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## Section 5 Faunal Analysis

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### 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) from 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 specific cultural resources (SIHP #s). These tabulations were created to illustrate the general categories of fauna present to aid in a comparative discussion between cultural resources (SIHP).

The depths given for bulk sediment samples and collected terrestrial faunal represent the exact depths from which they were collected and not the depths of the strata or feature from which the samples were taken. If bulk sediment samples contained no faunal material, then those samples are not discussed within Volume V, Section 5. Complete summaries of all sample analyses, including all non-faunal material, are located within Volumes IVA through IVD.

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 *Hawaiian Marine Shells Reef and Shore Fauna of Hawaii* (Kay 1979). This book is accepted as a standard reference within Hawaiian archaeology for marine fauna. Vertebrate reference books accepted within the professions also were used, including 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 Manager/Senior Archaeologist from Cultural Surveys Hawai'i, Inc. The 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 consulted 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 Classification of Faunal Material and Habitat

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 City Center (Section 4) of the Honolulu High-Capacity Transit Corridor Project.

The faunal material was classified into eight categories: mammal, Aves (bird), Osteichthyes (bony fish), Chelonioida (sea turtle), Chondrichthyes (shark), marine mollusk shell, Crustacea (Decapoda), and Echinoidea (sea urchin). Mammals identified within the collected samples consisted of Canidae (dog), Suidae (pig), Muridae (rat), Felidae (cat), Bovidae (cow, sheep, and goat), and Equidae (horse). Of the identified mammals, three (Felidae, Bovidae, and Equidae) were introduced in the post-Contact period, while the remaining (Canidae, Suidae, and Muridae) span both the pre-Contact and post-Contact period. Muridae was further differentiated, when possible, between the smaller sized rat genera (*Rattus* sp.) which includes the Polynesian rat (*Rattus exulans*) and the larger sized rat genera introduced in the post-Contact period (*Rattus norvegicus*). When specific species identification could not be made, mammals were classified as either small or medium mammal. Aves identified within the collected samples consisted of duck (*Anas platyrhynchos domesticus*), Red Junglefowl or chicken (*Gallus gallus*), and unidentified Aves. Osteichthyes identified consisted of various identified and unidentified species. Chelonioida identified consisted of green sea turtle (*Chelonia mydas*). Chondrichthyes consisted of unidentified shark teeth. Marine mollusk shells consisted of a wide variety of unidentified and identified families and species. Echinoidea identified consisted of the species *Echinothrix diadema* (long spined urchin), *Echinometra mathaei* (burrowing urchin), and *Heterocentrotus mamillatus* (slate pencil urchin).

The marine mollusks, Echinoidea, and Crustacea identified during laboratory analysis inhabit various shoreline and coastal environments. 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* thrive on rocks and rock shelves within intertidal zones. Rocky substrates and tide-pools provide shelter for *Nerita picea*, *Theodoxus neglectus*, *Theodoxus vespertinus* (which migrate between freshwater and saltwater), *Cellana* sp., and Cypraeidae (Hammatt et al. 2000; Kay 1979).

*Chelonia mydas* (green sea turtle) was represented only once in the entire City Center assemblage by a possible cranial fragment 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 through 20A)**

#### **T-001**

Two bulk sediment samples were collected from Stratum II (1.80–2.40 mbs). Faunal analysis identified Crustacea (0.6 g) and non-midden marine mollusk shells from various families and species (12.8 g): *Isognomon* sp. (5.1 g), Tellinidae (3.5 g), *Periglypta reticulata* (2.3 g), *Tellina palatam* (1.1 g), *Tellina* sp. (0.4 g), Pyramidellidae (0.1 g), Veneridae (0.1 g), *Ctena bella* (0.1 g), and *Brachidontes crebristriatus* (0.1 g). The sample collected from Stratum II contained taxa consistent with a natural estuary deposit.

#### **T-004**

Two bulk sediment samples were collected from Stratum II (1.70–2.08 mbs). Faunal analysis identified Crustacea (0.5 g) and naturally-occurring non-midden marine mollusk shells from various families and species (95.1 g): Ostreidae (33.2 g), *Pinctada radiata* (27.4 g), *Tellina* spp. (16.1 g), *Tellina palatam* (8.3 g), *Brachidontes crebristriatus* (4.4 g), *Nerita picea* (2.0 g), Vermetidae (1.8 g), *Theodoxus vespertinus* (0.7 g), *Natica* sp. (0.2 g), and limpets/gastropods (1.0 g). The sample from Stratum II contained taxa consistent with a natural estuary deposit.

#### **T-009**

One bulk sediment sample was collected from Stratum II (2.00–2.20 mbs). Faunal analysis identified naturally-occurring marine mollusk shells from various families and species (5.7 g): Isognomidae (3.9 g), *Tellina palatam* (0.9 g), and an unidentified shell fragment (0.9 g).

#### **T-010**

One bulk sediment sample was collected Stratum Ih (0.90–1.15 mbs). Faunal analysis identified naturally-occurring limpets (0.3 g). Stratum Ih was identified as a fill deposit.

#### **T-012**

One bulk sediment sample was collected Stratum Id (1.80 mbs). Faunal analysis identified naturally-occurring marine mollusk shells from various families and species (2.2 g): *Brachidontes crebristriatus* (1.3 g), Cypraeidae (0.3 g), *Tellina* sp. (0.1 g), burned shell (0.2 g), Vermetidae (0.1 g), gastropods (0.1 g), and fresh and/or brackish water snails (0.1 g). This stratum was identified as a sandy loam fill deposit. The invertebrate material was likely imported with a marine deposit utilized as fill. The burned shell was identified as possible midden removed from its original context.

#### **T-014**

Two bulk sediment samples were collected from Stratum II (1.80–2.07 mbs). Faunal analysis identified naturally-occurring Ostreidae marine shell (2.8 g), unidentified medium mammal

fragments (1.9 g), unidentified small mammal fragments (0.1 g), and fish bone (0.1 g). The sample collected from Stratum II contained taxa consistent with a shallow marine and/or nearshore environment.

### **T-018**

Three bulk sediment samples were collected, one each from Stratum Ie (1.15–1.30 mbs), Stratum II (1.70–2.20), and Stratum III (2.20–2.35 mbs). Faunal analysis of Stratum Ie, a fill deposit, identified naturally-occurring Echinoidea (0.1 g) and Osteichthyes (fish) (0.1 g). Faunal analysis of Stratum III identified naturally-occurring gastropod material (0.1 g). No faunal material was found within the bulk sample from Stratum II.

### **T-019**

Three bulk sediment samples were collected, two from Stratum II (1.98–2.20 mbs and 2.13–2.23 mbs) and one from Stratum III (3.00–3.25 mbs). Faunal analysis of Stratum II identified *Pervagor spilosoma* ('ō'ili'uwī'uwī or Fantail Filefish) (0.3 g) and unidentified Osteichthyes (fish) (0.2 g). Faunal analysis of Stratum III identified Osteichthyes (fish spine) (<0.1 g) and naturally-occurring marine mollusk shells from various families and species (293.1 g): *Tellina palatam* (262.4 g), *Pinctada radiata* (17.0 g), *Brachidontes crebristriatus* (6.0 g), *Natica* sp. (5.0 g), *Theodoxus vespertinus* / *Nerita picea* (2.2 g), and gastropod (0.5 g). The abundant quantity of *Tellina palatam* and *Pinctada radiata* indicate a shallow marine environment.

### **T-020**

Six bulk sediment samples were collected; two from Stratum II (1.55–1.70 mbs and 1.83–1.93 mbs), one from Stratum IIIa (2.80–2.90 mbs), one from Stratum IIIb (2.90–3.00 mbs), one from Stratum IV (3.00–3.10 mbs), and one from SIHP #-7425 (2.35–2.50 mbs), an *imu* feature. Faunal analysis of Stratum II identified a small amount of unidentified marine shell fragments (0.3 g), fresh- or brackish-water gastropods (snails) (0.9 g), Tellinidae (1.1 g), and Osteichthyes (fish) (0.1 g). No faunal material was identified within the bulk samples from Strata IIIa, IIIb, and IV. Faunal analysis identified only a few fragments of marine shell (<0.1 g).

### **T-020A**

Four bulk sediment samples were collected, three from Stratum II (1.70–1.89 mbs, 2.30–2.34 mbs, and 2.36–2.53 mbs), and one from Stratum III (2.56–2.85 mbs). The sample from Stratum II at 2.36–2.53 mbs yielded Osteichthyes (fish) (0.4 g). No faunal material was identified in the other samples from Stratum II or Stratum III.

### **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 through 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, if any, invertebrate material was found within T-008, T-018, T-020, and T-020A. Minimal vertebrate faunal remains (largely fish) were collected from T-014, T-018, T-019, T-020, and T-020A. The faunal analysis of natural deposits within the West Kalihi zone indicate a previous shallow marine or estuary environment underlying the historic fill layers. No evidence of cultural remains were identified in these deposits.

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

### T-021

A single unmodified *Equus ferus caballus* metacarpus was collected individually during excavations from Stratum Ic, a fill deposit (1.80–1.90 mbs).

### T-022

One bulk sediment sample was collected Stratum II (1.84–2.02 mbs). Faunal analysis identified gastropods (0.2 g) and a burned shell (0.5 g). The burned shell has been identified as possible naturally transported midden.

### T-031

A single *Sus scrofa* long bone fragment was collected individually from the backdirt pile of Stratum Ic, a fill deposit (0.30 mbs). The diaphysis shows evidence of butchering marks from a metal saw blade, indicating a historic origin.

### T-034

Faunal remains from *Bos taurus* were collected individually during excavations from Stratum Ib (0.70–0.83 mbs). All of the elements (femur, ribs, possible scapula, and vertebra) show evidence of butchering marks from a metal saw blade. In addition, the vertebra shows evidence of possible carnivore gnawing.

### T-037

Faunal remains from *Bos taurus* were collected individually during excavations from Stratum Ib (0.70 mbs). All of the elements (ribs, long bones, and possible vertebrae) show evidence of butchering marks from a metal saw blade.

### Summary of Faunal Assemblage from East Kalihi

Four of the 20 test excavations (T021, T-031, T-034, and T-037) contained terrestrial vertebrate material within East Kalihi. T-021 contained the introduced species *Equus ferus caballus*, while T-034 and T-037 contained the introduced species *Bos taurus*. T-021 also contained *Sus scrofa*, a Polynesian introduction as well as post-Contact species; however, the element shows evidence of butchering marks from a metal saw blade, indicating a historic context.

Invertebrate faunal material was identified within T-022, Stratum II, which contained a small amount of naturally-occurring gastropod and burned shell. Stratum II exhibited evidence of previous disturbance and it is likely the burned shell was intrusive.

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

Bulk samples of natural alluvial deposits were collected from four of the six test excavations (T-049, T-050, T-052, and T-053). No faunal material was identified within West Kapālama.

### Summary of faunal Assemblage from West Kapālama

No faunal material was identified within West Kapālama.

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

### T-054

One bulk sediment sample was collected from Stratum II, SIHP #-7426 (1.70–1.90 mbs). Faunal analysis identified naturally-occurring marine mollusk shells consisting of *Tellina palatam* (1.6 g) and gastropod (0.5 g). The sample collected from Stratum II contained taxa that are consistent with a natural wetland or shallow marine/estuary deposit.

### T-057

One bulk sediment sample was collected from Stratum II, SIHP #-7426 (1.62 mbs). Faunal analysis identified Tellinidae and Mytilidae fragments (1.3 g) and fresh- or brackish-water gastropods (snails) (~139.6 g). The sample collected from Stratum II contained taxa that are consistent with a natural wetland or shallow marine/estuary deposit. The presence of fresh- or brackish water snails is also consistent with agricultural wetland sediment.

### T-058

Two bulk sediment samples were collected from Stratum II, SIHP #-7426 (1.68–1.78 mbs and 1.68–1.85 mbs). Faunal analysis identified naturally-occurring fresh- or brackish-water gastropods (snails) (~78.6 g) and marine mollusk shells: Trochidae (1.0 g), Trochidae and bivalve fragments (7.5 g), and bivalve and gastropod fragments (4.9 g). The samples collected from Stratum II contained taxa that are consistent with a natural wetland or shallow marine/estuary deposit. The presence of fresh- or brackish- water snails is also consistent with agricultural wetland sediment.

### T-059

One bulk sediment sample was collected from Stratum II, SIHP #-7426 (1.65–1.75 mbs). Faunal analysis identified naturally-occurring fresh- or brackish-water gastropods (snails) (~84.0 g) and Tellinidae (2.7 g). The sample collected from Stratum II contained taxa that are consistent with a natural wetland or shallow marine/estuary deposit. The presence of fresh- or brackish-water snails is also consistent with agricultural wetland sediment.

### T-060

Three bulk sediment samples were collected, two from Stratum IIb, SIHP #-7426 (1.70 mbs and 1.98 mbs) and one from Stratum III (2.34 mbs). Faunal analysis of Stratum IIb identified naturally-occurring fresh- or brackish-water gastropods (snails) (0.8 g), Crustacea (0.5 g), Osteichthyes (fish) (0.1 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-occurring 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 sample collected from Stratum IIb contained taxa that are consistent with a natural wetland or shallow marine/estuary deposit. The sample collected from Stratum III contained taxa that are consistent with a shallow marine/estuary deposit.

**T-061**

One bulk sediment sample was collected from Stratum II, SIHP #-7426 (1.40–2.05 mbs). Faunal analysis identified naturally-occurring fresh- or brackish-water gastropods (snails) and marine mollusk shell consisting of *Hipponix* sp. The sample collected from Stratum II contained taxa that are consistent with a natural wetland or shallow marine/estuary deposit. The presence of fresh- or brackish-water snails is also consistent with agricultural wetland sediment.

**T-062**

Two bulk sediment samples were collected, one each from Stratum II, SIHP #-7426 (1.45–1.70 mbs) and Stratum III (2.05 mbs). 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-occurring marine mollusk shells from various families and species (233.9 g): *Brachidontes crebristriatus* (142.9 g), Pteriidae (14.4 g), *Trochus* sp. (14.1 g), Fascioliidae (9.1 g), *Isognomon* sp. (7.9 g), Thaididae (7.7 g), *Ctena bella* (5.7 g), *Tellina* spp. (3.2 g), *Natica* sp. (1.8 g), *Cymatium* sp. (1.2 g), *Hipponix* spp. (1.1 g), *Tellina palatam* (0.9 g), Tellinidae (0.4 g), Ostreidae (0.2 g), Architectonicidae (0.1 g), Nassariidae (0.1 g), limpets (1.6 g), and unidentified dark-stained shell fragments (21.5 g). The sample collected from Stratum III contained taxa that are consistent with a natural shallow marine or estuary deposit.

**T-063**

Two bulk sediment samples were collected, one each from Stratum Iib, SIHP #-7426 (1.72–1.90 mbs) and Stratum III (2.15–2.28 mbs). Faunal analysis of Stratum Iib identified faunal remains from Osteichthyes (fish) (<0.1 g). Faunal analysis of Stratum III identified Crustacea (0.1 g) and naturally-occurring marine mollusk shells from various families and species (116.5 g): *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 natural wetland or shallow marine environment. The sample collected from Stratum III contained taxa that are consistent with a natural shallow marine or estuary deposit.

**T-064**

Two bulk sediment samples were collected, one each from Stratum Iia, SIHP #-7426 (1.30–1.53 mbs) and Stratum Iib (1.53–1.80 mbs). No faunal material was identified within Stratum Iia. Faunal analysis of Stratum Iib identified Crustacea (3.6 g) and naturally-occurring marine mollusk shells from various families and species (71.4 g): *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 sample collected from Stratum III contained taxa that are consistent with a natural shallow marine or estuary deposit.

Faunal remains from *Bos taurus* and possible Aves were collected individually during excavations from Stratum Ie (0.63–1.35 mbs). The diaphysis sections of a *Bos taurus* humerus show evidence of breakaway spurs, indicating cultural modification. *Bos taurus* is a post-Contact species of a historic origin.

**T-065**

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.

**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. The *Sus scrofa* and *Bos taurus* elements (intermediate phalanx and diaphysis section) both show evidence of rust staining, indicating the *Sus scrofa* is also historic in origin.

**T-067**

Two bulk sediment samples were collected, one each from Stratum II, SIHP #-7426 (1.50–1.65 mbs) and Stratum III (1.84–1.98 mbs). Faunal analysis of Stratum II identified naturally-occurring marine 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-occurring marine mollusk shells from various families and species (63.7 g): *Tellina palatam* (20.6 g), *Trochus* sp. (18.6 g), *Brachidontes crebristriatus* (16.9 g), Fascioliariidae (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 samples collected from Strata II and III contained taxa that are consistent with a natural shallow marine or estuary deposit. However, pollen analysis also indicated agricultural activity (see Section 9).

Faunal remains consisting of *Bos taurus* and possible *Felis catus* (both post-Contact species) were collected individually during excavations from Stratum Ib (0.63–1.00 mbs). One of the *Bos taurus* elements, a rib, shows evidence of butchering marks from a metal saw blade. The *Bos taurus* and *Felis catus* remains both show evidence of rust staining, further indicating a historic origin. A single *Aves* (bird) tibiotarsus shaft was collected from Stratum II (1.50–1.60 mbs) and also shows evidence of rust and copper staining.

**T-068**

Two bulk sediment samples were collected from Stratum Iib, SIHP #-7426 (1.78–1.83 mbs and 1.83–1.91 mbs). Faunal analysis identified a single burned Osteichthyes (fish) bone (0.1 g) (1.78–1.83 mbs). The faunal material present within T-068 is consistent with a natural wetland or marine environment.

**T-069**

One bulk sediment sample was collected from the interface of Strata II (SIHP #-7426) and III (1.63–1.94 mbs). Faunal analysis identified naturally-occurring marine mollusk shell consisting of *Tellina palatam* (17.1 g), Trochidae (2.3 g), and *Brachidontes crebristriatus* (2.0 g). The sample collected from the Strata II/III interface contained taxa that are consistent with a natural shallow marine or estuary deposit.

**T-071**

Three bulk sediment samples were collected, one each from Stratum II, SIHP #-7426 (1.15–1.22 mbs), Stratum III, SIHP #-7426 (1.40–1.55 mbs), and Stratum IV (1.75–1.85 mbs). Faunal

analysis of Stratum II (SIHP #-7426) 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 a small amount of naturally-occurring marine mollusk shells consisting of *Brachidontes crebristriatus*, *Ctena bella*, Trochidae, and waterworn shell fragments. The sample collected from Stratum II contained taxa that are consistent with a natural wetland or estuary deposit. The sample collected from Stratum IV contained taxa that are consistent with a natural shallow marine or estuary deposit.

### **T-073**

Three bulk sediment samples were collected, one from the Strata If-II interface (taken from the backdirt pile) and two from Stratum II, SIHP #-7426 (1.51–1.60 mbs and 1.57–1.68 mbs). Faunal analysis of the Strata If-II interface identified fresh- or brackish-water gastropods (snails) (3.5 g). Faunal analysis of Stratum II also identified naturally-occurring fresh- or brackish-water gastropods (snails) (0.4 g). The samples collected from Stratum II (SIHP #-7426) contained taxa that are consistent with a wetland or estuary deposit. The presence of fresh- or brackish-water snails is also consistent with wetland agricultural sediments.

### **T-075**

Six bulk sediment samples were collected, three from Stratum IIa, SIHP #-7426 (1.53–1.68 mbs) and three from Stratum IIb, SIHP #-7426 (1.68–1.95 mbs). Faunal analysis of Stratum IIa identified naturally-occurring fresh- or brackish-water gastropods (snails) (2.3 g), bivalve fragments (<0.1 g), and Osteichthyes (fish) (0.1 g). Faunal analysis of Stratum IIb identified naturally-occurring fresh- or brackish-water gastropods (snails) and bivalve shell fragments (0.1 g). The samples collected from Strata IIa and IIb (SIHP #-7426) contained taxa that are consistent with a natural wetland or estuary deposit. The presence of fresh- or brackish-water snails is also consistent with wetland agricultural sediments.

### **T-076**

Two bulk sediment samples were collected from Stratum II, SIHP #-7426 (1.59 mbs and 1.70 mbs). No faunal material was identified within the sample at 1.59 mbs. Faunal analysis of the sample at 1.70 mbs identified Crustacea (0.4 g) and naturally-occurring marine mollusk shell consisting 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 samples collected from Stratum II (SIHP #-7426) contained taxa that are consistent with a natural wetland or estuary deposit.

### **T-078**

Four bulk sediment samples were collected, one from Stratum If (1.55–1.65 mbs), one from Stratum IIa, SIHP #-7426 (1.73–1.75 mbs), and two from Stratum IIb, SIHP #-7426 (1.80–1.90 mbs and 1.85–1.94 mbs). Faunal analysis of Stratum If identified a small amount of Echinoidea and waterworn bivalve fragments consisting of *Tellina* sp. and *Brachidontes crebristriatus*. Stratum If was identified as a sand fill deposit. The sample collected from Stratum If contained taxa that are consistent with a marine deposit. Faunal analysis of Stratum IIa (SIHP #-7426) identified Osteichthyes (fish) (0.1 g). Faunal analysis of Stratum IIb (SIHP #-7426) identified limpet and bivalve fragments (7.2 g), Osteichthyes (fish) (0.1 g), and abundant fresh- or brackish-water gastropods (snails) (~107.9 g). The samples collected from Strata IIa and IIb

(SIHP #-7426) contained taxa that are consistent with natural wetland or estuary deposits. The presence of fresh- or brackish-water snails is also consistent with wetland agricultural sediments.

### **T-079**

Two bulk sediment samples were collected, one each from Stratum Id (1.45–1.61 mbs) and Stratum II, SIHP #-7426 (1.68–1.84 mbs). Faunal analysis of Stratum Id identified a small amount of waterworn marine shell fragments, consistent with a marine deposit. Faunal analysis of Stratum II (SIHP #-7426) identified Echinoidea and fresh- or brackish-water gastropods (snails) (1.0 g). The sample collected from Stratum II (SIHP #-7426) contained taxa that are consistent with a natural wetland or estuary deposit.

### **T-080**

Three bulk sediment samples were collected from Stratum II, SIHP #-7426 (1.40–1.60 mbs, 1.60–1.75 mbs, and 1.75–1.85 mbs). Faunal analysis identified bivalve and gastropod fragments (3.9 g), Tellinidae (1.8 g), and abundant fresh- or brackish-water gastropods (snails) (~288.8 g). The samples collected from Stratum II (SIHP #-7426) contained taxa that are consistent with a natural wetland or estuary deposit. The presence of fresh- or brackish-water snails and the results of pollen analysis (see Section 9) are also consistent with wetland agricultural sediments.

### **T-081**

Two bulk sediment samples were collected, one each from Stratum IIa, SIHP #-7426 (1.90–1.95 mbs) and Stratum IIb (2.00–2.05 mbs). Faunal analysis of Stratum IIa identified bivalve and limpet fragments (2.8 g) and fresh- or brackish-water gastropods (snails) (31.0 g). Faunal analysis of Stratum IIb identified Crustacea (0.1 g), Echinoidea (0.1 g), a single unidentified Chondrichthyes (shark) tooth (0.2 g), and naturally-occurring marine mollusk shells from various families and species (141.4 g): *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), Vermetidae (0.1 g), and unidentified shell fragments (3.0 g). The sample collected from Stratum IIa (SIHP #-7426) contained taxa that are consistent with a natural wetland or estuary deposit. The sample collected from Stratum IIb contained taxa that are consistent with a natural marine deposit.

### **Summary of Faunal Assemblage from East Kapālama**

Bulk samples of natural sediments within East Kapālama documented faunal material consistent with natural 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.

Four of the 30 test excavations within the East Kapālama area (T-064, T-065, T-066, and T-067) contained terrestrial faunal material collected individually during excavations. T-064 contained Aves and *Bos taurus* (a post-Contact species) within a fill deposit. The *Bos taurus* shows evidence of cultural modification; however, the breakage pattern is not conclusive as to

whether the modification evidences a traditional Hawaiian or non-traditional butchery process. T-065 contained Aves (unidentified bird) within a fill deposit, with no cultural modifications. T-066 contained both post-Contact species (*Bos taurus*) and Polynesian-introduced species (*Sus scrofa*). The *Bos taurus* was butchered with a metal saw blade indicating a historic origin. However, both the *Sus scrofa* and *Bos taurus* show evidence of rust staining indicating the *Sus scrofa* is also historic in origin. T-067 contained *Bos taurus* and possible *Felis catus* (both post-Contact species) within a fill deposit as well as Aves (unidentified bird) within a natural stratum. The *Bos taurus* shows evidence of butchering marks from a metal saw blade indicating a historic origin. The *Bos taurus*, *Felis catus*, and Aves all show evidence of rust staining, indicating a historic origin.

## 5.7 Faunal Analysis for Iwilei (Test Excavations 85 through 95)

### T-085

One bulk sediment sample was collected from Stratum II (2.05–2.10 mbs). Faunal analysis identified Crustacea (0.1 g) and naturally-occurring marine mollusk shells from various families and species consisting of *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 sample collected from Stratum II contained taxa that are consistent with a natural shallow marine or estuary deposit.

### T-086

A single metatarsal from *Ovis aries* (sheep) was collected individually during excavations from Stratum I<sub>h</sub> (1.55 mbs). *Ovis aries* was introduced in the post-Contact period. The remains show no evidence of cultural modification.

### T-092

One bulk sediment sample was collected from Stratum II, SIHP #-5368 (1.73–1.83 mbs). Faunal analysis identified Crustacea (0.1 g) and naturally-occurring marine mollusk shell from various families and species consisting of *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 sample collected from Stratum II (SIHP #-5368) contained taxa that are consistent with a natural wetland or estuary deposit. The presence of a small amount of possible midden marine shell is likely the result of water transport. Organic content within the sample also indicates possible fishpond sediments (see Volume IVB).

### T-093

Three bulk sediment samples were collected, one from Stratum II<sub>a</sub>, SIHP #-5368 (1.95–2.20 mbs) and two from Stratum II<sub>b</sub>, SIHP #-5368 (2.29–2.50 mbs and 2.50–2.74 mbs). Faunal analysis of Stratum II<sub>a</sub> identified Crustacea (0.1 g) and fresh- or brackish-water gastropods (snails) (4.3 g). Faunal analysis of Stratum II<sub>b</sub> (SIHP #-5368) identified fresh- or brackish-water gastropods (35.3 g) and burned Osteichthyes (fish) vertebra (0.1 g) within the upper sample and naturally-occurring marine mollusk shell consisting of *Nerita picea* and *Brachidontes crebristriatus* (2.0 g total) within the lower sample. The samples collected from Strata II<sub>a</sub> and II<sub>b</sub> (SIHP #-5368) contained taxa that are consistent with a natural wetland or estuary deposit. The

presence of fresh- or brackish-water snails (as well as organics) is also consistent with fishpond sediments.

#### **T-094**

One bulk sample was processed from Stratum If (1.10–1.20 mbs). Faunal analysis identified naturally-occurring Crustacea (0.2 g).

A rib fragment from *Bos taurus* (a post-Contact species) was collected from Stratum Ic (0.40 mbs). The rib fragment shows no indication of cultural modification.

#### **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 ten test excavations (T-086 and T-094) contained terrestrial faunal material collected individually during excavations. Test Excavation 86 contained *Ovis aries*, a post-Contact species. The metatarsal showed no indication of cultural modification. Test Excavation 94 contained *Bos taurus*, also a post-Contact species. The rib fragment showed no indication of cultural modification.

## **5.8 Faunal Analysis for Downtown Waterfront (Test Excavations 96 through 115)**

### **SIHP #50-80-14-7427 (Test Excavations 96, 97, 98, 99, 100, and 101)**

Test excavations comprising SIHP #50-80-14-7427 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 (considered components of SIHP #-7427). The midden within these culturally enriched strata is tabulated below within each test excavation summary (Table 199, Table 201, and Table 203). The marine mollusk faunal material identified as naturally-occurring 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 faunal analysis summary.

#### **T-096**

A midden table of marine and terrestrial faunal material identified within bulk- and field-screened sediment samples from Test Excavation 96, cultural resource SIHP #-7427 (Strata Ii and II), is provided in Table 199 below. The invertebrate species most represented within the midden signature consisted of *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 also were collected individually during excavation from between 0.35–0.70 mbs (spanning Strata Ic through Ig fill deposits), Stratum Ii, and Stratum II) (Table 200). Faunal remains collected from Strata Ic-Ig consisted of *Bos taurus*, *Sus scrofa*, *Capra aegagrus hircus*, and *Capra aegagrus hircus* (possible) skeletal elements. Metal saw butcher marks are evident on several of the *Bos taurus*, *Capra aegagrus hircus*, and *Capra aegagrus hircus* (possible) skeletal elements, indicating historic food remnants. In addition to the mammalian remains collected, there also were unmodified rib fragments and vertebrae from an unmodified Osteichthyes (fish) collected from Strata Ic-Ig (see Appendix A.2).

Faunal remains collected from Stratum Ii, SIHP #-7427 (1.32–1.35 mbs) consisted of *Canis lupus familiaris*, *Sus scrofa*, *Bos taurus*, and medium mammal skeletal elements. Metal saw butcher marks are evident on the *Bos taurus* (ribs), indicating historic food remnants. Butcher marks are also evident on the *Sus scrofa* (femur), however the marks are not consistent with a metal blade.

The faunal remains collected from Stratum II, SIHP #-7427 (1.70 mbs) consisted of *Sus scrofa*, *Canis lupus familiaris*, and other medium mammal skeletal elements. Metal saw butcher marks are evident on the medium mammal long bone fragment, indicating historic food remnants.

Table 199. 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	-	-		
<b>Invertebrate Midden</b>				
Conidae <i>Conus</i> sp.		7.1	<b>7.1</b>	<b>4.8%</b>
Gastropod/bivalve		0.4	<b>0.4</b>	<b>0.3%</b>
Isognomidae <i>Isognomon</i> sp.		59.7	<b>59.7</b>	<b>40.1%</b>
Isognomidae <i>Isognomon</i> spp.		23.6	<b>23.6</b>	<b>15.8%</b>
Mytilidae <i>Brachidontes crebristriatus</i>		17.2	<b>17.2</b>	<b>11.6%</b>
Neritidae <i>Nerita picea</i>		12.3	<b>12.3</b>	<b>8.3%</b>
Neritidae <i>Theodoxus neglectus</i>		0.1	<b>0.1</b>	<b>0.1%</b>
Tellinidae <i>Tellina palatam</i>		22.3	<b>22.3</b>	<b>15.0%</b>
Trochidae <i>Trochus</i> sp.		1.6	<b>1.6</b>	<b>1.1%</b>
Burned shell		2.0	<b>2</b>	<b>1.3%</b>
Calcified shell	1.0		<b>1.0</b>	<b>0.7%</b>
Crustacea		0.3	<b>0.3</b>	<b>0.2%</b>
Crustacea (burned)		0.1	<b>0.1</b>	<b>0.1%</b>
<i>Echinothrix diadema</i> sp.		0.1	<b>0.1</b>	<b>0.1%</b>
<i>Echinothrix mathaei</i> sp./ <i>Echinometra diadema</i> sp.	0.1	1.0	<b>1.1</b>	<b>0.7%</b>
<b>Total Invertebrate Midden</b>	<b>1.1</b>	<b>147.9</b>	<b>148.9</b>	<b>100.0%</b>
<b>Vertebrate Midden</b>				
Medium mammal	0.1	1.0	<b>1.1</b>	<b>34.4%</b>
<i>Sus scrofa</i> (pig)		0.1	<b>0.1</b>	<b>3.1%</b>
<i>Canis lupus familiaris</i> (dog)		0.3	<b>0.3</b>	<b>9.4%</b>
<i>Rattus</i> sp. (rat)		0.3	<b>0.3</b>	<b>9.4%</b>
Osteichthyes (fish)	0.7	0.5	<b>1.2</b>	<b>37.5%</b>

Test Excavation	96	96	Weight (g)	Total %
Stratum	Ii	II		
Feature	-	-		
Scaridae (fish)		0.1	0.1	3.1%
Chondrichthyes (shark tooth)		0.1	0.1	3.1%
<b>Total Vertebrate Midden</b>	0.8	2.4	3.2	100.00%

Table 200. Terrestrial Faunal Material Collected Individually from Test Excavation 96, Including SIHP #-7427.

Acc. #	Stratum	Depth (mbs)	SIHP – Feature #	Family/ Class	Species	Element	Description	Modification
096-F-1	Ic-Ig	0.35-0.70	-	Bovidae	<i>Bos taurus</i> (cow)	Diaphysis section	Fragment	Butchered (cut with metal saw blade)
096-F-2	Ic-Ig	0.35-0.70	-	Suidae	<i>Sus scrofa</i> (pig)	Incisor	Complete	None
096-F-3	Ic-Ig	0.35-0.70	-	Bovidae	<i>Capra aegagrus hircus</i> (goat)	Metacarpal; Metatarsus; Phalanges; Vertebra	Complete/ fragments	Phalanges butchered (cut with metal saw blade)
096-F-4	Ic-Ig	0.35-0.70	-	Bovidae	<i>Capra aegagrus hircus</i> (possible goat)	Cranial; diaphysis sections; ulna	Fragments	Ulna butchered (cut with metal saw blade)
096-F-5	Ii, SIHP #-7427	1.32-1.35	-	Suidae	<i>Sus scrofa</i> (pig)	Incisor; Mandible; Mandible portion; Teeth; Molars	Complete/ fragments	None
096-F-6	Ii, SIHP #-7427	1.32-1.35	-	Canidae	<i>Canis lupus familiaris</i> (dog)	Radius; Diaphysis sections; Femur; Coracoid process; Cranial; Petrous process; Possible metatarsal	Complete/ fragments	None
096-F-7	Ii, SIHP #-7427	1.32-1.35	-	Mammalia	Medium mammal	Diaphysis sections; Irregular bones	Fragments	None

Acc. #	Stratum	Depth (mbs)	SIHP – Feature #	Family/ Class	Species	Element	Description	Modification
096-F-8	Ii, SIHP #7427	1.33	-	Bovidae	<i>Bos taurus</i> (cow)	Ribs	Fragments	Butchered (cut with metal saw blade)
096-F-9	Ii, SIHP #7427	1.33	-	Suidae	<i>Sus scrofa</i> (pig)	Femur; Left supra orbital margin; Proximal end of rib; Diaphysis section (possible pig)	Fragments	Butcher marks on femur
096-F-10	II, SIHP #7427	1.70	-	Suidae	<i>Sus scrofa</i> (pig)	Mandibular tusk; Mandible	Fragments	None
096-F-11	II, SIHP #7427	1.70	-	Canidae	<i>Canis lupus familiaris</i> (dog)	Distal tibia; Rib; Metatarsal	Fragments	None
096-F-12	II, SIHP #7427	1.70	-	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 from Test Excavation 97, cultural resource SIHP #7427 (Stratum II), is provided in Table 201 below. The midden content within Stratum II was similar to that identified within T-096, although less in amount due to the smaller sampling volume (6.5 L from T-097; 30 L from T-096). The invertebrate species most represented within the midden signature consisted of *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, including dog, medium mammal, and fish. However, hand-collected terrestrial faunal remains within SIHP #7427 also included historically introduced species (see below).

Terrestrial faunal remains collected individually during excavation from Stratum Ic (0.45 mbs and 0.59 mbs), Stratum Ie (1.04 mbs), and Strata II/III, SIHP #7427 (1.80 mbs) (Table 202). Stratum Ic faunal remains consisted of *Bos taurus* and *Rattus norvegicus* (possible) fragments. Faunal remains within Stratum Ie consisted of *Bos taurus* (possible) fragments. Strata II/III, SIHP #7427 remains consisted of *Equus ferus caballus* with perimortem trauma on the distal metapodial.

The *Bos taurus* (long bone) fragments from Stratum Ic were cut with a metal saw blade, while the *Bos taurus* fragments from Stratum Ie show butcher marks from an unidentified tool. The

presence of horse remains at Strata II/III, II/III SIHP #-7427 indicates usage of this cultural layer during the historic period.

Table 201. Invertebrate and Vertebrate Midden Identified Within Bulk Sediment Samples from Test Excavation 97, SIHP #-7427

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

Table 202. Terrestrial Faunal Material Collected Individually from Test Excavation 97, Including SIHP #-7427

Acc. #	Stratum	Depth (mbs)	SIHP – Feature #	Family/ Class	Species	Element	Description	Modification
097-F-1	Ic	0.45	-	Bovidae	<i>Bos Taurus</i> (cow)	Diaphysis sections	Fragments	Butchered (cut with metal saw blade)
097-F-2	Ic	0.59	-	Muridae	<i>Rattus norvegicus</i> (possible) (rat)	Calcaneus; Metacarpals/ metatarsals	Fragments	None
097-F-3	Ie	1.04	-	Bovidae	<i>Bos taurus</i> (possible cow)	Diaphysis sections (Mostly thin cortical bone)	Fragments	Butcher marks on cortical bone
097-F-4	II/III SIHP #-7427	1.80	-	Equidae	<i>Equus ferus caballus</i> (horse)	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 from Test Excavation 100, cultural resource SIHP #-7427 (Stratum II), is provided in Table 203 below. The midden content within Stratum II was similar to that identified within T-096, although less in amount due to the lesser sampling volume (19.0 L from T-100; 30 L from T-096). The invertebrate species most represented within the midden signature consisted of *Brachidontes crebristriatus*, *Tellina palatam*, *Nerita picea*, and *Conus* 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, including medium mammal and fish.

Terrestrial faunal remains collected individually during excavation from Strata If/Ik (0.85 mbs) consisted of a single *Bos taurus* fragment with striations on one end (possibly taphonomic) and cut marks (from a non-metal blade) along the exterior, indicating historic food remnants.

Table 203. Invertebrate and Vertebrate Midden Identified Within Bulk Sediment Samples from Test Excavation 100, SIHP #-7427

Test Excavation	100	Weight (g)	Total %
Stratum	II		
Feature	-		
<b>Invertebrate Midden</b>			
Conidae <i>Conus</i> sp.	5.6	<b>5.6</b>	<b>16.0%</b>
Cymatiidae <i>Cymatium</i> sp.	0.7	<b>0.7</b>	<b>2.0%</b>
Mytilidae <i>Brachidontes crebristriatus</i>	10.7	<b>10.7</b>	<b>30.6%</b>
Neritidae <i>Nerita picea</i>	6.3	<b>6.3</b>	<b>18.0%</b>
Ostreidae	0.9	<b>0.9</b>	<b>2.6%</b>
Isognomidae <i>Isognomon</i> sp.	0.6	<b>0.6</b>	<b>1.7%</b>
Tellinidae <i>Tellina</i> sp.	1.1	<b>1.1</b>	<b>3.1%</b>
Tellinidae <i>Tellina palatam</i>	7.7	<b>7.7</b>	<b>22.0%</b>
Crustacea (burnt)	0.5	<b>0.5</b>	<b>1.4%</b>
<i>Echinothrix mathaei</i> sp. and <i>Echinometra diadema</i> sp.	0.9	<b>0.9</b>	<b>2.6%</b>
<b>Total Invertebrate Midden</b>	<b>35.0</b>	<b>35.0</b>	<b>100.0%</b>
<b>Vertebrate Midden</b>			
Medium mammal	0.5	<b>0.4</b>	<b>57.1%</b>
Osteichthyes (fish)	0.2	<b>0.2</b>	<b>28.6%</b>
<b>Total Vertebrate Midden</b>	<b>0.7</b>	<b>0.7</b>	<b>100.0%</b>

**T-101**

Terrestrial faunal remains were collected individually during excavation from Stratum Ic (0.40 mbs) and from SIHP #-7427 Feature 14 (0.67 mbs and 0.90–1.10 mbs). Faunal remains from Stratum Ic consisted of unmodified *Felis catus* skeletal elements. Faunal remains from SIHP #-7427 Feature 14 consisted of a single *Bos taurus* (possible), *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 historic food remnants. The remaining bones show no evidence of cultural modification (Table 204).

Table 204. Terrestrial Faunal Material Collected Individually from Test Excavation 101, Including SIHP #-7427 Feature 14

Acc. #	Stratum	Depth (mbs)	Feature	Family/Class	Species	Element	Description	Modification
101-F-1	Ic	0.40	-	Felidae	<i>Felis catus</i> (cat)	Left and right humeri	Complete/fragment; Distal 2/3 of right humerus	None
101-F-2	SIHP #-7427 Feature 14	0.69	7427-14	Bovidae	<i>Bos taurus</i> (possible cow)	Flat bone portion (Possible scapula, rib, or transverse process)	Fragment	Butchered (cut with metal saw blade)
101-F-3	SIHP #-7427 Feature 14	0.69	7427-14	Bovidae	<i>Bos taurus</i> (cow)	Tooth; Diaphysis section	Fragment	Diaphysis section butchered (cut with metal saw blade)
101-F-4	SIHP #-7427 Feature 14	0.69	7427-14	Suidae	<i>Sus scrofa</i> (pig)	Teeth (2) (molar and incisor); Diaphysis sections (possible <i>Sus scrofa</i> )	Fragments	None
101-F-5	SIHP #-7427 Feature 14	0.69	7427-14	Aves (bird)	Unidentified	Metatarsus	Complete	None

### T-104

Three field-screened bulk sediment samples were collected, two from Stratum If (0.47–0.90 mbs and 0.65–0.90 mbs) and one from Stratum Ig (0.87–1.12 mbs). Faunal analysis identified a large amount of possible marine shell midden within Stratum If. All faunal material collected from Stratum If is tabulated in Table 205. Faunal analysis of Stratum Ig identified *Tellina palatam* (4.5 g), Ostreidae (1.5 g), *Nerita picea* (0.5 g), Cypraeidae (0.1 g), and *Echinothrix diadema* sp. (0.1 g).

Table 205. Stratum If Faunal Material Collected from Test Excavation 104

Faunal Material	Weight (g)
Conidae <i>Conus</i> sp.	65.0
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>	0.9
Naticidae <i>Natica</i> sp.	5.7
Ostreidae	3.6
Tellinidae <i>Tellina</i> sp.	32.6
Tellinidae <i>Tellina palatam</i>	56.8
Echinoidea	0.1
<i>Echinothrix diadema</i> sp./ <i>Echinometra mathaei</i> sp.	0.9
Burned shell	2.1
<b>Total</b>	<b>173.1</b>

Terrestrial faunal remains were collected individually during excavation from Stratum Ie (0.5 mbs), Stratum If (0.65–1.12 mbs), Stratum Ig (1.15–1.25 mbs), and Stratum Ik (1.90–2.14 mbs). Stratum Ie contained a single complete and unmodified *Bos taurus* phalanx. Stratum If remains consisted of *Sus scrofa*, *Bos taurus*, *Canis lupus familiaris*, and medium mammal. Stratum Ig remains consisted of *Bos taurus*, *Sus scrofa*, *Canis lupus familiaris*, and unidentified medium mammal. Stratum Ik remains consisted of *Sus scrofa*, *Carpa aegagrus hircus*, and unidentified medium mammal. In addition to the mammalian remains collected, there also were unmodified spine fragments, from an unidentified Osteichthyes (fish) from Stratum If.

The *Bos taurus* and *Sus scrofa* from Stratum If, *Bos taurus* from Stratum Ig, and medium mammal from Stratum Ik were all butchered using a metal saw blade, indicating historic food remnants. Additionally, the *Bos taurus* ribs from Stratum Ig had butcher marks made by another type of blade. The remaining bones show no evidence of cultural modification. All of the strata containing faunal material (Strata 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 fill layer (Table 206).

Table 206. Terrestrial Faunal Material Collected Individually from Test Excavation 104

Acc. #	Stratum	Depth (mbs)	Feature	Family/ Class	Species	Element	Description	Modification
104-F-1	Ie	0.50	-	Bovidae	<i>Bos taurus</i> (cow)	Phalanx	Complete	None
104-F-2	If	0.65-0.90	-	Suidae	<i>Sus scrofa</i> (pig)	Molar; Diaphysis sections	Fragments	None
104-F-3	If	0.80-0.84	-	Bovidae	<i>Bos taurus</i> (cow)	Ribs	Fragments	Butchered (cut with metal saw blade)

Acc. #	Stratum	Depth (mbs)	Feature	Family/ Class	Species	Element	Description	Modification
104-F-4	If	0.80-0.84	-	Suidae	<i>Sus scrofa</i> (pig)	Femur diaphysis section; Femur diaphysis frag.; Ribs; Large maxillary tusk	Fragments	Femur diaphysis section butchered (cut with metal saw blade)
104-F-5	If	0.80-0.84	-	Mammalia	Medium mammal	Unidentified	Fragments	None
104-F-6	If	0.87-1.12	-	Suidae	<i>Sus scrofa</i> (pig)	Diaphysis sections; Canine; Incisor	Fragments	None
104-F-7	If	0.87-1.12	-	Canidae	<i>Canis lupus familiaris</i> (dog)	Cranial; Intermediate phalanx	Complete/ fragments	None
104-F-8	Ig	1.15-1.25	-	Bovidae	<i>Bos taurus</i> (cow)	Scapula; Metatarsus (epiphyses absent); Ribs	Complete/ fragments	Scapula butchered (cut with metal saw blade); Butcher marks on ribs
104-F-9	Ig	1.15-1.25	-	Bovidae	<i>Bos taurus</i> (cow)	Metacarpus; possible vertebra; Diaphysis section; Diaphysis section fragments	Complete/ fragments	Diaphysis section butchered (cut with metal saw blade)
104-F-10	Ig	1.15-1.25	-	Suidae	<i>Sus scrofa</i> (pig)	Humerus	Complete	None
104-F-11	Ig	1.15-1.25	-	Canidae	<i>Canis lupus familiaris</i> (dog)	Ulna; Ribs; Lt humerus	Complete/ fragments	None
104-F-12	Ig	1.15-1.25	-	Mammalia	Medium mammal	Diaphysis sections/irregular bone	Fragments; Pieces mend	None
104-F-13	Ig	1.15-1.25	-	Mammalia	Medium mammal	Diaphysis sections	Fragments	None
104-F-14	Ik	1.90-2.14	-	Suidae	<i>Sus scrofa</i> (pig)	Left humerus	Complete	None
104-F-15	Ik	1.90-2.14	-	Bovidae (goat)	<i>Capra aegagrus hircus</i>	Teeth	Complete	None

Acc. #	Stratum	Depth (mbs)	Feature	Family/ Class	Species	Element	Description	Modification
104-F-16	Ik	1.90-2.14	-	Mammalia	Medium mammal	Rib; Condyle	Fragments	Rib butchered (with metal saw blade)

### T-104A

Two bulk sediment samples were collected from Stratum II (0.80–1.08 mbs and 1.38–1.48 mbs). Faunal analysis identified a single Vermetidae (0.1 g).

### T-108

Terrestrial faunal remains collected individually during excavation from Stratum Id (0.68 mbs and 1.00 mbs) consisted of an *Ovis aries* distal metatarsal shaft with perimortem breakage, *Bos taurus* (juvenile), and medium mammal skeletal elements. None of the bones show evidence of cultural modification. *Ovis aries* and *Bos taurus* were introduced in the post-Contact period.

### T-109

One bulk sediment sample was collected from Stratum Ie (2.20 mbs). Faunal analysis of Stratum Ie identified medium mammal (11.0 g), Osteichthyes (0.7 g), naturally-occurring marine shell (3.7 g), *Echinothrix diadema* (1.0 g), Crustacea (0.2 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 g), *Nassarius gaudiosus* (1.0 g), *Cymatium* sp. (0.6 g), and *Turbo sandwicensis* (1.5 g).

### T-112

Terrestrial faunal remains were collected individually during excavation from the back dirt and Stratum Ib. The back dirt collection consisted of *Carpa aegagrus hircus*, *Canis lupus familiaris*, and other medium mammal fragments. *Bos taurus* fragments were found throughout Stratum Ib (0.47-2.50 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 a historic origin. The rest of the bones show no signs of cultural modifications (Table 207).

Table 207. Terrestrial Faunal Material Collected Individually from Test Excavation 112

Acc. #	Stratum	Depth (mbs)	Feature	Family/ Class	Species	Element	Description	Modification
112-F-1	Back dirt	-	-	Bovidae	<i>Capra aegagrus hircus</i> (goat)	Left mandible	Fragments	None
112-F-2	Back dirt	-	-	Canidae	<i>Canis lupus familiaris</i> (dog)	Fibula; Proximal rib; Radius	Fragments	None
112-F-3	Back dirt	-	-	Mammalia	Medium mammal	Possible facial bones	Fragments	None
112-F-4	Ib	0.47-2.50	-	Bovidae	<i>Bos taurus</i> (cow)	Ribs; Scapula; femur (possible); Diaphysis sections; Diaphysis sections/irregular bones	Fragments	Butchered (cut with metal saw blade)
112-F-5	Ib	1.97	-	Bovidae	<i>Bos taurus</i> (cow)	Innominate; Ribs	Fragments	Ribs butchered (with metal saw blade)
112-F-6	Ib	1.97	-	Suidae	<i>Sus scrofa</i> (pig)	Tibia diaphysis (distal portion); Proximal rib	Fragments	None
112-F-7	Ib	1.97	-	Bovidae	<i>Capra aegagrus hircus</i> (goat)	Left mandible with molars; Scapular spine	Fragments	None
112-F-8	Ib	1.97	-	Canidae	<i>Canis lupus familiaris</i> (dog)	Tibial condyle	Fragment	None

**T-114**

A single *Bos taurus* rib fragment was collected individually during excavation from Stratum Ic (0.48 mbs). The bone fragment shows marks from being butchered by a metal saw blade, indicating historic food remnants. In addition, a single burned fragment of *Cypraea caputserpentis* (1.5 g) was collected from Stratum Ic at 0.48 mbs.

**T-115**

A single *Bos taurus* rib fragment was collected individually during excavation from Stratum Id (1.70-2.35 mbs). The rib shows marks from being butchered by a metal blade, indicating historic food remnants.

**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.

Nine of the 19 test excavations contained vertebrate material collected individually during excavation (T-096, T-097, T-100, T-101, T-104, T-108, T-112, T-114, and T-115). Test Excavation 96 included faunal remains from several strata (Strata Ic-Ig, Ii, and II). Strata Ii and II are identified as components of SIHP #50-80-14-7427. Species collected from Strata Ic-Ig consisted of *Bos taurus*, *Sus scrofa*, *Capra aegagrus hircus*, and *Capra aegagrus hircus* (possible) skeletal elements. In addition to the mammalian remains collected, there also were unmodified rib fragments and vertebrae from an unidentified Osteichthyes (fish) collected from Strata Ic-Ig (see Appendix A.2). Remains collected from Stratum Ii (SIHP #-7427) consisted of *Canis lupus familiaris*, *Sus scrofa*, *Bos taurus*, and medium mammal skeletal elements. Remains collected from Stratum II (SIHP #-7427) consisted of *Sus scrofa*, *Canis lupus familiaris*, and other medium mammal skeletal elements. Some of the bones of historic-introduced species show marks consistent with butchering by a metal saw blade. These butchered bones include *Bos taurus*, *Capra aegagrus hircus*, and possible *Capra aegagrus hircus* from Strata Ic-Ig; *Bos taurus* from Stratum Ii; and a medium mammal fragment from Stratum II. The *Sus scrofa* femur from Stratum Ii shows butcher marks from some other type of blade, while the rest of the bones show no indication of cultural modification.

Test Excavation 97 included a faunal remains from Stratum Ic, Stratum Ie, and the Strata II/III interface. Species collected from Stratum Ic consisted of *Bos taurus* and *Rattus norvegicus* (possible) fragments. Possible *Bos taurus* fragments were collected from Stratum Ie. The Strata II/III remains consisted of *Equus ferus caballus* with perimortem trauma on the distal metapodial. The *Bos taurus* fragments from Stratum Ic were cut with a metal saw blade while the *Bos taurus* fragments from Stratum Ie show butcher marks from a tool other than a metal saw. Due to the fact that horses (*Equus ferus caballus*) were not introduced into Hawai'i until the early 1800s (Riper and Riper 1982), the presence of *Equus ferus caballus* at the base of Stratum II provides an early nineteenth century *terminus post quem* for this cultural layer.

Test Excavation 100 faunal remains from fill Strata 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. The *Bos taurus* fragment was not found in a deposit associated with SIHP #50-80-14-7427.

Test Excavation 101 yielded terrestrial faunal remains from Stratum Ic and from the Stratum Ie interface with SIHP #-7427 Feature 14. Faunal remains from Stratum Ic consisted of unmodified *Felis catus* skeletal elements. Faunal remains from Stratum Ie/SIHP #-7427 Feature 14 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 historic food remnants. The other bone elements show no sign of cultural modification.

Test Excavation 104 yielded terrestrial faunal remains from fill deposits: Strata Ie, If, Ig, and Ik. Stratum Ie contained a single complete unmodified *Bos taurus* phalanx. Stratum If contained *Sus scrofa*, *Bos taurus*, *Canis lupus familiaris*, and medium mammal. Stratum Ig contained *Bos*

*taurus*, *Sus scrofa*, *Canis lupus familiaris*, and medium mammal. Stratum Ik contained *Sus scrofa*, *Capra aegagrus hircus*, and medium mammal. The *Bos taurus* and *Sus scrofa* from Stratum If, *Bos taurus* from Stratum Ig, and medium mammal from Stratum Ik, were all butchered using a metal saw blade, indicating historic food remnants. Additionally, the *Bos taurus* ribs from Stratum Ig had butcher marks made by a non-metal saw blade. The other bones show no signs of cultural modification. All of the strata containing faunal material (Strata 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 *Capra aegagrus hircus*) in each fill deposit. In addition to the mammalian remains collected, unidentified and unmodified Osteichthyes (fish) spine fragments were collected from Stratum If (see Appendix A.2).

Test Excavation 108 remains collected from Stratum Id, a fill deposit, consisted of an *Ovis aries* distal metatarsal shaft with perimortem breakage, *Bos taurus* (juvenile), and medium mammal skeletal elements. None of the bones show evidence of cultural modification with a metal saw blade.

Test Excavation 112 faunal remains collected from Stratum Ib, a fill deposit, consisted of *Capra aegagrus hircus*, *Canis lupus familiaris*, *Bos taurus*, and *Sus scrofa*. Most of the *Bos taurus* fragments show evidence of being butchered with a metal saw blade. The rest of the bones show no evidence of cultural modifications. Faunal remains also were collected from the back dirt (unknown provenience) which consisted of unmodified *Capra aegagrus hircus*, *Canis lupus familiaris*, and medium mammal.

Test Excavations 114 and 115 yielded *Bos taurus* rib fragments from Stratum Ic (T-114) and Stratum Id (T-115). The ribs both shows evidence of being butchered with a metal saw blade.

## **5.9 Faunal Analysis for West Kaka‘ako (Test Excavations 116 through 161)**

### **T-116**

A single *Bos taurus* rib fragment was collected individually during excavation from Stratum Ij (1.20–1.80 mbs). The rib fragment shows marks from being butchered by a metal saw blade, indicating historic food remnants.

### **T-117**

*Bos taurus* fragments were collected individually during excavation throughout Stratum Ic (0.20–1.33 mbs) and a concentration of *Bos taurus*, *Sus scrofa*, and *Canis lupus familiaris* skeletal elements was collected from Stratum Ic at 1.0 mbs. Most of the *Bos taurus* fragments had been butchered with a metal saw blade. The rest of the bones show no signs of cultural modifications.

### **T-118**

One bulk sediment sample was collected from Stratum Ie (1.55–1.70 mbs). Faunal analysis identified Osteichthyes (fish) (0.1 g), Chondrichthyes (shark tooth) (0.1 g), *Echinothrix diadema* sp./*Echinometra mathaei* sp.(0.1 g), various gastropods (1.1 5g), *Nerita picea* (5.3 g), *Turbo sandwicensis* (3.2 g), *Brachidontes crebristriatus* (1.9 g), and *Isognomon* sp. (0.8 g). The faunal material is consistent with a marine environment. Stratum Ie is a sandy clay loam fill deposit.

**SIHP #50-80-14-7428 (Test Excavations 119, 119A, 120, 120A, and 120B)**

Test excavations comprising SIHP #50-80-14-7428 contained 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 (SIHP #-7427 Features 2–13). The midden within Stratum II and associated features is tabulated for each individual trench (Table 208 through Table 211, and Table 213). The marine mollusk faunal material identified as naturally-occurring 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 summary.

**T-119**

A midden table of marine and terrestrial faunal material identified within a field-screened sediment sample from Test Excavation 119, cultural resource SIHP #-7428 (Stratum II), is provided in Table 208 below. The invertebrate species most represented within the midden signature consisted of *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* also were collected individually during excavation from Stratum Ic at 0.80 mbs. Faunal fragments included a cervical vertebra portion (butchered with a metal saw blade) and irregular bones that mend (fit together). The faunal remains within Ic were collected from a fill layer and are not associated with SIHP #-7428.

Table 208. Invertebrate and Vertebrate Midden Identified Within Bulk Sediment Samples from Test Excavation 119, SIHP #-7428

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

**T-119A**

A midden table of marine and terrestrial faunal material identified within bulk- and field-screened sediment samples within cultural resource SIHP #-7428 Feature 1a is provided in Table 209 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 also were 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). SIHP #-7428 Feature 1a was identified as a fill deposit associated with a historic foundation wall (SIHP #-7428 Feature 1); therefore the fauna midden had been previously removed from its original context. However, based on the fauna material and the test excavation location, it is likely that the fill material originated from the culturally-enriched A-horizon within the surrounding area (SIHP #-7428 A-horizon).

Terrestrial faunal remains were collected individually during excavation from the back dirt and Stratum II (0.45-1.30 mbs). The back dirt collection consisted of unmodified *Canis lupus familiaris* (diaphysis sections). Faunal remains from Stratum II consisted of *Canis lupus familiaris* molar fragments that mend. No cultural modifications were observed. *Canis lupus familiaris* is a Polynesian introduction common in both pre- and post-Contact contexts. Stratum II is a component of SIHP #-7428.

Table 209. Invertebrate and Vertebrate Midden Identified Within Bulk Sediment Samples from Test Excavation 119A, SIHP #-7428 Feature 1a

Test Excavation	119A	Weight (g)	Total %
Stratum	-		
Feature	1a		
<b>Invertebrate Midden</b>			
Conidae	2.7	<b>2.7</b>	<b>2.2%</b>
Conidae <i>Conus</i> sp.	5.7	<b>5.7</b>	<b>4.6%</b>
Cymatiidae	8.0	<b>8.0</b>	<b>6.5%</b>
Cypraeidae <i>Cypraea caputserpentis</i>	0.9	<b>0.9</b>	<b>0.7%</b>
Cypraeidae <i>Cypraea</i> sp.	0.4	<b>0.4</b>	<b>0.3%</b>
Gastropod	0.5	<b>0.5</b>	<b>0.4%</b>
Mytilidae <i>Brachidontes crebristriatus</i>	18.9	<b>18.9</b>	<b>15.3%</b>
Nassariidae <i>Nassarius hirtus</i>	2.3	<b>2.3</b>	<b>1.9%</b>
Naticidae	0.4	<b>0.4</b>	<b>0.3%</b>
Neritidae <i>Nerita picea</i>	59.2	<b>59.2</b>	<b>47.8%</b>
Pteriidae <i>Pinctada radiata</i>	0.8	<b>0.8</b>	<b>0.6%</b>
Strombidae <i>Strombus</i> sp.	2.8	<b>2.8</b>	<b>2.3%</b>
Tellinidae cf. <i>Tellina elizabethae</i>	2.9	<b>2.9</b>	<b>2.3%</b>
Tellinidae <i>Tellina palatam</i>	7.4	<b>7.4</b>	<b>6.0%</b>
Thaididae <i>Morula granulata</i>	2.0	<b>2.0</b>	<b>1.6%</b>
Trochidae <i>Trochus</i> sp.	0.3	<b>0.3</b>	<b>0.2%</b>
Turbinidae opercula	1.0	<b>1.0</b>	<b>0.8%</b>
Turbinidae <i>Turbo sandwicensis</i>	0.8	<b>0.8</b>	<b>0.6%</b>
Isognomidae <i>Isognomon</i> sp.	0.2	<b>0.2</b>	<b>0.2%</b>
Tellinidae <i>Tellina</i> spp.	2.4	<b>2.4</b>	<b>1.9%</b>
Burned shell	2.0	<b>2.0</b>	<b>1.6%</b>
Crustacea	0.6	<b>0.6</b>	<b>0.5%</b>

Echinoidea	1.1	<b>1.1</b>	<b>0.9%</b>
Echinoidea <i>mathaei</i> sp.	0.1	<b>0.1</b>	<b>0.1%</b>
<i>Echinothrix diadema</i> sp.	0.4	<b>0.4</b>	<b>0.3%</b>
Echinoidea <i>diadema</i> sp. and <i>mathaei</i> sp.	0.1	<b>0.1</b>	<b>0.1%</b>
<b>Total Invertebrate Midden</b>	<b>123.9</b>	<b>123.9</b>	<b>100.0%</b>
<b>Vertebrate Midden</b>			
Medium mammal	0.1	<b>0.1</b>	<b>2.8%</b>
<i>Canis lupus familiaris</i> (dog)	1.8	<b>1.8</b>	<b>50%</b>
Monacanthidae <i>Pervagor spilosoma</i> (fish)	1.7	<b>1.7</b>	<b>47.2%</b>
<b>Total Vertebrate Midden</b>	<b>3.6</b>	<b>3.6</b>	<b>100.0%</b>

## T-120

A midden table of marine and terrestrial faunal material identified within field-screened sediment samples from Test Excavation 120, cultural resource SIHP #-7428 (Stratum II and Features 2–8), is provided in Table 210 below. The invertebrate families and species most represented within the midden signature consisted of *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).

Faunal remains also were collected individually during excavation from Stratum II (0.65–1.35 mbs). The remains consisted of *Bos taurus*, *Canis lupus familiaris*, and *Sus scrofa* skeletal elements. The *Bos taurus* (diaphysis section) fragment was butchered with a metal saw blade indicating historic food remnants. Stratum II is a component of SIHP #50-80-14-7428.

Table 210. 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	II	II	II	II	II	II	II	II		
Feature	-	2	3	4	5	6	7	8		
<b>Invertebrate Midden</b>										
Cassididae <i>Casmaria ponderosa</i>								0.5	<b>0.5</b>	<b>0.1%</b>
Conidae <i>Conus</i> sp.	4.3				0.6				<b>4.9</b>	<b>0.5%</b>
Conidae <i>Conus quercinus</i>						35.4			<b>35.4</b>	<b>3.9%</b>
Cymatiidae						9.1			<b>9.1</b>	<b>1.0%</b>
Cymatiidae <i>Cymatium</i> sp.								2.3	<b>2.3</b>	<b>0.4%</b>
Cymatiidae <i>Cymatium maricium</i>	3.3								<b>3.3</b>	<b>0.4%</b>

Test Excavation	120	120	120	120	120	120	120	120	Weight (g)	Total %
Stratum	II	II	II	II	II	II	II	II		
Feature	-	2	3	4	5	6	7	8		
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%
Fascioliariidae	1.0								1.0	0.1%
Gastropod	31.8								31.8	3.5%
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>	14.0	3.2	3.6	13.4	19.1	62.0	62.7	13.9	191.9	21.1%
Nassariidae	1.0								1.0	0.1%
Nassariidae <i>Nassarius hirtus</i>						1.7			1.7	0.2%
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	13.0	21.2	66.9	43.0		148.6	16.4%
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		1.0		3.8	0.4%
Tellinidae <i>Tellina palatam</i>	15.0	0.2		1.8	7.6	17.9	5.5	1.7	49.7	5.5%
Trochidae <i>Trochus intextus</i>				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	3.0		1.6	5.5	18.6	2.0%
Crustacea		1.3	0.7	7.4	4.6	4.0	3.8	1.3	23.1	2.5%
Echinoidea			0.3					2.4	2.7	0.3%
<i>Echinothrix diadema</i> sp.	0.3								0.3	0.0%
<i>Echinometra mathaei</i> sp.		0.1							0.1	0.0%
<i>Echinothrix diadema</i> sp./ <i>Echinometra mathaei</i> sp.				0.5	3.8	11.5	5.0		20.8	2.3%
<b>Total Invertebrate Midden</b>	<b>396.5</b>	<b>8.2</b>	<b>6.4</b>	<b>46.1</b>	<b>64.4</b>	<b>220.5</b>	<b>129.5</b>	<b>37.0</b>	<b>908.6</b>	<b>100.0</b>

Test Excavation	120	120	120	120	120	120	120	120	Weight (g)	Total %
Stratum	II	II	II	II	II	II	II	II		
Feature	-	2	3	4	5	6	7	8		
<b>Vertebrate Midden</b>										
Medium mammal			0.1	0.9	2.2				<b>3.2</b>	<b>6.4%</b>
Medium mammal (burned)	1.3								<b>1.3</b>	<b>2.6%</b>
<i>Sus scrofa</i> (pig)	0.3				7.3	0.5			<b>8.1</b>	<b>16.2%</b>
<i>Canis lupus familiaris</i> (dog)	3.4					8.3	1.2	13.6	<b>26.5</b>	<b>53.1%</b>
<i>Canis lupus familiaris</i> (dog) (burned)					0.6				<b>0.6</b>	<b>1.2%</b>
<i>Rattus</i> sp. (rat)	0.1			0.1	0.1	0.9	0.1	0.1	<b>1.4</b>	<b>2.8%</b>
Aves (bird) (burned)					0.1				<b>0.1</b>	<b>0.2%</b>
Osteichthyes (fish)	0.1	0.1	0.1	0.3					<b>0.6</b>	<b>1.2%</b>
<i>Scarus</i> sp. (fish)								0.15	<b>0.15</b>	<b>0.3%</b>
<i>Scarus perspicillatus</i> (fish)					0.15				<b>0.15</b>	<b>0.3%</b>
Monacanthidae <i>Pervagor spilosoma</i> (fish)				0.1	0.15	5.5	0.3	0.15	<b>6.2</b>	<b>12.4%</b>
<i>Bilunulatus alboteniatus</i> (fish)							0.3		<b>0.3</b>	<b>0.6%</b>
<i>Chaetodon miliaris</i> (fish)	0.3								<b>0.3</b>	<b>0.6%</b>
<i>Diodon holocanthus</i> (fish)	0.3								<b>0.3</b>	<b>0.6%</b>
Chondrichthyes (shark tooth)		0.1			0.1	0.3	0.1	0.1	<b>0.7</b>	<b>1.4%</b>
<b>Total Vertebrate Midden</b>	<b>5.8</b>	<b>0.2</b>	<b>0.2</b>	<b>1.4</b>	<b>10.7</b>	<b>15.5</b>	<b>2.0</b>	<b>14.1</b>	<b>49.9</b>	<b>100.0</b>

### T-120A

A midden table of marine and terrestrial faunal material identified within bulk sediment samples from Test Excavation 120A, cultural resource SIHP #-7428 (Stratum II and Features 9-13), is provided in Table 211 below. The invertebrate species most represented within the midden signature consisted of *Brachidontes crebristriatus*, *Nerita picea*, and *Tellina palatam*, although a wide variety of species in lesser amounts also were 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).

In addition to the bulk samples from Stratum II, several hand collected faunal remains were collected from Stratum II consisting of *Tellina palatam* (10.3 g), Veneridae (5.8 g), and *Cypraea caputserpentis* (1.2 g).

In addition to the bulk samples collected from SIHP #-7428, bulk samples were collected from Stratum Id (1.05–1.15 mbs) and Stratum III (1.32–1.45 mbs and 1.49–1.65 mbs). Faunal

analysis of Stratum Id identified Osteichthyes (fish) (0.1 g), naturally-occurring marine shell (0.4 g), Crustacea (0.1 g), *Echinothrix diadema* sp./*Echinometra mathaei* sp. (0.1 g), and possible marine shell midden consisting of *Brachidontes crebristriatus* (1.5 g), (1.5 g), *Tellina palatum* (0.5 g), *Isognomon* sp. (0.3 g). Faunal analysis of Stratum III identified Chondrichthyes (shark tooth) (0.1 g), naturally-occurring marine shell (1.5 g), Crustacea (1.2 g), *Echinothrix diadema* sp./*Echinometra mathaei* sp. (0.6 g), and possible marine shell midden consisting of *Conus* sp. (34.1 g), *Tellina palatam* (2.0 g), *Tellina* spp. (1.4 g), *Brachidontes crebristriatus* (2.0 g), and *Nerita picea* (1.6 g).

Terrestrial faunal remains collected individually during excavation from Stratum II (1.10–1.18 mbs) consisted of *Equus ferus caballus*, *Bos taurus*, *Sus scrofa*, and unidentified medium mammal (Table 212). The *Sus scrofa* fragments were butchered with a metal saw blade indicating historic food remnants. The medium mammal long bone fragments show evidence of burning. Stratum II is a component of SIHP #50-80-14-7428.

Table 211. 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	-	9	10	11	12	13		
<b>Invertebrate Midden</b>								
cf. Terebridae					7.1		<b>7.1</b>	<b>4.5%</b>
Conidae <i>Conus</i> sp.	5.1				0.3		<b>5.4</b>	<b>3.4%</b>
Cymatiidae <i>Cymatium</i> sp.	1.7						<b>1.7</b>	<b>1.1%</b>
Cypraeidae					0.1		<b>0.1</b>	<b>0.1%</b>
Cypraeidae <i>Cypraea caputserpentis</i>	1.2						<b>1.2</b>	<b>0.8%</b>
Cypraeidae <i>Cypraea</i> spp.	0.7						<b>0.7</b>	<b>0.4%</b>
Gastropod/bivalve (burned)	3.0						<b>3.0</b>	<b>1.9%</b>
Isognomidae <i>Isognomon</i> sp.	0.6			0.2	1.0		<b>1.8</b>	<b>1.1%</b>
Mytilidae <i>Brachidontes crebristriatus</i>	20.3	0.1	1.2	2.8	9.5		<b>33.9</b>	<b>21.4%</b>
Nassariidae	2.5						<b>2.5</b>	<b>1.6%</b>
Naticidae <i>Natica</i> sp.	0.4						<b>0.4</b>	<b>0.3%</b>
Neritidae <i>Nerita picea</i>	33.0	0.9	2.4	3.1	9.8	0.8	<b>50.0</b>	<b>31.6%</b>
Neritidae <i>Nerita picea</i> (burned)					1.1		<b>1.1</b>	<b>0.7%</b>
Ostreidae	0.3						<b>0.3</b>	<b>0.2%</b>
Pteriidae <i>Pinctada radiata</i>	0.1						<b>0.1</b>	<b>0.1%</b>
Strombidae <i>Strombus</i> sp.	1.8		0.1				<b>1.9</b>	<b>1.2%</b>
Tellinidae	0.3						<b>0.3</b>	<b>0.2%</b>
Tellinidae <i>Tellina palatam</i>	9.5	0.7		0.5	2.6	0.1	<b>13.4</b>	<b>8.5%</b>
Tellinidae <i>Tellina</i> sp.			1.8				<b>1.8</b>	<b>1.1%</b>
Tellinidae <i>Tellina</i> spp.	1.4			0.6			<b>2.0</b>	<b>1.3%</b>
Thaididae <i>Morula</i> sp.				1.6			<b>1.6</b>	<b>1.0%</b>
Trochidae	2.7						<b>2.7</b>	<b>1.7%</b>
Trochidae <i>Trochus</i> sp.	0.4	0.1	0.3	0.2			<b>1.0</b>	<b>0.6%</b>
Turbinidae <i>Turbo sandwicensis</i>	2.8						<b>2.8</b>	<b>1.8%</b>
Turbinidae <i>Turbo</i> sp. (burned)	0.2						<b>0.2</b>	<b>0.1%</b>

Test Excavation	120A	120A	120A	120A	120A	120A	Weight (g)	Total %
Stratum	II	II	II	II	II	II		
Feature	-	9	10	11	12	13		
Burned shell			3.9	3.2	2.7		9.8	6.2%
Crustacea	1.9	1.0			0.3	0.1	3.3	2.1%
Crustacea (burned)	0.3				0.3		0.6	0.4%
<i>Echinothrix diadema</i> sp./ <i>Echinometra mathaei</i> sp.	3.0	0.1	0.8	0.8	2.9		7.6	4.8%
<b>Total Invertebrate Midden</b>	<b>93.2</b>	<b>2.9</b>	<b>10.5</b>	<b>13.0</b>	<b>37.7</b>	<b>1.0</b>	<b>158.3</b>	<b>100%</b>
<b>Vertebrate Midden</b>								
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</i> <i>spilosoma</i> (fish)	0.2						0.2	4.5%
Chondrichthyes (shark tooth)				0.1			0.1	2.3%
<b>Total Vertebrate Midden</b>	<b>1.8</b>	<b>0</b>	<b>2.2</b>	<b>0.4</b>	<b>0</b>	<b>0</b>	<b>4.4</b>	<b>100%</b>

Table 212. Terrestrial Faunal Material Collected Individually from Test Excavation 120A

Acc. #	Stratum	Depth (mbs)	Feature	Family/ Class	Species	Element	Description	Modification
120A-F-1	II, SIHP #-7428	1.10-1.18	-	Equidae	<i>Equus ferus caballus</i> (horse)	Scapula; Distal portion metacarpus; Mandibular molar	Fragments	None
120A-F-2	II, SIHP #-7428	1.10-1.18	-	Bovidae	<i>Bos taurus</i> (cow)	Scapula; Right proximal metatarsal; Rib; Spinous process (pieces mend); Astragalus	Fragments	None
120A-F-3	II, SIHP #-7428	1.10-1.18	-	Suidae	<i>Sus scrofa</i> (pig)	Ulna; Distal end metatarsal	Fragments	Ulna butchered (cut with metal saw blade)
120A-F-4	II, SIHP #-7428	1.10-1.18	-	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- and field-screened sediment samples from Test Excavation 120B, cultural resource SIHP #-7428 (Stratum II), is provided in Table 213 below. The invertebrate species most represented within the midden signature consisted of *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).

In addition to the faunal remains tabulated for SIHP #-7428 below, a bulk sediment sample was also collected from the Strata Ic/II interface (0.65–1.00 mbs) and Stratum III (1.30–1.40 mbs). Faunal analysis of the Strata Ic/II interface identified naturally-occurring shell (0.4 g) and marine shell midden consisting of *Conus* sp. (41.6 g), a large gastropod fragment (16.7 g), *Tellina palatam* (11.9 g), *Cypraea moneta* (4.5 g), *Pinctada radiata* (2.3 g), *Heterocentrotus mammillatus* (1.1 g), *Theodoxus neglectus* (1.0 g), *Turbo* sp. operculum (0.4 g), and *Brachidontes crebristriatus* (0.3 g). Faunal analysis of Stratum III identified Chondrichthyes (shark tooth) (0.1 g) and possible midden consisting of *Nerita picea* (0.9 g), *Brachidontes crebristriatus* (1.2 g), *Echinothrix diadema* sp./*Echinometra mathaei* sp. (0.4 g), *Trochus* sp. (0.2 g), burned shell (2.8 g), and Crustacea (1.2 g).

The faunal remains collected individually from Strata Ic-II (0.65–1.00 mbs) consisted of *Bos taurus*, *Sus scrofa*, *Sus scrofa* (juvenile), and *Canis lupus familiaris* (Table 214). Three of the bones (*Bos taurus* glenoid fossa and tibia; *Canis lupus familiaris* left glenoid fossa) show butcher marks from a metal saw blade indicating historic food remnants. Stratum II remains were collected in three separate samples. The sample from 1.00–1.10 mbs contained *Bos taurus*, *Canis lupus familiaris*, and medium mammal fragments; the sample from 1.10–1.20 mbs contained *Sus scrofa* and medium mammal fragments; and the sample from 1.10–1.30 mbs contained a single *Equus ferus caballus* vertebra fragment. None of the Stratum II remains show evidence of cultural modification. Stratum II is a component of SIHP #50-80-14-7428.

Table 213. Invertebrate and Vertebrate Midden Identified Within Bulk Sediment Samples from Test Excavation 120B, SIHP #-7428

Test Excavation	120B	Weight (g)	Total %
Stratum	II		
Feature	-		
<b>Invertebrate Midden</b>			
Conidae <i>Conus</i> sp.	74.9	<b>74.9</b>	<b>26.9%</b>
Cymatiidae <i>Cymatium</i> sp.	1.4	<b>1.4</b>	<b>0.5%</b>
Cypraeidae <i>Cypraea caputserpentis</i>	1.1	<b>1.1</b>	<b>0.4%</b>
Cypraeidae <i>Cypraea maculifera</i>	16.8	<b>16.8</b>	<b>5.9%</b>
Gastropod	3.0	<b>3.0</b>	<b>1.0%</b>
Isognomidae	1.0	<b>1.0</b>	<b>0.3%</b>

Isognomidae <i>Isognomon</i> sp.	5.5	<b>5.5</b>	<b>1.9%</b>
Isognomidae <i>Isognomon</i> spp.	11.7	<b>11.7</b>	<b>4.3%</b>
Mytilidae <i>Brachidontes crebristriatus</i>	16.8	<b>16.8</b>	<b>5.9%</b>
Naticidae <i>Natica</i> sp.	1.0	<b>1.0</b>	<b>0.3%</b>
Naticidae <i>Natica gualteriana</i>	1.0	<b>1.0</b>	<b>0.3%</b>
Neritidae	5.1	<b>5.1</b>	<b>1.8%</b>
Neritidae <i>Nerita picea</i>	37.2	<b>37.2</b>	<b>13.0%</b>
Neritidae <i>Nerita picea</i> opercula	2.6	<b>2.6</b>	<b>0.9%</b>
Neritidae <i>Theodoxus neglectus</i>	0.3	<b>0.3</b>	<b>0.1%</b>
Pteriidae <i>Pinctada radiata</i>	25.1	<b>25.1</b>	<b>8.8%</b>
Strombidae	1.6	<b>1.6</b>	<b>0.6%</b>
Strombidae <i>Strombus maculatus</i>	3.0	<b>3.0</b>	<b>1.0%</b>
Strombidae <i>Strombus</i> sp.	2.8	<b>2.8</b>	<b>1.0%</b>
Tellinidae	2.6	<b>2.6</b>	<b>0.9%</b>
<b>Test Excavation</b>	<b>120B</b>	<b>Weight (g)</b>	<b>Total %</b>
<b>Stratum</b>	<b>II</b>		
<b>Feature</b>	<b>-</b>		
Tellinidae <i>Tellina palatam</i>	46.0	<b>46.0</b>	<b>16.1%</b>
Tonnidae <i>Tonna dolium</i>	7.2	<b>7.2</b>	<b>2.5%</b>
Trochidae <i>Trochus</i> sp.	1.9	<b>1.9</b>	<b>0.7%</b>
Turbinidae <i>Turbo</i> sp. opercula	1.3	<b>1.3</b>	<b>0.5%</b>
Burned shell	9.1	<b>9.1</b>	<b>3.2%</b>
Crustacea	2.4	<b>2.4</b>	<b>0.8%</b>
Crustacea (burned)	0.5	<b>0.5</b>	<b>0.2%</b>
Echinoidea <i>mathaei</i> sp. and <i>diadema</i> sp.	3.4	<b>3.4</b>	<b>1.9%</b>
<b>Total Invertebrate Midden</b>	<b>286.0</b>	<b>286.0</b>	<b>100.0%</b>
<b>Vertebrate Midden</b>			
Medium mammal	0.1	<b>0.1</b>	<b>1.4%</b>
Medium mammal teeth (burned)	0.5	<b>0.5</b>	<b>7.0%</b>
Small mammal	0.1	<b>0.1</b>	<b>1.4%</b>
<i>Sus scrofa</i> (pig)	0.5	<b>0.5</b>	<b>7.0%</b>
<i>Canis lupus familiaris</i> (dog)	1.2	<b>1.2</b>	<b>16.9%</b>
<i>Rattus</i> sp. (rat teeth)	0.1	<b>0.1</b>	<b>1.4%</b>
<i>Gallus gallus</i> (chicken)	3.9	<b>3.9</b>	<b>54.9%</b>
Osteichthyes (fish)	0.5	<b>0.5</b>	<b>7.0%</b>
Monacanthidae <i>Pervagor spilosoma</i> (fish)	0.1	<b>0.1</b>	<b>1.4%</b>
Chondrichthyes (shark tooth)	0.1	<b>0.1</b>	<b>1.4%</b>
<b>Total Vertebrate Midden</b>	<b>7.1</b>	<b>7.1</b>	<b>100.0%</b>

Table 214. Terrestrial Faunal Material Collected Individually from Test Excavation 120B

Acc. #	Stratum	Depth (mbs)	Feature	Family/Class	Species	Element	Description	Modification
120B-F-1	Ic/II	0.65-1.00	-	Bovidae	<i>Bos taurus</i> (cow)	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	0.65-1.00	-	Suidae	<i>Sus scrofa</i> (pig)	Mandible with molars; Incisors, Cranial bones; Ribs; Irregular bones	Fragments	None
120B-F-3	Ic/II	0.65-1.00	-	Suidae	<i>Sus scrofa</i> (juvenile pig)	Mandible with molars; Vertebrae	Fragments	None
120B-F-4	Ic/II	0.65-1.00	-	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, SIHP #7428	1.00-1.10	-	Bovidae	<i>Bos taurus</i> (cow)	Ribs; Diaphysis sections	Fragments	None
120B-F-6	II, SIHP #7428	1.00-1.10	-	Canidae	<i>Canis lupus familiaris</i> (dog)	Femoral epiphysis	Fragment	None
120B-F-7	II, SIHP #7428	1.00-1.10	-	Mammalia	Medium mammal	Irregular bones; Diaphysis section	Fragments	None
120B-F-8	II, SIHP #7428	1.10-.20	-	Suidae	<i>Sus scrofa</i> (pig)	Incisor root	Fragment	None
120B-F-9	II, SIHP #7428	1.10-1.20	-	Mammalia	Medium mammal	Irregular bones	Fragments	None
120B-F-10	II, SIHP #7428	1.10-1.30	-	Equidae	<i>Equus ferus caballus</i> (horse)	Vertebra	Fragment	None

**T-121**

One bulk sediment sample was collected from Stratum V (1.63 mbs). Faunal analysis identified Osteichthyes (fish) (0.1 g), Crustacea (0.3 g), *Echinometra mathaei* sp. (0.1 g), and naturally-occurring marine shell (4.0 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 show no evidence of cultural modification.

**SIHP #50-80-14-2963 (Test Excavations 122, 123, and 124)**

Test excavations comprising SIHP #50-80-14-2963 contained invertebrate and vertebrate faunal materials expressing a wetland environment and/or a strong midden signature. The wetland environment was expressed within T-123 (Strata II and III) by a high content of fresh- or brackish-water gastropods (snails). A midden signature was identified within T-122 (Stratum II), T-123 (Stratum III), and particularly T-124 (Strata IIa and IIb buried A-horizons and associated features). The midden signatures are tabulated for each individual trench (Table 215 through Table 217). The marine mollusk faunal material identified as naturally-occurring 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 summary.

**T-122**

A midden table of marine and terrestrial faunal material documented within cultural resource SIHP #-2963 (Stratum II) is provided in Table 215 below. The invertebrate species most represented within the midden signature is *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 215. Invertebrate and Vertebrate Midden Within Test Excavation 122, SIHP #-2963

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

**T-123**

Four bulk sediment samples were collected, one each from Stratum Id (0.76–0.84 mbs), Stratum If (1.45–1.73 mbs), Stratum II SIHP #-2963 (1.73–1.80 mbs), and Stratum III (1.80–1.92 mbs). Faunal analysis of samples from Strata Id and If identified a small amount of non-midden marine shell and Osteichthyes (fish) (0.1 g).

Faunal analysis of Stratum II, SIHP #-2963, identified abundant fresh- or brackish-water gastropods (snails) indicative of a wetland deposit (607.7 g), Osteichthyes (fish) (0.1 g), naturally-occurring marine shell (12.5 g), and medium mammal remains (0.1 g).

Faunal analysis of Stratum III, SIHP #-2963, also identified fresh- or brackish-water gastropods (snails) indicative of a wetland deposit (~84.0 g). In addition, a distinct midden signature was identified which is tabulated with Table 216 below. The invertebrate species most represented within the midden signature consisted of *Conus* spp., although a variety of species in lesser amounts also were 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.

Table 216. Invertebrate and Vertebrate Midden Within Test Excavation 123, SIHP #-2963

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

**T-124**

A midden table of marine and terrestrial faunal material documented within cultural resource SIHP #-2963 (Features 1, 2, 5, 8, and 11) is provided in Table 217 below. The invertebrate families and species most represented within the midden signature consisted of *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 were consistent with pre-Contact

terrestrial and marine species. Of particular note was the rare presence of green sea turtle (*Chelonia mydas*) within SIHP #-2963 Feature 5 (for detailed discussion see Section 5.14). The fish species *Pervagor spilosoma* ('ō'ili'uwī'uwī) and *Seriola* cf. *dumerili* (kāhala) also were present (see Cultural and Environmental Osteichthyes Discussion in Section 5.1).

Faunal remains also were 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 show butcher marks from a metal saw blade indicating historic food remnants, which is consistent with the presence of the introduced species (*Bos taurus*). In addition to the terrestrial species, Osteichthyes (fish) remains also were collected individually from Stratum Id (see Appendix A.2). Although T-124 is associated with SIHP #50-80-14-02963, the faunal remains originated from a fill deposit.

Table 217. 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		
<b>Invertebrate Midden</b>							
Conidae <i>Conus</i> sp.	8.3					8.3	10.2%
Isognomidae <i>Isognomon</i> sp.		0.1				0.1	0.1%
Mytilidae <i>Brachidontes crebristriatus</i>	12.3	5.5	4.6	1.6		24.0	29.4%
Neritidae <i>Theodoxus neglectus</i>			7.2	0.1		7.3	9.0%
Neritidae <i>Nerita picea</i>	5.8	2.5				8.3	10.2%
Strombidae	0.1	0.4				0.5	0.6%
Strombidae <i>Strombus</i> sp.	0.8					0.8	1.0%
Tellinidae <i>Tellina palatam</i>	5.6	1.1		2.2		8.9	10.9%
Trochidae	1.0	0.4			0.3	1.7	2.1%
Burned shell	7.6	0.6	0.7		0.7	9.6	11.8%
Crustacea	3.8	2.2	1.0	0.4	0.3	7.7	9.4%
<b>Test Excavation</b>	<b>124</b>	<b>124</b>	<b>124</b>	<b>124</b>	<b>124</b>	<b>Weight (g)</b>	<b>Total %</b>
<b>Stratum</b>	<b>IIa</b>	<b>IIa</b>	<b>IIb</b>	<b>IIb</b>	<b>IIb</b>		
<b>Feature</b>	<b>1</b>	<b>2</b>	<b>5</b>	<b>8</b>	<b>11</b>		
Echinoidea	0.4			0.3		0.7	0.9%
<i>Echinometra mathaei</i> sp.					0.1	0.1	0.1%
<i>Echinothrix diadem a</i> sp./ <i>Echinometra mathaei</i> sp.	1.6	0.6	1.3			3.5	4.3%

<b>Total Invertebrate Midden</b>	<b>47.3</b>	<b>13.4</b>	<b>14.8</b>	<b>4.6</b>	<b>1.4</b>	<b>81.5</b>	<b>100%</b>
<b>Vertebrate Midden</b>							
Medium mammal	2.7	1.8	0.1			<b>4.6</b>	<b>38.7%</b>
Small mammal		0.1			0.1	<b>0.2</b>	<b>1.7%</b>
<i>Rattus</i> sp. (rat)	0.3			0.1		<b>0.4</b>	<b>3.4%</b>
Osteichthyes (fish)	2.9	0.3	2.2	0.2		<b>5.6</b>	<b>47.1%</b>
Carangidae <i>Seriola</i> cf. <i>dumerili</i> (fish)			0.2			<b>0.2</b>	<b>1.7%</b>
Monacanthidae <i>Pervagor spilosoma</i> (fish)	0.1					<b>0.1</b>	<b>0.8%</b>
<i>Chelonia mydas</i> (green sea turtle)			0.7			<b>0.7</b>	<b>5.9%</b>
Chondrichthyes (shark tooth)	0.1					<b>0.1</b>	<b>0.8%</b>
<b>Total Vertebrate Midden</b>	<b>6.1</b>	<b>2.2</b>	<b>3.2</b>	<b>0.3</b>	<b>0.1</b>	<b>11.9</b>	<b>100%</b>

### T-125

*Bos taurus* skeletal elements were collected individually during excavation from Stratum Id (0.45–0.50 mbs). The long bone fragments show evidence of being butchered with a metal saw blade, indicating historic food remnants.

### T-126

One bulk sediment sample was collected from Stratum II (1.50 mbs). Faunal analysis identified naturally-occurring bivalves and gastropods (5.5 g).

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

### T-129

Two bulk sediment samples were collected, one each from Stratum II (1.39–1.45 mbs) and Stratum III (1.55–1.59 mbs). Faunal analysis of Stratum II identified naturally-occurring limpets and micro-gastropods (0.8 g), Osteichthyes (fish) (0.7 g), and medium mammal (0.7 g). Faunal analysis of Stratum III identified fresh- or brackish-water gastropods (snails) (~55.0 g), Crustacea (0.4 g) and naturally-occurring marine mollusk shell consisting of indicative of a shallow marine or estuary deposit, including *Tellina* sp. (0.7 g), *Brachidontes crebristriatus* (0.5 g), *Tellina palatam* (0.1 g), Neritidae operculum (0.1 g), and various gastropods and limpets (1.5 g).

Terrestrial faunal remains were collected individually during excavation from Stratum Id (0.40 mbs), Stratum Ie (0.60 mbs), and Stratum II (0.85–1.20 mbs) (Table 218). Species represented in Stratum Id consisted of *Bos taurus*, *Sus scrofa*, *Canis lupus familiaris*, and unidentified medium mammal fragments. None of the remains show evidence of cultural modification. Species represented in Stratum Ie consisted of unmodified *Felis catus* skeletal fragments and *Bos taurus* fragments that were butchered with a metal saw blade. Within Stratum II, unmodified skeletal elements of *Sus scrofa* and juvenile *Canis lupus familiaris* were collected.

Their context within a natural stratum and lack of modification may indicate a traditional Hawaiian context. Based on the presence of introduced species in Stratum Id (*Bos taurus*) and Stratum Ie (*Bos taurus* and *Felis catus*), these strata are of post-Contact origin.

In addition to the mammalian remains, Stratum Id yielded unidentified Osteichthyes fragments, including a very large unmodified vertebra fragment (0.60 mbs) and an unmodified fin fragment (0.34–0.49 mbs) (see Appendix A.2).

Table 218. Terrestrial Faunal Material Collected Individually from Test Excavation 129

Acc. #	Stratum	Depth (mbs)	Feature	Family/ Class	Species	Element	Description	Modification
129-F-1	Id	0.40	-	Bovidae	<i>Bos taurus</i> (cow)	Vertebral facet; Vertebra (pieces mend)	Fragment	None
129-F-2	Id	0.40	-	Suidae	<i>Sus scrofa</i> (pig)	Rib	Fragment	None
129-F-3	Id	0.40	-	Canidae	<i>Canis lupus familiaris</i> (dog)	Rib	Fragment	None
129-F-4	Id	0.40	-	Mammalia	Medium mammal	Diaphysis section	Fragment	None
129-F-5	Ie	0.60	-	Bovidae	<i>Bos taurus</i> (cow)	Ribs (pieces mend); Proximal rib end	Fragments	Butchered (cut with metal saw blades)
129-F-6	Ie	0.60	-	Felidae	<i>Felis catus</i> (cat)	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	0.85-1.20	-	Suidae	<i>Sus scrofa</i> (pig)	Ribs; Diaphysis section; Mandible	Fragments	None

Acc. #	Stratum	Depth (mbs)	Feature	Family/ Class	Species	Element	Description	Modification
129-F-8	II	0.85-1.20	-	Canidae	<i>Canis lupus familiaris</i> (juvenile dog)	Innominate (ala, unfused); Mandible	Fragments	None

### T-130

Terrestrial faunal remains collected individually during excavation from Stratum Ii (0.76–1.38 mbs), a burnt trash deposit (SIHP #-7189), consisted of *Capra aegagrus hircus*, *Anas platyrhynchos domesticus*, and *Gallus gallus* skeletal elements. None of the bones show evidence of cultural modification, however the presence of introduced species (*Capra aegagrus hircus* and *Anas platyrhynchos domesticus*) indicates a post-Contact date for Stratum Ii.

### T-131

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

Terrestrial faunal remains were collected individually during excavation from Strata Ic, Id, and II (intermixed) (0.54–1.33 mbs). The species represented consisted of *Bos taurus*, *Sus scrofa*, *Felis catus*, *Meleagris gallopavo*, and unidentified medium mammal. The *Bos taurus* fragment shows evidence of being butchered with a metal saw blade and the medium mammal vertebra fragment is fused to a piece of metal, both of which indicate a historic origin. This correlates with the assemblage of identified species which included historic introductions (*Bos taurus*, *Felis catus*, and *Meleagris gallopavo*) (Table 219).

Table 219. Terrestrial Faunal Material Collected Individually from Test Excavation 131

Acc. #	Stratum	Depth (mbs)	Feature	Family/ Class	Species	Element	Description	Modification
131-F-1	Ic, Id, III (intermixed)	0.54-1.33	-	Bovidae	<i>Bos taurus</i> (cow)	Vertebra (pieces mend); Ribs; Long bone condyles	Fragments	Butchered (cut with metal saw blade)
131-F-2	Ic, Id, III (intermixed)	0.54-1.33	-	Suidae	<i>Sus scrofa</i> (pig)	Humerus (distal portion)	Fragment	None
131-F-3	Ic, Id, III (intermixed)	0.54-1.33	-	Felidae	<i>Felis catus</i> (cat)	Left scapula; Right calcaneus	Complete	None
131-F-4	Ic, Id, III (intermixed)	0.54-1.33	-	Mammalia	Medium mammal	Vertebra (possible)	Fragment	Fused to metal matrix

Acc. #	Stratum	Depth (mbs)	Feature	Family/ Class	Species	Element	Description	Modification
131-F-5	Ic, Id, III (intermixed)	0.54-1.33	-	Aves	<i>Meleagris gallopavo</i> (Rio Grande wild turkey)	Left tibiotarsus (distal portion)	Fragment	None

### T-132

One bulk sediment sample was collected from Stratum II (1.35–1.49 mbs). Faunal analysis identified fresh- or brackish-water gastropods (snails) (174.0 g) and naturally-occurring marine shell (3.2 g). The faunal results are consistent with a natural wetland deposit.

Terrestrial faunal remains were collected individually during excavation from Stratum Id (0.50–1.00 mbs) and Stratum Ie (1.20–1.39 mbs). A *Felis catus* left humerus fragment was collected from Stratum Id. Species collected from Stratum Ie, a burnt trash deposit (SIHP #-7189), consisted of *Sus scrofa*, *Canis lupus familiaris*, *Gallus gallus*, and an unidentified Aves (bird) fragment. None of the bones show 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 Stratum Ie (*Sus scrofa*, *Canis lupus familiaris*, *Gallus gallus*) are Polynesian introductions common in both pre- and post-Contact contexts (Table 220).

Table 220. Terrestrial Faunal Material Collected Individually from Test Excavation 132

Acc. #	Stratum	Depth (mbs)	Feature	Family/ Class	Species	Element	Description	Modification
132-F-1	Id	0.50-1.00	-	Felidae	<i>Felis catus</i> (cat)	Left humerus (distal portion)	Fragment	None
132-F-2	Ie	1.20-1.39	-	Suidae	<i>Sus scrofa</i> (pig)	Tibia diaphysis section; Metatarsal (proximal portion)	Fragments	None
132-F-3	Ie	1.20-1.39	-	Canidae	<i>Canis lupus familiaris</i> (dog)	Humerus diaphysis section	Fragment	None
132-F-4	Ie	1.20-1.39	-	Aves	<i>Gallus gallus</i> (chicken)	Left humerus	Complete	None
132-F-5	Ie	1.20-1.39	-	Aves (bird)	Unidentified	Tibiotarsus (distal portion)	Fragment	None

**T-133**

Two bulk sediment samples were collected, one each from Stratum I<sub>h</sub> (1.10–1.45 mbs) and Stratum II (1.40–1.80 mbs). Faunal analysis of Stratum I<sub>h</sub> identified bivalves and gastropods (2.4 g), *Echinothrix diadema* sp. and *Echinometra mathaei* sp. (0.2 g), and Crustacea (1.4 g). Faunal analysis of Stratum II identified naturally-occurring marine shell consisting of *Tellina* sp. (8.4 g), *Brachidontes crebristriatus* (7.8 g), *Natica* sp. (5.1 g), *Tellina palatam* (0.2 g), gastropods and limpets (3.2 g), Crustacea (1.0 g), and *Echinothrix diadema* sp./*Echinometra mathaei* sp. (0.9 g). Faunal analysis of Stratum III is consistent with a natural shallow marine or estuary environment.

Butchered *Sus scrofa* rib fragments were collected individually during excavation from Stratum I<sub>c</sub> (0.15–0.70 mbs). The bones were butchered using a metal saw blade, indicating historic food remnants.

**T-134**

One bulk sediment sample was collected from Stratum II (1.15–1.45 mbs). Faunal analysis identified fresh- or brackish-water gastropods (snails) (not weighed), Osteichthyes (0.1 g), unidentified small mammal (0.1 g), and naturally-occurring marine shell consisting of *Brachidontes crebristriatus* (4.3 g), *Natica* sp. (3.3 g), *Tellina* sp. (2.4 g), *Trochus* sp. (1.5 g), gastropods (2.9 g), Crustacea (2.8 g), and *Echinometra diadema* sp./*Echinothrix mathaei* sp. (0.9 g). The faunal results are consistent with a natural shallow marine or estuary environment.

Terrestrial faunal remains were collected individually during excavation from Stratum I<sub>b</sub> (0.15–0.60 mbs) and from the Strata I<sub>b</sub>/I<sub>c</sub> interface (0.60 mbs). The remains from Stratum I<sub>b</sub> consisted of *Bos taurus*, *Sus scrofa*, and medium mammal skeletal elements, none of which show evidence of cultural modification. The remains from the Strata I<sub>b</sub>/I<sub>c</sub> interface consisted of a single *Bos taurus* tibia fragment with butcher marks from a metal saw blade, indicating a historic 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 (Table 221).

Table 221. Terrestrial Faunal Material Collected Individually from Test Excavation 134

Acc. #	Stratum	Depth (mbs)	Feature	Family/ Class	Species	Element	Description	Modification
134-F-1	I <sub>b</sub>	0.15-0.60	-	Bovidae	<i>Bos taurus</i> (cow)	Right femoral head (pieces mend)	Fragments	None
134-F-2	I <sub>b</sub>	0.15-0.60	-	Suidae	<i>Sus scrofa</i> (pig)	Right femoral diaphysis section with femoral head (pieces mend)	Fragments	None
134-F-3	I <sub>b</sub>	0.15-0.60	-	Mammalia	Medium mammal	Epiphysis portions; Diaphysis sections	Fragments	None
134-F-4	I <sub>b</sub> /I <sub>c</sub> interface	0.60	-	Bovidae	<i>Bos taurus</i> (cow)	Tibia diaphysis section	Fragment	Butchered both ends (cut with metal saw)

Acc. #	Stratum	Depth (mbs)	Feature	Family/ Class	Species	Element	Description	Modification
								blade)
134-F-5	Ib/Ic interface	0.60	-	Mammalia	Medium mammal	Cranial	Fragment	None
134-F-6	Ib/Ic interface	0.60	-	Mammalia	Medium mammal	Irregular bone	Fragment	None

### T-136

One bulk sediment sample was collected from Stratum II (1.85 mbs). Faunal analysis identified species consistent with a natural shallow marine or estuary environment (Table 222).

A single *Bos taurus* scapula fragment was collected individually during excavation from Stratum Ih (0.86 mbs). The bone shows evidence of being butchered by a metal saw blade, indicating historic food remnants.

Table 222. 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
Tellinidae <i>Tellina palatam</i>	5.7
Naticidae	5.7
Pteriidae <i>Pinctada radiata</i>	4.2
Pyramidellidae <i>Pyramidala dolabrata</i>	1.0
cf. Fascioliariidae <i>Peristrenia ustulata</i>	0.6
Trochidae	0.5
Hipponicidae <i>Hipponix</i> spp.	0.5
Lucinidae <i>Ctena bella</i>	0.1
Neritidae opercula	0.1
Cardiidae <i>Fragum mundum</i>	0.1
Cymatiidae	0.1
Crustacea	3.9
<i>Echinothrix diadema</i> sp./ <i>Echinometra mathaei</i> sp.	9.2
Limpets	0.3
Miscellaneous shell	0.8
<b>Total</b>	<b>84.1</b>

### T-137

Faunal remains collected individually during excavation from Stratum Ib (at 1.0 mbs) consisted of a *Bos taurus* rib fragment and a *Canis lupus familiaris* (possible) ulna fragment. The *Bos taurus* rib shows evidence of being butchered with a metal saw blade, indicating historic food remnants.

### T-138

One bulk sediment sample was collected from Stratum III (1.40-1.50 mbs). Faunal analysis of Stratum III identified fresh- or brackish-water gastropods (snails) (not weighed) and naturally-

occurring marine mollusk, Crustacea, Echinoidea, and Osteichthyes, indicating a natural shallow marine or estuary environment (Table 223).

Terrestrial faunal remains collected individually during excavation from Stratum II (1.20 mbs), a burnt trash deposit (SIHP #-7189), consisted of *Bos taurus*, medium mammal, and unidentified Aves (bird). One of the *Bos taurus* bones shows evidence of being butchered with a metal saw blade, indicating historic food remnants.

Table 223. Stratum III Faunal Material Collected from Test Excavation 138

<b>Faunal Material</b>	<b>Weight (g)</b>
Mytilidae <i>Brachidontes crebristriatus</i>	23.6
Naticidae	1.4
Tellinidae	0.9
Fascioliariidae	0.8
Hipponicidae <i>Hipponix</i> spp.	0.4
Trochidae	0.3
Melampidae <i>Melampus castaneus</i>	0.1
<b>Faunal Material</b>	<b>Weight (g)</b>
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
Miscellaneous shell	7.2
Osteichthyes (fish)	0.1
Fresh- or brackish-water gastropods	--
<b>Total</b>	<b>36.6</b>

### T-139

One bulk sediment sample was collected from Stratum Ie (2.0 mbs). Faunal analysis identified naturally-occurring marine mollusk, Crustacea, and Echinoidea, indicating a fill deposit derived from natural shallow marine or estuary sediments (Table 224). Terrestrial faunal remains were collected individually during excavation from Stratum Ib (0.10–0.45 mbs). The remains consisted of *Equus ferus caballus*, *Bos taurus*, *Capra aegagrus hircus*, *Felis catus*, and unidentified Aves (bird) skeletal elements. None of the bones show 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 deposit (Table 225). In addition, a *Sus scrofa* (pig) tooth and *Bos taurus* bone fragment was observed in Stratum Id.

Table 224. Stratum Ie Faunal Material Collected from Test Excavation 139

Faunal Material	Weight (g)
Mytilidae <i>Brachidontes crebristriatus</i>	20.7
Trochidae	1.4
Fasciolariidae	0.7
Hipponicidae <i>Hipponix</i> spp.	0.7
Isognomidae <i>Isognomon</i> sp.	0.2
Tellinidae	0.1
Turbinidae <i>Turbo sandwicensis</i>	0.1
<i>Fragum mundum</i>	0.1
Naticidae	0.1
Gastropods	0.1
Limpets	1.5
Vermetidae	0.1
<i>Echinothrix diadema</i> sp.	0.1
<b>Total</b>	<b>25.9</b>

Table 225. Terrestrial Faunal Material Collected Individually from Test Excavation 139

Acc. #	Stratum	Depth (mbs)	Feature	Family/ Class	Species	Element	Description	Modification
139-F-1	Ib	0.10-0.45	-	Equidae	<i>Equus ferus caballus</i> (horse)	Molar; Diaphysis section	Fragments	None
139-F-2	Ib	0.10-0.45	-	Bovidae	<i>Bos taurus</i> (cow)	Diaphysis sections	Fragments	None
139-F-3	Ib	0.10-0.45	-	Bovidae	<i>Capra aegagrus hircus</i> (goat)	Teeth	Fragments	None
139-F-4	Ib	0.10-0.45	-	Felidae	<i>Felis catus</i> (cat)	Metatarsal	Complete	None
139-F-5	Ib	0.10-0.45	-	Aves (bird)	Unidentified	Diaphysis sections	Fragments	None

### T-140

One bulk sediment sample was collected from Stratum II (1.20–1.34 mbs). Faunal analysis identified naturally-occurring Crustacea (3.9 g) and various marine mollusk shell fragments (0.9 g).

### SIHP #50-80-14-5820 (Test Excavations 141, 142, 145, 146A, 150, 151, and 151A)

Test excavations comprising SIHP #50-80-14-5820 contained 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 1–29). The midden within this stratum and associated features is tabulated for each trench (Table 226,

Table 228, Table 231, Table 232, and Table 234 through Table 236) below. The marine mollusk faunal material identified as naturally-occurring 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 summary.

### T-141

A midden table of marine and terrestrial faunal material identified within field-screened sediment samples from Test Excavation 141, cultural resource SIHP #-5820 (Features 1, 2, and 3) is provided in Table 226 below. The invertebrate species most represented within the midden signature include *Tellina palatam* and *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. However, individually collected terrestrial faunal remains within SIHP #-5820 also included historically introduced species (see below).

Terrestrial faunal remains were collected individually during excavation from SIHP #-5820 Feature 1 (0.45–0.58 mbs and 0.77–1.15 mbs), SIHP #-5820 Feature 2 (0.89 mbs), and SIHP #-5820 Feature 31 (Table 227). The faunal remains collected from SIHP #-5820 Feature 1 consisted of *Sus scrofa*, *Canis lupus familiaris*, and unidentified Aves (bird) skeletal elements as well as an entire articulated *Equus ferus caballus* burial between 0.77–1.15 mbs. None of the remains show any evidence of cultural modifications; however, the presence of *Equus ferus caballus* (horse) indicates a post-Contact origin for SIHP #-5820 Feature 1. The faunal remains from SIHP #-5820 Feature 2 consisted of a single unmodified *Sus scrofa* cranial fragment. The faunal remains from SIHP #-5820 Feature 31 consisted of *Sus scrofa* and *Gallus gallus* skeletal elements. The *Sus scrofa* humerus shows evidence of butchering with a metal saw blade, indicating historic food remnants.

Table 226. 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	-		
Feature	1	2	3		
<b>Invertebrate Midden</b>					
Gastropod			1.2	1.2	2.3%
Isognomidae	1.8			1.8	3.5%
Mytilidae <i>Brachidontes crebristriatus</i>	3.2		2.6	5.8	11.2%
Naticidae <i>Natica</i> sp.			0.3	0.3	0.6%
Neritidae <i>Nerita picea</i>	1.8		6.2	8	15.4%
Tellinidae <i>Tellina palatam</i>	12.1		18.9	31	59.6%
Crustacea	1.5		0.6	2.1	4.0%
Echinoidea	0.2			0.2	0.4%
<i>Echinothrix diadema</i> sp.		0.5		0.5	1.9%
<i>Echinothrix diadema</i> sp./ <i>Echinometra mathaei</i> sp.			0.7	0.7	1.3%

<b>Total Invertebrate Midden</b>	<b>20.6</b>	<b>0.9</b>	<b>30.5</b>	<b>52.0</b>	<b>100.0%</b>
<b>Vertebrate Midden</b>					
Medium mammal	0.8			<b>0.8</b>	<b>100.0%</b>
<b>Total Vertebrate Midden</b>	<b>0.8</b>	<b>0</b>	<b>0</b>	<b>0.8</b>	<b>100.0%</b>

Table 227. Terrestrial Faunal Material Collected Individually from Test Excavation 141

Acc. #	Stratum	Depth (mbs)	Feature	Family/ Class	Species	Element	Description	Modification
141-F-1	-	0.45-0.58	SIHP #-5820, Fe. 1	Suidae	<i>Sus scrofa</i> (pig)	Molar	Complete	None
141-F-2	-	0.45-0.58	SIHP #-5820, Fe. 1	Canidae	<i>Canis lupus familiaris</i> (dog)	Vertebra (spinous process; Humerus (proximal section)	Fragments	None
141-F-3	-	0.45-0.58	SIHP #-5820, Fe. 1	Aves (bird)	Unidentified	Diaphysis section	Fragment	None
141-F-4	-	0.77-1.15	SIHP #-5820, Fe. 1	Equidae	<i>Equus ferus caballus</i> (horse)	Articulated Horse	Complete	None
141-F-5	-	0.89	SIHP #-5820, Fe. 2	Suidae	<i>Sus scrofa</i> (pig)	Cranial	Fragment	None
Acc. #	Stratum	Depth (mbs)	Feature	Family/ Class	Species	Element	Description	Modification
141-F-6	-	0.75-0.83	SIHP #-5820, Fe. 31	Suidae	<i>Sus scrofa</i> (pig)	Humerus portion; Phalanx	Fragment/ Complete	Humerus butchered (cut with metal saw blade)
141-F-7	-	0.75-0.83	SIHP #-5820, Fe. 31	Aves	<i>Gallus gallus</i> (chicken)	Left tibiotarsal (distal portion)	Fragment	None

### T-142

A midden table of marine and terrestrial faunal material identified within bulk- and field-screened sediment samples from Test Excavation 142, cultural resource SIHP #-5820 (Stratum II and Features 5-8), is provided in

Table 228 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 of SIHP #-5820 tabulated within Table 228, 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* sp./*Echinometra mathaei* sp. (0.5 g), Crustacea (0.1 g), *Gallus gallus* (chicken) (15.2 g), Osteichthyes (fish) (0.1 g), and various gastropods/bivalves/limpets (17.5 g). Faunal analysis of Stratum III identified naturally-occurring gastropods and limpets (1.7 g), Crustacea (0.1 g), and *Echinometra mathaei* sp. (0.1 g). Faunal analysis of Stratum IV documented unidentified Aves (0.3 g) as well as naturally-occurring Crustacea (1.9 g), *Echinometra mathaei* sp. (0.1 g), *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 (0.18–0.50 mbs and 0.24–0.42 mbs), a modern utility pit (0.44–0.70 mbs), Stratum II (SIHP #-5820) (0.69 mbs and 0.7 mbs), SIHP #-5820 Feature 5 (0.44–0.52 mbs), SIHP #-5820 Feature 6 (0.52–0.6 mbs), and SIHP #-5820 Feature 7 (0.50–0.60 mbs) (Table 229).

Stratum Ic faunal remains consisted of *Felis catus*, *Gallus gallus*, and two sets of unidentified Aves (bird) skeletal elements. No cultural modifications were observed. In addition to the mammalian remains, unidentified spine and irregular Osteichthyes (fish) bone fragments were identified (see Appendix A.2). The modern utility pit faunal remains 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. It is likely that this effect occurred in association with trash-burning activities which took place in this area in the historic period.

The Stratum II (SIHP #-5820) faunal remains consisted of a *Canis lupus familiaris* diaphysis section with perimortem fractures and a *Bos taurus* rib fragment with butcher marks from a metal saw blade (striations on both sides and a single false start). The presence of *Bos taurus*, a post-Contact introduced species, indicates post-Contact usage of Stratum II.

The SIHP #-5820 Feature 5 faunal remains 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. It is likely that this effect occurred in association with trash-burning activities which took place in this area in the historic period.

The SIHP #-5820 Feature 6 faunal remains consisted of *Bos taurus* skeletal elements with butcher marks on the diaphysis sections (uniform striations on both sides) and black charred/burned areas on the cancellous diaphysis sections. These marks are 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 SIHP #-5820 Feature 7 faunal remains 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 show evidence of butchering with a metal saw blade, indicating historic food remnants.

Table 228. 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		
<b>Invertebrate Midden</b>							
Conidae <i>Conus</i> sp.			17.4	11		28.4	4.4%
Isognomidae <i>Isognomon</i> sp.		0.2	157.2	281.6		439	68.6%
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	12.4%
Neritidae <i>Nerita picea</i> opercula		3.0		0.1		3.1	0.5%
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%
Crustacea	0.2	0.1	0.9		0.3	1.4	0.2%
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%
<b>Total Invertebrate Midden</b>	<b>2.1</b>	<b>39.6</b>	<b>226.3</b>	<b>361.4</b>	<b>10.3</b>	<b>639.6</b>	<b>100.0%</b>
<b>Vertebrate Midden</b>							
Medium mammal			17.9	0.4	0.4	18.7	63.4%
Medium mammal (burned/calcified)				2.6		2.6	8.8%
Med mammal (burned)				5.2		5.2	17.6%
Small mammal					0.1	0.1	0.3%
<i>Sus scrofa</i> (pig)					0.5	0.5	1.7%
<i>Rattus</i> sp. (rat)			0.5			0.5	1.7%
Aves (bird)				0.9		0.9	3.1%
Osteichthyes (fish)		0.1	0.6	0.2	0.1	1.0	3.4%
<b>Total Vertebrate Midden</b>	<b>0</b>	<b>0.1</b>	<b>19</b>	<b>9.3</b>	<b>1.1</b>	<b>29.5</b>	<b>100.0%</b>

Table 229. Terrestrial Faunal Material Collected Individually During Test Excavation 142

Acc. #	Stratum	Depth (mbs)	Feature	Family/ Class	Species	Element	Description	Modification
142-F-1	Ic	0.18-0.50	-	Felidae	<i>Felis catus</i> (cat)	Lumbar vertebrae	Complete	None
142-F-2	Ic	0.18-0.50	-	Aves (bird)	Unidentified	Ribs; Proximal phalanx; 3rd phalanx	Fragments/complete	None
142-F-3	Ic	0.18-0.50	-	Aves (bird)	Unidentified	Left and right tibiotarsus; Sternum/ keel	Fragments	None
142-F-4	Ic	0.24-0.42	-	Aves	<i>Gallus gallus</i> (chicken)	Right femur; Left femoral condyle; Cranium; Ribs (possible); Sternum (possible); Irregular bones	Fragments	None
142-F-5	Ib	0.44-0.70	modern pit	Bovidae	<i>Bos taurus</i> (cow)	Mandible portion with teeth (2); Astragalus (foot bone); Talus; Vertebra (possible); Rib; Cranial (possible)	Fragments/complete	All calcined
142-F-6	Ib	0.44-0.70	modern pit	Suidae	<i>Sus scrofa</i> (pig)	Proximal femur shaft portion, with unfused end for head	Fragment	Calcined
142-F-7	Ib	0.44-0.70	modern pit	Felidae	<i>Felis catus</i> (juvenile cat)	Maxilla with molars (2) and canine (incomplete roots); Distal femur portion; Radial portion (possible <i>Felis catus</i> )	Fragments	None
142-F-8	Ib	0.44-0.70	modern pit	Mammalia	Medium mammal	Irregular bones	Fragments	Butcher marks/ calcination
142-F-9	Ib	0.44-0.70	modern pit	Aves (bird)	Unidentified	Possible foot elements (thin and lightweight)	Fragments	None
142-F-10	-	0.44-0.52	SIHP #-5820, Fe. 5	Bovidae	<i>Bos taurus</i> (cow)	Rib	Fragment	Burned/ calcined (deformed from high temperature fire)

Acc. #	Stratum	Depth (mbs)	Feature	Family/ Class	Species	Element	Description	Modification
142-F-11	-	0.44-0.52	SIHP #-5820, Fe. 5	Mammalia	Medium mammal (possible <i>Bos taurus</i> or <i>Sus scrofa</i> )	Cranial (possible)	Fragment	None
142-F-12	-	0.50-0.60	SIHP #-5820, Fe. 7	Bovidae	<i>Bos taurus</i> (cow)	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	-	0.50-0.60	SIHP #-5820, Fe. 7	Suidae	<i>Sus scrofa</i> (pig)	Occipital/basilar condyle; Right styloid portion; Cranial (possible)	Fragments	None
142-F-14	-	0.50-0.60	SIHP #-5820, Fe. 7	Mammalia	Medium mammal (possible <i>Bos taurus</i> or <i>Sus scrofa</i> )	Irregular bones	Fragments	None
142-F-15	-	0.52-0.60	SIHP #-5820, Fe. 6	Bovidae	<i>Bos taurus</i> (cow)	Diaphysis section (possible tibia); Cancellous diaphysis sections	Fragments	Butcher marks on diaphysis sections (uniform striations on both sides); Black charred/ burned areas
142-F-16		0.69	-	Canidae	<i>Canis lupus familiaris</i> (dog)	Diaphysis section	Fragment	Perimortem fractures
142-F-17	II, SIHP #-5820	0.70	-	Bovidae	<i>Bos taurus</i> (cow)	Rib	Fragment	Butcher marks (striations both sides, a single false start)

**T-143**

Four bulk sediment samples were collected, one from Stratum Id (0.60–0.80 mbs), one from Stratum Ie (0.95 mbs), and two from Stratum II (1.05–1.48 mbs). Faunal analysis of Stratum Id, a fill deposit, identified medium mammal (16.5 g), *Canis lupus familiaris* (dog) (3.8 g), Osteichthyes (fish) (2.9 g), *Nerita picea* (1.3 g), and Echinoidea (1.7 g). Faunal analysis of Stratum Ie, a fill deposit, identified medium mammal (5.8 g), Osteichthyes (0.2 g), *Nerita picea* (4.4 g), *Echinothrix diadema* sp./*Echinometra mathaei* sp. (1.7 g), and limpets/gastropods (1.6 g). Faunal analysis of Stratum II identified *Rattus* sp. (rat) (0.1 g), Osteichthyes (fish) (0.1 g), and naturally-occurring marine fauna indicative of a shallow marine or estuary deposit consisting of *Nerita picea* (5.7 g), *Strombus* sp. (3.4 g), *Brachidontes crebristriatus* (2.0 g), *Echinometra mathaei* sp. (0.3 g), *Tellina* sp. (0.2 g), crustacean (0.1 g), *Turbo sandwicensis* (1.6 g), *Theodoxus* sp. (0.1 g), limpets and gastropods (1.7 g), and unidentified shell (0.4 g).

Terrestrial faunal remains were collected individually during excavation from Stratum Id (0.60–0.80 mbs), the Strata Id/Ie interface (0.94 mbs), and Stratum II (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 historic food remnants, unmodified *Canis lupus familiaris* (possible), and unidentified medium mammal skeletal elements.

The Stratum Id/Ie interface faunal remains consisted of *Bos taurus* rib and humerus long bone fragments, *Sus scrofa* skeletal elements, and unidentified Aves skeletal elements. The *Bos taurus* long bone shows evidence of butchering with a metal saw blade on both ends, indicating historic food remnants.

The Stratum II faunal remains consisted of *Capra aegagrus hircus* skeletal elements, some of which (frontal bone/horn) show burn marks. The presence of introduced species (*Capra aegagrus hircus*) in Stratum II indicates use of this stratum within the post-Contact period (Table 230).

Table 230. Terrestrial Faunal Material Collected Individually from Test Excavation 143

Acc. #	Stratum	Depth (mbs)	Feature	Family/ Class	Species	Element	Description	Modification
143-F-1	Id	0.60-0.80	-	Bovidae	<i>Bos taurus</i> (cow)	Tibia (distal portion); Ribs; Vertebra	Fragments	Butchered (cut with metal saw blade)
143-F-2	Id	0.60-0.80	-	Canidae	<i>Canis lupus familiaris</i> (possible dog)	Diaphysis sections/ irregular bones; Vertebrae	Fragments	None
143-F-3	Id	0.60-0.80	-	Mammalia	Medium mammal	Ulna	Fragment	None
143-F-4	Id/Ie	0.94	-	Bovidae	<i>Bos taurus</i> (cow)	Humerus diaphysis section	Fragment	Butchered (cut with metal saw blade on both ends)
143-F-5	Id/Ie	0.94	-	Bovidae	<i>Bos taurus</i> (cow)	Rib	Fragment	None
143-F-6	Id/Ie	0.94	-	Suidae	<i>Sus scrofa</i> (pig)	Femur; Canine tooth; Diaphysis sections	Fragments	None
143-F-7	Id/Ie	0.94	-	Aves (bird)	Unidentified	Femur; Diaphysis sections	Fragments	None
143-F-8	III	1.44	-	Bovidae	<i>Capra aegagrus hircus</i> (goat)	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 identified within bulk- and field-screened sediment samples from Test Excavation 145, cultural resource SIHP #-5820 (Stratum II and Features 9 and 10), is provided in Table 231 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. In addition, a bulk sediment sample from Stratum III (0.84–1.01 g) identified naturally-occurring marine shell (1.7 g).

Faunal remains were collected individually during excavation from Stratum Ic (0.70 mbs) and from the Strata II/III interface (0.76 mbs). The Stratum Ic faunal remains consisted of *Bos taurus* and unidentified Aves (bird). The *Bos taurus* (ribs) show evidence of butchering with a metal saw blade, indicating historic food remnants. The faunal remains collected from the Strata II/III interface are 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 show evidence butchering with a metal saw blade, indicating historic food remnants.

Table 231. 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		
<b>Invertebrate Midden</b>					
Mytilidae <i>Brachidontes crebristriatus</i>	1.8		0.8	<b>2.6</b>	<b>12.7%</b>
Neritidae <i>Nerita picea</i>			1.3	<b>1.3</b>	<b>6.3%</b>
Strombidae <i>Strombus</i> sp.	0.9	0.8	0.7	<b>2.4</b>	<b>11.7%</b>
Tellinidae <i>Tellina</i> sp.	4.1			<b>4.1</b>	<b>20.0%</b>
Turbinidae <i>Turbo</i> sp. Opercula	0.9			<b>0.9</b>	<b>4.4%</b>
Burned shell		1.6		<b>1.6</b>	<b>7.8%</b>
Crustacea			1.4	<b>1.4</b>	<b>6.8%</b>
Crustacea (burned)	2.4	1.8		<b>4.2</b>	<b>20.5%</b>
Echinoidea			0.1	<b>0.1</b>	<b>0.5%</b>
Echinoidea <i>diadema</i> sp.	0.2			<b>0.2</b>	<b>1.0%</b>
Echinoidea <i>mathaei</i> sp.		1.4		<b>1.4</b>	<b>6.8%</b>
Echinoidea <i>mathaei</i> sp. (burned)	0.3			<b>0.3</b>	<b>1.5%</b>
<b>Total Invertebrate Midden</b>	<b>10.6</b>	<b>5.6</b>	<b>4.3</b>	<b>20.5</b>	<b>100.0%</b>
<b>Vertebrate Midden</b>					
Medium mammal			1.3	<b>1.3</b>	<b>86.7%</b>
Osteichthyes (fish)	0.2			<b>0.2</b>	<b>13.3%</b>
<b>Total Vertebrate Midden</b>	<b>0.2</b>	<b>0</b>	<b>1.3</b>	<b>1.5</b>	<b>100.0%</b>

**T-146A**

A midden table of marine and terrestrial faunal material identified within bulk- and field-screened sediment samples from Test Excavation 146A, cultural resource SIHP #-5820 (Stratum II and Features 11–17) is provided in Table 232 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 and consisted of medium mammal, pig, dog, and fish.

In addition to the midden analysis tabulated within Table 232, faunal analysis was conducted of bulk sediment samples collected from Stratum Ic (0.42–0.67 mbs 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-occurring 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-occurring marine fauna indicative of a natural shallow marine or estuary deposit (77.1 g) (Table 233).

Faunal remains also were collected individually during excavation from Stratum Ic (0.42–0.67 mbs) and from SIHP #-5820 Feature 15 (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 SIHP #-5820 Feature 15 consisted of *Sus scrofa*, *Canis lupus familiaris*, and medium mammal skeletal elements. None of the remains show 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 232. 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		
<b>Invertebrate Midden</b>								
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%
<i>Echinothrix diadema</i> sp.			0.1		0.2		0.3	1.3%
<i>Echinothrix diadema</i> sp./ <i>Echinometra mathaei</i> sp.	0.1	0.4		0.2			0.7	3.0%

<b>Total Invertebrate Midden</b>	<b>3.3</b>	<b>2.1</b>	<b>2.6</b>	<b>3.9</b>	<b>10.2</b>	<b>1.5</b>	<b>23.6</b>	<b>100.0%</b>
<b>Vertebrate Midden</b>								
Medium mammal			0.2				<b>0.2</b>	<b>22.2%</b>
Osteichthyes (fish) (burned)	0.1						<b>0.1</b>	<b>11.1%</b>
Osteichthyes (fish)			0.2	0.2	0.1	0.1	<b>0.6</b>	<b>66.7%</b>
<b>Total Vertebrate Midden</b>	<b>0.1</b>	<b>0</b>	<b>0.4</b>	<b>0.2</b>	<b>0.1</b>	<b>0.1</b>	<b>0.9</b>	<b>100.0%</b>

Table 233. Stratum IV Faunal Material Collected from Test Excavation 146A

<b>Faunal Material</b>	<b>Weight (g)</b>
<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>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 Stratum Ib backdirt (0.38–1.15 mbs). The remains consisted of a *Bos taurus*, *Canis lupus familiaris*, and *Gallus gallus* skeletal elements. The *Bos taurus* (rib) fragment was butchered with a metal saw blade, indicating historic food remnants.

**T-149**

Terrestrial faunal remains were collected individually during excavation from the Stratum Ib (0.45–0.55 mbs) and Stratum Ie (0.50–1.10 mbs). Faunal identified from Stratum Ib consisted of *Bos taurus*, *Sus scrofa* (possible) with perimortem trauma, and unmodified *Felis catus* (possible) skeletal elements. Faunal identified from Stratum Ie consisted of *Bos taurus* skeletal elements. The *Bos taurus* skeletal elements from both strata had been butchered with a metal blade, indicating historic food remnants.

**T-150**

A midden table of marine and terrestrial faunal material identified within bulk- and field-screened sediment samples from Test Excavation 150, cultural resource SIHP #-5820 (Stratum II and SIHP #-5820 Features 18–20) is provided in Table 234 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, SIHP #-5820 (0.90–1.10 mbs). The remains consisted of unmodified *Sus scrofa* and *Felis catus* (possible) skeletal elements. The possible presence of introduced species (*Felis catus*) indicates Stratum II (SIHP #-5820) was utilized within the post-Contact period.

Table 234. 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		
<b>Invertebrate Midden</b>						
Conidae <i>Conus</i> sp.	2.9				2.9	1.3%
Cymatiidae	7.1		1.5	0.1	8.7	3.8%
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	0.8%
Mytilidae <i>Brachidontes crebristriatus</i>	2.4	1.9	11.2	0.3	15.8	7.0%
Neritidae <i>Nerita picea</i>	10.4	12.4	35.3		58.1	25.6%
Neritidae opercula			4.3		4.3	1.9%
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	0.8%
Strombidae		2	2.4		4.4	1.9%
Strombidae (burned)		2.4			2.4	1.1%
Strombidae <i>Strombus</i> sp.	21		20.5	1.2	42.7	18.8%
Tellinidae <i>Tellina</i> spp.			7.1		7.1	3.1%
Tellinidae		0.1			0.1	0.0%
Tellinidae <i>Tellina palatam</i>		3	3.2	0.8	7.0	3.1%
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	18.6%
Turbinidae <i>Turbo</i> sp.			5.8		5.8	2.6%
Burned shell			10.1		10.1	4.4%
Crustacea	0.4	0.8	3.0	0.8	5.0	2.2%
Echinoidea	0.7				0.7	0.3%
Echinoidea <i>Heterocentrotus mammillatus</i>	1.9				1.9	0.8%
<i>Echinometra mathaei</i> sp.		0.1		0.1	0.2	0.1%
Echinothrix <i>diadema</i> sp./ <i>Echinometra mathaei</i> sp.			0.2		0.2	0.1%
<b>Total Invertebrate Midden</b>	<b>79.2</b>	<b>35.8</b>	<b>107.6</b>	<b>4.6</b>	<b>227.2</b>	<b>100.0%</b>
<b>Vertebrate Midden</b>						
Osteichthyes (fish)	1.6	0.3	0.2	0.2	2.3	100.0%
<b>Total Vertebrate Midden</b>	<b>1.6</b>	<b>0.3</b>	<b>0.2</b>	<b>0.2</b>	<b>2.3</b>	<b>100.0%</b>

**T-151**

A midden table of marine and terrestrial faunal material identified within bulk- and field-screened sediment samples from Test Excavation 151, cultural resource SIHP #-5820 (Stratum Id, Stratum II, and Features 21–23 and 25), is provided in Table 235 below. The invertebrate families and species most represented within the midden signature include *Nerita picea*, *Theodoxus neglectus*, 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 medium mammal, rat, and fish.

In addition to the midden analysis tabulated within Table 235, 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-occurring 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* sp. (0.2 g).

Terrestrial faunal remains were collected individually during excavation from SIHP #-5820 Feature 24 (0.70–0.83 mbs). The remains consisted of two articulated *Canis lupus familiaris* (infants), one with incomplete permanent dentition and one with deciduous dentition. Additional faunal remains were hand collected during excavation from Stratum II at 0.98 mbs, near and below the base of SIHP #-5820 Feature 24. These remains consisted of juvenile *Sus scrofa* fragments and a fragment of *Pervagor spilosoma* (Fantail Filefish) (0.1 g). None of the remains show any evidence of cultural modification. The *Sus scrofa* and *Canis lupus familiaris* are both Polynesian introductions common in both pre- and post-Contact deposits.

Table 235. Invertebrate and Vertebrate Midden Identified Within Bulk Sediment Samples from Test Excavation 151, SIHP #-5820

Test Excavation	151	151	151	151	151	151	Weight (g)	Total %
Stratum	Id	II	Id	Id	Id	II		
Feature	-	-	21	22	23	25		
<b>Invertebrate Midden</b>								
Cymatiidae <i>Cymatium</i> sp.					0.7		0.7	0.6%
Isognomidae <i>Isognomon</i> sp.	0.9						0.9	0.8%
Mytilidae <i>Brachidontes crebristriatus</i>	1.3	1.7	5.7	0.3	0.4		9.4	8.0%
Naticidae <i>Natica</i> sp.		0.4					0.4	0.3%
Neritidae <i>Nerita picea</i>	9.5		1.8	49.4	8.0		68.7	58.1%
Neritidae <i>Nerita picea</i> and <i>Theodoxus neglectus</i>		2.1		7.2			9.3	7.9%
Strombidae <i>Strombus</i> sp.				9.1			9.1	7.7%
Strombidae <i>Strombus</i> sp. (burned)	0.4						0.4	0.3%
Tellinidae <i>Tellina palatam</i>		0.1	0.1		1.4		1.6	1.4%
Tellinidae <i>Tellina</i> sp.				0.1			0.1	0.1%
Tellinidae <i>Tellina</i> spp.	0.4						0.4	0.3%
Turbinidae <i>Turbo</i> sp. operculum				0.7			0.7	0.6%
Gastropods	1.6						1.6	1.4%

Test Excavation	151	151	151	151	151	151	Weight (g)	Total %
Stratum	Id	II	Id	Id	Id	II		
Feature	-	-	21	22	23	25		
Burned shell		1.4	4.9	0.6	2.3		9.2	7.8%
Crustacea		0.8	0.4	0.5	0.6		2.3	1.9%
Crustacea (burned)	0.1					0.8	0.9	0.8%
Echinoidea			1.7			0.1	1.8	1.5%
<i>Echinometra mathaei</i> sp.		0.1	0.1				1.9	1.6%
<i>Echinothrix diadema</i> sp.	0.3						0.3	0.3%
<i>Echinothrix diadema</i> sp./ <i>Echinometra mathaei</i> sp.				0.3	0.3		0.6	0.5%
<b>Total Invertebrate Midden</b>	<b>14.5</b>	<b>6.6</b>	<b>14.3</b>	<b>68.2</b>	<b>13.7</b>	<b>0.9</b>	<b>118.2</b>	<b>100.0%</b>
<b>Vertebrate Midden</b>								
Medium mammal				0.3	0.1		0.4	12.9%
<i>Rattus rattus</i> (rat)		0.1					0.1	3.2%
<i>Rattus</i> sp. (rat)						0.1	0.1	3.2%
Osteichthyes (fish)	0.4	0.2	1.6		0.3		2.5	80.6%
<b>Total Vertebrate Midden</b>	<b>0.4</b>	<b>0.4</b>	<b>1.6</b>	<b>0.3</b>	<b>0.4</b>	<b>0.1</b>	<b>3.1</b>	<b>100.0%</b>

## T-151A

A midden table of marine and terrestrial faunal material identified within bulk- and field-screened sediment samples from Test Excavation 151A, cultural resource SIHP #-5820 (Stratum II and Features 26–29), is provided in Table 236 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.

Medium mammal (possible *Sus scrofa*) fragments were collected individually from the back dirt during excavation from approximately 0.70 mbs. The fragments show evidence of butchering with a metal saw blade and were calcined, both of which indicate a historic origin. The approximated depth of 0.70 mbs indicates the remains were associated with Strata Id or Ie.

Table 236. 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		
<b>Invertebrate Midden</b>							
Mytilidae <i>Brachidontes crebristriatus</i>	0.3	0.4	0.2	0.3		1.2	5.5%
Neritidae <i>Nerita picea</i>		6.8	1.0	4.6		12.4	57.1%
Strombidae <i>Strombus</i> sp.		4.6				4.6	21.2%
Tellinidae <i>Tellina palatam</i>	1.0					1.0	4.6%

Test Excavation	151A	151A	151A	151A	151A	Weight (g)	Total %
Stratum	II	Id	Id	Id	Id		
Feature	-	26	27	28	29		
Burned shell		0.2				0.2	0.9%
Crustacea		0.7	0.4	0.1		1.2	5.5%
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%
<i>Echinometra mathaei</i> sp.	0.2		0.1			0.3	1.4%
<i>Echinothrix diadema</i> sp./ <i>Echinometra mathaei</i> sp.		0.1				0.1	0.5%
<b>Total Invertebrate Midden</b>	<b>2.1</b>	<b>12.8</b>	<b>1.7</b>	<b>5.1</b>	<b>0</b>	<b>21.7</b>	<b>100.0%</b>
<b>Vertebrate Midden</b>						<b>0</b>	
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%
<b>Total Vertebrate Midden</b>	<b>0.1</b>	<b>0.1</b>	<b>0.1</b>	<b>14.9</b>	<b>0.1</b>	<b>15.3</b>	<b>100.0%</b>

### T-152

One bulk and one field-screened sediment sample were collected from Stratum Ie (0.52–1.10 mbs). Faunal analysis identified burned medium mammal (0.3 g), Osteichthyes (fish) (0.2 g), naturally-occurring marine shell (10.3 g), and marine shell midden consisting of *Turbo sandwicensis* (13.8 g), *Nerita picea* (12.2 g), *Conus* sp. (8.9 g), burned shell (1.6 g), Echinoidea (1.4 g), Crustacea (2.1 g).

One bulk sample and one field-screened sample were collected from Stratum Ig (0.61–0.76 mbs). Faunal analysis identified Osteichthyes (fish) (0.2 g), naturally-occurring marine shell (4.2 g), and marine shell midden consisting of *Nerita picea* (11.4 g), *Strombus* sp. (3.3 g), *Tellina palatam* (1.8 g), *Natica* sp. (1.0 g), *Turbo* sp. operculum (0.3 g), *Isognomon* sp. (0.1 g), *Ctena bella* (0.1 g), *Brachidontes crebristriatus* (0.1 g), burned shell (1.0 g), Crustacea (0.8 g), and *Echinometra mathaei* sp. (0.1 g).

The samples from Strata Ie and Ig contained a strong midden signature; however, both strata were identified as fill deposits, indicating that the midden had been removed from its original cultural context.

A single *Sus scrofa* sacral vertebra and a *Canis lupus familiaris* mandible fragment were collected individually during excavation from Stratum Ie (0.52–1.10 mbs). Neither bone show evidence of cultural modification. Both species are Polynesian introductions common in both pre- and post-Contact deposits.

### T-153

Three bulk sediment samples were collected, two from Strata II (1.32 mbs and 1.34–1.41 mbs) and one from Stratum III (1.5 mbs). 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-occurring marine mollusk shell (0.6 g), and unmodified *Canis lupus*

*familiaris* (2.4 g). Faunal analysis of Stratum III identified naturally-occurring Crustacea (0.3 g), *Brachidontes crebristriatus* (5.7 g), *Pyramidula dolabrata* (4.3 g), Trochidae (0.5 g), and Tellinidae (0.1 g). The faunal results for Stratum III are consistent with a natural shallow marine or estuary deposit.

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

#### **T-154**

One bulk sediment sample was collected from Stratum II (1.3–1.38 mbs). Faunal analysis identified fresh- or brackish-water gastropods (snails), indicative of a wetland deposit, Crustacea (0.1 g), Neritidae (0.1 g), and a small amount of naturally-occurring marine mollusk shell (0.8 g).

#### **T-155**

Four bulk sediment samples were collected, one each from Stratum Ic (0.83–1.07 mbs), Stratum Id (1.07–1.22 mbs), Stratum II (1.22–1.24 mbs), and Stratum III (1.24–1.48 mbs). No faunal material was identified in the samples from Strata Ic and Id. Faunal analysis of Stratum II identified naturally-occurring marine mollusk shell (1.3 g), *Echinometra mathaei* (0.1 g), as well as possible midden consisting of burned Crustacea (0.2 g) and small mammal (0.1 g). Faunal analysis of Stratum III identified naturally-occurring marine mollusk shell, Crustacea, and Echinoidea (total 3.4 g).

#### **T-156**

One bulk sediment sample was collected from Stratum II (0.93–1.08 mbs). Faunal analysis identified naturally-occurring 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) and fish (0.1 g).

#### **T-157**

Two bulk sediment samples were collected, one each from Stratum II (0.88–0.98 mbs) and Stratum III (1.03–1.13 mbs). Faunal analysis of Stratum II identified naturally-occurring 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-occurring marine mollusk shell (2.4 g), Crustacea (1.2 g), and *Echinometra mathaei* (0.2 g).

#### **T-159**

Three bulk sediment samples were collected, one each from Stratum II (1.27–1.37 mbs), Stratum III (1.45–1.52 mbs), and Stratum IV (1.55–1.65 mbs). Stratum II contained naturally-occurring limpets/gastropods (1.7 g) and *Echinometra mathaei* (0.2 g). Faunal analysis of Stratum III identified naturally-occurring 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-occurring 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, one each from Stratum Ie (0.89–1.03 mbs), Stratum If (1.12–1.33 mbs), and Stratum II (1.33–1.52 mbs). Faunal analysis of Stratum Ie identified naturally-occurring limpets/gastropods (0.1 g), Echinoidea (0.1 g), and Crustacea (0.1 g). Faunal analysis of Stratum If identified naturally-occurring limpets/gastropods (0.2 g), *Echinometra mathaei* (0.1 g), and Crustacea (0.1 g). No faunal material was identified within Stratum II.

## T-161

One bulk sediment sample was collected from Stratum III (1.52–1.54 mbs). Faunal analysis identified naturally-occurring 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 from 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 and T-123, T-129 to T-140, and T-153 to T-161. Areas of natural Jaucas sand showed cultural activity in the form of marine and terrestrial material midden deposits within the buried A-horizon and its associated features.

Thirty-two of the 46 test excavations contained terrestrial faunal remains (T-116, T-117, T-119 to T-121, T-124 to T-126, T-129 to T-134, T-136 to T-139, T-141 to T-143, T-145, T-146A, and T-148 to T-153).

Test excavations within West Kaka'ako contained both pre-Contact and post-Contact species consisting of *Sus scrofa* (pig), *Canis lupus familiaris* (dog), *Equus ferus caballus* (horse), *Bos taurus* (cow), *Felis catus* (cat), *Capra aegagrus hircus* (goat), *Gallus gallus* (chicken), *Anas platyrhynchos domesticus* (duck), *Meleagris gallopavo* (Rio Grande wild turkey), unidentified Aves (bird), and unidentified medium mammal. The majority of terrestrial faunal remains were collected from fill deposits. The majority of faunal remains collected from natural deposits contained species introduced in the post-Contact period (T-120, T-120A, T-120B, T-138, T-141 Feature 1, T-142 Features 5–7 and Stratum II, T-143, and T-150) and often showing metal saw butcher marks or evidence of burning at a high heat. Notably, only a handful of test excavations contained unmodified faunal remains within natural strata from only species introduced in the pre-Contact period (T-119A, T-129, T-151, and possibly T-145 and T-146A, which also contained unidentified medium mammal).

## 5.10 Faunal Analysis for Kewalo (Test Excavations 162 through 178)

### T-162

Two bulk sediment samples were collected, one each from Stratum II (1.38–1.55 mbs) and Stratum III (1.55–1.89 mbs). Faunal analysis of Stratum II identified naturally-occurring limpets (0.1 g), *Echinometra mathaei* sp. (0.1 g), and Crustacea (0.1 g). Faunal analysis of Stratum III identified naturally-occurring *Echinometra mathaei* (0.1 g) and Crustacea (0.3 g).

**T-163**

Three bulk sediment samples were collected, one each from Stratum II (1.50–1.60 mbs), Stratum III (1.60–1.70 mbs), and Stratum IV (1.70–1.81 mbs). Faunal analysis of Stratum II identified naturally-occurring gastropods (0.1 g). No faunal material was identified within Stratum III. Faunal analysis of Stratum IV identified naturally-occurring Crustacea (0.3 g), *Echinometra mathaei* sp. (0.1 g), limpets/gastropods (2.4 g), *Brachidontes crebristriatus* (0.2 g), and *Crepidula aculeate* (0.1 g).

**T-164**

Two bulk sediment samples were collected, one each from Stratum II (1.73–1.90 mbs) and Stratum III (1.92–2.07 mbs). Faunal analysis of Stratum II identified burned Crustacea (0.1 g). Faunal analysis of Stratum III identified Crustacea (0.7 g), *Echinometra mathaei* sp. (0.1 g) and miscellaneous marine mollusk shell (4.4 g).

**T-165**

One bulk sediment sample was collected Stratum III (1.86–2.04 mbs). Faunal analysis of Stratum III identified naturally-occurring marine shell consisting of Crustacea (2.2 g), *Brachidontes crebristriatus* (0.9 g), Ostreidae (0.7 g), *Turbo* sp. (0.1 g), and *Tellina* spp. (0.1 g). The faunal results are consistent with a natural shallow marine or estuary deposit.

**T-166**

One bulk sediment sample was collected from Stratum II (1.44–2.07 mbs). Faunal analysis identified naturally-occurring Crustacea and marine mollusk shell (0.5 g).

**SIHP #50-80-14-7429 (Test Excavations 167, 168, 168A, 168B, 169, 170, and 170A)**

Test excavations comprising SIHP #50-80-14-7429 contained invertebrate and vertebrate faunal material expressing a strong midden signature. This strong midden content was identified within the buried A-horizon (Stratum II, SIHP #-7429) and associated features (SIHP #-7429 Features 1–7). The midden within this stratum and associated features is tabulated for each individual trench (Table 237, Table 239 through Table 241, and Table 243). The marine mollusk faunal material identified as naturally-occurring 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-167**

A midden table of marine and terrestrial faunal material identified within bulk sediment samples from Test Excavation 167, cultural resource SIHP #-7429 (Stratum II and Features 1–3), is provided in Table 237 below. The invertebrate species most represented within the midden signature consisted of *Nerita picea*. 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.

In addition to the midden analysis tabulated within Table 237, faunal analysis was conducted of bulk sediment samples collected from Stratum II (0.95 mbs) and Stratum III (1.60–1.84 mbs).

Faunal analysis of Stratum II identified *Heterocentrotus mammillatus* (0.9 g). Faunal analysis of Stratum III identified naturally-occurring marine shell (7.4 g) and potential midden consisting of *Nerita picea* (3.4 g), Crustacea (5.2 g), and *Echinometra mathaei* sp. (2.2 g).

Terrestrial faunal remains were collected individually during excavation from SIHP #-7429 Features 1–3. Faunal remains collected from SIHP #-7429 Feature 1 (1.40–1.45 mbs) consisted of a single fragmentary medium mammal skeletal element. Faunal remains collected from SIHP #-7429 Feature 2 (1.41–1.49 mbs) contained irregular bone fragments of a medium mammal. Faunal remains collected from SIHP #-7429 Feature 3 (1.40–1.45 mbs) contained both medium mammal and *Sus scrofa* skeletal elements. The medium mammal fragments from SIHP #-7429 Features 2 and 3 are burned. The medium mammal fragment from SIHP #-7429 Feature 1 shows no evidence of cultural modification. The *Sus scrofa* rib from SIHP #-7429 Feature 3 was butchered with a metal saw blade, indicating historic food remnants (Table 238).

Table 237. Invertebrate and Vertebrate Midden Identified Within Bulk Sediment Samples from Test Excavation 167, SIHP #-7429

Test Excavation	167	167	167	167	Weight (g)	Total %
Stratum	II/III	II	II	II		
Feature	-	1	2	3		
<b>Invertebrate Midden</b>						
Conidae <i>Conus</i> sp. (burned)				0.9	<b>0.9</b>	<b>5.6%</b>
Isognomidae				1.2	<b>1.2</b>	<b>7.4%</b>
Isognomidae <i>Isognomon</i> sp.				0.3	<b>0.3</b>	<b>1.9%</b>
Mitridae				0.3	<b>0.3</b>	<b>1.9%</b>
Mytilidae <i>Brachidontes crebristriatus</i>				1.3	<b>1.3</b>	<b>8.0%</b>
Neritidae <i>Nerita picea</i>	0.7	1.9		4.7	<b>7.3</b>	<b>45.1%</b>
Strombidae <i>Strombus</i> sp.				0.3	<b>0.3</b>	<b>1.9%</b>
Crustacea				2.2	<b>2.2</b>	<b>13.6%</b>
Crustacea (burned)		0.7			<b>0.7</b>	<b>4.3%</b>
Echinoidea spp.				1.7	<b>1.7</b>	<b>10.5%</b>
<b>Total Invertebrate Midden</b>	<b>0.7</b>	<b>2.6</b>	<b>0</b>	<b>12.9</b>	<b>16.2</b>	<b>100.0%</b>
<b>Vertebrate Midden</b>						
Medium mammal				0.3	<b>0.3</b>	<b>60.0%</b>
Osteichthyes (fish)			0.1	0.1	<b>0.2</b>	<b>40.0%</b>
<b>Total Vertebrate Midden</b>	<b>0</b>	<b>0</b>	<b>0.1</b>	<b>0.4</b>	<b>0.5</b>	<b>100.0%</b>

Table 238. Terrestrial Faunal Material Collected Individually from Test Excavation 167

Acc. #	Stratum	Depth (mbs)	Feature	Family/Class	Species	Element	Description	Modification
167-F-1	-	1.40-1.45	SIHP #-7429, Fe. 3	Suidae	<i>Sus scrofa</i> (pig)	Rib; Irregular bones	Fragments	Rib butchered (cut with metal)
167-F-2	-	1.40-1.45	SIHP #-7429, Fe. 3	Mammalia	Medium mammal	Diaphysis section; Irregular bones	Fragments	Diaphysis section burned
167-F-3	-	1.41-1.45	SIHP #-7429, Fe. 1	Mammalia	Medium mammal	Diaphysis section	Fragment	None
167-F-4	-	1.41-1.49	SIHP #-7429, Fe. 2	Mammalia	Medium mammal	Irregular bones (pieces mend)	Fragments	Burned

**T-168**

A midden table of marine and terrestrial faunal material identified within bulk- and field-screened sediment samples from Test Excavation 168, cultural resource SIHP #-7429 (Stratum II), is provided in Table 239 below. The invertebrate families or species most represented within the midden signature consisted of Neritidae and *Turbo sandwicensis*. 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 consist of medium mammal and fish.

Table 239. Invertebrate and Vertebrate Midden Identified Within Bulk Sediment Samples from Test Excavation 168, SIHP #-7429

Test Excavation	168	Weight (g)	Total %
Stratum	II		
Feature	-		
<b>Invertebrate Midden</b>			
Isognomidae <i>Isognomon</i> sp.	0.1	<b>0.1</b>	<b>0.9%</b>
Neritidae	2.4	<b>2.4</b>	<b>20.5%</b>
Neritidae <i>Nerita picea</i>	2.4	<b>2.4</b>	<b>20.5%</b>
Strombidae <i>Strombus</i> sp.	0.3	<b>0.3</b>	<b>2.6%</b>
Tellinidae <i>Tellina palatam</i>	0.4	<b>0.4</b>	<b>3.4%</b>
Turbinidae <i>Turbo sandwicensis</i>	1.3	<b>1.3</b>	<b>11.1%</b>
Burned shell	1.0	<b>1.0</b>	<b>8.5%</b>
Crustacean	0.8	<b>0.8</b>	<b>6.8%</b>
Echinoidea	0.5	<b>0.5</b>	<b>4.3%</b>
<i>Echinometra mathaei</i> sp. and <i>diadema</i> sp.	2.5	<b>2.5</b>	<b>21.4%</b>

<b>Total Invertebrate Midden</b>	<b>11.7</b>	<b>11.7</b>	<b>100.0%</b>
<b>Vertebrate Midden</b>			
Medium mammal	1.7	<b>1.7</b>	<b>81.0%</b>
Osteichthyes (fish)	0.4	<b>0.4</b>	<b>19.0%</b>
<b>Total Vertebrate Midden</b>	<b>2.1</b>	<b>2.1</b>	<b>100.0%</b>

### T-168A

Three bulk sediment samples were collected, two from Stratum II (1.40–1.45 mbs and 1.40–1.53 mbs) and one from the interface of Strata II/III (1.49–1.58 mbs). Faunal analysis of Stratum II identified naturally-occurring marine shell (4.6 g). Faunal analysis of the interface of Strata II/III identified naturally-occurring *Echinometra mathaei* sp. and Crustacea (0.7 g).

### T-168B

A midden table of marine and terrestrial faunal material identified within bulk sediment samples from Test Excavation 168B, cultural resource SIHP #-7429 (Stratum II and Feature 5), is provided in Table 240 below. The invertebrate species most represented within the midden signature consisted of *Nerita picea*, although a variety of invertebrate species in small amounts is also represented. 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 consist of medium mammal, dog, rat, and fish, as well as the historically introduced bovine.

In addition to the midden collected within SIHP #-7429 (Stratum II and Feature 5), a single *Casmaria erinaceus kalosmodix* was hand-collected from Stratum III.

The terrestrial faunal remains collected individually during excavation from Stratum II, SIHP #-7429 (1.40–1.45 mbs) consisted of *Sus scrofa* and *Bos taurus* skeletal elements. A *Bos taurus* rib was butchered with a metal saw blade, indicating historic food remnants.

Table 240. Invertebrate and Vertebrate Midden Identified Within Bulk Sediment Samples from Test Excavation 168B, SIHP #-7429

Test Excavation	168B	168B	Weight (g)	Total %
Stratum	II	II		
Feature	-	5		
<b>Invertebrate Midden</b>				
Isognomidae <i>Isognomon</i> sp.		1.4	<b>1.4</b>	<b>6.9%</b>
Lucinidae <i>Ctena bella</i>		0.1	<b>0.1</b>	<b>0.5%</b>
Mytilidae <i>Brachidontes crebristriatus</i>	0.1	0.1	<b>0.2</b>	<b>1.0%</b>
Neritidae <i>Nerita picea</i>	9.6	1.5	<b>11.1</b>	<b>54.4%</b>
Strombidae <i>Strombus</i> sp.	1.1	0.5	<b>1.6</b>	<b>7.8%</b>
Cf Strombidae (burned)	1.4		<b>1.4</b>	<b>6.9%</b>
Tellinidae <i>Tellina palatam</i>	0.1		<b>0.1</b>	<b>0.5%</b>
Trochidae <i>Trochus</i> sp.	0.1		<b>0.1</b>	<b>0.5%</b>
Turbinidae <i>Turbo</i> sp., operculum	0.8		<b>0.8</b>	<b>3.9%</b>
Crustacean	0.9	1.6	<b>2.5</b>	<b>12.3%</b>
Crustacean (burned)	0.5		<b>0.5</b>	<b>2.5%</b>
Echinodermata		0.1	<b>0.1</b>	<b>0.5%</b>
<i>Echinothrix diadema</i> sp.	0.4	0.1	<b>0.5</b>	<b>2.5%</b>

<b>Total Invertebrate Midden</b>	<b>15</b>	<b>5.4</b>	<b>20.4</b>	<b>100.0%</b>
<b>Vertebrate Midden</b>				
Medium mammal	0.2		<b>0.2</b>	<b>1.4%</b>
Bovine (medium mammal) possible rib cut, marks present with metal blade	13.1		<b>13.1</b>	<b>94.2%</b>
<i>Canis lupus familiaris</i> (dog)	0.1		<b>0.1</b>	<b>0.7%</b>
<i>Rattus</i> sp. (rat)		0.1	<b>0.1</b>	<b>0.7%</b>
Fish	0.4		<b>0.4</b>	<b>2.9%</b>
<b>Total Vertebrate Midden</b>	<b>13.8</b>	<b>0.1</b>	<b>13.9</b>	<b>100.0%</b>

### T-169

A midden table of marine and terrestrial faunal material identified within bulk- and field-screened sediment samples from Test Excavation 169, cultural resource SIHP #-7429 (Stratum II), is provided in Table 241 below. The invertebrate species most represented within the midden signature consisted of *Nerita picea*, although also present is a variety of invertebrate species in small amounts was also represented. 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 within bulk samples are consistent with pre-Contact terrestrial and marine species, including medium mammal, rat, bird, and fish. However, hand-collected terrestrial faunal remains included historically introduced species (see below).

Terrestrial faunal remains were collected individually during excavation within Stratum II (1.44–1.54 mbs). The remains included *Bos taurus*, medium mammal (possible *Ovis aries*), *Canis lupus familiaris*, and medium mammal (possible *Felis catus* or *Canis lupus familiaris*). The *Bos taurus* fragment had been butchered with a metal saw blade, indicating historic food remnants. The remaining bones show no evidence of cultural modification (Table 242).

Table 241. Invertebrate and Vertebrate Midden Identified Within Bulk Sediment Samples from Test Excavation 169, SIHP #-7429

<b>Test Excavation</b>	<b>169</b>	<b>Weight (g)</b>	<b>Total %</b>
<b>Stratum</b>	<b>II</b>		
<b>Feature</b>	<b>-</b>		
<b>Invertebrate Midden</b>			
Cypraeidae <i>Cypraea caputserpentis</i>	0.3	<b>0.3</b>	<b>3.0%</b>
Nacellidae <i>Cellana sandwicensis</i>	0.4	<b>0.4</b>	<b>4.0%</b>
Neritidae <i>Nerita picea</i>	3.7	<b>3.7</b>	<b>37.0%</b>
Tellinidae <i>Tellina palatam</i>	0.5	<b>0.5</b>	<b>5.0%</b>
Crustacea	0.3	<b>0.3</b>	<b>3.0%</b>
Echinoidea <i>mathaei</i> sp./ <i>diadema</i> sp.	4.8	<b>4.8</b>	<b>48.0%</b>
<b>Total Invertebrate Midden</b>	<b>10</b>	<b>10</b>	<b>100.0%</b>
<b>Vertebrate Midden</b>			
Medium mammal	1.8	<b>1.8</b>	<b>85.7%</b>
<i>Rattus</i> sp. (rat)	0.1	<b>0.1</b>	<b>4.8%</b>
Aves (bird)	0.1	<b>0.1</b>	<b>4.8%</b>
Fish	0.1	<b>0.1</b>	<b>4.8%</b>
<b>Total Vertebrate Midden</b>	<b>2.1</b>	<b>2.1</b>	<b>100.0%</b>

Table 242. Terrestrial Faunal Material Collected Individually from Test Excavation 169

Acc. #	Stratum	Depth (mbs)	Feature	Family/Class	Species	Element	Description	Modification
169-F-1	II, SIHP #7429	1.44	-	Bovidae	<i>Bos taurus</i> (cow)	Tibia diaphysis section	Fragment	Butchered (cut with metal saw blade)
169-F-2	II, SIHP #7429	1.44	-	Mammalia	Medium mammal (possible <i>Ovis aries</i> )	Vertebra; Tibia (distal portion); Epiphysis; Irregular bone fragments	Fragments	None
169-F-3	II, SIHP #7429	1.44	-	Canidae	<i>Canis lupus familiaris</i> (dog)	Vertebra	Fragment	None
169-F-4	II, SIHP #7429	1.44-1.54	-	Mammalia	Medium mammal (possible <i>Felis catus</i> or <i>Canis familiaris</i> )	Metatarsus (possible, pieces mend)	Fragment	None
169-F-5	II, SIHP #7429	1.44-1.45	-	Canidae	<i>Canis lupus familiaris</i> (dog)	Cervical vertebra; Ulna; Irregular bones	Fragments	None

**T-170A**

A midden table of marine and terrestrial faunal material identified within bulk sediment samples from Test Excavation 170A, cultural resource SIHP #7429 (Stratum II and Feature 7), is provided in Table 243 below. The invertebrate species most represented within the midden signature consisted of *Nerita picea* and *Strombus* sp. 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 consist of medium mammal and fish.

Terrestrial faunal remains were collected individually during excavation from SIHP #7429 Feature 7 (0.56–0.60 mbs). The remains consisted of a single *Canis lupus familiaris* proximal phalanx, diaphysis sections from a *Rattus* sp., and a vertebra and irregular bone from a medium mammal. The medium mammal vertebra had been butchered with a metal saw blade, indicating a historic origin. The remaining bones show no evidence of cultural modification. *Canis lupus familiaris* and *Rattus* sp. are both associated with pre-and post-Contact contexts.

Table 243. Invertebrate and Vertebrate Midden Identified Within Bulk Sediment Samples from Test Excavation 170A, SIHP #-7429

Test Excavation	170A	170A	Weight (g)	Total %
Stratum	II	II		
Feature		7		
<b>Invertebrate Midden</b>				
Isognomidae <i>Isognomon</i> sp.		0.1	0.1	0.6%
Naticidae <i>Natica</i> sp. (burned)		2.0	2	11.4%
Neritidae <i>Nerita picea</i>	3.8	2.6	6.4	36.6%
Strombidae <i>Strombus</i> sp.		8.5	8.5	48.6%
Crustacea (burned)		0.3	0.3	1.7%
<i>Echinothrix diadema</i> sp./ <i>Echinometra mathaei</i> sp.	0.2		0.2	1.1%
<b>Total Invertebrate Midden</b>	<b>4.0</b>	<b>13.5</b>	<b>17.5</b>	<b>100.0%</b>
<b>Vertebrate Midden</b>				
Medium mammal	0.2		0.2	28.6%
Osteichthyes (fish)	0.4	0.1	0.5	71.4%
<b>Total Vertebrate Midden</b>	<b>0.6</b>	<b>0.1</b>	<b>0.7</b>	<b>100.0%</b>

**T-171**

A single *Bos taurus* (possible) distal tibia fragment was collected individually during excavation from Stratum II (0.85 mbs). The bone was butchered with a metal saw blade, indicating historic food remnants.

**T-172**

Three bulk sediment samples were collected, one each from Stratum II (0.84–0.86 mbs), Stratum III (1.00–1.10 mbs), and Stratum IV (1.25–1.35 mbs). Faunal analysis of Stratum II identified midden material consisting of burned unidentified medium mammal (0.2 g), burned Osteichthyes (fish) (0.2 g), and *Nerita picea* (0.2 g), indicating some cultural enrichment to Stratum II. Faunal analysis of Stratum III identified naturally-occurring marine fauna consisting of Crustacea (0.6 g), *Echinometra mathaei* sp. (0.1 g), and limpets/gastropods (1.7 g). No faunal material was identified within Stratum IV.

**T-174**

One bulk sediment sample was collected from Test Excavation 174, Stratum II (1.0 mbs). No marine fauna was identified.

A single *Sus scrofa* (possible) rib fragment was collected individually during excavation from Stratum Ie (0.67–1.03 mbs). The bone shows no evidence of cultural modification. *Sus scrofa* is a Polynesian introduction common in both pre- and post-Contact contexts

**T-174A**

A single *Bos taurus* proximal phalanx was collected individually during excavation from Stratum Id (0.75 mbs). The bone shows no evidence of cultural modification, however the presence of *Bos taurus* (an introduced species) indicates a post-Contact origin.

**T-175**

Two bulk sediment samples were collected, one each from Stratum II (0.62–0.68 mbd) and Stratum III (0.75–0.82 mbd). Faunal analysis of Stratum II identified naturally-occurring marine mollusk shell (2.2 g), Crustacea (1.4 g), and *Echinothrix diadema* sp./*Echinometra mathaei* sp. (0.2 g). Faunal analysis of Stratum III identified naturally-occurring Crustacea (1.0 g) and *Brachidontes crebristriatus* (0.1 g).

**T-175A**

Three bulk sediment samples were collected, two from Stratum II (0.60–0.68 mbs and 0.66 mbs) and one from Stratum III (0.80–0.90 mbs). Faunal analysis of Stratum II identified possible midden material, indicating some cultural-enrichment to Stratum II. A midden table for Stratum II is provided below (Table 244). In addition to the midden content, naturally-occurring marine mollusk shell, Crustacea, and Echinoidea also were documented (7.4 g). Faunal analysis of Stratum III identified naturally-occurring marine fauna consisting of Crustacea (0.2 g), *Brachidontes crebristriatus* (0.2 g), and limpets/gastropods (0.1 g).

Table 244. Stratum II Faunal Material Collected from Test Excavation 175A

Faunal Material	Weight (g)
Conidae <i>Conus</i> sp.	3.0
Cypraeidae <i>Cypraea</i> sp.	0.3
Lucinidae <i>Ctena bella</i>	0.3
Mytilidae <i>Brachidontes crebristriatus</i>	0.5
Tellinidae <i>Tellina</i> sp.	0.1
Trochidae <i>Trochus</i> sp.	0.7
Turbinidae <i>Turbo</i> sp.	2.7
Crustacea	2.2
<b>Total</b>	<b>9.5</b>

**T-176**

One bulk sediment sample was collected from Stratum II (0.39–0.68 mbs). Faunal analysis identified *Barbatia* sp. (4.5 g).

**T-177**

Four bulk- and field-screened sediment samples were collected, two from Stratum II (0.90–1.05 mbs and 0.90–1.04 mbs) and two from Stratum III (0.97–1.53 mbs and 1.15–1.25 mbs). Faunal analysis of Stratum II identified possible midden material, indicating some cultural-enrichment to Stratum II. A midden table for Stratum II is provided below (Table 245). In addition to the midden content, naturally-occurring marine mollusk shell, Crustacea, and Echinoidea, as well as juvenile shell of the marine mollusk midden also were documented (9.4 g). Faunal analysis of Stratum III also identified a small possible midden signature consisting of similar marine mollusk families and species, including *Turbo sandwicensis* (0.7 g), *Ctena bella* (0.1 g), *Brachidontes crebristriatus* (0.1 g), *Strombus* sp. (0.1 g), and Crustacea (0.2 g).

Table 245. Stratum II Faunal Material Collected from Test Excavation 177

Faunal Material	Weight (g)
Lucinidae <i>Ctena bella</i>	0.5
Mytilidae <i>Brachidontes crebristriatus</i>	1.1
Naticidae <i>Natica</i> sp.	0.2
Neritidae <i>Nerita picea</i>	42.7
Pteriidae <i>Pinctada radiata</i>	1.2
Strombidae <i>Strombus maculatus</i>	3.8
Turbinidae <i>Turbo sandwicensis</i>	0.9
Crustacea	0.2
<b>Total</b>	<b>50.6</b>

### Summary of Faunal Assemblage from Kewalo

The faunal material collected within bulk sediment samples within Kewalo indicated a wetland environment continuing from West Kaka'ako (T-153 through T-161) through the western edge of Kewalo, including T-162 through T-166. The eastern portion of Kewalo showed a distinct marine and terrestrial material midden signature within the sand A-horizon, including T-167 through T-170A and a slight midden presence also within the sand deposits of T-172 through T-177. The marine and terrestrial midden material indicate a discrete area of cultural activity.

Seven of the 11 test excavations contained terrestrial faunal material (T-167, T-168B, T-169, T-170A, T-171, T-174, and T-174A). Test Excavation 167 contained remains from three features of SIHP #50-80-14-7429 (Features 1–3). All three features contained unidentified medium mammal remains, while SIHP #-7429 Feature 3 also contained *Sus scrofa*. The medium mammal fragments from SIHP #-7429 Features 2 and 3 were burned, while the *Sus scrofa* rib from Feature 3 was butchered with a metal saw blade, indicating historic food remnants.

Test Excavation 168B contained *Sus scrofa* and *Bos taurus* skeletal elements within Stratum II. A *Bos taurus* rib was butchered with a metal saw blade, indicating historic food remnants. These remains are part of SIHP #50-80-14-7429.

Test Excavation 169 remains collected from Stratum II included *Bos taurus*, medium mammal (possible *Ovis aries*), medium mammal (possible *Felis catus* or *Canis lupus familiaris*), and *Canis lupus familiaris*. The *Bos taurus* fragment had been butchered with a metal saw blade, indicating historic food remnants. These remains are part of SIHP #50-80-14-7429.

Test Excavation 170A remains collected from SIHP #-7429 Feature 7 consisted of *Canis lupus familiaris*, *Rattus* sp., and unidentified medium mammal. The medium mammal vertebra had been butchered with a metal saw blade, indicating historic food remnants. *Canis lupus familiaris* and *Rattus* sp. are both associated with pre-and post-Contact contexts.

Test Excavations 171, 174, and 174A all contained single elements from either *Bos taurus* or *Sus scrofa*. T-171 contained a butchered *Bos taurus* (possible) fragment from Stratum II, indicating historic food remnants. The remaining bones are not culturally modified.

## 5.11 Faunal Analysis for East Kaka'ako (Test Excavations 179 through 197)

### T-179

One bulk sediment sample was collected from Stratum II (1.05–1.15 mbs). Faunal analysis identified Crustacea (1.6 g), *Echinothrix diadema* sp./*Echinometra mathaei* sp. (0.1 g), and naturally occurring marine mollusk shell consisting of limpets and unidentified gastropods (3.6 g), *Brachidontes crebristriatus* (1.1 g), and *Nerita* sp. (0.1 g). The sample collected from Stratum II contained taxa that are consistent with a shallow marine or estuary environment.

### T-181

One bulk sediment sample was collected from Stratum Id, a fill deposit (0.80–1.00 mbs). Faunal analysis identified naturally-occurring marine mollusk shells consisting of water-worn limpets, bivalves, and micro shells. The sample collected from Stratum Id contained taxa that are consistent with a shallow marine or estuary environment.

### T-182

One bulk sediment sample was collected from Stratum II, SIHP #-6856 (1.36–1.46 mbs). Faunal analysis identified naturally-occurring marine shell fragments (2.0 g).

### T-184

Two bulk sediment samples were collected, one each from Stratum Id (0.86–1.06 mbs) and Stratum II, SIHP #-6856 (1.39–1.46 mbs). Faunal analysis of Stratum Id, a hydraulic fill deposit, identified an Aves long bone fragment (0.3 g), fresh- or brackish-water gastropods (snails) (2.9 g), *Echinothrix diadema* sp./*Echinometra mathaei* sp. (0.1 g), unidentified gastropods (5.1 g), *Theodoxus neglectus* (2.8 g), and Crustacea (0.5 g). Faunal analysis of Stratum II identified naturally-occurring marine faunal material consisting of bivalves, limpets, and unidentified gastropods (3.1 g), *Nerita picea* (0.4 g), and Crustacea (<0.1 g); and fresh- or brackish-water gastropods (snails) (not weighed). The samples collected from Strata Id and II contained taxa that are consistent with a wetland or shallow marine/estuary environment.

### T-186

Two bulk sediment samples were collected, one each from the Strata IIa/IIb interface, SIHP #-6636 (1.24–1.37 mbs) and Stratum III (1.35–1.45 mbs). Faunal analysis of the Strata IIa/IIb interface identified abundant fresh- or brackish-water gastropods (snails) (not weighed), Crustacea (0.2 g), *Echinometra mathaei* sp. (0.2 g), and naturally-occurring marine mollusk shell consisting of bivalves, limpets, and unidentified gastropods (0.8 g) and an operculum (1.1 g). Faunal analysis of Stratum III identified fresh- or brackish-water gastropods (snails) (3.7 g), Crustacea (5.2 g), *Echinometra mathaei* sp. (0.3 g), limpets, unidentified gastropods, and bivalves (36.1 g), and a shark tooth (0.2 g). The samples collected from Strata IIa/IIb and III contained taxa that are consistent with a wetland or shallow marine/estuary environment.

### T-187

One bulk sediment sample was collected from Stratum IIb, SIHP #-6636 (1.18–1.36 mbs). Faunal analysis identified fresh- or brackish-water gastropods (snails) (25.7 g), unidentified

mammal remains (<0.1 g), *Echinometra mathaei* sp. (<0.1 g), and naturally occurring marine mollusk shell consisting of *Nerita picea/Theodoxus neglectus* (1.7 g) and unidentified gastropods and bivalves (1.2 g). The sample collected from Stratum IIb contained taxa that are consistent with a wetland or shallow marine/estuary environment.

### **T-188**

Three bulk sediment samples were collected, one each from Stratum Id (1.15–1.39 mbs), Stratum IIa, SIHP #-6636 (1.40–1.45 mbs), and Stratum IIb, SIHP #-6636 (1.50–1.60 mbs). No faunal material was identified within Stratum Id. Faunal analysis of Stratum IIa identified fresh- or brackish-water gastropods (snails) (11.2 g), Crustacea (<0.1 g), and limpets and bivalves (0.3 g). Faunal analysis of Stratum IIb identified fresh- or brackish-water gastropods (snails) (183.0 g), *Echinometra mathaei* sp. (0.3 g), *Nerita picea* (0.2 g), and limpets, unidentified gastropods, and bivalves (3.4 g). The samples collected from Strata IIa and IIb contained taxa that are consistent with a wetland or shallow marine/estuary environment.

### **T-189**

Four bulk sediment samples were collected, one from Stratum Id (1.27–1.38 mbs), one from Stratum IIa, SIHP #-6636 (1.38–1.42 mbs), and two from Stratum IIb, SIHP #-6636 (1.42–1.51 mbs and 1.55–1.65 mbs). No faunal material was identified within Stratum Id. Faunal analysis of Stratum IIa identified fresh- or brackish-water gastropods (snails) (11.3 g) and gastropod, limpet and bivalve fragments (1.3 g). Faunal analysis of Stratum IIb identified fresh- or brackish-water gastropods (snails) (388.3 g), *Echinometra mathaei* sp. (0.1 g), Crustacea (<0.1 g), *Theodoxus neglectus* (1.7 g), and marine limpets, unidentified gastropods, and bivalves (22.0 g). The samples collected from Strata IIa and IIb contained taxa that are consistent with a wetland or shallow marine/estuary environment.

### **T-191**

Three bulk sediment samples were collected, two of which were wet screened and analyzed, one from Stratum IIa, SIHP #-6636 (0.87–0.95 mbs) and one from Stratum IIb, SIHP #-6636 (1.20–1.26 mbs). Faunal analysis of Stratum IIa identified fresh- or brackish-water gastropods (snails) (77.5 g) and naturally-occurring marine mollusk shell (8.6 g). Faunal analysis of Stratum IIb identified naturally-occurring marine mollusk shell (3.7 g): *Brachidontes crebristriatus* (1.4 g), limpets (1.0 g), Thaididae (0.7 g), *Nerita picea* (0.4 g), *Ctena bella* (0.1 g), and *Melampus* sp. (0.1 g). These taxa are consistent with a wetland/estuary environment. The samples collected from Strata IIa and IIb contained taxa that are consistent with a wetland or shallow marine/estuary environment.

### **T-192**

One bulk sediment sample was collected from Stratum II, SIHP #-6636 (1.75–1.83 mbs). Faunal analysis identified fresh- or brackish-water gastropods (snails) (17.8 g), Crustacea (<0.1 g), *Hipponix* sp. (<0.1 g), and limpets (<0.1 g). The sample collected from Stratum II contained taxa that are consistent with a wetland or shallow marine/estuary environment.

**T-193**

Two bulk sediment samples were collected, one each from Stratum IIa, SIHP #-6636 (1.53–1.56 mbs) and Stratum IIb, SIHP #-6636 (2.20–2.25 mbs). Faunal analysis of Stratum IIa identified abundant fresh- or brackish-water gastropods (snails) (142.1 g), *Echinometra mathaei* sp. (<0.1 g), and limpets, gastropods, and bivalve fragments (1.2 g). Faunal analysis of Stratum IIb identified a single terrestrial snail (0.9 g), fresh- or brackish-water gastropods (snails) (1.4 g), Crustacea (2.0 g), and marine mollusk shell consisting of Fascioliidae (4.5 g), *Brachidontes crebristriatus* (3.5 g), Turbinidae/Trochidae (2.4 g), *Natica* sp. (1.8 g), limpets (1.4 g), and Tellinidae (0.2 g). The samples collected from Strata IIa and IIb contained taxa that are consistent with a wetland or shallow marine/estuary environment.

**T-195**

One bulk sediment sample was collected from Stratum II, SIHP #-6636 (1.37–1.46 mbs). Faunal analysis identified fresh- or brackish-water gastropods (snails) (26.9 g), Osteichthyes (fish) (<0.1 g), Crustacea (<0.1 g), *Echinometra mathaei* sp. (<0.1 g), and limpets and unidentified gastropods (0.8 g). The sample collected from Stratum II contained taxa that are consistent with a wetland or shallow marine/estuary environment.

**T-196**

Two bulk sediment samples were collected from Stratum II, SIHP #-6636 (1.50–1.55 mbs and 1.56–1.70 mbs). Faunal analysis identified abundant fresh- or brackish-water gastropods (snails) (219.5 g), Crustacea (0.1 g), and naturally-occurring marine mollusk shell (13.0 g): *Theodoxus neglectus* (0.4 g), *Tellina palatam* (0.4 g), Fascioliidae (0.1 g), *Brachidontes crebristriatus* (0.1 g), and limpets, gastropods, and bivalve fragments (12.0 g). The samples collected from Stratum II contained taxa that are consistent with a wetland or shallow marine/estuary environment.

**Summary of Faunal Assemblage from the East Kaka‘ako Zone**

The taxa identified within the East Kaka‘ako Zone consisted mainly of naturally-occurring marine faunal material indicative of a natural wetland or shallow marine/estuary environment. A majority of the samples of natural deposits also contained fresh- or brackish-water snails indicative of natural or agricultural wetlands and/or fishponds (T-184, T-186 to T-188, T-191 to T-193, T-195, and T-196). Only one instance of mammal osseous remains (T-187) and one instance of Aves remains (T-184) were documented.

**5.12 Faunal Analysis for Kālia (Test Excavations 198-225)****T-198**

Two bulk samples were collected, one each from Stratum II, SIHP #-6636 (1.40–1.48 mbs) and Stratum III, SIHP #-6636 (1.85–1.90 mbs). Faunal analysis of Stratum II identified Aves (0.3 g), *Echinothrix diadema* sp. (0.1 g), *Cypraea* sp. (2.1 g), *Hipponix* sp. (0.4 g), and other naturally-occurring miscellaneous marine shells (2.6 g). Faunal analysis of Stratum III identified fresh- or brackish-water gastropods (snails) (102.8 g), Crustacea and Echinoidea (0.5 g), and limpets, bivalves, and unidentified gastropod fragments (10.7 g). The samples collected from Strata II and III contained taxa that are consistent with a wetland or shallow marine/estuary environment.

**T-199**

One bulk sediment sample was collected from Stratum II, SIHP #-6636 (1.5–1.6 mbs). Faunal analysis identified fresh- or brackish-water gastropods (snails; 168.5 g), naturally-occurring marine bivalves and limpets (1.4 g), Osteichthyes (fish; 0.1 g), and unidentified medium mammal remains (0.1 g). The sample collected from Stratum II contained taxa that are consistent with a wetland or shallow marine/estuary environment.

**T-200**

Three bulk sediment samples were collected, one each from Stratum IIa, SIHP #-6636 (1.45–1.55 mbs), the interface of Strata IIa/IIb, SIHP #-6636 (1.55–1.65 mbs), and Stratum IIb, SIHP #-6636 (1.65–1.73 mbs). Faunal analysis of Stratum IIa identified fresh- or brackish-water gastropods (snails) (500.0 g), bivalve fragments (0.4 g), Neritidae (0.4 g), and Crustacea (<0.1 g). Faunal analysis of the Strata IIa/IIb interface identified fresh- or brackish-water gastropods (snails) (>500.0 g), Osteichthyes (fish) (0.1 g), and naturally occurring marine shell consisting of bivalves, limpets, gastropods, and Crustacea (3.0 g). Faunal analysis of Stratum IIb identified fresh- or brackish-water gastropods (snails) (14.1 g), Crustacea (6.8 g), Echinoidea (0.9 g), Osteichthyes (fish) (0.1 g), and marine mollusk shell consisting of limpets and gastropods (19.3 g), Melampidae (4.2 g), *Brachidontes crebristriatus* (2.4 g), and Naticidae (1.1 g). The samples collected from Strata IIa and IIb contained taxa that are consistent with a wetland or shallow marine/estuary environment.

Faunal remains from a juvenile *Sus scrofa* were collected individually during excavations from Stratum IIb (1.55 mbs). The remains show no evidence of cultural modification.

**T-202**

Two bulk sediment samples were collected, one each from Stratum II, SIHP #-6636 (1.20–1.70 mbs) and SIHP #-7430 Feature 1 (1.36–1.50 mbs). Faunal analysis of Stratum II identified a small amount of naturally-occurring marine shell consisting of gastropods, limpets, and Crustacea (6.2 g). Faunal analysis of SIHP #-7430 Feature 1, a historic privy, identified *Canis lupus familiaris* (0.2 g), Osteichthyes (fish) (0.1 g), and marine shell consisting of Melampidae (2.9 g) and Echinoidea, Crustacea, limpets, and gastropods (8.5 g). The sample collected from Stratum II contained taxa that are consistent with a wetland or shallow marine/estuary environment. The sample collected from SIHP #-7430 Feature 1 contained taxa indicating the privy fill material originated from a wetland or shallow marine/estuary environment.

**T-202A**

The remains of *Bos taurus* (vertebra), an unidentified medium mammal (diaphysis section), and Osteichthyes (large vertebra) were individually collected during excavation of Stratum Ie, a fill deposit (1.20–1.50 mbs). Both the *Bos taurus* and medium mammal remains show evidence of butchering marks from a metal saw blade.

**T-205**

One bulk sediment sample was collected from Stratum II, SIHP #-6636 (1.50–1.55 mbs). Faunal analysis identified abundant fresh- or brackish-water gastropod (snails) (~90% of the wet screened sample), Osteichthyes (fish) (2.3 g), Crustacea (0.2 g), and limpets, gastropods, and

bivalves (2.5 g). The sample collected from Stratum II contained taxa that are consistent with a wetland or shallow marine/estuary environment.

#### **T-207**

Two bulk sediment samples were collected, one each from Stratum IIa, SIHP #-6636 (0.85–1.07 mbs) and Stratum IIb, SIHP #-6636 (1.35–1.45 mbs). Both sediment samples were wet screened. Faunal analysis of Stratum IIa identified fresh and/or brackish water gastropods (snails) (3.2 g), Crustacea (0.9), *Echinometra mathaei* sp. (0.1 g), and naturally-occurring marine mollusk shell consisting of limpets (0.7 g), Melampidae (0.1 g), and various unidentified waterworn shells (2.6 g). Faunal analysis of Stratum IIb identified fresh and/or brackish water gastropods (snails) (33.4 g), Crustacea (0.4 g), Melampidae (0.4 g), Mytilidae (0.1 g), and limpets and gastropods (0.9 g). The samples collected from Strata IIa and IIb contained taxa that are consistent with a wetland or shallow marine/estuary environment.

#### **T-208**

Two bulk sediment samples were collected, one each from Stratum IIa, SIHP #-6636 (1.40–1.48 mbs) and Stratum IIb, SIHP #-6636 (1.52–1.58 mbs). Faunal analysis of Stratum IIa identified fresh- or brackish-water gastropods (snails) (5.1 g). Faunal analysis of Stratum IIb identified fresh- or brackish-water gastropods (snails) (~5% of wet screened sample), Crustacea (0.2 g), *Echinometra mathaei* sp. (<0.1 g), and limpets, gastropods, and bivalve fragments (2.8 g). The samples collected from Strata IIa and IIb contained taxa that are consistent with a wetland or shallow marine/estuary environment.

#### **T-212**

Three bulk sediment samples were collected, one from Stratum IIa, SIHP #-6636 (1.05–1.30 mbs) and two from Stratum IIb, SIHP #-6636 (1.60–1.70 mbs and 1.65–1.80 mbs). No faunal material was identified within Stratum IIa. Faunal analysis of Stratum IIb identified naturally-occurring limpets, gastropods, and Crustacea (11.2 g) and Melampidae (1.8 g). The samples collected from Stratum IIb contained taxa that are consistent with a wetland or shallow marine/estuary environment.

#### **T-219**

Two bulk sediment samples were collected, one each from Stratum IIa, SIHP #-6636 (1.28–1.32 mbs) and Stratum IIb, SIHP #-6636 (1.47–1.55 mbs). Faunal analysis of Stratum IIa identified fresh- or brackish-water gastropods (snails) (47.7 g), Crustacea (<0.1 g), and limpet and bivalve fragments (0.4 g). Faunal analysis of Stratum IIb identified fresh- or brackish-water gastropods (snails) (150.8 g), Crustacea (<0.1 g), and limpets, gastropods, and bivalve fragments (4.5 g). The samples collected from Strata IIa and IIb contained taxa that are consistent with a wetland or shallow marine/estuary environment.

#### **T-221**

One bulk sediment sample was collected from Stratum II, SIHP #-6636 (1.20–1.50 mbs). Faunal analysis identified fresh- or brackish-water gastropods (snails) (0.6 g), Osteichthyes (fish) (0.2 g), and naturally-occurring marine mollusk shells (2.5 g). The sample collected from Stratum II contained taxa that are consistent with a wetland or shallow marine/estuary environment.

## Summary of Faunal Assemblage from the Kālia Zone

The taxa identified within the Kālia Zone consisted mainly of naturally-occurring marine faunal material indicative of a natural wetland or shallow marine/estuary environment. A majority of the test excavations with sampled natural deposits also contained fresh- or brackish-water snails indicative of natural or agricultural wetlands and/or fishponds (T-198 to T-200, T-205, T-207, T-208, T-219, and T-221). There was little variety in the type of marine faunal material documented. One test excavation (T-219) contained historically-introduced snail species that are consistent with mid- to late-nineteenth century (or later) rice cultivation (see Section 6).

Terrestrial faunal remains were identified in only two test excavations. An unmodified *Sus scrofa* phalanx was identified within natural sediment within T-200. *Bos taurus* and medium mammal elements were identified within a fill deposit within T-202A. Both show evidence of butchering marks from a metal saw blade.

## 5.13 Faunal Analysis for Kaka‘ako Makai (Test Excavations 226-232A)

### SIHP #50-80-14-2918 (Test Excavations 226A, 226B, 226C, 226D, 227, and 227A)

Test excavations comprising SIHP #50-80-14-2918 contained 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 1–27). The midden within this stratum and associated features is tabulated for each individual trench (Table 246, Table 248, Table 251, Table 253, and Table 255). The marine mollusk faunal material identified as naturally-occurring 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 summary.

#### T-226A

A midden table of marine and terrestrial faunal material identified within bulk- and field-screened sediment samples from Test Excavation 226A, cultural resource SIHP #-2918, is provided in Table 246 below. The invertebrate species most represented within the midden signature consisted of *Conus* sp., *Brachidontes crebristriatus*, *Nerita picea*, *Strombus* sp., Tellinidae, and *Trochus* sp. In addition, a wide variety of other invertebrate species was represented in lesser amounts. 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 small and medium mammal, pig, dog, fish, and shark. In addition to the bulk- and field-screened sample analysis presented in Table 246, marine midden was individually hand collected from Stratum II (SIHP #-2918), which consisted of *Conus* sp. (18.8 g), *Natica gualteriana* (2.0 g), *Strombus* sp. (1.2 g), *Nerita picea* (0.8 g), Tellinidae (0.6 g), *Brachidontes crebristriatus* (1.1 g), *Cypraea caputserpentis* (9.3 g), *Tellina palatam* (5.2 g), *Turbo* sp. operculum (2.0 g), *Nassarius hirtus* (1.6 g), *Echinothrix diadema* sp. (0.1 g), and *Heterocentrotus mammillatus* (5.1 g).

Faunal analysis was also conducted of hand collected faunal material from Stratum Ic (0.58 mbs) and the Strata Ic/II interface (0.49–0.58 mbs) as well as bulk samples from Stratum Ic (0.35–0.82 mbs), Stratum III (1.1–1.4 mbs), and Stratum IV (1.3–1.47 mbs). Faunal analysis of

Stratum Ic (hand collected and bulk samples) identified naturally-occurring marine shell (8.2 g) and possible marine mollusk midden consisting of *Tellina palatam* (8.2 g), *Conus* sp. (4.0 g), and *Gouldia cookei* (0.6 g). Stratum Ic was identified as a fill deposit, therefore the possible midden material had been previously removed from its cultural context. The interface of Strata Ic/II similarly expressed a small possible marine mollusk midden signature consisting of *Conus* sp. (3.2 g) and *Nerita picea* (1.2 g) as well as medium mammal (0.3 g). Faunal analysis of Stratum III, natural Jaucas sand, also identified a small midden signature consisting of *Brachidontes crebristriatus* (1.3 g), Cymatiidae (0.9 g), *Strombus* sp. (0.1 g), *Tellina* sp. (0.1 g), *Trochus* sp. (0.1 g), and *Echinothrix diadema* sp./*Echinometra mathaei* sp. (0.2 g). Faunal analysis of Stratum IV identified naturally-occurring marine mollusk shell consistent with a shallow marine deposit, consisting of *Brachidontes crebristriatus* (10.2 g), limpets and gastropods (3.3 g), *Tellina* spp. (1.2 g), *Natica* sp. (0.8 g), Crustacea (0.1 g), and Echinoidea (0.1 g).

Terrestrial faunal remains were collected individually during excavation from the interface of Strata Ib/Ic (0.40–0.64 mbs), the interface of Strata Ic/II (0.70 mbs), SIHP #-2918 Feature 3 (0.97–1.00 mbs), Stratum III (0.75–1.27 mbs), and Stratum IV (1.15–1.36 mbs). Faunal remains from the interface of Strata Ib/Ic consisted of an unmodified *Canis lupus familiaris* distal metacarpus fragment and *Bos taurus* rib and long bone fragments. The *Bos taurus* rib fragments show evidence of butchering with a metal saw blade, indicating historic food remnants. In addition to the mammalian remains collected, Osteichthyes (fish) fragments were collected from the Strata Ib/Ic interface (see Appendix A.2).

Terrestrial faunal remains from the interface of Strata Ic/II consisted of unmodified *Bos taurus*, *Sus scrofa*, and small and medium mammal skeletal elements. The presence of *Bos taurus* indicates a post-Contact origin.

Terrestrial faunal remains from SIHP #-2918 Feature 3 consisted of diaphysis sections from a *Rattus* sp. and an unidentified medium mammal. No cultural modifications were observed.

Terrestrial faunal remains from Stratum III consisted of a collection of *Sus scrofa* skeletal elements, none of which show evidence of cultural modification. *Sus scrofa* is a Polynesian introduction common in both pre- and post-Contact contexts. Finally, a single unmodified medium mammal diaphysis fragment was collected from Stratum IV (Table 247).

Table 246. Invertebrate and Vertebrate Midden Identified Within Bulk Sediment Samples from Test Excavation 226A, SIHP #-2918

Test Excavation	226A	226A	226A	226A	Weight (g)	Total %
Stratum	II	II	II	II		
Feature	-	1	2	3		
<b>Invertebrate Midden</b>						
Conidae <i>Conus</i> sp.	4.2		0.7	6.9	<b>11.8</b>	<b>5.4%</b>
Cymatiidae		0.1		1.6	<b>1.7</b>	<b>0.8%</b>
Cymatiidae <i>Cymatium</i> sp.	0.4		3.2	1.9	<b>5.5</b>	<b>2.5%</b>
Cypraeidae	0.2				<b>0.2</b>	<b>0.1%</b>
Cypraeidae <i>Cypraea caputserpentis</i>	1.6	0.7		1	<b>3.3</b>	<b>1.5%</b>
Gastropod				1.7	<b>1.7</b>	<b>0.8%</b>

Test Excavation	226A	226A	226A	226A	Weight (g)	Total %
Stratum	II	II	II	II		
Feature	-	1	2	3		
Gastropod (burned)	1.4				1.4	0.6%
Isognomidae <i>Isognomon</i> sp.	1	0.6		0.2	1.8	0.8%
Mytilidae <i>Brachidontes crebristriatus</i>	27.5	3.7	2.6	25.1	58.8	26.8%
Nassariidae	0.5				0.5	0.2%
Nassariidae <i>Nassarius hirtus</i>	1.4		1.4		2.8	1.3%
Naticidae <i>Natica</i> sp.			0.3		0.3	0.1%
Naticidae <i>Natica gualteriana</i>				1.2	1.2	0.5%
Neritidae <i>Nerita picea</i>	30.1	7.5	2.4	7.4	47.4	21.6%
Neritidae <i>Nerita polita</i>	0.4				0.4	0.2%
Pteriidae <i>Pinctada radiata</i>	0.1				0.1	0.0%
Pyramidellidae <i>Pyramidella dolabrata</i>	0.8				0.8	0.4%
Strombidae <i>Strombus</i> sp.	4.4	4.6		3.1	12.1	5.5%
Strombidae <i>Strombus</i> sp. (burned)	0.3				0.3	0.1%
Tellinidae <i>Tellina palatam</i>	5.0	1.6	0.5		7.1	3.2%
Tellinidae <i>Tellina</i> sp.				4.0	4.0	1.8%
Tellinidae <i>Tellina</i> spp.	7.9		0.1	2.5	10.5	4.8%
Tonnidae <i>Tonna dolium</i>				0.2	0.2	0.1%
Trochidae <i>Trochus</i> sp.	3.6	0.3	3.9	1.8	9.6	4.4%
Trochidae <i>Trochus</i> spp.	0.8				0.8	0.4%
Turbinidae <i>Turbo</i> sp.				1.7	1.7	0.8%
Turbinidae <i>Turbo</i> sp. operculum	0.3				0.3	0.1 %
Turbinidae <i>Turbo sandwicensis</i>	1.1	0.7	0.6		2.4	1.1%
Burned shell	10.6	4	1.1	5.3	21	9.6%
Crustacea	1.5	0.3	0.1		1.9	0.9%
Crustacea (burned)	1.2			0.1	1.3	0.6%
Echinoidea <i>mathaei</i> sp.				0.1	0.1	0.0%
Echinoidea <i>mathaei</i> sp./ <i>diadema</i> sp.	2.0	0.8	0.3	1.9	5	2.3%
Echinoidea <i>mathaei</i> sp./ <i>diadema</i> sp., <i>Heterocentrotus mammillatus</i>	1.7				1.7	0.8%
<b>Total Invertebrate Midden</b>	<b>110.0</b>	<b>24.9</b>	<b>17.2</b>	<b>67.7</b>	<b>219.8</b>	<b>100%</b>
<b>Vertebrate Midden</b>						
Medium mammal	1.7	1.3	0.8	1.1	4.9	55.1%
Medium mammal (burned)				0.3	0.3	3.4%
Small mammal	0.2				0.2	2.2%
<i>Sus scrofa</i> (pig)	0.6		0.1		0.7	7.9%
<i>Canis lupus familiaris</i> (dog)	0.3				0.3	3.4%
Osteichthyes (fish)	1.9	0.1	0.2	0.2	2.4	27.0%
Chondrichthyes (shark tooth)	0.1				0.1	0.1%
<b>Total Vertebrate Midden</b>	<b>4.8</b>	<b>1.4</b>	<b>1.1</b>	<b>1.6</b>	<b>8.9</b>	<b>100%</b>

Table 247. Terrestrial Faunal Material Collected Individually from Test Excavation 226A

Acc. #	Stratum	Depth (mbs)	Feature	Family/ Class	Species	Element	Description	Modification
226A-F-1	Ib/Ic interface	0.40-0.64	-	Bovidae	<i>Bos taurus</i> (cow)	Ribs; Diaphysis section	Fragments	Ribs butchered (with metal saw blade)
226A-F-2	Ib/Ic interface	0.40-0.64	-	Canidae	<i>Canis lupus familiaris</i> (dog)	Metacarpus (distal portion)	Fragments	None
226A-F-3	Ic/II interface	0.70	-	Bovidae	<i>Bos taurus</i> (cow)	Rib (pieces mend)	Fragments	None
226A-F-4	Ic/II interface	0.70	-	Suidae	<i>Sus scrofa</i> (pig)	Femur (proximal portion) (Juvenile); Incisor tooth; Vertebra (spinous process)	Fragments	None
226A-F-5	Ic/II interface	0.70	-	Mammalia	Medium mammal	Diaphysis section; Cranial; Irregular bone	Fragments	None
226A-F-6	Ic/II interface	0.70	-	Mammalia	Small mammal	Femur diaphysis section (distal portion)	Fragment	None
226A-F-7	-	0.97-1.00	SIHP #-2918, Fe. 3	Mammalia	Medium mammal	Diaphysis sections	Fragments	None
226A-F-8	-	0.97-1.00	SIHP #-2918, Fe. 3	Muridae	<i>Rattus</i> sp. (rat)	Diaphysis section	Fragment	None
226A-F-9	III	0.75-1.27	-	Suidae	<i>Sus scrofa</i> (pig)	Scapula; vertebra (body section); ulna (distal shaft portion); and tubercle fragment	Fragment	None

Acc. #	Stratum	Depth (mbs)	Feature	Family/ Class	Species	Element	Description	Modification
226A-F-10	IV	1.15-1.36	-	Mammalia	Medium mammal	Diaphysis section	Fragment	None

### T-226B

A midden table of marine and terrestrial faunal material identified within bulk- and field-screened sediment samples from Test Excavation 226B, cultural resource SIHP #-2918, is provided in Table 248 below. The invertebrate species most represented within the midden signature consisted of *Conus* sp., *Brachidontes crebristriatus*, *Nerita picea*, and *Turbo sandwicensis*. In addition, a wide variety of other invertebrate species was represented in lesser amounts. 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 small and medium mammal, dog, rat, fish, and shark. However, hand-collected terrestrial faunal remains within SIHP #-2918 also include historically-introduced species (see below).

Terrestrial faunal remains were collected individually during excavation from Stratum II, SIHP #-2918 (0.53–0.76 mbs). Faunal remains consisted of *Bos taurus* and *Sus scrofa* skeletal elements. The *Bos taurus* (long bone) fragments show evidence of butchering with a metal saw blade, indicating historic food remnants.

Terrestrial faunal remains also were collected individually from SIHP #-2918 Feature 11 (0.90 mbs). Faunal remains consisted of an articulated *Canis lupus familiaris* (small dog). *Canis lupus familiaris* is a Polynesian introduction common in both pre- and post-Contact contexts (Table 249).

Table 248. Invertebrate and Vertebrate Midden Identified Within Bulk Sediment Samples from Test Excavation 226B, SIHP #-2918

Test Excavation	226B	Weight (g)	Total %									
Stratum	II											
Feature	-	4	5	6	7	8	9	10	11			
<b>Invertebrate Midden</b>												
Conidae <i>Conus</i> sp.	75.8					0.2			13.2	<b>89.2</b>	<b>27.9%</b>	
Cymatiidae	0.9									<b>0.9</b>	<b>0.3%</b>	
Cymatiidae <i>Cymatium muricinum</i>	9.6									<b>9.6</b>	<b>3.0%</b>	
Cymatiidae <i>Cymatium gutturnium</i>				1.5						<b>1.5</b>	<b>0.5%</b>	
Cymatiidae <i>Cymatium</i> sp.						0.9				<b>0.9</b>	<b>0.3%</b>	
Cypraeidae <i>Cypraea caputserpentis</i>	5.9									<b>5.9</b>	<b>1.8%</b>	
Cypraeidae <i>Cypraea cernica</i>	1.7									<b>1.7</b>	<b>0.5%</b>	
Gastropod		0.1								<b>0.1</b>	<b>0.0%</b>	
Isognomidae <i>Isognomon</i> sp.	5.5	0.1							0.3	<b>5.9</b>	<b>1.8%</b>	
Mytilidae <i>Brachidontes crebristriatus</i>	8.1	11.8	5.1	15.3	4.4	20.2	1.8	2.5	10.6	<b>79.8</b>	<b>25.0%</b>	
Naticidae <i>Natica gualteriana</i>							1.7			<b>1.7</b>	<b>0.5%</b>	
Naticidae <i>Natica</i> sp.	0.7			1.3		1.1				<b>3.1</b>	<b>1.0%</b>	
Neritidae <i>Nerita picea</i>	10.9	1	1.7	3.8	0.9	2.2	0.9	0.7	4.1	<b>26.2</b>	<b>8.2%</b>	
Neritidae <i>Nerita polita</i>	0.2									<b>0.2</b>	<b>0.1%</b>	
Neritidae <i>Theodoxus neglectus</i>				3.9					0.6	<b>4.5</b>	<b>1.4%</b>	
Strombidae		0.1								<b>0.1</b>	<b>0.0%</b>	
Strombidae <i>Strombus mutabilis ostergaardi</i>	5.2									<b>5.2</b>	<b>1.6%</b>	
Strombidae <i>Strombus</i> sp.	3			0.3	1.9				0.7	<b>5.9</b>	<b>1.8%</b>	
Tellinidae	0.3	0.2							0.1	<b>0.6</b>	<b>0.2%</b>	
Tellinidae <i>Tellina palatam</i>	2.3	1	0.2			7.4	2.3	0.7	5.1	<b>19</b>	<b>5.9%</b>	
Tellinidae <i>Tellina</i> spp.	2.1				1.7					<b>3.8</b>	<b>1.2%</b>	
Trochidae									0.2	<b>0.2</b>	<b>0.1%</b>	
Trochidae <i>Trochus intextus</i>				6.6						<b>6.6</b>	<b>2.1%</b>	

Test Excavation	226B	226B	226B	226B	226B	226B	226B	226B	226B	226B	Weight (g)	Total %
Stratum	II	II	II	II	II	II	II	II	II			
Feature	-	4	5	6	7	8	9	10	11			
Trochidae <i>Trochus</i> sp.	0.5				0.2	0.9	1.4	0.1	0.4	<b>3.5</b>	<b>1.1%</b>	
Trochidae <i>Trochus</i> sp. (burned)			0.9							<b>0.9</b>	<b>0.3%</b>	
Turbinidae <i>Turbo sandwicensis</i>	14.7	2.2		3.5					0.2	<b>20.6</b>	<b>6.4%</b>	
Burned shell	2.9					1.4		0.5	4.6	<b>9.4</b>	<b>2.9%</b>	
Crustacea	0.5			0.1		1			0.1	<b>1.7</b>	<b>0.5%</b>	
Crustacea (burned)			0.1		0.4			0.1		<b>0.6</b>	<b>0.2%</b>	
Echinoidea									0.1	<b>0.1</b>	<b>0.0%</b>	
Echinoidea <i>diadema</i> sp./ <i>Heterocentrotus mammillatus</i>	1.1									<b>1.1</b>	<b>0.3%</b>	
Echinoidea <i>mathaei</i> sp.									1	<b>1</b>	<b>0.3%</b>	
Echinoidea <i>mathaei</i> sp./ <i>diadema</i> sp.	1.7	0.5	0.6	1.8	0.9	2.2	0.2	0.1		<b>8</b>	<b>2.5%</b>	
<b>Total Invertebrate Midden</b>	<b>153.6</b>	<b>17.0</b>	<b>8.6</b>	<b>38.1</b>	<b>10.4</b>	<b>37.5</b>	<b>8.3</b>	<b>4.7</b>	<b>41.3</b>	<b>319.5</b>	<b>100.0%</b>	
<b>Vertebrate Midden</b>												
Medium mammal	0.8							0.1		<b>0.9</b>	<b>25.0%</b>	
Small/medium mammal						0.5				<b>0.5</b>	<b>13.9%</b>	
Small mammal	0.3		0.1							<b>0.4</b>	<b>11.1%</b>	
<i>Canis lupus familiaris</i> (dog)				0.3						<b>0.3</b>	<b>8.3%</b>	
<i>Rattus</i> sp. (rat)		0.1						0.1		<b>0.2</b>	<b>5.6%</b>	
Osteichthyes (fish)	0.5	0.1				0.4			0.2	<b>1.2</b>	<b>33.3%</b>	
Chondrichthyes (shark tooth)		0.1								<b>0.1</b>	<b>2.8%</b>	
<b>Total Vertebrate Midden</b>	<b>1.6</b>	<b>0.3</b>	<b>0.1</b>	<b>0.3</b>	<b>0</b>	<b>0.9</b>	<b>0</b>	<b>0.2</b>	<b>0.2</b>	<b>3.6</b>	<b>100.0%</b>	

Table 249. Terrestrial Faunal Material Collected Individually from Test Excavation 226B

Acc. #	Stratum	Depth (mbs)	Feature	Family/ Class	Species	Element	Description	Modification
226B -F-1	II, SIHP #2918	0.53-0.76	-	Bovidae	<i>Bos taurus</i> (cow)	Diaphysis section (possible humerus); Diaphysis section	Fragments	Butchered (cut with metal saw blade)
226B -F-2	II, SIHP #2918	0.53-0.76	-	Suidae	<i>Sus scrofa</i> (pig)	Cranial; Mandible; Vertebra; Ribs; Molar; Premolar (pieces mend); Canine	Fragments	None
226B -F-3	-	0.90	SIHP #-2918, Fe. 11	Canidae	<i>Canis lupus familiaris</i> (dog)	Complete articulated skeleton	Small dog	None

### T-226C

Test Excavation 226C contained very little faunal midden material within SIHP #-2918. A bulk sample from SIHP #-2918 Feature 29 identified Crustacea (1.3 g), burned medium mammal (0.1 g), and a small amount of waterworn shells and gastropods, while a bulk sample from SIHP #-2918 Feature 12 identified Osteichthyes (fish) (0.1 g) and naturally-occurring marine shell (0.5 g). An additional bulk sediment sample was collected from Stratum Id. The faunal material identified within Stratum Id consisted of water-worn gastropods, Crustacean, Echinoidea (6.9 g total), and Osteichthyes (fish) (0.1 g).

Terrestrial faunal remains were collected individually during excavation from Stratum Id (0.72–0.97 mbs). The remains consisted of *Bos taurus*, *Canis lupus familiaris*, *Gallus gallus*, and *Sus scrofa* skeletal elements. The *Bos taurus* elements show evidence of butchering with a metal saw blade, indicating historic food remnants (Table 250).

Table 250. Terrestrial Faunal Material Collected Individually from Test Excavation 226C

Acc. #	Stratum	Depth (mbs)	Feature	Family/ Class	Species	Element	Description	Modification
226C -F-1	Id	0.72-0.97	-	Bovidae	<i>Bos taurus</i> (cow)	Scapula; Scapula; Rib; Humerus; Tibia; Vertebra	Fragments	Butchered (cut with metal saw blade)
226C -F-2	Id	0.72-0.97	-	Canidae	<i>Canis lupus familiaris</i> (dog)	Left 1st molar (root apex open) (Juvenile); Right humerus (proximal portion) fragment (Juvenile); Right radius (proximal portion) (Juvenile); Left ulna styloid process; Left innominate fragment; Ala/acetabulum fragment; Right innominate; Left femur (proximal portion); Left tibia epiphysis	Fragments	None
226C -F-3	Id	0.72-0.97	-	Suidae	<i>Sus scrofa</i> (pig)	large tusk	Fragment	None
226C -F-4	Id	0.72-0.97	-	Aves	<i>Gallus gallus</i> (chicken)	Left innominate; Cranial (possible); tarsometatarsus (possible)	Fragments	None

**T-226D**

A table of marine and terrestrial faunal material identified within bulk sediment samples from Test Excavation 226D, cultural resource SIHP #-2918, is provided in Table 251 below. Very few invertebrate species were identified within the bulk samples, consisting of *Brachidontes*

*crebristriatus*, Crustacea, and *Echinothrix diadema* sp./*Echinometra mathaei* sp. The invertebrate species identified within the possible 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 pig and fish.

In addition to the midden analysis tabulated within Table 251, faunal analysis was conducted of a bulk sediment sample collected from Stratum III (1.2 mbs). Faunal analysis of Stratum III identified naturally-occurring marine mollusk shell consistent with a marine deposit, including *Brachidontes crebristriatus* (1.1 g), Tellinidae (0.7 g), *Natica* sp. (juvenile) (0.3 g), *Hipponix* sp. (0.1 g), gastropods (1.3 g), Crustacea (0.2 g), and *Echinometra mathaei* (0.2 g).

Terrestrial faunal remains were collected individually during excavation from Stratum Ib (0.35–0.68 mbs), Stratum Ic (0.80–1.10 mbs), Stratum Id (1.12 mbs), and SIHP #-2918 Feature 28 (0.65 mbs) (Table 252). The remains from Stratum Ib consisted of *Bos taurus* and *Sus scrofa* skeletal elements. The *Bos taurus* (vertebra) show evidence of butchering with a metal saw blade, indicating historic food remnants. In addition to the mammalian remains, Osteichthyes (fish) fragments also were collected from this stratum (see Appendix A.2).

The remains from Stratum Ic consisted of *Bos taurus*, *Sus scrofa*, and *Gallus gallus* skeletal elements. The *Bos taurus* (ribs and long bone) and *Sus scrofa* (long bone) fragments show evidence of butchering with a metal saw blade, indicating historic food remnants. In addition to the mammalian remains, Osteichthyes (fish) fragments also were collected from this stratum (see Appendix A.2). The remains from Stratum Id consisted of *Bos taurus* skeletal elements, including a rib butchered with a metal saw blade, indicating historic food remnants.

The remains from SIHP #-2918 Feature 28 consisted of a single unmodified *Bos taurus* vertebra.

Table 251. Invertebrate and Vertebrate Midden Identified Within Bulk Sediment Samples from Test Excavation 226D, SIHP #-2918

Test Excavation	226D	Weight (g)	Total %
Stratum	II		
Feature	-		
<b>Invertebrate Midden</b>			
Mytilidae <i>Brachidontes crebristriatus</i>	2.7	2.7	42.2%
Crustacea	1.8	1.8	28.1%
<i>Echinothrix diadema</i> sp./ <i>Echinometra mathaei</i> sp.	1.9	1.9	29.7%
<b>Total Invertebrate Midden</b>	<b>6.4</b>	<b>6.4</b>	<b>100.0%</b>
<b>Vertebrate Midden</b>			
<i>Sus scrofa</i> (pig)	8.1	8.1	84.4%
Osteichthyes (fish)	1.5	1.5	15.6%
<b>Total Vertebrate Midden</b>	<b>9.6</b>	<b>9.6</b>	<b>100.0%</b>

Table 252. Terrestrial Faunal Material Collected Individually from Test Excavation 226D

Acc. #	Stratum	Depth (mbs)	Feature	Family/ Class	Species	Element	Description	Modification
226D-F-1	Ib	0.35-0.68	-	Bovidae	<i>Bos taurus</i> (cow)	Vertebra; Ribs	Fragments	Vertebra butchered (cut with metal saw blade)
226D-F-2	Ib	0.35-0.68	-	Suidae	<i>Sus scrofa</i> (pig)	Diaphysis section; Left ulna (proximal portion); Right tibiotarsus; Right lunate	Fragments	None
226D-F-3	-	0.65	SIHP #-2918, Fe. 28	Bovidae	<i>Bos taurus</i> (cow)	Vertebra	Complete	None
226D-F-4	Ic	0.80-1.10	-	Bovidae	<i>Bos taurus</i> (cow)	Ribs; Lumbar vertebra; Tibia; Diaphysis section	Fragments	Ribs; Tibia; Diaphysis section (very burned) Butchered (cut with metal saw blade)
226D-F-5	Ic	0.80-1.10	-	Suidae	<i>Sus scrofa</i> (pig)	Canine; Diaphysis section; Carpal (unidentified)	Fragments	Diaphysis section butchered (cut with metal saw blade)
226D-F-6	Ic	0.80-1.10	-	Aves	<i>Gallus gallus</i> (possible chicken)	Thoracic vertebra	Fragment	None
226D-F-7	Id	1.12	-	Bovidae	<i>Bos taurus</i> (cow)	Rib; Diaphysis section	Fragments	Rib butchered (cut with metal saw blade)

**T-227**

A midden table of marine and terrestrial faunal material identified within bulk sediment samples within Test Excavation 227, cultural resource SIHP #-2918, is provided in Table 253 below. The invertebrate species most represented within the midden signature include: *Brachidontes crebristriatus*, *Tellina palatam*, and *Turbo sandwicensis*. 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. However, hand-collected terrestrial faunal remains within SIHP #-2918 also included historically-introduced species (see below).

Terrestrial faunal remains were collected individually during excavation from Stratum II (0.49–1.12 mbs), SIHP #-2918 Feature 14 (0.90–1.07 mbs), SIHP #-2918 Feature 16 (1.00–1.07 mbs), and SIHP #-2918 Feature 17 (1.05–1.16 mbs). Faunal remains from Stratum II consisted of *Bos taurus* and *Sus scrofa* skeletal elements, the majority of which show evidence of butchering with a metal saw blade, indicating historic food remnants. SIHP #-2918 Feature 14 contained a single *Bos taurus* rib that had been butchered with a metal saw blade, indicating historic food remnants. Feature 16 contained unmodified medium mammal diaphysis fragments and SIHP #-2918 Feature 17 contained unmodified *Sus scrofa* molar fragments (that mend). *Sus scrofa* is a Polynesian introduction common in both pre- and post-Contact contexts.

Table 253. Invertebrate and Vertebrate Midden Identified Within Bulk Sediment Samples from Test Excavation 227, SIHP #-2918

Test Excavation	227	227	227	227	227	Weight (g)	Total %
Stratum	II	II	II	II	II		
Feature	14	17	18	19	21		
<b>Invertebrate Midden</b>							
Mytilidae <i>Brachidontes crebristriatus</i>		1.2			0.5	<b>1.7</b>	<b>19.3%</b>
Planaxidae <i>Planaxis ponderosa</i>				0.5		<b>0.5</b>	<b>5.7</b>
Tellinidae <i>Tellina palatam</i>		1.7			1.3	<b>3.0</b>	<b>34.1</b>
Tellinidae <i>Tellina</i> sp.		0.1				<b>0.1</b>	<b>1.1</b>
Turbinidae <i>Turbo sandwicensis</i>				1.7	0.4	<b>2.1</b>	<b>23.9</b>
Crustacea					0.2	<b>0.2</b>	<b>2.3</b>
Echinoidea <i>mathaei</i> sp.				0.7		<b>0.7</b>	<b>8.0</b>
Echinoidea <i>diadema</i> sp. / <i>mathaei</i> sp.		0.3			0.2	<b>0.5</b>	<b>5.7</b>
<b>Total Invertebrate Midden</b>	<b>0.0</b>	<b>3.3</b>	<b>0.0</b>	<b>2.9</b>	<b>2.6</b>	<b>8.8</b>	<b>100.0%</b>
<b>Vertebrate Midden</b>							
Medium mammal		0.5				<b>0.5</b>	<b>62.5%</b>
Osteichthyes (fish)	0.1	0.1	0.1			<b>0.3</b>	<b>37.5%</b>
<b>Total Vertebrate Midden</b>	<b>0.1</b>	<b>0.6</b>	<b>0.1</b>	<b>0.0</b>	<b>0.0</b>	<b>0.8</b>	<b>100.0%</b>

Table 254. Terrestrial Faunal Material Collected Individually from Test Excavation 227

Acc. #	Stratum	Depth (mbs)	Feature	Family/ Class	Species	Element	Description	Modification
227-F-1	II, SIHP #2918	0.49-1.12	-	Bovidae	<i>Bos taurus</i> (cow)	Scapula; Vertebra spinous process; Vertebrae; Humeral condyle (distal portion); Tibia diaphysis section; Tibia (distal portion); Distal femoral condyle (anterior portion); Distal femoral condyle (posterior portion); Ribs	Fragments	Scapula; Vertebrae; Humeral condyle (distal portion); Tibia diaphysis section; Distal femoral condyle (anterior portion); Distal femoral condyle (posterior portion) butchered (cut with metal saw blade)
227-F-2	II, SIHP #2918	0.49-1.12		Suidae	<i>Sus scrofa</i> (pig)	Cranial; Scapula; Mandible with molars and premolars; Mandible with molars and premolars; Tusk; Innominate fragment (pieces mend)	Fragments	Cranial; Scapula butchered (cut with metal saw blade)
227-F-3	-	0.90-1.07	SIHP #2918, Fe. 14	Bovidae	<i>Bos taurus</i> (cow)	Rib	Fragment	Rib butchered (cut with metal saw blade)
227-F-4	-	1.00-1.07	SIHP #2918, Fe. 16	Mammalia	Medium mammal	Diaphysis section s	Fragments	None
227-F-5	-	1.05-1.16	SIHP #2918, Fe. 17	Suidae	<i>Sus scrofa</i> (pig)	Molars (pieces mend)	Fragments	None

**T-227A**

A midden table of marine and terrestrial faunal material identified within bulk- and field-screened sediment samples within Test Excavation 227A, cultural resource SIHP #-2918, is provided in Table 255 below. The invertebrate species most represented within the midden signature consisted of *Theodoxus neglectus*, *Brachidontes crebristriatus*, *Cypraea caputserpentis*, *Conus* sp., *Strombus maculatus*, *Tellina palatam*, and *Turbo sandwicensis*. 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, pig, dog, fish, and shark. However, hand-collected terrestrial faunal remains within SIHP #-7428 also included historically-introduced species (see below).

Terrestrial faunal remains were collected individually during excavation from Stratum Id (0.63 mbs), Stratum II (0.68–1.08 mbs and 0.80–0.90 mbs), and Stratum III (1.02 mbs). The remains from Stratum Id consisted of *Bos taurus* and *Sus scrofa* skeletal elements which show evidence of butchering with a metal saw blade, indicating historic food remnants. In addition to the mammalian remains from Stratum Id, Osteichthyes (fish) skeletal elements also were collected (see Appendix A.2).

The terrestrial faunal remains from Stratum II consisted of *Capra aegagrus hircus*, *Canis lupus familiaris*, and unidentified medium mammal skeletal elements. None of the remains show any indication of cultural modification. While *Canis lupus familiaris* is a Polynesian introduction common in both pre- and post-Contact contexts, *Capra aegagrus hircus* is an introduced species indicative of the post-Contact period. In addition to the mammalian remains from Stratum II, Osteichthyes (fish) skeletal elements also were collected (see Appendix A.2).

The terrestrial faunal remains from Stratum III consisted of an unmodified *Sus scrofa* canine fragment and unmodified medium mammal diaphysis fragments (Table 256).

Table 255. Invertebrate and Vertebrate Midden Identified Within Bulk Sediment Samples from Test Excavation 227A, SIHP #-2918

Test Excavation	227A	227A	227A	227A	227A	227A	Weight (g)	Total %
Stratum	II	II	II	II	II	II		
Feature	-	22	23	24	25	26		
<b>Invertebrate Midden</b>								
Conidae <i>Conus</i> sp.	26		2.5				<b>28.5</b>	<b>15.2%</b>
Cymatiidae	0.5						<b>0.5</b>	<b>0.3%</b>
Cymatiidae <i>Cymatium nicobarium</i>	7.6						<b>7.6</b>	<b>4.0%</b>
Cypraeidae <i>Cypraea caputserpentis</i>	10.3						<b>10.3</b>	<b>5.5%</b>
Cypraeidae <i>Cypraea erosa</i>	3.7						<b>3.7</b>	<b>2.0%</b>
Gastropod			0.2				<b>0.2</b>	<b>0.1%</b>
Isognomidae <i>Isognomon</i> sp.	2.7						<b>2.7</b>	<b>1.4%</b>
Mytilidae <i>Brachidontes crebristriatus</i>	29.9	0.2	4.0	1.2			<b>35.3</b>	<b>18.8%</b>
Nassariidae	1						<b>1</b>	<b>0.5%</b>
Naticidae <i>Natica</i> sp.	0.5						<b>0.5</b>	<b>0.3%</b>
Neritidae <i>Nerita picea</i>	7.3					0.8	<b>8.1</b>	<b>4.3%</b>
Neritidae <i>Theodoxus neglectus</i>	22		0.6				<b>22.6</b>	<b>12.0%</b>
Pteriidae <i>Pinctada radiata</i>	1.1						<b>1.1</b>	<b>0.6%</b>

Test Excavation	227A	227A	227A	227A	227A	227A	Weight (g)	Total %
Stratum	II	II	II	II	II	II		
Feature	-	22	23	24	25	26		
Strombidae <i>Strombus maculatus</i>	10.8						10.8	5.7%
Strombidae <i>Strombus</i> sp.	8.4			0.9			9.3	4.9%
Tellinidae <i>Tellina palatam</i>	19.1	0.4					19.5	10.4%
Thaididae <i>Drupa</i> sp.	1.2						1.2	0.6%
Trochidae <i>Trochus</i> sp.	2.7						2.7	1.4%
Turbinidae <i>Turbo sandwicensis</i>	14.1		0.4	1.4			15.9	8.5%
Turbinidae <i>Turbo</i> sp. opercula	1.9	1.1	1.2				4.2	2.2%
Crustacea	0.8		0.2	0.1			1.1	0.6%
Echinoidea <i>diadema</i> sp.	0.9						0.9	0.5%
Echinoidea <i>diadema</i> sp./ <i>mathaei</i> sp.				0.2			0.2	0.1%
<b>Total Invertebrate Midden</b>	<b>172.5</b>	<b>1.7</b>	<b>9.2</b>	<b>3.8</b>	<b>0.0</b>	<b>0.8</b>	<b>188.0</b>	<b>100.0%</b>
<b>Vertebrate Midden</b>								
Medium mammal	1.2			0.1		0.5	1.8	23.4%
<i>Sus scrofa</i> (pig)							0	0.0%
<i>Canis lupus familiaris</i> (dog)	0.4						0.4	5.2%
Osteichthyes (fish)	4.9	0.4			0.1		5.4	70.1%
Chondrichthyes (shark tooth)				0.1			0.1	1.3%
<b>Total Vertebrate Midden</b>	<b>6.5</b>	<b>0.4</b>	<b>0.0</b>	<b>0.2</b>	<b>0.1</b>	<b>0.5</b>	<b>7.7</b>	<b>100.0%</b>

Table 256. Terrestrial Faunal Material Collected Individually from Test Excavation 227A

Acc. #	Stratum	Depth (mbs)	Feature	Family/Class	Species	Element	Description	Modification
227A-F-1	Id	0.63	-	Bovidae	<i>Bos taurus</i> (cow)	Ribs; Innominate	Fragments	Butchered (cut with metal saw blade)
227A-F-2	Id	0.63	-	Suidae	<i>Sus scrofa</i> (pig)	Ulna; Diaphysis section; Rib; Incisors; Vertebra; Vertebra with facets	Fragments	Diaphysis section butchered (cut with metal saw blade)
227A-F-3	II, SIHP #2918	0.68-1.08	-	Bovidae	<i>Capra aegagrus hircus</i> (goat)	Cranial; Vertebral facets; Proximal phalanx	Fragments	None
227A-F-4	II, SIHP #2918	0.68-1.08	-	Mammalia	Medium mammal	Diaphysis sections	Fragments	None

Acc. #	Stratum	Depth (mbs)	Feature	Family/ Class	Species	Element	Description	Modification
227A-F-5	II, SIHP #2918	0.80-0.90	-	Canidae	<i>Canis lupus familiaris</i> (dog)	Cranial; Molar; Canine; Vertebral facets; Ulna; Diaphysis section; Metacarpal	Fragments	None
227A-F-6	III	1.02	-	Suidae	<i>Sus scrofa</i> (pig)	Canine	Fragment	None
227A-F-7	III	1.02	-	Mammalia	Medium mammal	Diaphysis sections	Fragments	None

### T-227B

Two bulk sediment samples were collected from Stratum II (1.30–1.40 mbs). Faunal analysis identified naturally-occurring marine fauna consistent with a shallow marine or estuary deposit, consisting of Osteichthyes (fish) (0.1 g), *Brachidontes crebristriatus* (7.8 g), Tellinidae (2.3 g), *Tellina palatam* (1.3 g), *Natica* spp. (0.5 g), *Hipponix* spp. (0.2 g), *Fragum mundum* (0.1 g), gastropod (0.6 g), Crustacea (0.1 g), *Echinometra mathaei* sp. (0.3 g), and Echinoidea/Crustacea/miscellaneous shell fragments (0.8 g).

Terrestrial faunal remains were collected individually during excavation from Stratum Ie (0.60–1.20 mbs). The remains consisted of *Bos taurus*, *Sus scrofa* (young adult), and *Gallus gallus* skeletal elements. The *Bos taurus* (ribs) show evidence of butchering with a metal saw blade, indicating historic food remnants.

### T-228A

No terrestrial faunal remains were collected from this test excavation, however, a large unmodified irregular bone fragment from an unidentified Osteichthyes (fish) was collected from Stratum Ig (1.25 mbs) (see Appendix A.2).

### T-229

One bulk sediment sample was collected Stratum II (1.19–1.31 mbs). Faunal analysis identified naturally-occurring marine fauna consistent with a shallow marine or estuary deposit, consisting of Osteichthyes (fish) (0.1 g), *Melampus castaneus* (3.2 g), *Brachiodontes crebristriatus* (2.7 g), *Trochus* sp. (0.8 g), Fascioliariidae (0.8 g), *Nattica* sp. (0.5 g), *Neritia picea* (0.4 g), Crustacea (0.1 g), *Echinometra mathaei* sp. (0.1 g), and gastropods (0.5 g).

### T-230

One bulk sediment sample was collected from Stratum II (1.20–1.40 mbs). Faunal analysis identified naturally-occurring marine fauna consisting of limpets/gastropods (2.5 g), Crustacea (0.3 g), and unidentified micro-shells (0.7 g).

### T-231A

Three bulk sediment samples were collected, one each from Stratum Ig (0.90–1.10 mbs), Stratum III (1.50–1.68 mbs), and Stratum IV (1.68–1.85 mbs). Faunal analysis of Stratum Ig, identified as a burned trash layer (SIHP #-7189), identified medium mammal cut with a metal saw blade (5.9 g), other medium mammal elements (0.5 g), Osteichthyes (fish) (0.2 g), small mammal (0.1 g), and various naturally-occurring marine shell fauna (1.7 g). Faunal analysis of Stratum III identified naturally-occurring marine fauna consistent with a shallow marine or estuary deposit, consisting of *Brachidontes crebristriatus* (0.9 g), Tellinidae (0.7 g), Carditidae (0.1 g), gastropods (0.9 g), limpets (0.9 g), Crustacea (0.7 g), and *Echinothrix diadema* sp./*Echinometra mathaei* sp. (0.3 g). Faunal analysis of the Stratum IV identified naturally-occurring bivalves and gastropods (9.4 g), microshells (1.2 g), and Crustacea (2.3 g).

Terrestrial faunal remains were collected individually during excavation from Stratum Ic (0.54 mbs). The remains consisted of *Bos taurus* and unmodified *Sus scrofa* skeletal elements. Several of the *Bos taurus* (rib and long bone) fragments show evidence of butchering with a metal saw blade, indicating historic food remnants.

### T-232A

Two bulk sediment samples and various hand collected marine shells were collected from Stratum Ie (0.65-1.00 mbs). A bulk sediment sample was also collected from Stratum If (0.94–1.10 mbs). Faunal analysis of Stratum Ie, identified as a burned trash layer (SIHP #-7189), identified Osteichthyes (fish) (2.1 g), *Sus scrofa* (0.2 g), *Gallus gallus* (0.1 g), *Rattus* sp. (0.1 g), Ostreidae (76.6 g), *Cellana exarata* (23.9 g), *Tellina palatam* (22.5 g), *Conus* sp. (22.3 g), *Cypraea caputserpentis* (7.3 g), terrestrial snails (6.0 g), Crustacea (3.3 g), *Nerita picea* (2.8 g), bivalve fragments (1.5 g), gastropods (1.3 g), *Turbo* sp. opercula (0.7 g), *Tellina* sp. (0.4 g), and *Isognomon* sp. (0.4 g). Faunal analysis of Stratum If identified a small amount of marine fauna consisting of *Brachidontes crebristriatus* (0.4 g) and Melampidae (0.3 g).

Terrestrial faunal remains were collected individually during excavation from Stratum Ib (0.20–0.30 mbs), Stratum Id (0.65 mbs), and Stratum Ie (0.81-0.96 mbs). The remains from Stratum Ib consisted of *Bos taurus* and unmodified *Canis lupus familiaris* skeletal elements. The *Bos taurus* (long bone) fragments show evidence of butchering with a metal saw blade, indicating historic food remnants.

The remains from Stratum Id consisted of *Bos taurus*, *Canis lupus familiaris*, *Gallus gallus*, *Rattus norvegicus*, *Sus scrofa*, and unidentified small mammal skeletal elements. None of the remains show any indication of cultural modification. Both *Bos taurus* and *Rattus norvegicus* are introduced species, indicative of a post-Contact context.

The remains from Stratum Ie consisted of *Bos taurus*, *Gallus gallus*, *Sus scrofa*, and unidentified medium mammal skeletal elements. The *Bos taurus* (ribs) and medium mammal (ribs, vertebrae) show evidence of butchering with a metal saw blade, indicating historic food remnants (Table 257).

Table 257. Terrestrial Faunal Material Collected Individually from Test Excavation 232A

Acc. #	Stratum	Depth (mbs)	Feature	Family/Class	Species	Element	Description	Modification
232A-F-1	Ib	0.20-0.30	-	Bovidae	<i>Bos taurus</i> (cow)	Left humerus distal portion; Diaphysis section	Fragments	Butchered (cut with metal saw blade)
232A-F-2	Ib	0.20-0.30	-	Canidae	<i>Canis lupus familiaris</i> (dog)	Scapula (glenoid fossa portion)	Fragment	None
232A-F-3	Id	0.65	-	Bovidae	<i>Bos taurus</i> (cow)	Rib fragments; Scapula fragment (two pieces mend); Diaphysis section (two pieces mend); Diaphysis sections; Metacarpus (proximal) fragment	Fragments	Rib, Scapula and Diaphysis sections Butchered (cut with metal saw blade)
232A-F-4	Id	0.65	-	Canidae	<i>Canis lupus familiaris</i> (dog)	Proximal rib fragment; Diaphysis sections	Fragments	None
232A-F-5	Id	0.65	-	Aves	<i>Gallus gallus</i> (chicken)	Tibiotarsal fragment; Left scapula; Right humerus	Fragment/Complete	None
232A-F-6	Id	0.65	-	Muridae	<i>Rattus norvegicus</i> (rat)	Left femur fragment	Fragment	None
232A-F-7	Id	0.65	-	Suidae	<i>Sus scrofa</i> (pig)	Left scapula fragment; Humerus (Proximal portion) fragment	Fragments	None

Acc. #	Stratum	Depth (mbs)	Feature	Family/ Class	Species	Element	Description	Modification
232A-F-8	Id	0.65	-	Suidae	<i>Sus scrofa</i> (pig)	Proximal rib fragments; Left mandible fragment (with 3 <sup>rd</sup> molar); Molar fragment; Premolar; Right scapula fragment (proximal portion); Cranial fragment (supra orbital arch margin); Proximal phalanx; Vertebral spinous process fragments	Fragments/ Complete	None
232A-F-9	Id	0.65	-	Mammalia	Small mammal	Tibia/fibula (four pieces mend)	Fragments	None
232A-F-10	Ie	0.81	-	Bovidae	<i>Bos taurus</i> (cow)	Rib fragment; Irregular fragments	Fragments	Butchered (cut with metal saw blade)
232A-F-11	Ie	0.81	-	Aves	<i>Gallus gallus</i> (chicken)	Diaphysis section fragment	Fragment	None
232A-F-12	Ie	0.81	-	Suidae	<i>Sus scrofa</i> (pig)	Proximal rib fragment; Irregular fragments/ diaphysis section	Fragments	None
232A-F-13	Ie	0.81-0.96	-	Aves	<i>Gallus gallus</i> (chicken)	Tibiotarsal (shaft)	Fragment	None
232A-F-14	Ie	0.81-0.96	-	Mammalia	Medium mammal	Vertebra fragments; Rib fragments	Fragments	Ribs butchered (cut with metal saw blade)

## Summary of Faunal Assemblage from Kaka'ako Makai

The faunal material collected within bulk sediment samples within Kaka'ako Makai showed a similar pattern to that seen within West Kaka'ako and Kewalo. The area of Jaucas sand deposits (T-226A through T-227A) contained a strong marine and terrestrial material midden signature within the A-horizon and associated features, evidencing cultural activity. In contrast, the nearby wetlands (T-227B through T-230) contained marine faunal material consistent with a shallow marine or estuary environment. Cultural activity within these wetlands was not evidenced in the faunal material. Test Excavations T-231A and T-232A contained a burned trash layer over natural marine deposits. The burned trash layers showed a mix of historic faunal material (such as saw-cut medium mammal) and marine and terrestrial faunal material that may relate to more traditional-style midden or to natural marine species mixed into the fill deposits.

Terrestrial faunal remains were collected from nine test excavation in this geographical zone (T-226A, T-226B, T-226C, T-226D, T-227, T-227A, T-227B, T-231A, and T-232A).

Test excavations within Kaka'ako Makai contained both pre-Contact and post-Contact species consisting of *Bos taurus*, *Capra aegagrus hircus*, *Canis lupus familiaris*, *Sus scrofa*, *Rattus* sp., *Rattus norvegicus*, *Gallus gallus*, and unidentified small and medium mammal. The majority of terrestrial faunal remains were collected from fill deposits. The majority of butchered remains consisted of *Bos taurus*, a post-Contact species. However, several *Sus scrofa* skeletal elements also show evidence of butchering with a metal blade. *Sus scrofa* is both a pre-Contact and post-Contact species. Terrestrial faunal also were collected from natural strata and cultural resource features (T-226A, T-226B, T-227, and T-227A). The remains included butchered *Bos taurus* (T-226B Stratum II and T-227 Stratum II and Feature 14) as well as saw cut *Sus scrofa* (T-227 Stratum II). In many cases historic species were not identified within the natural strata or features, however, it could not be determined if the remains were associated with a pre- or post-Contact time period (T-226A Strata III, IV, and Feature 3; T-227 Features 16 and 17; and T-227A Strata II and III). The *Canis lupus familiaris* remains from T-226B (Feature 11) appear to have been an articulated burial.

## 5.14 Faunal Analysis Conclusion

The faunal assemblage collected during the AIS for the City Center portion of the HHCTCP documented archaeological resources within the narrow but continuous transect through O'ahu's densely populated coastal south shore. Areas of previous wetlands or shallow marine environments and areas of cultural activity were identified. Areas of cultural activities were evident from distinct and consistent midden signatures within the City Center portion.

Terrestrial vertebrate and marine midden signatures consistent with traditional Hawaiian cultural consumption activities were documented in subsurface A-horizons and/or features in Jaucas sand throughout Kaka'ako and Kewalo and within the Chinatown waterfront area.

The overall faunal midden signature contained common and uncommon marine fauna. Common marine mollusks identified included, but were not limited to: *Turbo sandwicensis*, *Strombus* sp., Conidae, Tellinidae, *Brachidontes crebristriatus*, *Nerita picea*, *Theodoxus neglectus*, *Theodoxus vespertinus*, *Cellana* sp., and various Cypraeidae. *Turbo sandwicensis* and *Strombus* sp. were a type of food source harvested from the shallow sandy portions of the coast

protected from the surf. Conidae exist on benches fringing the shorelines. Tellinidae and *Brachidontes crebristriatus* thrive on rocks and rock shelves within intertidal zones. Rocky substrates and tide-pools provide shelter for *Nerita picea*, *Theodoxus neglectus*, *Theodoxus vespertinus* (which migrate between freshwater and saltwater), *Cellana* sp., various Cypraeidae, and *Cypraea caputserpentis* (Hammatt et al. 2000; Kay 1979). Echinoidea such as *Echinometra mathaei*, *Echinothrix diadema*, and *Heterocentrotus mamillatus* and Crustacea (not identified further) also were present in the midden signature. Both of these Classes live on rocks near the coast.

Chelonioidea *Chelonia mydas* was represented in the entire City Center assemblage by only a single 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...."

Of the many Osteichthyes (fish) remains collected during the project, eight species were positively identified. The identified species were collected from seven test excavations: T-119A, T-120, T-120B, T-124, T-151, T-226B, and T-227A, all within subsurface A-horizons. It is inconclusive as to whether the species identified were harvested from fishponds or from the ocean.

The 'ō'ili'uwī'uwī (*Pervagor spilosoma* or Fantail Filefish) were found in five out of seven test excavations containing identified fish species, with the 'ō'ili'uwī'uwī being the most commonly identified species. The habitat of this species is in the deeper waters on the outer edge of the reef (Tinker 1978:480). Titcomb quotes Kepelino as evidence that these fish were eaten, either raw or broiled after the skin had been removed (Titcomb 1972:119).

The *uhu* (*Scarus* sp. or Parrotfish) and a sub-species of *uhu* (*Scarus perspicillatus* or Spectacled Parrotfish) are part of the Scaridae family which contains about 80 species that inhabit shallow tropical seas (Tinker 1978:308). The *uhu* were a favorite fish with the Hawaiians, often eaten dried, broiled, or raw (Titcomb 1972:148).

The *kōkala* (*Diodon holocanthus* or Balloonfish/Spiny Porcupinefish) lives in shallow shoreline and reef areas (Tinker 1978:500). Diodontids are poor swimmers can be caught at the surface with hand nets (Froese and Pauly 2011).

The 'a'awa (*Bodianus bilunulatus albotaeniatus* or Hawaiian Hogfish) is a subspecies not endemic to the Hawaiian Islands. Wrasses are speedy, sleek swimmers living near the shoreline in the coral reef. The white meat of the 'a'awa is often broiled or dried (Titcomb 1972:57). Wrasses (*hinālea*) could be kept on hand and would remain healthy if kept in small pools.

The *kāhala* (*Seriola* cf. *dumerili* or Amberjack) are large predators that are often found in the deep seaward reefs, but are also known to come inshore to feed on schooling reef fishes. According to Titcomb, *kāhala* are often cooked whole in an *imu*, but can also be salted or wrapped in *ti* leaves and baked. They are a deep sea fish that often required many hooks on one line (Titcomb 1972:82).

The two species of *lau-hau*, *lau-wiliwili* (*Chaetodon miliaris* or Milletseed Butterflyfish) were identified. The Milletseed Butterflyfish inhabits shallow waters and is not a common food source (Randall 1996:101; Titcomb 1972: 98; Hoover 1993:27, 30).

The *kikākapu* (*Chaetodon tinkeri* or Tinker's Butterflyfish) are considered endemic to Hawai'i (Randall 1996:104; Hoover 1993:32). Tinker's Butterflyfish are found in calm deep reef edges (below 100 ft) (Tinker 1978:252). These fish were not often eaten due to the small amount of flesh (Titcomb 1972:88).

Terrestrial fauna vertebrate material was collected from post-Contact fill layers and from pre-Contact and early post-Contact subsurface A-horizon midden features. The common terrestrial Family/species identified in the subsurface features were 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), and Osteichthyes (fish). Felidae, Bovidae (cow, sheep, and goat), Equidae, and *Rattus norvegicus*, Aves (unidentified bird), Duck (*Anas platyrhynchos domesticus*), and Red Jungle fowl/chicken (*Gallus gallus*) also were identified.

Graphs showing both terrestrial and marine faunal material collected from individual cultural resources are shown in Figure 40 through Figure 46. In all graphs, the invertebrate marine midden constitutes a high percentage of the total faunal material collected. Large vertebrates, such as horse and cow, also show a high percentage of total weight; however, the large size of these individual animals and their higher bone density skews consumption weights. In addition, some of the larger animals were collected from in situ burials, and therefore do not represent food consumption. They are included in the graph as they are a part of the cultural resource.

Radiocarbon dating identified five test excavations that contained features (seven total) with pre-Contact dates (AD 1400s–1600s): T-124 (Features 5, 8, and 11), T-142 (Feature 8), T-145 (Feature 9), T-146A (Feature 14), and T-151 (Feature 25). The vertebrate and invertebrate species identified within these seven features consisted of indigenous and Polynesian-introduced species and were compatible with a pre-Contact date (Figure 47). Of these five test excavations, T-124 was the only trench in which all sampled features contained exclusively pre-Contact vertebrate and invertebrate species and no historic artifacts or historically introduced species. Other test excavations (T-142, T-145, and T-151) also contained historic artifacts, introduced mammal skeletal remains, and/or introduced tree species within the buried A-horizon and/or associated features, indicating a broad time-line of pre- and post-Contact activity in the area.

Radiocarbon dating also identified three test excavations that contained features dating to around the time of Contact (AD 1720–1820): T-146A (Features 12, 13, and 15), T-150 (Feature 20), and T-227A (Feature 23). The five features that were dated to around the time of Contact similarly contained traditional Hawaiian consumption species (Figure 48).

SIHP #-5820 produced eight C14 dated features, four of which fell into the pre-Contact range (Features 8, 9, 14, and 25) and four in the around the time of Contact range (Features 12, 13, 15, and 20). The comparison of the relative distributions is illustrated in Figure 49.

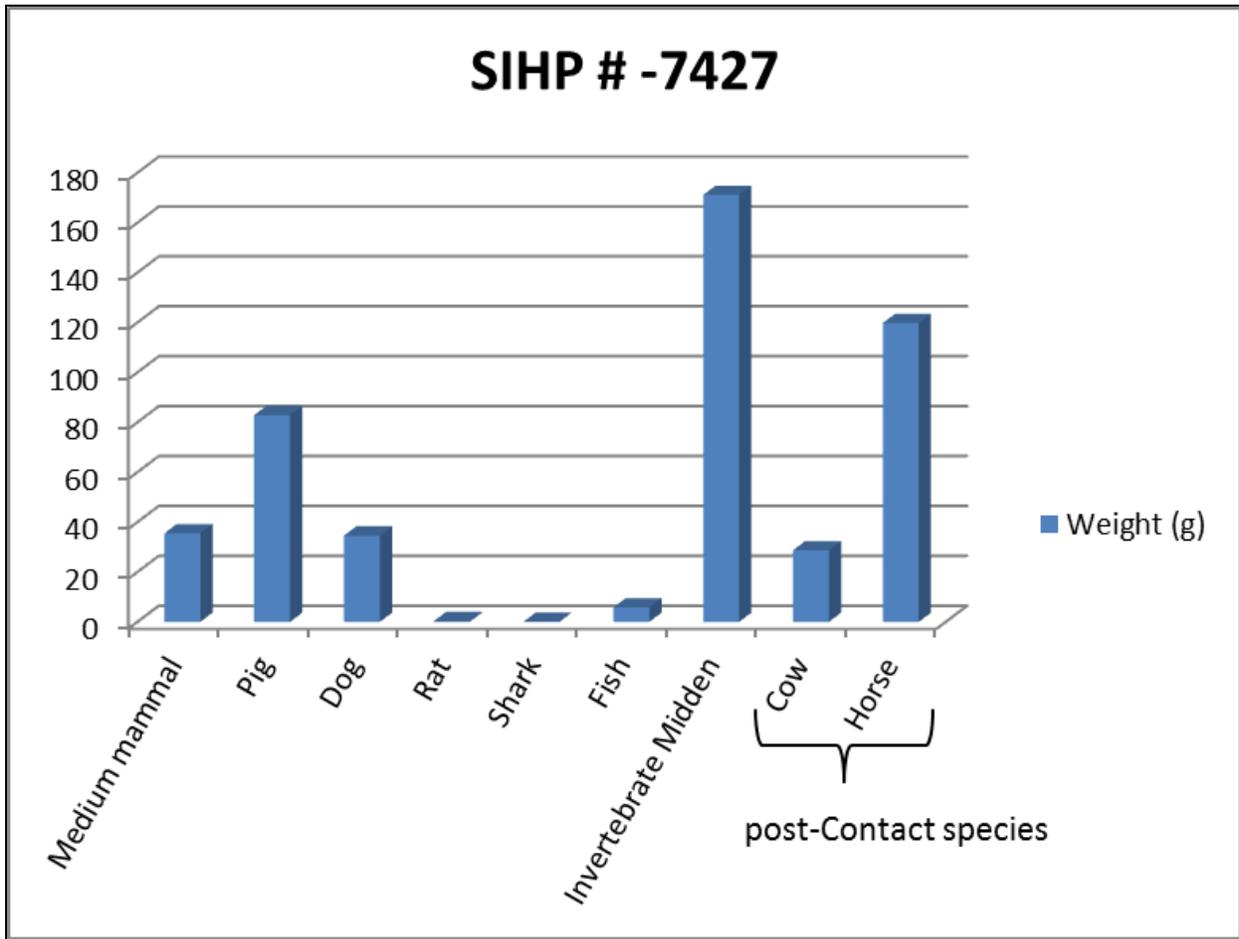


Figure 40. Graph showing all faunal material collected from SIHP #-7427, which consisted of two culturally enriched deposits

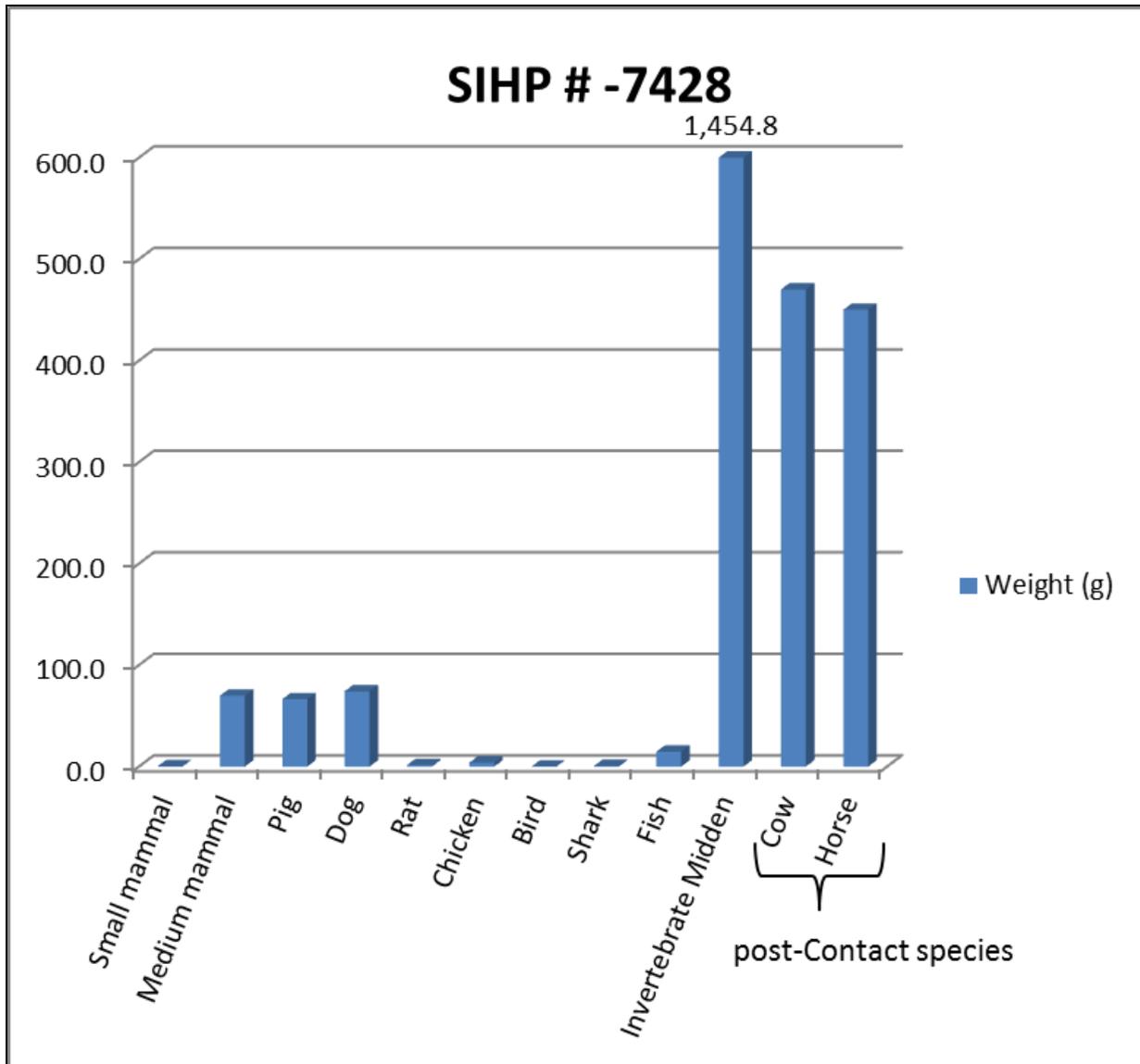


Figure 41. Graph showing all faunal material collected from SIHP #-7428. The cow and horse skeletal remains were documented within the A-horizon, rather than within discrete features.

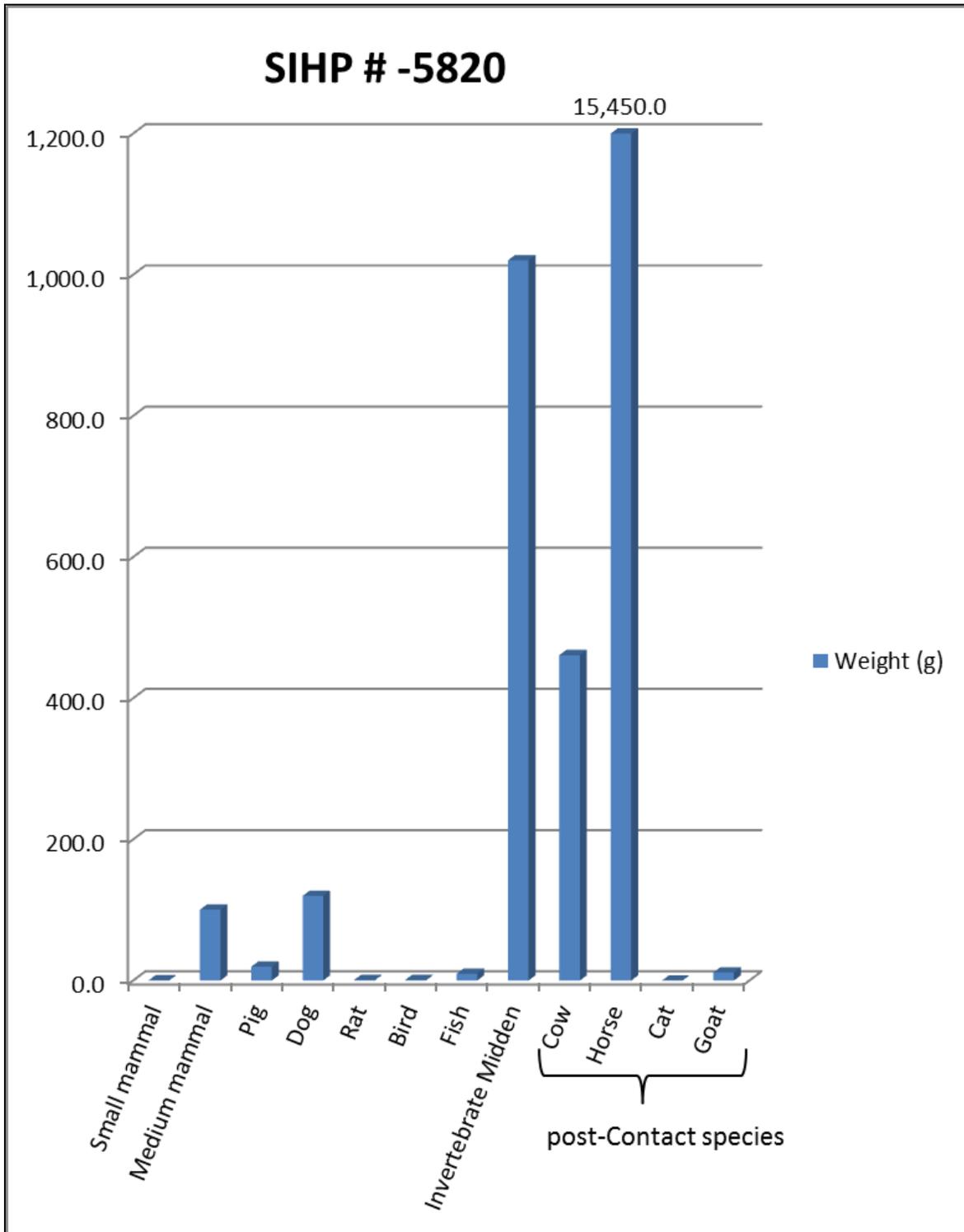


Figure 42. Graph showing all faunal material collected from SIHP #-5820. The large amount of horse remains is due to the identification of an in situ horse burial.

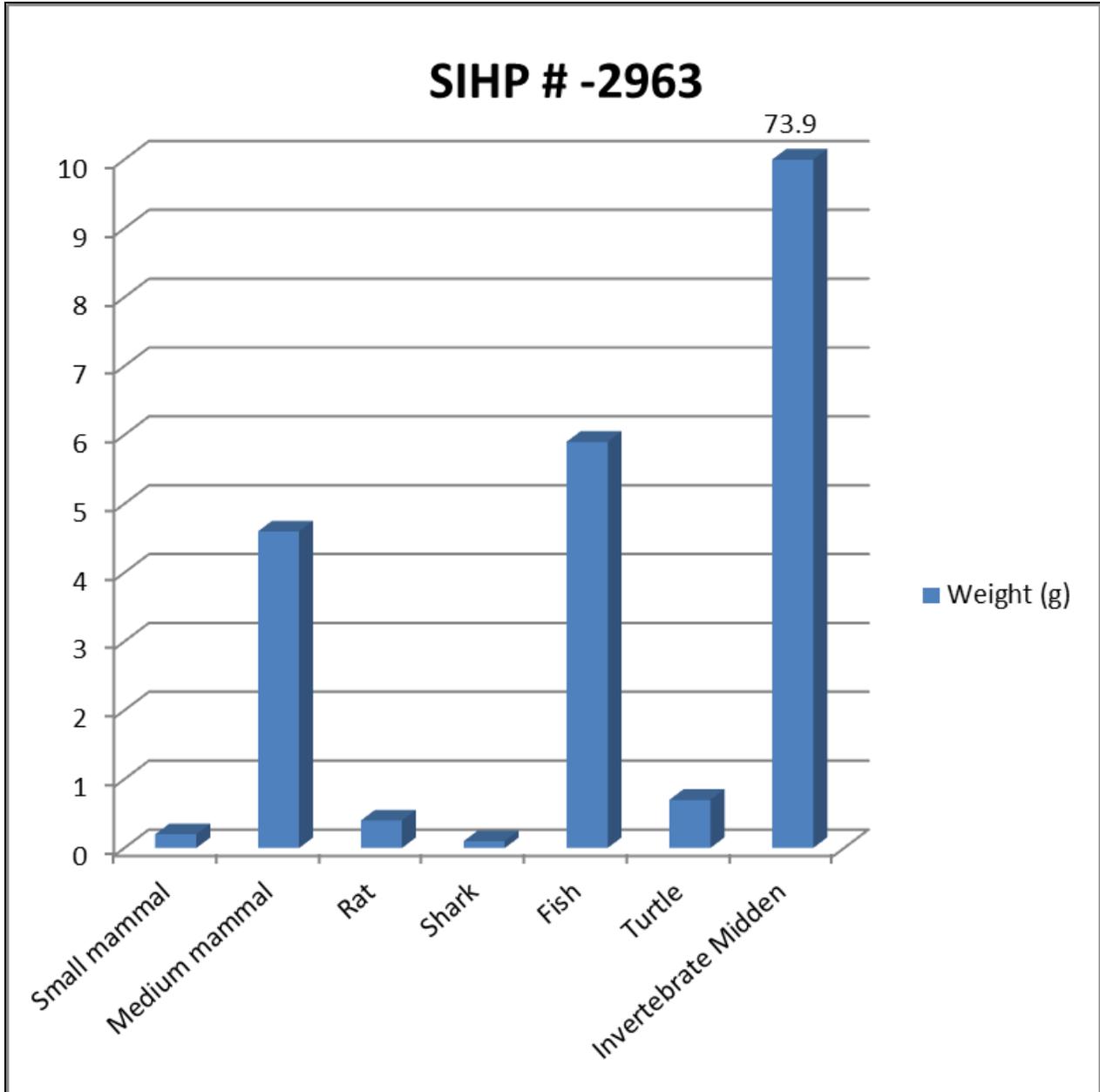


Figure 43. Graph showing all faunal material collected from SIHP #-2963. The graph represents material collected from five features associated with an A-horizon. Note the absence of post-Contact introduced species.

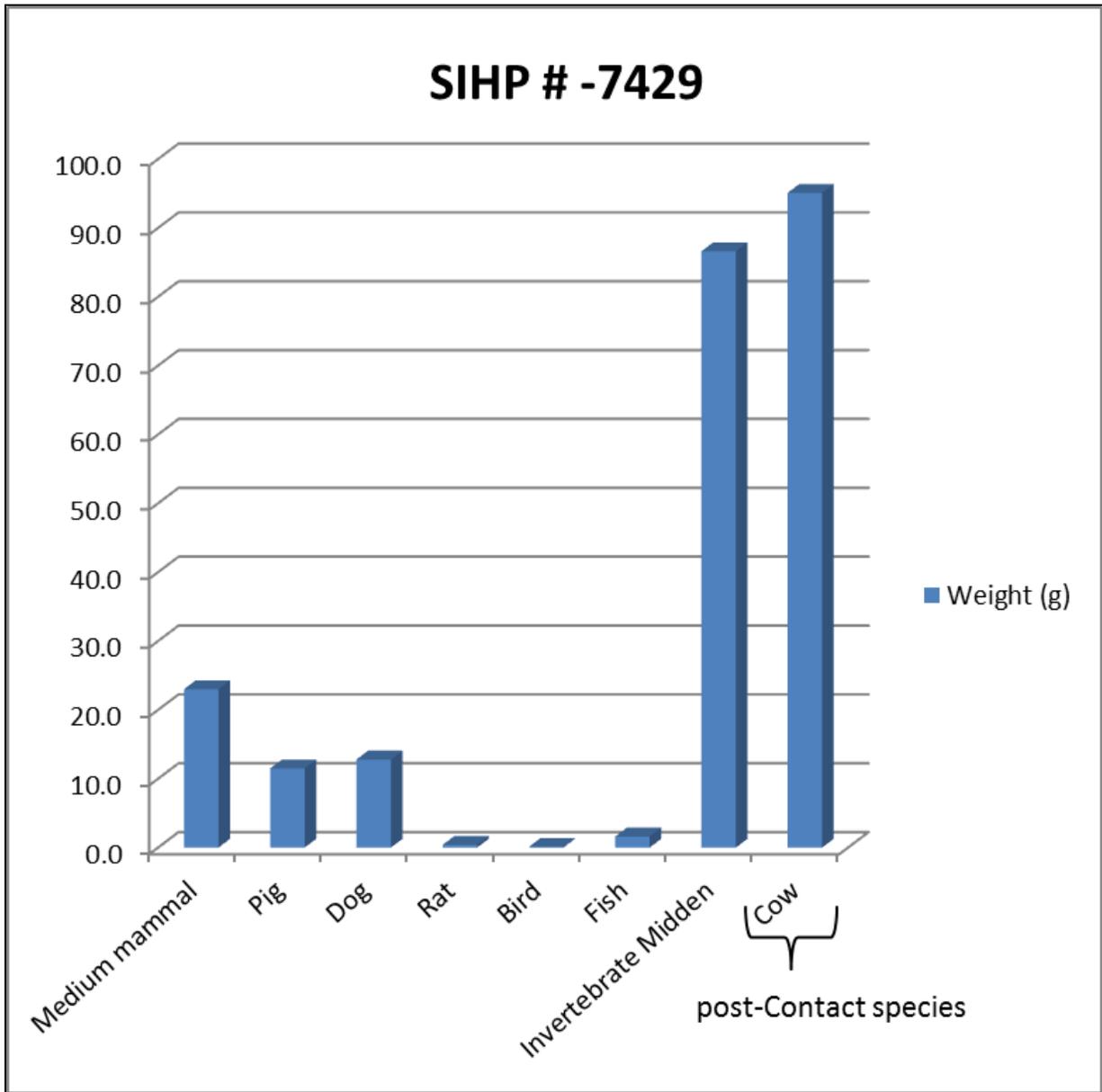


Figure 44. Graph showing all faunal material collected from SIHP #-7429.

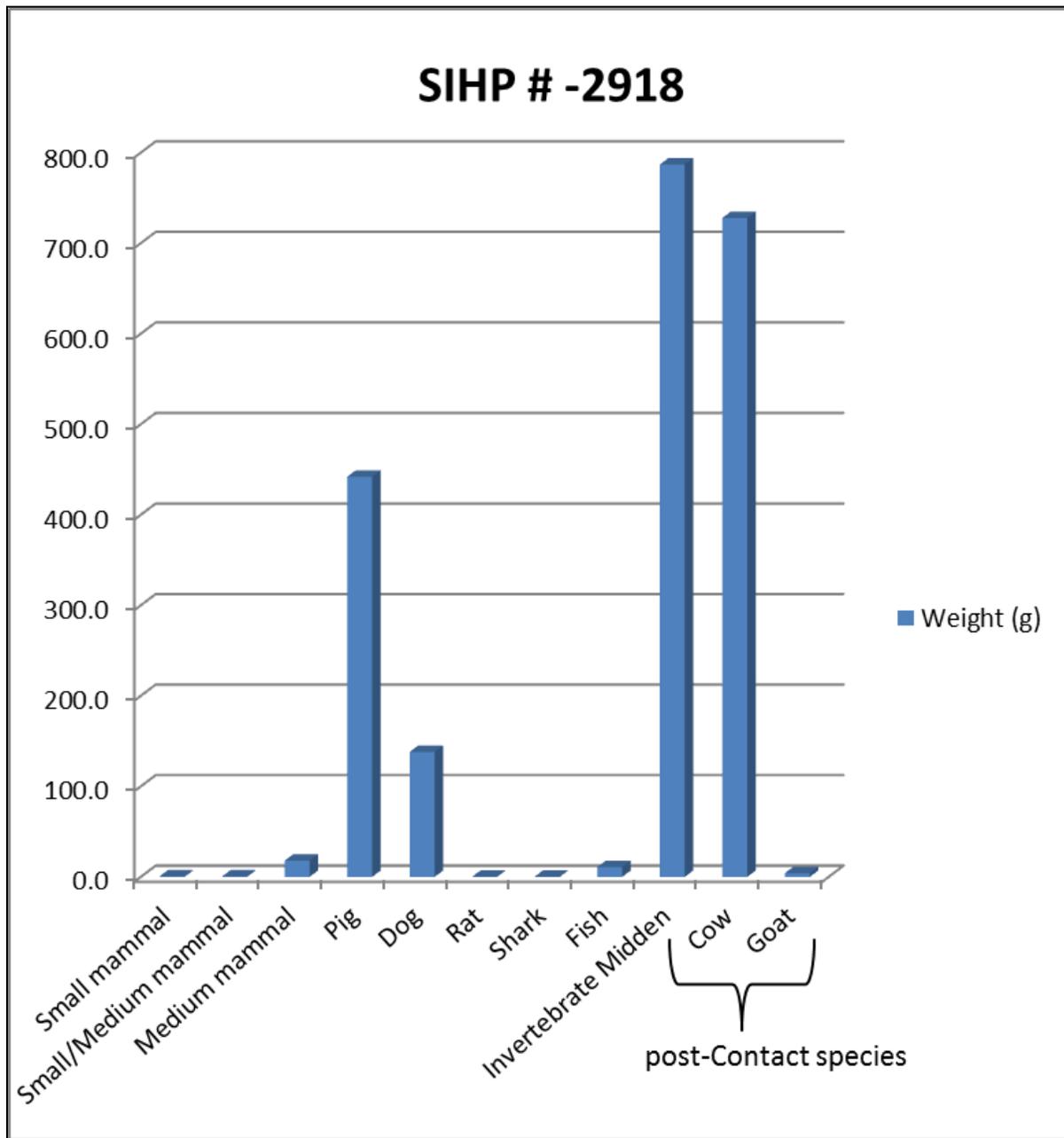


Figure 45. Graph showing all faunal material collected from SIHP #-2918. A strong invertebrate midden signature was identified throughout the A-horizon and associated features.

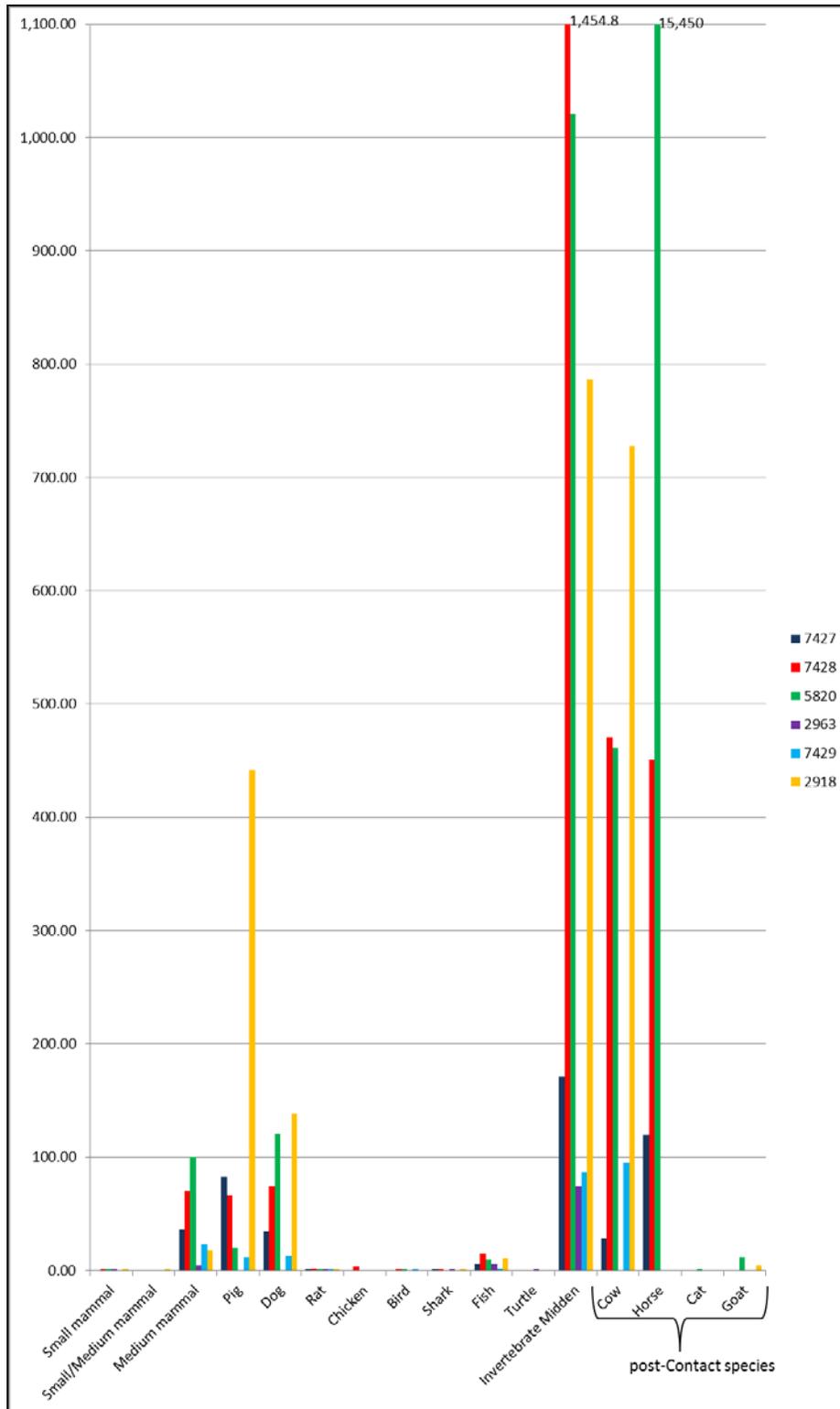


Figure 46. Graph comparing all faunal material collected from the six previously discussed cultural resources

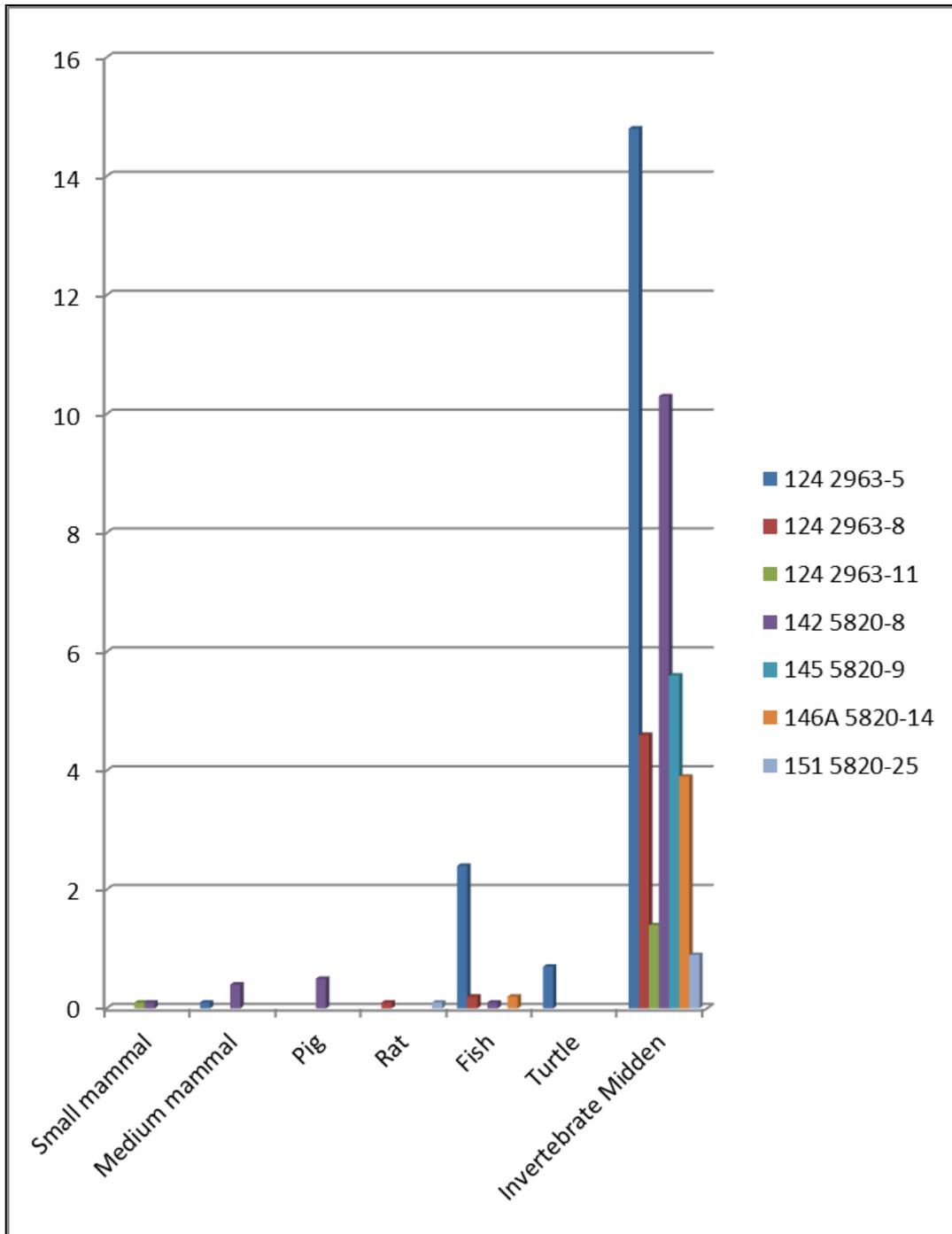


Figure 47. Graph comparing all faunal material collected from the seven features with pre-Contact C14 dates (1400s–1600s) (shown by test excavation number, SIHP number and Feature number). Marine species represent the highest weight, indicating that marine resources were consumed in greater quantity than terrestrial species.

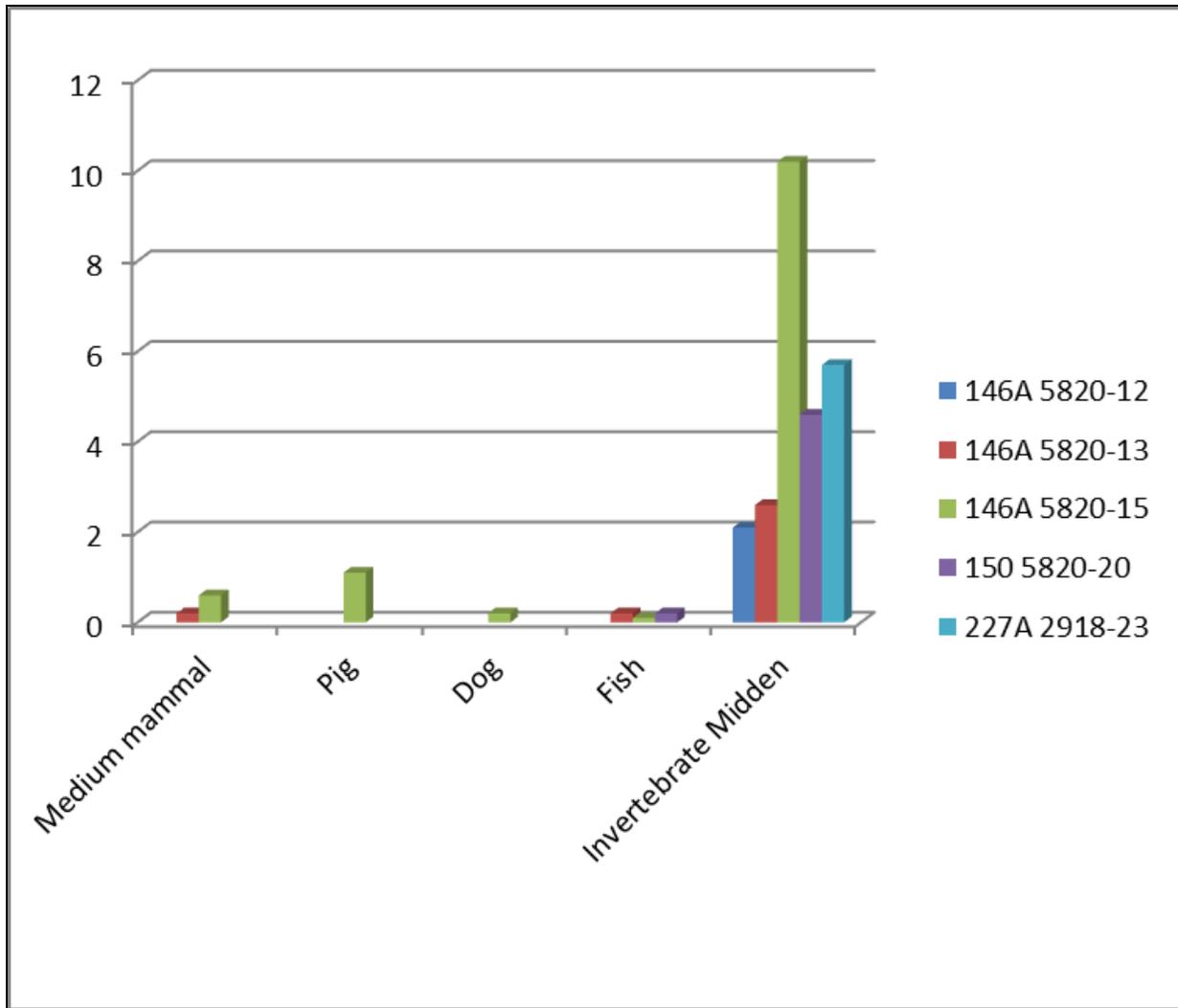


Figure 48. Graph comparing all faunal material collected from the five features with C14 dates from around the time of Contact (1720–1820) (shown by test excavation number, SIHP number and Feature number). The overall midden signature is very similar to that shown within the earlier pre-Contact features in Figure 45.

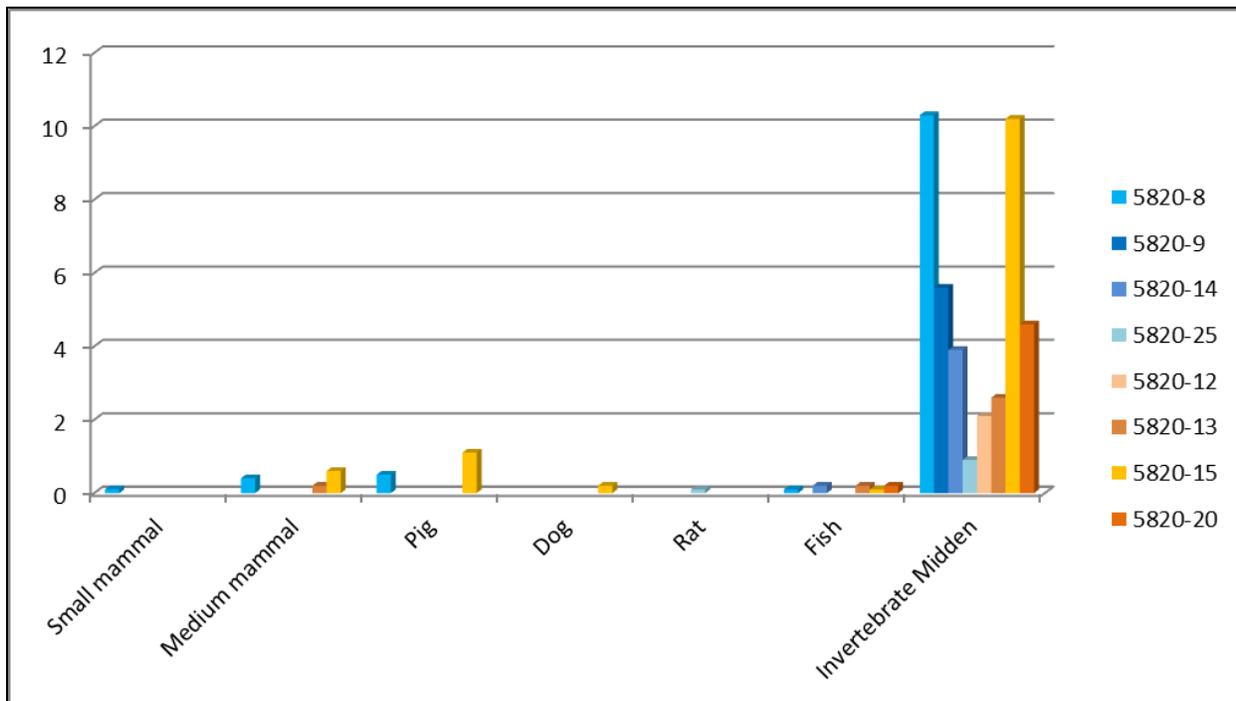


Figure 49. Graph comparing all faunal material collected from the eight features of SIHP #5820 with pre-Contact (1400s–1600s) and time of Contact (1720–1820) C14 dates (shown by SIHP number and Feature number); blue tones represent pre-Contact features and orange tones represent time of Contact features.

The terrestrial faunal midden assemblage collected provides evidence of pre-Contact and early post-Contact food scrap deposition, the latter represented by the high percentage of *Bos taurus* and other large species.

Faunal remains were collected individually during excavation from 70 test excavation units. These remains consisted of a variety of both Polynesian and post-Contact introduced species, which were examined for any evidence of cultural modification such as burning and butchering. The butchering marks observed were found to fall into two categories: those created by a metal saw blade (butcher's saw) cutting through the bone (creating horizontal striations along the compact bone but leaving clean edges at the ends of the bones), and those created by hand tools (of various materials) scraping the bone. No cleaver cut marks were observed, such as would create Kerf (notch) marks and splinters or rough edges on the ends of the bones. The implication being that metal saw blade marks are consistent with post-Contact/historic food consumption practices, particularly the meat products purchased from a butcher shop; whereas the scraping type of butcher marks are consistent with traditional Hawaiian food processing methods. The most interesting aspect of the assemblage of butchered (scraping) faunal material is that most of the bones displaying evidence of this presumably traditional method (Table 258) were *Bos taurus* (cow), a species not introduced until the post-Contact period. A *Sus scrofa* (pig – a

Polynesian-introduced species) femur was observed to have these traditional style butcher marks; however, this traditionally-butchered bone of a Polynesian-introduced species, was found in the same context (T-096, SIHP #50-80-14-7427, Feature 3, 1.33 mbs) as *Bos taurus* rib fragments that had been butchered by a metal saw blade. It seems likely that the traditionally-butchered bones represent early post-Contact traditional Hawaiian utilization of recently introduced species, prior to the wide scale adoption of immigrant food processing techniques. The faunal bones with evidence of butchering (with either a metal saw blade or traditional methods) originated from a transitional early post-Contact context. The only possibly pre-Contact faunal material with traditional butchering evidence was a *Canis lupus familiaris* diaphysis section. The diaphysis section showed evidence of spiral fracturing indicative of hand modification to long bones.

Table 258. All Individually Collected Faunal Material Showing Traditional Style Butcher Marks, as well as the Other Faunal Found in the Same Context

Test Exc.	Stratum	Depth (mbs)	SIHP #/ Feature	Family/ Class	Species	Element	Description	Modification
034	Ib	0.70-0.83		Bovidae	<i>Bos taurus</i> (cow)	Femur; Ribs; Possible scapula; Vertebra	Fragments	Butchered, possible carnivore gnawing on vertebra
037	Ib	0.70		Bovidae	<i>Bos taurus</i> (cow)	Ribs; Long bones; Possible vertebrae	Fragments	Butchered
067	Ib	0.63-1.00		Bovidae	<i>Bos taurus</i> (cow)	Femur head (unfused); Rib	Complete	Butchered rib, metallic rust staining
067	Ib	0.63-1.00		Felidae	<i>Felis catus</i> (possible) (cat)	Diaphysis section	Fragments	Metallic rust staining
096	-	1.33	SIHP #-7427, Fe. 3	Bovidae	<i>Bos taurus</i> (cow)	Ribs	Fragments	Butchered (cut with metal saw blade)
096	-	1.33	SIHP #-7427, Fe. 3	Suidae	<i>Sus scrofa</i> (pig)	Femur; Left supra orbital margin; Proximal end of rib; Diaphysis section (possible pig)	Fragments	Butcher marks on femur

Test Exc.	Stratum	Depth (mbs)	SIHP #/ Feature	Family/ Class	Species	Element	Description	Modification
097	Ie	1.04	-	Bovidae	<i>Bos taurus</i> (possible) (cow)	Diaphysis sections (Mostly thin cortical bone)	Fragments	Butcher marks on cortical bone
100	If/Ik	0.85		Bovidae	<i>Bos taurus</i> (cow)	Diaphysis section (possible femur)	Fragment	Striations on one end (possible taphonomic); cut marks along exterior
142	II, SIHP #5820	0.69	-	Canidae	<i>Canis lupus familiaris</i> (dog)	Diaphysis section	Fragment	Perimortem fractures; burned (traditional methods)

## 5.15 Cultural and Environmental Osteichthyes Discussion

### 5.15.1 Traditional Fishing Practices

One of the most varied and extensive occupations, fishing required various tools and methods. The fisherman required the knowledge to know the character of the reef, ocean, seasons, and weather; the concealment of excellent fishing grounds; and work time needed to make or expenses incurred from purchasing goods such as a canoe, fishing nets, line, sinkers, and hooks. The principal fishing god was Ku'ula, who was deemed one of the best fishermen during ancient times. Other notable fishermen include Hinahale, owner of all 'ōhua (young) fish; Kānemakua, a form of Kāne; Kapukapu; Kinilau; Kānekoa; and Kalamainu'u, the goddess of trap makers. Fishing shrines known as *ko'a* were located near shorelines. Fishermen often left an offering consisting of a stone or a fishhook prior to fishing. On returning from a successful fishing trip, offerings of fish also were made on the *ko'a* (Buck 1964:286-287).

Various kinds of fish required different methods of fishing including catching by hand or groping (*haha*); spearing ('*oi'a*); noosing (primarily used to catch sharks); nets (*upena*) or netting was the most diversified and profitable method of catching fish; fish traps; and fishhooks (*makau*). Spears, nets, fish traps, and fishhooks varied in terms of what a fisherman desired to catch; materials utilized to create the medium; types; variations; and terminology. Accessories such as stone sinkers, hook-and-line containers, bait, mortars, pestles, and bait sticks also helped aid fishermen hone their skills. These tools and methods were utilized both in the near shore reefs and open ocean, as well as in the constructed fishponds along the coast.

Fishponds were one of the most important traditional resources for the Hawaiian community. Historic maps and images depict the locations of numerous *loko i'a* (fishponds) near Waikīkī and historic documents describe “several hundred” and “innumerable” artificial freshwater fishponds extending a mile inland from the shore (Bloxam 1925:35–36; McAllister 1933:76). These ponds

were considered part of the land, rather than sea, and were therefore not *kapu* during the spawning seasons of certain species. This made the fishponds a consistent source of food year round (Wyban 1992:96).

### 5.15.2 Identified Fish Species

Of the many Osteichthyes (fish) remains collected during the project, eight species were positively identified: 'ō'ili'uwī'uwī (*Pervagor pilosoma* or Fantail Filefish); *uhu* (*Scarus* sp. or Parrotfish) and a sub-species of *uhu* (*Scarus perspicillatus* or Spectacled Parrotfish); *kōkala* (*Diodon holocanthus* or Balloonfish/Spiny Porcupinefish); 'a'awa (*Bodianus bilunulatus albotaeniatus* or Hawaiian Hogfish); *kāhala* (*Seriola* cf. *dumerili* or Amberjack); and two species of *lau-hau*, *lau-wiliwili* (*Chaetodon miliaris* or Milletseed Butterflyfish) and *kikākapu* (*Chaetodon tinkeri* or Tinker's Butterflyfish). These identified species were collected from eight test excavations; the distribution of these species by test excavation is shown in Table 259.

Table 259. Distribution of Identified Fish Species by Test Excavation Unit, Stratum, and Feature Number

Fish Type	T-119A	T-120	T-120A	T-120B	T-124	T-151	T-226B	T-227A
<b>‘ō‘ili‘uwī‘uwī</b> ( <i>Pervagor spilosoma</i> or Fantail Filefish)	SIHP #- 7428, Fe. 1a	SIHP #- 7428, Fe. 4, 5, 6, 7, 8 (5 fish)	Stratum II, SIHP #- 7428	Stratum II, SIHP #- 7428	SIHP #- 2963, Fe. 1	Stratum IIb, SIHP #-5820		
<b>uhu</b> ( <i>Scarus</i> sp. or Parrotfish)		SIHP #- 7428, Fe. 8						
<b>uhu</b> ( <i>Scarus perspicillatus</i> or Spectacled Parrotfish)		SIHP #- 7428, Fe. 5						
<b>lau-wiliwili</b> ( <i>Chaetodon miliaris</i> or Milletseed Butterflyfish)		Stratum II, SIHP #- 7428						
<b>Kikākapu</b> ( <i>Chaetodon tinkeri</i> or Tinker's Butterflyfish)							SIHP #- 2918, Fe. 8	
<b>Kōkala</b> ( <i>Diodon holocanthus</i> or Balloonfish/Spiny Porcupinefish)		Stratum II, SIHP #- 7428						
<b>‘a‘awa</b> ( <i>Bodianus bilunulatus albotaeniatus</i> or Hawaiian Hogfish)		SIHP #- 7428, Fe. 7						Stratum II, SIHP #- 2918
<b>Kāhala</b> ( <i>Seriola</i> cf. <i>dumerili</i> or Amberjack)					SIHP #- 2963, Fe. 5			

**Fantail Filefish (*Pervagor spilosoma* or 'ō'ili'uwī'uwī)**

Family: Monacanthidae

Species: *Pervagor spilosoma*

Common name: Fantail Filefish

Hawaiian name: 'ō'ili'uwī'uwī (Hoover 1993:57; Pukui and Elbert 1986)

The Fantail Filefish (*Pervagor spilosoma*; Figure 50) ranges from 2 to 3 inches up to 24 inches in length and can be identified by its yellow body with black dots, dark brown diagonal stripes on its head, an orange tail, and pale yellow ventral and dorsal fins (Hoover 1993:59; Randall 1996:192; Titcomb 1972:118; and Tinker 1978:480). They often make a small squealing noise if removed from water, which accounts for part of their name: “'uwī'uwī” means “to squeal” (Hoover 1993:59).

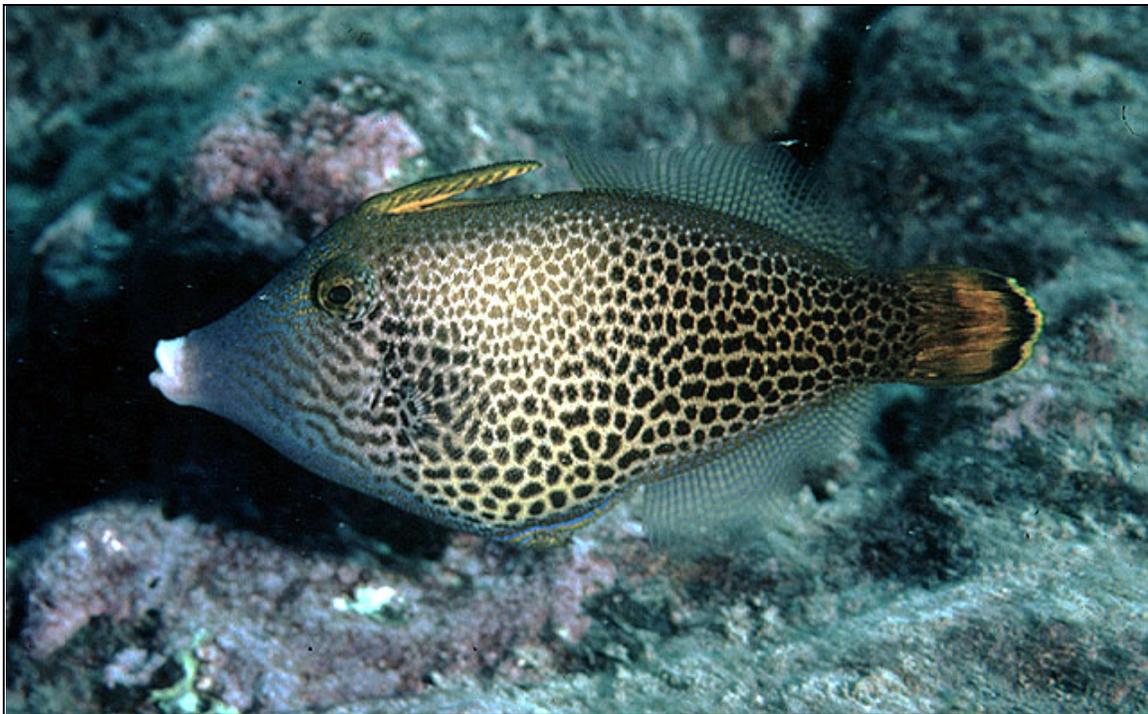


Figure 50. Fantail Filefish (Photo by John E. Randall 2011c)

The habitat of this species is in the deeper waters on the outer edge of the reef. Periodically, usually in the early spring months, the Fantail Filefish appears in shallow water in large numbers, and is sometimes found dead and dry on the beach in great numbers (Tinker 1978:480). There is a Hawaiian saying: “*He i'a pae wale no ka 'uwī'uwī*” which literally translated means: “The 'uwī'uwī is a fish that washes ashore,” which Pukui tells us (1983:70, n. 615) was “said of a ne'er-do-well who goes from house to house and depends on others for his livelihood.” Titcomb states that “the natives believe its [the 'ō'ili'uwī'uwī] appearances to prophesy the demise of some great personage, such as a king or a chief.” (Titcomb 1972:119)

In the spring of 1944, they were observed in great numbers, millions of them all along the beaches of southeastern Oahu. They seemed to be already dead when they floated ashore and piled up on the beaches. This continued for weeks. (Titcomb 1972:119)

Titcomb quotes Kepelino as evidence that these fish were eaten, either raw or broiled after the skin had been removed; and Mrs. Pukui suggested that on Hawai'i island the dry carcasses were collected and used for fuel rather than food (Titcomb 1972:119). The remains of this fish were found in 6 out of 8 test excavations containing identified fish species, and 'ō'ili'uwī'uwī was the most commonly identified species.

**Parrotfish (*Scarus sp. or uhu*)**

Family: Scaridae

Species: *Scarus sp.*

Common name: Parrotfish

Hawaiian name: *uhu* (Hoover 1993:92-93)



Figure 51. Bullethead Parrotfish, a member of the Scaridae family (Directory of Kauai 2013)

The Parrotfish (*Scarus sp.*; Figure 51) ranges in size (depending on species) from 12 to 25 inches in length and their bodies are covered with large scales. Their coloration varies depending on their sex and whether they are in “initial” or “terminal” phase (Hoover 1993:92; Titcomb 1972:148; Tinker 1978:308). Although coloration varies by species, common colors for adult male Parrotfish are orange to purplish on the upper part of the body and green to blue below, and

adult female Parrotfish are purplish red or dark brownish red in color (Tinker 1978: 309). The Scaridae family contains about 80 species that inhabit shallow tropical seas and are principally herbivorous, feeding mostly on marine algae, coral, and other living forms (Tinker 1978:308). In Hawai'i, Parrotfish are known as *uhu*, and are a favorite fish with the Hawaiians, often eaten dried, broiled, or raw (Titcomb 1972: 148). The Parrotfish has a prominent place in many Hawaiian legends and was the most telltale of all fish amongst fishermen, as it was said to reveal what sort of behavior was going on at a fisherman's home (Titcomb 1972: 148).

**Spectacled Parrotfish** (*Scarus perspicillatus* or *uhu*)

Family: Scaridae

Species: *Scarus perspicillatus*

Common name: Spectacled Parrotfish

Hawaiian name: *uhu 'ahu'ula* (initial phase); *uhu uliuli* (terminal phase) (Hoover 1993:94)

The Spectacled Parrotfish (*Scarus perspicillatus*; Figure 52) can grow to 24 inches in length. In initial phase, the Spectacled Parrotfish has a grayish-brown body, with red fins and a red tail with a white band across it. In the terminal phase, it has a blue-green body and fins, with a dark band across its snout (Hoover 1993:95; Randall 1996:146).



Figure 52. Spectacled Parrotfish (Vasconcellos 2009)

**Butterflyfish (*Chaetodon* spp.)**

Two species of Butterfly fish were collected from test excavations, both of the Family Chaetodontidae.

**Milletseed Butterflyfish (*Chaetodon miliaris* or *lau-wiliwili*)**

Species: *Chaetodon miliaris*

Common name: Milletseed Butterflyfish

Hawaiian name: *lau wiliwili* (“leaf of the *wiliwili* tree”) (Hoover 1993:27, 30)



Figure 53. Milletseed Butterflyfish (Photo by John E. Randall 2011b)

The Milletseed Butterflyfish (*Chaetodon miliaris*; Figure 53) ranges from 1 to 6 inches in length and can be identified by its pale yellow body, which is marked by many, small, round, dark spots in vertical rows, with a black band across both the caudal peduncle and around the eye (Tinker 1978:249; Titcomb 1972: 98). In Hawai'i, the Milletseed Butterflyfish is known as *lau wiliwili* because it resembles the leaves of the indigenous *wiliwili* tree (Hoover 1993:27, 30). The Milletseed Butterflyfish inhabits shallow waters and is not a common food source (Randall 1996:101; Titcomb 1972: 98; Hoover 1993:27, 30).

**Tinker's Butterflyfish (*Chaetodon tinkeri*)**

Species: *Chaetodon tinkeri*

Common name: Tinker's Butterflyfish

Hawaiian name: NONE (Hoover 1993:32)

The Tinker's Butterflyfish (Figure 54) is an uncommon species of reef fish named after Spencer Wilkie Tinker (Tinker 1978:252). They were considered endemic to Hawai'i, but have been seen in the Marshall Islands (Randall 1996:104; Hoover 1993:32). Tinker's Butterflyfish are found in calm deep reef edges (below 100 ft) and feed on small invertebrates, plankton, and coral. They are characterized by a white body with a black upper posterior portion and a yellow band through its eye and on its caudal fin (Tinker 1978:252).

Hawaiians had several general names for other types of Butterflyfishes. Some were called *kikākapu* ("strongly prohibited") while others were called *lau-hau* ("leaf of the hau tree") or *lau-wiliwili* ("leaf of the wiliwili tree") (Hoover 1993:26-27). These fish were not often eaten due to the small amount of flesh (Titcomb 1972:88).



Figure 54. Tinker's Butterflyfish (Photo by Hiroyuki Tanaka 2011)

**Balloonfish/Spiny Porcupinefish (*Diodon holocanthus* or *kōkala*)**

Family: Diodontidae

Species: *Diodon holocanthus*

Common name: Balloonfish/Spiny Porcupinefish

Hawaiian name: *kōkala* (Hoover 1993:103)

The Balloonfish/Spiny Porcupinefish (*Diodon holocanthus*; Figure 55), known by its Hawaiian name *kōkala*, is identified by a light tan body marked with several large dark blotches and bars on its back and sides. The *Diodon holocanthus* has very long spines on the top of its head, which helps to distinguish it from other species of Balloonfish (Hoover 1993:103). *Diodon holocanthus* lives in shallow shoreline and reef areas (Tinker 1978:500). Diodontids are generally nocturnal fish that feed on bottom dwellers like sea urchins, mollusks, hermit crabs, and crabs (Tinker 1978: 500; Randall 1996:200-201). When threatened or excited, the *Diodon holocanthus* will inflate with water (or air if removed from the water) to a large, spiny ball (Hoover 1993:99). Diodontids are poor swimmers can be caught at the surface with hand nets (Froese and Pauly 2011).

According to Titcomb (1972), the spines of *kōkala* were regarded as poisonous by some Hawaiians, but the flesh may not have been considered poisonous. One sea god, Kane ko kala, was said to take this form, and those who had Kane ko kala as an *'aumakua* (guardian spirit) threw the fish back if it was caught (Titcomb 1972: 91).



Figure 55. *Diodon holocanthus* (Photo by Robert A. Patzner 2011)

**Hawaiian Hogfish (*Bodianus bilunulatus albotaeniatus* or 'a'awa )**

Family: Labridae

Species: *Bodianus bilunulatus*Sub-Species: *albotaeniatus*

Common name: Hawaiian Hogfish

Hawaiian name: 'a'awa

The Hawaiian Hogfish (*Bodianus bilunulatus albotaeniatus*; Figure 56) is a subspecies not endemic to the Hawaiian Islands. Hawaiian Hogfish belong to the Wrasse (Labridae) family (Hoover 1993:146). Wrasses are speedy, sleek swimmers living near the shoreline in the coral reef. Most wrasses feed on small hard shell invertebrates like crab, sea urchin, hermit crabs, and mollusks (Randall 1996:122). The general Hawaiian name for most wrasses is *hinālea*, but the Hawaiian Hogfish (*Bodianus bilunulatus albotaeniatus*) is called 'a'awa (Hoover 1993:142-143, 146; Randall 1996:125). The species name (*bilunulatus*) means “two crescents,” and the sub-species name (*albotaeniatus*) means “white line” (Hoover 1993:146) The 'a'awa are distinguished differently based on their age and sex. Juvenile 'a'awa are mostly black with yellow on top of their heads and backs. Adult female 'a'awa have light-colored bodies with dark streaks on their heads and fine lines. Terminal males are blotchy purplish gray and are not usually seen in depths less than 50 ft (Hoover 1993:146).

The white meat of the 'a'awa is often broiled or dried. Sometimes it is eaten as a *pupu* after drinking 'awa as an aftertaste (Titcomb 1972:57). Wrasses (*hinālea*) could be kept on hand and would remain healthy if kept in small pools. They could be caught with small nets when the 'awa was ready to be poured. *Hinālea* also were used as offering to the gods (Titcomb 1972:77). Partially decomposed wrasses were an ingredient in a Hawaiian condiment mixed with *kukui* nuts and chili pepper. People who had bad breath were referred to as “a dish of *hinālea* sauce” (Hoover 1993:143).



Figure 56. Adult female 'a'awa (Photo by John E. Randall 2011a)

**Amberjack (*Seriola cf. dumerili* or *kāhala*)**

Family: Carangidae

Species: *Seriola cf. dumerili*

Common name: Amberjack

Hawaiian name: *kāhala* (Hoover 1993:85)

The Amberjack (Figure 57), known by its Hawaiian name *kāhala*, is the largest member of the Jack family (Carangidae). Jacks are large predators that are often found in the deep seaward reefs, but are also known to come inshore to feed on schooling reef fishes. The *kāhala* are silvery fish distinguished with a dark diagonal bar through their eye and a yellow stripe along their side. *Kāhala* may work together to herd their prey. They tend to hunt in the early morning and late afternoon (Hoover 1993:82-85).

According to Titcomb, *kāhala* are often cooked whole in an *imu*, but can also be salted or wrapped in *ti* leaves and baked. They are a deep-sea fish that often required many hooks on one line. There was a proverb reflecting the appreciation for the *kāhala*: “*Poloei a’e la no a ka waha o kāhala*,” meaning, “It went straight to the high chief” (Titcomb 1972:82).



Figure 57. *Seriola dumerili* (Photo by Peter Wirtz 2011)

Table 260. Commercial Fishing Yields (lbs) for Select Species, as Reported by Jordan and Evermann (1903:761-765)

	<i>uhu</i>	<i>lau-hau</i>	<i>'a'awa</i>	<i>kāhala</i>	All Commercial Fish
Hawai'i	809	3,331	900	40,776	1,304,311
Lana'i	-	-	180	5,300	212,628
Maui	875	2,008	1,516	9,686	1,159,117
Moloka'i	5,674	2,065	1,205	2,148	376,255
O'ahu	10,505	110	5,921	3,915	2,737,198
Total All Islands	17,863	7,514	9,722	61,825	6,222,455

### 5.15.3 Marine Resource Exploitation Patterns

Jordan and Evermann (1903) reported on the commercial fisheries of the Hawaiian Islands, and included tables detailing the yield of the fisheries in 1900, by island and species. They included over 100 species of fish and other marine resources and reported the yield by both weight (lbs) and value (U.S. dollars).

The identified species collected from test excavations originated from buried cultural layers and discrete features, and occurred in small amounts. All of the identified species are fish that can be found in the inshore-reef zone almost exclusively (with the exception of the Amberjack, which occasionally frequents the reef zone to hunt). This assemblage seemed to indicate small scale subsistence level exploitation of the local marine resources.

As a rough comparative exercise, those species collected and identified by the project were extracted from the Jordan and Evermann (1903:761-765) tables (Table 259 and Figure 58), and compared to the species distribution encountered by the current project. This comparison was achieved by converting weights (lbs) of the commercial yields, and counts of the number of instances of species finds, to percentages of the total (Figure 59). As expected, the distributions are contradictory, supporting the hypothesis that the assemblage collected by the project represents small scale subsistence level exploitation of the local marine resources, rather than participation in the historical faunal remains (fish and pig) collected from the base of the historically documented commercial fishing industry.

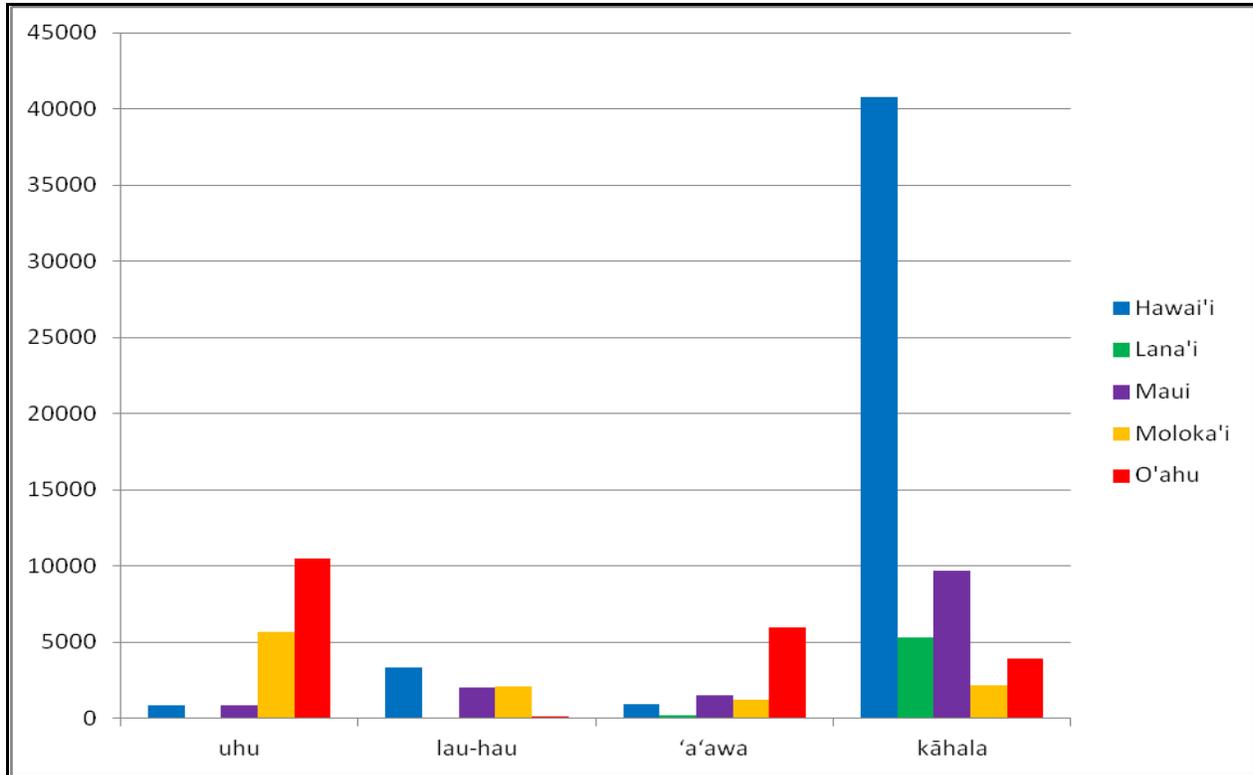


Figure 58. Yields (lbs) of four select species, by Island, as reported by Jordan and Evermann (1903:761-765)

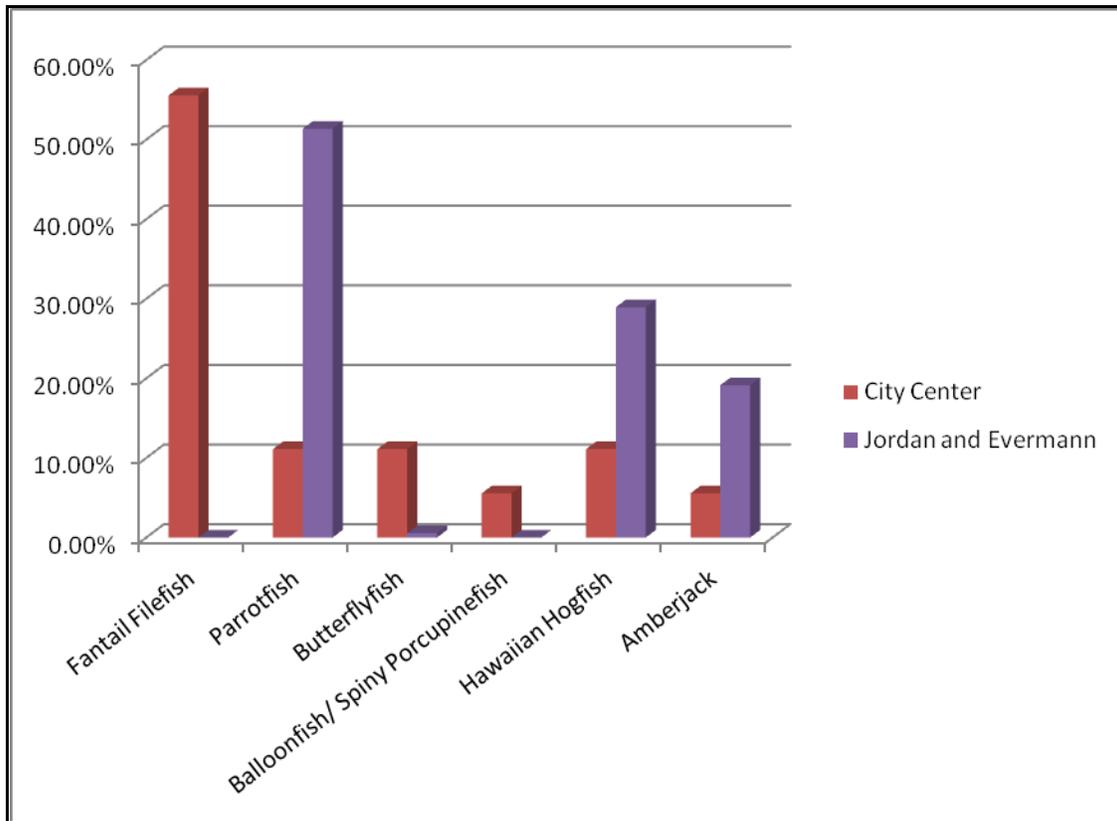


Figure 59. Species comparison of the percent of finds\* to percent of yield between HHCTCP City Center (Section 4) assemblages and Jordan and Everman (1903) tables

\* Project Parrotfish species were counted together and compared to *uhu*; Project Butterflyfish species were counted together and compared to *lau-hau* (the only listed species of Butterflyfish); and Jordan and Evermann (1903) do not list Fantail Filefish (*‘ō‘ili‘uwī‘uwī*) or Balloonfish/ Spiny Porcupinefish (*kōkala*) as commercially exploited species.