.1

T-137

Faunal remains collected individually during excavation from Stratum Ib (at 1 mbs) consisted of a *Bos taurus* rib fragment, and a *Canis lupus familiaris* (possible) ulna fragment. The *Bos taurus* rib showed evidence of being butchered with a metal saw blade, which (in addition to being an introduced species) indicates an historic origin not traditional Hawaiian.

T-138

One bulk sediment sample was collected from Test Excavation 138, Stratum III, at a depth of 1.5 mbs. Faunal analysis of Stratum III identified naturally-deposited marine mollusk, Crustacea, Echinoidea, and Osteichthyes indicating a shallow marine or estuary environment (Table 220).

Terrestrial faunal remains collected individually during excavation from Stratum II (at 1.2 mbs) consisted of *Bos taurus*, medium mammal and unidentified Aves (bird). One of the *Bos taurus* bones showed evidence of being butchered with a metal saw blade, which (in addition to being an introduced species) indicates an historic origin not traditional Hawaiian.

Table 220. Stratum II Faunal Material Collected from Test Excavation 138

Faunal Material	Weight (g)
Mytilidae <i>Brachidontes crebristriatus</i>	23.6
Naticidae	1.4
Tellinidae	0.9
Fasciolariidae	0.8
Hipponicidae <i>Hipponix</i> spp.	0.4
Trochidae	0.3
Melampidae <i>Melampus castaneus</i>	0.1
Neritidae operculum	0.1
Turbinidae <i>Turbo sandwicensis</i>	0.1
Gastropods	1.2
Crustacea	0.2
<i>Echinometra mathaei</i> sp.	0.1
Limpets	0.1
Misc. shell	7.2
Osteichthyes (fish)	0.1
Total	36.6

T-139

One bulk sediment sample was collected from Test Excavation 139, Stratum II, at a depth of 2.0 mbs. Faunal analysis of Stratum II identified naturally-deposited marine mollusk, Crustacea, and Echinoidea indicating a shallow marine or estuary environment (Table 221).

Terrestrial faunal remains were collected individually during excavation from Stratum Ib (0.1-0.45 mbs). These consisted of *Equus ferus caballus*, *Bos taurus*, *Capra aegagrus hircus*, *Felis catus*, and unidentified Aves (bird) skeletal elements. None of the bones showed evidence of cultural modification. It can be concluded from the presence of introduced species (*Equus ferus caballus*, *Bos taurus*, *Capra aegagrus hircus* and *Felis catus*) that this is a post-Contact context and not of traditional Hawaiian origin (Table 222).

Table 221. Stratum II Faunal Material Collected from Test Excavation 139

Faunal Material	Weight (g)
Mytilidae <i>Brachidontes crebristriatus</i>	20.7
Isognomidae <i>Isognomon</i> sp.	0.2
Tellinidae	0.1
Fascioliariidae	0.7
Hipponicidae <i>Hipponix</i> spp.	0.7
Trochidae	1.4
Cardiidae <i>Fragum mundum</i>	0.1
Turbinidae <i>Turbo sandwicensis</i>	0.1
Naticidae	0.1
Gastropods	0.1
Crustacea	1.2
<i>Echinometra mathaei</i>	0.1
Limpets	1.5
Vermetidae	0.1
Misc. shell	1.2
Total	28.3

Table 222. Terrestrial Faunal Material Collected Individually During Test Excavation 139

Acc. #	Stratum	Depth (cmbs)	Feature	Family/Class	Species	Element	Description	Modification
139-F-1	Ib	10-45	-	Equidae (horse)	<i>Equus ferus caballus</i>	Molar; Diaphysis section	Fragments	None
139-F-2	Ib	10-45	-	Bovidae (cow)	<i>Bos taurus</i>	Diaphysis sections	Fragments	None
139-F-3	Ib	10-45	-	Bovidae (goat)	<i>Capra aegagrus hircus</i>	Teeth	Fragments	None
139-F-4	Ib	10-45	-	Felidae (cat)	<i>Felis catus</i>	Metatarsal	Complete	None
139-F-5	Ib	10-45	-	Aves (bird)	Unidentified	Diaphysis sections	Fragments	None

T-140

One bulk sediment sample was collected from Test Excavation 140, Stratum II (1.2-1.34 mbs). Faunal analysis of Stratum II identified naturally-deposited Crustacea (3.9 g) and various marine mollusk shell fragments (0.9 g).

SIHP #50-8-14-5820 (Test Excavations 141, 142, 145, 146A, 150, 151, 151A)

Test Excavations comprising SIHP # -5820 contained invertebrate and vertebrate faunal material expressing a strong midden signature. Terrestrial vertebrate material collected individually during excavation was also documented. This strong midden content was identified within the buried A-horizon (Stratum II) and associated features (Features 1-29). All midden within this stratum and associated features is tabulated for each individual trench (Table 223, Table 225, Table 230, and Table 232 to Table 234) below. The marine mollusk faunal material identified as naturally-deposited shell or as juvenile in size is not included in the midden table.

Any vertebrate faunal material collected individually from various strata is also discussed within each test excavation discussion.

T-141

A midden table of marine and terrestrial faunal material identified within bulk sediment samples within Test Excavation 141, cultural resource SIHP # -5820, is provided in Table 223 below. The invertebrate species most represented within the midden signature consists of *Brachidontes crebristriatus*. The invertebrate species identified within the midden content are naturally found within a near-shore environment: on rocks and rock shelves within intertidal zones, tide-pools, and shallow marine waters. The vertebrate species identified consisted of medium mammal and fish. However, hand-collected terrestrial faunal remains within SIHP # -5820 also included historically introduced species (see below).

In addition to the midden analysis tabulated within Table 223, faunal analysis was conducted of a bulk sediment sample collected from a historic pit associated with Stratum Ib at a depth of 0.7-1.0 mbs. Faunal analysis of Stratum Ib identified Osteichthyes (0.1 g), *Isognomon* sp. (1.0 g), *Brachidontes crebristriatus* (0.9 g), and gastropod (0.6 g).

Terrestrial faunal remains were collected individually during excavation from Strata II, Feature 1 (0.45-0.58 mbs) and Feature 2 (0.89 mbs) of SIHP# 50-80-14-5820, as well as from a historic/modern utility excavation containing disturbed cultural material. The faunal remains collected from Feature 1 consisted of *Sus scrofa*, *Canis lupus familiaris* and Unidentified Aves (bird) skeletal elements from between 0.45 and 0.58 mbs, as well as an entire articulated *Equus ferus caballus* burial (0.77-1.15 mbs). None of these bones showed any evidence of cultural modifications; however a post-Contact origin for this feature is evident due to the presence of *Equus ferus caballus* (Horse) which was first brought to O'ahu in the early 1800s (Riper and Riper 1982). The faunal collection from Feature 2 consisted of a single unmodified *Sus scrofa* cranial fragment at 0.89 mbs.

The faunal remains collected from the historic/modern utility excavation area consisted of *Sus scrofa* and *Gallus gallus* skeletal elements. The *Sus scrofa* humerus showed evidence of butchering with a metal saw blade, indicating an historic origin, not traditional Hawaiian. However, the historic/modern utility excavation area is a disturbed context so it is unclear where the bones originated (Table 224).

Table 223. Invertebrate and Vertebrate Midden Identified Within Bulk Sediment Samples from Test Excavation 141, SIHP # -5820

Test Excavation	141	141	141	Weight (g)	Total %
Stratum	II	II	II		
Feature		1	2		
Invertebrate Midden					
Gastropod	1.2			1.2	2.3%
Isognomidae		1.8		1.8	3.5%
Isognomidae <i>Isognomon</i> sp.				0	0.0%
Mytilidae <i>Brachidontes crebristriatus</i>	2.6	3.2		5.8	11.2%

Test Excavation	141	141	141	Weight (g)	Total %
Stratum	II	II	II		
Feature		1	2		
Neritidae <i>Nerita picea</i>	6.2	1.8		8	15.5%
Tellinidae <i>Tellina palatam</i>	18.9	12.1		31	60.0%
Crustacea	0.6	1.5		2.1	4.1%
Echinoidea		0.2	0.4	0.6	1.2%
Echinoidea <i>diadema</i> sp.			0.5	0.5	1.0%
Echinoidea <i>mathaei</i> sp. and <i>diadema</i> sp.	0.7			0.7	1.4%
Total Invertebrate Midden	30.2	20.6	0.9	51.7	100.0%
Vertebrate Midden					
Medium mammal		0.8		0.8	100.0%
Osteichthyes (fish)				0	0.0%
Total Vertebrate Midden	0	0.8	0	0.8	100.0%

Table 224. Terrestrial Faunal Material Collected Individually During Test Excavation 141

Acc. #	Stratum	Depth (cmbs)	Feature	Family/ Class	Species	Element	Description	Modification
141-F-1	II	45-58	5820-1	Suidae (pig)	<i>Sus scrofa</i>	Molar	Complete	None
141-F-2	II	45-58	5820-1	Canidae (dog)	<i>Canis lupus familiaris</i>	Vertebra (spinous process; Humerus (proximal section)	Fragments	None
141-F-3	II	45-58	5820-1	Aves (bird)	Unidentified	Diaphysis section	Fragment	None
141-F-4	II	77-115	5820-1	Equidae (horse)	<i>Equus ferus caballus</i>	Articulated Horse	Complete	None
141-F-5	II	89	5820-2	Suidae (pig)	<i>Sus scrofa</i>	Cranial	Fragment	None
141-F-6	Utility exc.	75-83	-	Suidae (pig)	<i>Sus scrofa</i>	Humerus portion; Phalanx	Fragment/ Complete	Humerus butchered (cut with metal saw blade)
141-F-7	Utility exc.	75-83	-	Aves (chicken)	<i>Gallus gallus</i>	Left tibiotarsal (distal portion)	Fragment	None

T-142

A midden table of marine and terrestrial faunal material identified within bulk sediment samples within Test Excavation 142, cultural resource SIHP # -5820, is provided in Table 225 below. The invertebrate families and species most represented within the midden signature include: *Isognomon* sp., *Nerita picea*, *Theodoxus neglectus*, *Conus* sp., and Echinoidea (sea

urchin). These species are naturally found within a near-shore environment: on rocks and rock shelves within intertidal zones, tide-pools, and shallow marine waters. The vertebrate species identified are consistent with pre-Contact terrestrial and marine species, including: small and medium mammal, pig, rat, bird, and fish. However, hand-collected terrestrial faunal remains within SIHP #5820 also included historically introduced species (see below).

In addition to the midden analysis tabulated within Table 225, faunal analysis was conducted of bulk sediment samples collected from Stratum Ic (0.24-0.42 mbs), Stratum III (0.77-1.01 mbs), and Stratum IV (1.34-1.37 mbs). Faunal analysis of Stratum Ic, identified as fill, identified *Echinothrix diadema* and *Echinometra mathaei* (0.5 g), Crustacea (0.1 g), *Gallus gallus* (15.2 g), Osteichthyes (0.1 g) and various gastropods/bivalves/limpets (17.5 g). Faunal analysis of Stratum III identified naturally-deposited gastropods and limpets (1.7 g), Crustacea (0.1 g), and *Echinometra mathaei* (0.1 g). Faunal analysis of Stratum IV documented unidentified Aves (0.3 g) as well as naturally-deposited Crustacea (1.9 g), *Echinometra mathaei* (0.1 g), and shallow marine mollusk: *Brachidontes crebristriatus* (8.3 g), *Cymatium* sp. (1.1 g), *Tellina* sp. (0.9 g), and limpets and gastropods (2.6 g).

Terrestrial faunal remains were collected individually during excavation from Stratum Ic: between (0.18 and 0.58 mbs), (0.24 and 0.42 mbs), and (0.44 and 0.7 mbs) respectively; and Stratum II: between (0.44 and 0.52 mbs) (SIHP# 50-80-14-5820, Feature 5), (0.52 and 0.6 mbs) (SIHP# 50-80-14-5820, Feature 6), (0.5 and 0.6 mbs) (SIHP# 50-80-14-5820, Feature 7), (0.69 mbs, and 0.7 mbs) respectively.

Stratum Ic faunal remains collected between (0.18 and 0.58 mbs) consisted of: *Felis catus* and two sets of unidentified Aves (bird) skeletal elements, with no evidence of cultural modification. The Stratum Ic faunal remains between (0.24 and 0.42 mbs) consisted of: unmodified *Gallus gallus* skeletal elements. In addition to the Aves remains from Stratum Ic between (0.24 and 0.42 mbs), there were also unmodified unidentified spine and irregular Osteichthyes (fish) bone fragments recovered (see Appendix A). The Stratum Ic faunal remains between 0.44 and 0.7 mbs consisted of: calcined *Bos taurus* skeletal elements; a calcined *Sus scrofa* fragment; unmodified juvenile *Felis catus* skeletal elements; irregular bone fragments from a medium mammal that showed butcher marks (from a non-metal saw blade) and calcination; and unmodified unidentified Aves (bird) skeletal fragments. The calcined *Bos taurus*, *Sus scrofa*, and medium mammal skeletal elements are indicative of exposure to extreme heat for an extended period of time which doubtfully would have occurred in a traditional Hawaiian context, it is more likely that this effect occurred in association with trash-burning activities which took place in this area in historic times.

The Stratum II faunal remains from SIHP # 50-80-14-5820, Feature 5 (between 0.44 and 0.52 mbs) consisted of: a burned/calcined *Bos taurus* rib fragment and an unmodified medium mammal (possible *Bos taurus* or *Sus scrofa*) cranial (possible) fragment. The calcined *Bos taurus* rib is indicative of exposure to extreme heat for an extended period of time, which doubtfully would have occurred in a traditional Hawaiian context, it is more likely that this effect occurred in association with trash-burning activities which took place in this area in historic times. The Stratum II faunal remains from SIHP # 50-80-14-5820, Feature 6 (between 0.52 and 0.6 mbs) consisted of *Bos taurus* skeletal elements with butcher marks on the diaphysis sections (uniform striations on both sides) and black charring/burnt areas on the cancellous diaphysis sections;

consistent with traditional Hawaiian food processing methods. However, the presence of *Bos taurus* (an introduced species) places this feature in the post-Contact period. The Stratum IIa faunal remains from SIHP # 50-80-14-5820, Feature 7 (between 0.5 and 0.6 mbs) consisted of: *Bos taurus* skeletal elements, unmodified *Sus scrofa* skeletal elements, and unmodified medium mammal (possible *Bos taurus* or *Sus scrofa*) irregular bone fragments. The *Bos taurus* radius and vertebrae had been butchered with a metal saw blade, indicating an historic origin and not traditional Hawaiian.

Also within Stratum II, a *Canis lupus familiaris* diaphysis section with perimortem fractures was recovered at 0.69 mbs, and a *Bos taurus* rib fragment with butcher marks from a non-metal saw blade (striations on both sides and a single false start) was collected at 0.7 mbs. Again, the presence of *Bos taurus* (an introduced species) places this feature in the post-Contact period (Table 226).

Table 225. Invertebrate and Vertebrate Midden Identified Within Bulk Sediment Samples from Test Excavation 142, SIHP # -5820

Test Excavation	142	142	142	142	142	Weight (g)	Total %
Stratum	II	II	II	II	II		
Feature	-	5	6	7	8		
Invertebrate Midden							
Conidae <i>Conus</i> sp.			17.4	11		28.4	4.5%
Isogonomidae <i>Isognomon</i> sp.		0.2	157.2	281.6		439	69.0%
Mytilidae <i>Brachidontes crebristriatus</i>			1.6	3.4	0.4	5.4	0.8%
Nassariidae <i>Nassarius gaudiosus</i>		1				1	0.2%
Neritidae <i>Nerita picea</i>	1.7	1.7	21.7	46.9	7.4	79.4	12.5%
Neritidae <i>Nerita picea</i> and <i>Theodoxus neglectus</i>		11.2				11.2	1.8%
Neritidae <i>Theodoxus neglectus</i>			8.8			8.8	1.4%
Ostreidae <i>Ostrea sandwicensis</i>				2		2	0.3%
Tellinidae <i>Tellina palatam</i>		0.5				0.5	0.1%
Turbinidae <i>Turbo sandwicensis</i>		17.2		2.8		20	3.1%
Turbinidae <i>Turbo</i> sp.					1.6	1.6	0.3%
Burned shell		4.4		2.1		6.5	1.0%
Crustacea (burned)				0.7		0.7	0.1%
Echinoidea <i>mathaei</i> sp. and <i>diadema</i> sp.				10.6		10.6	1.7%
Echinoidea				0.2	0.6	0.8	0.1%
Echinoidea <i>mathaei</i> sp.	0.2	0.3				0.5	0.1%
Echinoidea spp.			18.7			18.7	2.9%
Total Invertebrate Midden	2.1	36.6	226.3	361.3	10.3	636.6	100.0%
Vertebrate Midden							
Medium mammal			17.9	1	0.4	19.3	59.0%
Medium mammal (burned/calcified)				2.6		2.6	8.0%
Med mammal (burned)				5.2		5.2	15.9%

Test Excavation	142	142	142	142	142	Weight (g)	Total %
Stratum	II	II	II	II	II		
Feature	-	5	6	7	8		
Small mammal					0.1	0.1	0.3%
<i>Sus scrofa</i> (pig)					0.5	0.5	1.5%
<i>Rattus</i> sp. (rat)			0.5			0.5	1.5%
Aves (bird)				0.9		0.9	2.8%
Osteichthyes (fish)		0.1	0.6	2.8	0.1	3.6	11.0%
Total Vertebrate Midden	0	0.1	19	12.5	1.1	32.7	100.0%

Table 226. Terrestrial Faunal Material Collected Individually During Test Excavation 142

Acc. #	Stratum	Depth (cmbs)	Feature	Family/ Class	Species	Element	Description	Modification
142-F-1	Ic	18-50	-	Felidae (cat)	<i>Felis catus</i>	Lumbar vertebrae	Complete	None
142-F-2	Ic	18-50	-	Aves (bird)	Unidentified	Ribs; Proximal phalanx; 3rd phalanx	Fragments/complete	None
142-F-3	Ic	18-50	-	Aves (bird)	Unidentified	Left and right tibiotarsus; Sternum/keel	Fragments	None
142-F-4	Ic	24-42	-	Aves (chicken)	<i>Gallus gallus</i>	Right femur; Left femoral condyle; Cranium; Ribs (possible); Sternum (possible); Irregular bones	Fragments	None
142-F-5	Ic	44-70	modern pit	Bovidae (cow)	<i>Bos taurus</i>	Mandible portion with teeth (2); Astragalus (foot bone); Talus; Vertebra (possible); Rib; Cranial (possible)	Fragments/complete	All calcined
142-F-6	Ic	44-70	modern pit	Suidae (pig)	<i>Sus scrofa</i>	Proximal femur shaft portion, with unfused end	Fragment	Calcined

Acc. #	Stratum	Depth (cmbs)	Feature	Family/ Class	Species	Element	Description	Modification
						for head		
142-F-7	Ic	44-70	modern pit	Felidae (cat)	<i>Felis catus</i> (Juvenile)	Maxilla with molars (2) and canine (incomplete roots); Distal femur portion; Radial portion (possible <i>Felis catus</i>)	Fragments	None
142-F-8	Ic	44-70	modern pit	Mammalia	Medium mammal	Irregular bones	Fragments	Butcher marks/ calcination
142-F-9	Ic	44-70	modern pit	Aves (bird)	Unidentified	Possible foot elements (thin and lightweight)	Fragments	None
142-F-10	Ila	44-52	5820-5	Bovidae (cow)	<i>Bos taurus</i>	Rib	Fragment	Burned/calcin ed (deformed from high temperature fire)
142-F-11	Ila	44-52	5820-5	Mammalia	Medium mammal (possible <i>Bos taurus</i> or <i>Sus scrofa</i>)	Cranial (possible)	Fragment	None
142-F-12	Ila	50-60	5820-7	Bovidae (cow)	<i>Bos taurus</i>	Radial proximal portion (possible); Lumbar vertebrae; Ribs; Irregular bones; 2nd and 3rd Carpus	Fragments	Radius and vertebrae butchered (cut with metal saw blade)
142-F-13	Ila	50-60	5820-7	Suidae (pig)	<i>Sus scrofa</i>	Occipital/basilar condyle; Right styloid portion; Cranial	Fragments	None

Acc. #	Stratum	Depth (cmbs)	Feature	Family/ Class	Species	Element	Description	Modification
						(possible)		
142-F-14	Iia	50-60	5820-7	Mammalia	Medium mammal (possible <i>Bos taurus</i> or <i>Sus scrofa</i>)	Irregular bones	Fragments	None
142-F-15	Iia	52-60	5820-6	Bovidae (cow)	<i>Bos taurus</i>	Diaphysis section (possible tibia); Cancellous diaphysis sections	Fragments	Butcher marks on diaphysis sections (uniform striations on both sides); Black charring/burnt areas on cancellous diaphysis sections
142-F-16	Iia	69	-	Canidae (dog)	<i>Canis lupus familiaris</i>	Diaphysis section	Fragment	Perimortem fractures
142-F-17	Iia	70	-	Bovidae (cow)	<i>Bos taurus</i>	Rib	Fragment	Butcher marks (striations both sides, a single false start)

T-143

Four bulk sediment samples were collected from Test Excavation 143, Strata Id, Ie and II, at a depth of 0.58-0.66 mbs (Stratum Id), 0.95 mbs (Stratum Ie), and 1.05-1.48 mbs (Stratum II). Faunal analysis of Stratum Id, identified as fill, identified medium mammal (16.5 g), *Canis lupus familiaris* (3.8 g), Osteichthyes (2.9 g), *Nerita picea* (1.3 g), and Echinoidea (1.7 g). Faunal analysis of Stratum Ie, also identified as fill, identified medium mammal (5.8 g), Osteichthyes (0.2 g), *Nerita picea* (4.4 g), *Echinothrix diadema* and *Echinometra mathaei* (1.7 g), and limpets/gastropods (1.6 g). Faunal analysis of Stratum II identified naturally-deposited marine fauna indicative of a shallow marine or estuary deposit (Table 227). The presence of *Rattus* sp. is indicative of some disturbance to the deposit, as discussed in Volume IIc.

Terrestrial faunal remains were collected individually during excavation from Stratum Id (between 0.6 and 0.8 mbs), the Stratum Id/II interface (at 0.98 and 1 mbs) and Stratum III (at 1.44 mbs). The Stratum Id faunal remains were collected from a concentration and consisted of: *Bos taurus* skeletal elements which had been butchered with a metal saw blade (indicating an

historic and not traditional Hawaiian origin), as well as unmodified *Canis lupus familiaris* (possible) and other medium mammal skeletal elements.

The Stratum Id/II interface faunal remains from 0.98 mbs consisted of a single *Bos taurus* fragment that had been butchered on both ends with a metal saw blade, indicating an historic and not traditional Hawaiian origin. The Stratum Id/II interface faunal remains from 1 mbs consisted of unmodified *Bos taurus*, *Sus scrofa*, and unidentified Aves (bird) skeletal elements.

The Stratum III faunal remains consisted of *Capra aegagrus hircus* skeletal elements, some of which (frontal bone/horn) had burn marks. The presence of introduced species (*Capra aegagrus hircus* in Stratum III and *Bos taurus* in upper strata) places all of these strata within the post-Contact period (Table 228).

Table 227. Stratum II Faunal Material Collected from Test Excavation 143

Fauna Material	Weight (g)
Osteichthyes (fish)	0.1
<i>Rattus</i> sp. (rat)	0.1
Neritidae <i>Nerita picea</i>	5.7
Strombidae <i>Strombus</i> sp.	3.4
Mytilidae <i>Brachidontes crebristriatus</i>	2.0
Tellinidae <i>Tellina</i> sp.	0.1
Crustacea	0.1
<i>Echinometra mathaei</i>	0.3
Total	11.8

Table 228. Terrestrial Faunal Material Collected Individually During Test Excavation 143

Acc. #	Stratum	Depth (cmbs)	Feature	Family/Class	Species	Element	Description	Modification
143-F-1	Id	60-80	-	Bovidae (cow)	<i>Bos taurus</i>	Tibia (distal portion); Ribs; Vertebra	Fragments	Butchered (cut with metal saw blade)
143-F-2	Id	60-80	-	Canidae (dog)	<i>Canis lupus familiaris</i> (possible)	Diaphysis sections/irregular bones; Vertebrae	Fragments	None
143-F-3	Id	60-80	-	Mammalia	Medium mammal	Ulna	Fragment	None
143-F-4	Id/II	98	-	Bovidae (cow)	<i>Bos taurus</i>	Humerus diaphysis section	Fragment	Butchered (cut with metal saw blade on both ends)
143-F-5	Id/II	100	-	Bovidae (cow)	<i>Bos taurus</i>	Rib	Fragment	None
143-F-6	Id/II	100	-	Suidae (pig)	<i>Sus scrofa</i>	Femur; Canine tooth; Diaphysis sections	Fragments	None
143-	Id/II	100	-	Aves (bird)	Unidentified	Femur;	Fragments	None

Acc. #	Stratum	Depth (cmbs)	Feature	Family/Class	Species	Element	Description	Modification
F-7						Diaphysis sections		
143-F-8	III	144	-	Bovidae (goat)	<i>Capra aegagrus hircus</i>	Cranium; Maxilla with premolars/molars (pieces mend); Cervical vertebra	Fragments	Burn marks on cranium (frontal bone/horn)

T-145

A midden table of marine and terrestrial faunal material documented within Test Excavation 145, cultural resource SIHP # -5820, is provided in Table 229 below. The invertebrate species consisted of a variety of species in small amounts, including: *Brachidontes crebristriatus*, *Tellina* sp., *Strombus* sp., and *Nerita picea*. These species are naturally found within a near-shore environment: on rocks and rock shelves within intertidal zones, tide-pools, and shallow marine waters. The vertebrate species consisted of medium mammal and fish.

Faunal remains were collected individually during excavation from Stratum Ic (at 0.7 mbs) and from the Stratum II/III interface (at 0.76 mbs). The Stratum Ic faunal remains consisted of *Bos taurus* ribs and a thin irregular bone from an unidentified Aves (bird). The *Bos taurus* ribs had been butchered with a metal saw blade, indicating an historic and not traditional Hawaiian origin. The faunal remains collected from the Stratum II/III interface were associated with the culturally enriched sand A-horizon (a component of SIHP #50-80-14-5820) and consisted of unidentified medium mammal skeletal elements, some of which showed evidence of being butchered with a metal saw blade, indicating an historic and not traditional Hawaiian origin.

Table 229. Invertebrate and Vertebrate Midden Within Test Excavation 145, SIHP # -5820

Test Excavation	145	145	145	Weight (g)	Total %
Stratum	II	II	II		
Feature	-	9	10		
Invertebrate Midden					
Mytilidae <i>Brachidontes crebristriatus</i>	1.8		0.8	2.6	12.1%
Neritidae <i>Nerita picea</i>			1.3	1.3	6.0%
Strombidae <i>Strombus</i> sp.	1.9	0.8	0.7	3.4	15.8%
Tellinidae <i>Tellina</i> sp.	4.1			4.1	19.1%
Turbinidae <i>Turbo</i> sp. Opercula	0.9			0.9	4.2%
Burned shell		1.6		1.6	7.4%
Crustacea			1.4	1.4	6.5%
Crustacea (burned)	2.4	1.8		4.2	19.5%
Echinoidea			0.1	0.1	0.5%
Echinoidea <i>diadema</i> sp.	0.2			0.2	0.9%
Echinoidea <i>mathaei</i> sp.		1.4		1.4	6.5%
Echinoidea <i>mathaei</i> sp. (burned)	0.3			0.3	1.4%
Total Invertebrate Midden	11.6	5.6	4.3	21.5	100.0%
Vertebrate Midden					

Test Excavation	145	145	145	Weight (g)	Total %
Stratum	II	II	II		
Feature	-	9	10		
Medium mammal			1.3	1.3	86.7%
Osteichthyes (fish)	0.2			0.2	13.3%
Total Vertebrate Midden	0.2	0	1.3	1.5	100.0%

T-146A

A midden table of marine and terrestrial faunal material identified within bulk sediment samples within Test Excavation 146A, cultural resource SIHP # -5820, is provided in Table 230 below. The invertebrate species consisted of a variety of species in small amounts, including: *Brachidontes crebristriatus*, *Tellina* spp., *Strombus* sp., and *Nerita picea*. These species are naturally found within a near-shore environment: on rocks and rock shelves within intertidal zones, tide-pools, and shallow marine waters. The vertebrate species identified are consistent with pre-Contact terrestrial and marine species, including: medium mammal, pig, dog, and fish.

In addition to the midden analysis tabulated within Table 230, faunal analysis was conducted of bulk sediment samples collected from Stratum Ic (0.42-0.67 and 0.72-0.86 mbs) and Stratum IV (1.59-1.64 mbs). Faunal analysis of Stratum Ic identified Osteichthyes (1.2 g), medium mammal (0.5 g), naturally-deposited marine mollusk (1.9 g), and potential marine midden (10.6 g). As Stratum Ic is identified as a fill deposit the potential midden has been removed from its original context. Faunal analysis of Stratum IV identified naturally-deposited marine fauna indicative of a shallow marine or estuary deposit (Table 231).

Faunal remains were also collected individually during excavation from Stratum Ic (0.42-0.67 mbs) and from Stratum II, Feature 15 of SIHP # 50-80-14-5820 (0.81-0.92 mbs and 0.84-0.92 mbs). The Stratum Ic faunal remains consisted of unmodified *Sus scrofa* and *Canis lupus familiaris* skeletal elements. The faunal remains collected from Feature 15 between 0.81 and 0.92 mbs consisted of unmodified medium mammal skeletal elements, and the faunal remains collected from Feature 15 between 0.84 and 0.92 mbs consisted of unmodified *Sus scrofa* and *Canis lupus familiaris* skeletal elements. None of the remains showed any indication of cultural modification; both identified species (*Sus scrofa* and *Canis lupus familiaris*) are Polynesian introductions common in both pre- and post-Contact contexts.

Table 230. Invertebrate and Vertebrate Midden Within Test Excavation 146A, SIHP # -5820

Test Excavation	146A	146A	146A	146A	146A	146A	Weight (g)	Total %
Stratum	II	II	II	II	II	II		
Feature	11	12	13	14	15	16		
Invertebrate Midden								
Cypraeidae				0.1			0.1	0.4%
Isognomidae <i>Isognomon</i> sp.			0.1			0.1	0.2	0.8%
Mytilidae <i>Brachidontes crebristriatus</i>	0.1	0.2	0.9	0.2	0.1	1.1	2.6	11.0%
Naticidae <i>Natica</i> sp.			0.5				0.5	2.1%
Neritidae (burned)	0.6						0.6	2.5%
Neritidae <i>Nerita picea</i>					2.4		2.4	10.2%

Neritidae <i>Theodoxus neglectus</i>			0.3		0.5		0.8	3.4%
Strombidae <i>Strombus</i> sp.		0.3		2.3	3.1		5.7	24.2%
Tellinidae <i>Tellina palatam</i>				0.9	2.2		3.1	13.1%
Tellinidae <i>Tellina palatam</i> (burned)	0.7						0.7	3.0%
Tellinidae <i>Tellina</i> sp.			0.5				0.5	2.1%
Tellinidae <i>Tellina</i> spp.		0.1					0.1	0.4%
Tonnidae <i>Tonna dolium</i>	0.5						0.5	2.1%
Burned shell	1.2	0.4					1.6	6.8%
Crustacea		0.7	0.2	0.2	1	0.3	2.4	10.2%
Crustacea (burned)	0.1						0.1	0.4%
Echinoidea					0.7		0.7	3.0%
Echinoidea <i>diadema</i> sp.			0.1		0.2		0.3	1.3%
Echinoidea <i>mathaei</i> sp. and <i>diadema</i> sp.	0.1	0.4		0.2			0.7	3.0%
Total Invertebrate Midden	3.3	2.1	2.6	3.9	10.2	1.5	23.6	100.0%
Vertebrate Midden								
Medium mammal			0.2		0.6		0.8	28.6%
<i>Sus scrofa</i> (pig)					1.1		1.1	39.3%
<i>Canis lupus familiaris</i> (dog)					0.2		0.2	7.1%
Osteichthyes (fish) (burned)	0.1		0.2	0.2	0.1	0.1	0.7	25.0%
Total Vertebrate Midden	0.1	0	0.4	0.2	2	0.1	2.8	100.0%

Table 231. Stratum IV Faunal Material Collected from Test Excavation 146A

Faunal Material	Weight (g)
<i>Brachidontes crebristriatus</i>	60.2
<i>Isognomon</i> sp.	3.9
Cypraeidae	3.5
<i>Tellina palatam</i>	1.6
<i>Trochus</i> sp.	1.6
<i>Tellina</i> sp.	1.3
<i>Nerita</i> sp. operculum	0.1
<i>Turbo sandwicensis</i>	0.1
<i>Ctena bella</i>	0.1
Crustacea	1.0
<i>Echinometra mathaei</i>	0.1
Unidentified shell	3.7

T-148A

Terrestrial faunal remains were collected individually during excavation from the spoil bin but within the Ib matrix (0.38-1.4 mbs). These consisted of a *Bos taurus* rib fragment; the right tibia (distal portion) and 3rd metatarsus of a *Canis lupus familiaris*; and a *Gallus gallus* left tarsometatarsus fragment. The *Bos taurus* rib was butchered with a metal saw blade, indicating an historic origin (not traditional Hawaiian).

T-149

Terrestrial faunal remains were collected individually during excavation from Stratum II (0.90-1.1 mbs). The remains consisted of unmodified *Sus scrofa* and *Felis catus* (possible)

skeletal elements. The possible presence of introduced species (*Felis catus*) places Stratum II within the post-Contact period. Stratum II of T-150 was associated with the culturally enriched A-horizon of SIHP# 50-80-14-5820

T-150

A midden table of marine and terrestrial faunal material identified within bulk sediment samples within Test Excavation 150, cultural resource SIHP # -5820, is provided in Table 232 below. The invertebrate families and species most represented within the midden signature include: *Nerita picea*, *Strombus* sp., *Turbo sandwicensis*, *Brachidontes crebristriatus*, Cymatiidae, and *Tellina* spp. These species are naturally found within a near-shore environment: on rocks and rock shelves within intertidal zones, tide-pools, and shallow marine waters. The vertebrate species consisted of fish. However, hand-collected terrestrial faunal remains within SIHP # -5820 also included historically introduced species (see below).

Terrestrial faunal remains were collected individually during excavation from Stratum II (0.90-1.1 mbs). The remains consisted of unmodified *Sus scrofa* and *Felis catus* (possible) skeletal elements. The possible presence of introduced species (*Felis catus*) places Stratum II within the post-Contact period. Stratum II of T-150 was associated with the culturally enriched A-horizon of SIHP # 50-80-14-5820.

Table 232. Invertebrate and Vertebrate Midden Identified Within Bulk Sediment Samples from Test Excavation 150, SIHP # -5820

Test Excavation	150	150	150	150	Weight (g)	Total %
Stratum	II	II	II	II		
Feature	-	18	19	20		
Invertebrate Midden						
Conidae <i>Conus</i> sp.	2.9				2.9	1.3%
Cymatiidae	7.1		1.5	0.1	8.7	4.0%
Cypraeidae			1.3		1.3	0.6%
Cypraeidae <i>Cypraea caputserpentis</i>		0.4			0.4	0.2%
Isognomidae <i>Isognomon</i> sp.	0.6		1.3		1.9	0.9%
Mytilidae <i>Brachidontes crebristriatus</i>	2.4	1.9	11.2	0.3	15.8	7.2%
Neritidae <i>Nerita picea</i>	10.4	12.4	35.3		58.1	26.5%
Neritidae <i>Nerita picea</i> and <i>Theodoxus neglectus</i>				1.3	1.3	0.6%
Neritidae <i>Theodoxus neglectus</i>		1.9			1.9	0.9%
Strombidae		2	2.4		4.4	2.0%
Strombidae (burned)		2.4			2.4	1.1%
Strombidae <i>Strombus</i> sp.	21		20.5	1.2	42.7	19.5%
Tellinidae <i>Tellina</i> spp.			7.1		7.1	3.2%
Tellinidae		0.1			0.1	0.0%
Tellinidae <i>Tellina palatam</i>		3		0.8	3.8	1.7%
Tonnidae <i>Tonna dolium</i>		0.2			0.2	0.1%
Trochidae sp.		0.1			0.1	0.0%
Trochidae <i>Trochus</i> sp.			0.4		0.4	0.2%
Turbinidae <i>Turbo sandwicensis</i>	31.8	10.5			42.3	19.3%

Test Excavation	150	150	150	150	Weight (g)	Total %
Stratum	II	II	II	II		
Feature	-	18	19	20		
Turbinidae <i>Turbo</i> sp.			5.8		5.8	2.6%
Burned shell			10.1		10.1	4.6%
Crustacea	0.4	0.8	2.5	0.8	4.5	2.1%
Echinoidea	0.7				0.7	0.3%
Echinoidea <i>Heterocentrotus mammillatus</i>	1.9				1.9	0.9%
Echinoidea <i>mathaei</i> sp.		0.1		0.1	0.2	0.1%
Echinoidea <i>mathaei</i> sp. and <i>diadema</i> sp.			0.2		0.2	0.1%
Total Invertebrate Midden	79.2	35.8	99.6	4.6	219.2	100.0%
Vertebrate Midden						
Osteichthyes (fish)	1.6	0.3	0.2	0.2	2.3	100.0%
Total Vertebrate Midden	1.6	0.3	0.2	0.2	2.3	100.0%

T-151

A midden table of marine and terrestrial faunal material identified within bulk sediment samples within Test Excavation 151, cultural resource SIHP # -5820, is provided in Table 233 below. The invertebrate families and species most represented within the midden signature include: *Nerita picea*, *Theodoxus neglectus*, *Brachidontes crebristriatus*, and Echinoidea (sea urchin). These species are naturally found within a near-shore environment: on rocks and rock shelves within intertidal zones, tide-pools, and shallow marine waters. The vertebrate species included medium mammal, rat and fish, including *Pervagor spilosoma* ('ō'ili'uwī'uwī).

In addition to the midden analysis tabulated within Table 233, faunal analysis was conducted of bulk sediment samples collected from Stratum III at a depth of 1.03-1.25 mbs. Faunal analysis identified naturally-deposited marine mollusk shell (1.4 g) as well as possible marine midden consisting of: *Brachidontes crebristriatus* (0.4 g), *Tellina palatam* (0.4 g), Trochidae (0.3 g), Crustacea (0.2 g) and *Echinothrix diadema* (0.2 g).

Terrestrial faunal remains were collected individually during excavation from Stratum IIB between (0.7 and 0.78 mbs, 0.7 and 0.83 mbs, and at 0.98 mbs) respectively, all of which are within Feature 24 of SIHP # 50-80-14-5820. The remains from between (0.7 and 0.78 mbs) consisted of an articulated *Canis lupus familiaris* (infant) with incomplete permanent dentition. The remains from between (0.7 and 0.83 mbs) consisted of an articulated *Canis lupus familiaris* (infant) with deciduous dentition. The remains from (0.98 mbs), the base of Feature 24, consisted of juvenile *Sus scrofa* fragments. None of the remains showed any evidence of cultural modification, and the two species present (*Sus scrofa* and *Canis lupus familiaris*) are both Polynesian introductions common in both pre- and post-Contact deposits.

Table 233. Invertebrate and Vertebrate Midden Identified Within Bulk Sediment Samples from Test Excavation 151, SIHP # -5820

Test Excavation	151	151	151	151	151	151	Weight	Total %
Stratum	II	II	II	II	II	II		

Feature	-	21	22	23	24	25	(g)	
Invertebrate Midden								
Mytilidae <i>Brachidontes crebristriatus</i>	3		0.3	0.4	1.5		5.2	11.3%
Naticidae <i>Natica</i> sp.	0.4						0.4	0.9%
Neritidae <i>Nerita picea</i>	9.5	1.8	49.4	8	1.7		0.8	1.7%
Neritidae <i>Nerita picea</i> and <i>Theodoxus neglectus</i>	2.1		7.2				9.3	20.1%
Tellinidae <i>Tellina palatam</i>	0.1	0.1		1.4			1.6	3.5%
Strombidae <i>Strombus</i> sp.			7.2		2		9.2	19.9%
Strombidae <i>Strombus</i> sp. (burned)	0.4						0.4	0.9%
Tellinidae <i>Tellina</i> sp.			0.1				0.1	0.2%
Tellinidae <i>Tellina</i> spp.	0.4						0.4	0.9%
Cymatiidae <i>Cymatium</i> sp.				0.7			0.7	1.5%
Isognomidae <i>Isognomon</i> sp.	0.9						0.9	1.9%
Trochidae <i>Trochus</i> sp.					0.3		0.3	0.6%
Gastropods	1.6						1.6	3.5%
Burned shell	1.4	4.9	0.6	2.3			9.2	19.9%
Crustacea	0.8	0.4	0.5	0.6			2.3	5.0%
Crustacea (burned)	0.1					0.8	0.9	1.9%
Echinoidea		1.7				0.1	1.8	3.9%
Echinoidea <i>mathaei</i> sp.	0.1	0.1					0.2	0.4%
Echinoidea <i>diadema</i> sp.	0.3						0.3	0.6%
Echinoidea <i>mathaei</i> sp. and <i>diadema</i> sp.			0.3	0.3			0.6	1.3%
Total Invertebrate Midden	21.1	9	65.6	13.7	5.5	0.9	46.2	100.0%
Vertebrate Midden								
Medium mammal			0.3	0.1			0.1	3.4%
<i>Rattus rattus</i> (rat)	0.1						0.1	3.4%
<i>Rattus</i> sp. (rat)						0.1	0.1	3.4%
Osteichthyes (fish)	0.6	1.6		0.3			2.5	86.2%
Monacanthidae <i>Pervagor spilosoma</i> (fish)					0.1		0.1	3.4%
Total Vertebrate Midden	0.7	1.6	0.3	0.4	0.1	0.1	2.9	100.0%

T-151A

A midden table of marine and terrestrial faunal material identified within bulk sediment samples within Test Excavation 151A, cultural resource SIHP # -5820, is provided in Table 234 below. The invertebrate species most represented within the midden signature include: *Nerita picea* and *Strombus* sp. These species are naturally found within a near-shore environment: on rocks and rock shelves within intertidal zones, tide-pools, and shallow marine waters. The vertebrate species consisted of fish and small and medium mammal, including saw-cut tool marks, indicating a historic date.

Medium mammal (possible *Sus scrofa*) fragments were collected individually from the spoil bin (approximately 0.7 mbs) during excavation. The fragments had been butchered with a metal saw blade and were calcined, both of which indicate an historic origin, not traditional Hawaiian.

Though these remains were collected from the spoil bin (and are therefore without context) the approximated depth (0.7 mbs) would place them in association with the features found in the culturally enriched A-horizon of SIHP # 50-80-14-5820.

Table 234. Invertebrate and Vertebrate Midden Identified Within Bulk Sediment Samples from Test Excavation 151A, SIHP # -5820

Test Excavation	151A	151A	151A	151A	151A	Weight (g)	Total %
Stratum	II	Id	Id	Id	Id		
Feature	-	26	27	28	29		
Invertebrate Midden							
Mytilidae <i>Brachidontes crebristriatus</i>	0.3	0.4	0.2	0.3		1.2	5.5%
Neritidae <i>Nerita picea</i>		6.8	1	4.6		12.4	57.1%
Strombidae <i>Strombus</i> sp.		4.6				4.6	21.2%
Tellinidae <i>Tellina palatam</i>	1					1	4.6%
Burned shell		0.2				0.2	0.9%
Crustacea		0.7	0.4	0.1		1.2	5.5%
Crustacea (burned)	0.6					0.6	2.8%
Echinoidea				0.1		0.1	0.5%
Echinoidea <i>mathaei</i> sp.	0.2		0.1			0.3	1.4%
Echinoidea <i>mathaei</i> sp. and <i>diadema</i> sp.		0.1				0.1	0.5%
Total Invertebrate Midden	2.1	12.8	1.7	5.1	0	21.7	100.0%
Vertebrate Midden						0	
Medium mammal				0.2		0.2	1.3%
Medium mammal (cut w/metal saw blade)				14.7		14.7	96.1%
Small mammal	0.1					0.1	0.7%
Osteichthyes (fish)		0.1	0.1		0.1	0.3	2.0%
Total Vertebrate Midden	0.1	0.1	0.1	14.9	0.1	15.3	100.0%

T-152

Bulk sediment samples were collected from Test Excavation 152, Stratum Ig and its associated Feature 1. Faunal analysis of Stratum Ig, identified as likely locally procured fill, identified a strong faunal midden signature (Table 235). This midden content is similar to other midden material identified within West Kaka'ako; however, as the faunal midden has been removed from its original context, no conclusive analysis can be drawn. Faunal analysis of Feature 1 identified a much lighter faunal midden signature, consisting of: burned medium mammal (0.3 g), Osteichthyes (0.2 g), Crustacea (2.1 g), Echinoidea (1.4 g), *Turbo sandwicensis* (13.8 g), *Conus* sp. (8.9 g), and *Nerita picea* (12.2 g).

A single *Sus scrofa* sacral vertebra and a *Canis lupus familiaris* mandible fragment were collected individually during excavation from Stratum Ig (0.52-1.1 mbs). Neither bone showed evidence of cultural modification. Both species are Polynesian introductions common in both pre- and post-Contact deposits, and are therefore inconclusive.

Table 235. Stratum Ig Faunal Material Collected from Test Excavation 152

Faunal Material	Weight (g)
Neritidae <i>Nerita picea</i>	11.4
Neritidae	13.3
Strombidae <i>Strombus</i> sp.	10.7
Strombidae <i>Strombus maculatus</i>	4.6
Naticidae <i>Natica</i> sp.	2.3
Turbinidae <i>Turbo</i> sp. operculum	0.3
Turbinidae <i>Turbo sandwicensis</i>	17.3
Tellinidae <i>Tellina palatam</i>	9.7
Isognomidae <i>Isognomon</i> sp.	0.1
Cypraeidae <i>Cypraea caputserpentis</i>	6.8
Mytilidae <i>Brachidontes crebristriatus</i>	0.1
Lucinidae <i>Ctena bella</i>	0.1
Burned shell	1.0
Crustacea	0.8
<i>Echinometra mathaei</i>	0.1
Medium mammal	8.1
Osteichthyes (fish)	0.2
Total	86.9

T-153

Three bulk sediment samples were collected from Test Excavation 153, Strata II and III (1.32 and 1.34-1.41 mbs) for Stratum II and (1.5 mbs) for Stratum III. Faunal analysis of Stratum II identified fresh or brackish water gastropods (snails), indicative of a wetland deposit, Crustacea (0.1 g), a small amount of naturally-deposited marine mollusk shell (0.6 g), and unmodified *Canis lupus familiaris* (2.4 g) was also identified. Faunal analysis of Stratum III identified naturally-deposited Crustacea (0.3 g) and marine mollusk shell indicative of a shallow marine or estuary deposit: *Brachidontes crebristriatus* (5.7 g), *Pyramidula dolabrata* (4.3 g), Trochidae (0.5 g), and Tellinidae (0.1 g).

A single *Bos taurus* (possible) cortical bone fragment, and a *Canis lupus familiaris* tooth fragment (Broken ½ mandibular molar 1) were collected individually during excavation from Stratum Ib (at 0.36 mbs). Neither showed evidence of cultural modification, but the presence of *Bos taurus* (an introduced species) indicates a post-Contact origin.

T-154

One bulk sediment sample was collected from Test Excavation 154, Stratum II (1.3-1.38 mbs). Faunal analysis of Stratum II identified fresh or brackish water gastropods (snails), indicative of a wetland deposit, Crustacea (0.1 g), and a small amount of naturally-deposited marine mollusk shell (0.9 g).

T-155

Two bulk sediment samples were collected from Test Excavation 155, Strata II and III (1.22-1.24 mbs and 1.24-1.48 mbs) respectively. Faunal analysis of Stratum II identified naturally-deposited marine mollusk shell (1.3 g), *Echinometra mathaei* (0.1 g), as well as possible midden; a burned Crustacea (0.1 g) was identified. Faunal analysis of Stratum III identified naturally-deposited marine mollusk shell, Crustacea, and Echinoidea (total 3.4 g).

T-156

One bulk sediment sample was collected from Test Excavation, Stratum II (0.85-1.0 mbs). Faunal analysis of Stratum II identified naturally-deposited marine mollusk shell (5.3 g), Crustacea (0.1 g), *Echinometra mathaei* and *Echinothrix diadema* (0.1 g), as well as possible midden shell, *Nerita picea* (0.4 g).

T-157

Two bulk sediment samples were collected from Test Excavation 157, Strata II and III (0.88-0.98 mbs and 1.03-1.13 mbs) respectively. Faunal analysis of Stratum II identified naturally-deposited marine mollusk shell (6.2 g), Crustacea (1.7 g), *Echinometra mathaei* and *Echinothrix diadema* (0.1 g), as well as possible midden shell, *Brachidontes crebristriatus* (0.8 g). Faunal analysis of Stratum III identified naturally-deposited marine mollusk shell (2.4 g), Crustacea (1.2 g), and *Echinometra mathaei* (0.2 g).

T-159

Three bulk sediment samples were collected from Test Excavation 159 from Stratum II (1.22-1.37 mbs), Stratum III (1.45-1.52 mbs), and Stratum IV (1.55-1.65 mbs). Stratum II contained naturally-deposited limpets/gastropods (1.7 g) and *Echinometra mathaei* (0.2 g). Faunal analysis of Stratum III identified naturally-deposited marine mollusk shell of various families and species (2.2 g) and possible faunal midden consisting of burned Crustacea (0.4 g) and *Echinometra mathaei* (0.3 g). Faunal analysis of Stratum IV identified naturally-deposited marine mollusk shell (0.5 g), Crustacea (0.1 g), and *Echinometra mathaei* and *Echinothrix diadema* (0.1 g).

T-160

Three bulk sediment samples were collected from Test Excavation 160 from Stratum Ie (0.89-1.12 mbs), Stratum II (1.12-1.33 mbs), and Stratum III (1.33-1.52 mbs). Faunal analysis of Stratum Ie identified naturally-deposited limpets/gastropods (0.1 g), Echinoidea (0.1 g), and Crustacea (0.1 g). Faunal analysis of Stratum II identified naturally-deposited limpets/gastropods (0.2 g), *Echinometra mathaei* (0.1 g), and Crustacea (0.1 g). No faunal material was identified within Stratum III.

T-161

One bulk sediment sample was collected from Test Excavation 161, Stratum III, at a depth of 1.52-1.54 mbs. Faunal analysis of Stratum III identified naturally-deposited limpets (0.6 g), *Brachidontes crebristriatus* (0.1 g), *Nerita picea* (0.1 g), *Trochus* sp. (0.1 g), Crustacea (0.5 g), and Echinoidea (0.1 g).

Summary of Faunal Assemblage from West Kaka'ako

The faunal material collected within bulk sediment samples within West Kaka'ako showed a distinct pattern of interspersed natural wetlands and sand deposits with a strong midden signature. The natural wetlands were distinguished by the presence of fresh or brackish water snails and/or shallow marine mollusk species. Areas of natural wetlands included T-122 to T-123, T-129 to T-140, and T-153 to T-161. Areas of Jaucas sand showed cultural activity in the form of marine and terrestrial material midden deposits within the buried A-horizon and its numerous associated features.